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Attachment

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

FOREWORD

APPROVAL SHEETS

DISTRICT ROADS COORDINATION COMMITTEE

1	Mr. Lal Kumar K.C	: DDC Chairperson	: Chairperson
2	Mr. Chok Bdr Dahal	: Mayor, Bhimeshwar Municipality	: Member
3	Mr. Ganesh Bdr Shrestha	: DDC Member	: Member
4	Mr. Bharat Bdr K.C	: DDC Member	: Member
5	Mr. Kashi Nath Pokharel	: DDC Member	: Member
6	Mr. Dinesh Raj Shivakoti	: DDC Member	: Member
7	Mr. Kumar Khadka	: DDC Member	: Member
8	Mr. Madav Prasad Upreti	: DDC Member	: Member
9	Mr. Ishwar Chandra Pokharel	: DDC Member	: Member
10	Mr. Rhishikesh Upreti	: DDC Member	: Member
11	Mr. Parbat Gurung	: DDC Member	: Member
12	Mr. Dal Man Thami	: DDC Member	: Member
13	Ms. Harka Maya Jirel	: DDC Member (Women representative)	: Member
14	Mr. Ambika Gole	: DDC Member	: Member
15	Mr. D.B Basnet	: DDC Member	: Member
16		: Representative (District Federation of Industry and Commerce)	: Member
17		: Party Representative (Nepali Congress)	: Member
18		: Party Representative (RPP)	: Member
19		: Party Representative (CPM- ML)	: Member
20	Mr. Rajendra Neupane	: District Engineer /DRSP	: Member
21	Mr. Gopi Krishna Khanal	: Local Development Officer	: Member
			Secretary

DISTRICT TECHNICAL TEAM

1	Mr. Rajendra Neupane	: Engineer/DRSP
2	Mr. Narayan Shiwakoti	: Overseer/DRSP
3	Mr. Kishor Shrestha	: 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
LDF	Local Development Fund
LDO	Local Development Officer
LGP	Local Governance Programme
LRCC	Local Road Coordination Committee
MoLD	Ministry of Local Development
msl	Mean 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
VDC	Village Development Committee
YPO	Yearly Plan of Operation

1. INTRODUCTION

1.1 Background

Dolakha district is located in the middle hills in the Central Development Region of Nepal. It borders with Tibet (China) in the north, Ramechhap and Solukhumbu districts in the east, and Sindhupalchok district in the west and Ramechhap district in the south. The district headquarters at Charikot has access to Arniko Highway by a single-lane blacktopped Lamosangu-Jiri Road. Lamosangu-Jiri Road was constructed with the financial and technical assistance from the Government of Switzerland during the 70's. This road has provided a base for the socio-economic transformations of Dolakha district.

Dolakha district is predominantly rural with an average population density of about 79.1 persons per square kilometre in 1991. The district belongs to one of the least populated districts in the country. Charikot, the district headquarter, is the largest urban centre in the district with population of 1,190 (projected for the year 2000). The annual population growth rate is 2.5 %. Whilst the average literacy rate (six years and above) is about 47.63 % only and about 27.38 % of the women are literate. The general information of the district is presented in table 1.1

General Information of the District

Population 2000	217,218
Population growth % Per annum (1991-2000)	2.50 %
Regional /Urban centre	Kathmandu
Length of existing roads (km.)	173.3
Road density (pop/length of existing roads)	1253
Area of district (sq.km)	2144.4
Area of Agricultural land (sq.km)	507.8
Road density (area of agricultural land/length of existing road)	2.93
Area of forest/scrub land (sq.km)	861.6
Area of grassland (sq.km)	135.6
Area of remaining land (sq. km)	639.4

Source: Digitised Data, DRSP, May 2001, Periodic Plan, DDC Dolakha, 2000 and Record on Nepalese Development: Nepal District Profile, 1999

TABLE 1.1

The total area of the district is 2,144.4 sq. km¹. The distribution of the land resource base indicates that about 40.2 % of total area (861.6 sq. km.) is under forest/scrub and about 23.7 percent of total area (507.8 sq. km.) is under agriculture.

Based on annual population growth of 2.50 percent, it has been estimated that the district had population of 217,218 during 2000.

Swiss Agency for Development and Cooperation (SDC) has been involved for more than two decades in this district and has made substantial financial contribution and commitments. In addition to DRSP there are other ongoing projects funded by SDC in Dolakha district. DRSP has given a high priority for the construction of new roads and maintenance of existing roads. It is implementing road construction programme in collaboration with the Food for Work Programme.

The DDC of Dolakha 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

¹ This finding is based on the data digitised with the use of AutoCAD software and compiled with the use of Arc View GIS software version 3.2 at DRSP office.

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).

During the Programme Orientation and Vision Sharing Workshop in December 1999, Dolakha, 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/N) 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 Dolakha district is lack of adequate transport infrastructure. The objective of the District Transport Master Plan (DTMP) and District Transport Perspective Plan (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. This is done through developing a sustainable road network that reduces the aggregate transportation cost and minimises the environmental impacts.

The DTMP will provide the fundamental base for planning and implementation of the construction of new district roads in Dolakha district over a period of five years starting from the fiscal year of 2001/2002 to 2005/2006. The plan recommends roads that have a high priority for construction in the district. This includes roads, which link the district with other districts or with strategic road network in the country. The DTPP reflects the perspective plan of the district over the next 20 years. It is expected that these plans will provide HMG and donors a rational basis to decide on future investments towards the improvement of the district transport situation.

The implementation of the DTMP / DTPP will also minimise the current ad-hoc practices of investing on roads based on short-term considerations. This is especially crucial due to high demand for rural roads and the shortage of funds for their construction.

1.3 Methodology

The different phases and procedures of the methodology for preparing the DTMP and the DTPP are elaborated in Volume I "Methodology", which is an integral part of the Dolakha DTMP/DTPP. It describes in detail the individual steps of the planning cycle and provides the basis for prioritisation and decision-making. The DRCC of Dolakha district has approved the methodology and particularly the scoring system 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 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 in Table 1.2

Chronology of events in DTMP/DTPP development

Date	Achievement	Participants/ Ownership	Remarks
October 1999	Formation of District Road Coordination Committee (DRCC)	DDC Dolakha DRSP/PSU	Workshop in Dolakha
November 1999	Hire of District Technical Team (1 engineer and 2 overseers)	DDC Dolakha	
December 1999	Dolakha 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 to March 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 Dolakha
May to October 2000	Collection of data and analysis of individual road corridors. <ul style="list-style-type: none"> • 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 Dolakha and Kathmandu
September 2000	Development and approval of scoring system. Finalisation of criteria for prioritisation.	DRCC DRSP/PSU	Workshop in Dolakha
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 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

Date	Achievement	Participants/ Ownership	Remarks
March 2001	Presentation of guidelines for the preparation of DTPP to the VDCs	All VDC Chairman of the district Ilaka Members DDC/DRCC DRSP/PSU	Workshop in Dolakha
April 2001	Collection of proposal from VDCs for DTPP	Vice-Chairman VDC Chairman Ilaka Members MP	Workshop in Dolakha
April-June 2001	Final editing of approved DTMP/DTPP		DRSP/PSU
April 2002	Presentation of DTMP findings to DDC, DRCC	DDC/DRCC	Workshop in Dolakha
	Approval of Draft DTMP by DDC	DDC/DRCC	DRCC Meeting in Dolakha
	Endorsement by DoLIDAR	DoLIDAR	Kathmandu
	Approval of Draft DTMP and DTPP by the District Council.	DDC DRSP/PSU	District Council Meeting in Dolakha
	Endorsement by MoLD Endorsement by NPC		

TABLE 1.2

2. DISTRICT INVENTORY/ DISTRICT PROFILE ANALYSIS

This chapter provides a general overview of Dolakha district. Emphasis has been given to issues related to transport development 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 is located between the northern latitudes of 27°28' and 28°0' and the eastern longitudes of 85°50' and 86°32'. Dolakha district is approximately 132 km north-east of Kathmandu, and 141 km north from Janakpur, the zonal headquarter. Bhimeshwor Municipality is the district headquarters situated at Charikot Bazaar lies at an altitude of 1,970 above mean sea level (msl). The district borders through Tibet (China) in the north, Ramechhap and Solukhumbu districts in the east, Sindhupalchok district in the west and Ramechhap district in the south.

2.1.2 Geo-Physical Aspects

The district lies mainly in the hills and mountain between Mahabharat Lekh and lesser Himalayas. The altitude ranges from 762 m to 7,183 m above msl 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. About 35 percent of the area of the district lies in the high Himalaya, while the remaining 40 and 25 percent are located in high and mid mountain region respectively.

2.1.3 Political Division of the District

The district is divided into two electoral constituencies dividing the north and south half of the district. There are 51 Village Development Committees (VDCs) and one municipality distributed in 11 Ilakas.

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 Tamakoshi river. The climate is sub-tropical in the middle mountain and cool in the high mountain region. Some of the mountain peaks located in the district are Meungse (7,183 msl), Gaurishankar (7,148 msl) and Chobha-Bhamare (5960 msl). Dolakha district is characterized by heavy rainfall. The average annual rainfall in the district is 2,348 mm.

2.2 Economic Activities

Agriculture is the major source of income and employment in the district. The agriculture alone provides employment for over about 63.83 percent of the economically active population.

Porters carry commodities from Charikot, Dolakha Bazaar, Mainapokhari, Jiri and Kirne (Ramechhap district) to different areas of the district.

The economy of the district is supported by formal sector employment like teaching, civil service, and by informal sector employment like agricultural labor, porter and remittance from seasonal migration to Kathmandu, Terai and Indian cities for non-farm labor.

