

ACKNOWLEDGEMENT

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The study team

EXECUTIVE SUMMARY

Transportation is considered as the “Infrastructure for Infrastructure” and forms a basis for increasing the access as well as mobility in either rural as well as urban environment. Urbanization and its associated transportation infrastructure define the relationship between city and countryside, accessibility is one of the major components to improve access of the people to service and facilities through increased mobility.

Increased mobility results in better linkages with the market centers, tourism sector, agricultural production pocket area and help in generating numerous opportunities in the area. With transport sector interventions and planning based on accessibility as well as mobility considerations, Municipal Transport Master Plan (MTMP) for a Municipality offers long-term perspective for the planned development of the rural roads network in the district. Thus, MTMP of Bidur Municipality will support the probable investments in systematic transport system with appropriate guidelines and criteria for rational decision-making process.

"BIDUR" name is familiar as Nuwakot district headquarters situated at 68km north-west of the capital Kathmandu. This municipality was formed by existing government on of 27th Falgun 2073 according to constitution of nepal 2015 part 5. It spread across 130.01 square Kilometers, most of it covered by an open campestrial even some parts are in mountain areas. It was formed by amalgamating parts of existing Bidur Municipality, Charghare, Tupche, Gerku, Kalyanpur VDCs and 4-9 wards of khadgabhanjyang and divided into thirteen wards.

The city contains places of historical significance such as Nuwakot 7 storey old Palace and religious Devighat located at the confluence of the Tadi and Trishuli Rivers. Before 1744 A.D Nepal was a tiny pieces ruled by several dynasty. After then, King Prithvi Narayan Shah, King of Gorkha land started his amalgamation campaign from this region. During that period, Nuwakot was one of the entry gate of Kantipur (Kathmandu). It was the western gate to kathmandu as well as one of the route to Tibet for trade purpose. It has lots of temples, dabalis, with several culture and customs, mainly conserved from the period of Malla dynasty and Shah dynasty.

Municipality road network is conceptualized by considering the functional hierarchy as arterial, sub-arterial and urban roads of various categories such as Class A, Class B, Class C and Class D. Based on technical study and bottom up participatory approach, two Class A roads with length 15.17 km roads and right of way of 16m; five Class B roads with length 34.39 km and right of way of 12m; and six Class C roads with total length of 29.63 km and RoW of 9m and the rest D class road have been proposed within the Municipality. After provision of all SRN and DRCN roads within the Municipality each road will be linked with any of the hierarchical road network.

A network consists of several links and has their own importance. It is not possible to construct/maintain or upgrade all roads at a time due to various constraints as: time, resources and cost constraint. Thus, each link in a network needs to be prioritized and various intervention need to be taken based on the prioritization. The road network is prioritized separately for different class

based on eight criteria, which includes Road Width, Surface type, link to higher road network, municipal special area, population served, linkage to Indicative potential and Access to SAMT (Service center, Agriculture, Market, Tourism).

The first five-year financial plan is prepared based on the assumption that the second year budget will increase 10% from first year budget. And the further forecast is based on the assumption that about 30% of the total investment must be allocated to road network upgrading and maintenance. The perspective cost of road network is calculated based on the road will be developed full width at the end, i.e. Class A of 16m, Class B of 12m, Class C of 9m and Class D of 6m respectively. The total perspective cost of Class A, B and is NRs. 1.6 Billion.

The five-year implementation plan is on the basis of budget allocation of 70% - 30% for construction plus upgrading and maintenance respectively. And, even the construction & Upgrading budget is allocated in ratio of 40%-30%-20%-10% for Class A, B, C and D roads respectively.

Year	Cost of various Intervention (In Lakhs)					
	Class A	Class B	Class C	Class D	Maintenance	Total
I	238.8	179.1	119.4	59.7	255.9	853.0
II	262.7	197.0	131.4	65.7	281.5	938.3
III	289.0	216.7	144.5	72.2	309.6	1,032.1
IV	317.9	238.4	158.9	79.5	340.6	1,135.3
V	349.7	262.3	174.8	87.4	374.7	1,248.9

For the preparation of implementation plan one intervention for each road was considered to be intervening. For example, if a road is earthen at present, it will first be upgraded to gravel road and then the next ranked road is provided with intervention and if the budget remains only then it will be upgraded to bituminous/metalled road. At short run all the Class A roads will be upgraded to two lane roads, whereas Class B, C and D roads to single lane roads. At the end of MTMP period all Class A roads will have at least one sort of intervention. A001 and A002 will be upgraded to Gravel. Similarly, five Class C roads will be provided with one level of intervention.

It has been recommended that the proper framework and policies for the implementation of the perspective plans is must and for this it is important to build the capacity of the Municipality and the local organizations and committees. Promotion of Non-motorized travel (walking and cycling) mode and efficient planning of public transportation routes is must. Preparation of MTMP is the first effort for the planned development of the municipal area. This is an opportunity for

implementing a sustainable transport system in the Municipality. The study being its first, should be periodically reviewed and revised along with integration with other plans. This will ensure efficient use of available resources and proper development of the Municipality. For effective MTMP, it need to be compatible with comprehensive town planning and land use policy.

ACRONYMS/ABBREVIATIONS

DDC	District Development Committee
DOLI	Department of Local Infrastructure Development
DTMP	District Transport Master Plan
GIS	Geographic Information System
GPS	Global Positioning System
Ha	Hectare
HH	Household
IDPM	Indicative Development Potential Map
Km.	Kilometer
MIM	Municipal Road Inventory Map
Min.	Minute
MoFAGA	Ministry of Federal Affairs and General Administration
MRCC	Municipal Road Coordination Committee
MTMP	Municipal Transport Master Plan
MTPP	Municipal Transport Perspective Plan
NMT	Non- Motorized Transport
O-D	Origin and Destination
PCU	Passenger Car Unit
PT	Public Transport
ROW	Right of Way
Sq. km	Square Kilometre
SRN	Strategic Road Network
ToR	Terms of Reference
VDCs	Village Development Committees

TABLE OF CONTENT:

ACKNOWLEDGEMENT	i
EXECUTIVE SUMMARY	ii
ACRONYMS/ABBREVIATIONS	v
TABLE OF CONTENT:	vi
LIST OF FIGURES:	ix
LISTS OF TABLES:	x
CHAPTER ONE: INTRODUCTION	1
1.1 Background:	1
1.2 Objectives	2
1.3 Scope of work:	3
1.4 Study Area:	4
1.5 Limitation of Study:	6
1.6 Organization of Report	6
CHAPTER TWO: METHODOLOGY	7
2.1 Approach:	7
2.2 Methodological Framework:	7
2.3 Secondary Data Collection	9
2.4 Primary Data Collection:	9
2.5 Application of GIS for Preparation of Maps:	10
2.6 Preparation of Visionary City Development and Indicative Development Potential Map (IDPM)	10
2.7 Scoring Criteria for Prioritization	10
CHAPTER THREE: MUNICIPALITY PROFILE	12
3.1 Population Status	12

3.2 Demographic Status	13
3.3 Household Characteristics:	14
3.4 Accessibility	15
3.5 Origin and Destination Study:	16
3.6 Road Inventory.....	16
3.8 Road Demand:	18
3.9 Land Use Pattern	22
3.10 Road Safety Status:	23
CHAPTER 4: VISIONARY CITY DEVELOPMENT PLAN	24
4.1 Ward Specific Features	24
4.2 Indicative Development Potential	24
4.3 Visionary City Development	25
CHAPTER 5: ROAD HIERARCHY DEVELOPMENT	27
5.1 Road Hierarchy:	27
5.2 High Hierarchical Road Network	28
5.3 Municipal Roads	29
5.4 Ward Specific Hierarchy of Road	34
CHAPTER 6: PRIORITIZATION CRITERIA	36
6.1 Concept of Prioritization	36
6.2 Weightage Scoring Criteria.....	36
6.3 Prioritized Road Network	38
CHAPTER 7: MUNICIPAL TRANSPORT MASTER PLAN	40
7.1 Perspective Plan of Municipal Road Network	40
7.2 Financial Institutions and Capital Investment Plan	40

7.3 Five Year Budget Expenditure.....	41
7.5 Five Year Implementation Plan	43
CHAPTER 8: CONCLUSION	47
8.1 Conclusion	47
8.2 Recommendation	47
GLOSSARY:	49
REFERENCES:	51
ANNEX A: MAPS ANNEX B: PHOTGRAPHS	

Figure 4: Education status in percentile	13
Figure 5: Occupational Status in percentile	14
Figure 6: Income distribution in percentile	14
Figure 7: Trip Distribution in percentile	14
Figure 8: Time to reach nearest Bus Stop from each ward.	15
Figure 9: Frequent Travel Destination	16
Figure 10: Land use proportion within the Municipality	23
Figure 11 Road Network Hierarchy	27
Figure 12 Urban Road Hierarchy	27
Figure 13: Recommended cross section for Class A roads.....	31
Figure 14: Recommended cross section for Class B roads	32
Figure 15: Recommended cross section for Class C roads	33
Figure 16: Recommended cross section for Class D roads.....	34
Figure 17: Expenditure Breakdown based on to MTMP Guidelines “A” Annex 5.	42

LISTS OF TABLES:

Table 1: Population Status of the Municipality	12
Table 2: Ward wise inventory of Road based on surface type	17
Table 3: Length based on road width	17
Table 4: Ward specific Prioritized roads	18
Table 5 Landuse pattern of Bidur Municipality	22
Table 6: Proposed width for various types of roads within urban area:	28
Table 7: Classification of Municipal Roads.....	28
Table 8 List of SRN Roads within the Municipality	29
Table 9: List of DRCN Roads within the Municipality	29
Table 10 Comparison of various hierarchy of roads	30
Table 11 List of Class A roads	31
Table 12 List of Class B Roads.....	32
Table 13 List of Class C roads	33
Table 14 Ward specific hierarchy of road network	34
Table 15 Road Density.....	35
Table 16 Proposed Scoring Criteria with score for prioritization	36
Table 17 Prioritized Major Municipal Road Network	39
Table 18 Budget Allocation for Upgrading and Maintenance	43
Table 19 Five Year Implementation Plan for Class A,B and C Roads	45

CHAPTER ONE: INTRODUCTION

This chapter briefly explains the background and study area of the study along with the scopes and objectives associated with the preparation of Municipal Transport Master Plan.

1.1 Background:

Transport, which is simple, defined as movement of people and goods covering some geographical space are one of the major components to improve people's access to services. It not only increases the accessibility to the remote places, but also increases the mobility scenario, and hence results in better linkages with market centers/agricultural production pocket areas and other opportunities in the district as well as Municipality.

Adequate roads network in any Municipality can reduce isolation; encourage availing public services and help to transfer technology. Road construction has been seen to bring about notable enthusiasm and visible changes in rural life. However, in the absence of rational criteria and professional guidelines, road constructions and upgrading are carried out in an "*ad hoc manner*" in major places, be it be rural municipalities or Municipalities.

Municipal Transport Master Plan (MTMP) is primarily a reflection of existing transport infrastructure situation and future potential ones in consistent with the resources available in the Municipality. It offers long term perspective for the planned development of the roads network in the Municipality. The MTMP preparation strongly advocates meaningful participation of all key stakeholders of municipal roads in the planning process, which makes MTMP more acceptable and ensure ownership. A comprehensive Municipal Transport Master Plan (MTMP) is being developed in the Municipality to support investments in transport development with appropriate guideline and criteria for rational and transparent decision making process. MTMP becomes an authoritative document of the district to negotiate possible grant and loan assistance from donor agencies. Proper planning and sustainability are the key issues for development of municipal transport network.

Thirteen wards Municipality Bidur, after being designated as a Municipal area, it will attract more population along with high investment on infrastructure development. Thus, proper Municipal Transport Master Plan (MTMP) is must for assessing the present road and transport infrastructures and facilities within the Municipality and the surrounding Municipalities' so as to ensure proper accessibility and mobility by various means of transportation. It also helps to define other policies too, such as: comprehensive land use and city development plan.

1.2 Objectives

The prime objective of this study is the preparation of Municipality Transport Master Plan (MTMP). The planning approach is participatory and bottom-up from the settlement level. It includes a constructive plan to incorporate all present and tomorrow's transportation needs.

The specific objectives of the MTMP covered during the study with reference to ToR are mentioned below:

1. Preparation of the Municipality Road Inventory Map (MIM) of all road networks.
2. Identification of the major road networks linking the Municipality with the surrounding areas.
3. Analysis of the present mobility and accessibility situation.
4. Identification and prioritization of the interventions based on mobility and accessibility situation.
5. Development of scoring criteria and its approval from Municipality.
6. Preparation of Municipal Transport Perspective Plan for transport services and facilities
7. Preparation of physical and financial implementation plan of prioritized roads for the MTMP period.
8. Preparation of five years Municipality Transport Master Plan (MTMP).

