Siddharthanagar Municipality

Office of the Municipal Executive

Siddharthanagar, Rupandehi

Lumbini Province, Nepal

Municipality Transport Master Plan (MTMP)

of

Siddharthanagar Municipality

(Approved by 9th Municipal Council)

2021

Acknowledgement

We would like to sincerely thank the Mayor, Deputy Mayor, Ward Chair and Chief administration officer of Siddharthanagar Municipality, for their support throughout our stay in Siddharthanagar. We would like to express our gratitude to all the members of municipality transportation coordination committee (MTCC) for their input and guidance for the preparation of MTMP.

We would also like to present our gratitude to all the staff members of the municipality, all the members of the *wada nagarik manch,* the representatives from different political parties and volunteers for their support and contribution for making the working environment easy and pleasant.

We would like to thank all the citizens for their patience and friendly environment who were directly and indirectly involved in the data collection process. We are greatly thankful to everyone who helped in facilitating us for data collection. We thank the volunteers who helped for traffic vehicle count on the major road linkages.

Executive Summary

Transportation is essential infrastructure that shapes our urban form, impacts our economic well being and is a primary determinant of entire city's environmental, financial and social sustainability. Transport facilities help in developing access with the rural-urban linkages. Road accessibility can reduce isolation, stimulate crop production and marketing activities, encourage public services and help to transfer technology. Road building has been seen to bring about notable enthusiasm and visible changes in rural life. Road infrastructure is considered as "the infrastructure for infrastructure". However, in the absence of notable criteria and rational guidelines, road construction is carried out in adverse manner resulting in haphazard use and wastage of limited resources. Municipal Transport Master Plan is prepared for assessing and planning the present road and transport infrastructures and facilities within the municipality and the surrounding rural municiapality and municipality.

Bhirahawa Nagar Panchayat established in 2024 BS (1967 AD) changed its name to Siddharthanagar Nagar Panchayat after the good name of Lord Gautam Buddha in 2034 BS (1977 AD). Further, it was named as Siddharthanagar Municipality in 2047 BS (1990 AD). after the people's movement for multiparty democracy. Siddharthanagar (formerly Bhairahawa) is a municipality and the administrative headquarter of Rupandehi District on the Outer Terai plains of Nepal, 265 km (165 mi) west of Kathmandu Nepal's capital. It is the closest city to Lumbini, the birthplace of Gautama Buddha, which is located 22 km (14 mi) to the west. The city borders the Indian city of Sonauli in Maharajganj district of Uttar Pradesh. The city is among the major industrial power house in the country impacting major economic aspects of Nepal. It has the second largest rate of border trade with India after Birgunj border in the country. Bhairahawa is under the administration of Siddharthanagar Nagarpalika (municipality) so often known as Siddharthanagar. Area of Siddharthanagar Municiapality is 36.03 Sq. Km and has 13 wards in total. It is surrounded by Rohini and Omsatiya in the East, Mayadevi in the West, Mayadevi and Omsatiya in the North and Sunaulai of India in South.

MTMP started with the setup of Municipal Road Coordination Committee (MRCC) and the collection of demand and inventory of road within the municipality. Road inventory survey was done and length of the roads collected is about 226.25 km with most of the roads with gravelled surface and black top few of earthen surface and least Brick / Stone Paved surface. Similarly, the average time to reach the nearest bus stop is about 10 minutes for this municipality and due to lack of proper public transportation; mobility mostly relies on private vehicles.

Indicative Development Potential Plan is prepared basically showing the existing and potential market center/service centers (key growth centers) and the areas having various development potentials such as agro-based industries, high value cash crops and tourism.

This study also formulated the road hierarchy for the various roads namely Class A, B, C and D. Class C and D basically deals with access while Class A and B basically deal with mobility and accessibility to higher services. The total lengths of Class A, B, C and D roads are 38.23 km,

19.99 km, 15.02 km and 153.00 km respectively. Total cost for the required interventions proposed is calculated based on the rates of ToR and was found to be approximately 2.9 billion rupees.

Due to the limitation of the municipality budget, the roads are ranked hierarchy wise based on the Demand priority of wards, Proposed road class, Total existing width, Population served, Road surface condition, Road density, Settlement density, Service provided by the road such as Recreational(R), Agricultural (A), Market(M) and Service centre (S) (RAMS), Access to poor and minor. And five-year implementation plan is prepared.

Abbreviations

DADO	:	District Agriculture Development Office
DDC	:	District Development Committee
DEO	:	District Education Office
DFO	:	District Forest Office
DoLIDAR	:	Department of Local Infrastructure Development and Agriculture Roads
DoR	:	Department of Road
DOS	:	Department of survey
DVO	:	District Veterinary Office
GIS	:	Geographical Information System
GPS	:	Global Positioning System
IDPM	:	Indicative Developmental Potential Map
INGO	:	International Non-Governmental Organization
MIM	:	Municipality Inventory Map
MTMP	:	Municipal Transport Master Plan
MTPP	:	Municipal Transport Perspective Plan
MRCC	:	Municipality Road Coordination Committee
MTICC	:	Municipality Transport Infrastructure Coordination Committee
MNP	:	Municipality Network Plan
MoFALD	:	Ministry of Federal Affairs and Local Development
NGO	:	Non-Governmental Organization
ToR	:	Terms of Reference
WDO	:	Women Development Office

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CHAPTER I: INTRODUCTION

1.1 INTRODUCTION

Local Self-Governance Act (LSGA) provisions formulation of local development plan according to needs-based, bottom-up and participatory approach. It has prominently defined tangible steps for formulation of such development plan. Underlying objective of this plan is to make investment for planned development within each of the local bodies' territory. Ultimately, development endeavors help attaining sustainable livelihood and improved well-being of people. People's needs for sustainable livelihood and improved well-being are such that they require better access to information, markets and opportunities; they need better access to health, education and other goods and services. Accordingly, gradual investment in physical infrastructure development evolved urbanized and semi-urbanized settlements leading to improved access to various services, opportunities and resources by interior communities from state owned and private entities.

Ministry of Federal Affairs and Local Development stepped up to bring forward proposal to create additional 72 new municipalities from those urban and semi-urban settlements by combining prevalent Village Development Communities. Government of Nepal approved the proposal leading to creation of 72 new municipalities. Since these municipalities are at an early stage of infrastructure development, they require ample mentoring and molding so that organized and beautiful cities are developed in due course of time. This will only be possible if and only if these municipalities can create planned transport network as it is '**infrastructure of infrastructures**. Therefore, present environment is conducive for development of appropriate and implementable transport framework for these municipalities.

In this context, this Terms of Reference (ToR) is prepared to hire consultants to prepare Municipal Transport Master Plan (MTMP). The ToR aptly amalgamates the framework for MTMP preparation with responsibility of the consultant to be hired in one package. Intended MTMP can partially fulfill lacking part of LSGA, which is objective tool for prioritizing the projects.

1.2 Objectives

The overall objective of the consulting services is to prepare the Municipality Transport Master Plan (MTMP/MTPP) of Siddharthanagar Municipality.

As part of MTMP preparation, accessibility planning could be an effective tool to assess the existing situation of the services and facilities. The interventions derived from the accessibility planning will represent the real needs and priorities of the local people. The planning approach is participatory and bottom-up from the settlement level. The implementations of such projects will certainly be more participatory and owned by the local communities.

The MTMP is designed to take account of the real needs of the people for infrastructure as per vision of the city development plan that will primarily be a visionary plan. Based on this visionary plan MTMP shall be harmonized with DoLIDAR's Approach manual to maintain similarity so that municipal transport network can be overlaid to the respective DTMP/other MTMPs to prepare local transport network.

The specific objectives are:

- To finalize vision of city development plan.

- To analyze the accessibility situation.
- To identify and priorities the interventions based on the accessibility situation.
- To prepare Indicative Developmental Potential Map (IDPM)
- To prepare the Municipality Inventory Map (MIM) of Road networks.
- To collection of demands for new/rehabilitation transport linkages from Municipalities/Settlements based on city development plan.
- To prepare the Perspective Plan of transport services and facilities;
- To synchronize the draft Perspective Plans of adjoining VDCs/Municipalities/ districts
- To develop scoring criteria and its approval from Municipality.
- To prepare the five-year Municipality Transport Master Plan (MTMP)
- To prepare a realistic physical and financial implementation plan of prioritized roads for the MTMP period; and
- To prepare Municipal Transport Perspective Plan (MTPP)

1.3 Scope of Services

Consultant will provide high quality services for the preparation of MTMP/MTPP, with the reference to the annexes 1-5 and visionary city development plan. The scope of services to be carried out.

Consultant need advice, assist and support the Municipality to form the MRCC. It shall ensure involvement of the MRCC in the entire planning, decision-making, programming etc. processes in the preparation of the MTMP. Initiating with one

Introduction / orientation workshop to the various stakeholders (MRCC, Ward representative and ToleSudhar Committee's representatives) about the process and procedures and their respective roles during the Preparation of MTMP/MTPP the consultant shall continue preparation of MTMP.

CHAPTER II: APPROACH AND METHODOLOGY

2.1 Approach

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, Municipality officials is crucial. The Municipality Transport Infrastructure Coordination Committee (MTICC) has been constituted at the district level as authorized legislative body of Municipality. This body, comprising political representatives from all political parties, provided necessary policy decisions during the MTMP preparation process.

2.2 Methodology

The Consultant has studied the entire procedure of project implementation as recommended by the Interim guidelines and MTMP methodology developed. The Consultant has strictly followed the methodology prescribed by the guideline while preparing/updating the existing MTMPs of the Municipality under the study area. The general methodology of the study is outlined below:

- Desk Study and Review of previous MTMP reports
- Collection and review of other Relevant Documents.
- Collection and review of Maps
- Collection and review of other socioeconomic aspects.
- Identification of existing and potential areas with development activities.
- Prepare the accessibility profile of settlements and compile them at ward level
- Preparation of indicative Development Potential Map.
- Preparation of Municipality Inventory Map (MIM)
- Preparation of Municipality Network Plan (MNP)
- Preparation of MTMP

2.3 Collection and Review of Secondary Sources of Information

Secondary data were collected from annual report published by district level offices and consultation with stakeholders such as Department of survey,(DOS) District Agriculture Development Office (DADO), District Veterinary Office (DVO), Municipality, Office, District Development Committee (DDC), District Education Office (DEO), Women Development Office (WDO), District Forest Office (DFO), Small Cottage Industries and Local Business Entrepreneurs etc. Field study was carried out for general socio-economic assessment of the district. During the field study, data collection was done from primary and secondary sources by using P-RRA and consultation methods with emphasis on data/information regarding area, location and significance of development potential areas such as extensive agriculture, horticulture, livestock farming, high value cash crops, cottage and agro-based industries, Centre for business/commerce/markets places, tourism area, hydropower and water mills, mining area, service centers; e.g. hospital, health post, agriculture service sub-Centre

etc. were collected from annual report, district profile, study report published by various offices such as DDC, DADO, District Education office, Small Cottage Industries, local business person etc. The information about demographic data of district, maps, service flow pattern, various maps showing service centers or the location of SOR (Service of Road) facilities, transport infrastructure inventory, past plans and sector study reports, sector standards and policy targets were collected from the secondary sources - Central Bureau of Statistics, Kathmandu, Survey Department, Local NGOs, line agencies, DDC, etc. The details on the documents collected are summarized below:

2.4 Collection of Maps

- Topo maps of the 1:25000 scales, for use as base map
- Digitized topographic maps of department of survey.
- District administrative map.
- District Trail Maps, Helvetas/ TBSU.
- Strategic road network mapof DoR.

2.4.1 Collections of Primary Data and Analysis

Primary information on existing accessibility level of settlements was derived from the communities, VDC officials, school teachers and other related organizations/individuals during the field investigation period and recorded in a standard format specially developed for this purpose. The primary data has been collected from local people through answer to the pre-prepared questionnaires which were filled up by the enumerators.

2.5 Preparation of Indicative Development Potential Map

IDPM is basically the indication of the existing and potential market/service centers (key growth centers) and the areas having various development potentials such as high value cash crops, agro based industries and tourism. Thus, IDPM shows the areas of high value cash crops, tourism potential, extensive agriculture, extensive horticulture, livestock farming, fisheries, NTFP/ MAPs, hydropower location and the other social service centers areas such as hospital, post office, telecommunication, school, campus, market and village centers, security offices and large settlements, important historic and religious places. Finally, it indicates the grading of various markets of the district thus providing the basis of network planning.

Preparation of Indicative Development Potential Map IDPM is basically the indication of the existing and potential market/service centers (key growth centers) and the areas having various development potentials such as high value cash crops, agro based industries and tourism. Thus, IDPM shows the areas of high value cash crops, tourism potential, extensive agriculture, extensive horticulture, livestock farming, fisheries, NTFP/ MAPs, hydropower location and the other social service centers areas such as hospital, post office, telecommunication, school, campus, market and village centers, security offices and large settlements, important historic and religious places. Finally, it indicates the grading of various markets of the district thus providing the basis of network planning. Existing/potential areas are defined as:

- Areas with extensive agriculture.

- Areas with extensive high value cash crops.
- Areas with extensive NTFP.
- Areas with extensive horticulture.
- Areas with extensive livestock farming.
- Areas with extensive fisheries.
- Areas with extensive small cottage industries.
- Potential areas for tourism development.
- Existing/potential areas for development of large industries like hydropower, mining etc

2.6 Preparation of Municipality Inventory Map (MIM)

The following steps were taken for preparation of MIM report:

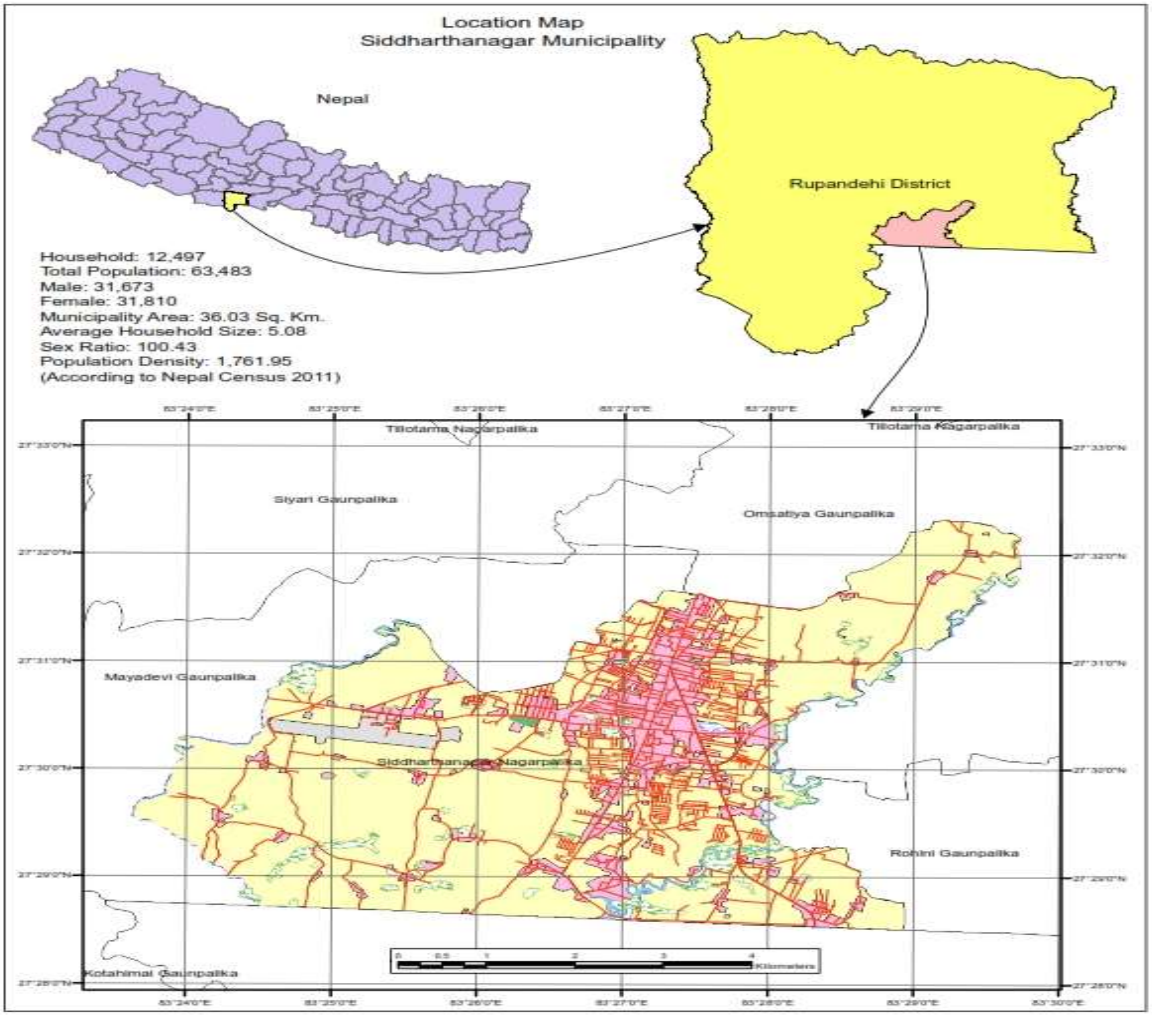
- The inventory survey of the existing rural roads was carried out and necessary interventions such as new construction, rehabilitation, periodic maintenance, regular maintenance etc. were identified.
- The information/data on existing rural infrastructures was taken using Global Positioning System (GPS) instruments including GPS tracking of existing roads and GPS way points of trail bridges conducted by TBSU. GPS tracking constituted major activity for DIM preparation, which has taken considerable effort in field level.
- Information on road surface type, traffic levels, status of pass ability, status of construction, adequacy of bypasses, existing bridges and their requirements, status of drainage and other improvement required were collected during inventory survey.
- The MIM was presented and discussed in the MTICC meetings and the mode of interventions on rehabilitations, maintenance and upgrading of the existing rural roads was agreed. The required interventions were analyzed based on accessibility situation. Presentation on MIM and IDPM was made in one day meeting with MTICC. This meeting then finalized the proposed IDPM and MIM plans.

