

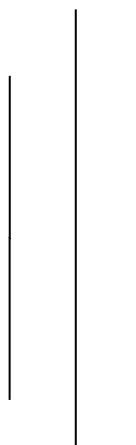


Siddha Kumakha Rural Municipality
Office of the Rural Municipal Executive
Siddha Kumakha, Salyan
Karnali Province, Nepal

Rural Municipality Transport Master Plan (RMTMP)

(Final Report)

Volume - I



SUBMITTED BY:

Canvas Engineering Consultancy

Kupandol, Lalitpur

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Acronyms/Abbreviations

DDC	District Development Committee
DTMP	District Transport Master Plan
GIS	Geographic Information System
GPS	Global Positioning System
IDPM	Indicative Development Potential Map
RMIM	Rural Municipality Road Inventory Map
RMRCC	Rural Municipality Road Coordination Committee
NMT	Non- Motorized Transport
RMTMP	Rural Municipality Transport Master Plan
RMTTP	Rural Municipality Transport Perspective Plan
VDC	Village Development Committee
MTPP	Municipality Transport Perspective Plan
PCU	Passenger Car Unit
DOLIDAR	Department of Local Infrastructure Development and Agricultural Roads
OD	Origin and Destination
ToR	Terms of Reference
HH	Household
VDCs	Village Development Committees
PT	Public Transport
Min.	Minute
Km.	Kilometre
Sq. km	Square Kilometre
Ha	Hectare

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Executive Summary

Transport facilities help in developing access with the rural-urban linkages. Road accessibility can reduce isolation, stimulate crop production and marketing activities, encourage public services and help to transfer technology. Road building has been seen to bring about notable enthusiasm and visible changes in rural life. Road infrastructure is considered as “the infrastructure for infrastructure”. However, in the absence of notable criteria and rational guidelines, road construction is carried out in adverse manner resulting in haphazard use and wastage of limited resources. Rural Municipal Transport Master Plan is prepared for assessing and planning the present road and transport infrastructures and facilities within the municipality and its surrounding.

Siddha Kumakha Rural Municipality (Gaunpalika) lies in Salyan district of Karnali Province. In 12 March 2017, the government of Nepal implemented a new local administrative structure consisting of 753 local units. With this implementation of the new local administrative structure, VDCs have been replaced with the municipal and rural municipal councils.

The Siddha Kumakha Rural Municipality was established by merging the existing Bajhakaada, Siddeshowri, Chand Karenji village development committees (VDCs) having a total of 89.36 square km. After merging the six VDCs population it had a total population of 13593 according to 2011 Nepal census. The population density of Siddha Kumakha Rural Municipality is 152.112 person/sq. km. Siddha Kumakha Rural Municipality has altogether 5 wards.

RMTMP started with the setup of Rural Municipal Road Coordination Committee (RM RCC) and the collection of demand and inventory of road within the municipality. Road inventory survey was done and total length of road surveyed was 220.29 km out of which 13.95 km is blacktopped, 112.59 Km roads are all earthen and 93.75 Km roads are newly proposed.

Indicative Development Potential Plan is prepared showing the existing and potential market center/service centers (key growth centers) and the areas having various development potentials such as agro-based industries, high value cash crops and tourism. This city may be developed as the agricultural-cultural-historical centre and with promoting this, the tourism can be improved. By improving the agriculture and tourism sector we have to develop the health, education and environment of the people of this municipality.

This study formulated the road hierarchy for the various roads namely Class A, B, C and D. Class C and D basically deals with access while Class A and B basically deal with mobility and accessibility to higher services. The minimum right of way, setback, pavement width and footpath width provisions for the different classes of roads are recommended as follows:-

SN	Road Class	Min.RoW(m)	Setback(m)	Pavement(m)
1	A	20	2.5	11
2	B	15	2.5	11
3	C	10	2	7
4	D	6	1.5	5

The total lengths of Class A, B, C and D roads are summarized as shown in the table below.

Road Class	New Track (Km)	Earthen (Km)	Sub- Total (Km)
A	24.52	2.56	27.08
B	14.69	5.80	20.49
C	40.20	40.43	80.63
D	33.18	44.96	78.14
Total	112.59	93.75	206.34

There are total 274.08 km length of district roads and 13.95 km length of nation highway passing through this rural municipality which plays important role for inter-municipality mobility.

For the development of the entire road network to all weather condition there is need of 412.9 Crore of budget which in summary is as follows:-

SN	Intervention	Cost In NRs. (Crore)
1	New Track Open	37.49
2	Gravelling	90
3	Blacktop	197.3

For the RMTMP period, based on the capacity of municipality and to provide minimum accessibility condition total of 38.83Crore of NRs is estimated which is distributed as under:

Year	Class A,B,C	Class D	Maintenance	Total
Year 1	36,300,000.00	4,000,000.00	17,300,000	57,600,000
Year 2	41,700,000.00	4,600,000.00	19,800,000	66,100,000
Year 3	48,000,000.00	5,300,000.00	22,800,000	76,100,000
Year 4	55,200,000.00	6,100,000.00	26,300,000	87,600,000
Year 5	63,500,000.00	7,100,000.00	30,300,000	100,900,000
Total	244,700,000	27,100,000	116,500,000	388,300,000

Chapter 1: Introduction

1.1. Background

Life in organized human settlements, which are mostly referred to as communities, is only possible if people have mobility in daily basis. Residential area is spatially separated from workplaces, major shopping is concentrated in identifiable centers, and larger entertainment and relaxation facilities are found at specific locations. They have to have accessibility.

Transport facilities help in developing access with the rural-urban linkages. Road accessibility can reduce isolation, stimulate crop production and marketing activities, encourage public services and help to transfer technology. Road building has been seen to bring about notable enthusiasm and visible changes in rural life. Road infrastructure is considered as “the infrastructure for infrastructure”. However, in the absence of notable criteria and rational guidelines, road construction is carried out in adverse manner resulting in haphazard use and wastage of limited resources.

Haphazard development of settlement in the urban area is a great problem which we learned from the past earthquake. From disaster risk management and reducing the problem of congestion we should go for planned development. Construction of roads after the settlement is made or extension of road only after the congestion problem creates different types of problem in the society which we are closely observing from different metropolitan cities. In this regard, formulation of Rural Municipal Transport Master Plan was initiated for assessing the present road and transport infrastructures and facilities within the Rural Municipality and the surrounding Municipalities. So as to be presented as proper rural municipality or a city, it must have a very good mobility and accessibility by public or private means of transportation.

1.2. Objective of RMTMP

The prime objective of this study is to prepare the Rural Municipality Transport Master Plan (RMTMP) for Siddha Kumakha Rural Municipality. The planning approach is participatory and bottom-up from the settlement level. It will include a constructive plan to incorporate all the transportation needs and facilities for now and tomorrow. The specific objectives of the RMTMP are mentioned below:

1. Prepare the Rural Municipality Inventory Map (RMIM) of all road networks.
2. Identify the major road networks linking the Rural Municipality with the surrounding areas.
3. Collection of demands for new/rehabilitation transport linkages from Municipalities/settlements based on city development plan.
4. Prepare the Perspective Plan of transport services and facilities (Rural Municipal Transport Perspective Plan)
5. Prepare physical and financial implementation plan of prioritized roads for the RMTMP period.
6. Prepare a five years Rural Municipality Transport Master Plan (RMTMP).

1.3.Scope and Limitation of RMTMP

The scope of this work and service the consultant will provide for the project is given below:

- a. Analyze Mobility status of the rural municipality

The consultant will also conduct mobility study, incorporated in the O-D survey. This is important especially because the road network in capital has provided access to majority of the population. The question then arises on how -efficiently, economically and safely the goods and passengers are transported, which is indicated by mobility.

- b. Access the condition of public transportation

The consultant will collect data on different public transportation routes and their operation characteristics, which operate within the municipal area and to other adjoining area.

- c. Prepare Rural Municipality Inventory Map (RRMIM) of existing roads within Siddha Kumakha Rural Municipality.

The consultant will prepare the Rural Municipality Inventory Map linking to strategic road networks such as national highways, district core road network, main trails and bridges. This shall be done by walkover surveys using enumerators. The inventory map shall include the road names, total length and breadth of the roads, surface type, existing condition, Right of way, vehicular traffic and pedestrian traffic flow etc.

- d. Scoring criteria

The consultant shall develop scoring criteria to screen and prioritize all interventions potential interventions for proper allocation of limited budget. Scoring and

prioritization criteria shall be checked with all linkages and interventions and approved by the rural municipality.

e. Road classification and Nomenclature

The consultant shall use metric system of nomenclature and apply the same classification throughout the data collection.

f. Preparation of perspective plan of interventions of services and facilities.

The data collected through accessibility survey, demand survey and inventory maps shall be used to prepare a perspective plan of interventions of services and facilities. All the identified interventions shall be screened and rated on the basis of approved criteria and forwarded to Rural Municipality council meetings. The final perspective plan shall be shown in GIS maps.

g. Prepare a realistic physical and Financial Implementation Plan of Prioritised Roads for the RMTMP period

The consultant shall collect information on the resources that can be spent on the construction or rehabilitation of transportation infrastructures by the rural municipality. The consultant may also carry out studies to project the resources to fund the transport infrastructures for the next five years. From the total projected resources, the consultant shall discuss with the rural municipality to find out the appropriate proportion to be spent on ongoing roads and new interventions proposed. The projected resources should be able to cope with the total number of roads and new interventions proposed.

h. Prepare Rural Municipal Transport Master Plan (RMTMP) of Siddha Kumakha Rural Municipality

The consultant shall prepare Rural Municipal Transport Master Plan (RMTMP) for Siddha Kumakha Rural Municipality with due consideration to the existing situation of: vehicular parking, travel routes, modes of transport, etc and propose for future urban growth. The consultant shall prepare a base scenario of the existing road and transport network and management based on the O-D survey and O-D matrix and prepare road inventory map and transport infrastructure network and management

plan based on the travel demand forecast, population growth forecast, and growth rate of vehicular and transport infrastructure.

i. Prepare framework for medium term and long-term planning

The consultant shall also forecast the demand for medium term (10 years) and long term (20 years) and recommend a framework to guide future interventions and planning processes. The long-term plan shall consider the proposed East-West Railway and other major transport sector interventions in the long term.

1.4.Approach and Methodology

Rural roads are supposed to provide both access and mobility to all possible and potential areas. RMTMP will help to assist the planning of such roads to fulfil the stated objectives. Better planning is incomplete without relevant quality data and quality data can only be acquired by use of properly selected survey methods. The chapter deals with the methodological framework adopted for data collection covering all used survey method, sampling techniques, quality and quantity of data along with data processing, analysis and presentation methodology.

1. Approach:

Rural Municipal Transport Master Plan has been prepared using participatory bottom-up approach and differs from conventional practices of trickle-down approach. Techno-Political interface has been incorporated in the planning process, where active participation from representatives of political parties, line agencies, ruralmunicipality officials is crucial. The Rural Municipal Road Coordination Committee (RMRCC) has been constituted as authorized legislative body of rural municipality. This body, comprising all political parties' representatives and concerned technical officials, helps in necessary policy decisions during the RMTMP preparation and implementation process.

2. Methodological Framework:

The study started with preliminary planning or desk study where basic background of rural municipality is studied with help of secondary data including census data, GIS data. The study got acceleration with formation of RMRCC and inspection report. Various field surveys were carried out with objective of collecting primary data on transportation network, trip characteristics and service facilities. Along with the primary data, demands for various

transportation projects (construction/upgrading/maintenance) were obtained from each ward. Also, potential areas/locations for various facilities were also identified based on interaction with local people and RMRCC. The scoring criteria for prioritizing road network was identified based on ToR and will be approved by rural municipality. Then, the hierarchy of roads will be purposed and perspective plan of various interventions will be purposed and analysed based on available fund and finally physical and financial implementation plan of prioritized roads for RMTMP period. After analysis, the study will come up with potential roads, that need immediate intervention and roads that need to be given consideration for effective future planning.

All the above-mentioned strategy adopted for data collection, processing and analysis is summarized in the following figure in next page.

Secondary Data Collection

Any sorts of data that were collected from secondary sources are called secondary data. These data were collected from annual report published by district level offices and consultation with various concerned stakeholders. RuralMunicipal Road Coordination Committee (RMRCC), which compromises people from various fields and political parties, is the next source for various secondary data. Field study was also carried out for general socio-economic assessment of the Rural Municipality that includes collection of data regarding high development potential areas such as extensive agriculture, horticulture, livestock farming, high value cash crops, cottage and agro-based industries, centre for business/commerce/markets places, tourism area, service centres (hospital, health post, agriculture service sub-centre etc.). The information about demographic data of rural municipality, various maps showing service centres, transport infrastructure inventory, past plans and sector study reports, sector standards and policy targets were collected from the secondary sources, which includes Bureau of Statistics, Survey Department, Local NGOs, line agencies, DDC, rural municipality etc. Digitized topographic maps, administrative map of rural municipality, strategic road network map prepared by DoR, etc. were some other secondary data that were used during the study.