1.3 Scope of work:

The scope of this work is summarized as:

- a. Analysis of accessibility and mobility status of the Municipality:

Carrying out various surveys to gain data on accessibility and mobility situation that includes their travel patterns, questionnaire surveys and origin-destination survey.

- b. Assessment of public transportation condition.

Data on different public transportation routes and their operation characteristics, which operate within the municipal area and to other adjoining area, is studied.

- c. Assessment of safety status and issues:

Road safety status and issues is to be accessed. Possible interventions to make the roads safer are proposed and recommended.

- d. Preparation of Municipality Inventory Map (MIM) of existing roads:

MIM linking to strategic road networks and all other roads is prepared. It has include the road names, total length and width, surface type, existing condition, Right of way, vehicular traffic and pedestrian traffic flow etc.

- e. Collection of demands for New/Upgrading/Rehabilitation transport linkages from Wards/Settlements:

Data regarding the construction, maintenance or rehabilitation of roads according to the existing condition and demand from ward level meeting and actual condition of all the linkages from road inventory survey is noted.

- f. Scoring criteria:

Scoring criteria to screen and prioritize all potential interventions for proper allocation of limited budget is developed and approved by the Municipality.

- g. Preparation of perspective plan of interventions of services and facilities:

All the identified interventions is screened and rated on the basis of approved criteria and forwarded to Municipality council meetings and finally shown in GIS maps.

- h. Preparation of realistic physical and Financial Implementation Plan of Prioritised Roads for the MTMP period:

Information on the resources required for construction/rehabilitation, necessary funding allocation for next five years and appropriate proportion to be spent on ongoing roads and new interventions proposed in next year from Municipality is assessed.

- i. Preparation of Municipal Transport Master Plan (MTMP) :

MTMP is prepared with due consideration to existing and projected future situation. Base scenario of existing road and transport network based on O-D survey, projected transport infrastructure network and management plan is prepared.

- j. Medium term and long term planning:

The scope of work demands a detailed work plan for five years period (short term). Forecast/estimate of the demand for medium term (10 years) and long term (20 years) is done and recommend a framework to guide future interventions and planning processes.

1.4 Study Area:

"BIDUR" name is familiar as Nuwakot district headquarters situated at 68km north-west of the capital Kathmandu. This municipality was formed by existing government on of 27th Falgun 2073 according to constitution of nepal 2015 part 5. It spread across 130.01 square Kilometers, most of it covered by an open campestrial even some parts are in mountain areas. It was formed by amalgamating parts of existing Bidur Municipality, Charghare, Tupche, Gerku, Kalyanpur VDCs and 4-9 wards of khadgabhanjyang and divided into thirteen wards.

The city contains places of historical significance such as Nuwakot 7 storey old Palace and religious Devighat located at the confluence of the Tadi and Trishuli Rivers. Before 1744 A.D Nepal was a tiny pieces ruled by several dynasty. After then, King Prithvi Narayan Shah, King of Gorkha land started his amalgamation campaign from this region. During that period, Nuwakot was one of the entry gate of Kantipur (Kathmandu). It was the western gate to kathmandu as well as one of the route to Tibet for trade purpose. It has lots of temples, dabalis, with several culture and customs, mainly conserved from the period of Malla dynasty and shah dynasty.

Facts about this municipality

Established : 1987AD

Area : 130.01 sq. Km.

Population : 54351 (28977 F, 25374 M)

Total HH : 12505

Voters : 34331

Total ward nos.: 13

Total executive body members: 23 (Female: 6) Total assembly members :
70 (Female: 27) Market

center:

Trishuli, Battar, Rising, Bidur, Nuwakot, Debighat, Baguwa, Gangate,
Hattigauda, Dhunge, Betrawoti Aakkare

The present ward allocations based on wards & their corresponding name of the ward is presented below.

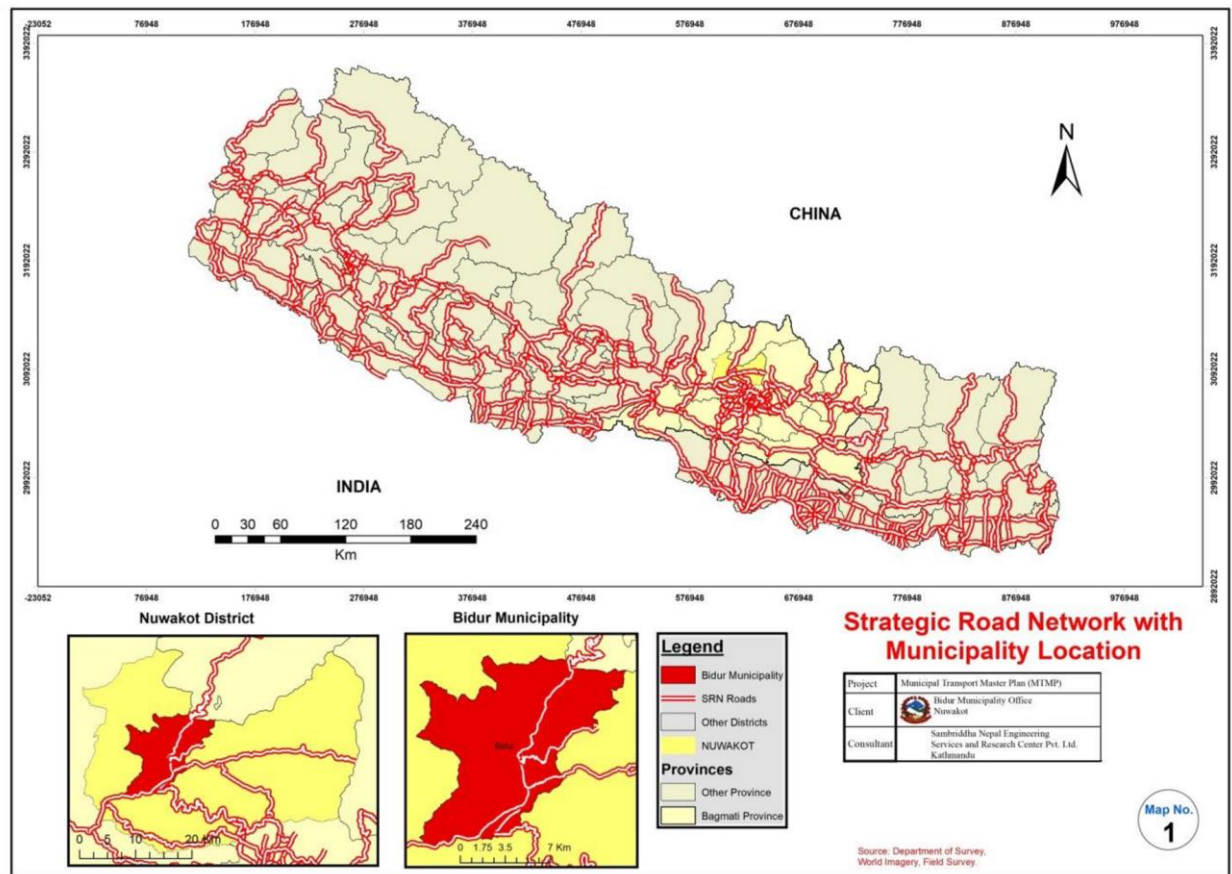


Figure 1: Bidur Municipality Map (study area)

1.5 Limitation of Study:

Lack of Comprehensive Town Development Plan, Proper Land Use Policy and Drainage Network Master Plan, which could have affect the future overall development pattern, and hence future development of these policy need to be based on the proposed MTMP. Bottom - Up Participatory approach along with lack of proper financial policy for land acquisition leads some difficulty in MTMP planning process.

1.6 Organization of Report

This final report, which in the summarization report of all the work, both field and table work is summarized in eight chapters. Chapter one basically deals with introduction aspect, covering background, scope and objectives along with limitation. Chapter Two deals with the methodology adopted while data collection and data analysis process. Chapter Three covers the existing situation and scenario of the Municipality, which includes the socioeconomic, household and trip characteristics along with road services and facilities within the locality. It also covers how these factors are contributing in the development. Indicative Development Potential of the Municipality has been discussed in Chapter 4. Likewise, Chapter 5 deals with formulation of road hierarchy along with detail of various

classes of roads. Chapter 6 deals with Prioritization criteria and prioritized road network. Implementing strategy and financial plan has been discussed on Chapter 7 and finally chapter 8 deals with the conclusion and summary aspects.

CHAPTER TWO: METHODOLOGY

2.1 Approach:

MTMP will help to assist the planning of such roads to fulfill the stated objective. 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.

Municipality Transport Master Plan has been prepared using participatory bottom-up approach and differs from conventional practices of top down approach. Techno Political interface has been incorporated in the planning process, where active participation from representatives of political parties, line agencies, and Municipality officials is crucial. The Municipality Road Coordination Committee (MRCC) has been constituted as authorized legislative body of Municipality.

2.2 Methodological Framework:

The study starts with preliminary planning or desk study where basic background of Municipality is studied with help of secondary data including census data, GIS data. The study got acceleration with formation of MRCC 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/location for various facilities was also identified based on interaction with local people and MRCC. The scoring criteria for prioritizing road network was identified based on ToR and were approved by Municipality. Then, the hierarchy of road was purposed and perspective plan of various interventions were purposed and were analyzed based on available fund and finally physical and financial implementation plan of prioritized roads for MTMP 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 chart.

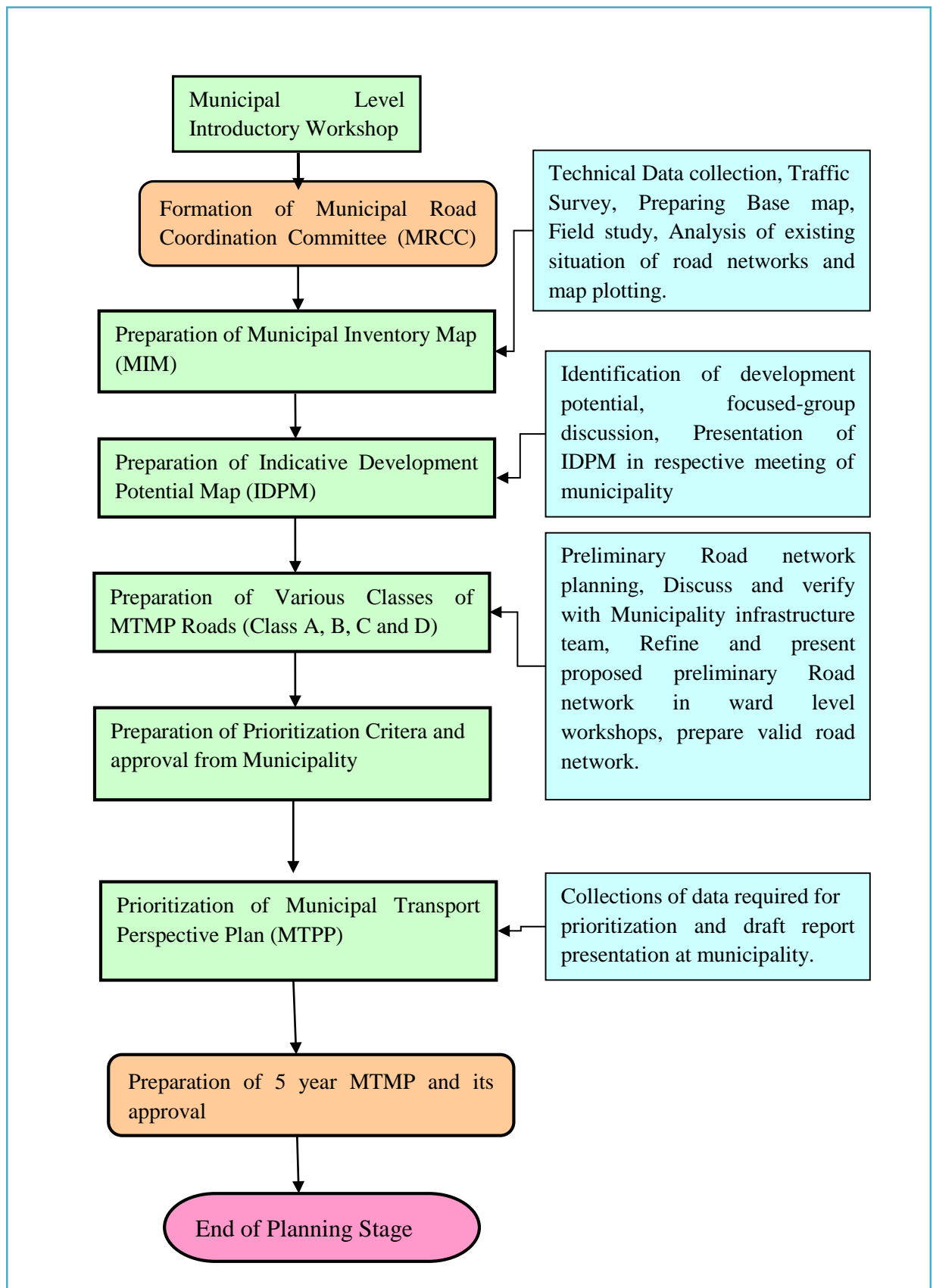


Figure 2: Methodological framework for planning MTMP

2.3 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. The information about demographic data of Municipality, various maps showing service centers, 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, DCC, Municipality etc. Digitized topographic maps, administrative map of Municipality, strategic road network map prepared by DoR, etc. were some other secondary data that were used during the study.