CHAPTER III: INFORMATION OF PROJECT AREA

3.1 Introduction

Siddharthanagar (formerly Bhairahawa) is a municipality and the administrative headquarter of Rupandehi District on the Outer Terai plains of Nepal, 265 km (165 mi) west of Kathmandu Nepal's capital. It is the closest city to Lumbini, the birthplace of Gautama Buddha, which is located 22 km (14 mi) to the west. The city borders the Indian city of Sonauli in Maharajganj district of Uttar Pradesh. The city is among the major industrial power house in the country impacting major economic aspects of Nepal. It has the second largest rate of border trade with India after Birgunj border in the country. Bhairahawa is under the administration of Siddharthanagar Nagarpalika (municipality) so often known as Siddharthanagar. Area of Siddharthanagar Municiapality is 36.03 Sq. Km and has 13 wards in total. It is surrounded by Rohini and Omsatiya in the East, Mayadevi in the West, Mayadevi and Omsatiya in the North and Sunaulai of India in South.

3.2 Location Map



3.3 Socio-economic and demographic status

Socio-economic as "Socioeconomics is the social science that studies how economic activity affects and is shaped by social processes. In general it analyzes how societiesprogress, stagnate, or regress because of their local or regional economy, or the global economy"(Wikipedia, 2015). According to Merriam-Webster, demographics "is or relating to the study of changes that occur in large groups of people over a period of time". Population data were taken from CBS for the year 2001 and 2011.

3.4 Population distribution of Siddharthanagar Municipality

Siddharthanagar Municipality city has population of 63,483 (census 2011) with female 31,810 and male 31,673 and household numbers 12,497. Major five castes are Brahmin, Muslim, Chhetri, Magar Gurung, Magar, with religious groups mainly Hindus, Muslim, Kirat, Buddhist, Christian, etc. The ward wise population is listed on table no 1.

Table 1: Population distribution of Siddharthanagar municipality

Ward No	Total Population	Male	Female	House Hold	Area (Sq Km)	Population Density/ Km^2
1	5,705	2,787	2,918	1,066	4.35	1,311.49
2	3,005	1,446	1,559	498	3.13	960.06
3	6,624	3,324	3,300	1,285	2.89	2,292.04
4	4,900	2,493	2,407	813	4.72	1,038.14
5	1,051	538	5,13	193	0.2	5,255.00
6	9,031	4,543	4,488	1,633	1.33	6,790.23
7	3,990	2,016	1,974	952	0.46	8,673.91
8	8,872	4,421	4,451	2,078	1.82	4,874.73
9	6,868	3,396	3,472	1,352	6.13	1,120.39
10	2,932	1,495	1,437	467	4.2	698.10
11	2,387	1,204	1,183	335	5.29	451.23
12	3,967	1,972	1,995	886	0.88	4,507.95
13	4,151	2,038	2,113	939	0.63	6,588.89
Total	63,483	31,673	3,1810	12,497	36.03	1,761.95

It is obvious that the core area (wards 7, 6, 13, 5, 8, 12) has the highest density, and the peripheral and new extended area (wards 11, 10, 2) has low density. With the increase in density of urban area, the demand of urban services like water supply, road and drainages, electricity etc.

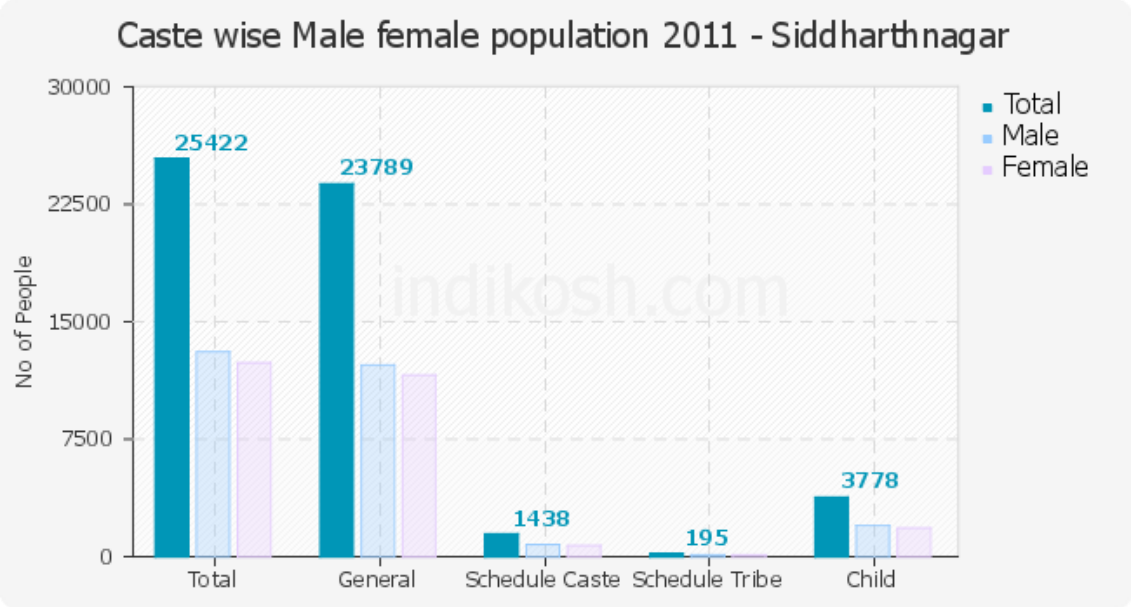


Figure 1: caste wise male and female population

3.5 Population density of Siddharthanagar Municipality

The population density of this municipality is 1761.95 people per square kilometers. In Siddharthanagar Municipality ward 7 have high density 8673.91 people per square kilometers then other ward and ward 11 have lowest density 451.23 people per square kilometers. For ward-wise population Density and its distribution refer Table 1.

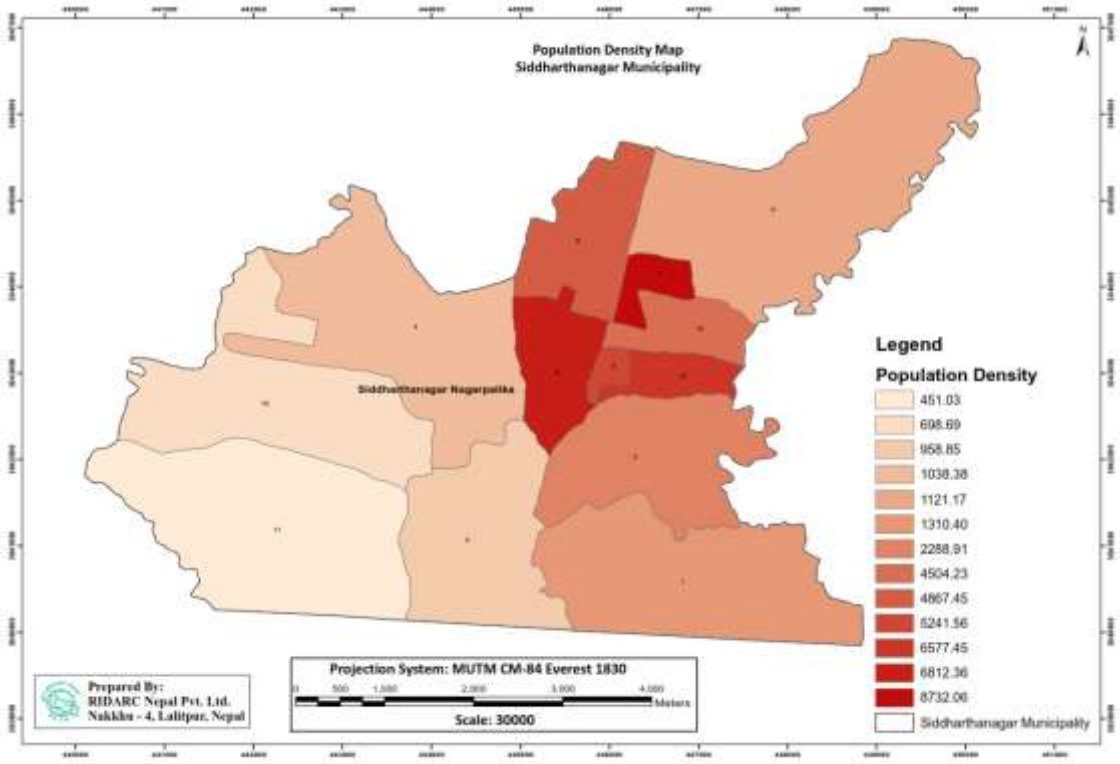


Figure 2: Population Density Map

3.6 Climate

The highest temperature ever recorded in Siddharthanagar was 44.8 °C (112.6 °F) on 7 June 1998, while the lowest temperature ever recorded was −1.1 °C (30.0 °F) on 20 January 1971. The average maximum temperature of Siddharthanagar is 30.9 °C and mimumum average temperature is 18.7°C, with annual average rainfall is 1725.3 mm.

Climate data for Siddharthanagar (Bhairahawa Airport) (1981-2010)													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average high °C (°F)	21	25.4	31.3	36.1	36.4	35.5	33	33.4	33	32.2	28.9	24.1	30.9
	-69.8	-77.7	-88.3	-97	-97.5	-95.9	-91.4	-92.1	-91.4	-90	-84	-75.4	-87.6
Daily mean °C (°F)	14.9	18.1	23	28	30	30.6	29.5	29.6	28.8	26.3	21.7	17.1	24.8
	-58.8	-64.6	-73.4	-82.4	-86	-87.1	-85.1	-85.3	-83.8	-79.3	-71.1	-62.8	-76.6
Average low °C (°F)	8.8	10.7	14.6	19.9	23.6	25.7	25.9	25.9	24.7	20.3	14.5	10.2	18.7
	-47.8	-51.3	-58.3	-67.8	-74.5	-78.3	-78.6	-78.6	-76.5	-68.5	-58.1	-50.4	-65.7
Average precipitation mm (inches)	17.7	19.2	16.7	26.4	82.3	269.4	545.6	395.5	253.5	77.5	8.2	13.3	1725.3
	-0.7	-0.76	-0.66	-1.04	-3.24	-10.61	-21.48	-15.57	-9.98	-3.05	-0.32	-0.52	-67.93
Source: Department of Hydrology and Meteorology													

Table 2: Temperature and Rainfall in Siddharthanagar municipality

3.7 Land use and settlement pattern

Siddharthanagar Municipality has the area of 36.03 sq. km of which 77.74 % area is covered wih agricultural land followed by barren land. Theree is no forest area within the Municipality, however, government property and ponds are scattered all over the Municipality which needs to be developed in planned way to improve the environment of the area.

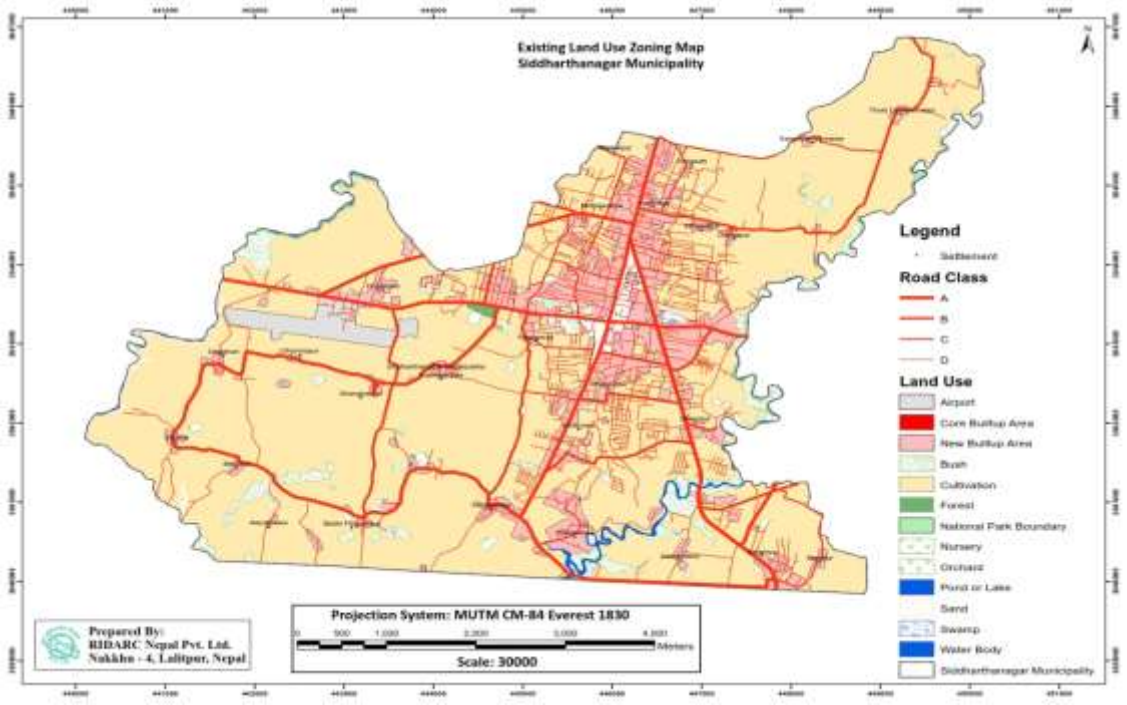


Figure 3: Existing Landuse plan of Siddharthanagar Municipality

Ample agricultural land is observed within the city mostly in the peripheral area. These low angle sloping lands are good for dry cultivation like maize, millet, wheat and cereals. The current land usage is explicit in the table.

Table 3: Land use pattern

Categories	Area (sqkm)	Percentage (%)
Core Built up Area	0.011	0.03%
National Park Boundary	0.132	0.37%
Cultivation	28.008	77.74%
Forest	0.042	0.12%
Orchard	0.087	0.24%
Nursery	0.038	0.11%
Swamp	0.058	0.16%
Sand	0.180	0.50%
Barren Land	4.558	12.65%
Water Body	0.315	0.87%
Pound or Lake	0.091	0.25%
Airport	0.602	1.67%
Bush	1.491	4.14%
Built up Area	0.418	1.16%
Total	**36.03**	**100**

3.11 Road and traffic

Transporation options around the city and into surrounding areas include bus, minibus, unmetered taxicab and cycle rickshaw. There is regular bus service to Lumbni and Butwal. Private cars and motorbike are means of transportation in Siddharthagar. Due to increase in private ownership of vehicles there is huge problem in praking in central area. There is lack of public tranporation and there is only one Bhairawa bus park which could not accommodate sufficient public vehicles. In Siddharthanagar there is Gautam Budhha domestic airport connect to Kathmandu and Pokhara. it is being upgraded to international airport under the name of Gautam Buddha International Airport.

Siddharth Highway running south -noth and Postal Highway from east to west this highway dividing this municipality into nearly two halves are the main road transport in Siddharthanagar Municipality and constitute main proportion of traffic within the municipality. Most of roads close to the highway and within the planning area are paved. few of the road network is graveled and narrow. Access is not the main problem in Municipality but the mobility is the question.