2.3 Demographic and Social Characteristics

2.3.1 Demography

According to the latest population census (i.e.1991), the total population of the district was 173,236 with 84,825 male and 88,411 female population. There are about 35,826 households and settlements randomly scattered over the district. The average household size is 4.8. The average

population density is 79.1 inhabitants per sq.km. The overall demographic dynamics of the district is presented in Table 2.1. According to DDC record, about 63.83 % of the total economically active population is directly or indirectly engaged in agriculture. Of the total economically active population a significant number (about 18 percent) are engaged in off-farm/non-farm laboring for their sustenance.

Demographic Characteristic of the District

Characteristics	1981 census	1991 census	2000 (DDC Source)
Total population:	150,576	173,236	217,218
Male	74,910	84,825	109,369
Female	75,666	88,411	107,849
Economically active population	72,155	86,956	138,648
Male	45,033	42,531	62,392
Female	27,122	44,425	76,256
Total households	28,848	35,826	39,791
Average household size	5.2	4.8	5.4
Population density per sq. km	68.7	79.1	101.3

Source: Record on Nepalese Development- Nepal District Profile, 1999 & Dolakha DDC Information Centre

TABLE 2.1

A review of population in the district suggests that the population density is considerably lower in the northern area of the district in the high hills and mountain region in comparison to the middle hills.

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. The Relative Indicators of Development for the year 1997 has shown that the district has a rank of 23 out of 75 districts for Deprivation Index, while it ranks 72 for per capita food production. From the perspective of infrastructure development it is ranked as 27th. The study done by ICIMOD (1995) indicated that more than 75 per cent of the total households in the district are still unable to produce sufficient food from their own-farm resources, and about five percent of the households 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 seek employment as daily wage-workers and as porters within and outside of the district for their seer survival.

2.3.3 Health Aspects

Throughout the district people still consult traditional healers. The services of health posts and the hospital are used only in serious cases. The district hospital is located at Jiri and a national level Epilepsy Hospital, which is also known as Primary Health Care Centre, under the support of Korean Government is located at Dolakha Bazaar. In addition, there is one health centre at Charikot bazaar and 10 health posts, 43 sub-health posts and 3 Ayurvedic dispensaries located in different VDCs of the district. According to DDC record for 2000, one doctor in the district provides services to 72,405 people, one hospital bed is shared among 7,758 people and one paramedic provides services to 2,858 people. Out of 39,791 households only 12,694 households use toilets, which is only 31.9 % among the total households.

According to the District Information Centre about 6.4 % of the total population or 13,808 people are living in the distance of more than one hour to reach to health service facilities. Looking at the present health situation and available facilities of the district, the health services available are far below the peoples' demand and requirement.

2.3.4 Religious Activities

Famous religious spots like Bhimeshwor Temple and Kalinchowk Bhagawati are located in this district. Thousands of pilgrims travel to Kalinchowk and Bhimeshwor temples every year. The district has the potential of developing domestic tourism. Hinduism is the dominating religion of the district, religiously, 71.05% population are Hindu, 28.59 % are Buddhist and 0.36 % of others religions.

2.4 Service Centres and Services

2.4.1 Overview

The main service centres are the places, which provide most of the economic facilities and public and private services to the population of the district. They have been identified based on the criteria outlined in Chapter 3.7.3 of Methodology (Vol. I).

Charikot is the district headquarter and the main market centre of the district. After the construction of Lamosangu-Jiri road the Charikot market grew up rapidly. Its population was about 1190 during 2000. Most of the government offices, the hospital and schools and campus are located here. The majority of the population from the district visit Charikot for official as well as for personal reasons. Commodities are exported and imported to and from different VDCs of the district to Charikot. Other service centres are scattered over the district. The population of different service centres are shown in table 2.2 (refer to map 2).

Main Service Centres

Main Service Centres	Household & Population (2000)	
	Household	Population
Charikot	248	1190
Dolakha	140	672
Melung	22	106
Deurali (Bagkhor)	100	540
Chhaunde (Japhe)	16	77
Jiri	121	581
Pikhuti (Sunkhani)	41	197
Tamakoshi (Nayapul)	66	317
Singati	86	413

Source: Annex 3.3.1

TABLE 2.2

The population distribution at market centres indicates that the bigger market centres are Charikot, Dolakha, Jiri, and Singati. Jiri has a STOL airport but air services to Jiri do not operate any more.

Charikot (including Dolakha Bazaar) and Jiri bazaar have a telephone service. In addition, VHF telecommunication services are operating in some places. This is far below the public demand in the district. The only alternative to telecommunication service is the postal service. There is one District Post Office at Charikot Bazaar, 9 Ilaka Post Offices and 44 Additional Post Offices scattered over the district.

2.4.2 Description of Main Service Centres

The distribution pattern of settlements and service centres indicate that most of the plain areas and riverbanks have a dense settlement and population distribution due to favorable land use pattern, agricultural production, infrastructure development and other socio-economic factors.

The construction of Lamosangu-Jiri road has promoted the growth of market centres at Thulopakhar, Charikot (district headquarter) and Jiri. Other smaller service centres located on this road are Nayapul and Khawa. Due to lack of accessibility in other areas of the district, permanent market centres are not well developed and articulated. They are scattered in the district. These are Dolakha, Singati, Gumkhola Bazaar, Maina Pokhari (Kabhre), Deurali Bagkhor and Melung (refer to map 2).

Charikot

Charikot is the district headquarter of the Dolakha district with the total population of 1190 and 248 households. The majority of the government services are located within the Charikot market. It has a direct access to Kathmandu valley through Lamosangu-Jiri strategic road that connects with the Arniko Highway. It is the main market centre for the entire district from where household commodities are exported to other parts of the district.

Jiri

Jiri is the second largest market/service centre of the district, after Charikot. With a large permanent market, Jiri has many governmental and non-governmental services like District hospital and a technical school.

Dolakha

This is the traditional and historical market centre of the north-eastern part of the district. Bhimeshwor temple located in this place attracts tourists from different parts of the country. The total population of Dolakha is about 672. The only Epilepsy hospital of the country is situated here. The centre has services like post office, police post, public telephone etc.

Singati

Singati and Pikhuti (Gumukhola) market centres are located on the proposed Dolakha-Singati road corridor. They are prominent market centres for the population of northern Dolakha (refer to map 2). It takes 45 minutes by foot to reach Singati from Pikhuti. They are located on the western bank of river Bhotekoshi and Tamakoshi.

Singati market is located at the converging point of river Tamakoshi and Bhotekoshi. These market centres have a large catchment area consisting of 14 VDCs. People from these VDCs are dependent on these markets for selling and purchasing different commodities. Porters carry commodities required for daily consumption to these market centres.

Maina Pokhari (Kabhre)

Maina Pokhari market/service centre is the starting point of the Siddhakothan-Jugu-Singati road corridor. This market is located on the Lamosangu-Jiri road. All goods required for household consumption are imported from Kathmandu. The market provides service to population from 6 VDCs located north of the Lamosangu-Jiri road and from 3 VDCs located south of the road. Farmers used to sell their farm products, vegetables, fruits, cash crops etc. at the market. The market also has hotels, grocery stores etc.

Deurali (Bagkhor)

Maga Deurali market/service centre is at the intersection of Mude-Deurali and Deurali-Melung-Sitali road corridors. The market provides service to population from 10 VDCs of Dolakha, 6 VDCs of Ramechhap and 2 VDCs of Sindhupalchowk district. Farmers used to sell their home products like fruits, vegetables, cash crops etc. at this market and buy their daily consumption goods. The market is open throughout the week. Daily consumption commodities are imported to this market from Kathmandu. This market also has hotels, school, government offices etc. Tourists and people from 6 VDCs of Ramechhap district have to pass through this market for visiting a religious place called Shailungeshwor.

Melung

The market/service centre at Melung is located on Deurali-Melung-Sitali road corridor. The market is open throughout the week and also has a weekly market on Wednesday. It provides service to population from 16 VDCs from Dolakha and Ramechhap district. Essential goods are carried for 10 km. from Milte Khola located on Nayapul-Manthali road. The market has facilities like school, bank, police post, government offices, telecommunication service, grocery stores etc.

Chhaunde

Chhaunde is the market/service centre located on the eastern region of the district at the intersection of Khawa-Chhaunde and Bhirkot-Chhaunde road corridors. The daily essential goods are transported to Chhaunde either from Khawa, a market on Lamosangu-Jiri road, or from Bhirkot, a market on Nayapul-Manthali road, or from Malukhola, located on the Nayapul-Manthali road. A weekly market held every Wednesday provides service to the population from 8 VDCs of Dolakha district and 3 VDCs of Ramechhap district. People from these VDCs travelling to Kathmandu or to Manthali, the district headquarter of Ramechhap district pass through this market. This market has services like schools, health post etc.

2.5 Existing Transport Situation (Roads, Trails, Bridges)

2.5.1 Accessibility

Dolakha district as a whole is moderate in terms of transportation and communication infrastructure among the other hilly districts of Nepal. The details of the road networks existed within the district is summarised in Table 2.3.