2.4 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 wards 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. Following primary data collection are adopted for data collection methods.

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 wada nagarik manch 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.

Household questionnaire method.

A household (HH) survey, method of Origin and Destination study was conducted in all wards of Bidur Municipality, to collect data on socio-economic status, HH characteristics and trip making characteristics. Total of 55 households were sampled randomly and response of 116 people were collected. The socio-economic details include monthly income, occupation and educational status and vehicle ownership level. Trip characteristics include origin & destination of trip, trip purpose and mode, trip time and accessibility to nearest bus stop.

2.5 Application of GIS for Preparation of Maps:

GIS software has been used for the preparation of different maps and database of the municipal roads and other details. GIS maps prepared for Municipal Transport Master Plan (MTMP) can be summarized in the following points.

a. Preparation of map

Shape files for Ward Boundary, Municipal/Rural Municipal, District Boundary and Development Region Boundary was obtained from Department of Survey. Ward Boundary of each Municipality were also generated in similar manner. Satellite image of the respective Municipality was obtained using Image Capture Software and Google Earth. A ".kml" file was used to obtain an enclosed area for image capture using Google Earth. The image was captured in spatial reference of WGS 1984. After the image was captured, layers for land use, road, buildings, etc. were digitized. Then, WGS 1984 was transformed into Modified Universal Transverse Mercator (MUTM) in three regions namely MUTM 81, MUTM 84 and MUTM 87.

b. Cartography

After field verified data was entered then map preparation was done. All the maps are prepared in Arc GIS version 10.5. MUTM 84 was used as projected coordinate system. All maps are prepared in a scale in the multiple of 1:25000. Symbols for Road classes have been used as described in Terms of Reference (ToR) provided by MoFAGA. Other symbols are standard and are used so that the whole map expresses what it is intended to.

2.6 Preparation of Visionary City Development and Indicative Development Potential Map (IDPM)

IDPM is basically the indication of the existing and potential market/service centers and high value cash crops, agro-based industries and tourism based areas. Similarly, visionary city development plan also governs how the city is planned to be developed in future and is based on the present and foresight vision of the Municipality. Visionary City development plan is also discussed in front of MRCC and Municipality and the idea of MRCC and Municipality is incorporated in the preparation of IDPM and Visionary City Development Plan.

2.7 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 centers, religious and tourism places were taken as the indicators for prioritization. The scoring criteria is finalized after rigorous study and set in front of Municipality and MRCC for its approval and had been approved with little bit of modification.

CHAPTER THREE: MUNICIPALITY PROFILE

The chapter deals with the present condition and scenario of the Municipality Socioeconomic, trip, land use and road network characteristics within the Municipality. The basic data source of the analysis is the collected primary data.

3.1 Population Status

Present and projected Socio-economic and demographic status play a vital role in shaping the cities. Population, household structure and their characteristics are some of the major pillar for better understanding of the locality. Population of Bidur Municipality 54351 comprising of 12505 HH (Census 2011) in an area of 130.01 Sq. Km. (Department of Survey). The population density of Bidur Municipality is 418 people per sq. km. The ward specific population and population density (to the nearest whole number) is summarized in Table 1.

Table 1: Population Status of the Municipality

Ward	Previous Wards/VDcs	समावेश गाववस / नगरपालिका	Area (Sq. Km)	Popula tion	Population Density
1	Bidur (1,10,11)	ववदरु (१,१०,११)	4.69	3219	687
2	Bidur (2,3)	ववदरु (२,३)	8.44	4362	517
3	Khadgabhanjyang (4-9)	खड्कभञ्ज्याङ्ग(४-९)	12.56	4792	382
4	Bidur (4)	ववदरु (४)	1.92	4418	2,302
5	Bidur (5, 7)	ववदरु (५,७)	7.44	4624	621
6	Bidur (6), Charghare (1,2)	ववदरु (६) र चारघरे(१,२)	5.98	3628	606
7	Tupche (1-5,7)	तप्चे(१-५,७)	13.46	3897	289

8	Bidur (8), Tupche (6,8)	ववदरु (८) र तपु चे(६,८)	7.91	3793	480
9	Bidur (9), Tupche (9)	ववदरु (९) र तपु चे(९)	6.16	5443	884
10	Gerkhu (3,4,7,9)	गखे (३,४,७,९)	13.58	3567	263
11	Gerkhu (1,2,5,6,8)	गखे (१,२,५,६,८)	9.03	2815	312
12	Charghare (3-9)	चारघरे(३-९)	14.84	4071	274
13	Kalyanpur (1-9)	कल्याणपरु (१-९)	24.00	5722	238
Total			130.01	54351	418

Based on Table 1, we can clearly see population density lies in the range of just 238 person per sq.km. to 2302 person per sq.km. Less population density is witnessed in Ward 13 having area of 24 sq.km, whereas highest population and population density is witnessed in the ward 4 with area of just 1.92 sq.km.

3.2 Demographic Status

Based on HH data observed in field, the population have been categorized based on gender, educational status, caste and educational status and been summed up as below.

The status of the Municipality is governed to large extent by the educational and occupational status. Higher the educational level of the residents, high will be the level of development. Based on HH survey, Almost 50% of people have completed or are perusing

school level education.

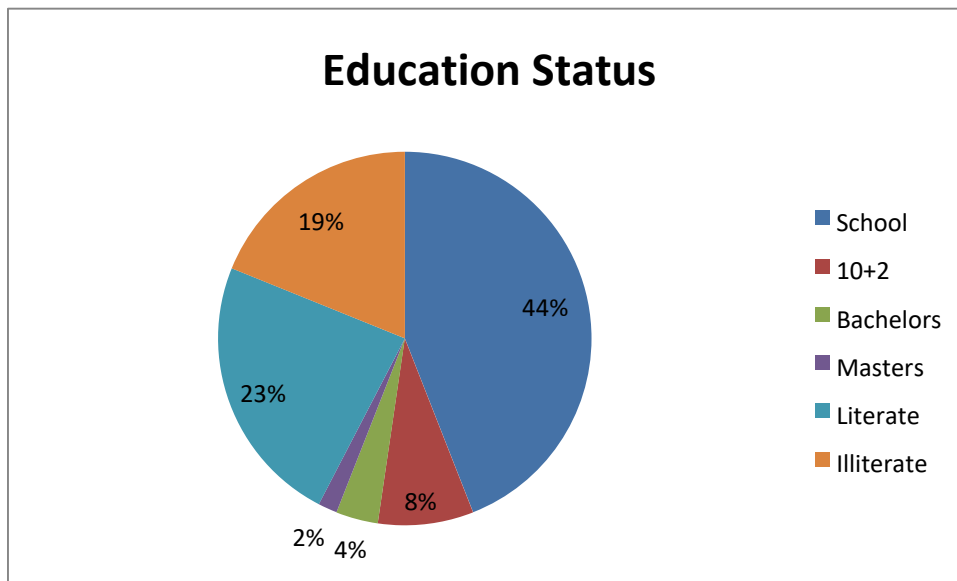


Figure 3: Education status in percentile

This Municipality is inhabitant by people of different castes. People from all over the nation are settled in this Municipality and there is also hodgepodge in the employment criteria too as shown by the below mentioned figure in terms of percentage in which Agriculture takes the major share followed by students while unemployed being the least.

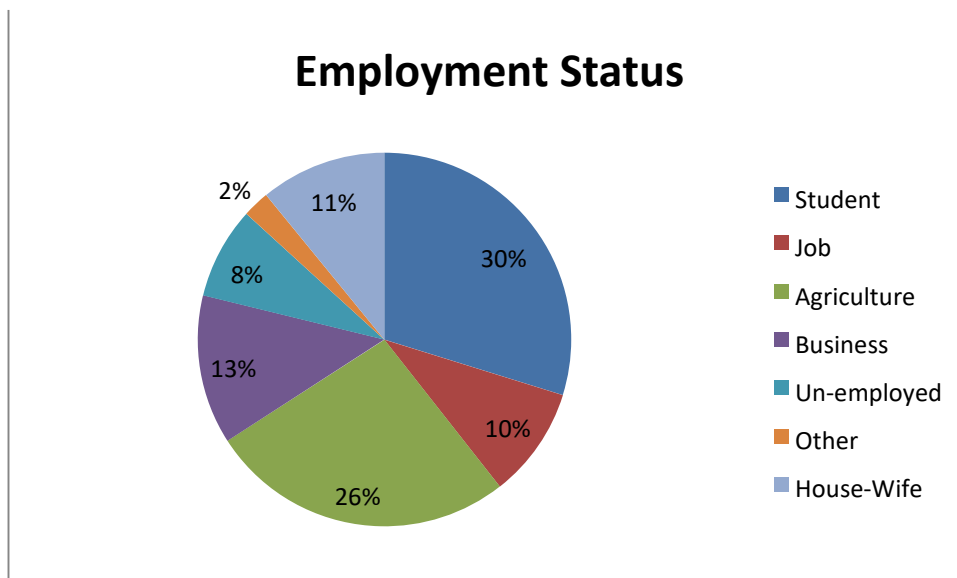


Figure 4: Occupational Status in percentile

significant role in the trip characteristics and finally on the overall planning aspects of the locality. Higher the income, people tends to live luxurious life i.e. tends to have their own vehicle and so on. Most of the family were found to be earning below 20,000 monthly. About half of HH has income in range of 20,000 – 30,000 and only 20% earns more than that. This might be either underreported as the Municipality is consider as a develop one.

Analysing trip characteristics, trips are undertaken to fulfill various purpose. Based on analysis, 33% of the were found for shopping and hence the trips are for families travel to Bidur/Kathmandu for buying their items.

3.4 Accessibility

Accessibility refers to the ability to reach desired goods, services, activities and destinations. Provision of small trail roads, cycle track, provision of public transportation and proper road network with last mile connectivity help to ensure accessibility. Although walking is the dominant mode, the main thing that need to be consider for better accessibility as well as mobility is the public transportation network and their frequency. One factor that need to be consider for better planning is the average time required to reach the bus stop from each HH and aggregating them at least in ward basis to set up priority. The sample data were analyzed on ward to ward basis and their average value to

3.3 Household Characteristics:

Household is defined as those who dwell under the same roof and compose a family, i.e. in simple words it's can be termed as family (Merriam Webster Dictionary). Any journey undertaken by any mode/means of transport having a definite origin and destination and having some sort of purpose is called trip. T rip

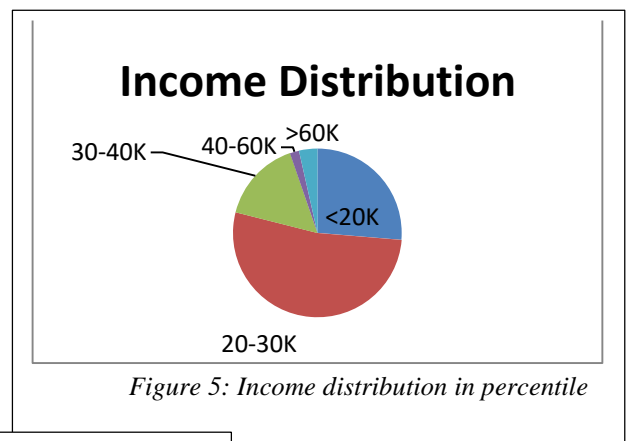


Figure 5: Income distribution in percentile

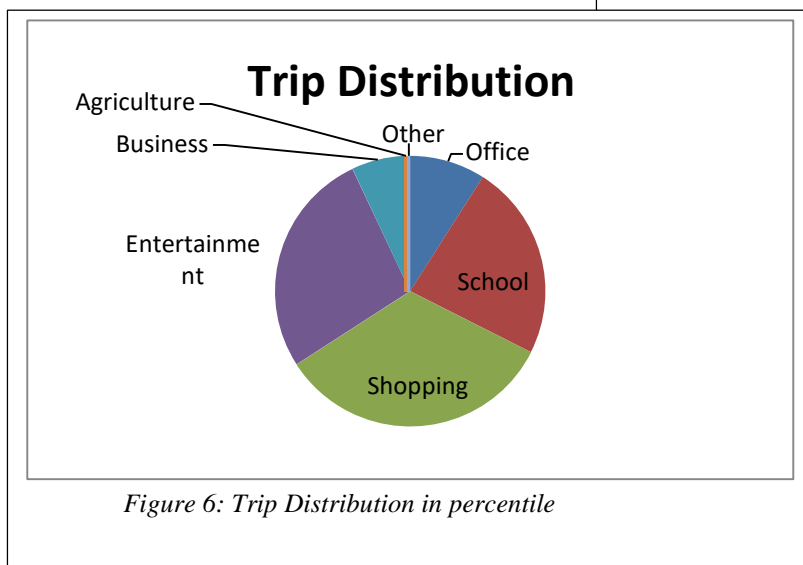


Figure 6: Trip Distribution in percentile

characteristics differs from locality to locality and even household to household.