3.12 Road inventory

Road inventory survey was done and details of all the roads and cross structures were collected. Total length of all the roads is 226.25 Km of which 105.09 Km is blacktopped, 74.11 Km is graveled, 46.13 km earthen and 0.93 Km is brick / block paved road. Distribution of road type is given below figure 4.

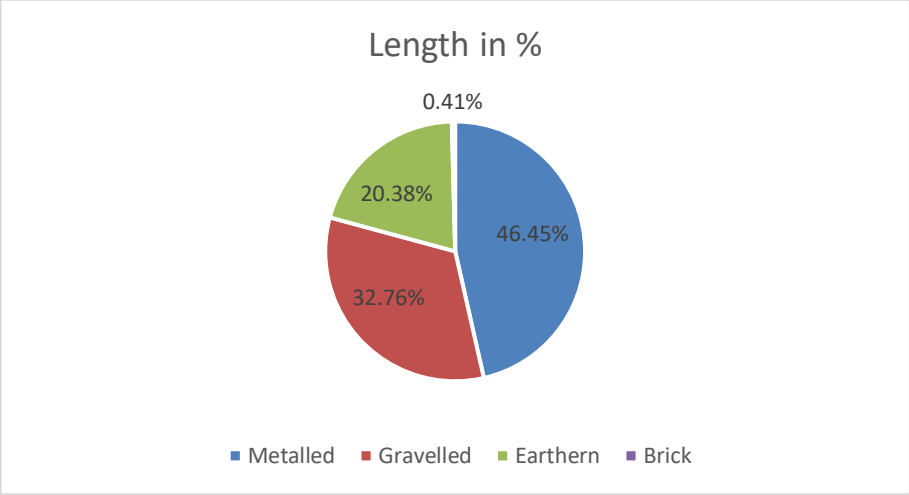


Figure 2: Road Inventory of Siddharthanagar Municipality

At present the road density of per Km is 341 populations. From the table below road density is shown.

Table 4: Road density of Siddharthanagar municipality

Road Type	Class		

	A	B	C	D	Total km	Population Projection (2020)
Metalled	38.23	13.39	12.71	40.76	105.09	77220
Gravelled		3.30	2.30	68.50	74.11	
Earthern		3.30		42.82	46.12	
Brick				0.93	0.93	
Total Km	38.23	19.99	15.02	153.00	**226.25**	
Road Density of per km road						**341**

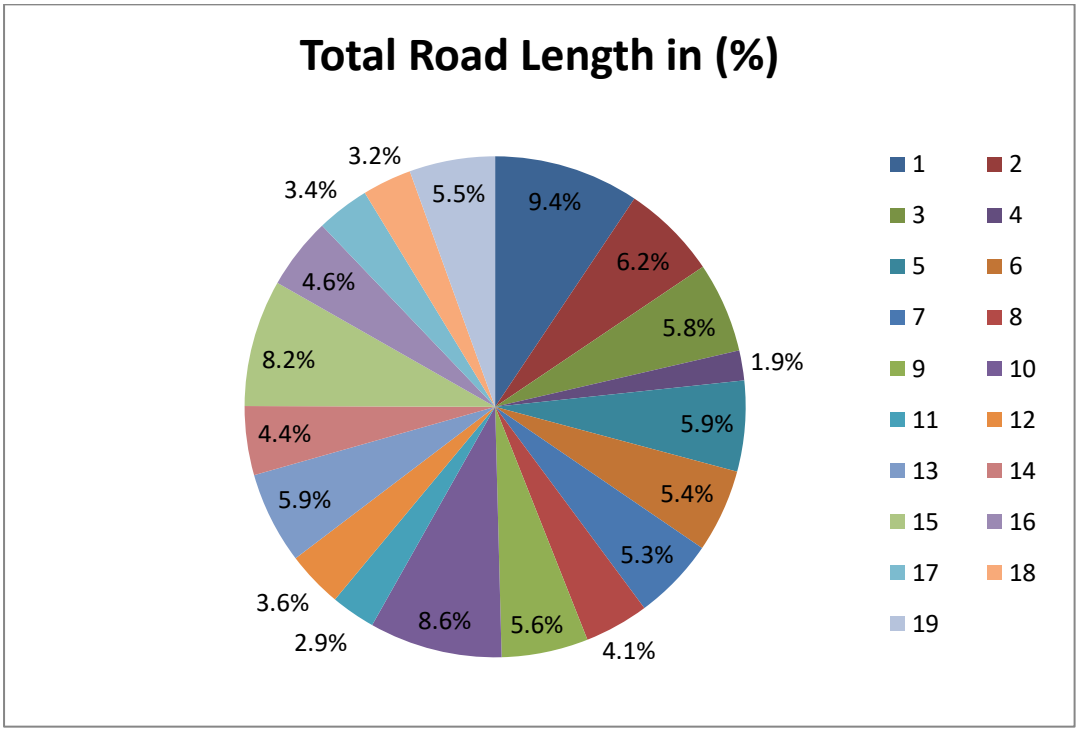


Figure 3: Total length of road based on ward number wise

CHAPTER IV: PERSPECTIVE PLANNING

This section discusses about the future anticipated population and the traffic and the planning road infrastructure to cater this traffic in short, medium and long term.

4.1 Projection of population

The underlying assumption for the preparation of MTMP is that, the recently designated municipal area has a growing population and has also fulfilled the population criteria (one of many criteria to be a municipality) to be a municipality. As such the municipality is an urban area or an urbanizing area. One of the characteristics of an urban area is higher population densities and corresponding higher demand for services and facilities all of which directly demands proper transport infrastructure. For sustainable supply of transport infrastructure, it is pertinent to forecast the population in the future so that the infrastructures can be planned and constructed accordingly.

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

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

Based on CBS data, an analysis of urban population growth trend of Nepal is performed and it can be derived: urban population of Nepal is increasing rapidly from 1971 till 2001 and the trend will resume similarly and by 2031, 43.34% people as compared to rural will be living in the urban area that is clear in the following table and graph.

	1971	1981	1991	2001	2011	2021	2031
Urban Population	461,938	956,721	1,695,719	3,227,879	4,523,821	6,902,867	10,143,254
Rural population	11,094,045	14,066,118	16,795,378	19,923,544	21,970,683	23,475,186	23,453,778
Total Population	11,555,983	15,022,839	18,491,097	23,151,423	26,494,504	30,378,055	33,597,032
% Urban	3.99%	6.36%	9.17%	13.94%	17.07%	22.72%	30.19%

Table 2 Urban population growth trends

When overall population is growing in continual rate, Siddharthanagar also depicts the same growth trend. Siddharthanagar is also experiencing the urban growth due to

- Migration for economic opportunities
- Migration for official purposes
- Educational facilities
- Health facilities
- Rural urban linkages

The urban population of Siddharthanagar portrays continuous increment in previous years that can be obvious with the following chart.

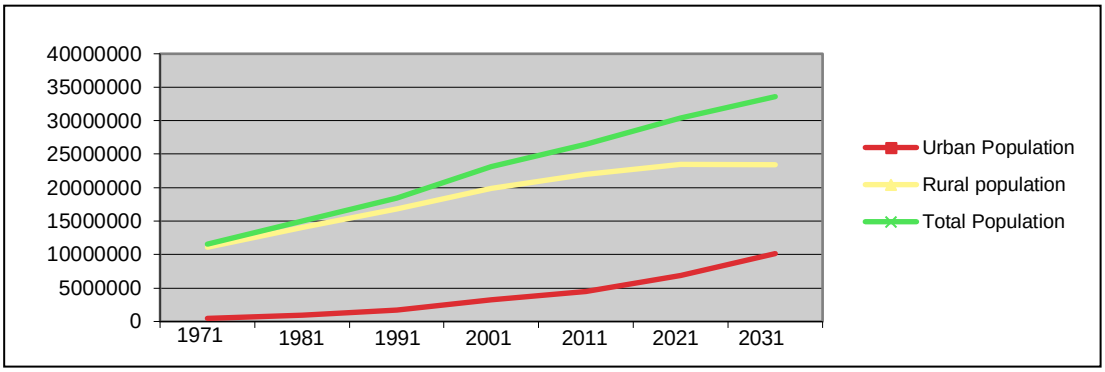


Figure 2 Urban population growth trends

Table 3 Urban population of Siddharthanagar in various years

	1991	2001	2011
Population	39,473	52,569	63,483
Increase		13,096	10,914

With the rapid urbanization, more people will be migrating to urban areas, consequently increasing the size of the city. The annual growth rate of Siddharthanagar is 1.09 % as per CBS 2011.The total population of Siddharthanagar as per CBS 2011 is 63,483 with male and female occupying 49.89% and 50.11% respectively. There is latest development which was not visualized a decade ago. These include the fast construction of the Gautam Buddha International Airport and declared Butwal – a neighbouring city to Siddarthanagar – as a capital city of Province no 5. The rate of import and export through Siddarthanagar has been tremendiously increased after the undeclared blockade imposed by India after promulgation of the constitution of Nepal 2072. All these recent developments opened the avenue for the people to run various kind of business which ultimately increased the trend of migrating large number of people from rural area to this urban area. Furthermore, due to expansion of infrastructure and desire of people to raise their living standard, the population growth rate could be about 2.2 % for next 15 years. Hence, the planning shall be done to accommodate the growing population that requires prediction of future demography. The population forecast for 15 years from 2020 can be made with the formula for growth rate calculation,

$P_t = P_o (1+ r)^t$, where

P_o = Population at the base year, P_t = Population after t years, r = growth rate

Using the above principle, by 2035, the population is expected to rise to 107,025. The population projection for the different year is tabulated below.

Table 5 Population growth rate and base year population

Population (2011)	Projection (2020)	Projection (2029)	Projection (2035)
63,484	77,220	86,095	107,025

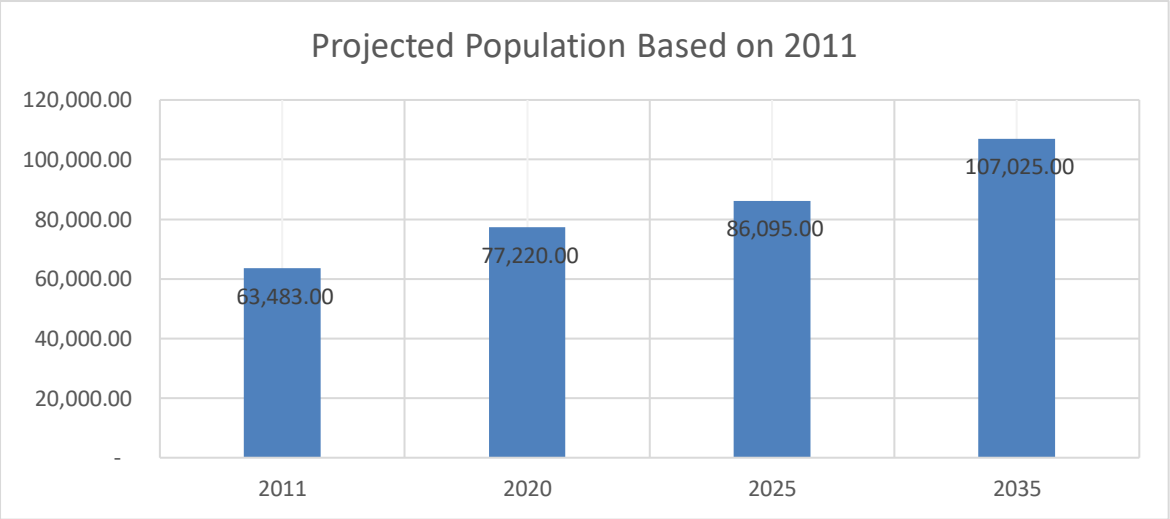


Figure 1 Projected Populations for Siddharthanagar Municipality

4.2 Projection of road traffic

Transportation forecasting is the process of estimating the number of people or vehicles that will use a specific transportation facility in the future. Forecasts explain what the needs of the future might be and provide benchmarks for from developing overall transportation policy, to planning studies, to the engineering design of specific projects, and efficient transportation system operation. At the same time, the transport infrastructure and facilities pave the path for the development of the area. Thus, the existing trend in the development of the economy and change in land use along with the planned development and land use are considered to plan the transport facilities requirements in the future. In the planning process of the transport infrastructures, projection of the traffic is the most crucial factor. Traffic forecasting for planning projects determines the required number of lanes and road width to meet the future anticipated traffic demands. Future transportation demand will depend upon demographic and geographic factors, including population size and age, economic and employment growth,

transportation network and operating conditions and transportation and land use policy, including cost of travel.

4.3 Indicative development potential

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

For the Siddharthanagar municipality the following area have been proposed for the potential development area.

Table 6: Indicative development potential plan of Siddharthanagar based on Municipal By-Law

S.N.	Development Potential	Area	Ward No.
1	Industrial	Siddharthanagar Municipality Ward No. 1, 2 and 3 (proposed)	1, 2 and 3
2	Institutional	Siddharthanagar Municipality Ward No. 1, 2 and 3 (proposed)	1, 2 and 3
3	Touristic	Budha Chwok, Devekota chwok ***(Construction of Bank Road as like Basntapur Ktm)***	12
4	Agricultural area	All Land except covered by commercial area	1, 2, 3, 10 and 11
		All Land except covered by low density residential area	1, 2, 3, 10 and 11
5	Commercial	Starting from Sunal Border	1
		250m on both side of South Nort of siddhartha highway	3
6	High density residential area	In Siddharthanagar municipality periphery of Devekota Chwok and Bank Road	4, 5, 6, 12 and 13
7	High density mixed residential area	Siddharthanagar Bazar area	8 and 9

8	Low density residential area	All Land except covered by commercial area and industrial of ward	1, 2 and 3

4.4 Visionary city development plan

Lead sectors for visionary development of Siddharthanagar Municipality are:

1. Economic state

   Among five major entry points of Nepal-India Border, Siddharthanagar Municipality is an important commercial and industrial city which is located at the southern part of Rupendehi district of Nepal. It is the gate way to Lumbini where Lord Gautam Buddha was born. Hence, it is one of the popular land transits for international tourists and foreign trade. Lumbini is 22 km far in west from Siddharthnagar. there are several small- and large-scale industries around Siddharthanagar. In west towards Lumbini. Bhairahawa Special Ecomic Zone (SEZ) was proposed to increase trade between Nepal and India. Government of Nepal has been encouraging different industries to establish their plant in the SEZ. The economy of Siddharthanagar is based on industries and agricultural goods which include following.

   i. Transport sector / Auto services
   ii. Hotels and restaurants
   iii. Banking and finance
   iv. Industries
   v. Agro-business
   vi. Health sectors
   vii. Education sectors
   viii. Trade and commerce

2. Tourism

   Siddharthanagar is the gateway to Lumbni for tourist who come to vist religious tourist spots such as: (a) the Lumbini Garden around Lord Buddha's birthplace, with numerous temples, monasteries and holy ponds; (b) the Devedaha an arheological site associated with the Koliya, tribe of Lord Buddhas's mother and one of eight tribes that received corporeal relics after his death at Kushinagar; (c) Ramagrama- the center of the koliya Kingdom having a stupa mound measuring approximately 10 meters in height and 20 meters in diameter; (d) the Kapilvastu- the kingdom of the Shakya (Lord Buddha's paternal royal family) with many archaeological sites; (e) Tribeni Ghat on the Narayani River, an auspicious site for bathing which attracts hundred thousands of piligrims on Maghe Sankranti; (f) Valmiki Ashram near Tribeni Ghat which is believed to be the place where Prince Siddhartha got dwon from his horse Kantaka and storde off on foot into the jungles in his search for answers to his questions; and (g) Lumbini Museum, Lumbini International Research Institue, and Kapilvastu Museum. The museum and research center have an ancient literatures related to Buddha, and ruins of the ancient capital of Shakya Kingdom where Buddha has spent his youth as Prince Siddhartha, The Municipality is also a gateway to Chitwan National Park, a preserve large than 900 square km protecting some 700 native animal species including tiger, rhinoceros, gharial and crocodile and flora native to the Terai-Duar savanna; including grasslands and a

wetland areas called Khadara Phanta north of Lumbini protecting the endangered Sarus Crane.

3. Agriculture

Agriculture is the dominant ecomic acitivity in the Municipality. 2800.08 ha of land, which is about 77.74 % of the toal area of the Municipality (3,603 ha) is under cultivation and almost all cultivated land is irrigated. Paddy, wheat, oilseeds, potato and vegetables are major crops grown in the Municipality. Compared to other crops people grow more paddy, wheat and oilseeds and very little green vegetables and potato. The total cereal and cash crop production in 2010 were about 9,500 tons. Besides crop cultivation people in the area are found to practice nursery planting for spaling production of fruit tress and livestock farming as well.