Inventory of Existing Transport

Transport Linkage	Reference No.	Total Length (Km)
Lamosangu-Tamakoshi-Ramechhap	F32	68.0
Tamakoshi-Jiri	F33	38.0
Jiri-Those	22A032R	11.1
Deurali (Bagkhor) – Dande Khola	22A001R	14.0
Nigale - Simte	22B006R	10.7
Bhirmuni - Ghaledanda	22B009R	7.1
Nigale - Sano Dhading	22B010R	5.0
Mude - Deurali (Bagkhor)	22A011R	15.5
Nigale - Surke	22B012R	3.0
Deurali - Maga	22B013R	7.6
Maga - Mathillo Mati	22B014R	8.5
Mati - Sunkhanidanda	22B015R	2.0
Dangalpu - Phasimai	22B016R	2.5
Namdu - Marbu	22B017A	6.0
Charikot-Dolakha bazaar	22A018R	4.5
Charikot - Deurali	22B019R	8.0
Dolakha - Singati	22A021R	28.0
Sunkhani - Liptun	22A023R	5.0
Siddhakothan – Kaphle	22A029R	5.0
Khawa - Chhaunde	22A034R	18.3
Bhirkot -Setpahara	22A036R	9.8
Maina Pokhari - Khatrigau	22B038R	4.0

Source: Annex 3.01

TABLE 2.3

Out of the total 51 VDCs only 14 VDCs have access to motorable roads and about two-thirds of the total households have to walk for at least six hours to reach the road head. At present the district has 86.06 km, 20.50 km and 73.00 km of blacktopped, gravel and earth roads respectively.

The socio-economic activities still largely depend on trail-based transport and communication system depending on main and mule trails. Main trails provide access to the substantial region of the district, serve a larger number of pedestrian and porters and are longer in length. These are all-weather trails and mules are occasionally used for transportation on these trails.

2.6 Agricultural Profile

Agriculture is the main source of income in the Dolakha district and about 93% of the population are dependent on it for their livelihood.

Following the land use analysis of the district (refer to map 6) the existing land resource base in the district has been broadly divided into cultivated land, forest/shrub, grassland and others. Distribution of the land resources among these categories indicate that forest covers most of the area of the district (40.2% or 861.6 sq. km.) followed by cultivated land (23.7% or 507.8 sq. km.) and grassland (6.3% or 135.6 sq. km), based on the topographic map of 1996. The total district area is 2144.4 sq. km.

The agriculture production system is subsistence in nature and market integration is very limited. A review of irrigation facilities in the district indicates that only about 9.5 percent of the total cultivated land is under perennial irrigation system (Table 2.4). Although there are many sources of water, expansion of irrigation infrastructure in the district is quite difficult due to remoteness and difficult terrain. It is very well known that without irrigation facilities it is virtually impossible to accelerate agricultural production and productivity.

Irrigation Status of the District

Description	Area (ha)
Total cultivate land	78,998
□ Area under permanent irrigation systems	
-Government Schemes	1,125
-Local/Community Schemes	1,896
□ Area under partially irrigation systems	4,796
-Government Schemes	1,662
-Local/Community Schemes	2,823
□ Rainfed /Cultivating Area with out irrigation	67,696

Source: Agricultural Development Office, Dolakha

TABLE 2.4

Lack of irrigation facilities for the winter crops is still perceived to be a major constraint 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. Mono-cropping with paddy is an overwhelming practice on rain-fed khet land.

Potato constitutes one of the major food components of the people. It is usually cultivated at high altitude and middle mountain belt of the district. Potato production in the district is sufficient for local use as well as for the export to neighbour district as an extra income to farmers. However, due to lack of transportation facilities it could not have been materialised. Villages along the Lamoshanghu-Jiri roads including Bhimeshowar municipality, Namdu, Bhedpu, Melung, Jiri are

known for market oriented vegetable production. Those areas are also important from the prospect of dairy development.

Livestock raising is the second important occupation of the people of Dolakha district. Cows, buffaloes, sheeps, goats, and yaks are the major sources of income of the people. In the northern high altitude of district most of the people are engaged in raising yaks. Yaks are used for meat purpose and their milk is used to produce butter, cheese, and ghee that are well known throughout the country. Although, cheese is the most potential source of income, people are not in a position to improve it basically due to lack of transportation facilities to export in the market centres.

The experience has shown that Dolakha district is suitable for the production of Citrus fruits like orange, lemon, Jyamir, peaches, and pears. If the transport infrastructure could be provided to the areas of the fruit farming, it will certainly contribute adequate to the income to the people and improve the economic condition of the district as a whole. Pawati, Fasku, Sunkhani, Sundrawati VDCs are known for fruit production.

Different types of medical herbs are also 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 main 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.

2.7 Industrial Profile

There are only few industrial activities of any significance within the district. According to the record of District Cottage Industry Board, about 700 industries are registered. Amongst them, the maximum numbers of industries are related to agro-based industry (268) followed by service related industries (283). Other registered industries are forest-based (73), tourism industry (10) and mine based industry (9). More than 300 unregistered industries are under operation in the district. The major ones are rice mills, construction works, carpet, noodles, water turbines, *Radi/Pakhi* weaving, pottery, knitting and sewing, wood carving and carpentry. All of these industries are mainly concentrated in the main market centres. Black smiths and gold smiths are scattered over the district.

According to the district development plan of FY 056/57, the total numbers of the operational industries beside hotels are summarized in Table 2.5.

Details of the Existing Industries

Type of Industry	Numbers	Percentage
Agro-based	78	33.48
Construction Works	59	25.32
Carpet/ Radi-Pakhi	28	12.02
Noodles	19	8.15
Water Turbines	18	7.72
Bakery	16	6.87
Knitting and sewing	15	6.44
Total	233	100

Source: District Development Plan / Local Governance Programme, 1999

TABLE 2.5

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-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 considerably to the extent that people from the hill districts cannot afford to settle there anymore. However, after the opening of Lamosangu-Jiri roads in late seventies seasonal migration to Kathmandu valley in search of jobs and other opportunities has considerably increased.

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. After the construction of Lamosangu-Jiri road, transportation cost has substantially reduced subsequently leading to an increased use of fertilizers above the national average. After the opening of the road, the import of commodities required for household has increased substantially compare to the export. This is primarily due to the location of agricultural pockets at more than half day walking distance from the road network. The transport cost of portering the surplus production from the production area increases as the distance increases from the road head due to distance decay functions.

2.9 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 Dolakha in April 2000. A total of ten road corridors were proposed as a new construction during the workshop to include in the study of District Transport Master Plan (DTMP). During the regional synchronisation workshop in December 2000 in Kathmandu 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 4):

Proposed DTMP Roads

Transport Linkages / Corridors	Reference No.	Proposed for	Total (km)	Existing * (km)
Deurali (Bagkhor) -Melung-Sitali	22A001R	New Construction	44.0	14.0
Nayapul-Pawati	22A005A	New Construction	12.6	-
Deurali (Bagkhor) -Dudhpokhari	22A007R	New Construction	15.4	-
Mude-Deurali (Bagkhor)	22A011R	Rehabilitation	15.5	15.5
Dolakha-Singati	22A021R	New Construction	32.0	28.0
Sunkhani-Sangwa	22A023R	New Construction	30.0	5.0
Singati-Lamabagar	22A026R	New Construction	28.0	-
Siddhakothan-Jugu-Singati	22A029R	New Construction	32.0	5.0
Jiri-Mali-Shyama	22A031R	New Construction	23.0	-
Khawa-Chhaunde	22A034R	Rehabilitation	18.3	18.3
Bhirkot-Chhaunde	22A037R	New Construction	18.8	-
Busti-Putalikath	22A040A	New Construction	12.1	-

* The existing roads are of varying standard

Source: Annex 3.01

TABLE 2.6

The DRCC meeting also recommended to upgrade/rehabilitate Mude-Deurali (Bagkhor) and Khawa-Chhaunde road corridors during the DTMP period.

Dolakha DDC has given a high priority for the construction of roads that will constitute a ring road around the district. Six roads that make different sections of the ring road are Dolakha-Singati, Mude-Deurali (Bagkhor), Deurali (Bagkhor)-Melung-Sitali, Bhirkot-Gairimudi-Chhaunde, Khawa-Chhaunde and Siddhakothan-Jugu-Singati (refer to map 4). The construction of these roads will provide access to main market centres, areas with high agricultural resource base and the main trading routes. Out of these roads Mude-Deurali (Bagkhor) and Khawa-Chhaunde are the existing roads while the others are recommended for new construction. The other six road corridors proposed for DTMP are; Nayapul-Pawati, Deurali (Bagkhor)- Dudhpokhari, Sunkhani-Sangwa, Singati-Lamabagar, Jiri-Mali-Shyama, and Busti-Putalikath which are not part of the ambitious ring road concept.

Based on the general assessment of the proposed road corridor a brief description of each road linkage is presented on the following section.

Deurali (Bagkhor)-Melung-Sitali

The DDC has proposed the new road corridor from Deurali (Bagkhor) to Melung, one of the main service/market centres of the district. The extension of this road corridor to Sitali will provide access to Nayapul-Manthali road. This road corridor provides service to population residing on the southern region of Dolakha district and also the population from Ramechhap district. The total length of this road corridor is 44.0 km and 14.0 km has already been constructed with the use of the bulldozer.

Nayapul-Pawati

The proposed Nayapul-Pawati road corridor will provide access from Pawati to the service/market centre at Nayapul (Tamakoshi). The total length of this agriculture road is about 12.6 km. The construction of this road corridor will provide access to the major agricultural producing areas to the market centre at Nayapul (Tamakosi), which is linked with the Lamosangu-Jiri and Lamosangu-Ramechhap strategic road.

Deurali (Bagkhor)-Dudhpokhari

The proposed Deurali (Bagkhor)- Dudhpokhari road corridor will connect the two service/market centre from Deurali to Doramba. The total length of this rural road is about 15.4 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 the service/market centre. Further this corridor will also improve access to Sailungeswor, one of the potential sites for tourism of the district.