Annual or monthly earning of each household has

reach the nearest bus stop along with range.

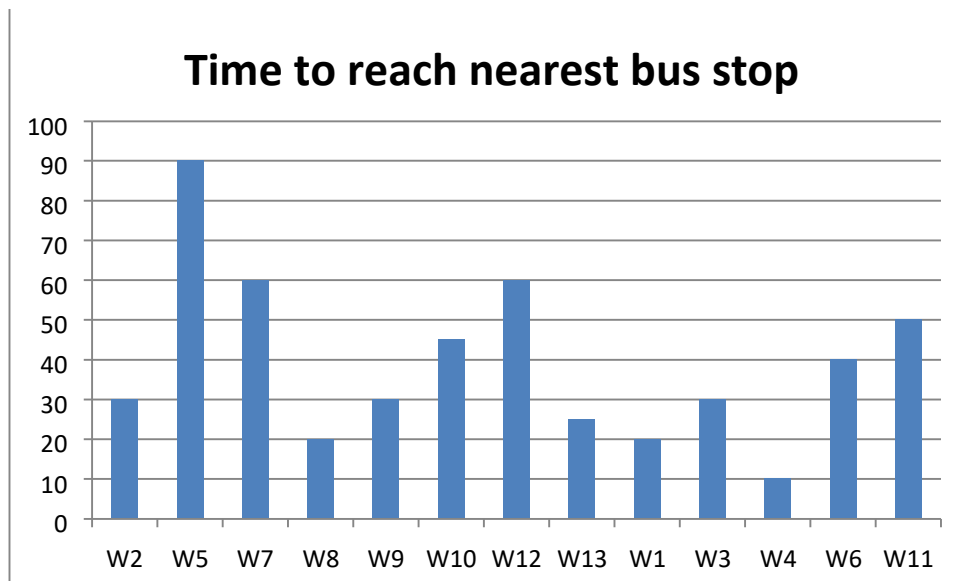


Figure 7: Time to reach nearest Bus Stop from each ward.

This chart highlights the fact that ward 5 and 12 are having more time requirement for accessing the transportation services than others to reach the nearby bus stop, whereas other wards requires lesser than that of 1 & 4. This shows we need to focus on accessibility of public transportation first at some wards and mobility at other wards.

3.5 Origin and Destination Study:

Trip, simply called journey is the process of going from one place to another with some purpose. Thus, trip is characterized by origin (starting point) and destination (ending point). To be more precise, trip are characterized by trip production and trip attraction. Home end is always trip production and the location which attract the produced trips for various causes (job, shopping, and entertainment) are attraction end of trips. Most of the trips are home based trips with different destination. Bidur and Battar have almost all facilities within themselves and are developed one and hence intra ward trips occurs

within it. Some of the major inter ward or intra-municipal trips are shown in bar chart:

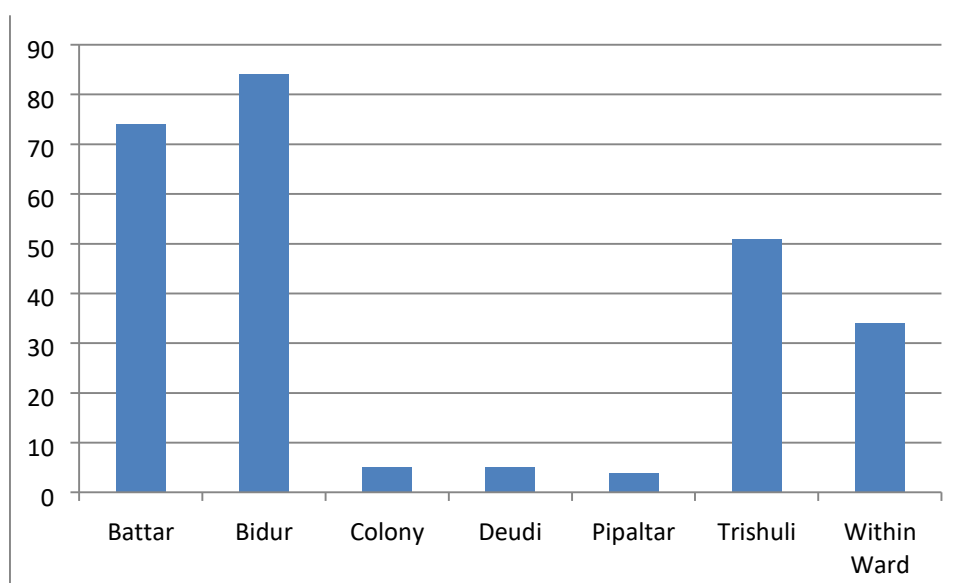


Figure 8: Frequent Travel Destination

3.6 Road Inventory

Road network is one the great indicator of development. Various surface types and width of road exists within Municipality, which has a great role to play in development of the Municipality. Road inventory survey was carried out in the Municipality to have proper view of road network. Thus the concept of both Accessibility as well as mobility lies within the same Municipality. The road width also varies from 2-3 meter to even upto 22m roads.

Different wards have different road network; some has high road network within small area whereas some has low network in large area. Road density is the major parameter that used to reflect the development of road within the considered area. Higher value of which, represent higher level of settlement or high development. Thus Road density is usually defined in two perspectives, first length of road per square kilometer area and second as length of road per 1000 population.

Table 2: Ward wise inventory of Road based on surface type

Ward	Black Top	Earthen	Gravel	Total
1	12.23	6.26	0.27	18.75
2	9.17	31.26	5.45	48.03
3	1.69	38.19	1.62	41.50
4	0.84	16.79	1.39	19.03

5	8.46	44.75	5.18	58.73
6	0.01	23.21	5.70	28.92
7	3.41	21.99	-	27.76
8	0.19	28.38	-	28.56
9	13.31	24.58	0.65	39.22
10	6.13	34.55	1.93	43.22
11	-	18.84	-	18.84
12	0.01	41.56	1.52	44.54
13	-	38.75	-	44.39
Total	55.46	369.12	23.70	461.50

Table below shows the road details based on width

Table 3: Length based on road width

SN	Width	Length (km)
1	0-4	103.53
2	4-6	268.18
3	>6	89.79
total		461.50

3.8 Road Demand:

Demand form was asked to be filled up by each ward for the priority of road demanded. They were asked to rank top five road in their wards or vicinity so as to ensure betterment of the ward. Most of the roads were demanded for periodic maintenance and upgrading as summarized in table below and form of maps in ANNEX A

Table 4: Ward specific Prioritized roads

Ward No:12					
SN	Name of Road	Existing Width (m)	Road Type	Proposed Category	Priority

Municipal Transport Master Plan (MTMP): Bidur Municipality

a	Bhote Bisauna- Gauribesi- Charghare- Katheri- Bhattagaun - Bhaduwar - Tarkeshwor	6	Upgrading	C	1
b	Bhote Bisauna- Khanigaun -Mulabari - Picnic Spot- Chainpur- Nayabasti	7	Upgrading	C	2
c	Gauribesi- Naubise- Pokhari Thok- Koirala Gaun- Kusunde Gaun	6	Upgrading	C	3
d	Chainpur - Panthagaun- Bhaduwar	6	Upgrading	C	4
e	Gauribesi- Naubise- Kalikhola- Katheri	6	Upgrading	C	5
War d No: 13					
SN	Name of Road	Existing Width (m)	Category of Road	Proposed Category	Priority
a	Khursani Khola- Ajingare- Tallo Deudi- Mathillo Deudi	4	Upgrading	B	1
b	Raising- Harkapur- Bhyagute- Takhung- Trishuli Deurali Road	4	Upgrading	B	2
c	Ajingare- Ranishuwara- Bhalu Khola- Thapagaun- Nayandanda- Lokmarga	6	New Track and Upgrading	C	3
d	Kafalswara- Rip- Bageshwari School- Ranagaun- Bhedesuwara	-	New Track and Upgrading	D	4
e	Deudi- Shivamandir- Fedi Sadak- Charghare- Kalyanpur- Chhipre- Megan VDC- Bolumtar- Aamthang-Pemachhyoling Gumba- Megan VDC	4	New Track and Upgrading	D	5
War d No: 2					
SN	Name of Road	Existing Width (m)	Category of Road	Proposed Category	Priority
a	Budi Deuta Mandir near Bhairawi- Maidan Tole- Damai Tole Tallo Bhag- Tindhara- Top khana- Nuwakot Chokade	-	New Track and Upgrading	C	1

Municipal Transport Master Plan (MTMP): Bidur Municipality

b	Topkhana- Rimalgaun- Kuwapani- PNS Museum- Mathillo Kuwapani- FarmHouse- Topkhana-	3	Upgrading	D	2
c	Barahi Mandir- Nuwakot- Dharampani-	4	Upgrading	D	3
d	Bahar Barahi- Nuwakot- Dharampani	4	Upgrading	D	4
e	Shera- Simalkot- Kapas khorla- Dharampani	4	Upgrading	D	5
War d No: 7					
SN	Name of Road	Existing Width (m)	Category of Road	Proposed Category	Priority
a	Adherikhola- Ratmate- Kol danda- Naginsthan- Borle- Sasndhikharka- Kalipokhari	5	New Track and Upgrading	D	1
b	Gaura Ghar- Sisne Chaur- Sunghure- Simala Saura- Badun Danda	5	New Track and Upgrading	D	2
c	Chandeshwari School- Chhaphthok- Bhane Chautari	5	Upgrading	D	3
d	Chaulani- Chowapur Batsala School	4	Upgrading	D	4
e	Naya Chautara- Samikophed- Thulo Khola- Rijal Tole- Sundaradevi Nandi	5	Upgrading	D	5
War d No: 10					
SN	Name of Road	Existing Width (m)	Category of Road	Proposed Category	Priority
a	Betrawati- Keraghari- Kuwapani- Suryagadi	4	Upgrading	B	1
b	Gorkhutar- Gerku Khola- Majha Gaun	4	Upgrading	C	2
c	Kalamata Chhapakhana- Syale Betrawati	-	New Track and Upgrading	C	3
d	Betrawati tallo mahabhir- Kuwapani	4	Upgrading	C	
e	Kyauri Bhanjyang- Jogi Gufa- Mahakali School	-	New Track and Upgrading	C	5
War d No: 9					

Municipal Transport Master Plan (MTMP): Bidur Municipality

SN	Name of Road	Existing Width (m)	Category of Road	Proposed Category	Priority
a	Trishuli Hospital- Aangabutar- Tupche- Mailung	4	Upgrading	C	1
b	Plaster- Bhyaugute- Bhairamkot- Deurali	5	Upgrading	C	2
c	Sill Tank- Aangabutar- Proposed Road A	5	Upgrading	D	3
d	Jafati- Sill Tank	4	Upgrading	D	4
e	Jafati- Andheri Khola	4	New Track and Upgrading	D	5

Ward No:5

SN	Name of Road	Existing Width (m)	Category of Road	Proposed Category	Priority
a	Surya Mode- Tuti Ghat- Baluwa Khani- Devighat Bridhharsam	-	New Track and Upgrading	C	1
b	Thulo Gaun- Post Bdr. Bogati Park- Pipe Karkhana- Nayabasti- Pipaltar- Devighat	3.5	Upgrading	C	2
c	Main Road- Thulo Gaun- Majha Gaun- Tallo Gaun- Manakamana Mandir	3.5	Upgrading	C	3
d	Ward Office- Aanpbot- Shiva Mandir- Majhi Tole- Children Park- Main Road	3.5	Upgrading	D	4
e	Thapa Tole- Chhaphthok- Dhansar- Rajghat	3.5	Upgrading	D	5

Ward No: 8

SN	Name of Road	Existing Width (m)	Category of Road	Proposed Category	Priority
a	Raising- Khursani Khola- Aal Kholsa- Bhairamkot	3.5	Upgrading	C	1
b	Pahar Khop- Trishuli Hospital	3.5	Upgrading	C	2
c	Majhi Gaun- Ghor Dhunga	3.5	Upgrading	C	3
d	Raising- Keureni	3.5	Upgrading	C	4
e	Bhairamkot- Aal Bhanjyang- Chorkharka	3.5	Upgrading	C	5

Ward No: 6					
SN	Name of Road	Existing Width (m)	Category of Road	Proposed Category	Priority
a	Devighat - Chainpur	5	Upgrading	C	
b	Multhala Buwanbesi	5	Upgrading	C	
c	Dhaad Hatti Gauda	3	Upgrading	D	
d	Multhala Seldada	3	Upgrading	D	
e	Ward Office Sichai Karyalaya	5	Upgrading	C	

Ward No: 3					
SN	Name of Road	Existing Width (m)	Category of Road	Proposed Category	Priority
a	Bidhyamandir - Pusantar - Khadgabhanjyang Sadak	5	Upgrading	B	
b	Kukhure-Pipaldanda - Khadgabhanjyang	5	Upgrading	B	
c	sirkhali - Krishna Mandir Jogidada Sadak	3	Upgrading	C	
d	Devighat Pusantar Khadgabhangyang Majhuwa Gorsyang	5	Upgrading	B	
e	Sirkhali ChatreKhola Trishuli Corridor				

Ward No: 4					
SN	Name of Road	Existing Width (m)	Category of Road	Proposed Category	Priority
a	Battar Purano Bazar AapGhari Road	3	Upgrading	C	
b	Campus Chowk Aashrit Nagar BaluwaTar	5	Upgrading	C	
c	Sangam chowk Sanyojan Marg	8	Upgrading	B	
d	Buspark Road	8	Upgrading	B	
e	Battar Purano Bazar Bhimsen Marg	3	Upgrading	C	

3.9 Land Use Pattern

Land use pattern affect transportation planning to large extent. Future development of the locality is largely dependent on the present land use pattern and possibility of development. The land use distribution of Bidur Municipality shows that it is mostly used as the agricultural land followed by Bushes to the second most Thus the area of Bidur has both agricultural areas as well as built-up areas in respective suburbs and nearby of the road. Though, small stream seems to passing across the different wards, due to less significant area, the proportion of water bodies is quite negligible within the Municipality. This is shown as below in the form of figure as well as shown in the form of Map as in ANNEX A. The landuse is taken from survey department data 1990.