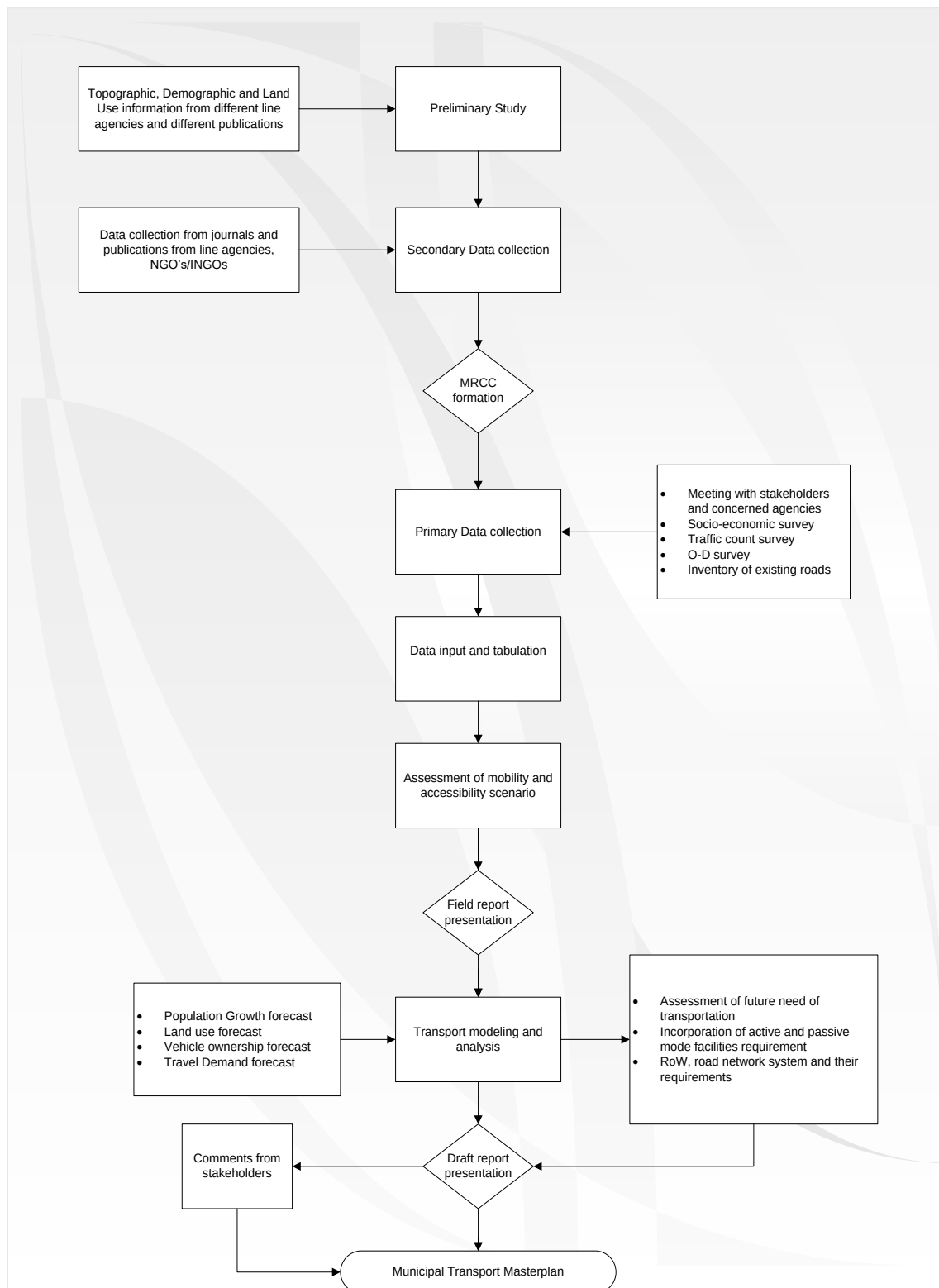


Figure 1: Methodological framework

Primary Data Collection:

Primary information on present household and trip characteristics, traffic characteristics, existing accessibility and mobility level of settlements, prioritized road network required for each ward are obtained via various reliable methods. Tracking of the existing road network along with detail information of its width, surface type and possible intervention required for the effectiveness of services is also carried out.

The primary data collection methods carried out in the field was:

- Road Inventory Survey
- Demand Survey
- Public Transport and Services Study

Road inventory survey was conducted to collect data on its condition of road, road linkage, road safety status and issues that need to be highlight. It helps in field validation of base maps and also assists in preparation of road inventory map, nomenclature and coding of the road linkages and to propose various interventions.

Road Demand survey comprised of interaction session with the members of ward committee followed by asking them to fill up demand survey form, which includes demand of new facility or interventions to improve existing roads based on priority.

Public Transport and Services Study highlights the services provided by public transportation and location of various services and facilities. It was carried out by directly interviewing the route operators.

Data Processing, Analysis and Presentation of Reports

Data collected at field were first entered at MS office tools (MS excel and Word) and GIS database. All the complete and reliable sets of data were transformed into useable information and the present scenario of rural municipality are shown through graphs, figures and tables. Similarly, those which were entered into GIS database provide various types of maps. Population and traffic were forecasted for the RMTMP and RMTTP time period. Various transportation models were used for interpretation and forecasting. And, finally various intervention was purposed and their economic analysis were also performed.

Digital Name Coding

Digital Name is a code given to each road which is unique and generated by an order of alphabetical and numerical digits. Each code is different to the other and forms the basis of differentiating from other road.

The first step taken in naming the streets is to identify the start and end point of a street. This was done with the help of municipal officials and local participation. A start point may be defined as a point located in the western end of a street, if the street is aligned in the West-East alignment and vice-versa. Similarly, in case of a street aligned in the North-South alignment, the start point shall be located in the Northern end of the street.

If the alignment of a street is not exactly North-South or West-East then the start point is defined by the angle by which a street is deviated from the North-South or the West-East line. If a street's deviation is within 45 degrees from North-South line then its start point shall be on the Northern end, else on the Western end of the West-East line. Although the above convention was followed, the situation of streets in some places can imply the method to be impractical. Hence, major service centres and markets or thoroughfares are also considered as the reference point for start point of a street.

After the designation of the start and end points, streets are assigned a unique code in the format A010101. The first letter in the Code represents a major road network (SRN, DRCN or Feeder Roads) in the rural municipality, which shall be taken as the reference for the Digital Name Coding of the Rural Municipal roads. The 2nd and 3rd number represent the number of primary branches from this major road network. Similarly, 4th and 5th number represent the number of secondary branches from the primary branches linking the major road and so on which maintains a hierarchy in coding. Each code may contain 1 letter only to a combination of 15 numbers and letters or more.

While coding, the streets branching from the main streets to the left are given only odd numbers (A01 or A13) and those branching from the right are given even numbers (A02 or A10). The major issue in Digital Name Coding process arises in the coding of new roads in the future. This issue is important as the codes are allocated progressively to each street and any new street shall be given a subsequent code after the last assigned code depending upon the left or right side of the street. The new Digital codes will break the continuity of the Digital naming of the streets but whatsoever these codes will be used for computer database

as the local people only use street names for the recognition of the roads in the rural municipality.

Scoring Criteria for Prioritization

A network consists of several links. It is not possible to construct all roads at a time due to resource and time constraint. Therefore, each link in a network needs to be prioritized. After developing a municipal level network, the cost estimate of the road is prepared. Existing population within the zone of influence, present road demand, future potential route, accessibility situation, land use pattern, environmental and social safeguard, proximity to the market/service centres, religious and tourism places were taken as the indicators for prioritization. The scoring criteria will be finalized after rigorous study and approval from Rural Municipality and RRM RCC.

Table 1: Scoring Criteria for prioritization of Rural Municipal road

S.N	Scoring Criteria	Scoring Unit	Score
1	Link providing service to large settlement areas/population	Population served/km	30
2	Link providing service to existing	No of areas	20
	· market center		
	· tourist attraction areas		
	· other obligatory centres as decided by the rural municipality		
3	Link providing service to the existing service centres such as health centres, education centres (schools/campuses), offices (rural municipality office/Government office, etc.),	Number of different service sector	20
4	Link providing service to the areas recognised by the rural municipality as areas for special consideration, such as areas inhabited by backward and poor ethnic groups/communities, isolated remote areas, historic sites, religious sites etc	Connection to the settlement of such criteria	10
Sub Total			100

Chapter 2: Review of existing infrastructure situation

The chapter deals with the present condition and scenario of the rural municipality based on various primary and secondary data sources. Socio-economic, trip, land use and transportation characteristics are basically dealt in this chapter along with analysing accessibility and mobility scenario within the rural municipality. The basic data source of the analysis is the collected primary data.

2.1. Location

Siddha Kumakha Rural Municipality (Gaunpalika) lies in Salyan district of Province number 6. In 12 March 2017, the government of Nepal implemented a new local administrative structure consisting of 753 local units. With this implementation of the new local administrative structure, VDCs have been replaced with the municipal and rural municipal councils.

The Siddha Kumakha Rural Municipality was established by merging the existing Bajhakaada, Siddeshowri, Chand Karenji village development committees (VDCs) having a total of 89.36 square km. After merging the three VDCs population it had a total population of 13593 according to 2011 Nepal census. The population density of Siddha Kumakha Rural Municipality is 152.112 person/sq. km. Siddha Kumakha Rural Municipality has altogether 5 wards. Topographically the municipality entails 28°26'09.08" N latitude and 82°11'03.84" E longitude with the elevation of 1166m.

Table 2 Borders of Siddha Kumakha Rural Municipality

East:	Bagchaur Municipality
West:	Bangad Kupinde Municipality
North:	Kumakha Kalika Rural Municipality
South:	Sharada Municipality

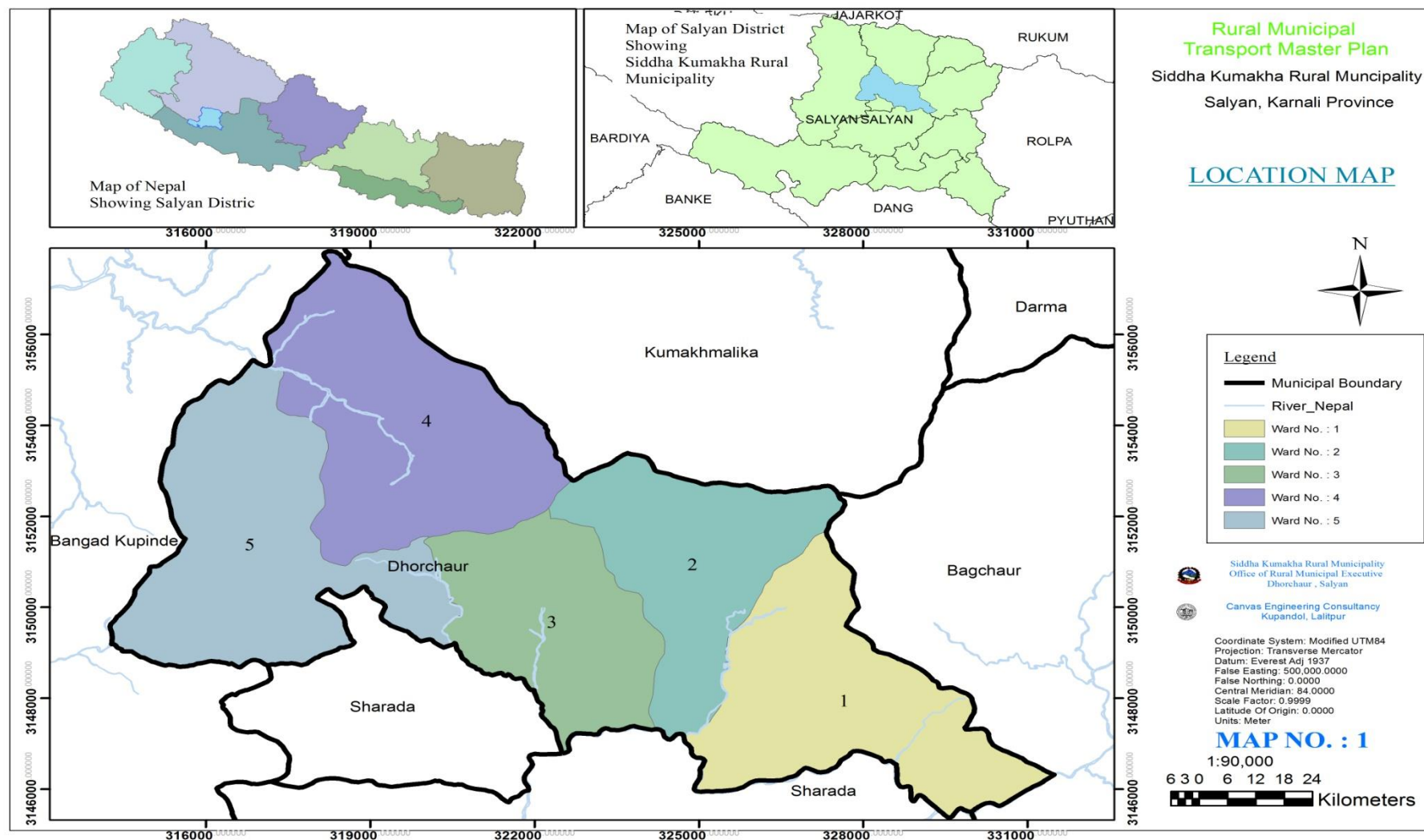


Figure 2 Location Map of Siddha Kumakha Rural Municipality

Table 3 Formation of wards of Siddha Kumakha Rural Municipality

S. No.	New Ward	Previous V.D.C.	Population	Area (Sq. Km)
1	1	Bajha Kanda	3194	18.3
2	2	Siddheshowri	2484	14.62
3	3	Siddheshowri	2699	13.69
4	4	Chande Karenji	2806	21.21
5	5	Chande Karenji	2430	21.55
Total			13613	89.37

2.2. Socio-demographic

Population of this rural municipality in the year of 2068 was 13593 out of which 6504 are male while 7089 are female. The detail population of this sub-metropolitan city is tabulated below:

Ward No.:	HH	Population	Male	Female
1	585	3174	1504	1670
2	442	2484	1221	1263
3	501	2699	1303	1396
4	464	2806	1331	1475
5	412	2430	1145	1285
Total	2404	13593	6504	7089

(Source: National Population Census 2068, CBS Nepal)

The population density of this rural municipality is 152.1 persons per square kilometer. The rate of increment of population yearly is increasing as people of this rural municipality city tend to migrate from other places in search of opportunities and better infrastructure facilities.

2.3. Population projection

A population forecast requires certain information on historic population counts, births, deaths, other rates which affect population change. Population forecasting is essentially a matter of judgment in selecting the kind of forecast to present, in determining the procedures for making it, and in appraising effects of the factors that induce population changes. The problem, of course, is much simpler for areas which have shown marked stability in the size of their populations for several decades, and for which no great change in the economic and social conditions of the locality seems likely. On the other hand it may be extremely difficult and complex for areas which have had sharp fluctuations in the direction or rate of population change in the past, and which may continue to have them.