4. Industry

Siddharthanagar is a well-established industrial center in Nepal. In 2006, there were 47 registered industries within the Municipality (Source: Directory of manufacturing establishments 2064, CBS Nepal). Given the favorable location and conditions for growth, the number of industrial establishments has steadily increased from 47 in 2006 to 75 industries (mostly small industries) in 2010 (Source: Municipal Profile, 2011). Some 60% of toal productions of the industries were exported to mountain and hilly districts of western region and about 15% were exported to Kathmandu. The remaining 15% of the productions were consumed locally and 10% were exported to India. The majority of industries were small scale industries such as rice mills, food and beverages, wood and steel furniture and brick industries. Other rapidly growing industry in the Municipality is construction related industries.

4.5 Transport and land use

Land-use potential is a measure of the scale of socioeconomic activity that takes place on a given area of land. A unique property of land use is its ability to generate traffic. The connection between transportation and land use is a fundamental concept in transportation. Everything that happens to land use has transportation implications and every transportation action affects land use. Actions by transportation agencies shape land use by providing infrastructure to improve accessibility and mobility.

Planning of any land-use and transportation system is to ensure that there is an efficient balance between land-use activity and transportation capability. Trip generation provides the linkage between land use and travel as depicted in the below cycle.

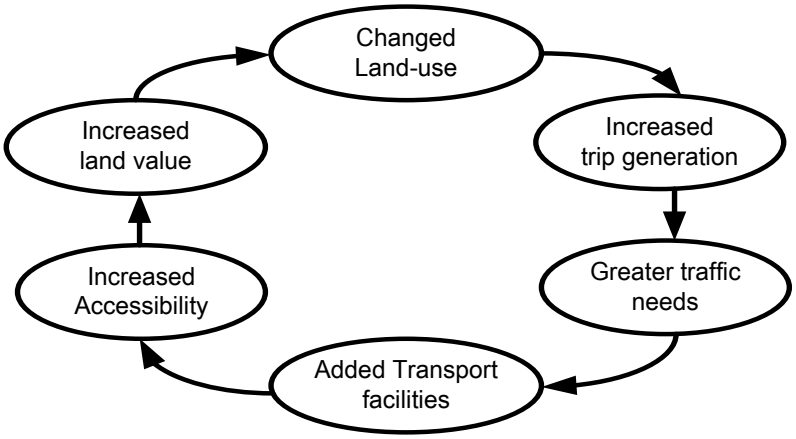


Figure 2: Land use and Transportation Interaction

4.6 Accessibility and mobility scenario

Transportation system most often needs to trade-off between accessibility and mobility. Need of travel is a derived demand, not being end in itself but a means. Accessibility is the ease with which goods, services, people and opportunities can be reached. In the context of Siddharthanagar municipality with core market centres as epicentre of all goods, services and facilities, people lying on the peripheral regions need accessibility.

Mobility is efficient movement of goods and people. Mobility is more focused on trips and distance covered. Mobility values transportation as end rather than means, but still in outlying areas accessibility requires a lot of mobility, while central population need smaller trip lengths. While we provide space for active mode users and public transits as a means of enhancing accessibility, we are trading a part of road space from the mobility sector, and when we provide more road space for private vehicles to move efficiently, we trade part of road space associated with accessibility.

Present scenario of Siddharthanagar reflects the access to bus stop on an average about 10 minutes, Class "C" roads that are planned for public vehicle to ply would reduce this time to within 5 minutes. People will have access to either Class "B" or Class "A" roads designed for more mobility within 8 minutes or 12 minutes on an average walking distance that are designed for greater mobility. Planning work has focused on reducing access directly to highways, subsequent developments are recommended for national authority to develop required infrastructures.

4.8 Short Term Municipality Transport Master Plan (Five years)

The short-term municipality transport master plan has been developed to guide the municipal investments on road infrastructure through 2020-2021. This short-term plan will mainly focus on the demand by the people and for the accessibility of the people in the first step. The plan will advance the municipality towards the medium- and long-term plan as outlined in the later topics.

Short term planning elements generally known as transportation system management (TSM) are basically meant for efficient use of existing and proposed infrastructure. Short term MTMP refers to maintenance and upgrading of the existing road networks to the proposed standards to support the present and future (5 years) transport demand paving the demand for the implementation of medium term and long-term plan. It also includes construction of new road linkages which are necessary to support the current road network and the envisaged road network for the future. The interventions are applied to the road sections based on their priorities (based on the developed scoring criteria) and the annual budget. The transport infrastructure envisaged at the end of five years plan is for the development and maintenance of access road linkages and collector roads that maintains a road hierarchy (as formulated above) and justifies the construction and development of higher hierarchy roads in the medium and long term (in short term if justified).

As such, short term plan focuses on the accessibility of all the settlements, moving towards mobility to increase the access to wider services, thus paving the way for development of proper sustainable public transport services within and around the municipality. The strategy and investment plans for short term municipality transport master plan is elaborated in the next section.

4.9 Medium term Municipality Transport Master Plan (Ten years)

The development of the road network in medium term plan includes opening of the track and clearing the right of way (ROW) along the Class B roads. The period of short-term plan controls the encroachment and urban sprawl growth along the ROW of the Class B roads.

Medium term and long-term municipality transport plan give the layout for the development of higher hierarchy road corridors with higher mobility and limited direct access. During the short term (first five years) development of local access roads and collector roads develops the concept and culture of wide roads among the locals. This facilitates in creating the demand for expansion of the roads to their designated class width during the medium term (five to ten years). Medium term plan continues the development and maintenance of the access roads and, expansion and maintenance of collector roads to their respective standard layout. Class “B” roads will also be constructed and expanded during the medium-term plan depending upon the necessity/demand of road hierarchy.

All the roads of Class “C” will be constructed and maintained at their designated standard layout at the end of medium-term plan. Class “B” and Class “A” roads will also be constructed wide enough to address the demand generated during this period. Few Class “B” roads will be constructed to their full width with designated pedestrian paths and cycle tracks. For other

Class "B" roads, the medium-term time period will allow opening of the track by shifting the existing structures and stopping further construction of other structures within the designated ROW.

4.10 Long term Municipality Transport Master Plan (Twenty years)

The development of Class A roads is necessary in the long run of the municipality for the structured development of the road network hierarchy and thus the proper development of the trips and the municipality as a whole. The period of short term and medium-term plan controls the encroachment and urban sprawl growth along the ROW of the Class "A" roads.

Long term municipality transport master plan envisages the development of the roads of all hierarchy within the municipality as depicted by the perspective plan whose demand is set out by the indicative potential development of the municipality.

Short term period (first five years) identifies the higher hierarchy roads necessary for the municipality in the long run and set necessary bylaws. It also implements those higher hierarchy roads in the policy level by controlling the development of other structures within the proposed ROW and shifting of the existing structure away. It will facilitate clearing of the ROW and track opening during the medium-term time period (five to ten years). During medium term plan, these roads will be developed to certain level as per the existing demand.

This time period (first ten years) is critical in developing proper implementation policies, tools and plans for the construction and implementation of the standards of these roads in the long-term time period of ten to twenty years. Plans to integrate other service facilities such as electricity, drainage and drinking water pipes should be developed during this period. Other plans such as land use plan, city development plan (if not developed), drainage network master plan should be developed in compliance with the municipality transport master plan. Depending upon these plans, MTMP may also be revised. During the long-term plan of ten years to twenty years, the higher hierarchy roads will be constructed in full phase.

CHAPTER V: FORMULATION OF ROAD HIERARCHY

Roadways serve a variety of functions, including but not limited to the provision of direct access to properties, pedestrian and bicycle paths, bus routes and catering for through traffic that is not related to immediate land uses. Many roads serve more than one function and to varying degrees, but it is clear that the mixing of incompatible functions can lead to problems. Thus, it is important to distinguish road 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 tool of road network and land use planning to asset management.

Road hierarchy restricts or reduces direct connections between certain types of links, for example residential streets and arterial roads, and allows connections between similar order streets (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). These hierarchical distinctions of road types become clearer when considering the recommended design specifications for the number of through lanes, design speed, intersection spacing and driveway access.

A well-formed road hierarchy will reduce 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.

The road hierarchy principles will assist planning agencies via orderly planning and provision of public transport routes, pedestrian and bicycle routes. It also identifies the effects of development decisions in and on surrounding areas and roadways within the hierarchy and also facilitates 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.

This study also formulates the road hierarchy for the various roads. After going through large number of literatures, the study has proposed four level hierarchy roads namely Class A, B, C and D. Class C and D basically deals with access while Class A and B basically deals with mobility and accessibility to higher services.

Table 7 Criteria of road hierarcy

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	Connection between Class A and C roads; and also Provide alternative connection routes between Class A	Connects higher order roads and 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 lay bys	Segregated NMT facilities and Bus lay bys	Segregated NMT facilities	Local NMT movement
	Complete access to public transport	High access to Public transport	Limited access to public transport	
Maintenance Responsibility	Municipality	Municipality	Municipality & Local people	Local people
Speed (Kmph)	80-100	60-80	50-60	40-50
Capacity (PCU/hr.)	4000-4800	2400-3600	1500-2400	Less than 1500
Access Control	Full Control	Partial Control	No	No
Public transport services	Mass Transit facilities	Mass Transit, Local Public transport	Limited access to public transport	No public transportation
Right of Way	Minimum 20 m	Minimum 10 m	Minimum 8 m	Minimum 6m*

* The roads fulfilling the minimum width of road criteria set by the municipality

5.1 Class 'A' road

All major roads which connect one or more major Growth Centres (market, tourism Centre, industry, etc.) or several Wards with high network coverage, connected directly or through the

National Strategic Road Network or district road falls on the **road class A.** List of class A road is given in table below and the detail map is presented in **Annex**

Table 8: Lists of Class A roads

Municipality Code	Name of Road	Drain	Road Width	Right of way	Road surface type	Length in KM	Remarks
49M63A001	Siddhartha Highway	Yes	8	50	Metalled	6.211187	NH10-H1001
49M63A002	Seema Path	No	5	20	Metalled	3.744468	
49M63A003	Mahudehawa , To Gallamandi Chowk	No	6	20	Metalled	10.101751	
49M63A004	Bimanghat Road	No	8	25	Metalled	3.29228	
49M63A005	Shanti Path	Yes	6	22	Metalled	1.578228	
49M63A006	Lumbani Road	No	8	50	Metalled	3.700744	
49M63A007	Maitri Path	Yes	8	22	Metalled	3.776092	
49M63A008	Parasi bypass Road	Yes	7	20	Metalled	0.901836	
49M63A009	Parasi Road	Yes	8	50	Metalled	4.926141	F130-F04401
Total						**38.232727**	**Km**

5.2 Class 'B' road

All roads which connect to a major road network and other roads of similar hierarchy with a road connecting major Growth Centre of the same or neighbouring wards which provide access between Class A and class C road falls on the category of **class B.** List of class B road is given in table as shown in below and the detail map is shown in Annex.

Table 9: List of Class B roads

Municipality Code	Name of Road	Drain	Road Width	Right of way	Road surface type	Length in KM	Remarks
49M63B001	Prabhat Path	Yes	6	12	Earthern	3.300555	
49M63B002	Airport Road To Badkipipal Road	No	4	0	Gravelled	1.115865	
49M63B003	Hat Bazar Path	No	6	15	Metalled	0.79772	

Municipality Code	Name of Road	Drain	Road Width	Right of way	Road surface type	Length in KM	Remarks
49M63B004	Buspark Chowk To Santinagar Chowk	Yes	6	0	Metalled	0.752583	
49M63B005	Sakuni Path	Yes	5	0	Metalled	1.890409	
49M63B006	Rangshala Road	Yes	7	25	Metalled	1.242456	
49M63B007	Laxmi Path	No	4	0	Metalled	2.446895	
49M63B008	Airport Road To Badkipipal Road	No	4	0	Metalled	1.641448	
49M63B009	Lumbini Road To Basadilwa	No	8	0	Metalled	0.378392	
49M63B010	Harniya Path	No	6	8	Metalled	1.164384	
49M63B011	Gallamandi Chowk To Lumbini Road	yes	9	0	Metalled	0.532295	
49M63B012	Surya Path	Yes	6	30	Metalled	0.359109	
49M63B013	Prabhat Path	Yes	6	12	Metalled	2.187376	
Total						**17.80949**	**km**

5.3 Class 'C' road

All roads which provide connection to higher order roads with all agricultural roads which connect a farm with a mini-market Centre or a agro-based production Centre and means for mobility of local trips are understood as road **class C.** List of class C road is given in table below and the detail map is presented in Annex.

Table 10 List of Class C roads

Municipality Code	Name of Road	Drain	Road Width	Road surface type	Length in KM	Remarks
49M63C001	Siddartha Highway To Prabhat Path	No	5	Gravelled	2.165234	
49M63C002	Maitri Path To Rahaman Tol	No	4	Gravelled	0.13739	
49M63C003	Maitri Path To Rahaman Tol	No	4	Metalled	0.679349	
49M63C004	BP Path	No	6	Metalled	0.492591	
49M63C005	Airport Road To Rahaman Tol	Yes	5	Metalled	0.74463	
49M63C006	Janak Path	No	6	Metalled	0.899936	
49M63C007	Kishorpur path	No	5	Metalled	0.625225	
49M63C008	Belhiya Path	No	6	Metalled	1.867763	
49M63C009	Prabhat Path To Goligadh	No	6	Metalled	0.811388	
49M63C010	Mahabir Jain Path	Yes	8	Metalled	1.373158	
49M63C011	Amarnath Path	Yes	6	Metalled	1.058153	
49M63C012	Uchhami Path	Yes	6	Metalled	1.387861	

Municipality Code	Name of Road	Drain	Road Width	Road surface type	Length in KM	Remarks
49M63C013	Sita Path	Yes	6	Metalled	0.948633	
49M63C014	Himali Path	No	6	Metalled	1.013661	
49M63C015	Siddartha Highway To Prabhat Path	No	5	Metalled	0.358446	
49M63C016	Uchhami Path	Yes	6	Metalled	0.453065	
Total					15.016483	km

5.4 Class 'D' road

All roads which provide connection to higher order roads with all agricultural roads which connect a tol road with a mini-market Centre or a agro-based production Centre and link with class 'C' road**.** List of class 'D' road is given in table below and the detail map is presented in Annex.