Table 5 Landuse pattern of Bidur Municipality

Sn	Type	Area	Percentage
1	Agriculture	79.57	61.21%
2	Barren Land	0.48	0.37%
3	Bush	30.17	23.21%
4	Forest	11.40	8.77%
5	Grass	4.20	3.23%
6	Orchard	0.28	0.21%
7	Pond	0.12	0.09%
8	River	1.71	1.32%
9	Sand	2.07	1.59%
Total		130.01	

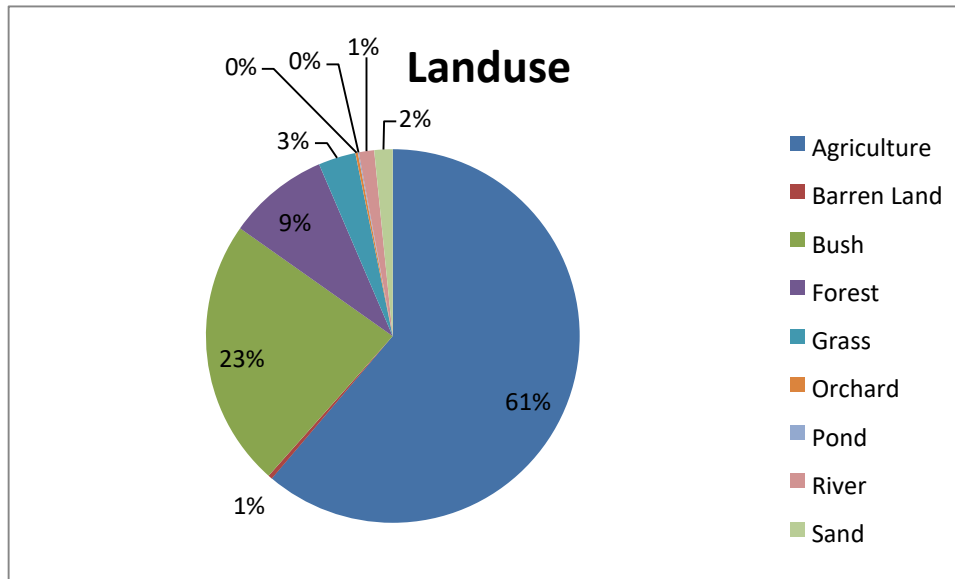


Figure 9: Land use proportion within the Municipality

3.10 Road Safety Status:

Road accident is one of the critical issue in Nepal and they are the seen most critical issue. They are not addressed properly. Significant traffic and pedestrian volume, improper and inadequately maintained road condition, lack of traffic control measures are further accelerating the road safety status within the Municipality. There is not any provision of separate footpath for pedestrian within the Municipality and hence, pedestrian is forced to share the same road space with other vehicle. Sharp curves and gradient exists within the roads and they need to be maintained.

CHAPTER 4: VISIONARY CITY DEVELOPMENT PLAN

The development of the Municipality is basically depended on the features of the individual wards and the vision of the Municipality. This chapter basically covers the indicative development potential and visionary city development plan of the Municipality.

4.1 Ward Specific Features

Betrawati lies which lies in ward 11 is famous for its religious and has touristic importance. Trishuli Bazar in ward 4 is tourist destination for trout fish and Nuwakot durbar has its own importance as well.

4.2 Indicative Development Potential

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 yield agricultural area and tourism. Thus, IDP shows high value cash crops, tourism area, and area of service centers such as hospital, post office, telecommunication, school, campus, bus parks, security offices and large settlements, important historic and religious places.

Bidur is located in Nuwakot district which lies near to the capital city of the nation and has got the historical, cultural, religious, economic as well as political significance. Bidur was developed pre-historically from the ancient times for the human settlements and other more. Previously, the number of people was less; so does the task to manage the services for them too, but as the span of time and number of population this place trends to be in increasing pattern which could ultimately lead to the verse of facing unmanaged urbanization. So a distinct vision of long term development vision is the present necessity of this Municipality.

The eastern portion of the Municipality has higher potential for cash crops & other kinds as the soil is fertile and areas are still vacant and has less occupied by human residence. This can be the centre for the vegetable and fruits production as most of the population of this portion of Municipality is engaged in agriculture. There are few places of historical interest like Nuwakot Durbar which could attract the tourist from the intra-municipality and can be converted to great. Chicken farming in ward 12 should be further expanded to generate revenue for the Municipality, and also the enlargement of the Trout Fish Farming could be proved boon for the income generation of the Municipality. Palet feed is located in ward 5 of Municipality. Bidur Municipality has no universities educational institutions as it is near to Kathmandu Metropolitan City which has major universities, colleges and other educational institutes. So local people go to nearest Metropolitan city for their higher education. However, few primary, secondary, higher secondary schools are granting good education. One of the Police Force office is also located in this Municipality which is an advantages to the local people and consist of the many sahakari(financial institutions) are available in the Municipality along with Sanima Bank; helping the people with financial aspects.

Hence higher level educational centre can be established within the Municipality. Also, the Municipality is not equipped with medical facilities except that of various health posts. So, either new hospitals need to be established or the recent Hospital located at the center of the Municipality should be upgraded to the hospital. These facilities can be upgraded for betterment of the services and thus, it can be upgraded as the major medical centre of the entire Municipality. The main potential of socio economic development of Bidur Municipality is Agriculture and services.

As discussed above there are many historical, cultural as well as tourism spot which ranks Bidur Municipality among the places to visit. Some places are listed as:

- Durbar
- Colony

- Seal tank
- Trishuli

4.3 Visionary City Development

Visionary city development plan ensures safe, responsible, sustainable development of city. According to Kevin Lynch's "*A Theory of Good City Form*" (Cambridge, MA, MIT Press, 1981), several basic concepts underlie urban and regional economic analysis. First, cities cannot grow if their residents simply provide services for one another. The city must create products which can be sold to an external purchaser, bringing in money which can be reinvested in new production facilities and raw materials. This "economic base" of production for external markets is crucial. Without it, the economic engine of the city grinds to a halt. Once the economic base is established, an elaborate internal market can evolve. This market includes the production of goods and services for businesses and residents within the city. Obviously, a large part of the city's physical plant is devoted to facilities for internal transactions: retail stores, restaurants, and local professional services such as home stay for tourists, and so on. Modern cities are increasingly engaged in competition for economic resources such as industrial plants, high-technology firms, development of tourism centres, government facilities etc. Various potential areas of development and future oriented planning of Municipality, were discussed and finalized with Municipality and is summarized in the following subheading.

The motto of municipality is

लशक्षा,संस्कृतत, कृविरपवू ाधु ारकोअलभयान।

ददगोव्यापाररककेन्द्रववदरु को स्वालभमान।।

4.3.1 Tourism Area

Kathmandu being famous in world for cultural as well as historical places and it will attract the tourist around the world. Similarly, Bidur can also attract local as well as outsider based on its tourism perspective. The tourism can be categorized as natural, historical as well as religious and it must be protected for betterment of Municipality.

Nuwakot Durbar has historical importance. Betrawati bazar has religious importance. And cave is in ward 7 which needs promotion.

4.3.2 Future Settlement Area

As the population of the Municipality is trending to increase rapidly and also being located at the vicinity of Kathmandu Valley, there is possibility of high increase in population in nearby area. As the southern part of Municipality is highly urbanizing and is expected to cater the further demand unless proper decentralization doesn't occurs. Also the special places within Battar and Bidur is also expected to go with high urbanization.

4.3.3 Agricultural Area

As the inner core city of Kathmandu is getting covered by just houses and just houses, the population will increases tremendously and the demand for agricultural product need to be managed by the nearby places. The agricultural productivity of Tupche, ward 12, Khadgabhanjyang is high and thus it is necessary to protect this area from further settlement. These places are famous for flower farming, cash crop farming as well as Cow farming. Proper commercialization of the agricultural products within this Municipality will serves to enhance the economic status of people within the Municipality as well as the economic profile of Municipality. Along with them, Fishery & Poultry could be the major source for income via butchery.

CHAPTER 5: ROAD HIERARCHY DEVELOPMENT

5.1 Road Hierarchy:

Road network serve for direct access to the particular land-use by the provision of pedestrian footpaths, bicycle tracks, bus and vehicle routes and cater through traffic that is not related to immediate land uses. Functional provisions of passenger and goods movement mainly define the hierarchy of roads and their classification. On the basis of this concept, roads are classified as per their function. Road class is related to the technical standard and functional requirements. Therefore, road classification should be based on its functional hierarchy. It is important to distinguish roads in different class or type based on various criteria. A road hierarchy is a means of defining each roadway in terms of its function such that appropriate objectives for that roadway can be set and appropriate design criteria can be implemented. It is an important instrument of road network and land use planning.

There are restrictions of direct linkage between various kinds of road-hierarchy. In other words, direct connections between certain types of road links should be reduced, for example residential streets and arterial roads. Connections between similar order streets should be made (e.g. arterial to arterial) or between street types that are separated by one level in the hierarchy (e.g. arterial to highway and collector to arterial.). This conceptual framework can be seen from Figure 9 and 10, These hierarchical distinctions of road types becomes more clear when considering the recommended design specifications for the

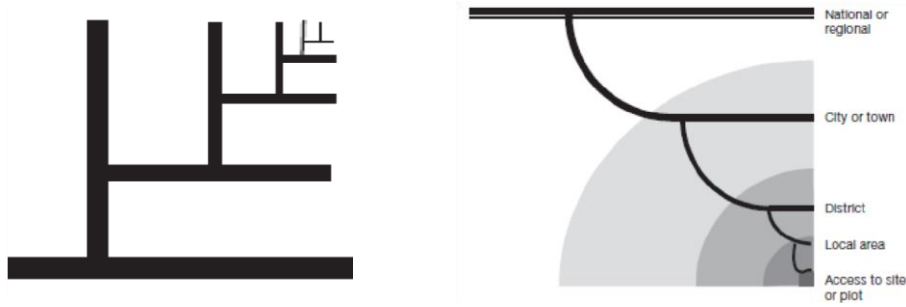


Figure 10 Road Network Hierarchy Figure 11 Urban Road Hierarchy number of through

lanes, design speed, intersection spacing and driveway access.

A well-formed road hierarchy increases the performance and efficiency of the particular type of road as well as of the entire road network. Furthermore, it reduces overall impact of traffic by concentrating longer distance flow onto routes in less sensitive locations, ensuring land uses and activities that are incompatible with traffic flow are restricted from routes where traffic movement should predominate and preserving areas where through traffic is discouraged.

5.1.1 Formulation of Road Hierarchy

Roads under jurisdiction of Municipal authority are referred as urban roads. The classification practices of urban roads basically are guided by the functional hierarchy of roads. Municipality has a complete road network hierarchy consisting of National Highways, Feeder Roads, District Roads and Urban Roads of all four classes. The concept of road hierarchy assist in planning of overall road network and its transport services. Different hierarchy of road has different effect in surrounding areas and other roadways. Hierarchy of roads enable urban design principles such as accessibility, connectivity, efficiency, amenity and safety. Further, it also identifies treatments such as barriers, buffers and landscaping to preserve amenity for adjacent land uses. Thus, a proper plan should accommodate all users of the urban streets in planning, designing and construction of the road infrastructure and furniture. Municipality road network can be conceptualized by considering the functional hierarchy as arterial, sub-arterial and urban roads of various categories such as Class A, Class B, Class C and Class D.