The main factors affecting the population projection are birth rate, death rate and migration to the city/town concerned. Out of these factors, the migration is chief factor. The factors for migration may be the desire for better economic opportunities, desire for better living or housing conditions (this applies particularly to short distance migration within the same general locality), movement for reasons of health, education, or retirement etc. The level of national economic activity also affects the direction of migration. When employment is high or rising, the movement is generally from rural areas and small towns to the medium-size and larger cities, because of the relatively larger rate of wages and economic opportunities in urban areas.

Table 4 Population Projection

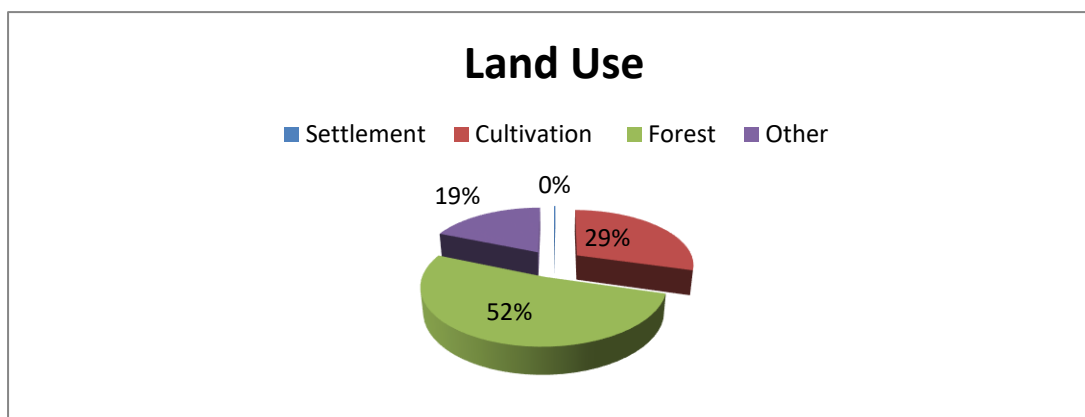
Population as of 2001	11977
Population as of 2011	13593
<u>Estimated Population after 5 years</u>	
Arithemathical Increase Method	14401
Geometrical Increase Method	14482
<u>Estimated Population after 20 years</u>	
Arithemathical Increase Method	16825
Geometrical Increase Method	17509

2.4. Land use Condition

This rural municipality is in the hilly region of Nepal. Most of the area is covered by forest while almost all the remaining area is used for cultivation. The detail of the land use condition of this city is tabulated below:

Table 5 Land use condition in the study area

Land Use	Area (Hector)
Bush	1,037.93
Cultivation	2,629.91
Forest	4,631.86
Grass	586.98
Orchard	0.65
Pond	0.06
Sand	42.23
Waterbody	6.69
Grand Total	8,936.32



2.5. Transportation

a. Road inventory

For the collection of existing road infrastructure data, GPS survey was used and total length of road surveyed was 220.29 Km, out of which 13.95 Km is blacktopped, 112.59 Km road is earthen and 93.75 Km road is proposed new track.

Table 6: Existing Road condition based on Surface Type

Ward No.:	Road Surface (Km)				Sub Total
	Blacktopped	Gravel	Earthen	New Track	
1	9.57	-	22.24	19.11	50.93
2	1.17	-	19.35	19.50	40.03
3	3.21	-	28.44	10.09	41.73
4	-	-	25.90	23.10	49.00
5	-	-	16.65	23.23	39.88
Total	13.95	-	112.59	95.03	221.57

Based on the data collected, it can be seen that the road density per 1000 population is 9.31 km per 1000 population and 1.42 km per square kilometre of area. This value is high as compared to national statistics such as 1.91 km per 1000 populations and 0.344 km per square kilometre.

Table 7: Road Density ward wise

Ward No.:	Population	Area (Sq. Km)	Road (In Km)	Road Per Sq. Km	Road per 1000 Population
1	3174	18.3	32.52	1.78	10.24
2	2484	14.62	20.52	1.40	8.26
3	2699	13.69	31.65	2.31	11.73
4	2806	21.21	25.20	1.19	8.98
5	2430	21.55	16.65	0.77	6.85
Total	13593	89.37	126.54	1.42	9.31

In this road inventory survey, it was found that the roads of this rural municipality are narrow and their width is insufficient to cross two vehicles from opposite direction at a time. Also, the actual width of feeder road and district roads is very small in comparison to their right of way. This rural municipality is supported by one national highway, Rapti Highway, which connects the Rural Municipality with other district and capital city of Nepal-Kathmandu.

According to the District Transport Master Plan (DTMP) of Salyan District, five roads of total length 47.56 Km of this rural municipality are listed as district road core networks (DRCN) and Village Road Core Network (VRCN).

Table 8: District Road Core Networks inside Siddha Kumakha Rural Municipality

S.No.:	Name	Length (In Km)	Remarks
1	Dhorchaur-Uchalne-Chhapdanda-Nathepipal	17.13	DRCN
2	Dhorchaur-Kalalekh-Gurudase(ward 4) -Kain kada (Kumakha)	9.95	DRCN
3	Chakalighat-Okharbot-Thuli Jimali-Thapachaur-Trebeni-Ragechaur Road	9.78	VRCN
4	Kumakha (Gol Takuri) -Oral Gaun - Bhanga Chaur-Kuiyajhol	5.92	VRCN
5	Chhap danda-Ghareli Sadak	4.79	VRCN
Total		47.57	

These District Roads were under the responsibility of the District Development Committee and now they are under the responsibility of Rural Municipality itself.

b. Bridge/Crossings

This rural Municipality consists of steep hills and fast flowing streams. Travelling across such geographical surface requires large number of bridges and crossings.

Suspension bridges are widely used for crossing over streams along foot trails in this rural municipality. Currently, 2 non-motorable bridges are in operation in this rural municipality. Similarly, twomotorable bridges are under operation in Rpati Highway.

c. Road Priority

From the ward level workshop, the most demanding five roads for each ward are collected and these roads will be used for the road priority and while developing road hierarchy.

Table 9: Priority road length based on order of priority (in Km)

Ward No	Priority Road (Km)					SubTotal
	Priority 1	Priority 2	Priority 3	Priority 4	Priority 5	
1	10.44	3.58	0.58	9.63	2.44	26.67
2	9.37	5.73	3.46	0.73	3.94	23.23
3	9.36	4.85	6.72	2.60	0.69	24.23
4	13.67	3.80	3.28	3.49	1.83	26.07
5	4.79	2.44	13.30	1.98	2.61	25.12
Total	47.63	20.40	27.35	18.42	11.51	125.32

Table 10: Priority Road length based on intervention required

Ward No	Upgrading (Km)	New Construction (Km)	Sub-Total
1	22.24	19.11	41.35
2	19.35	19.50	38.86
3	28.44	10.09	38.52
4	25.90	23.10	49.00
5	16.65	23.23	39.88
Total	112.59	95.03	207.62

Table 11: Priority Road list

Ward No	Priority	Road Name	Length (Km)		Sub Total
			Earthen	New Track	
1	1	Kagkhola - Melchaur - UpalloBajhakaada–Jayamare (Wardoffice)	7.14	3.30	10.44
	2	Jalamare - Duberi - Upallo Bajhakaada	2.88	-	2.88
	3	Patare- Kukarekhor	0.58	-	0.58
	4	Upallo Bajhakaada - Hampaal - Dhane Thakura - Simaana Bazaar	2.02	7.61	9.63
	5	Patare-Hamphal-Pallo Hamphal	1.04	1.41	2.44

Ward No	Priority	Road Name	Length (Km)		Sub Total
			Earthen	New Track	
2	1	Chakalighat-Okharbot-Thuli Jimali-Thapachaur-Trebeni-Ragechaur Road	2.67		2.67
		Kumakha (Gol Takuri) -Oral Gaun - Bhanga Chaur- Kuiyajhol	0.94	1.52	2.45
		Trebeni - bhadare - Goltakuri - Kumakha	4.24		4.24
	2	Chakalighat-Okharbot-Thuli Jimali-Thapachaur-Trebeni-Ragechaur Road	1.08		1.08
		Trebeni -Phedi khola - Khani Gaun - Kumakha	0.41	4.24	4.65
	3	Kumakha (Gol Takuri) -Oral Gaun - Bhanga Chaur- Kuiyajhol	3.46		3.46
	4	Rara Baraju - Kaaji gaun - Roka gaun		0.73	0.73
	5	Sal Ghari- Badha Chaur - Jaluke - Danda Katheri	0.66	3.28	3.94
3	1	Dhorchaur-Uchalne-Chhapdanda-Nathepipal	9.36	-	9.36
	2	Dhorchaur-Kalalekh-Gurudase(ward 4) -Kain kada (Kumakha)	4.85	-	4.85
	3	Saharkari - Jhar Gaun - Marmaal Chaur - Simpakha - Majhakharka	4.74	1.03	5.76
	4	Tinkune - Kala Lekha	-	2.60	2.60
	5	Santi bazaar - Ramaldanda - Simri Takura - Simdhara	-	0.69	0.69
4	1	Uchallne -Salleri - Kharban - Khopi Khelna - Ratan Taal - Mulkhola	6.93	6.75	13.67
	2	Saudota - Uchalne	3.62	0.88	4.50
	3	Chinauli - Kharban	-	3.28	3.28
	4	Chade - Salleri	2.20	1.29	3.49
	5	Chipchipe - Sima Tol - Sisneri	0.87	0.96	1.83
5	1	Chhap danda-Ghareli Sadak	3.01	1.77	4.79
	2	Thara Gaira -School - Bangard- Tallo Ghareli	0.93	1.51	2.44
	3	Dah- Ramri -Majh khark - Sune - Jhargaun	7.35	6.91	14.26
	4	Kajeri - Ramri - Daha	-	1.98	1.98
	5	Majha Khark -Uchalne Bato	-	2.61	2.61

d. Traffic condition

This rural municipality posses mixed traffic. There is significant amount of traffic volume on Rapti Highway. Nevertheless, the traffic on other Rural Municipal roads is negligible. Public transportation is available from Chaapdanda, which provides mobility to local people, however, these means of transportation is not reliable due to poor road infrastructures inside the Rural Municipality. Furthermore, considerable number of public vehicles are available on Dhorchaur – Uchalne –Chaapdanda Road, which provides services to people of this Rural

Municipality all year round. For the goods transportation purpose, large and small trucks are being used along with public bus and Jeep, and for the transportation of construction materials such as sand, stone and gravel, tractors and trippers are being used.

2.6. Visionary City Development Plan

The vision of this Siddha Kumakha Rural Municipality should be to develop an environment friendly and clean city by fostering its cultural and religious history and importance with modern urban facilities. However, this plan is yet to be prepared.

For this the main visionary city development plan of the rural municipality should be to develop/preserve the following:

1. Agriculture
2. Tourism
3. Industry

2.7. Indicative Development Potential

IDP is basically the indication of the existing and potential market center/service centers (key growth centers) and the areas having various development potentials such as agro-based industries, high value cash crops and tourism. Thus, IDP shows high value cash crops, tourism area, and area of service centers such as hospital, post office, telecommunication, school, campus, security offices and large settlements, important historic and religious places. Finally, it prepares the ranking of the markets of the rural municipality as the basis of network planning. The IDPM of this rural municipality is yet to be prepared.

Existing/potential areas are defined as:

- Existing/potential areas for development of large industries.
- Areas with extensive small cottage industries.
- Area with service centers such as hospital, post office, telecommunication, school, campus, security offices, Bus Park, sport and recreational centers etc.
- Potential areas for tourism development.
- Area with large settlements.
- Area with important historic and religious places.
- Areas with extensive high value cash crops
- Areas with extensive horticulture.

- Areas with extensive livestock farming.

Chapter 3: Rural Municipality Inventory Map of Road Network

3.1 List of Rural Municipality Roads Class A

All major roads which connect one or more major Growth Centres (market, tourism Centre, industry, etc.) or several Wards with high network coverage, connected directly or through the National Strategic Road Network or district road falls on the road class A. The proposed right of way for this class of road is 20m which includes footpath, greenery, and the carriageway as shown below in the cross section.

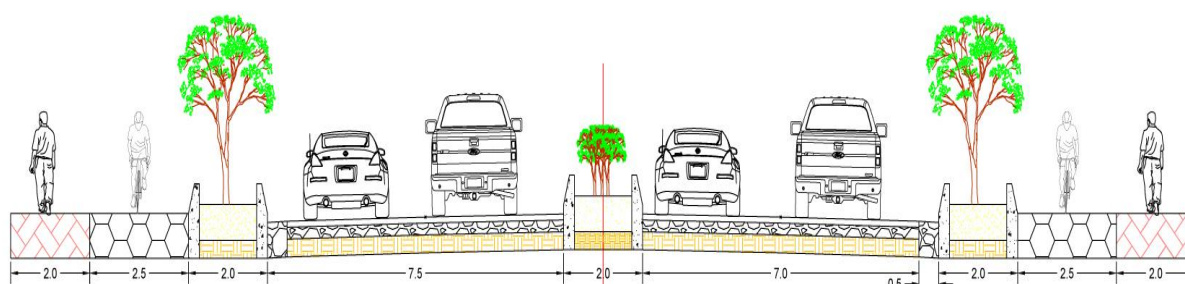


Figure 3 Typical section for Class A road

There are two municipal roads of class A of total length 27.08 Km out of which 24.52 Km is existing road with earthen surface and 2.56 Km is proposed new track. Detail of inventory of Class A roads is illustrated in table below:

Table 12: List of Municipal roads A

Road Code	Road Name	Length (Km)				Sub Total
		Black top	Gravel	Earthen	New Track	
A001	Dhorchaur-Uchalne-Chhapdanda-Nathepipal	-	-	14.57	2.56	17.13
A002	Dhorchaur-Kalalekh-Gurudase(ward 4) - Kain kada (Kumakha)	-	-	9.95	-	9.95
Total		-	-	24.52	2.56	27.08

3.2 List of Rural Municipality Roads Class B

All roads which connect to a major road network and other roads of similar hierarchy with a road connecting major Growth Centre of the same or neighbouring wards which

provide access between Class A and class C road falls on the category of class B. The right of way of this class road is 15m.