Mude-Deurali (Bagkhor)

This is an existing road corridor that extends from the service/market centre at Mude to the other service/market centre at Deurali (Bagkhor) (refer to map 4). This corridor links with the Lamosangu-Jiri strategic network at Mude that provides better access to export agriculture products from the remote VDC. The total length of this road corridor is 15.5 km.

Dolakha-Singati

This is one of the most important road corridors in the context of Dolakha district that links the northern part of the district to the district headquarter and other service/market centres. It provides access to the service/market centre at Singati (refer to map 4) from Dolakha Bhimeshwor located 6 km from Charikot, the district headquarter of Dolakha district. Singati is located on northern region of the district on the left bank of river Tamakosi. The total length of this proposed rural road is about 32 km. A total of 28 km road has already been constructed with the support provided by the RCIW project.

Sunkhani-Sangwa

The proposed Sunkhani-Sangwa road corridor will connect remote VDC located at north-west to the main service/market centre Dolakha and Charikot. The total length of the proposed rural road is

about 30.0 km and 5.0 km of road from Sunkhani to Liptun has been already constructed. The construction of this road corridor will provide better access to export agriculture product to the main service/market centre of the district. The major local agro-based products of the area are potato, herbs and amriso. There is also a slate mine in the Alampu VDC, which could be a major income source of the people. Further this corridor will also provide access to the existing and potential hydropower site of the district.

Singati-Lamabagar

The total length of the proposed Singati-Lamabagar road corridor is about 28.0 km. This road corridor will link the far-north area of the district to Singati, one of the service/market centres of the district. This route is a major gateway to the potential tourist site like Melungse and Gaurishankar Himal and will promote the tourism business within the district. 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. The construction of this road corridor will provide access to the potential hydropower site and religious centre at Lamabagar.

Siddhakothan–Jugu–Singati

This road corridor provides access to the small service/market centre at Siddhakothan located in Kabhre VDC from the service/market centre at Mainapokhari located on Lamosaghu-Jiri strategic road. Siddhakothan is on the right bank of river Tamakosi and has access to Singati service/market centre. The total length of this proposed rural road corridor is 32 km and 5 km is already been constructed. The construction of Siddhakothan-Jugu section of the above road corridor is being carried out under the RCIW project.

Jiri-Mali-Shyama

The proposed Jiri-Mali-Shyama road corridor will connect remote VDC located at eastern side of the district and other VDC of Ramechhap district to the main service/market centre at Jiri. The total length of the proposed rural road is about 23.0 km. This route is a major gateway to the tourist visiting to the Mount Everest. Therefore, it is one of the most important road corridors from the tourism aspect for the district. The construction of this road corridor will provide better access to export agriculture product to the main service/market centre Jiri of the district and further it can be exported to Kathmandu valley. The major local agro-based products of the area are potato, herbs (Lokta) and dairy farming.

Khawa-Chhaunde

Khawa-Chhaunde road corridor is one of the existing roads of the Dolakha district. This road corridor provides access to the service/market centre at Chhaunde from Khawa. Chhaunde is situated at Japhe VDC on the south-eastern region of the district that has a direct link to Lamosangu-Tamakoshi-Ramechhap road. On the other hand Khawa is located on the Lamosangu-Jiri road. Therefore, this road corridor is very important of the people residing in the influence zone of road to export agriculture products to the service/market centre. Khawa is a distribution centre for commodities transported to Chhaunde. The total length of the existing road corridor is about 18.3 km.

Bhirkot-Chhaunde

This proposed road corridor is a component of the ring road. It provides access to the service/market centre at Chhaunde from Bhirkot located on Tamakoshi–Manthali strategic road. The Tamakoshi–Manthali strategic road links the district headquarters of Ramechhap district with Tamakoshi (Nayapul) located on the Lamosangu-Jiri strategic road (refer to map 4). The total length of this proposed road corridor is 18.8 km.

Busti-Putalikath

The proposed Busti-Putalikath agriculture road corridor will connect the main agriculture pocket area to the main service/market centre at Tamakoshi (Nayapul). The total length of the proposed

road corridor is about 12.1 km. In the absence of the access to the service/market centre the farmers are forced to carry their agriculture products by themselves to the service centre. The construction of this road corridor will provide better access to export agriculture product to the main service/market centre Tamakoshi of the district and further it can be exported to Kathmandu valley. The major local agro-based products of the area are potato, sweet orange, sugarcane, herbs and vegetables.

3. INDICATORS FOR DISTRICT TRANSPORT PLANNING

As mentioned in Methodology (Volume 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 Dolakha district have been compiled in Table 2.3. The ranking of individual road corridors was done following the approved scoring system.

3.1 Demography

Following the 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 thematic map (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	OZI	Score		Total Score IZI+OZI	Transformed Score (10)
				(Pop/km)	(Pop/Km)	IZI (6)	OZI (4)		
Busti-Putalikath	12.1	3,484	0	289	0	0.6	0.0	0.6	0.1
Bhirkot-Chhaunde	18.8	5,316	0	283	0	0.5	0.0	0.5	0.1
Deurali (Bagkhor)-Dudhpokhari	15.4	7,699	863	500	57	4.1	0.5	4.6	4.6
Deurali (Bagkhor)-Melung-Sitali	44.0	26,919	0	612	0	6.0	0.0	6.0	6.2
Dolakha-Singati	32.0	13827	0	433	0	3.0	0.0	3.0	2.8
Jiri-Mali-Shyama	23.0	13,216	10,684	575	465	5.4	4.0	9.4	10.0
Nayapul-Pawati	12.6	5,593	0	444	0	3.2	0.0	3.2	3.0
Siddhakothon-Jugu-Singati	32.0	15,028	3,561	470	112	3.6	1.0	4.6	4.6
Singati-Lamabagar	28.0	7,041	4,584	252	164	0.5	1.4	1.9	1.5
Sunkhani-Sangwa	30.0	18,108	2,669	604	89	5.9	0.8	6.7	6.9

Source: Annex 3.1

TABLE 3.1

Jiri-Mali-Shyama road corridor will provide service to population of 13,216 and 10,684 in its inner zone of influence (IZI) and outer zone of influence (OZI) respectively. This corridor serves the third and first highest population per km of road in its IZI and OZI respectively. However, it receives the score of 10.0 in overall and ranked first among all corridors. The total length of this corridor is approximately 23.0 km.

Sunkhani-Sangwa road corridor starts from Sunkhani that links with the Dolakha-Singati corridor. The total population served in its IZI and OZI are 18,108 and 2,669 respectively. This corridor is ranked as second with the total score of 6.9. The total length of this corridor is approximately 30.0 km.

Deurali (Bagkhor)-Melung-Sitali road will provide service to maximum population of 26,919 in its IZI from 8 VDCs of Dolakha district (refer to map 5). This corridor does not have OZI because the IZI of other roads overlap with its OZI area. Although it serves the maximum number of

population per km of road in its IZI it ranked only third in overall ranking. The total length of this road corridor is 44.0 km, and has received a total score of 6.2.

Siddhakothan-Jugu-Singati road corridor provides access to food deficit area located in the north-eastern region of the district. The road passes through six VDCs (Kabhre, Kshetraba, Jugu, Jayanku, Suri and Laduk) and provides service to other VDCs located in its outer zone of influence such as Kshetraba, Siddhakothan, Jugu, Bhorle and Singati (refer to map 5). The total population served in its IZI and OZI are 15,028 and 3,561 respectively. This road corridor ranked as fourth with the total score of 4.6.

Deurali (Bagkhor)-Dudhpokhari road corridor starts from the service/market centre at Deurali (Bagkhor), located in the western region of the district. This corridor passes through seven VDCs (Bhedpu, Bhusapheda, Dhyangasukhathokar, Dudhpokhari, Fasku, Katakuti, and Sailungeswor) from the Dolakha district (refer to map 5). The total population served per km of the road length in its IZI and OZI are 500 and 57 respectively. The total score received by this corridor is 4.6 out of 10.0 and ranked as fifth in the overall ranking.

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:

Sunkhani-Sangwa road corridor has been assigned a maximum score of 15 and has high priority from the agricultural perspective due to comparatively large areas of cultivated land per road length within IZI.

This is followed by **Deurali (Bagkhor)-Melung-Sitali** road corridor ranked second with a total score of 10.3. This is again due to large area of land in the IZI of this road corridor. Sitali has a fertile agricultural resource base for the production of rice, vegetables and fruits. The major crop of the northern part of all VDCs located at higher elevations is potato. The main productive areas of potato are located at Dhyangusukathokan and Shailungeswor VDCs. Grains, fruits, vegetables are produced at lower elevations. The construction of this road will encourage the export of cash crops including herbs and Nepali Paper (Lokta).

Siddhakothan-Jugu-Singati road corridor has been ranked third with a total score of 9.3 out of 15. The total area of cultivated land per km road length within IZI and OZI is 102 and 32 hectares respectively. This corridor mainly passes through vegetable pocket area (Kabre and Suri), orange pocket area Lapsi (Namdu, Kabhre), and traditional herbs producing areas.

Deurali (Bagkhor)-Dudhpokhari road corridor has been ranked fourth with a total score of 8.7. This corridor mainly passes through vegetable production area like Bhusepheda, Dudhpokhari, Katakuti and Fasku VDCs and the citrus, lapsi and other fruit pocket area (refer to map 2).

Singati-Lamabagar road corridor has been assigned a total score of 5.0 and ranked as fifth. The VDCs located in the northern side like Alampu is known for the production of orange, while Bulung and other VDCs are known for potato production. This road corridor will encourage the production and export of these cash crops and will promote the herbal plants and Lokta/Argali production, including both natural and plantation of herbs. It will also encourage export of raw materials for Nepal Kagaj Uddyog (Nepali paper factory), and livestock production like sheep, Chauri i.e. Yak, and kasturi area.