Table 6: Proposed width for various types of roads within urban area:

City	Criteria	Expressway	Arterial	Sub arterial	Collector	Local
Sub city	10,000 -40,000	-	-	30m	20m	10m
City	40,000 -100,000	-	50m	30m	20m	10m
Sub Metro City	100,000 -300,000	50m	30m	20m	10m	10m

Source: Planning Norms and Standard 2015, GoN, DUDBC

The various standard documents on Nepal, which includes Nepal Road Standard (NRS 2070), Nepal Rural Road Standard (NRRS 2071) and Nepal Urban Road Standard 2068 Draft suggest the need of footpath and the total right of way is adopted as per ToR provided by MoFAGA and is as follows:

Table 7: Classification of Municipal Roads

Road Type	Road Class	Right of way (RoW)
Main Collector Road	Class A	16 m
Other Collector Road	Class B	12 m
Tole Road	Class C	8 m
Other Road	Class D	6 m

5.2 High Hierarchical Road Network

Road are classified based on its importance and its area served. Basically, higher hierarchical road network within the Municipality comprises of Strategic Road Network (National Highway and Feeder Roads) and then the local road network, consisting of District Road Core Network (DRCN).

5.2.1 Strategic Road Network (SRN)

There are 5 Strategic Road Network within the Municipality. The total Right of way of these roads is 50m. The total length of the roads is 44.98Km.

Table 8 List of SRN Roads within the Municipality

Road Name	Length (m)
Galchhi - Debighat	4.53
Kathmandu - Trisuli - Dhunche - Rasuwagadhi	17.94
Nuwakot Darbar Access Road	8.71
Samakhosi - Tokhagaun-Dandagaun-Gurje-Tadi-Gangate	3.46
Trishuli-Samari-Bharyang Bhurung (Midhill Highway)	10.35
Grand Total	44.98

5.2.2 District Road Core Network (DRCN)

Based on District Transport Master Plan (DTMP) report prepared by Department of Local Infrastructure (DoLI) there are four DRCN roads within the Municipality which passes through various wards and are of total right of way of 30m as approved by District Development Committee and District Road Coordination Committee. These roads are summarized as below

Table 9: List of DRCN Roads within the Municipality

Road Name	Length (m)
Mandredunga-Khadgabhanjyang-Gorshyang-Dansing-Kapahalpani	11.03

Multhala-Chhatrekhola-Budhasing-Taruka	9.04
Trishuli-Deurali-Meghang-Kimtang-Thambukhola	12.14
Trishuli-Sole Bajar	9.49
Grand Total	41.7

5.3 Municipal Roads

Different road within the Municipality serves different function, some basically serves the function of access and some serves function of high quality mobility. Hence road need to be categorized so as to ensure effective and efficient transportation planning process. As described earlier, this MTMP had formulate four level road hierarchy namely Class A, B, C and D, and are described in subsequent heading. The function of Class C and D is basically to provide access, while Class A and B provides mobility and accessibility to higher services which includes linkage to SRN and DRCN roads as well as provides linkage to nearby Municipality.

There is fundamental difference between various class of roads and have been summed up in the form of table 10 as:

Table 10 Comparison of various hierarchy of roads

Criteria	Class A	Class B	Class C	Class D
Purpose	Mobility	Mobility and control access	Access and mobility	Access
Function	Through and long distance movement	Connect Class A and C; provide alternative connection routes between Class A	Connects higher order roads & mobility to local trips.	Connect local trips to higher level roads.
	High network coverage	Support through movement of traffic	Access to property	direct access to property
	Segregated NMT facilities and Bus laybys	Segregated NMT facilities and laybys	Segregated NMT facilities	Local NMT movement
Maintenance Responsibility	Municipality	Municipality	Municipality & Community	Community
Design Speed (Kmph)	40	30	20	20
Radius (m)	30	20	15	15

Minimum RoW (m)	16	12	8	6
Setback distance (m)	2	2	1.5	1.5
Access Control	Applicable based on locality	Not Applicable	Not Applicable	Not Applicable
Public transport services	Public Transportation	Local Public transport	Small form of public transport	No public transportation

5.3.1 Class A Roads

Class A roads serve as the major collector roads. These roads start either from the Arterial or Sub-Arterial road. These roads are of relatively long distance which connect big market or settlement areas or two or more wards centers within the Municipality. They provides linkage to SRN & DRCN roads as well as to the nearby Municipality.

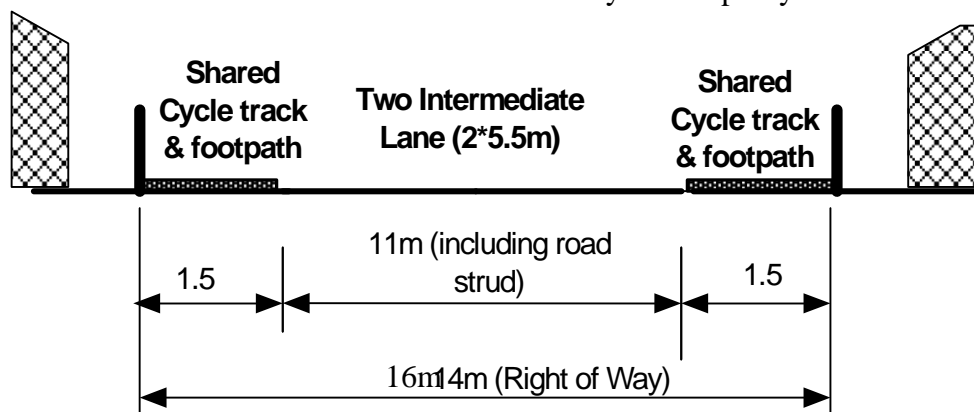


Figure 12: Recommended cross section for Class A roads

Two Class A roads have been proposed so as to support the Indicative development potential as well as interconnectivity. Based on technical study and bottom up participatory approach, following five Class A roads with length 15 km roads and right of way of 16m has been approved.

Table 11 List of Class A roads

Name	Code	Ward Pass	Length(m)
Kagune - Charghare - Kalyanpur - Takhung	A001	13	5.01
Dandathok - Tupchetar - Bahundada - Khursani (28A001R)	A002	7,8,13	10.15

5.3.2 Class B Roads

These roads serves as a second level of road with total right of way more than 10m and can be considered as Feeder roads of Municipality. These roads connects major road network and other roads of similar hierarchy with either major growth centre or provide access between Class A and class C road. Mobility is the main concern for these roads and it need to be equipped with at least facilities for non-motorized travel. The typical cross section for Class B roads is as:

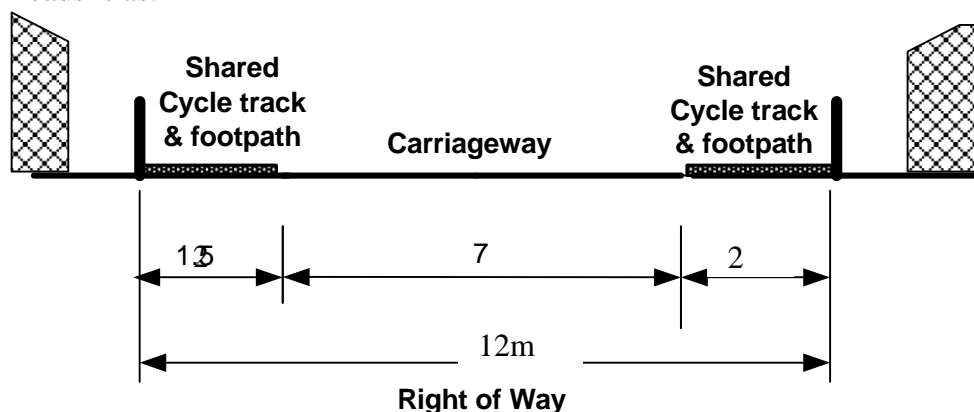


Figure 13: Recommended cross section for Class B roads

Five Class B roads have been proposed so as to support the Indicative development potential as well as interconnectivity to Class A roads and DRCN roads. Based on technical study and bottom up participatory approach, 34.38 Km of roads have been approved as Class B roads with ROW 12m as follows:

Table 12 List of Class B Roads

Name	Code	Ward Pass	Length
Gerkhutar - Upallo Gerkhu	B001	10,11	10.62
Kapashkhoriya-Dharampani	B002	2	2.63
Bhotebisauni-Gauribesi-Charghare-Katheri-BhattagaunBaduwar-Tarkeshwor	B003	6,12	9.6
Bhotebisauni-Khanigau-Mulabari-Picnic chainpurNayabasti - Bhatagaun	B004	6,12	6.63
Majhigaun - Pusuntar - Alamdanda	B005	3,5	4.91

5.3.3 Class C Roads

Class C roads basically serves the function of access to greater extent and mobility to some extent. These are third hierarchy of roads and these provide access to Class D roads. The right of way for these are recommended to be more than 8m wider roads. Class C roads are

residential street and they provide access to the private property and small industrial or public place. These roads provides connection to higher order roads or with agricultural roads which connect a farm with a mini-market centre or an agro-based production centre. These roads serve mainly for small/light vehicular movement for low volume intensity.

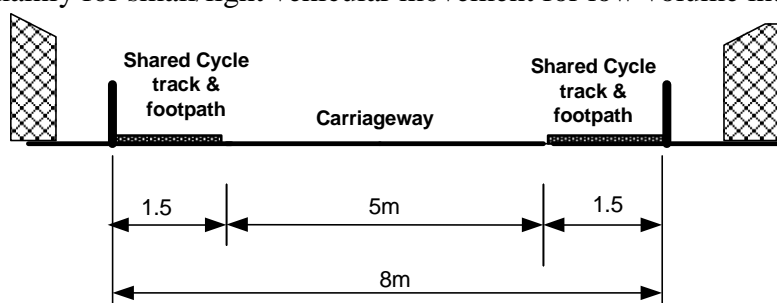


Figure 14: Recommended cross section for Class C roads

Six Class C roads of 29.62 km length is approved based on both technical study, on site feasibility as well as Bottom Up approach and been listed as follows:

Table 13 List of Class C roads

Name	Code	Ward Pass	Length
Sahugaun - Ratmate - Junetar - Ranathok	C001	7,9	8.67
Betrawati-Keraghari-Mahavir-Suryagadhi	C002	10	4.17
Trishuli - Pange Gau - Bogati Gau	C003	1	3.47
Bidur - Gauribesi - Khatrigaun	C004	2,4,6,12	2.20
Ajingare-Raniswanra-Bhalukhola-ThapagaunNayandada	C005	4,8,9,13	10.9
Muniipality Office Road	C006	2,4	.22

5.3.4 Class D Roads

Class 'D' roads are all other minor roads which gives access to public property. All other roads that fulfil the minimum requirement set by the Municipality and that doesn't fall under above classes, automatically falls under Class D roads. The cross section can be decided from local level with approval from MRCC, but ensuring all road users are given sufficient rights of sharing the roadway. The community level participation is must for completion of these roads. The Municipality-community share can go from 40% - 60% to 60% - 40% for effectiveness of construction and maintaining the roads. This criteria of investment from local sector depend on Municipality policy.

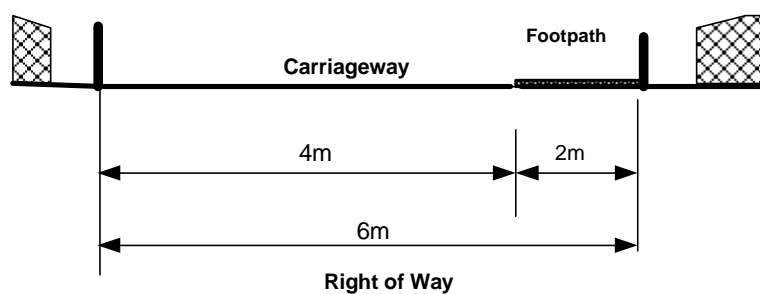


Figure 15: Recommended cross section for Class D roads

5.4 Ward Specific Hierarchy of Road

Various hierarchy of road have different functions and characteristics. Based on equity atleast each ward need to be connected by higher hierarchical road network. AS highlight in the table below, all the wards are touch by DRCN roads. Later each wards are touched by either of Class A, B or C roads.