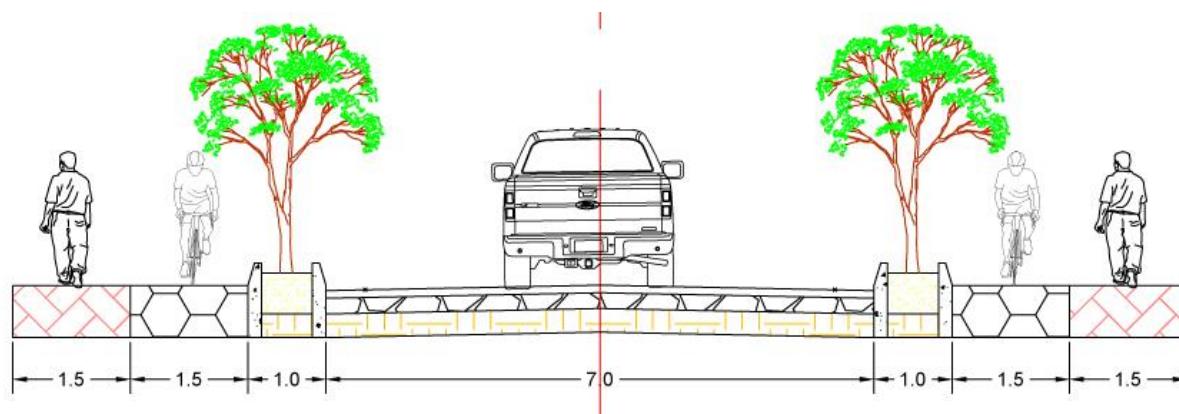


Figure 4 Typical section for Class B road

There are 3rural municipal roads of class B of total length 20.49 Km out of which 14.69 Km is existing road with earthen surface and 5.80 Km is proposed new track. Detail of inventory of Class B roads is illustrated in table below:

Table 13: List of Rural Municipality roads of Class B

Road Code	Road Name	Length (Km)		Sub Total
		Earthen	New Track	
B001	Chakalighat-Okharbot-Thuli Jimali-Thapachaur-Trebeni-Ragechaur Road	7.27	2.51	9.78
B002	Kumakha (Gol Takuri) -Oral Gaun - Bhanga Chaur- Kuiyajhol	4.40	1.52	5.92
B003	Chhap danda-Ghareli Sadak	3.01	1.77	4.79
Total		14.69	5.80	20.49

3.3 List of Ward Roads of Class C

All roads which provide connection to higher order roads with all agricultural roads which connect a farm with a mini-market Centre or an agro-based production Centre and means for mobility of local trips are understood as road class C. For this the proposed right of way for class C roads is 10 m.

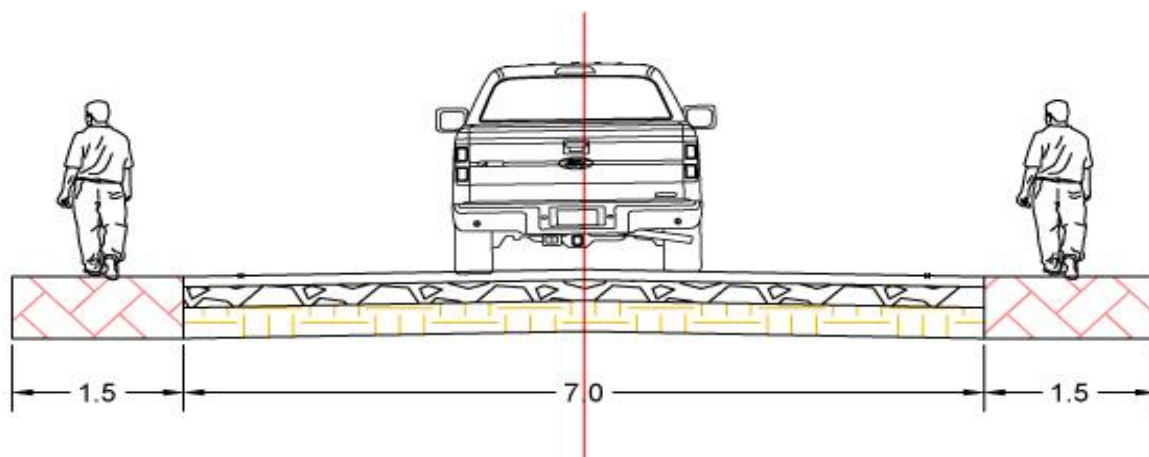


Figure 5 Typical section for Class C road

The following is the list of ward roads of class C. Total length of Class C road is 80.63 Km, out of which 40.20 Km is earthen and 40.43 Km is proposed new track.

Table 14: List of ward roads Class C

Road Code	Road Name	Length (Km)		Sub Total
		Earthen	New Track	
C001	Upallo Bajhakaada - Hampaal - Dhane Thakura - Simaana Bazaar	3.54	7.61	11.15
C002	Patara-Hamphal-Pallo Hamphal	1.04	1.41	2.44
C003	Kagkhola - Melchaur - Upallo Bajhakaada – Duberi-Badhachaur	7.14	3.30	10.44
C004	Jyamire - Duberi - Upallo Bajhakaada	2.88	-	2.88
C005	Tribeni -Pedi khola - Khani Gaun - Kumakha	0.41	4.24	4.65
C006	Tribeni - Bhadare - Goltakuri - Kumakha	4.24	-	4.24
C007	Santi bazaar - Ramaldanda - Simri Takura - Simdhara	1.94	0.69	2.63
C008	Saharkari - Jhar Gaun - Marmaal Chaur - Simpakha - Majhakharka	4.74	1.03	5.76
C009	Tinkune - Kala Lekha	-	2.60	2.60
C010	Dah- Ramri -Majh khark - Sune - Jhargau	7.35	6.91	14.26
C011	Majha Khark -Uchalne Bato	-	2.61	2.61
C012	Uchallne -Salleri - Kharban - Khopi Khelna - Ratan Taal - Mulkhola	6.93	6.75	13.67
C013	Chinauli - Kharban	-	3.28	3.28
Total		40.20	40.43	80.63

3.4 List of Ward Roads of Class D

All other small roads present inside the Municipality lie under class D roads. Such roads provide service to very small population and are for mobility inside a small area. The proposed right of way for class D roads is 6 m.

The following is the list of ward roads of class D. Total length of Class D road is 79.42 Km out of which 33.18 Km is earthen and 46.24 Km is proposed new track.

Table 15 List of Ward Roads Class D

Road Code	Road Name	Length (Km)		Sub Total
		Earthen	New Track	
D001	Satippol – Bichgaun (Uchalne)	-	0.75	0.75
D002	Saudota – Dhanetakura	0.70	-	0.70
D003	Hampaal - Rani Salla	0.54	-	0.54
D004	Patare- Kukarekhor	0.70	-	0.70
D005	Patare- Melbot-Upallo Patare	1.36	1.37	2.73
D006	Jyamire - Tallo Bajhakada (Pasupati Pravi)- Olidera	2.19	0.29	2.48
D007	Belauti Ghari-Syanijula	0.55	-	0.55
D008	Belauti Ghari - Syanla	0.32	-	0.32
D009	Tallo Bajhakada - Kharke danda - Melchaur	0.20	1.82	2.02
D010	Tribeni - Melchaur	0.73	2.56	3.28
D011	Khani Gaun - Irja danda	-	0.92	0.92
D012	Chakhligat - Badha Chaur	0.93	0.99	1.93
D013	Chisa Paani Road	-	0.78	0.78
D014	Sal Ghari- Badha Chaur - Jaluke - Danda Katheri	1.85	3.28	5.14
D015	Garhale - Phedi Khola	-	1.07	1.07
D016	Rara Baraju - Kaaji gaun - Roka gaun	-	0.73	0.73
D017	Bhalu Khola - Pallo Kalle Chaur	0.67	-	0.67
D018	Dhorchaur - Kalle chuar	0.86	-	0.86
D019	Santi Bazar - Simadhara	0.40	0.33	0.73
D020	Ramal danda - Simti Takura road	-	0.56	0.56
D021	Tallo Kuiya Jhol Road	-	1.23	1.23
D022	Mathillo Kuiya jhol Road	-	1.35	1.35
D023	Bhangchaur Road	-	0.88	0.88
D024	Melchaure Road	0.68	-	0.68
D025	Jiuwa - Rage Chaur - Danda Kotheri	2.60	-	2.60
D026	Batule – Gaterna - Khanigaira	0.85	1.85	2.70
D027	Jhar Gaun Road	-	0.74	0.74
D028	Majha Gaun Road	-	1.12	1.12
D029	Tinkune - Kapre Chaur	-	1.17	1.17
D030	Saudota - Uchalne	2.93	0.88	3.80
D031	Chade - Salleri	2.20	1.29	3.49
D032	Majh Khark – Thulo Nain’na- Melchauri	-	2.45	2.45

Road Code	Road Name	Length (Km)		Sub Total
		Earthen	New Track	
D033	Kareni - Darim Taura	2.98	0.54	3.52
D034	Chipchipe - Sima Tol - Sisneri	0.87	0.96	1.83
D035	Tata - Karenji	-	0.95	0.95
D036	Kajeri - Ramri - Daha	-	1.98	1.98
D037	Melchauri Road	1.64	-	1.64
D038	Katuje- Takura - Dhaherini	2.02	-	2.02
D039	Mathilo Bada Gada Bato	1.00	0.90	1.90
D040	Bada Kada-Guide bato-Khaira Gaari	1.54	3.81	5.35
D041	Thara Gaira -School - Bangard- Tallo Ghareli	0.93	1.51	2.44
D042	Timile - Kotbaara- Sagine	0.95	5.46	6.41
D043	Ratan Taal - Kharpule	-	1.71	1.71
Total		33.18	46.24	79.42

3.5 Rural Municipality Inventory Map of Road Network

Road inventory survey was conducted through the rural municipality as far as possible except the new construction considered. In the inventory survey, the surface condition, width of road, and intervention required were collected. These data are presented in rural municipality inventory map of road by surface condition, by width and invention needed. Similarly, the map of road infrastructure is also prepared. Refer annex of this report for map in detail.

Table 16: Length of Roads based on surface condition

Class	Earthen	New Track	Sub Total (Km)
A	24.52	2.56	27.08
B	14.69	5.80	20.49
C	40.20	40.43	80.63
D	33.18	46.24	78.14
Total	112.59	95.03	206.34

Chapter 4: Perspective Plan of Rural Municipality Transport Network

4.1 Process and procedure for collection of demand

For the collection of ward road demand, ward level workshop on each ward was conducted. With discussion with the concerned stakeholders of each ward, five roads from each ward with their significance were selected as the ward road for the RMTMP period.

4.2 Scoring system for screening, grading and prioritization

As the financial resources of rural municipality is less as compared to the demand of people there is always conflict among the leaders from different parts for the development of road infrastructure. For this we have to prioritize roads, based on the certain conditions. For this RMTMP, we have adopted the criteria given by the ministry with discussion and minor modification with the concerned stakeholders. Based on this criteria, municipal and ward roads have been prioritized class wise. The details of prioritization criteria are included in chapter 1 of Volume II of this report and prioritized roads are shown in Annex with detail of score on each criteria and ranking.

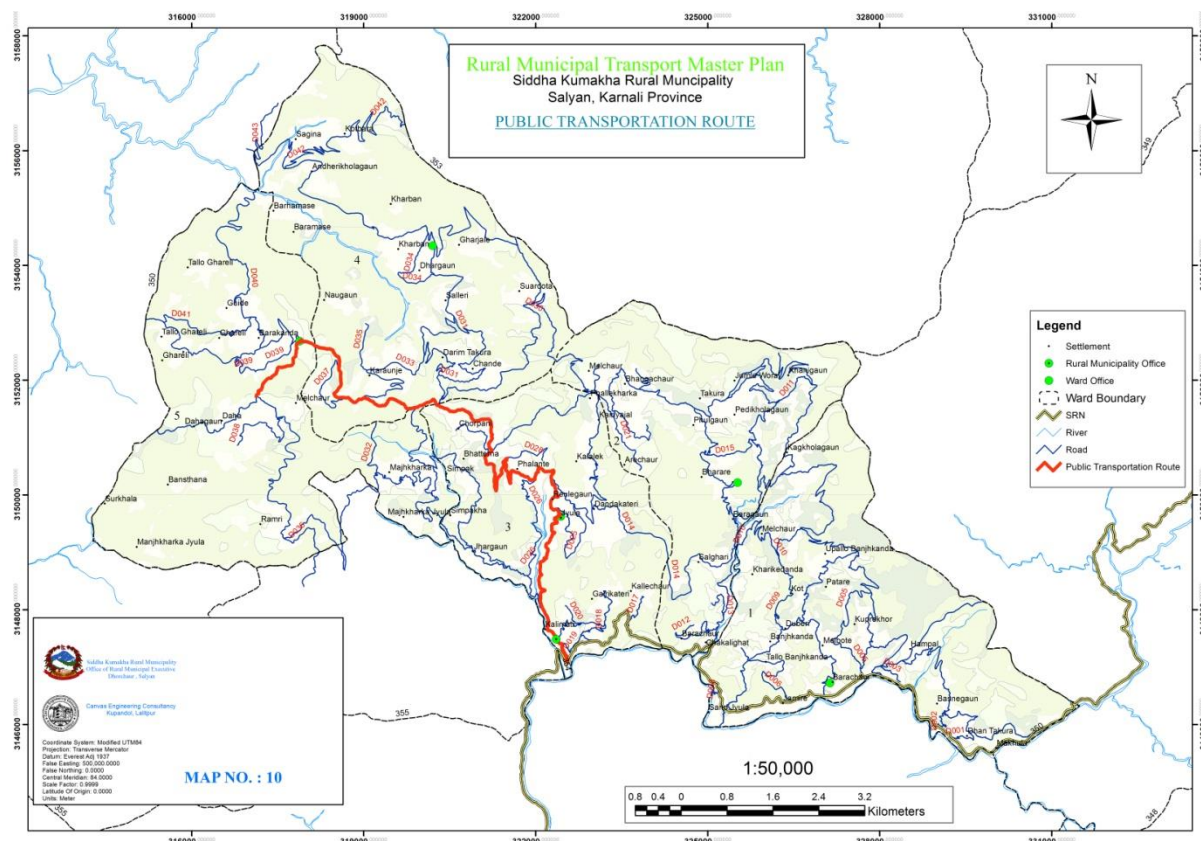
4.3 Possible inter-municipality/district linkages

This rural municipality is supported by one 13.95 Km long highway, Rapti Highway which connects the Rural Municipality with other district and capital city of Nepal-Kathmandu. According to the District Transport Master Plan (DTMP) of Salyan District, five roads of total length 47.57 Km of this rural municipality are listed as district road core networks (DRCN) and Village Road Core Network (VRCN). These roads serve as inter-municipality and district linkages.