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)		
Busti-Putalikath	12.1	87	0	0.9	0.0	0.9	0.9
Bhirkot-Chhaunde	18.8	71	0	0.8	0.0	0.8	0.7
Deurali (Bagkhor)-Dudhpokhari	15.4	91	34	1.2	5.0	6.2	8.7
Deurali (Bagkhor)-Melung-Sitali	44.0	192	0	7.3	0.0	7.3	10.3
Dolakha-Singati	32.0	76	0	0.3	0.0	0.3	0.3
Jiri-Mali-Shyama	23.0	140	4	4.2	0.5	4.7	4.7
Nayapul-Pawati	12.6	96	0	1.5	0.0	1.5	1.8
Siddhakothan-Jugu-Singati	32.0	102	32	1.9	4.7	6.6	9.3
Singati-Lamabagar	28.0	117	6	2.8	0.9	3.7	5.0
Sunkhani-Sangwa	30.0	236	3	10.0	0.5	10.5	15.0

Source: Annex.3.2

TABLE 3.2

The proper investments on the transport sector of Dolakha district will facilitate the provision of services like credit and agricultural inputs such as seed and fertilisers. It will provide access to service/market centres for agricultural products to export. 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.

There are opportunities in the district for transforming low productive subsistence agriculture to market 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 temperate and cold 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.

In addition, road linking to the northern parts of the district (Sunkhani-Sangwa, Sangati-Lamabagar) will open the district for domestic as well as international tourism development. Furthermore, these roads will facilitate the export of transport for high value forest products like Chiraito, Lokta, Jatamasi etc. They have a high prospect for export.

3.3 Economic Structure and Service Centres

The analysis of market centres and settlements indicates the importance of transportation networks and future scenario of development. The geographical condition and agricultural potentiality of places also determine the importance of market exchange goods. This section analyses the economic facilities and governmental services and assigns priority to the road corridor based on the scores of market centres.

The concentration of economic and social activities are located at the district headquarters at Charikot and other service/market centres at Mude, Dolakha, Singati, Tamakoshi (Nayapul), Maina Pokhari (Kabhre), and Jiri. The main service/market centres like Charikot, Tamakoshi (Nayapul), Maina Pokhari (Kabhre), and Jiri lies on the Lamosangu-Jiri strategic road that has a direct link

with the Kathmandu valley. Other minor service/market centres within the district are Deurali (Bagkhor), Chhaunde and Melung (refer to map 2).

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. An evaluation of the data applying the methodology described in Volume 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 Volume I, 3.7.3.

The evaluation of the data indicates that the district headquarter Charikot along with other main service/market centres Jiri and Dolakha provide the maximum number of economic facilities and government services to the district population. Therefore, Charikot, Jiri and Dolakha receive the maximum score of 85.0 out of 100 (see Table 3.3) followed by Doramba, Tamakoshi and Singati with the score 74.4, 69.4 and 6.4 respectively. The score of proposed road corridors based on services provided by the existing service/market centres is summarized in Table 3.4. Deurali-Doramba road corridor receives the maximum score of 10.0 and followed by Dolakha-Singati, Busti-Putalikath and Nayapul-Pawati with the total score of 9.1, 5.9 and 5.6 respectively. The score of other road corridors ranges from 0.2 to 2.9.

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

Road Corridor	Market/Service centres	Market/Service centres' Weightage	Total Weightage	Length of the Road (Km)	Weightage per km of the road	Total Score (10)	Transformed Score (10)
Busti-Putalikath	Tamakoshi	69.4	69.4	12.1	5.7	5.9	5.9
Bhirkot-Chhaunde	Chhaunde	33.1	33.1	18.8	1.8	0.0	0.2
Deurali (Bagkhor)-Dudhpokhari	Deurali	55.6	130.0	15.4	8.4	10.0	10.0
	Doramba	74.4					
Deurali-Melung-Sitali	Deurali (Bagkhor)	55.6	108.1	44.0	2.5	1.0	1.0
	Melung-Sitali	52.5					
Dolakha - Singati	Charikot	85.0	251.9	32.0	7.9	9.1	9.1
	Pikhuti Gumukhola	17.5					
	Dolakha	85.0					
	Singati	64.4					
Jiri-Mali-Shyama	Jiri	85.0	85.0	23.0	3.7	2.9	2.9
Nayapul-Pawati	Tamakoshi	69.4	69.4	12.6	5.5	5.6	5.6
Siddhakothan - Jugu-Singati	Maina Pokhari (Kabhre)	60.0	60.0	32.0	1.9	0.2	0.2
Singati-Lamabagar	Singati	64.4	64.4	28.0	2.3	0.8	0.8
Sunkhani-Sangwa	Dolakha	85.0	85.0	30.0	2.8	1.6	1.6

Source: Annex 3.3

TABLE 3.3

3.4 Trade Flow/Predicted Changes

Most of the commodities like kerosene, salt, cloth, rice are carried to the district headquarters Charikot and Jiri Bazaar from Kathmandu. Charikot and Dolakha Bazaar serve the north-western

part of the district and the Jiri Bazaar serves the north-eastern part and some adjoining areas of Solukhumbu and Ramechhap districts. Similarly, the market centres located along the Mude-Melung-Sitali road serve the southern part of the district

The trade flows within Dolakha 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 are transported by porters on proposed road corridors throughout the year. On some proposed road corridors like Dolakha-Singati, Jiri-Mali-Shyama, Singati-Lamabagar and Busti-Putalikath mules are also used to transport the commodities.

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 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	Truck	Bus/Jeep					
Busti-Putalikath	12.1	136	281			417	107	44,707	2.2	2.2
Bhirkot-Chhaunde	18.8	750	-			750	66	49,867	2.5	2.5
Deurali (Bagkhor) - Dudhpokhari	15.4	109	-			109	260	28,260	1.0	1.0
Deurali (Bagkhor)-Melung-Sitali	44.0	1,700	-			1,700	57	96,591	5.9	5.9
Dolakha Singati	32.0	1,440	540			1,980	112	222,188	15.0	15.0
Jiri-Mali-Shyama	23.0	367	752			1,119	81	90,783	5.5	5.5
Nayapul-Pawati	12.6	109	-			109	135	14,679	0.0	0.4
Siddhakothan- Jugu-Singati	32.0	900	-			900	78	70,313	4.0	4.0
Singati-Lamabagar	28.0	130	518			648	186	120,343	7.6	7.6
Sunkhani-Sangwa	30.0	150	-			150	150	22,440	0.6	0.6

Source: Annex 3.4

TABLE 3.4

Along the proposed **Dolakha-Singati** road corridor goods are transported by porters and mules. Singati is located approximately at the middle part of northern Dolakha (refer to map 7) and provides service to substantial population of the district. Due to the high trade volume (1980 ton/year) the total transportation costs per year along this corridor is also higher and thus receives the maximum score of 15.

Singati-Lamabagar road corridor, which provides the access to the northern part of the district, has received the second highest score based on the total transport cost per km. 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 186.00 that is the second most expensive after the Deurali (Bagkhor)-Doramba road corridor. The total score received by this corridor based on the total transport cost per km is 7.6 out of 15.0.

The existing trade volume on proposed **Deurali (Bagkhor)-Melung-Sitali** road corridor is 1,700 ton/year, a relatively high figure. The average transport cost per km per ton is the cheapest one (Rs

57/ton/km) compared to the other road corridors due to the existing road of 14 km from Deurali towards Melung service/market centre. As a consequence this road corridor has the third highest score of 5.9 out of 15.0.

Jiri-Mali-Shyama road corridor, which provides the access to the north-eastern part of the district and is also the main trekking route to the Mount Everest from Jiri service/market centre. The existing trade volume on the proposed road corridor is 1,119 ton/year with the relatively low transport cost per ton per km. Due to the higher trade volume this road corridor also receives the considerable score of 5.5 and ranked as fourth.

The scores received by other six road corridors based on the total transport cost per km of road length are relatively low that ranges from 0.4 to 4.0.

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.

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 3.5.10 of Vol. III) 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 development potentials is summarized below in Table 3.5.

Scores of Proposed Roads Based on Development Potentials

Road Corridors	Length (km)	Total Weightage	Total Score (5)	Transformed Score (5)
Busti-Putalikath	12.1	3.1	1.6	1.6
Bhirkot-Chhaunde	18.8	2.9	1.3	1.6
Deurali (Bagkhor)- Dudhpokhari	15.4	2.0	0.0	0.9
Deurali(Baghkhor)-Melung-Sitali	44.0	5.0	4.4	4.4
Dolakha-Singati	32.0	5.0	4.4	4.4
Jiri-Mali-Shyama	23.0	5.4	5.0	5.0
Nayapul-Pawati	12.6	3.3	1.9	2.4
Siddhakothan-Jugu-Singati	32.0	3.2	1.8	1.8
Singati-Lamabagar	28.0	3.9	2.8	2.8
Sunkhani-Sangwa	30.0	3.0	1.5	1.5

Source: Annex 3.5

TABLE 3.5

Jiri-Mali-Shyama road corridor will promote the tourism industry within Dolakha and neighbouring district. This proposed corridor has also high potential for developing livestock farming and exporting timber and non-timber forest products. Jiri is one of the main service/market centres from where most of the commodities are exported to the north-eastern 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.

Deurali (Bagkhor)-Melung-Sitali road corridor has high potential of producing potato, collecting herbs, and promoting business and trade within and influence zone of road corridor. This road corridor has also high potential of expanding and growing service/market centres. The total score of this proposed road corridor is 4.4 and ranked second from the development potential aspects.