Table 11 List of Class D roads

Municipality Code	Name of Road	Drain	Road Width	Road surface type	Length in KM	Remarks
49M63D001	Doghara Road	No	3	Brick	0.071232	
49M63D002	<Null>	No	2	Brick	0.314657	
49M63D003	<Null>	No	4	Brick	0.247374	
49M63D004	<Null>	No	4	Brick	0.048126	
49M63D005	<Null>	Yes	4	Brick	0.07511	
49M63D006	Doghara Road	No	3	Brick	0.034016	
49M63D007	<Null>	No	3	Brick	0.051025	
49M63D008	<Null>	No	4	Brick	0.085768	
49M63D009	<Null>	No	5	Earthern	0.130625	
49M63D010	<Null>	No	4	Earthern	0.240058	
49M63D011	<Null>	No	5	Earthern	0.201693	
49M63D012	<Null>	No	4	Earthern	0.043459	
49M63D013	<Null>	No	3	Earthern	0.197375	
49M63D014	<Null>	No	5	Earthern	0.160817	
49M63D015	<Null>	No	4	Earthern	0.223249	
49M63D016	<Null>	No	5	Earthern	0.58917	
49M63D017	<Null>	No	4	Earthern	0.139467	
49M63D018	Santoshi Path	Yes	5	Earthern	0.145126	
49M63D019	<Null>	No	4	Earthern	0.064478	
49M63D020	<Null>	No	2	Earthern	0.061919	
49M63D021	<Null>	No	4	Earthern	0.446213	
49M63D022	<Null>	No	6	Earthern	0.208757	
49M63D023	<Null>	No	3	Earthern	0.261482	

Municipality Code	Name of Road	Drain	Road Width	Road surface type	Length in KM	Remarks
49M63D024	<Null>	No	6	Earthern	0.133479	
49M63D025	Sita path	No	4	Earthern	0.055841	
49M63D026	<Null>	Yes	6	Earthern	0.181716	
49M63D027	<Null>	No	4	Earthern	0.199193	
49M63D028	<Null>	No	4	Earthern	0.080839	
49M63D029	<Null>	No	4	Earthern	0.66754	
49M63D030	Rahim Path	No	5	Earthern	0.47826	
49M63D031	<Null>	No	4	Earthern	0.042166	
49M63D032	<Null>	No	5	Earthern	0.228235	
49M63D033	<Null>	No	6	Earthern	0.484914	
49M63D034	<Null>	No	5	Earthern	0.199501	
49M63D035	<Null>	No	4	Earthern	0.057282	
49M63D036	<Null>	No	4	Earthern	0.133238	
49M63D037	<Null>	No	4	Earthern	0.443772	
49M63D038	<Null>	No	4	Earthern	0.423558	
49M63D039	<Null>	No	4	Earthern	0.111755	
49M63D040	<Null>	Yes	4	Earthern	0.197769	
49M63D041	Doghara Road	No	3	Earthern	0.092177	
49M63D042	<Null>	No	4	Earthern	0.25003	
49M63D043	<Null>	No	4	Earthern	0.282936	
49M63D044	<Null>	No	4	Earthern	0.213607	
49M63D045	<Null>	No	4	Earthern	0.040414	
49M63D046	Doghara Road	No	4	Earthern	0.385956	
49M63D047	<Null>	No	4	Earthern	0.0491	
49M63D048	<Null>	No	4	Earthern	0.061909	
49M63D049	<Null>	No	6	Earthern	0.145459	
49M63D050	<Null>	No	6	Earthern	0.046328	
49M63D051	<Null>	Yes	5	Earthern	0.225529	
49M63D052	<Null>	No	4	Earthern	0.142689	
49M63D053	<Null>	No	3	Earthern	0.101365	
49M63D054	<Null>	No	4	Earthern	0.10311	
49M63D055	<Null>	No	4	Earthern	0.190099	
49M63D056	<Null>	No	3	Earthern	0.038229	
49M63D057	<Null>	No	4	Earthern	0.08682	
49M63D058	<Null>	No	4	Earthern	0.107034	
49M63D059	<Null>	No	4	Earthern	0.214772	
49M63D060	<Null>	No	3	Earthern	0.070664	
49M63D061	<Null>	No	4	Earthern	0.061328	
49M63D062	<Null>	Yes	3	Earthern	0.07906	
49M63D063	<Null>	No	4	Earthern	0.09839	

Municipality Code	Name of Road	Drain	Road Width	Road surface type	Length in KM	Remarks
49M63D064	<Null>	No	4	Earthern	0.069395	
49M63D065	<Null>	No	3	Earthern	0.121662	
49M63D066	<Null>	No	6	Earthern	0.913538	
49M63D067	<Null>	No	4	Earthern	0.038242	
49M63D068	<Null>	No	3	Earthern	0.1339	
49M63D069	<Null>	No	3	Earthern	0.063886	
49M63D070	<Null>	No	5	Earthern	0.682377	
49M63D071	<Null>	No	4	Earthern	0.211256	
49M63D072	<Null>	No	4	Earthern	0.076181	
49M63D073	<Null>	No	4	Earthern	0.041301	
49M63D074	<Null>	No	4	Earthern	0.069863	
49M63D075	<Null>	No	4	Earthern	0.041824	
49M63D076	<Null>	No	5	Earthern	0.379388	
49M63D077	<Null>	No	4	Earthern	0.076961	
49M63D078	<Null>	No	6	Earthern	0.101741	
49M63D079	<Null>	No	5	Earthern	0.364359	
49M63D080	<Null>	No	4	Earthern	0.122709	
49M63D081	<Null>	No	4	Earthern	0.059819	
49M63D082	<Null>	No	2	Earthern	0.005194	
49M63D083	<Null>	No	4	Earthern	0.15339	
49M63D084	<Null>	No	5	Earthern	0.107352	
49M63D085	<Null>	Yes	4	Earthern	0.09934	
49M63D086	<Null>	No	5	Earthern	0.144294	
49M63D087	<Null>	No	4	Earthern	0.085899	
49M63D088	Buddha Colony	No	6	Earthern	0.384992	
49M63D089	Buddha Colony	No	4	Earthern	0.2656	
49M63D090	<Null>	No	4	Earthern	0.022319	
49M63D091	Doghara Road	No	3	Earthern	0.08456	
49M63D092	Doghara Road	No	3	Earthern	0.162822	
49M63D093	<Null>	No	5	Earthern	0.192796	
49M63D094	<Null>	No	4	Earthern	0.180778	
49M63D095	<Null>	No	4	Earthern	0.179445	
49M63D096	<Null>	No	4	Earthern	0.173667	
49M63D097	<Null>	No	3	Earthern	0.091078	
49M63D098	<Null>	No	3	Earthern	0.064991	
49M63D099	<Null>	No	4	Earthern	0.367341	
49M63D100	<Null>	No	4	Earthern	0.199626	
49M63D101	<Null>	No	6	Earthern	0.963714	
49M63D102	<Null>	No	3	Earthern	0.055154	
49M63D103	<Null>	No	3	Earthern	0.140076	

Municipality Code	Name of Road	Drain	Road Width	Road surface type	Length in KM	Remarks
49M63D104	<Null>	No	4	Earthern	0.168284	
49M63D105	<Null>	No	6	Earthern	0.077878	
49M63D106	<Null>	No	6	Earthern	0.074937	
49M63D107	<Null>	No	2	Earthern	0.161063	
49M63D108	<Null>	No	4	Earthern	0.154036	
49M63D109	<Null>	No	4	Earthern	0.083225	
49M63D110	<Null>	No	4	Earthern	0.063768	
49M63D111	<Null>	No	4	Earthern	0.185759	
49M63D112	<Null>	No	4	Earthern	0.067851	
49M63D113	<Null>	No	4	Earthern	0.136928	
49M63D114	<Null>	No	4	Earthern	0.047028	
49M63D115	<Null>	No	3	Earthern	0.108119	
49M63D116	<Null>	No	4	Earthern	0.077703	
49M63D117	<Null>	No	3	Earthern	0.078227	
49M63D118	<Null>	No	4	Earthern	0.058179	
49M63D119	<Null>	No	5	Earthern	0.157092	
49M63D120	<Null>	Yes	6	Earthern	0.099738	
49M63D121	<Null>	No	5	Earthern	0.104721	
49M63D122	<Null>	No	5	Earthern	0.033799	
49M63D123	<Null>	No	4	Earthern	0.313619	
49M63D124	<Null>	No	5	Earthern	1.227513	
49M63D125	<Null>	No	4	Earthern	0.067231	
49M63D126	<Null>	No	4	Earthern	0.0295	
49M63D127	<Null>	No	4	Earthern	0.236297	
49M63D128	<Null>	Yes	4	Earthern	0.06688	
49M63D129	<Null>	No	4	Earthern	0.147494	
49M63D130	<Null>	No	4	Earthern	0.066628	
49M63D131	Magh Path	No	4	Earthern	0.060382	
49M63D132	<Null>	No	4	Earthern	0.138986	
49M63D133	<Null>	No	4	Earthern	0.182167	
49M63D134	<Null>	No	4	Earthern	0.06559	
49M63D135	<Null>	No	4	Earthern	0.064744	
49M63D136	<Null>	No	3	Earthern	0.046216	
49M63D137	<Null>	No	4	Earthern	1.457474	
49M63D138	<Null>		0	Earthern	0.09727	
49M63D139	<Null>		0	Earthern	0.149131	
49M63D140	<Null>		0	Earthern	0.041271	
49M63D141	<Null>		0	Earthern	0.07712	
49M63D142	<Null>		0	Earthern	0.041856	
49M63D143	<Null>		0	Earthern	0.086715	

Municipality Code	Name of Road	Drain	Road Width	Road surface type	Length in KM	Remarks
49M63D144	<Null>		0	Earthern	0.049271	
49M63D145	<Null>		0	Earthern	0.022013	
49M63D146	<Null>		0	Earthern	0.138639	
49M63D147	<Null>		0	Earthern	0.079871	
49M63D148	<Null>		0	Earthern	0.17743	
49M63D149	<Null>		0	Earthern	0.03767	
49M63D150	<Null>		0	Earthern	0.076913	
49M63D151	<Null>		0	Earthern	0.134944	
49M63D152	<Null>		0	Earthern	0.287748	
49M63D153	<Null>		0	Earthern	0.101022	
49M63D154	<Null>		0	Earthern	0.24565	
49M63D155	<Null>		0	Earthern	0.108581	
49M63D156	<Null>		0	Earthern	0.109574	
49M63D157	<Null>		0	Earthern	0.108842	
49M63D158	<Null>		0	Earthern	0.094106	
49M63D159	<Null>		0	Earthern	0.326319	
49M63D160	<Null>		0	Earthern	0.277696	
49M63D161	<Null>		0	Earthern	0.059618	
49M63D162	<Null>		0	Earthern	0.08648	
49M63D163	<Null>		0	Earthern	0.121817	
49M63D164	<Null>		0	Earthern	0.315098	
49M63D165	<Null>		0	Earthern	0.117409	
49M63D166	<Null>		0	Earthern	0.192208	
49M63D167	<Null>		0	Earthern	0.120209	
49M63D168	<Null>		0	Earthern	0.066992	
49M63D169	<Null>		0	Earthern	0.086429	
49M63D170	<Null>		0	Earthern	0.103793	
49M63D171	<Null>		0	Earthern	0.160836	
49M63D172	<Null>		0	Earthern	0.084061	
49M63D173	<Null>		0	Earthern	0.043702	
49M63D174	<Null>		0	Earthern	0.043501	
49M63D175	<Null>		0	Earthern	0.224269	
49M63D176	<Null>		0	Earthern	0.386328	
49M63D177	<Null>		0	Earthern	0.13121	
49M63D178	<Null>		0	Earthern	0.204983	
49M63D179	<Null>		0	Earthern	0.099274	
49M63D180	<Null>		0	Earthern	0.446415	
49M63D181	<Null>		0	Earthern	0.21512	
49M63D182	<Null>		0	Earthern	0.082416	
49M63D183	<Null>		0	Earthern	0.061577	

Municipality Code	Name of Road	Drain	Road Width	Road surface type	Length in KM	Remarks
49M63D184	<Null>		0	Earthern	0.229581	
49M63D185	<Null>		0	Earthern	0.083797	
49M63D186	<Null>		0	Earthern	0.079146	
49M63D187	<Null>		0	Earthern	0.075297	
49M63D188	<Null>		0	Earthern	0.048334	
49M63D189	<Null>		0	Earthern	0.095762	
49M63D190	<Null>		0	Earthern	0.15605	
49M63D191	<Null>		0	Earthern	0.050615	
49M63D192	<Null>		0	Earthern	0.040146	
49M63D193	<Null>		0	Earthern	0.203554	
49M63D194	<Null>		0	Earthern	0.085603	
49M63D195	<Null>		0	Earthern	0.643528	
49M63D196	<Null>		0	Earthern	0.375255	
49M63D197	<Null>		0	Earthern	0.10303	
49M63D198	<Null>		0	Earthern	0.107647	
49M63D199	<Null>		0	Earthern	0.044008	
49M63D200	<Null>		0	Earthern	0.182825	
49M63D201	<Null>		0	Earthern	0.038187	
49M63D202	<Null>		0	Earthern	0.162085	
49M63D203	<Null>		0	Earthern	0.203355	
49M63D204	<Null>		0	Earthern	0.054179	
49M63D205	<Null>		0	Earthern	0.054333	
49M63D206	<Null>		0	Earthern	0.147327	
49M63D207	Buddha Colony		0	Earthern	0.134718	
49M63D208	<Null>		0	Earthern	0.074749	
49M63D209	Buddha Colony		0	Earthern	0.22469	
49M63D210	<Null>		0	Earthern	0.140297	
49M63D211	<Null>		0	Earthern	0.21849	
49M63D212	<Null>		0	Earthern	0.128885	
49M63D213	<Null>		0	Earthern	0.11927	
49M63D214	<Null>		0	Earthern	0.056259	
49M63D215	<Null>		0	Earthern	0.145516	
49M63D216	<Null>		0	Earthern	0.049654	
49M63D217	<Null>		0	Earthern	0.000977	
49M63D218	<Null>		0	Earthern	0.150321	
49M63D219	<Null>		0	Earthern	0.108453	
49M63D220	<Null>		0	Earthern	0.142522	
49M63D221	<Null>		0	Earthern	0.121478	
49M63D222	<Null>		0	Earthern	0.140366	
49M63D223	<Null>		0	Earthern	0.192743	

Municipality Code	Name of Road	Drain	Road Width	Road surface type	Length in KM	Remarks
49M63D224	<Null>		0	Earthern	0.131224	
49M63D225	<Null>		0	Earthern	0.113264	
49M63D226	<Null>		0	Earthern	0.063093	
49M63D227	<Null>		0	Earthern	0.037478	
49M63D228	<Null>		0	Earthern	0.169274	
49M63D229	<Null>		0	Earthern	0.12985	
49M63D230	<Null>		0	Earthern	0.069183	
49M63D231	<Null>		0	Earthern	0.112457	
49M63D232	<Null>		0	Earthern	0.161809	
49M63D233	<Null>		0	Earthern	0.202348	
49M63D234	<Null>		0	Earthern	0.252344	
49M63D235	<Null>		0	Earthern	0.087497	
49M63D236	<Null>		0	Earthern	0.124037	
49M63D237	<Null>		0	Earthern	0.124481	
49M63D238	<Null>		0	Earthern	0.242633	
49M63D239	<Null>		0	Earthern	0.133004	
49M63D240	<Null>		0	Earthern	0.123501	
49M63D241	<Null>		0	Earthern	0.049511	
49M63D242	<Null>		0	Earthern	0.116725	
49M63D243	<Null>		0	Earthern	0.063823	
49M63D244	<Null>		0	Earthern	0.135431	
49M63D245	<Null>		0	Earthern	0.171768	
49M63D246	<Null>		0	Earthern	0.163451	
49M63D247	<Null>		0	Earthern	0.039752	
49M63D248	<Null>		0	Earthern	0.036866	
49M63D249	<Null>		0	Earthern	0.031261	
49M63D250	<Null>		0	Earthern	0.027792	
49M63D251	<Null>		0	Earthern	0.061509	
49M63D252	<Null>		0	Earthern	0.055856	
49M63D253	Chini Mill Planning Road		0	Earthern	0.450126	
49M63D254	Chini Mill Planning Road		0	Earthern	0.479162	
49M63D255	<Null>		0	Earthern	0.082016	
49M63D256	<Null>		0	Earthern	0.222555	
49M63D257	<Null>		0	Earthern	0.103403	
49M63D258	<Null>		0	Earthern	0.106218	
49M63D259	<Null>		0	Earthern	0.290964	
49M63D260	<Null>		0	Earthern	0.133441	
49M63D261	<Null>		0	Earthern	0.020545	
49M63D262	<Null>	No	6	Earthern	0.185482	
49M63D263	<Null>		0	Earthern	0.23847	

Municipality Code	Name of Road	Drain	Road Width	Road surface type	Length in KM	Remarks
49M63D264	<Null>		0	Earthern	0.244166	
49M63D265	<Null>		0	Earthern	0.044033	
49M63D266	<Null>		0	Earthern	0.155581	
49M63D267	<Null>		0	Earthern	0.135358	
49M63D268	<Null>		0	Earthern	0.087994	
49M63D269	<Null>		0	Earthern	0.299703	
49M63D270	<Null>		0	Earthern	0.154185	
49M63D271	Chini Mill Planning Road		0	Earthern	0.197262	
49M63D272	Chini Mill Planning Road		0	Earthern	0.095944	
49M63D273	Vatika Path	No	5	Gravelled	1.193934	
49M63D274	<Null>	No	5	Gravelled	0.22886	
49M63D275	Sita path	Yes	4	Gravelled	0.214396	
49M63D276	Amar Jyoti Path	No	6	Gravelled	0.705964	
49M63D277	Sita path	No	6	Gravelled	0.706457	
49M63D278	<Null>	No	4	Gravelled	0.227854	
49M63D279	<Null>	Yes	5	Gravelled	0.383519	
49M63D280	<Null>	No	5	Gravelled	0.183471	
49M63D281	<Null>	No	5	Gravelled	0.088322	
49M63D282	<Null>	Yes	4	Gravelled	0.217537	
49M63D283	<Null>	No	5	Gravelled	0.254977	
49M63D284	<Null>	No	5	Gravelled	0.148325	
49M63D285	<Null>	No	5	Gravelled	0.269627	
49M63D286	<Null>	No	4	Gravelled	0.166303	
49M63D287	<Null>	No	5	Gravelled	0.046157	
49M63D288	<Null>	No	5	Gravelled	0.229031	
49M63D289	<Null>	No	4	Gravelled	0.065248	
49M63D290	<Null>	No	4	Gravelled	0.354679	
49M63D291	<Null>	No	6	Gravelled	0.207877	
49M63D292	<Null>	No	5	Gravelled	0.159109	
49M63D293	<Null>	No	5	Gravelled	0.041783	
49M63D294	Kishorpur	Yes	5	Gravelled	0.222044	
49M63D295	Kishorpur	Yes	5	Gravelled	0.212075	
49M63D296	<Null>	No	7	Gravelled	0.544014	
49M63D297	Naudihawa Road	No	6	Gravelled	1.094212	
49M63D298	<Null>	No	5	Gravelled	0.399133	
49M63D299	<Null>	No	6	Gravelled	0.550515	
49M63D300	<Null>	No	3	Gravelled	0.242518	
49M63D301	Harniya Path	No	5	Gravelled	0.20423	
49M63D302	<Null>	No	5	Gravelled	0.178614	
49M63D303	<Null>	No	5	Gravelled	0.17542	