4.4 Public Transportation

With the increase of development of infrastructures within the Rural Municipality, the requirement for intra-municipal public transportation has become mandatory. Currently, following two public transportation routes are in operation within the rural municipality.

- 1: Chaapdanda –Uchalne –Dhorchaur – Shreenagar
- 2: Chinali – Danda Katheri –Dhorcharu- Shreenagar



Although all of these public transportation routes are oriented toward capital city-Kathmandu-they provide significant support to intra-Rural Municipality movement. However, Rural Municipality will require more concrete, effective and efficient public transportation system inside the Rural Municipality in future. To meet this inevitable need, existing public transportation routes are modified and other new routes are assigned based on population, area, expected traffic flow in future and need of local peoples. Such routes are classified in three categories.

a. Primary Route Network (PRN)

The primary routes provide linkage between large settlements within the Rural Municipality to Rural Municipality centre. These routes serve as backbone of rural municipality by serving large population and accommodating large number of vehicles. This RMTTP has proposed two primary routes within rural municipality.

Table 17: Proposed Primary Public Transportation Routes

Route	Name
Primary Route 1	Kharban – Uchalne –Dorchaur - Shreenagar
Primary Route 2	Khanigaun – Bharare – Chalkhalighat - Shreenagar
Primary Route 3	Upallno Baanjhakanda - Jyamire

Route	Name
Primary Route 4	Danda Katheri - Dorcharu

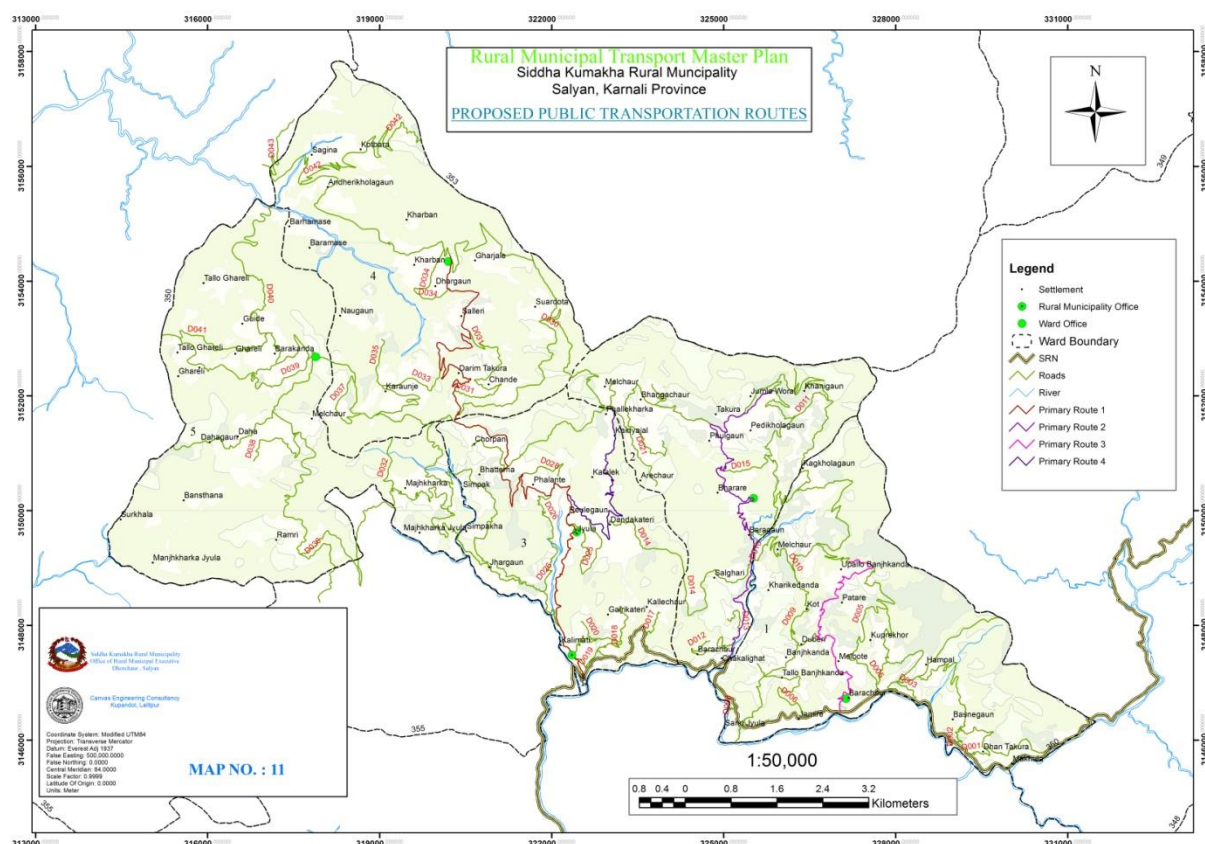


Figure 6: Proposed Primary Route Network

4.5 Interventions for MTPP

a. Maintenance

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

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

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

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

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

The length of roads in km to be included under each Maintenance type for the first year is indicated below.

Table 18: Length of road for maintenance work

Road Code	Length of road in km for maintenance (Km)		
	Emergency	Routine	Recurrent(earthen)
A001	17.13	17.13	14.57
A002	9.95	9.95	9.95
B001	9.78	9.78	7.27
B002	5.92	5.92	4.40
B003	4.79	4.79	3.01
B004	2.88	2.88	2.88
C001	11.15	11.15	3.54
C002	2.44	2.44	1.04
C003	10.44	10.44	7.14
C005	4.65	4.65	0.41
C006	4.24	4.24	4.24

Road Code	Length of road in km for maintenance (Km)		
	Emergency	Routine	Recurrent(earthen)
C007	2.63	2.63	1.94
C008	5.76	5.76	4.74
C009	2.60	2.60	-
C010	14.26	14.26	7.35
C011	2.61	2.61	-
C012	13.67	13.67	6.93
C013	3.28	3.28	-
D001	0.75	0.75	-
D002	0.70	0.70	0.70
D003	0.54	0.54	0.54
D004	0.70	0.70	0.70
D005	2.73	2.73	1.36
D006	2.48	2.48	2.19
D007	0.55	0.55	0.55
D008	0.32	0.32	0.32
D009	2.02	2.02	0.20
D010	3.28	3.28	0.73
D011	0.92	0.92	-
D012	1.93	1.93	0.93
D013	0.78	0.78	-
D014	5.14	5.14	1.85
D015	1.07	1.07	-
D016	0.73	0.73	-
D017	0.67	0.67	0.67
D018	0.86	0.86	0.86
D019	0.73	0.73	0.40
D020	0.56	0.56	-
D021	1.23	1.23	-
D022	1.35	1.35	-
D023	0.88	0.88	-
D024	0.68	0.68	0.68
D025	2.60	2.60	2.60
D026	2.70	2.70	0.85
D027	0.74	0.74	-
D028	1.12	1.12	-
D029	1.17	1.17	-
D030	3.80	3.80	2.93
D031	3.49	3.49	2.20
D032	2.45	2.45	-
D033	3.52	3.52	2.98
D034	1.83	1.83	0.87
D035	0.95	0.95	-

Road Code	Length of road in km for maintenance (Km)		
	Emergency	Routine	Recurrent(earthen)
D036	1.98	1.98	-
D037	1.64	1.64	1.64
D038	2.02	2.02	2.02
D039	1.90	1.90	1.00
D040	5.35	5.35	1.54
D041	2.44	2.44	0.93
D042	6.41	6.41	0.95
D043	1.71	1.71	-
Total	207.62	207.62	112.59

Table 19: Cost of maintenance for first year of RMTMP in thousands

Road Code	Maintainance Cost in Thousands		
	Emergency	Routine	Recurrent(earthen)
A001	771	514	5,463
A002	448	299	3,732
B001	440	293	2,727
B002	266	178	1,651
B003	216	144	1,130
B004	129	86	1,079
C001	502	335	1,327
C002	110	73	389
C003	470	313	2,677
C005	209	139	153
C006	191	127	1,590
C007	119	79	728
C008	259	173	1,777
C009	117	78	-
C010	642	428	2,757
C011	117	78	-
C012	615	410	2,597
C013	148	98	-
D001	34	23	-
D002	32	21	263
D003	24	16	201
D004	32	21	264
D005	123	82	510
D006	112	75	823
D007	25	16	205
D008	14	9	118
D009	91	60	73
D010	148	99	273
D011	42	28	-

Road Code	Maintenance Cost in Thousands		
	Emergency	Routine	Recurrent(earthen)
D012	87	58	350
D013	35	23	-
D014	231	154	695
D015	48	32	-
D016	33	22	-
D017	30	20	253
D018	39	26	322
D019	33	22	151
D020	25	17	-
D021	56	37	-
D022	61	41	-
D023	39	26	-
D024	31	21	256
D025	117	78	976
D026	121	81	319
D027	33	22	-
D028	51	34	-
D029	52	35	-
D030	171	114	1,097
D031	157	105	825
D032	111	73	-
D033	158	106	1,117
D034	82	55	325
D035	43	28	-
D036	89	59	-
D037	74	49	616
D038	91	61	756
D039	86	57	375
D040	241	160	576
D041	110	73	348
D042	289	192	355
D043	77	51	-
Total	9,343	6,228	42,221

b. Improvement

Improvement refers to actions required to improve a road to bring it to a maintainable all-weather standard. It includes the following actions:

1. Rehabilitation - Significant repairs required to bring a very poor road back to a maintainable standard. This does not include any changes to the original surface type.

2. Gravelling - Placement of gravel layer to make it all-weather and ensure that the road remains passable during the rainy season.

3. Cross drainage - Placement of suitable cross-drainage structures with the aim of making the road all-weather and ensuring that the road remains passable even during the rainy season.

4. Protective structures - Placement of retaining walls and lined side drains to avoid excessive damage to the road during the rainy season and bring it to a maintainable standard.

5. Blacktopping - Placement of a blacktop layer in roads with traffic volumes exceeding 50 passenger car units (PCU) to reduce damage to the road surface.

6. Widening - Increase of the road width in roads with traffic volumes exceeding 500 passenger car units (PCU) to ensure the proper flow of traffic.

Table 20: Length for gravelling and blacktop and cost

Road Code	Length (Km)			Gravelling Cost	Blacktopping Cost	Track Opening Cost
	Earthen	New Track	Total			
A001	14.57	2.56	17.13	69,988	153,436	10,248
A002	9.95	-	9.95	40,660	89,139	-
B001	7.27	2.51	9.78	24,177	53,003	6,061
B002	4.40	1.52	5.92	39,967	87,619	10,038
B003	3.01	1.77	4.79	19,566	42,895	7,098
B004	2.88	-	2.88	45,561	99,883	30,448
C001	3.54	7.61	11.15	9,986	21,893	5,633
C002	1.04	1.41	2.44	42,663	93,531	13,211
C003	7.14	3.30	10.44	11,754	25,768	-
C005	0.41	4.24	4.65	18,992	41,636	16,964
C006	4.24	-	4.24	17,324	37,981	-
C007	1.94	0.69	2.63	10,761	23,592	2,768
C008	4.74	1.03	5.76	23,552	51,633	4,102
C009	-	2.60	2.60	10,636	23,318	10,413
C010	7.35	6.91	14.26	58,261	127,726	27,626
C011	-	2.61	2.61	10,662	23,374	10,438
C012	6.93	6.75	13.67	55,866	122,476	26,989
C013	-	3.28	3.28	13,408	29,393	13,126
D001	-	0.75	0.75	15,531	34,049	3,502
D002	0.70	-	0.70	2,874	6,301	-
D003	0.54	-	0.54	2,962	6,494	2,900