Dolakha-Singati road corridor will provide easier access to Gaurishankar Himal and Tsho-rolpa Lake, the potential site for the tourism in the district and will promote the growth of tourism industry in the area. The total score received by this proposed road corridor is 4.4 out of 5.0.

The extension of road from **Singati to Lamabagar** will provide access to location of the potential Rolwaling Hydroelectric project with the capacity of 120 MW. This area has the potential for developing yak, sheep and potato farming. Non-timber forest products have been identified as potential development areas. This road will promote the trade of mines (slates and magnesites) and Non-Timber Forest Products (NTFPs) like Himalayan herbs and Nepali paper. As a consequence this road corridor ranked fourth with the total score of 2.8.

Other roads, however, have relatively lower development potentials and consequently receive the low score ranging from 0.9 to 2.4 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 April 2000 workshop at Dolakha. 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

Road Corridors	Total Marks given	Total Score (5)	Transformed Score (5)
Busti-Putalikath	1	0.0	0.6
Bhirkot-Chhaunde	1	0.0	0.6
Deurali (Bagkhor)- Dudhpokhari	1	0.0	0.6
Deurali(Bagkhor)-Melung-Sitali	4	3.8	3.8
Dolakha-Singati	5	5.0	5.0
Jiri-Mali-Shyama	1	0.0	0.6
Nayapul-Pawati	1	0.0	0.6
Siddhakothan-Jugu-Singati	3	2.5	2.5
Singati-Lamabagar	2	1.3	1.3
Sunkhani-Sangwa	3	2.5	1.9

Source: Annex 3.6

TABLE 3.6

The district has clearly prioritised four main road corridors Dolakha-Singati in the central, Deurali (Bagkhor)-Melung-Sitali in the south-east, Siddhakothan-Jugu-Singati in the west and Sunkhani-Sangwa in the north-east part of the district.

3.7 Tentative Construction Costs of Proposed Roads

The initial construction cost estimate covers the total costs for the new construction and reconstruction cost of existing road sections (if any) to a maintainable standard of the individual road linkages. It includes the cost for labour, local construction materials, imported materials and transportation costs. The costs are prepared for the construction of Fair Weather Class 'A', District Road. The 'Green Road Concept' of construction is taken into consideration. Stone pitched causeways with gabion and river training works along narrow streams is the only form of water crossings taken into consideration. Retaining structures shall be limited to dry stone masonry for low height walls.

The cost estimate is prepared for the purpose of comparative cost analysis of the proposed roads. The technical information picked up during the walkover survey along the corridor of the proposed road is used in the preparation of the costs. The walkover survey was carried out over ten road corridors proposed for DTMP preparation. The cost estimate of the Dolakha – Singati road, which is half complete, is calculated taking into account the expenditure to date and costs projected for its completion.

The cost per kilometer is taken as the basis of engineering rating for each proposed road. The most economical road is given the highest score. The initial cost along with the engineering rating is summarized in the Table 3.7 below.

Summary of Initial Cost and Engineering Rating of Proposed Roads

Name of Road	Length (Km)	Total Cost (NRs)	Cost per km (NRs)	Engineering Rating	
				Score (20)	Transformed Score (20)
Busti-Putalikath	12.1	25,894,000	2,140,000	5.2	5.2
Bhirkot-Chhaunde	18.8	20,868,000	1,110,000	18.7	18.7
Deurali (Bagkhor) - Dudhpokhari	15.4	39,116,000	2,540,000	0.0	1.0
Deurali (Bagkhor)-Melung-Sitali	44.0	44,500,000	1,011,364	20.0	20.0
Dolakha Singati	32.0	61,440,000	1,920,000	8.1	8.1
Jiri-Mali-Shyama	23.0	37,490,000	1,630,000	11.9	11.9
Nayapul-Pawati	12.6	20,538,000	1,630,000	11.9	11.9
Siddhakothan- Jugu-Singati	32.0	37,120,000	1,160,000	18.1	18.1
Singati-Lamabagar	28.0	49,735,000	2,460,000	1.0	1.0
Sunkhani-Sangwa	30.0	62,400,000	2,080,000	6.0	6.0

Source: Annex 3.7

TABLE 3.7

From the analysis it is observed that Deurali (Bagkhor)-Melung-Sitali 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 five are Bhirkot-Chhaunde, Siddhakothan-Jugu-Singati, Nayapul-Pawati and Jiri-Mali-Shyama with the score 18.7, 18.1, 11.9 and 11.9 respectively.

3.8 Environmental Issues and 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) Busti-Putalikath

The proposed alignment descends down from Busti to the Khani khola and ascends to Putalikath. Khani khola is the only stream along the alignment where there is the danger to toe cutting of the proposed road. There exists a minor landslide on the bank of the Khani khola over a stretch of 30m. Nigure community forest, a thin forest area exists along the road over nominal stretch of the road corridor.

b) Bhirkot-Chhaunde

More than 50% of the road corridor passes through bari land, while 14% is grazing land, 14.5% is community forest while the rest is cultivated land. There are no major river/streams along the road corridor that needs special attention. There exists a major landslide in the proximity of the starting point on the Nayapul - Khimti sector of the existing road, which needs to be avoided.

c) Deurali (Bagkhor)-Dudhpokhari

The proposed road corridor follows a gentle descending gradient. There are no major rivers or streams along the proposed road corridor other than minor spring-fed streams of 6m width. Biraute community forest is a naturally grown, dense forest while Shailunge forest is a national forest, which is dense with sallo and gurans as the predominant species. Sherpas and the Tamangs are the ethnic groups that reside in the Sailunge and Dadhuwa region respectively. The Sailunge danda, within the Sailunge forest is also popular amongst the tourists. Geological unstable areas do not exist along the vicinity of the road corridor.

d) Deurali (Bagkhor)-Melung-Sitali

Ten VDCs with total population of 62,000 are expected to be benefited by this proposed road. Gentle hill slopes exist along the proposed road corridor between Deurali to Melung but the hill slope inbetween Melung to Sitali is steep. Dhande, Ghyang, Phadke, Dhumba and Mane are perennial, spring fed kholas along the proposed road corridor. Minor failures exist at the bank of the Phadke khola. Sailunge national forest exists along short stretch of the proposed road corridor. Threats from geological instability do not exist within the road corridor.

e) Dolakha-Singati

The proposed road is approximately 32 km in length and serves a large population of the district with the prospect of being extended further to Lamabaghar in the north. Rolwaling valley north of Singati is a popular trekking route. Gumkhola is the major perennial, spring fed river, with a width of 35m. Kuthali khola, Bakhara khola, Sere khola and Pande khola are other minor perennial, spring-fed rivers along the proposed alignment. Tilicho community forest is a dense community forest with salla as the predominant species. Soti community forest and Sitka community forest are less dense. Thami community with a household numbering 500 to 600 reside in the Suspa and Sundarawati settlement area. Ekle bhir in the Sunkhani area is relatively unstable. Steep slopes exist along the Jhamashi area approaching Gumkhola.

f) Jiri-Mali-Shyama

The proposed road alignment is situated at an altitude of 1900m to 2400m, with Shyama danda in the Yelung area at an altitude of 2400m is a tourist spot, due to the scenic beauty of the area. Yelung khola is the only major water crossing along the alignment. Chhauri danda forest and Bhasme forest are national forest along the proposed road corridor with dense salla and gobre salla as the predominant species in the forest. The proposed road alignment falls along the trekking route from Jiri to the Mt. Everest base camp in Solukhumbu district.

g) Nayapul-Pawati

The proposed road alignment initially follows the Tamakoshi river and ascends from an altitude of 800m at Nayapul of the Lamasangu – Jiri road to an altitude of approximate 2000m at Pawati. Charnawati and Andheri khola are the major rivers which are perennial, spring fed with high gradient. Possibility of toe cutting by the Tamakoshi river exists for the initial part of the alignment. Weak geological areas in the proximity of km 2+300 and 2+700 exist. The proposed road corridor encounters the Charnawati community forest and Simte community forest for approximate lengths of 1.5km and 1km respectively. Salla and Sal are the predominant species available in the forests.

h) Siddakothan-Jugu-Singati

The starting point, Siddakothan lies on the Lamasangu – Jiri road. Jugu khola, Jyankhu khola and Tinekhu khola are minor streams that remain dry during the dry season. However the streams are steep gradient and susceptible to undercutting during the monsoons. Under cutting along the banks of Jyankhu khola had caused landslide during heavy rains in 1996. Steep gradient areas approaching Singati from Jyankhu is susceptible to landslides with construction of road. Hanumante community forest, Jaleshwori community forest and Chhatrapa community forest are the forest areas within the corridor of the proposed road. Sallo is the predominant species in the forests.

i) Sukhani-Sangwa

The lowest point of the proposed road corridor is 1460m at Gumkhola while the highest point is 1920m in the proximity of km 28+800. Ghattekhol, Gum khola, Danepa khola and Tamrawoti khola are the major streams the road needs to pass. Steep slope areas are Ratmate danda, Patikhola bhir and Thamichagu bhir for approximate lengths of 650m, 150m and 350m respectively. Weak geological formations exist in the proximity of km 11+800 in the Lamidanda area. Sitka community forest and Kyangpol danda forest are naturally grown forests with Sallo, and Khote sallo and Gurans are the predominant species.

j) Singati-Lamabagar

Singati is the lowest point along the alignment at an altitude of 950 m while Lamabagar is situated at an altitude of 1900m. Rivers that are of the perennial, spring fed type along the proposed road corridor are Singati khola, Orang khola, Gonger khola, Hwang khola and Bhaise khola. A section of the proposed alignment runs along the banks of the Tamakoshi river which is susceptible to effects of the Tshorolpa GLOF if ever it bursts and toe undercutting by the Tamakoshi river. There exists an active landslide for a length of 300m at the Chhet Chhet area where the alignment needs to be avoided. The proposed road corridor needs to pass the Malung community forest, Sisneri forest and Kalapani state forest. The scenic beauty along the trekking route that exists in the area attracts many tourists to the region. The Gumba that exists in the region is also a tourist attraction along with its religious significance.