Municipality Code	Name of Road	Drain	Road Width	Road surface type	Length in KM	Remarks
49M63D304	Sita path	No	6	Gravelled	0.131148	
49M63D305	Sita path	No	6	Gravelled	0.4648	
49M63D306	<Null>	No	4	Gravelled	0.224286	
49M63D307	<Null>	No	5	Gravelled	0.413964	
49M63D308	<Null>	No	5	Gravelled	0.066779	
49M63D309	<Null>	No	5	Gravelled	0.085799	
49M63D310	<Null>	No	5	Gravelled	0.0863	
49M63D311	<Null>	No	5	Gravelled	0.080281	
49M63D312	<Null>	No	5	Gravelled	0.078441	
49M63D313	<Null>	No	5	Gravelled	0.63696	
49M63D314	<Null>	No	4	Gravelled	0.40569	
49M63D315	<Null>	No	6	Gravelled	0.287696	
49M63D316	<Null>	Yes	6	Gravelled	0.324288	
49M63D317	<Null>	No	6	Gravelled	0.090737	
49M63D318	<Null>	No	6	Gravelled	0.270702	
49M63D319	<Null>	No	6	Gravelled	0.372667	
49M63D320	Maha Maya Path	No	6	Gravelled	0.207476	
49M63D321	<Null>	No	5	Gravelled	0.186408	
49M63D322	<Null>	No	4	Gravelled	0.03955	
49M63D323	<Null>	No	4	Gravelled	0.036535	
49M63D324	<Null>	No	4	Gravelled	0.038768	
49M63D325	<Null>	No	3	Gravelled	0.379172	
49M63D326	<Null>	No	4	Gravelled	0.327907	
49M63D327	<Null>	No	4	Gravelled	0.173021	
49M63D328	<Null>	No	4	Gravelled	0.177782	
49M63D329	<Null>	No	4	Gravelled	0.177722	
49M63D330	<Null>	No	4	Gravelled	0.060512	
49M63D331	<Null>	No	4	Gravelled	0.945783	
49M63D332	<Null>	No	4	Gravelled	1.183467	
49M63D333	<Null>	No	4	Gravelled	0.380686	
49M63D334	<Null>	No	4	Gravelled	0.211041	
49M63D335	<Null>	No	6	Gravelled	0.193696	
49M63D336	<Null>	No	4	Gravelled	0.125752	
49M63D337	<Null>	No	6	Gravelled	0.092102	
49M63D338	<Null>	No	5	Gravelled	0.14861	
49M63D339	<Null>	No	5	Gravelled	0.22381	
49M63D340	<Null>	Yes	5	Gravelled	0.092095	
49M63D341	<Null>	No	4	Gravelled	0.040059	
49M63D342	<Null>	No	4	Gravelled	0.307232	
49M63D343	<Null>	No	5	Gravelled	0.162484	

Municipality Code	Name of Road	Drain	Road Width	Road surface type	Length in KM	Remarks
49M63D344	<Null>	No	5	Gravelled	0.413739	
49M63D345	<Null>	No	5	Gravelled	0.062822	
49M63D346	Buddha Colony	No	6	Gravelled	2.556506	
49M63D347	<Null>	No	4	Gravelled	0.146356	
49M63D348	<Null>	No	5	Gravelled	1.038372	
49M63D349	<Null>	No	4	Gravelled	0.215767	
49M63D350	<Null>	No	3	Gravelled	0.139508	
49M63D351	<Null>	No	3	Gravelled	0.213412	
49M63D352	<Null>	No	4	Gravelled	0.177779	
49M63D353	<Null>	No	4	Gravelled	0.140376	
49M63D354	<Null>	Yes	6	Gravelled	0.817879	
49M63D355	<Null>	No	6	Gravelled	1.54704	
49M63D356	<Null>	No	5	Gravelled	0.54163	
49M63D357	<Null>	No	6	Gravelled	0.165561	
49M63D358	<Null>	No	6	Gravelled	0.066565	
49M63D359	<Null>	No	5	Gravelled	0.270819	
49M63D360	<Null>	No	5	Gravelled	0.661175	
49M63D361	<Null>	No	6	Gravelled	0.151999	
49M63D362	<Null>	No	6	Gravelled	0.165448	
49M63D363	<Null>	No	4	Gravelled	0.140403	
49M63D364	<Null>	No	4	Gravelled	0.108704	
49M63D365	<Null>	No	3	Gravelled	0.094722	
49M63D366	Sagarmatha Path	No	4	Gravelled	0.173334	
49M63D367	<Null>	No	4	Gravelled	0.28954	
49M63D368	<Null>	No	4	Gravelled	0.244929	
49M63D369	Rudra Path	No	6	Gravelled	0.666522	
49M63D370	<Null>	No	4	Gravelled	0.06807	
49M63D371	<Null>	No	3	Gravelled	0.030514	
49M63D372	<Null>	No	4	Gravelled	0.123613	
49M63D373	Bel Baba Path	No	4	Gravelled	0.223481	
49M63D374	<Null>	No	3	Gravelled	0.120306	
49M63D375	<Null>	Yes	5	Gravelled	0.129228	
49M63D376	<Null>	No	4	Gravelled	0.315741	
49M63D377	<Null>	No	4	Gravelled	0.148483	
49M63D378	<Null>	No	4	Gravelled	0.143165	
49M63D379	<Null>	No	4	Gravelled	0.262285	
49M63D380	Panchasil Marg	No	4	Gravelled	0.228454	
49M63D381	<Null>	No	4	Gravelled	0.073979	
49M63D382	<Null>	No	4	Gravelled	0.087211	
49M63D383	Lekhnath Path	No	6	Gravelled	0.305345	

Municipality Code	Name of Road	Drain	Road Width	Road surface type	Length in KM	Remarks
49M63D384	<Null>	No	4	Gravelled	1.028754	
49M63D385	<Null>	No	4	Gravelled	0.309017	
49M63D386	<Null>	No	4	Gravelled	0.170988	
49M63D387	<Null>	No	4	Gravelled	0.64232	
49M63D388	<Null>	No	4	Gravelled	0.153141	
49M63D389	<Null>	No	4	Gravelled	0.043346	
49M63D390	<Null>	No	4	Gravelled	0.058714	
49M63D391	<Null>	Yes	6	Gravelled	0.079837	
49M63D392	<Null>	No	6	Gravelled	0.26522	
49M63D393	<Null>	No	5	Gravelled	0.113981	
49M63D394	<Null>	No	5	Gravelled	0.127872	
49M63D395	<Null>	No	5	Gravelled	0.181936	
49M63D396	<Null>	No	6	Gravelled	0.587128	
49M63D397	<Null>	Yes	4	Gravelled	0.206213	
49M63D398	<Null>	No	4	Gravelled	0.247067	
49M63D399	<Null>	No	4	Gravelled	0.144355	
49M63D400	<Null>	No	4	Gravelled	0.132013	
49M63D401	<Null>	No	5	Gravelled	0.31818	
49M63D402	<Null>	No	4	Gravelled	0.132186	
49M63D403	<Null>	No	4	Gravelled	0.145264	
49M63D404	<Null>	No	4	Gravelled	0.14283	
49M63D405	<Null>	No	4	Gravelled	0.199077	
49M63D406	<Null>	No	4	Gravelled	0.192671	
49M63D407	<Null>	No	4	Gravelled	0.126767	
49M63D408	<Null>	No	3	Gravelled	0.1073	
49M63D409	<Null>	Yes	4	Gravelled	0.255431	
49M63D410	<Null>	No	5	Gravelled	0.459665	
49M63D411	<Null>	No	4	Gravelled	0.227552	
49M63D412	<Null>	No	3	Gravelled	0.093266	
49M63D413	Melmilap Path	No	4	Gravelled	0.161541	
49M63D414	Gaurishankar Path	No	4	Gravelled	0.279971	
49M63D415	<Null>	No	3	Gravelled	0.07325	
49M63D416	<Null>	No	4	Gravelled	0.204244	
49M63D417	<Null>	No	4	Gravelled	0.136049	
49M63D418	<Null>	Yes	4	Gravelled	0.073768	
49M63D419	<Null>	No	4	Gravelled	0.059793	
49M63D420	<Null>	No	4	Gravelled	0.097269	
49M63D421	<Null>	No	3	Gravelled	0.041385	
49M63D422	<Null>	No	3	Gravelled	0.038397	
49M63D423	<Null>	No	6	Gravelled	0.190364	

Municipality Code	Name of Road	Drain	Road Width	Road surface type	Length in KM	Remarks
49M63D424	<Null>	No	4	Gravelled	0.035988	
49M63D425	<Null>	No	4	Gravelled	0.038209	
49M63D426	<Null>	No	6	Gravelled	0.208641	
49M63D427	<Null>	No	6	Gravelled	0.021071	
49M63D428	<Null>	No	6	Gravelled	0.081045	
49M63D429	<Null>	No	6	Gravelled	0.237024	
49M63D430	<Null>	No	6	Gravelled	0.370266	
49M63D431	<Null>	No	6	Gravelled	0.087018	
49M63D432	<Null>	No	6	Gravelled	0.289496	
49M63D433	<Null>	No	6	Gravelled	0.066901	
49M63D434	<Null>	No	6	Gravelled	0.104592	
49M63D435	<Null>	No	6	Gravelled	0.118654	
49M63D436	<Null>	No	6	Gravelled	0.101851	
49M63D437	<Null>	No	4	Gravelled	0.171571	
49M63D438	<Null>	No	3	Gravelled	0.25966	
49M63D439	<Null>	No	3	Gravelled	0.066102	
49M63D440	<Null>	No	5	Gravelled	0.152479	
49M63D441	<Null>	No	8	Gravelled	0.182202	
49M63D442	<Null>	No	4	Gravelled	0.143071	
49M63D443	Khanda Tole Path	No	5	Gravelled	0.256707	
49M63D444	Doghara Road	Yes	6	Gravelled	0.072032	
49M63D445	<Null>	No	4	Gravelled	0.049629	
49M63D446	<Null>	No	6	Gravelled	0.222065	
49M63D447	<Null>	Yes	3	Gravelled	0.089267	
49M63D448	<Null>	No	4	Gravelled	0.300636	
49M63D449	<Null>	No	4	Gravelled	0.198842	
49M63D450	<Null>	No	4	Gravelled	0.038382	
49M63D451	<Null>	No	5	Gravelled	0.09483	
49M63D452	<Null>	No	4	Gravelled	0.145077	
49M63D453	<Null>	No	5	Gravelled	0.141662	
49M63D454	<Null>	No	5	Gravelled	0.096435	
49M63D455	Chanakya path	No	5	Gravelled	0.247781	
49M63D456	<Null>	No	5	Gravelled	0.273774	
49M63D457	Radhakrishna Path	No	4	Gravelled	0.291026	
49M63D458	<Null>	No	4	Gravelled	0.297069	
49M63D459	Sanjay Path	No	5	Gravelled	1.127735	
49M63D460	Dhodhare	Yes	5	Gravelled	0.279612	
49M63D461	<Null>	Yes	5	Gravelled	0.625229	
49M63D462	<Null>	No	5	Gravelled	0.769544	
49M63D463	Mahudehawa	No	5	Gravelled	0.124142	

Municipality Code	Name of Road	Drain	Road Width	Road surface type	Length in KM	Remarks
49M63D464	Mahudehawa	Yes	5	Gravelled	0.069219	
49M63D465	<Null>	No	5	Gravelled	0.053474	
49M63D466	Bank Colony	No	2	Gravelled	0.094678	
49M63D467	<Null>	Yes	4	Gravelled	0.057446	
49M63D468	<Null>	No	4	Gravelled	0.215735	
49M63D469	<Null>	No	4	Gravelled	0.050704	
49M63D470	<Null>	No	5	Gravelled	0.293737	
49M63D471	<Null>	No	4	Gravelled	0.423126	
49M63D472	<Null>	No	6	Gravelled	0.169791	
49M63D473	Samaimai Path	No	4	Gravelled	0.737496	
49M63D474	<Null>	No	6	Gravelled	0.123046	
49M63D475	<Null>		0	Gravelled	0.271715	
49M63D476	<Null>		0	Gravelled	0.162359	
49M63D477	<Null>		0	Gravelled	0.12125	
49M63D478	<Null>		0	Gravelled	0.212039	
49M63D479	<Null>		0	Gravelled	0.064243	
49M63D480	<Null>		0	Gravelled	0.080312	
49M63D481	<Null>		0	Gravelled	0.110289	
49M63D482	<Null>		0	Gravelled	0.196054	
49M63D483	<Null>		0	Gravelled	0.250336	
49M63D484	<Null>		0	Gravelled	0.217782	
49M63D485	<Null>		0	Gravelled	0.069905	
49M63D486	<Null>		0	Gravelled	0.121739	
49M63D487	<Null>		0	Gravelled	0.076617	
49M63D488	<Null>		0	Gravelled	0.062622	
49M63D489	<Null>		0	Gravelled	0.15766	
49M63D490	<Null>		0	Gravelled	0.234344	
49M63D491	<Null>		0	Gravelled	0.146407	
49M63D492	<Null>		0	Gravelled	0.284183	
49M63D493	<Null>		0	Gravelled	0.154739	
49M63D494	<Null>		0	Gravelled	0.071591	
49M63D495	<Null>		0	Gravelled	0.078552	
49M63D496	<Null>		0	Gravelled	0.078884	
49M63D497	<Null>		0	Gravelled	0.078059	
49M63D498	<Null>		0	Gravelled	0.072684	
49M63D499	<Null>		0	Gravelled	0.027725	
49M63D500	<Null>		0	Gravelled	0.095706	
49M63D501	<Null>		0	Gravelled	0.109164	
49M63D502	<Null>		0	Gravelled	0.293538	
49M63D503	<Null>		0	Gravelled	0.235701	

Municipality Code	Name of Road	Drain	Road Width	Road surface type	Length in KM	Remarks
49M63D504	<Null>		0	Gravelled	0.197192	
49M63D505	<Null>		0	Gravelled	0.042727	
49M63D506	<Null>		0	Gravelled	0.040452	
49M63D507	<Null>		0	Gravelled	0.043107	
49M63D508	<Null>		0	Gravelled	0.038675	
49M63D509	<Null>		0	Gravelled	0.208801	
49M63D510	<Null>		0	Gravelled	0.203989	
49M63D511	<Null>		0	Gravelled	0.13121	
49M63D512	<Null>		0	Gravelled	0.189702	
49M63D513	<Null>		0	Gravelled	0.14552	
49M63D514	<Null>		0	Gravelled	0.039916	
49M63D515	<Null>		0	Gravelled	0.184417	
49M63D516	<Null>		0	Gravelled	0.056383	
49M63D517	<Null>		0	Gravelled	0.194799	
49M63D518	<Null>		0	Gravelled	0.117802	
49M63D519	<Null>		0	Gravelled	0.075096	
49M63D520	<Null>		0	Gravelled	0.045732	
49M63D521	<Null>		0	Gravelled	0.161374	
49M63D522	<Null>		0	Gravelled	0.148945	
49M63D523	<Null>		0	Gravelled	0.099469	
49M63D524	<Null>		0	Gravelled	0.2287	
49M63D525	<Null>		0	Gravelled	0.14409	
49M63D526	<Null>		0	Gravelled	0.123764	
49M63D527	<Null>		0	Gravelled	0.183232	
49M63D528	<Null>		0	Gravelled	0.150092	
49M63D529	<Null>		0	Gravelled	0.151097	
49M63D530	<Null>		0	Gravelled	0.205132	
49M63D531	<Null>		0	Gravelled	0.074376	
49M63D532	<Null>		0	Gravelled	0.062167	
49M63D533	<Null>		0	Gravelled	0.234656	
49M63D534	<Null>		0	Gravelled	0.09663	
49M63D535	<Null>		0	Gravelled	0.242433	
49M63D536	<Null>		0	Gravelled	0.504656	
49M63D537	<Null>		0	Gravelled	0.339717	
49M63D538	<Null>		0	Gravelled	0.061912	
49M63D539	<Null>		0	Gravelled	0.307716	
49M63D540	<Null>		0	Gravelled	0.134929	
49M63D541	<Null>		0	Gravelled	0.118244	
49M63D542	<Null>		0	Gravelled	0.175412	
49M63D543	<Null>		0	Gravelled	0.096061	