Road Code	Length (Km)			Gravelling Cost	Blacktopping Cost	Track Opening Cost
	Earthen	New Track	Total			
D004	0.70	-	0.70	14,255	31,251	5,160
D005	1.36	1.37	2.73	2,195	4,812	-
D006	2.19	0.29	2.48	20,984	46,003	13,127
D007	0.55	-	0.55	3,065	6,718	3,000
D008	0.32	-	0.32	2,860	6,270	-
D009	0.20	1.82	2.02	9,979	21,878	6,053
D010	0.73	2.56	3.28	8,090	17,737	7,921
D011	-	0.92	0.92	2,755	6,041	-
D012	0.93	0.99	1.93	3,506	7,687	-
D013	-	0.78	0.78	10,637	23,318	-
D014	1.85	3.28	5.14	4,593	10,069	4,496
D015	-	1.07	1.07	7,463	16,361	3,837
D016	-	0.73	0.73	11,150	24,445	5,480
D017	0.67	-	0.67	11,031	24,184	7,397
D018	0.86	-	0.86	3,021	6,624	2,958
D019	0.40	0.33	0.73	3,776	8,278	3,697
D020	-	0.56	0.56	7,875	17,264	3,976
D021	-	1.23	1.23	5,533	12,129	5,416
D022	-	1.35	1.35	2,229	4,887	-
D023	-	0.88	0.88	13,417	29,415	10,227
D024	0.68	-	0.68	4,783	10,486	4,683
D025	2.60	-	2.60	2,978	6,529	1,301
D026	0.85	1.85	2.70	2,294	5,029	2,246
D027	-	0.74	0.74	4,766	10,448	4,666
D028	-	1.12	1.12	3,180	6,971	3,113
D029	-	1.17	1.17	4,372	9,585	4,280
D030	2.93	0.88	3.80	5,043	11,055	4,937
D031	2.20	1.29	3.49	3,576	7,839	3,501
D032	-	2.45	2.45	5,849	12,821	-
D033	2.98	0.54	3.52	10,150	22,253	1,164
D034	0.87	0.96	1.83	1,290	2,829	-
D035	-	0.95	0.95	8,235	18,053	7,282
D036	-	1.98	1.98	8,240	18,064	-
D037	1.64	-	1.64	7,771	17,037	3,607
D038	2.02	-	2.02	21,841	47,881	15,239
D039	1.00	0.90	1.90	14,373	31,510	2,162
D040	1.54	3.81	5.35	3,881	8,508	3,799
D041	0.93	1.51	2.44	6,712	14,715	-
D042	0.95	5.46	6.41	6,998	15,342	6,851
D043	-	1.71	1.71	26,198	57,434	21,858
Total	112.59	95.03	207.62	903,110	1,979,895	374,997

Table 21: Roads requiring cross drainage structures

Road Code	Road Name	Types of Cross Structures			
		Bridge	Culvert	Causeway	Total
A001	Dhorchaur-Uchalne-Chhapdanda-Nathepipal	-	2	13	15
A002	Dhorchaur-Kalalekh-Gurudase(ward 4) -Kain kada (Kumakha)	-		2	2
B001	Chakalighat-Okharbot-Thuli Jimali-Thapachaur-Trebeni-Ragechaur Road	-	1	11	12
B002	Kumakha (Gol Takuri) -Oral Gaun - Bhanga Chaur- Kuiyajhol	-		9	9
B003	Chhap danda-Ghareli Sadak	-		4	4
C001	Upallo Bajhakaada - Hampaal - Dhane Thakura - Simaana Bazaar	-	2	17	19
C002	Patare-Hamphal-Pallo Hamphal	-		2	2
C003	Kagkhola - Melchaur - Upallo Bajhakaada - Badhachaur	-	1	15	16
C005	Tribeni -Pedi khola - Khani Gaun - Kumakha	-	1	7	8
C006	Tribeni - Bhadare - Goltakuri - Kumakha	-		2	2
C008	Saharkari - Jhar Gaun - Marmaal Chaur - Simpakha - Majhakharka	-	3	7	10
C009	Tinkune - Kala Lekha	-		2	2
C010	Dah- Ramri -Majh khark - Sune - Jhargaun	-	2	16	18
C012	Uchallne -Salleri - Kharban - Khopi Khelna - Ratan Taal - Mulkhola	-	4	3	7
C013	Chinauli - Kharban	-		2	2
D002	Saudota - Dhanetakura	-		1	1
D016	Rara Baraju - Kaaji gaun - Roka gaun	-		2	2
D030	Saudota - Uchalne	-		6	6
D031	Chade - Salleri	-		6	6
Total		-	17	127	144

4.6 Perspective plan of Rural municipality transport network with score and ranking

In total there are roads of length 220.29 Km within the rural municipality excluding feeder roads and National Highway, either in planned or existing condition. All the standards set by the rural municipality council are assumed not to decrease its RoW whenever these roads fall on the lower class in this RMTMP.

Table 22: Arrangement of Road width

SN	Road Class	Min.RoW(m)	Setback(m)	Pavement(m)
1	A	20	2.5	11
2	B	15	2.5	11
3	C	10	2	7
4	D	6	1.5	5

**The ROW of the class 'A' district roads is 20M and class 'B' roads is 15M*

Urban Development Strategy 2015 aims to pave 50% of the municipal roads by the end of 2031AD for New Municipalities and this RMTMP planned to pave **all roads** within the perspective period of 20 years i.e. by the year of 2039AD in its **full width**.

For the financial requirement, the rate of different interventions as given by the ToR is used.

For the financial planning the following assumptions are made:

- 20% of length of road requires retaining wall on hill and valley side and the cross section of retaining is taken as 1.5 square meter
- 30% of the length of road requires gabion wall and the cross section of gabion is taken as 1.5 square meter
- full length of road requires longitudinal drainage structures
- Length of bridge in average taken as 30m
- Financial capacity of rural municipality increases by 15% each year

Based on this rate of item and total required interventions, a total of 412 crore of Nepalese rupees is projected to be required to develop road infrastructure and maintain road infrastructures. For this the assumption made is that the financial capacity of rural municipality increases by 15% each year. These costs will change slightly as the roads are improved and the standard costs change. This should be updated on annual basis.

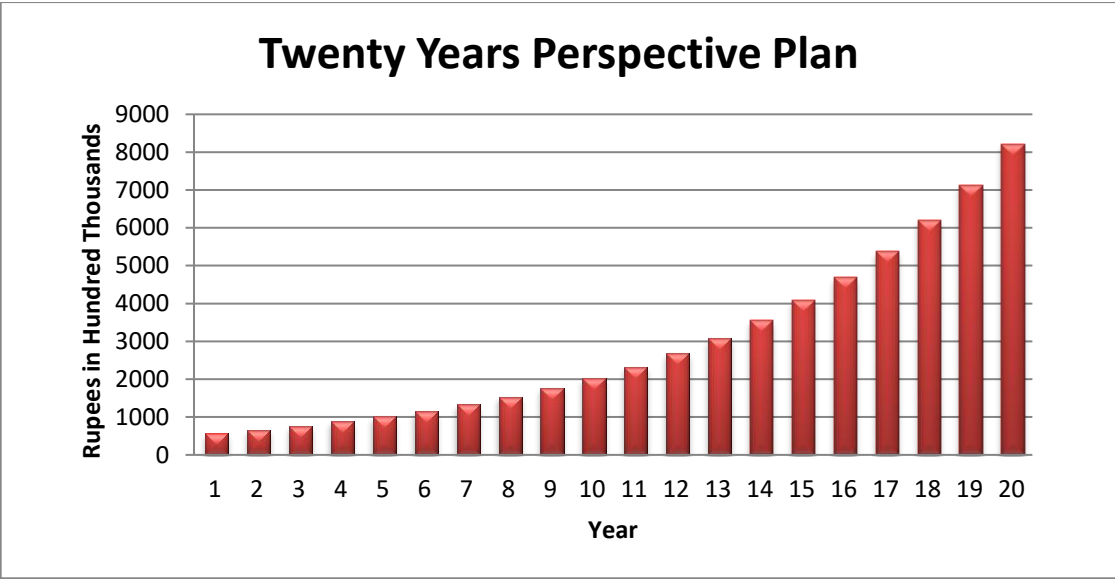


Figure 7: Perspective financial plan for 20 years

Chapter 5: First Five Year Rural Municipality Transport Master Plan

The Rural Municipal Transport Master Plan (RMTMP) that covers the next five years is prepared based on the projected financial requirement to fulfil the perspective plan. Year-wise targets are prepared for the different roads and intervention types.

5.1.Five Year Projected Financial Plan

To fulfil the required interventions implementation plan, financial requirements should be collected from the possible funding sources. For this the present financial capacity of the rural municipality is considered to increase by 15% each year. The rural municipality aims to invest approximately 5.76Crore of budget in road infrastructure in the following fiscal year and this budget will increase on the years following.

5.2.Sharing of Funds

The distribution of the available road sector budget for the RMTMP period is given by ToR is as given below figure. Out of 100% budget, 70% is allocated for the construction of roads and 30% is allocated for maintenance work. As this amount of budget for maintenance work is huge, this amount can also be used for the construction of drain and retaining structures while in the initial RMTMP period. After large network of road is developed, this amount will be used in maintenance work.

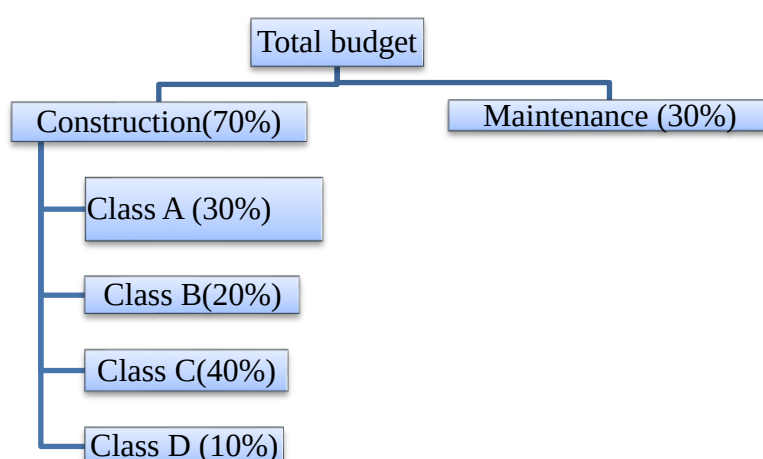


Figure 8: Distribution of Budget in RMTMP period

Based on the above distribution scheme of the budget, the required annual budget will be as follows:

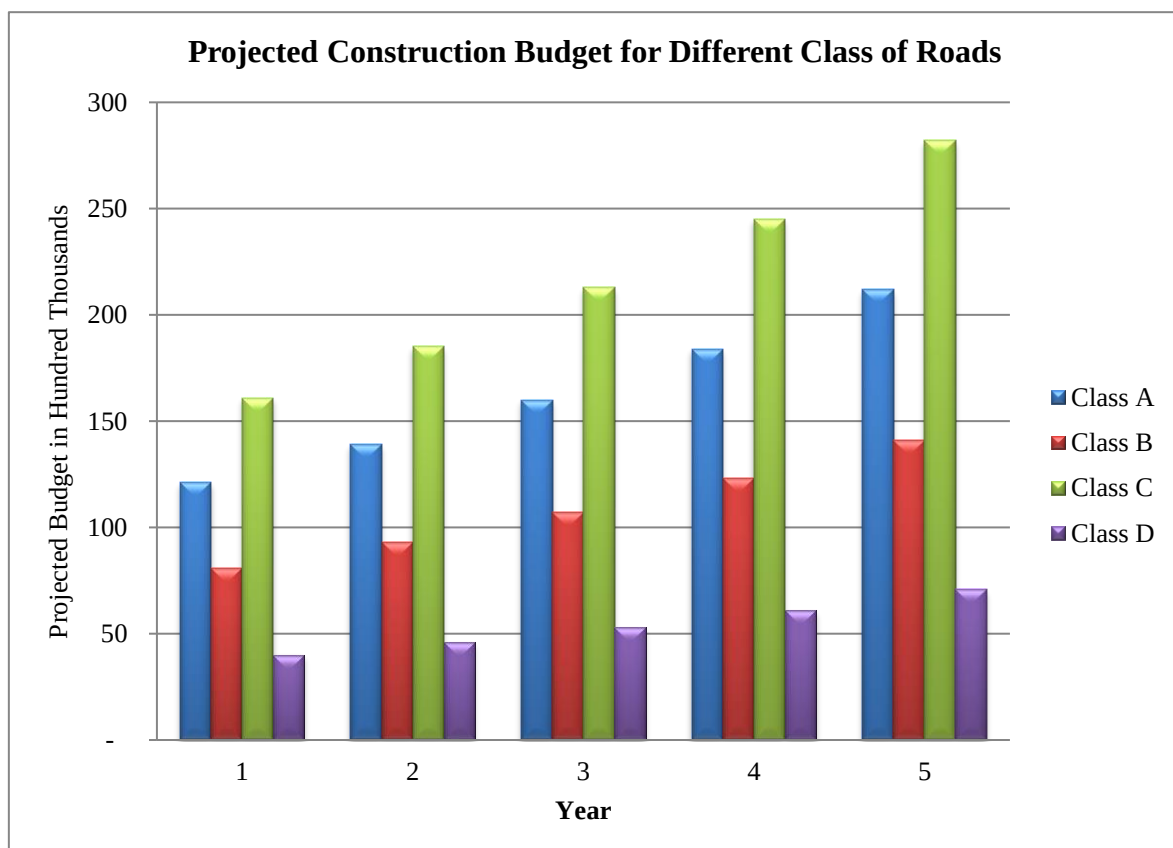
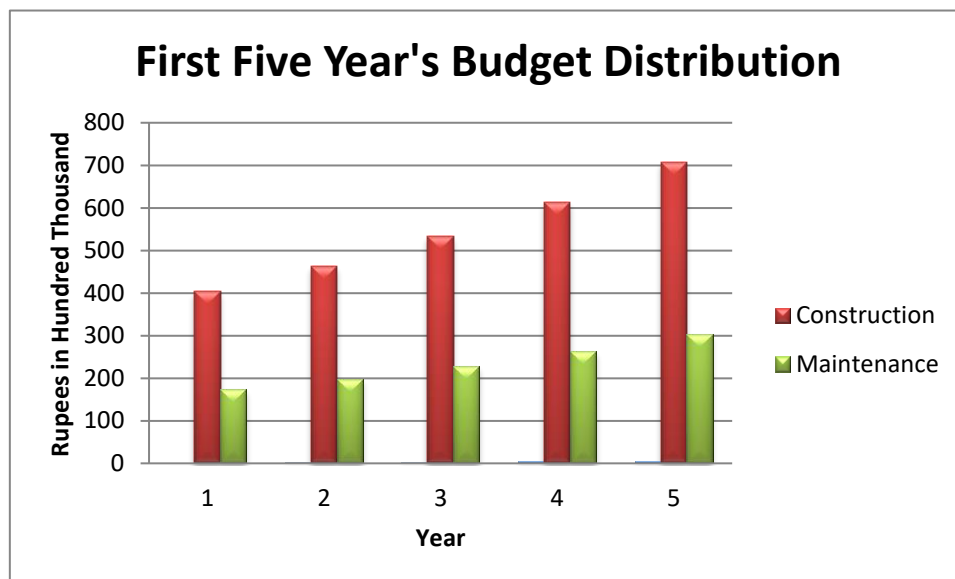


Figure 9: Investment Plan for RMTMP period

5.3.First Five-YearRural Municipality Transport Implementation Plan

For the implementation plan of RMTMP period, the following assumptions have been made:

- Class 'A' & 'B' roads are planned for double lane.
- Class 'C' and 'D' roads are planned for single lane.
- All class of roads are planned for upto all weather condition only
- Emphasis given to accessibility.
- Maintenance budget is considered to use in the construction/management of drain and retaining structures.