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.

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)
Busti-Putalikath	12.1	35	2	0	8	8.3	8.3
Bhirkot-Chhaunde	18.8	36	1	0	9	10.0	10.0
Deurali (Bagkhor) - Dudhpokhari	15.4	33	4	0	6	5.0	5.0
Deurali (Bagkhor)-Melung-Sitali	44.0	33	4	0	6	5.0	5.0
Dolakha Singati	32.0	30	7	0	3	0.0	1.3
Jiri-Mali-Shyama	23.0	33	4	0	6	5.0	5.0
Nayapul-Pawati	12.6	31	6	0	4	1.7	1.7
Siddhakothan- Jugu-Singati	32.0	34	3	0	7	6.7	6.7
Singati-Lamabagar	28.0	32	5	0	5	3.3	3.3
Sunkhani-Sangwa	30.0	32	5	0	5	3.3	3.3

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.

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)	
Busti-Putalikath	12.1	3,484	542	1500	45	125	0.3	0.1	0.4	0.3
Bhirkot-Chhaunde	18.8	5,316	1,068	2,703	57	144	0.9	0.1	1.0	0.8
Deurali (Bagkhor)-Dudhpokhari	15.4	8,562	706	4,541	46	295	0.3	1.3	1.6	1.6
Deurali (Bagkhor)-Melung-Sitali	44.0	26,920	4,234	12,680	97	289	2.7	1.2	3.9	4.6
Dolakha Singati	32.0	13,827	2,341	6,766	74	212	1.7	0.7	2.4	2.6
Jiri-Mali-Shyama	23.0	23,900	1,856	14,944	81	650	2.0	4.0	6.0	7.4
Nayapul-Pawati	12.6	5,593	480	2,530	39	201	0.2	0.6	0.8	0.6
Siddhakothan- Jugu-Singati	32.0	18,589	1,760	9,083	55	284	0.8	1.2	2.0	2.1
Singati-Lamabagar	28.0	10,287	1,737	5,609	63	201	1.1	0.6	1.7	1.7
Sunkhani-Sangwa	30.0	20,778	4,957	11,585	166	387	6.0	2.0	8.0	10.0

Note: P = Poor, UP = Ultra Poor

Source: Annex 3.9

TABLE 3.9

With the largest population of ultra poor per km of road Sunkhani-Sangwa road corridor received the highest score of 10.0 followed by Jiri-Mali-Shyama, Deurali (Bagkhor)-Melung-Sitali and Dolakha-Singati with the score of 7.4, 4.6 and 2.6 respectively. The score of other road corridors are ranging from 0.3 to 2.1.

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

Road Corridor	Parameters Used for the Prioritisation of Road Corridors and Their Corresponding Scores										
	Demography (10)	Agriculture (15)	Service Centres (10)	Trade flow (15)	Dev't Potential (5)	District Priority (5)	Const. Cost (20)	Environ ment (10)	Social Aspects (10)	Total Score (100)	Rank
Busti-Putalikath	0.1	0.9	5.9	2.2	1.6	0.6	5.2	8.3	0.3	25.2	9
Bhirkot-Chhaunde	0.1	0.7	0.2	2.5	1.6	0.6	18.7	10.0	0.8	35.2	6
Deurali (Bagkhor) - Dudhpokhari	4.6	8.7	10.0	1.0	0.9	0.6	1.0	5.0	1.6	33.4	7
Deurali (Bagkhor)- Melung-Sitali	6.2	10.3	1.0	5.9	4.4	3.8	20.0	5.0	4.6	61.2	1
Dolakha Singati	2.8	0.3	9.1	15.0	4.4	5.0	8.1	1.3	2.6	48.5	4
Jiri-Mali-Shyama	10.0	4.7	2.9	5.5	5.0	0.6	11.9	5.0	7.4	53.0	2
Nayapul-Pawati	3.0	1.8	5.6	0.4	2.4	0.6	11.9	1.7	0.6	27.9	8
Siddhakothan- Jugu-Singati	4.6	9.3	0.2	4.0	1.8	2.5	18.1	6.7	2.1	49.3	3
Singati-Lamabagar	1.5	5.0	0.8	7.6	2.8	1.3	1.0	3.3	1.7	25.0	10
Sunxhani-Sangwa	6.9	15.0	1.6	0.6	1.5	1.9	6.0	3.3	10.0	46.7	5

Source: Annex 3.10

TABLE 3.10

The findings of the scoring system indicate that five roads namely Deurali (Bagkhor)-Melung-Sitali, Jiri-Mali-Shyama, Siddhakothan-Jugu-Singati, Dolakha-Singati and Sunkhani-Sangwa have top priorities for the construction. A comparison of findings among these roads indicates that their respective scores are higher in comparison to other roads. Their scores are 61.2, 53.0, 49.3, 48.5 and 46.7 respectively.

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

Deurali (Bagkhor)-Melung-Sitali

The total score of this road corridor is 61.2 and ranked first. This corridor has received a maximum score from construction cost (20.0), agriculture land (10.3) and demographic (6.2) aspects. The construction of this corridor will open up access to the service/market centres from large agricultural producing area in the southern region. It will reduce the transport cost of agricultural exports to market centres at Mude or Sitali located on Lamosangu-Jiri and Nayapul-Manthali road. 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 population from the southern and the northern region of Dolakha and Ramechhap districts and will promote the growth of the market centre at Melung.

This corridor has a potential of being used as an alternative route to Kathmandu for population from Ramechhap district. They would not require detouring to Charikot anymore to reach Kathmandu. Further this corridor will help to stimulate more economic activities and lead to the construction of hotels, lodges, etc. at Melung.

Jiri-Mali-Shyama

The total length of Jiri-Mali-Shyama corridor is 23.0 km approximately. This corridor is ranked second with the total score of 53.0 out of 100.0. The maximum score received from different aspects are demographic (10), construction cost (11.9) and trade flow (5.5). The construction of this corridor will help to promote the tourism industry within and outside the district. This route is a major gateway to the trekking tourist visiting to the Mount Everest. At present, a large number of tourist trek from Jiri to the Everest base camp located in Solukhumbu district.

The completion of this corridor will provide better access to export agriculture product to the main service/market centre Jiri of the district and further it can be exported to Kathmandu valley. The major local agro-based products of the area are potato, herbs (Lokta) and dairy farming.

Siddhakothan-Jugu-Singati

The proposed Siddhakothan-Jugu-Singati road corridor 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 construction cost (18.1), agricultural land (9.3) and environmental impact (6.7). This corridor is ranked third with the total score of 49.3.

The main cash crops of the land located at lower altitudes are potato and citrus. Farmers residing more than 10 km away from the market currently cannot enhance their income from cash crops due to high transportation cost. The construction of this corridor will provide access to service/market centres at Singati or Kabhre and reduce the transportation cost. This will further enhance potato and citrus export from the pocket area to the service/market centres. There is also potential for establishing micro-hydro schemes in this area. This route could be used as the tourist route from Gaurishankar to Jiri after the construction.

Dolakha-Singati

The proposed Dolakha-Singati road corridor is ranked fourth with the total score of 48.5. The road provides service to a large number of population from VDCs located in the north-western region of the district. The maximum score received by this corridor are from trade flow (15.0), service centres (9.1) and construction cost (8.1).

The major agricultural products of this region are potato, citrus, 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 life status of the people will substantially improve. They will be able to sell their cash crops, herbal plants, goat and sheep from the area to the market for the better price. It is expected that the trade flow to "Khasa" (i.e. Tibet) will increase after the construction of this road. This corridor will also help to promote the tourism industry in the district. There are many potential tourism sites in the northern part of the district that will be more accessible after the construction of this corridor. The number of tourists visiting Mountain Gaurishankar, Rolwaling Himalayan Range and Melungse Himal will substantially increase.

Sunkhani–Sangwa

The total length of Sunkhani-Sangwa road corridor is 30.0 km approximately. The proposed road corridor is ranked fifth with the score of 46.7. The maximum score received by the corridor are from agriculture land (15.0), social (10.0) and demographic issues (6.9).

Sunkhani–Sangwa road corridor provides access to population located on north-western region of the district. It provides service to population not served by Dolakha-Singati road. This road corridor will also provide access to famous slate mine in the district extending over 2 to 3 km. and will facilitate their export. The construction of this corridor will help to export potato production from Lapilang and Kalinchowk VDCs to main market centres Dolakha and Charikot. The road will also provide access to Buddhist Gumba located in Bigu. Further the road will also encourage the export of herbal plants from Bigu, Alampu, and Chilankha VDCs.

The score of other five road corridors are ranging from 25.2 to 36.8 and have low priority compared to the corridors explained above.

As stated in the previous section (refer to section 2.9) Dolakha district has proposed two road corridors Mude-Deurali (Bagkhor) and Khawa-Chhaunde for the rehabilitation. The prioritisation process for the rehabilitation of two road corridors was not obligatory to carry out. The rehabilitation work of the Mude-Deurali (Bagkhor) was partially completed on the fiscal year 2000/01 and the remaining portion will be carried out in the fiscal year 2001/02.