Table 14 Ward specific hierarchy of road network

Ward	A	B	C	SRN	DRCN	Total
1	-	-	3.47	2.84	0.89	7.20
2	-	2.63	0.34	10.24	0.02	13.24
3	-	4.83	-	-	9.26	14.09
4	-	-	1.55	3.24	0.98	5.77
5	-	0.08	-	11.06	-	11.14
6	-	1.29	0.24	-	8.71	10.23
7	9.45	-	5.92	-	5.18	20.56
8	0.44	-	4.40	-	6.98	11.83
9	-	-	3.93	-	9.54	13.48
10	-	3.48	4.17	7.26	-	14.91
11	-	7.14	-	-	-	7.14
12	-	14.94	0.60	-	1.26	16.80

13	5.27	-	4.99	-	9.21	19.47
Total	15.17	34.39	29.63	34.63	52.05	165.86

Table below shows the road density per sq km and road density per 1000 population. *Table 15 Road Density*

Ward	Road length	Area (Sq. Km)	Population	Road Density Per Sq Km	Road Density Per 1000 population
1	18.75	4.69	3219	4.00	5.83
2	48.03	8.44	4362	5.69	11.01
3	41.50	12.56	4792	3.30	8.66
4	19.03	1.92	4418	9.91	4.31
5	58.73	7.44	4624	7.89	12.70
6	28.92	5.98	3628	4.84	7.97
7	27.76	13.46	3897	2.06	7.12
8	28.56	7.91	3793	3.61	7.53
9	39.22	6.16	5443	6.37	7.21
10	43.22	13.58	3567	3.18	12.12
11	18.84	9.03	2815	2.09	6.69
12	44.54	14.84	4071	3.00	10.94
13	44.39	24	5722	1.85	7.76
Total		130.01	54351		

CHAPTER 6: PRIORITIZATION CRITERIA

6.1 Concept of Prioritization

Each roads are of importance in some aspect, some serve large population, whereas some serve the purpose of access, while some link the ward with market or service facilities and some link acts as connectors between two wards or Municipality. It is not possible to construct/maintain or upgrade all roads at a time due to various constraints as: time, resources and cost constraint. Looking at the importance of road, some road need intervention immediately and some can be done later on. Thus, each link in a network needs to be

prioritized and various intervention need to be taken based on the prioritization. In simple words, rank of each road network need to be assessed based on its importance and the intervention is taken based on the rank. The scoring criteria and their weightage/score remains the same for all road links as well as for all type of intervention.

6.2 Weightage Scoring Criteria

After rigorous study (literature around the world and past experience) and ToR , following prioritization criteria is published. Eight ranking/prioritization indicator is proposed as prioritization indicator, which includes following:

Table 16 Proposed Scoring Criteria with score for prioritization

S.N	Scoring Criteria	Scoring Unit	Score
1	Demand Priority of wards		10
2	Total existing width	Meter	10
3	Population served		20
4	Road network benefit (access to service centers , recreational centre, agricultural centre and market)		30
5	Link to future development potential sites		10
6	Link to other road network (SRN, District roads, Airport)		10
7	Road Surface		10

A. Demand priority of wards:

It is the one of the major criteria for prioritization. Each ward has provided intervention in prioritised order during filling demand form from priority order one to five. These priority is based on actual present ward resident need, i.e. the intervention which is at number 1 priority need to be done first. Higher the priority of intervention, it should get highest score. If certain intervention got highest priority i.e. number 1 priority in certain ward level, then it need to get full marks. Road with first priority will get full marks and the score will reduced by 20 % for each lower level priority; i.e. second priority road will get 80% score. Lowest priority (5th priority) link intervention will get twenty percent of total score. And all other roads will get 10% of the total score. The road link with different priority from different wards will get the average score

B. Existing Width of Road:

Existing width is also the next governing factor for prioritization. The present width of the road is the indicator of the importance. The road which is wider among many roads within the Municipality carries slight more importance than other roads. Thus, widest road is given highest priority and thus full score. As the new proposed road doesn't have width at present day giving them Zero score will not be realistic and thus new proposed road is given 25% of the total score. Road width within zero and maximum width is given score based on relative scoring. The score for road with variable width will be based on weightage width.

C. Population Served

Population coverage by the road linkage is one of the important indicator of prioritization. Higher the population served by the road, higher will be it's necessity or importance and it need to be constructed/upgraded/maintained first. Thus, high score is assigned for the road link serving high population and all other score is based on the relative marking wit. Now the question arises which population can be considered as high population and thus relative score is provided. Among all roads within the Municipality, road serving maximum population is given full marks and the other roads are provided score accordingly. Thus, the score for road based on population served lies within zero to full score.

D. Road Network Benefit (RAMS)

It is one of the main governing prioritization indicator. The road link may provide access to recreational (picnic spot, historical place, park, cinema hall, playground), agricultural land, market centre and service centre(schools, health post, governmental offices, etc.). A single road link can serve just a single function to all above four function. Simply more the services road link offers more will be the importance of the road link/network. The proposed road intervention which serve all four facilities is regarded as the major intervention which need immediate attention and thus it is provided with highest full marks. If the road link only serve any three function/purpose, the score is reduced to 80% of the total final marks. Similarly, link serving any of the two function is provided with 60% and the road which serve only a single function is provided with 40%.

E. Future Potential Development

It is one of the main governing prioritization indicator. Higher the future potential development, higher will be its necessity or importance and it need to be constructed/upgraded/maintained first. Thus, high score is assigned for the higher potential road and all other score is based on the relative marking wt. Among all roads within the Municipality, road serving maximum potential development is given full marks and the other roads are provided score accordingly. Thus, the score for road based future potential lies within zero to full score.

F. Link to other road network

It is one of the main governing prioritization indicator. The proposed road intervention which join SRN, Feeder road, District road is regarded as the major intervention which need immediate attention and thus it is provided with highest full marks. If the road link only serve any two function/purpose, the score is reduced to 80% of the total final marks. Similarly, link serving any of the one function is provided with 60% and the road which serve from class A road is provided with 40%.

G. Existing Road Surface

Road surface type also governs the scoring and prioritization of the road. There are two principle behind which type of road to prioritize first, one principle says the objective need to be access first, i.e. first make the road motor-able so that it can be operated in all for all weather road. Another approach says the road importance is dependent on surface type, the road which is bituminous at presents has great importance and need to be maintained first compared to upgrading earthen road.Both aspect has significant impact on overall prioritization. Basically, road which has bituminous or metalled road surface serve large population and has significant width and thus it will get high marks in those criteria. Hence, this study give highest priority to earthen surface as we are mainly concern with accessibility first. Earthen surface road acquire full marks, gravel road surface acquire 80% of total and bituminous/metalled road gets 60% of total score. If a single road have different surface at different section, then the weightage average based on length is taken and score is provided accordingly.

6.3 Prioritized Road Network

The road intervention is based on the budget available as well as the importance of the road and based on above prioritization criteria all roads have been prioritized and then the MTMP plan had been proposed based on the prioritized road network. The prioritized score for various roads have been summed up in the form of table as:

Table 17 Prioritized Major Municipal Road Network

Road Code	Width	Surface Type	Ward Demand	Population Served	High Hierarchy Road	Municipal Special Area	ID P	SA MT	Total Score	Priority
CLASS A ROAD										
A001	10.0	10.0	9	9.5	8			20	66.5	2
A002	10.0	10.0	10	10	8			20	68	1
CLASS B R OADS										

B001	10.0	9.6	9	9.75	9	5		22.5	74.8 876	1
B002	8.8	10.0	6	7.5	10			10	52.2 5	5
B003	9.4	10.0	10	10	7			22.5	68.8 75	3
B004	9.4	10.0	9	9.5	7	0		22.5	67.3 75	4
B005	10.0	10.0	5	8.75	8	7.5		22.5	71.7 5	2
CLASS C R OADS										
C001	10.0	8.3	10	9.5	8	5		7.5	58.2 748	6
C002	9.0	10.0	10	8.75	9	10	10	27.5	94.2 5	1
C003	9.0	10.0	10	8.75	10	5		30	82.7 5	2
C004	10.0	10.0	5	7.5	9	5		20	66.5	3
C005	9.0	10.0	8	10	7	5		17.5	66.5	3
C006	10.0	6.0	5	6.25	7	10		15	59.2 5	5

CHAPTER 7: MUNICIPAL TRANSPORT MASTER PLAN

This chapter deals with the strategic framework associated with municipal transport master plan. Alongside, it also covers perspective plan and implementing strategies necessary to achieve the plan followed by budget expenditure plan.

7.1 Perspective Plan of Municipal Road Network

Perspective plan of Municipal road network includes the maintenance of the access and collector roads and development of higher hierarchy road corridors supporting mobility of the roads. First five years should focus on development of existing access roads and their maintenance. It also incorporates construction of new road linkages to provide basic access to the settlements. During this period formulated road hierarchy will be implemented in terms of policy and enforcement of bylaws. Within 2 years other complementary plans of land use and city development will be developed. In the third year, the MTMP and its perspective plan should be revised in coordination with the other plans formulated and changes captured during this period.

Medium term planning will implement the higher hierarchy roads in stages of clearing of the required ROW and infrastructure facilitation. Proper development stages of roads should be planned (construction of Class “A” roads to the standards of Class “C”, then gradually upgrading to Class “B” and to Class “A”). Other implementation strategies should be developed and finalized at the end of this period. The road network developed during this period shall complete construction of Class “C” roads. Gradual upgrading of the higher hierarchy road networks during year ten to twenty will be justified by the traffic generated and level of mobility demanded to support the emerging economy. Land development and management should go parallel with clearance of RoW of higher classes of road. Road corridor development project should be introduced for acquisition of land required to clear RoW for various classes of road.

7.2 Financial Institutions and Capital Investment Plan

The construction work in each year depends on the probable budget. Firstly, the total budget for the current or last financial year needs to be determined. Firstly, the municipal Annual Budget Book is studied for revenues sources as well as expenditure plan on road. Planning of the investment is essential to support local government in developing good and best practice in construction, upgrading, overall asset management and especially operation and maintenance the road project. The grass root level involvement in the development of the road sector helps to create an informed and responsible citizen in the society. Thus, it is important to have local people’s participation in the construction works of the local access roads. A majority (if not all) the local access roads should be constructed by the local people in coordination with the Municipality. People’s participation can be achieved in plantation alongside of the roads, cleaning of the road area and other activities.

Municipality has the responsibility of preparing the necessary framework and implementing policies and strategies for the planned development of the municipal roads and thus the Municipality as a whole. Major share of the municipal budget should be used to maintain the roads and construction of wider roads to meet the planned class and ROW. The annual program should address the local need and the need of emergency and specific maintenance.

Municipality has a major role in developing the roads. It has the responsibility of preparing the necessary framework and implementing policies and strategies for the planned development of the municipal roads and thus the Municipality as a whole. Major share of the municipal budget should be used to maintain the roads and construction of wider roads to meet the planned class and ROW. The annual program should address the local need and the need of emergency and specific maintenance. Specific roads should be constructed as a whole and not in parts for longer period of time. Other institutions are district and division line agencies such as DoR, DoLI. These institutions are responsible for the development of road corridors that are important to the district or a larger area as a whole. Their contribution may or may not invest in the roads within the Municipality, but wider roads of the Municipality that extends to the boundary to other VDC/districts may draw investment

beyond the municipal boundary. This will ultimately help in the development of the local municipal market centre.

7.3 Five Year Budget Expenditure

Provision of annual budget expenditure for proposed intervention (new construction, upgrading, maintenance and rehabilitation) is one of the final outcome of the study. The budget plan is based on realistic approach and takes consideration of annual allocated budget of Municipality. Intervention that can't be completed in preceding year should be the next priority in coming year. If a certain road, which was targeted to complete in first year could not be finished in first year, need to be given first priority in next year expenditure plan. If there occurs deficit in annual expenditure, Municipality need to incorporate that particular heading in next year at any cost. They can look for grant, assistance from district or even central level or they can incorporate them by shifting budget from less importance item/heading. Budgeting of roads has been divided according to interventions:

- i. Construction and upgrading (70%)
- ii. Maintenance (30%)

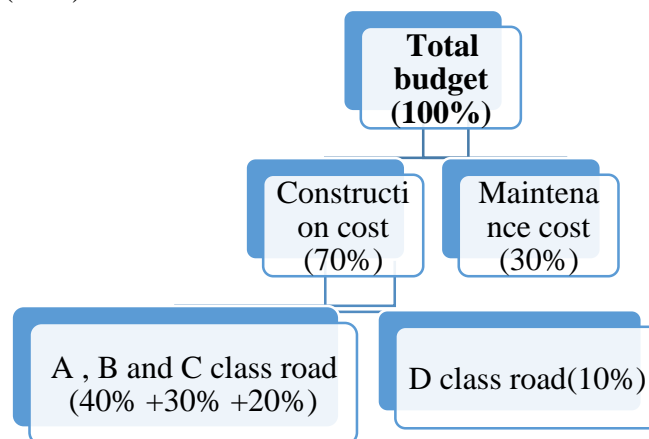


Figure 16: Expenditure Breakdown based on to MTMP Guidelines "A" Annex 5.