The projected budget for first five-year plan is as follows:

Table 23: Projected budget distribution for first five years

Year	Projected Budget (in Hundred Thousand)		
	Construction	Maintenance	Total
1	403	173	576
2	463	198	661
3	533	228	761
4	613	263	876
5	706	303	1,009
Total	2,718	1,165	3,883

Table 24: Projected construction budget for different class of roads

Year	Projected Budget (in Hundred Thousand)			
	Class A	Class B	Class C	Class D
1	121	81	161	40
2	139	93	185	46
3	160	107	213	53
4	184	123	245	61
5	212	141	282	71
Total	816	545	1,086	271

The summary of five-year Rural Rural Municipality Transport Master Plan-based on these assumptions-is elucidated in the table below: (All length is in Km)

Table 25 Summary of Projected Plan

Intervention	Class A	Class B	Class C	Class D	Total
Blacktopping	1.31	-	-	-	1.31
Gravelling	25.96	16.37	29.15	7.03	78.52
New Track	-	1.52	10.06	6.79	18.36

Table 26: RMTMP first two-year plan for Class A Roads

Road Code	Score	Rank	Proposed Improvement				I year				II year			
			New Track	Gravelling	Blacktopping	Periodic Maintenance	Length completed (Km)	Cost	Remaining length (Km)	Intervention	length completed (Km)	Cost	Remaining Length (Km)	Intervention
A001	95.00	1	2.56	17.13	17.13	-	2.00	6,285,714	15.13	Gravelling	3.00	9,428,571	12.13	Gravelling
A002	59.92	2	-	9.95	9.95	-	1.85	5,814,286	8.10	Gravelling	1.42	4,471,429	6.68	Gravelling

Table 27: RMTMP third, fourth and fifth year plan for Class A Roads

Road Code	Score	Rank	III year			IV year			V year		
			Length completed (Km)	Cost	Remaining Length (Km)	Length completed (Km)	Cost	Remaining Length (Km)	Length completed (Km)	Cost	Remaining Length (Km)
A001	95.00	1	4.00	12,571,429	8.13	4.00	12,571,429	4.13	3	8,187,970	1.52
A002	59.92	2	1.09	3,428,571	5.59	1.85	5,828,571	8.10	4.14	13,012,030	5.81

Table 28: RMTMP first two year plan for Class B Roads

Road Code	Score	Rank	Proposed Improvement				I year				II year			
			New Track	Gravelling	Blacktopping	Periodic Maintenance	Length completed (Km)	Cost	Remaining length (Km)	Intervention	length completed (Km)	Cost	Remaining Length (Km)	Intervention
B002	79.00	1	1.52	5.92	5.92	-	2.00	6,285,714	3.92	Gravelling	1.00	3,142,857	2.92	Gravelling
B001	74.97	2	2.51	9.78	9.78	-	0.58	1,814,286	9.20	Gravelling	1.00	3,142,857	8.20	Gravelling
B003	74.46	3	1.77	4.79	4.79	-	-	-	4.79	Gravelling	0.96	3,014,286	3.83	Gravelling

Table 29: RMTMP third, fourth- and fifth-year plan for Class B Roads

Road Code	Score	Rank	III year		IV year			V year		
			Cost	Remaining Length (Km)	Length completed (Km)	Cost	Remaining Length (Km)	Length completed (Km)	Cost	Remaining Length (Km)
B002	79.00	1	1,271,429	2.51	0.99	3,111,429	(0.99)	1.52	3,040,000	-
B001	74.97	2	6,285,714	6.20	2.00	6,285,714	4.20	2.00	6,285,714	2.20
B003	74.46	3	3,142,857	2.83	0.92	2,902,857	1.91	1.52	4,774,286	3.27

Table 30: RMTMP First two-year plan for Class C Roads

Road Code	Score	Rank	Proposed Improvement				I year				II year			
			New Track	Gravelling	Blacktopping	Periodic Maintenance	Length completed (Km)	Cost	Remaining length (Km)	Intervention	length completed (Km)	Cost	Remaining Length (Km)	Intervention
C012	92.68	1	6.75	13.67	13.67	-	3.00	6,000,000	3.75	New Track	3.75	7,500,000	(0.00)	New Track
C006	88.79	2	-	4.24	4.24	-	2.00	6,285,714	2.24	Gravelling	1.00	3,142,857	1.24	Gravelling
C003	88.52	3	3.30	10.44	10.44	-	1.91	3,814,286	1.40	New Track	1.40	2,800,000	(0.00)	New Track
C008	83.00	4	1.03	5.76	5.76	-	-	-	5.76	Gravelling	1.00	3,142,857	4.76	Gravelling

Road Code	Score	Rank	Proposed Improvement				I year				II year			
			New Track	Gravelling	Blacktopping	Periodic Maintenance	Length completed (Km)	Cost	Remaining length (Km)	Intervention	length completed (Km)	Cost	Remaining Length (Km)	Intervention
C010	76.38	5	6.91	14.26	14.26	-	-	-	14.26	Gravelling	0.61	1,914,286	13.65	Gravelling
C013	75.68	6	3.28	3.28	3.28	-	-	-	3.28	Gravelling	-	-	3.28	Gravelling
C009	75.00	7	2.60	2.60	2.60	-	-	-	2.60	Gravelling	-	-	2.60	Gravelling
C001	70.52	8	7.61	11.15	11.15	-	-	-	11.15	Gravelling	-	-	11.15	Gravelling
C002	64.52	9	1.41	2.44	2.44	-	-	-	2.44	Gravelling	-	-	2.44	Gravelling

Table 31: RMTMP third, fourth- and fifth-year plan for Class C Roads

Road Code	Score	Rank	III year			IV year			V year		
			Length completed (Km)	Cost	Remaining Length (Km)	Length completed (Km)	Cost	Remaining Length (Km)	Length completed (Km)	Cost	Remaining Length (Km)
C012	92.68	1	2.00	6,285,714	11.67	2.00	6,285,714	9.67	2.00	6,285,714	7.67
C006	88.79	2	1.00	3,142,857	0.24	0.24	754,286	0.00	-	-	0.00
C003	88.52	3	1.00	3,142,857	9.44	1.00	3,142,857	8.44	1.00	3,142,857	7.44
C008	83.00	4	1.00	3,142,857	3.76	1.00	3,142,857	2.76	1.00	3,142,857	1.76
C010	76.38	5	1.00	3,142,857	12.65	1.00	3,142,857	11.65	1.00	3,142,857	10.65
C013	75.68	6	0.78	2,442,857	2.50	1.00	3,142,857	1.50	1.00	3,142,857	0.50
C009	75.00	7	-	-	2.60	1.00	3,142,857	1.60	1.00	3,142,857	0.60
C001	70.52	8		-	11.15	0.56	1,745,714	10.60	1.00	3,142,857	9.60
C002	64.52	9		-	2.44	-	-	2.44	0.97	3,057,143	1.47

Table32 : RMTMP First two-year plan for Class D Roads

Road Code	Score	Rank	Proposed Improvement				I year					II year				
			New Track	Gravelling	Blacktopping	Periodic Maintenance	Length completed (Km)	Cost	Remaining cost	Remaining length (Km)	Intervention	length completed (Km)	Cost	Remaining_Cost	Remaining Length (Km)	Intervention
D030	61.679	1	0.88	3.80	3.80	-	0.88	1,508,571	2,491,429	2.92	New Track	1.39	3,060,000	1,540,000.00	1.53	Gravelling
D004	61.518	2	-	0.70	0.70	-	0.70	1,540,000	951,429	0.00	Gravelling	0.70	1,540,000	-	0.00	Gravelling
D016	60.788	3	0.73	0.73	0.73	-	0.56	951,429	-	0.17	New Track	-	-	-	0.17	Gravelling
D031	54.679	4	1.29	3.49	3.49	-	-	-	-	3.49	Gravelling	-	-	-	3.49	Gravelling
D003	51.518	5	-	0.54	0.54	-	-	-	-	0.54	New Track	-	-	-	0.54	Gravelling
D014	50.07	6	3.28	5.14	5.14	-	-	-	-	5.14	Gravelling	-	-	-	5.14	Gravelling

Table33: RMTMP third, fourth- and fifth-year plan for Class D Roads

Road Code	Score	Rank	III year			IV year			V year		
			Length completed (Km)	Cost	Remaining Length (Km)	Length completed (Km)	Cost	Remaining Length (Km)	Length completed (Km)	Cost	Remaining Length (Km)
D030	61.679	1	1.53	3,366,000	1.53	-	-	3.80	-	-	3.80
D004	61.518	2	-	-	0.00	-	-	0.70	-	-	0.70
D016	60.788	3	0.17	374,000	0.17	-	-	0.73	-	-	0.73
D031	54.679	4	0.91	1,560,000	0.38	0.38	651,429	0.00	2.00	4,400,000	1.49
D003	51.518	5	-	-	0.54	0.54	1,188,000	(0.00)	-	-	(0.00)
D014	50.07	6	-	-	5.14	2.49	4,260,571	2.65	1.58	2,700,000	1.08

Chapter 6: Conclusion and Recommendation

The draft report of RMTMP of Siddha Kumakha Rural Municipality is prepared after the analysis of field data and requirement of the rural municipality itself. The short term and long-term plan is prepared for five year and twenty years period. This RMTMP planning is based on the assumption that the spending capacity of Rural Municipality increases by 15% per year. The total budget for 20 years of implementation of this RMTMP is projected to be 590 Crore, 70% of which is allocated for construction and 30% is allocated for maintenance of existing structures. The ultimate goal of this RMTMP is to blacktop all the rural municipality roads to their full extent.

The concept of RMTMP is to develop sustainable and economic road network, therefore the Rural Municipality should focus on strengthening existing road network to operate them in all weather conditions rather than opening new tracks. Moreover, strategically important tracks should be opened after proper planning and design. Due to unavailability of intra municipal transport system, the number of private vehicles is increasing in the Rural Municipality which may cause severe problem of traffic congestion in future. So, Rural Municipality should take immediate action to operate local transport system inside the rural Municipality by rural Municipality itself or with collaboration with private entities. Similarly, the municipality should allocate different land use zones based on their current and future use, which will be applicable in future planning of infrastructure facilities inside Rural Municipality.

References

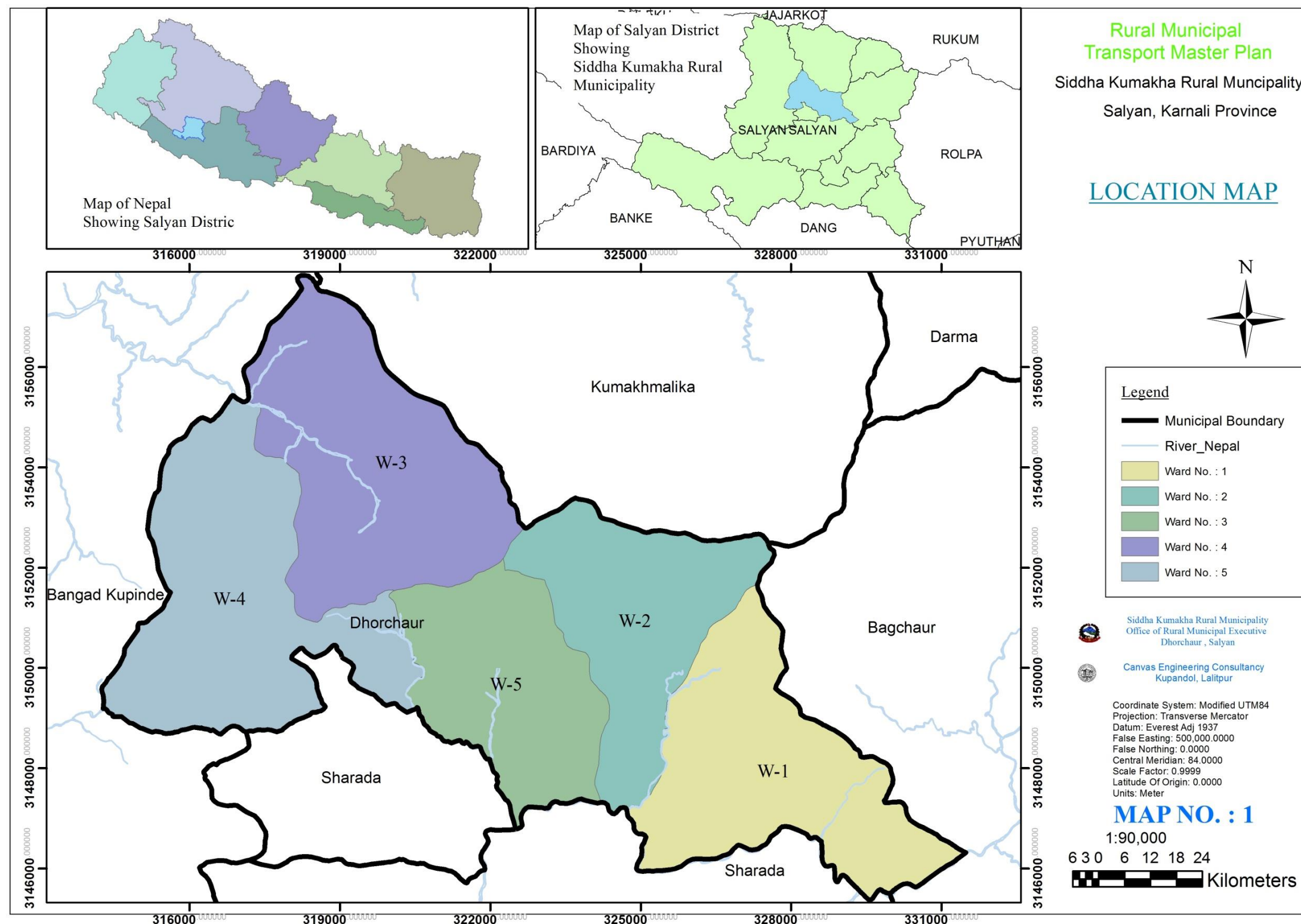
- Australia, M. R. (2011). *Road Hierarchy Criteria*.
- Central Bureau of Statistics. (2013). *National Census 2011*. Salyan: Government of Nepal, National Planning Commission Secretariat.
- Cole, S. (2005). *Applied Transport Economics Policy, Management and Decision Making*. London: Kogan Page Limited.
- Elgar, E. (2002). *Transport Economics*. Cheltenham: Edward ELgar Publishing Limited.
- Eppell, V. A., Bunker, J., & McClurg, B. (2001). A four level road hierarchy for network planning and management. *Proceedings 20th ARRB Conference*. Melbourne: Jaeger, Vicki, Eds.
- kadiyali, D. L. (2011). *Traffic Engineering and Transport planning*.
- Litman, T. (2015). *Evaluating Active Transport Benefits and Costs (Guide to valuing walking and cycling improvements and encouragement programs)*. Victooria Transport Policy Institute.
- McClurg, B., Bunker, J., & Eppell, V. (2001). A four level road hierarchy for network planning and management. *ARRB*. Melbourne.
- Meyer M.D & Miller E.J. *Urban Transportation Planning*.
- National Planning Commission. (2012). *National population and housing census (A national report)*. Kathmandu: Central Bureau of Statistics.
- Government of Nepal, (2068). *Nepal Urban Road Standard 2068 (Draft)*.
- Department of Roads, *Nepal Road Standard 2070*.
- TRB. (2013). *Transit capacity and quality of service manual*. Washington D.C.: Transit cooperative research program.
- National Urban Development Strategy 2015, GoN, Ministry of Urban Development
- District transport master plan Salyan