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 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/N
- National Road Fund
- DDC resources
- VDC resources
- Donors

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

a) DoLIDAR

Under the Agricultural Perspective Plan (1995/2015) DoLIDAR has allocated Rs 4.0 millions to the agricultural road (AR) 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) 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 Dolakha 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 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 Dolakha are mainly generated through taxes and royalties. Out of DDC's internal sources, Rs 2.5 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.

c) 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 1.7 million, is expected to be used for district roads in VDCs through which the road passes. No increase in this contribution is expected.

d) Constituency Development Fund

At present each MP receives Rs. 1 million as a block grant for their constituency. Dolakha district has two constituencies and it is expected that about 10% of this grant will be allocated to the transport sector for district roads. This will amount to Rs 0.2 million per year.

e) 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 7.9 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.

f) DRSP (SDC)

The budget allocated by the DRSP (SDC) for the implementation of DTMP is about Rs.12.4 million in the current fiscal year 058/59. The tentative budget forecasted for the implementation phase is about Rs 7.7, 9.5 and 4.6 million for the fiscal year 059/60, 060/61 and 061/62, and 062/62 respectively.

g) Rural Community Infrastructure Works (RCIW)

The RCIW programme under MoLD has been implemented in Dolakha 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 16.4 million is allocated for FY 058/59 and Rs 14.4 million annually for the next four years.

The district will have to identify and acquire other additional funding sources to finance the 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 tentative budget perspective can be made as shown in Table 4.1.

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

Sources	058/59	059/60	060/61	061/62	062/63
DRSP (SDC)	12,400	7,710	9,484	9,484	4,600
DoLIDAR (AR)	4,000	4,600	5,290	6,084	6,996
DDC block- grant	2,500	2,500	2,500	2,500	2,500
DDC internal fund	2,500	2,750	3,025	3,328	3,660
VDC block- grant	1,721	1,721	1,721	1,721	1,721
Constituency Development Fund	200	200	200	200	200
RCIW/MoLD	16,384	14,400	14,400	14,400	14,400
DoR/MoLD	7,900	5,849	6,726	7,735	8,895
Total	47,605	39,730	43,346	48,451	42,972

TABLE 4.1

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.

4.3 Matching of Resources on High Ranked DTMP Roads

This Section describes the implementation plan of Dolakha 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 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 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 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 Dolakha District Council.

Physical and Financial Plan for DTMP Roads

Roads by priority	Length (Km)	Current year ²		DTMP Implementation Year			
		2057/58	2058/59	2059/60	2060/61	2061/62	2062/63
<i>Likely available budget (Rs 000)</i>			47,605	39,730	43,346	45,451	42,972
1. Dolakha-Singati	32.0						
Construction (Rs 000)			7,680				
Physical output (km)		28.0	4.0				
Periodic Maintenance (Rs 000)			1,400	1,792	2,007	2,248	2,518
Routine Maintenance (Rs 000)			336	430	482	539	604
<i>Sub-total</i>			9,416	2,222	2,489	2,787	3,122
2. Bhirkot-Chhaunde	18.9						
Construction (Rs 000)			5,550	11,064			
Physical output (Km)		5.0	5.0	8.9			
Periodic Maintenance (Rs 000)			250	560	1,185	1,328	1,487
Routine Maintenance (Rs 000)			60	134	284	319	357
<i>Sub-total</i>			5,860	11,759	1,470	1,646	1,844
3. Siddhakothan-Jugu-Singati	32.0						
Construction (Rs 000)			6,960	10,394	13,096	9,020	
Physical output (Km)		6.0	6.0	8.0	9.0	3.0	
Periodic Maintenance (Rs 000)			300	672	1,254	2,037	2,518
Routine Maintenance (Rs 000)			72	161	301	489	604
<i>Sub-total</i>			7,332	11,227	14,651	11,546	3,122
4. Deurali (Bagkhor)-Melung-Sitali	44.0						
Construction (Rs 000)			11,880	10,349	11,591	12,982	
Physical output (Km)		14.0	9.0	7.0	7.0	7.0	
Periodic Maintenance (Rs 000)			700	1,288	1,882	2,599	3,462
Routine Maintenance (Rs 000)			168	309	452	624	831
<i>Sub-total</i>			12,748	11,946	13,924	16,204	4,293

² Fiscal Year 2001/2002

Roads by priority	Length (Km)	Current year ²		DTMP Implementation Year			
		2057/58	2058/59	2059/60	2060/61	2061/62	2062/63
5. Sunkhani-Sangwa	30.0						
Construction (Rs 000)			-	-	5,218	5,845	13,092
Physical output (Km)		5.0	-	-	2.0	2.0	4.0
Periodic Maintenance (Rs 000)			250	280	314	492	708
Routine Maintenance (Rs 000)			60	67	75	118	170
Sub-total			310	347	5,607	6,454	13,970
6. Jiri-Mali-Shyama	23.0						
Construction (Rs 000)			-	-	-	6,870	10,259
Physical output (Km)			-	-	-	3.0	4.0
Periodic Maintenance (Rs 000)			-	-	-	-	236
Routine Maintenance (Rs 000)			-	-	-	-	57
Sub-total			-	-	-	6,870	10,552
7. Mude-Deurali (Bagkhor)	15.5						
Rehabilitation (Rs 000)			2,450				
Physical output (Km)		8.5	7.0				
Periodic Maintenance (Rs 000)			425	868	972	1,089	1,219
Routine Maintenance (Rs 000)			102	208	233	261	293
Sub-total			2,977	1,076	1,205	1,350	1,512
8. Khawa-Chhaunde	18.3						
Rehabilitation (Rs 000)			1,050	2,352	2,634	1,623	
Physical output (Km)			3.0	6.0	6.0	3.3	
Periodic Maintenance (Rs 000)			-	168	564	1,054	1,440
Routine Maintenance (Rs 000)			-	40	135	253	346
Sub-total			1,050	2,560	3,334	2,929	1,785
Grand Total				41,138	42,681	49,788	40,199
Deficit (-) / Surplus (+)				(-)1,408	(-)742	(-)5,079	(-)2,306

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

TABLE 4.2

During the preparation of this plan it is assumed that the budget allocated by the DRSP, will be used for the construction of Bhirkot-Chhaunde, Mude-Deurali (Bagkhor) and Sunkhani-Sangwa road while the remaining resources will be allocated for the construction and maintenance of other roads. Since RCIW has continued its support to Siddhakothan-Jugu-Singati road construction under the Food for Work Programme, fund expected from RCIW project has been allocated only for this road. Furthermore, it is expected that DoR will continue its contribution in the construction of other road for the next five years. Similarly, DoLIDAR will continue its contribution in the construction of other agriculture and district roads within the district.

During the course of DTMP implementation, additional resources become available the remaining roads or road section of road under construction will be constructed based on priorities set out by the DTMP.

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" (Vol.I), 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 and Vice-chairman). Guidelines are also prepared and distributed to assist them in understanding the maps and the sections of draft DTMP. The guidelines also give details of the procedures for suggesting modifications to the draft DTMP and for formulating proposals for DTPP roads.

After endorsement in principal on preliminary DTMP by DRCC/DDC, a meeting of all VDC Chairmen, Vice Chairmen and Ilaka Members was organised at the district headquarter for the orientation Workshop for the DTPP on 10 January 2001.

5.1 Roads Recommended for DTPP

A one-day workshop was organised on 26 April 2001 for Chairman of VDCs and Ilaka members to present their proposals, harmonise and prioritise them for DTPP roads. The workshop proposed following roads (Table 5.1) for the District Transport Perspective Plan (DTPP) that has yet to be approved from District Council. Both DTMP and DTPP are expected to be approved from next District Council meeting. The roads proposed for DTPP are as follows:

Proposed DTPP Roads

Road Reference No.	Road Corridor	Remarks
22A026R	Singati-Lamabagar	A
22A005A	Nayapul-Pawati	A
22A040A	Busti-Putalikath	A
22B017A	Namdu-Jugu	A
22A007R	Deurali (Bagkhor)-Dudhpokhari	A
22A022R	Gumkhola-Sikta	B
22A024R	Babare (Kutisyau)-Singati	B
22A027R	Lamabagar-Lapche	B
22A002R	Melung-Bimire (Milti Khola)	B
22A003A	Pawati-Chyandanda	B
22A004R	Sailungeshwar-Pawati	B
22B006R	Nigale-Fasku-Simte	B
22A008R	Dudhpokhari-Deurali	B
22B013R	Deurali-Maga-Okhre	B

Road Reference No.	Road Corridor	Remarks
22B019R	Charikot-Kuri-Bigu-Sangwa	B
22A020R	Chhemawati (Simcha)-Panighat	B
22A025R	Sanwa-Orang (Rayobatta)	B
22A028R	Suri (Mulabari)-Rolwaling	B
22A030R	Jiri (Buldanda)-Suri	B
22A033R	Salle-Thulopatal (Chihanedanda)	B
22A035R	Japhe (Dholi Khola)-Chyama	B
22B038R	Maina Pokhari-Lamagaun	B
22A039R	Putalikath-Salle	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 October 1999 the DDC Dolakha 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 November 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 LRCC and UG had already been established for the Bhirkot-Chhaunde road corridor.

6.2 Budgetary Arrangements and Flow of Funds

Following the agreement between Dolakha District, DoLIDAR and PSU a District Road Fund (DRF) has been established. The DRF will be replenished by contributions from DoLIDAR, DDC block-grant, DDC internal funds, contribution from VDC block-grant, Constituency Development Fund, central government funding through DoR/MoLD, DRSP and eventually other donors in the transport sector.

All activities related to the implementation of the DTMP is expected to be financed through the DRF.

6.3 Road Construction, Operation and Maintenance

DDC of Dolakha 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

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Attachment

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