Municipality Code	Name of Road	Drain	Road Width	Road surface type	Length in KM	Remarks
49M63D544	<Null>		0	Gravelled	0.079946	
49M63D545	<Null>		0	Gravelled	0.066268	
49M63D546	<Null>		0	Gravelled	0.221796	
49M63D547	<Null>		0	Gravelled	0.105512	
49M63D548	<Null>		0	Gravelled	0.244601	
49M63D549	<Null>		0	Gravelled	0.149331	
49M63D550	<Null>		0	Gravelled	0.13919	
49M63D551	<Null>		0	Gravelled	0.277642	
49M63D552	<Null>		0	Gravelled	0.074372	
49M63D553	<Null>		0	Gravelled	0.13591	
49M63D554	<Null>		0	Gravelled	0.148688	
49M63D555	<Null>		0	Gravelled	0.174309	
49M63D556	<Null>		0	Gravelled	0.613373	
49M63D557	<Null>		0	Gravelled	0.273325	
49M63D558	<Null>		0	Gravelled	0.119204	
49M63D559	<Null>		0	Gravelled	0.107085	
49M63D560	<Null>		0	Gravelled	0.563767	
49M63D561	<Null>		0	Gravelled	0.240987	
49M63D562	<Null>		0	Gravelled	0.047501	
49M63D563	<Null>		0	Gravelled	0.148963	
49M63D564	<Null>		0	Gravelled	0.117097	
49M63D565	<Null>		0	Gravelled	0.074359	
49M63D566	<Null>		0	Gravelled	0.095917	
49M63D567	<Null>		0	Gravelled	0.053692	
49M63D568	<Null>		0	Gravelled	0.057192	
49M63D569	<Null>		0	Gravelled	0.057069	
49M63D570	Surya Path		0	Gravelled	0.108231	
49M63D571	Surya Path		0	Gravelled	0.48882	
49M63D572	<Null>		0	Gravelled	0.088551	
49M63D573	<Null>		0	Gravelled	0.077118	
49M63D574	<Null>		0	Gravelled	0.047713	
49M63D575	<Null>		0	Gravelled	0.125241	
49M63D576	<Null>		0	Gravelled	0.177282	
49M63D577	<Null>		0	Gravelled	0.124953	
49M63D578	<Null>		0	Gravelled	0.19362	
49M63D579	<Null>		0	Gravelled	0.123247	
49M63D580	<Null>		0	Gravelled	0.092267	
49M63D581	<Null>	No	6	Metalled	0.235492	
49M63D582	<Null>	No	3	Metalled	0.049697	
49M63D583	<Null>	No	4	Metalled	0.172533	

Municipality Code	Name of Road	Drain	Road Width	Road surface type	Length in KM	Remarks
49M63D584	<Null>	No	6	Metalled	0.060451	
49M63D585	<Null>	No	6	Metalled	0.234275	
49M63D586	<Null>	No	6	Metalled	0.717604	
49M63D587	<Null>	Yes	6	Metalled	0.059105	
49M63D588	<Null>	Yes	6	Metalled	0.332594	
49M63D589	<Null>	Yes	6	Metalled	0.09407	
49M63D590	<Null>	Yes	6	Metalled	0.177961	
49M63D591	<Null>	Yes	6	Metalled	0.136757	
49M63D592	<Null>	Yes	6	Metalled	0.483625	
49M63D593	<Null>	Yes	6	Metalled	0.367852	
49M63D594	<Null>	Yes	5	Metalled	0.321844	
49M63D595	<Null>	No	5	Metalled	0.34937	
49M63D596	<Null>	Yes	5	Metalled	0.496616	
49M63D597	Basant Path	Yes	6	Metalled	0.406623	
49M63D598	Bhimkali Path	No	4	Metalled	0.551435	
49M63D599	<Null>	Yes	6	Metalled	0.245544	
49M63D600	<Null>	Yes	6	Metalled	0.451342	
49M63D601	<Null>	No	4	Metalled	0.478021	
49M63D602	<Null>	No	8	Metalled	0.294614	
49M63D603	<Null>	No	4	Metalled	1.038487	
49M63D604	Vijay Path	No	6	Metalled	1.480273	
49M63D605	<Null>	Yes	5	Metalled	0.107646	
49M63D606	Colony Path	Yes	6	Metalled	0.668082	
49M63D607	<Null>	Yes	6	Metalled	0.153336	
49M63D608	Janata Path	No	6	Metalled	0.597324	
49M63D609	Karna Path	Yes	6	Metalled	0.674081	
49M63D610	<Null>	No	6	Metalled	0.064336	
49M63D611	<Null>	No	6	Metalled	0.40467	
49M63D612	Buddha Path	Yes	5	Metalled	0.436713	
49M63D613	Nag Path	Yes	4	Metalled	0.306917	
49M63D614	Annapurna Path	Yes	5	Metalled	0.439198	
49M63D615	Mankamana Path	Yes	5	Metalled	0.480768	
49M63D616	<Null>	No	4	Metalled	0.555928	
49M63D617	<Null>	Yes	5	Metalled	0.099926	
49M63D618	<Null>	No	4	Metalled	0.523534	
49M63D619	<Null>	Yes	6	Metalled	0.107268	
49M63D620	<Null>	No	6	Metalled	0.106179	
49M63D621	<Null>	No	6	Metalled	0.186436	
49M63D622	<Null>	No	3	Metalled	0.32299	
49M63D623	<Null>	No	4	Metalled	0.323341	

Municipality Code	Name of Road	Drain	Road Width	Road surface type	Length in KM	Remarks
49M63D624	<Null>	No	6	Metalled	0.204047	
49M63D625	Sewa Path	No	4	Metalled	0.469645	
49M63D626	<Null>	Yes	5	Metalled	0.042666	
49M63D627	<Null>	No	3	Metalled	0.179975	
49M63D628	Nagarpalika Path	No	6	Metalled	0.460648	
49M63D629	<Null>	Yes	5	Metalled	0.036796	
49M63D630	<Null>	No	6	Metalled	0.385519	
49M63D631	<Null>	Yes	4	Metalled	0.056204	
49M63D632	Doghara Road	No	6	Metalled	0.562646	
49M63D633	<Null>	No	6	Metalled	0.113341	
49M63D634	<Null>	No	6	Metalled	0.068738	
49M63D635	<Null>	No	3	Metalled	0.083282	
49M63D636	<Null>	Yes	6	Metalled	0.28509	
49M63D637	<Null>	Yes	6	Metalled	0.226451	
49M63D638	<Null>	No	4	Metalled	0.091729	
49M63D639	Deurali Path	No	5	Metalled	0.239413	
49M63D640	<Null>	No	4	Metalled	0.262052	
49M63D641	<Null>	No	5	Metalled	0.083363	
49M63D642	Bhairahawa Path	Yes	5	Metalled	0.549354	
49M63D643	<Null>	Yes	5	Metalled	0.088318	
49M63D644	Lekhnath Path	Yes	5	Metalled	0.149757	
49M63D645	Gargi Path	No	5	Metalled	0.356977	
49M63D646	Udaya Path	Yes	4	Metalled	0.22908	
49M63D647	<Null>	No	6	Metalled	0.220591	
49M63D648	<Null>	No	4	Metalled	0.29961	
49M63D649	Sano Colony Path	Yes	6	Metalled	0.355641	
49M63D650	Bhrikuti Path	No	4	Metalled	0.268943	
49M63D651	Kathautia Path	Yes	6	Metalled	0.226087	
49M63D652	Uchchami Path	Yes	6	Metalled	0.297784	
49M63D653	<Null>	Yes	6	Metalled	0.311498	
49M63D654	<Null>	Yes	4	Metalled	0.065864	
49M63D655	<Null>	No	5	Metalled	0.276116	
49M63D656	<Null>	No	5	Metalled	0.350555	
49M63D657	Kalyan Path	Yes	6	Metalled	0.372403	
49M63D658	<Null>	No	4	Metalled	0.179417	
49M63D659	<Null>	Yes	5	Metalled	0.19261	
49M63D660	<Null>	No	3	Metalled	0.076285	
49M63D661	<Null>	No	4	Metalled	0.148133	
49M63D662	<Null>	No	4	Metalled	0.222204	
49M63D663	Siddhartha Path	Yes	6	Metalled	0.142975	

Municipality Code	Name of Road	Drain	Road Width	Road surface type	Length in KM	Remarks
49M63D664	<Null>	No	6	Metalled	0.340814	
49M63D665	<Null>	Yes	8	Metalled	0.358555	
49M63D666	<Null>	Yes	6	Metalled	0.411012	
49M63D667	<Null>	Yes	5	Metalled	0.302643	
49M63D668	<Null>	No	4	Metalled	0.23244	
49M63D669	<Null>	No	4	Metalled	0.237542	
49M63D670	<Null>	No	5	Metalled	0.181023	
49M63D671	<Null>	No	4	Metalled	0.177137	
49M63D672	Ashok Path	No	5	Metalled	0.292789	
49M63D673	Kalika Path	Yes	6	Metalled	0.268366	
49M63D674	<Null>	Yes	4	Metalled	0.2002	
49M63D675	Pancha Path	Yes	5	Metalled	0.240828	
49M63D676	Somai Mai Path	No	6	Metalled	0.811854	
49M63D677	<Null>	No	6	Metalled	0.163534	
49M63D678	<Null>	No	6	Metalled	0.058464	
49M63D679	<Null>	Yes	6	Metalled	0.232352	
49M63D680	<Null>	Yes	5	Metalled	0.099948	
49M63D681	<Null>	Yes	5	Metalled	0.24107	
49M63D682	<Null>	Yes	6	Metalled	0.238418	
49M63D683	Kamal Path	Yes	5	Metalled	0.161265	
49M63D684	<Null>	No	5	Metalled	0.131191	
49M63D685	<Null>	No	6	Metalled	0.166405	
49M63D686	Gyan Path	No	5	Metalled	0.483869	
49M63D687	<Null>	Yes	4	Metalled	0.172871	
49M63D688	<Null>	No	8	Metalled	0.040903	
49M63D689	<Null>	No	5	Metalled	0.174169	
49M63D690	<Null>	Yes	6	Metalled	0.242851	
49M63D691	<Null>	Yes	6	Metalled	0.625821	
49M63D692	<Null>	No	4	Metalled	0.209429	
49M63D693	<Null>	Yes	5	Metalled	0.053082	
49M63D694	<Null>		0	Metalled	0.114929	
49M63D695	<Null>		0	Metalled	0.126364	
49M63D696	<Null>		0	Metalled	0.354187	
49M63D697	<Null>		0	Metalled	0.212382	
49M63D698	<Null>		0	Metalled	0.1953	
49M63D699	<Null>		0	Metalled	0.317633	
49M63D700	<Null>		0	Metalled	0.121146	
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49M63D702	<Null>		0	Metalled	0.293287	
49M63D703	<Null>		0	Metalled	0.316334	

Municipality Code	Name of Road	Drain	Road Width	Road surface type	Length in KM	Remarks
49M63D704	<Null>		0	Metalled	0.196942	
49M63D705	<Null>		0	Metalled	0.16051	
49M63D706	<Null>		0	Metalled	0.191214	
49M63D707	<Null>		0	Metalled	0.187765	
49M63D708	<Null>		0	Metalled	0.185667	
49M63D709	<Null>		0	Metalled	0.186361	
49M63D710	Chini Mill Planning Road		0	Metalled	0.217419	
49M63D711	Chini Mill Planning Road		0	Metalled	0.506651	
49M63D712	Chini Mill Planning Road		0	Metalled	0.189595	
49M63D713	Chini Mill Planning Road		0	Metalled	0.589014	
49M63D714	Chini Mill Planning Road		0	Metalled	0.371907	
49M63D715	Chini Mill Planning Road		0	Metalled	0.243044	
49M63D716	Chini Mill Planning Road		0	Metalled	0.633921	
49M63D717	Chini Mill Planning Road		0	Metalled	0.44833	
49M63D718	Chini Mill Planning Road		0	Metalled	0.203911	
49M63D719	<Null>	No	4	Metalled	0.238076	
49M63D720	<Null>		0	Metalled	0.230938	
49M63D721	Surya Path		0	Metalled	0.319734	
49M63D722	<Null>		0	Metalled	0.427563	
49M63D723	<Null>		0	Metalled	0.175163	
49M63D724	<Null>		0	Metalled	0.101876	
Total					**153.002212**	km

CHAPTER VI: FIVE YEARS MUNICIPAL TRANSPORT MASTER PLAN

6.1 Strategic framework

The framework adopted during the entire planning and how it is compatible with long term vision of transportation planning and economic-social development is described in the underlying headings.

6.1.1 Hierarchy of road

In any urban area, provision of proper hierarchy of roads at proper spacing helps to reduce traffic congestions and increase the mobility along the roads. A well-formed road hierarchy and its network of roads will reduce overall impact of traffic on the land use and at the same time guide the planned change of the land use. Thus, a proper hierarchy of road networks should be provided at proper spacing so that their purpose and functions can be justified.

Hierarchy should be maintained according to the major SRN road (national highway, feeder road) that passes through the municipality or is closest to the municipal area. Urban/municipal roads that open into these SRN should be have proper ROW and spacing so that the traffic that enters the SRN is justified and the purpose of the road is also preserved. The NRS (2070) gives the provision of parallel service (frontage roads) at the spacing of at least 750 meters. Larger spacing creates bottlenecks while closer spacing may be unnecessary.

A well-formed network of Class “A” and “B” roads creates blocks of 1 sq. km. to 2 sq. km. in the urban area and bigger blocks in the sub-urban areas. The hierarchy also provides well connected cycle tracks and pedestrian way.

6.1.2 Urban roads

Urban roads are used by all sorts of users including pedestrians, cyclists, motorists and pubic vehicles. Their speed of travel varies significantly. Pedestrians and cyclists move slowly while other motorized vehicles travel at greater speed. Sharing of common roadway by all these users is very unsafe and unpleasant, especially for the active users. Their volume is also very significant and thus cannot be ignored. Thus, proper road infrastructure should be provided to ensure their safety by segregated pedestrian facilities and bicycle tracks. Such segregation can be achieved by level difference in those facilities and construction of green belt between the facilities.

6.1.3 Highway by Pass

As in the case of Siddharthanagar municipality, it is divided into four parts by national highway whose main function is to serve long distance vehicle and obviously the speed will be very high. This may cause the safety problem to the local movement and people. For this the highway should bypass the city in not necessary to through. This enhance the safety of active road users within the city and also the traffic condition.

6.1.4 Green belt

Urban area is characterized by dense population and high built up area. Unplanned urbanization has rendered many cities unliveable 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. It also reduces the road side air temperature and absorbs more pollutants generated from the motor vehicles on street than other distant trees. Green belts can absorb precipitation and reduce the size of required drainage. The trees also act as screen and results in attenuation of air, noise and light pollution alongside the urban roads. Thus, green belt between the motorists and NMT users and in the median strip is a compulsory infrastructure in the urban roads.

6.1.5 Public transport

Public transport is a means for enhancing mobility of local people. High proportion of active transport users justifies the necessity of public transport to increase their mobility and thus access to wider services and facilities within the perceived travel time budget. Proper structured public transport routes are vital for sustainable transport development. The existing economy and travel pattern may not sustain on its own. Development of proper roads to facilitate access and (through access) mobility to various services and facilities will create more trips and thus demand. Strategic development of such roads will not only create demand for public transport (greater mobility) but also develop proper road network where public transport vehicles can ply.

As the demand increases, before well-structured and formal transport is justified economically, the local government should introduce **city buses**. City buses are government run public vehicles. Their sole purpose is to provide greater mobility to the local people even when the demand is not economically justified. Such provision adds fuel to the overall development of the local economy. It also captures the potential public transport users and retains those users. This is a “pull factor” to increase public transport users in the future and creates an environment to introduce formal public transport services.