ANNEX -I: WARD PASSAGE OF RURAL MUNICIPAL
ROADS

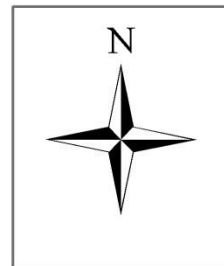
Road Code	Ward Pass (Km)					Sub Total
	1.00	2.00	3.00	4.00	5.00	
A001	-	-	9.36	3.45	4.32	17.13
A002	-	1.83	4.85	3.27	-	9.95
B001	1.07	8.71	-	-	-	9.78
B002	-	5.92	-	-	-	5.92
B003	-	-	-	-	4.79	4.79
B004	2.88	-	-	-	-	2.88
C001	11.15	-	-	-	-	11.15
C002	2.44	-	-	-	-	2.44
C003	10.44	-	-	-	-	10.44
C005	-	4.65	-	-	-	4.65
C006	-	4.24	-	-	-	4.24
C007	-	-	2.63	-	-	2.63
C008	-	-	5.76	-	-	5.76
C009	-	-	2.60	-	-	2.60
C010	-	-	0.96	-	13.30	14.26
C011	-	-	-	-	2.61	2.61
C012	-	-	-	13.67	-	13.67
C013	-	-	-	3.28	-	3.28
D001	0.75	-	-	-	-	0.75
D002	0.70	-	-	-	-	0.70
D003	0.54	-	-	-	-	0.54
D004	0.70	-	-	-	-	0.70
D005	2.73	-	-	-	-	2.73
D006	2.48	-	-	-	-	2.48
D007	0.55	-	-	-	-	0.55
D008	0.32	-	-	-	-	0.32
D009	2.02	-	-	-	-	2.02
D010	3.28	-	-	-	-	3.28
D011	-	0.92	-	-	-	0.92
D012	-	1.93	-	-	-	1.93
D013	-	0.78	-	-	-	0.78
D014	-	3.94	1.20	-	-	5.14
D015	-	1.07	-	-	-	1.07
D016	-	0.73	-	-	-	0.73
D017	-	-	0.67	-	-	0.67
D018	-	-	0.86	-	-	0.86

Road Code	Ward Pass (Km)					Sub Total
	1.00	2.00	3.00	4.00	5.00	
D019	-	-	0.73	-	-	0.73
D020	-	-	0.56	-	-	0.56
D021	-	1.23	-	-	-	1.23
D022	-	1.35	-	-	-	1.35
D023	-	0.88	-	-	-	0.88
D024	-	0.68	-	-	-	0.68
D025	-	-	2.60	-	-	2.60
D026	-	-	2.70	-	-	2.70
D027	-	-	0.74	-	-	0.74
D028	-	-	1.12	-	-	1.12
D029	-	-	1.17	-	-	1.17
D030	-	-	-	3.80	-	3.80
D031	-	-	-	3.49	-	3.49
D032	-	-	-	1.28	1.17	1.17
D033	-	-	-	3.52	-	3.52
D034	-	-	-	1.83	-	1.83
D035	-	-	-	0.95	-	0.95
D036	-	-	-	-	1.98	1.98
D037	-	-	-	1.64	-	1.64
D038	-	-	-	-	2.02	2.02
D039	-	-	-	-	1.90	1.90
D040	-	-	-	-	5.35	5.35
D041	-	-	-	-	2.44	2.44
D042	-	-	-	6.41	-	6.41
D043	-	-	-	1.71	-	1.71
H011	9.57	1.17	3.21	-	-	13.95
Grand Total	51.63	40.03	41.73	48.31	39.88	221.58

ANNEX-II: MAPS



Rural Municipal Transport Master Plan
Siddha Kumakha Rural Municipality
Salyan, Karnali Province
LAND USE



Legend

- Rural Municipality Office
- Ward Office
- Ward Boundary
- SRN
- DRCN
- VRCN
- River
- Settlement

Land use

Category

- Barren Land
- Bush
- Cultivation
- Forest
- Grass
- Orchard
- Pond
- Sand
- Waterbody

Siddha Kumakha Rural Municipality
Office of Rural Municipal Executive
Dhorchaur, Salyan

Canvas Engineering Consultancy
Kupandol, Lalitpur

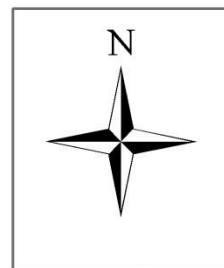
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MAP NO. : 2

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Rural Municipal Transport Master Plan
Siddha Kumakha Rural Municipality
Salyan, Karnali Province
SOCIAL INFRASTRUCTURE



Legend

- Settlement
- Rural Municipality Office
- Ward Office
- - - Ward Boundary
- SRN
- River
- Roads
- Social Infrastructure**
- Community Building
- H Health Post
- Municipality Office
- Public School
- Ward Office



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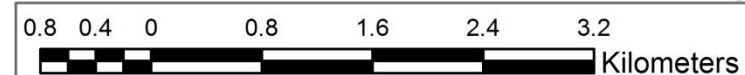


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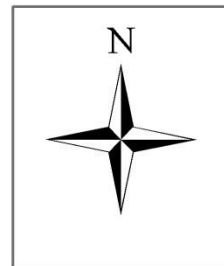
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MAP NO. : 3

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Rural Municipal Transport Master Plan
Siddha Kumakha Rural Municipality
Salyan, Karnali Province
SRN AND DRCN



Legend

- Settlement
- Rural Municipality Office
- gis_Clip
- Ward Office
- Ward Boundary
- SRN
- DRCN
- VRCN
- River



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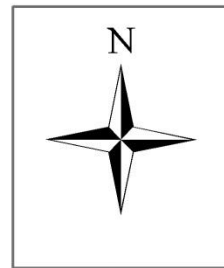
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MAP NO. : 4

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Rural Municipal Transport Master Plan
Siddha Kumakha Rural Municipality
Salyan, Karnali Province
EXISTING ROADS



Legend

- Settlement
- Rural Municipality Office
- Ward Office
- - - Ward Boundary
- SRN
- River
- Surface**
- Earthen



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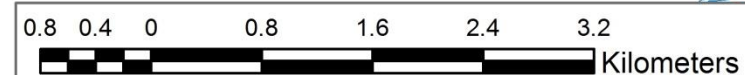


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MAP NO. : 5

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Rural Municipal Transport Master Plan
Siddha Kumakha Rural Municipality
Salyan, Karnali Province
PROPOSED NEW TRACKS



Legend

- Settlement
- Rural Municipality Office
- Ward Office
- Ward Boundary
- SRN
- River
- Surface**
- Existing Road
- Proposed New Track



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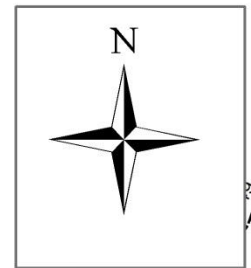
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Rural Municipal Transport Master Plan

Siddha Kumakha Rural Municipality
Salyan, Karnali Province

CLASSIFICATION OF RURAL MUNICIPAL ROADS



Legend

- Settlement
- Rural Municipality Office
- Ward Office
- - - Ward Boundary
- == SRN
- ~ River
- ~ <all other values>

Class

- A
- B
- C
- D



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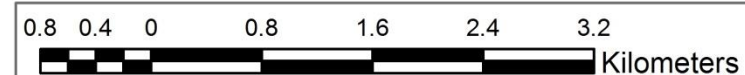


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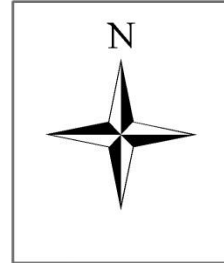
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Rural Municipal Transport Master Plan

Siddha Kumakha Rural Municipality
Salyan, Karnali Province

RURAL MUNICIPAL CODING OF ROADS (CLASS A)



Legend

- Settlement
- Rural Municipality Office
- Ward Office
- - - Ward Boundary
- SRN
- River
- Road Class**
 - Class A
 - Class B



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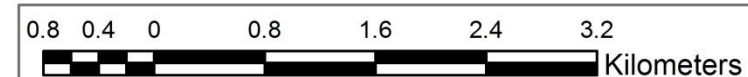


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MAP NO. : 8

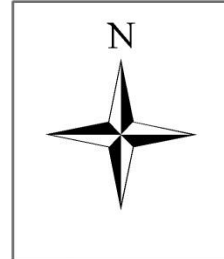
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Rural Municipal Transport Master Plan

Siddha Kumakha Rural Municipality
Salyan, Karnali Province

RURAL MUNICIPAL CODING OF ROADS (CLASS B)



Legend

- Settlement
- Rural Municipality Office
- Ward Office
- - - Ward Boundary
- SRN
- River
- Road Class**
 - Class A
 - Class B

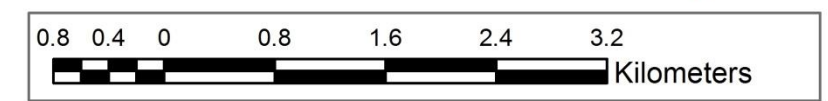
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MAP NO. : 9

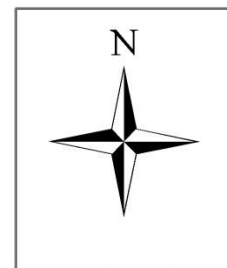
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Rural Municipal Transport Master Plan

Siddha Kumakha Rural Municipality
Salyan, Karnali Province

RURAL MUNICIPAL CODING OF ROADS (CLASS C)



Legend

- Settlement
- Rural Municipality Office
- Ward Office
- - - Ward Boundary
- SRN
- River
- Road Class**
- C



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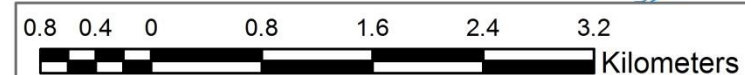


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MAP NO. : 10

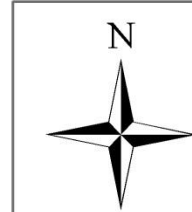
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Rural Municipal Transport Master Plan

Siddha Kumakha Rural Municipality
Salyan, Karnali Province

RURAL MUNICIPAL CODING OF ROADS (CLASS D)



Legend

- Settlement
- Rural Municipality Office
- Class**
- A
- B
- C
- D
- Ward Office
- Ward Boundary
- SRN
- River



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Coordinate System: Modified UTM84
Projection: Transverse Mercator
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MAP NO. : 11

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Rural Municipal Transport Master Plan
Siddha Kumakha Rural Municipality
Salyan, Karnali Province
EXISTING PUBLIC TRANSPORTATION ROUTE



Legend

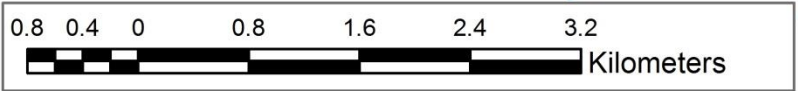
- Rural Municipality Office
- Ward Office
- Ward Boundary
- SRN
- Existing Routes
- River
- Road

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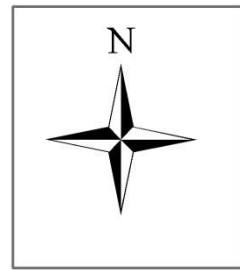
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MAP NO. : 12



Rural Municipal Transport Master Plan
Siddha Kumakha Rural Municipality
Salyan, Karnali Province
PROPOSED PUBLIC TRANSPORTATION ROUTES



Legend

- Settlement
- Rural Municipality Office
- Ward Office
- Ward Boundary
- SRN
- Roads
- River
- Primary Route 1
- Primary Route 2
- Primary Route 3
- Primary Route 4


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Coordinate System: Modified UTM84
Projection: Transverse Mercator
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MAP NO. : 13