Budgeting of municipal road has been calculated based on present budget and certain growth rate. The capacity enhancement of the Municipality is assumed by 10% increment each year. Maintenance cost has been allocated 30% of fund available for municipal road. Yearly maintenance plans according to need based assessment of required maintenance has to be prepared and cost allocation needs to be done through this plan. In absence of specific fund granted for special project, all other fund available to Municipality for construction of road should come through one window system collected in under single basket and allocated to the roads based on ranking of roads.

The present based on Budget allocation for fiscal year 2075/76 is, among which 10.53 crore is allocated on Road and Bridges for the fiscal year.

Table 18 Budget Allocation for Upgrading and Maintenance

Year	Budget	Cumulative Budget	For Class "A" Roads (40 %)	For Class "B" Roads (30 %)	For Class "C" Roads (20 %)	For Class "D" Roads (10%)	Total for Construction & Upgrading70%	Maintenance (30%)
2077/78	85,300,000	85,300,000	23,884,000	17,913,000	11,942,000	5,971,000	59,710,000	25,590,000
2078/79	93,830,000	179,130,000	26,272,400	19,704,300	13,136,200	6,568,100	65,681,000	28,149,000
2079/80	103,213,000	282,343,000	28,899,640	21,674,730	14,449,820	7,224,910	72,249,100	30,963,900
2080/81	113,534,300	395,877,300	31,789,604	23,842,203	15,894,802	7,947,401	79,474,010	34,060,290
2081/82	124,887,730	520,765,030	34,968,564	26,226,423	17,484,282	8,742,141	87,421,411	37,466,319
2082/83		658,141,533	38,465,421	28,849,066	19,232,710	9,616,355	96,163,552	41,212,951
Total	137,376,503 658,141,533.00		184,279,629	138,209,722	92,139,815	46,069,907	460,699,073	197,442,460

The cost of construction and upgrading of road of class “D” is subjected to 10% of total cost of construction and upgrading. Class A road owes 40%, Class B 30% and Class C 20% according to MTMP Guidelines “A” annex 5.

This budget need to be increased to provide intervention to all road network, if it is to be designed to desired level of full Right of way and hence they are constructed to acceptable level in next five years and is dealt in next subheading.

7.5 Five Year Implementation Plan

Provision of annual budget expenditure for proposed intervention (new construction, upgrading, maintenance and rehabilitation) is one of the final outcome of the study. The budget plan is based on realistic approach and takes consideration of annual allocated budget of Municipality. Intervention that can't be completed in preceding year should be the next priority in coming year. If a certain road, which was targeted to complete in first year could not be finished in first year, need to be given first priority in next year expenditure plan.

For the preparation of implementation plan one intervention for each road was considered to be intervening. However, if budget remains, then it shall be used for the preparation of second level of interventions considering the same priority. For example, if a road is earthen at present, it will first be upgraded to gravel road and then the next ranked road is provided with intervention and if the budget remains only then it will be upgraded to bituminous/metalled road. At short run all the Class A and B roads will be upgraded to two lane roads, whereas Class C and D roads to single lane roads

For track opening and gravelling full length (RoW) was used for intervening. In case of blacktopping within MTMP period (i.e. 5 years) **double lane for Class A and B, single lane for Class C and Class D roads** has been taken under considerations. The difference of RoW

and existing width was taken for determining the cost for widening. In each of these calculations, the rate given in guideline was for single lane and the necessary multiplication was made for respective number of lanes. Drainage calculation was made for both side drains as well as cross drains. Cross drain was considered at every 500 meter intervals. Most often double side drain was considered within the city area.

Based on the budget projection of the Municipality for next five year and budget allocation for various class of roads and surface type, the implementation strategy for the major hierarchical road network has been proposed.

Table 19 Five Year Implementation Plan for Class A,B and C Roads

Budget allocated for various classes of roads for Five years

S. No.	Code	Score	Length	YEAR I		Year II		Year III		Year IV		Year V		Length Completed
				Lengt h	Cost	Lengt h	Cost	Lengt h	Cost	Lengt h	Cost	Lengt h	Cost	
A Class Roads														
1	A001	66.50	5.01	1.54	11,942,000.00	1.70	13,136,200.00	1.77	13727329	0.00	0	0.00	0	5.01
2	A002	68.00	10.15	1.54	11,942,000.00	1.70	13,136,200.00	1.87	14,449,820.00	2.06	15,894,802.00	2.99	23,079,252.50	10.16
			15.17	3.09	23,884,000.00	3.40	26,272,400.00	3.64	28,177,149.00	2.06	15,894,802.00	2.99	23,079,252.50	15.17
B Class Roads														
3	B001	74.89	10.625	0.00	-	0.60	4,092,829.86	1.60	10,837,365.00	1.69	11,444,257.44	2.20	14,949,061.28	6.08
4	B002	52.25	2.6332	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00
5	B003	68.88	9.5972	0.00	-	0.00	-	1.60	10,837,365.00	1.82	12,397,945.56	1.66	11,277,362.02	2.66
6	B004	67.38	6.626	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.49
7	B005	71.75	4.9063	2.62	17,913,000.00	2.28	15,611,470.14	0.00	-	0.00	-	0.00	-	4.91
			34.39	2.62	17,913,000.00	2.89	19,704,300.00	3.19	21,674,730.00	3.51	23,842,203.00	3.86	26,226,423.30	10.65
C Class Roads														
8	C001	58.27	8.67	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	C002	94.25	4.17	1.25	11,942,000.00	1.37	13136200.00	1.51	14449820.00	0.00	0.00	0.00	0.00	4.13

Municipal Transport Master Plan (MTMP): Bidur Municipality Draft Report

10	C003	82.75	3.47	0.00	-	0.00	0.00	0.00	0.00	2.86	15894802.00	0.61	3392403.15	3.47
11	C004	66.50	2.20	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	2.20	12626610.00	2.20
12	C005	66.50	10.90	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.20	1465269.04	0.20
13	C006	59.25	0.22	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			29.63	1.25	11,942,000.00	1.37	13136200.00	1.51	14449820.00	0.00	15894802.00	0.00	17484282.20	10.00
Total Length of Road, Km			85.45	<i>Total Length of Road to be Completed Within 5 Year in Km</i>										35.81

CHAPTER 8: CONCLUSION

8.1 Conclusion

Municipal Transport Master Plan has been prepared for Bidur Municipality. A series surveys for data collection, series of different level interaction with the locals and various authorities was conducted. The study has identified all the roads of the Municipality, their status and interventions required. The map of IDPM, MIM, MTPP and other maps are prepared.

The study has formulated hierarchy of roads which is necessary for long term rapid development of the Municipality area. The study has shown increased trend of motorized vehicle. This is necessary to be implemented as the developed cities are have trouble to address the demand of active mode user friendly urban road infrastructures. As the implementation strategy suggests, the Municipality needs to develop proper framework and policies for the implementation of the perspective plans, built the capacity of the Municipality and the local organizations and committees and proper stages of development of the roads.

Transport and land use along with nodal development cannot be disintegrated. Preparation of municipal transport master plan is the first step in the planned development of the municipal area. MTMP alone cannot circumscribe the potential development of the municipal area. Comprehensive city development plan, land use plan, drainage master plan, etc. are some other plans that needs to be prepared and integrated with municipal transport master plan. For future nodal development and transport development, land use master plan and comprehensive city development plan should also be prepared. MTMP should then be revised based on those plans.

The Municipality is linked with high network of DRCN but proper materialization of the planned road network seems missing. Most of the roads are not of adequate width and hence they need to be upgraded. Samundradevi waterfalls, Bidur National Park & other monumental & historical places has high tourist attraction centre, whereas thanapati, sunkhani & Sikrey has high agricultural productivity. All the road are provided with atleast a level of intervention in the next five year so as to improves on accessibility first.

8.2 Recommendation

- Unplanned urbanization has rendered many cities unlivable because of the growing pollution and lack of green/open spaces. Road space is most frequently used public space. **Provision of green belt** along the urban roads creates safer and pleasant walking spaces, and acts as median to separate motorists from each other and from the NMT users.

- **Proper structured public transport routes** are vital for sustainable transport development. As the demand increases, before well-structured and formal transport is justified economically, the local government should introduce City Bus to ply at least within the Municipality.
- **A proper hierarchy of settlement** should be developed to segregate the commercial and business centers from settlement areas and industrial area. A hierarchy of the market centers should be developed as main market
- Better provision of **Road and road side infrastructure** is must for effectiveness of planning. Due to very high active users, proper networks of pedestrian way and cycle tracks should fit in the basic road width. Proper bus lay bys are necessary elements for proper public transport system. Adequate lighting system along with proper connected pedestrian ways and zebra crossings is another major road infrastructure.
- Increase private motorized vehicle ownership will have witnessed the need of parking, so **Proper Parking Management** is must. Similarly, parking at the major destinations such as business and market centers, industrial and commercial areas should be managed by the private sector.
- **Integrated service planning** is a very important factor for damage minimization during construction and expansion of various facilities. As the road follows, settlement also expands which demands other facilities such as electricity, drainage and drinking water. All these facilities are provided along with road infrastructure, mostly within the ROW of road. Proper integration of these services with road planning is necessary to minimize multiple investment in the individual infrastructure and the damage to other infrastructure during maintenance and/or expansion.
- The proposed roads cannot be directly implemented at a glance. **Proper phases of development** of roads of all hierarchy should be envisaged and planned.
- **Land acquisition** should go parallel with development phase of roads and possibly concept of land pooling can be adopted for land acquisition.
- **Proper Land Use Plan and Comprehensive city development plan** is must for better effectiveness of this MTMP and these three need to be correlated with each other.
- It is recommended to adopt **Labour based Environmental friendly and Participatory (LEP)** approach popularly known as Green Roads construction method. Green Road approach aims at reducing scarring by minimizing the amount of cut necessary and by balancing the amount of material cut with the amount of fill required.
- Revised Scoring criteria and Mid Period Review is must to ensure the MTMP is in accordance with the future developed polices on Land Use and Comprehensive City Development Plan.

GLOSSARY:

Accessibility: Ability to reach opportunities/facilities that is beneficial and not the movement.

Base map: A map depicting background reference information such as landforms, roads, landmarks, and political boundaries, onto which other thematic information is placed. A base map is used for locational reference and often includes a geodetic control network as part of its structure.

Capacity: The maximum number of vehicles that can pass over a given section of a lane or roadway in one direction (or in both directions for a two-lane or three-lane highway) during conditions.

Collector road: These roads provide both access and movement within residential, commercial and industrial areas. They are typically discontinuous between residential areas, so as to avoid traffic infiltration through neighbourhoods. Lower density developments and community land uses such as schools and convenience retail are often located on collector streets.

Destination: Location where trips are attracted or ended.

Emergency maintenance: Maintenance works that are to be carried out due to unexpected and sudden blockage of roads that stop vehicular movement due to natural disaster

Household: Those who dwell under the same roof, compose a family and eat at the same kitchen

Land Use: Land use highlight on what purpose the land is being used

Local road: These roads provide direct property access in residential, industrial, commercial and downtown areas. With local streets connecting primarily to collector roads, travel distances are short, speeds are relatively low and volumes are modest, as their primary function of accommodating traffic from adjacent lands.

Maintenance: The process of preserving the original condition or function of an asset

Mobility: Efficient and effective movement of people and goods

MTMP: The MTMP is a strategic planning document designed to identify and address the Municipality's needs to the year 2020 and beyond. The MTMP is the document that identify, classify and prioritize the municipal roads; identify possible sources of funds and materials for the construction of the prioritized roads according to their respective standards and scientific mobilization of the available resource.

Network: Set of nodes and connecting links that represent transportation facilities in an area.

New construction: The work of building

Origin: The location of the beginning of a trip or the zone in which a trip begins.

Passenger Car Unit (PCU): Factor used to convert various type of vehicle to car equivalent in context of heterogeneous traffic

Periodic maintenance: Maintenance works to be carried out in intervals of years and of largescale.

Public Transport: Shared passenger transport service which is available for use by the general public

Recurrent maintenance: Small maintenance works not falling under routine maintenance that are carried out a few times a year in all roads to repair minor damage resulting from traffic and rainfall

Right of Way: A general term denoting land, property of interest therein, usually in a strip, acquired for or devoted to transportation purposes

Routine maintenance: Small maintenance works that are to be carried out in all the seasons on all roads on a regular basis

Specific maintenance: Spot treatments and repairs that do not occur every year or in every road, and which are very specific in nature and location.

Traffic Volume: Number of vehicle passed through the considered section per unit time

Trip: A one-direction movement which begins at the origin at the start time, ends at the destination at the arrival time, and is conducted for a specific purpose.

Upgrading: The process of addition or change that makes something better than it was before

Usable area: The area that can be used for human construction. It includes cultivated and built up area. Environment sensitive area and barren lands are not usable area.

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ANNEX A:
MAPS

ANNEX B

PHOTOGRAPHS