6.1.6 Principle guideline of road planning

Change in land use and transport are cause and effect of each other, as depicted by the land use cycle in previous chapter. Thus, current land use and the predicted/planned change in land use in the future is the basic guideline for transport planning. Development of compact settlements and corresponding development scenario has been considered for road planning. The municipality is urbanizing area whose population is expected to rise in the coming years. As the population is added, the settlements grow both horizontally and vertically. Horizontal expansion increases the built-up area while vertical expansion increases the population density. With higher road densities, the required width of the transport facilities also increases locally and along the major roads. Increase in built up area demands bigger network of local and collector roads which ultimately demand wider roads of higher hierarchy.

6.1.7 Hierarchy of settlement

A proper hierarchy of settlement should be developed to segregate the commercial and business centres from settlement areas and industrial area. A hierarchy of the market centres should be developed as main market centre and local market centres. Promotion of bi-nuclear or multi-nuclear city is necessary for even development of the settlements within the municipality. These bring many services and facilities closer to the demand and reduce the need to travel to the main market centre.

6.1.8 Introduction of basic road and road side infrastructure

There is a need to redefine the term "road way" among the local people who perceive only paved road surface for motorized vehicles as proper road way. Although, the proportion of active transport users is very high, the road infrastructure necessary to support these users do not fit within the defined road by the locals. Such perception and construction of road infrastructure accordingly will lead to high rate of motorization which creates problem to manage the generated traffic, pollution and other externalities.

In the present context, with very high active users, proper networks of pedestrian way and cycle tracks should fit in the basic road width. It should be planned and implemented as basic road side infrastructure. Similarly, the landscaping of the road sections with proper greenbelt increases the greenery in the city, provides shade to the active users, segregate different users and a pleasant travelling environment for all the users.

Proper lay bys are necessary elements for proper public transport system. Bus stops should have proper sheltering furniture, seating benches, lighting system, trash boxes, information boards and displays of routes and schedule of buses and proper connected pedestrian ways and zebra crossings.

6.1.9 Urban road discipline

Obeying of proper discipline and enforcement of it is equally important as the provision of the urban road infrastructure itself. Proper discipline not only makes the use of the facility efficient; it also creates a sense of comfort and safety. Segregation of the pedestrian way and cycle track from the main carriageway enforces certain level of discipline among the users. Provision of proper NMT crossing facilities and control of jay walkers is necessary to maintain proper flow of traffic in the Main Street and safety.

6.1.10 Integrated service planning

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 investments in the individual infrastructure and the damage to other infrastructure during maintenance and/or expansion.

6.1.11 Development phase of roads

The proposed roads cannot be directly implemented at a glance. Proper phases of development of roads of all hierarchy should be envisaged and planned. The first phase is simply the formulation of necessary hierarchy and identification of road sections that serves/ can serve as different hierarchy roads. During this phase, bylaws as demanded by the formulated road hierarchy along the identified roads should be enforced. The next phase is to develop necessary policy and implementation plan for expansion and construction of the road. The phases of construction total road width should also be worked out as development of full road width as demanded by the respective road hierarchy may not be possible. As such, implementation of road hierarchy starts from roads in lowest hierarchy and stage wise expansion of the roads according to the demand and necessity of wider roads and facilities to the higher hierarchy roads.

6.1.12 Grass root institutions

The grass root institutions/committees should be empowered with the provision of local technicians in such institutions. Such institutions include consumers' groups, ward level committees, MRCC and others.

6.2 Prospective 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. Roads of Class "C" will also be widened to its functional width providing proper cycle tracks and pedestrian ways where permitted by the available road space. 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.

Year five to ten will then implement the higher hierarchy roads in stages of clearing of the required ROW road space and construction of necessary infrastructure. 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 then to Class "A"). Other implementation strategies should also be developed and finalized at the end of this period. The road network developed during this period shall complete construction of Class "C" roads. This will demand higher class roads to support the local road networks. 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.

6.3 Financial institution and capital investment plan

To determine how much of the proposed work can be carried out in the 5-year MTMP period, it is necessary to estimate the budget available in this period. This is done by estimating the amount of

money available from different sources based on the actual amounts of the current or last financial year, assuming certain growth rates for each funding source.

It is recommended that the planning section of municipality should incorporate funding source from different line agencies as well as NGOs, INGOs, people's contribution fund for proper management, infrastructure development and maintenance of road within the municipality.

6.4 Five-year budget expenditure

One of the final outcomes of this study is to provide annual budget expenditure for proposed intervention (new construction, upgrading, maintenance and rehabilitation).

For the allocation of yearly budget, the total cost required for twenty years is first calculated and this amount is distributed to twenty year assuming that budget spending capacity of municipality is expected to grow at the rate of 10% per year. Total budget required for the 5 years was found to be approximately 2.90 billion.

The estimate of budget required for the five years is prepared based on the assumption that the Class A road is to be made two lane, Class B road is to be made intermediate lane and Class C road is to be made single lane and lane considered are assumed to be metalled. Due to limitation of budget, the roads are assumed to have simple cross drainage structures within this period whereas cross drainage structures such as Bridges are not included in this budget and expected to be completed within this time period by external sources. For approximate costing, the construction rate of road appurtenances is assumed to be equal to that of gravelling cost and for short term the minimum width of 2 m is assumed if existing road width doesn't exist.

MTMP mainly deals with Class A, B and C roads, and it may find that Class D roads are not given any consideration. Interventions on those roads need to be incorporated in annual budget plan. Intervention that need can't be completed in predetermined 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 is 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.

Total budget is first broken down to 70% for road construction and 30% for maintenance. Of the total budget available for construction of roads, 90% are allocated for construction of class A, B, C roads and 10% are allocated for Class D roads. From the 90% of budget available for construction of class A, B and C, the proportion of budget for Class A, B, and C is 40%,30% and 20% respectively.

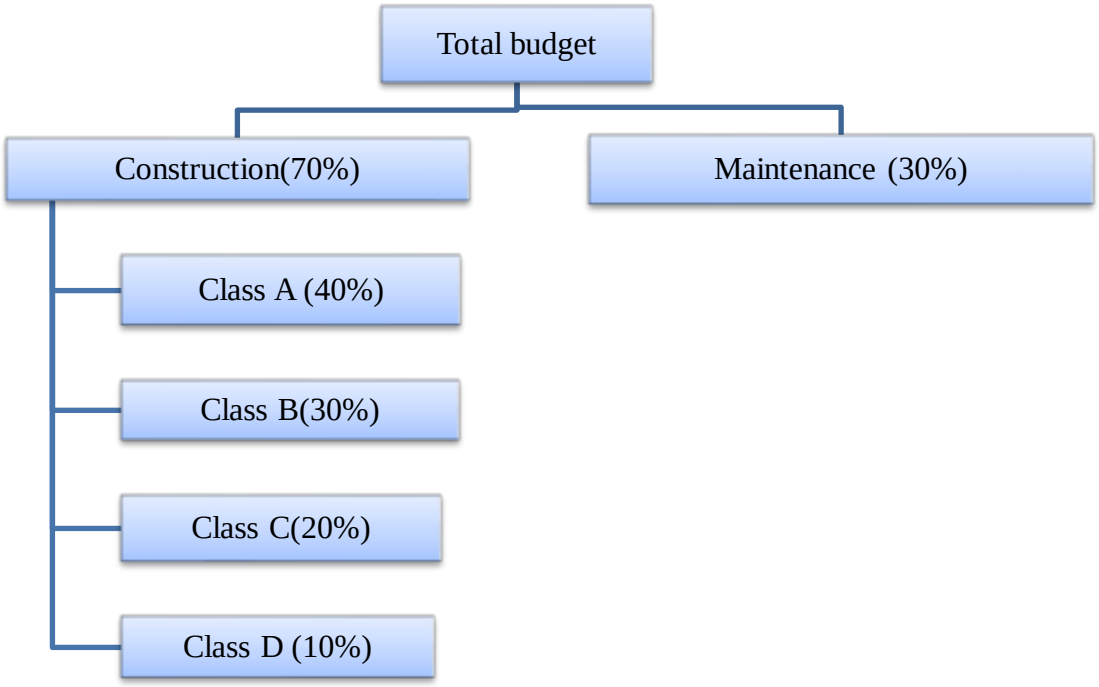

Figure 4: Budget Allocation

S. No.	Activities	Unit (Km)	Quantity	Rate	Cost
1	**Class A**				
1.1	New Construction	km	2.00	4000000	8,000,000.00
1.2	Periodic Maintenance (Blacktop)	km	38.23	200000	7,646,545.40
1.3	Rehabilitation	km	3.00	800000	2,400,000.00
1.4	Upgrading (Widening)	km	5.00	25000000	125,000,000.00
1.5	Emergency Maintence	km	7.65	30000	229,396.36
1.6	Routine Maintenance	km	11.47	20000	229,396.36
			Total Cost		**143,505,338.12**
2	**Class B**				
2.1	Periodic Maintenance	km	19.99	200000	3,998,835.40
2.2	Upgrading (Gravel to Blacktop)	km	3.30	5700000	18,813,163.50
2.3	Upgrading (Earthen to Gravel)	km	3.30	2200000	7,261,221.00
2.4	Emergency Maintence	km	4.00	30000	119,965.06
2.5	Routine Maintenance	km	6.00	20000	119,965.06
			Total Cost		**30,313,150.02**
3	**Class C**				
3.1	Periodic Maintenance	km	15.02	200000	3,003,296.60
3.2	Upgrading (Gravel to Blacktop)	km	2.30	5700000	13,124,956.80
			Total Cost		**16,128,253.40**
4	**Class D**				
4.1	Periodic Maintenance BT	km	153.00	200000	30,600,442.40
4.2	Upgrading (Earthen to Gravel)	km	42.82	2200000	94,195,411.20
4.3	Upgrading (Gravel to Blacktop)	km	68.50	5700000	390,471,363.60
4.4	widening	km	75.00	25000000	1,875,000,000.00
4.5	Lined Drain Construction	km	150.00	1000000	150,000,000.00
4.6	Track Opening	km	43.00	4000000	172,000,000.00
			Total Cost		**2,712,267,217.20**
	Grand Total Cost (A+B+C+D)				**2,902,213,958.75**

Table 12: Five Year Budget

6.5 Scoring Criteria and Priorities

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 and various interventions need to be taken based on the prioritization. After developing a municipal level road network, the cost estimate of the road is prepared and benefit of each link in the network is assessed. There might be various criteria of prioritization, which may differ from place to place The basic criteria that is used for prioritization includes existing population within the zone of influence, present road demand, future potential route, accessibility situation, land use pattern, proximity to the market/service centers, religious and tourism places, existing road width and surface type. These criteria are given various weightage and weightage average of all the criteria is summed up to come with a priority of intervention. All type of intervention is provided with same scoring criteria. The finalized scoring criterion based on rigorous study is set in front of municipality and MRCC for its approval.

Each road link is allocated the number of points corresponding to the fulfilment of the particular criteria. The weighted average of score that each intervention receives leads to a ranking/prioritization of the intervention options.

- **Demand priority of wards** indicates higher the priority order of the road by ward, higher the weightage the road gains.
- **Proposed road class:** higher the road class, higher number of people it serves and it should get more priority.
- **Total existing width:** the road with more width should get higher priority because it indicates the necessity of road and the people's dedication for wide roads.
- **Population served:** the main purpose of the road is to serve people and more a road serves for population it should be given high priority.
- **Road surface condition:** from the point of view of accessibility to mobility, more priority should be given to road of poor surface condition to upgrade to higher condition.
- **Road density:** it may be defined in two ways. In one way it is the length of road per unit area of the settlement and in another way, it indicates the length of road per 1000 population it serve.
- **Settlement density:** higher the settlement density, higher will be the road users and hence such area should be given more priority.
- **Service provided by the road such as Recreational(R), Agricultural (A), Market(M) and Service center(S) (RAMS):** if a road provides more service than another then this road should be given higher priority.

- **Access to poor and minor:** if a road serves for poor and marginalised people then it should be given higher priority.

6.6 Staging Implementation

Mid period review

In light of present context without proper land use and city development plans of the municipality, the formulated municipal transport plan for five years and long-term perspective plan cannot be complete. Comprehensive drainage plan and layout also guides the placement of cross drainage structures along the roads. Therefore, a mid period review is necessary. This review follows the formulation of comprehensive city development plan and land use plan. These plans will bolster the transport master plan and also suggest necessary deviations and revisions. The surveys conducted to prepare this MTMP are baseline survey for future planning. In reference to these surveys, the mid period review will track the changes and its effect on the formulated five-year plan and long-term perspective plan. Based on the recommendations of land use and city development plan, and the changes during the first two years in the road infrastructure and road traffic the mid period review will guide MTMP in the later stages.

The next MTMP will be prepared in the sixth year which will create a void in continuity of transport infrastructure development during the sixth year. The mid period year shall also formulate implementation and investment plan for that period which will be carried over the next MTMP.

Yearly maintenance plan

According to the yearly progress of transport infrastructure development and construction, yearly maintenance plan should be prepared. This maintenance plan addresses the recurrent maintenance, specific maintenance and emergency maintenance requirements of the municipal roads.

Stages of development of roads

Visualization of stages of development of roads is very important aspect of long-term municipality transport master plan (perspective plan). Current land use and road side development may not allow immediate implementation of wider roads. These restrictions should be addressed in various stages. The stages can be visualized in reference to various variables.

The prime stage is the formulation of policy and plans. This stage formulates the hierarchy and their geometric and physical characteristics, purpose and functions along with necessary ROW. With the formulation of road hierarchy, road bylaws will be enforced. It should be followed by formulation of proper implementation strategies for/and use of various tools for land acquisition and compensation, method and stages of construction of roads and road side infrastructures and enforcement of road discipline and right of users. Development of such policies will support continuous development of the roads. The next stage is to clear the total right of way so that other

infrastructures integrated with road can be developed. Until the end of clearing of proper right of way, the policies should be strong and well-informed. This will mark the entry to the next stage which is construction of full phase of all hierarchy roads.

Construction of higher hierarchy roads should be done in stages according to the necessity as guided by the developed lower hierarchy roads and corresponding demand of higher hierarchy roads they generate. The first stage should connect the pedestrian path and cycle tracks along with double lane carriageway for all higher hierarchy roads. The development of Class "A" roads should follow construction of road space to the standard of Class "C" then gradually expanding to Class "B" and finally to Class "A". Class "B" roads should also follow the same development stages. Construction of well-connected pedestrian way, cycle tracks and green belt along the edges of the ROW restricts any possible encroachment of the road space..

CHAPTER VII: CONCLUSION AND RECOMMENDATION

Municipality Transport Master Plan has been prepared for Siddharthanagar 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 has been prepared. Detail implementation strategy and budget expenditure plans have been prepared. The inventory shows that majority of roads are narrow and needs maintenance and upgrading. This is in line with the demand by the wards. The accessibility of roads has addressed most of the settlements but their mobility is very low. Access to facilities is hindered due to lack of reliable and safe public transport services within the municipality. Introduction of proper city buses and public transport is pertinent to fuel the development process at earliest.

The study has formulated hierarchy of roads which is necessary for long term rapid development of the municipality area. The report presents the necessary functions of the roads and their characteristics. Possible cross sections are also recommended. The study has shown high proportion of active road users which have been addressed thorough provision of pedestrian facilities and bicycle tracks is all roads except access roads. This is necessary to be implemented as the developed cities are having trouble to address the demand of active mode user friendly urban road infrastructures, Siddharthanagar Municipality has the opportunity to sustain the road users and create a sustainable and well-planned urban road network and infrastructure. 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.

This study, being first of its type for this municipality, should be revised and integrated with other plans that will be developed in coming years. Periodic review and update of the plans is necessary according to the change in land use and traffic that occurs in the future. A mid period review in the third year and five yearly MTMP should be prepared every five years.

Glossary

Active transport user	Active transport (also called non-motorized transport, NMT and human powered transport) refers to walking, cycling, and variants such as wheelchair, scooter and handcart use. It includes both utilitarian and recreational travel activity, plus stationary uses of pedestrian environments such as standing on sidewalks and sitting at bus stops
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	Collector 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.
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
Forecasting	The process of determining the future values of land use, socioeconomic, and trip making variables within the study area.
Local road	Local 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
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 documents 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.
Periodic maintenance	Maintenance works to be carried out in intervals of years and of large-scale
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
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.
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

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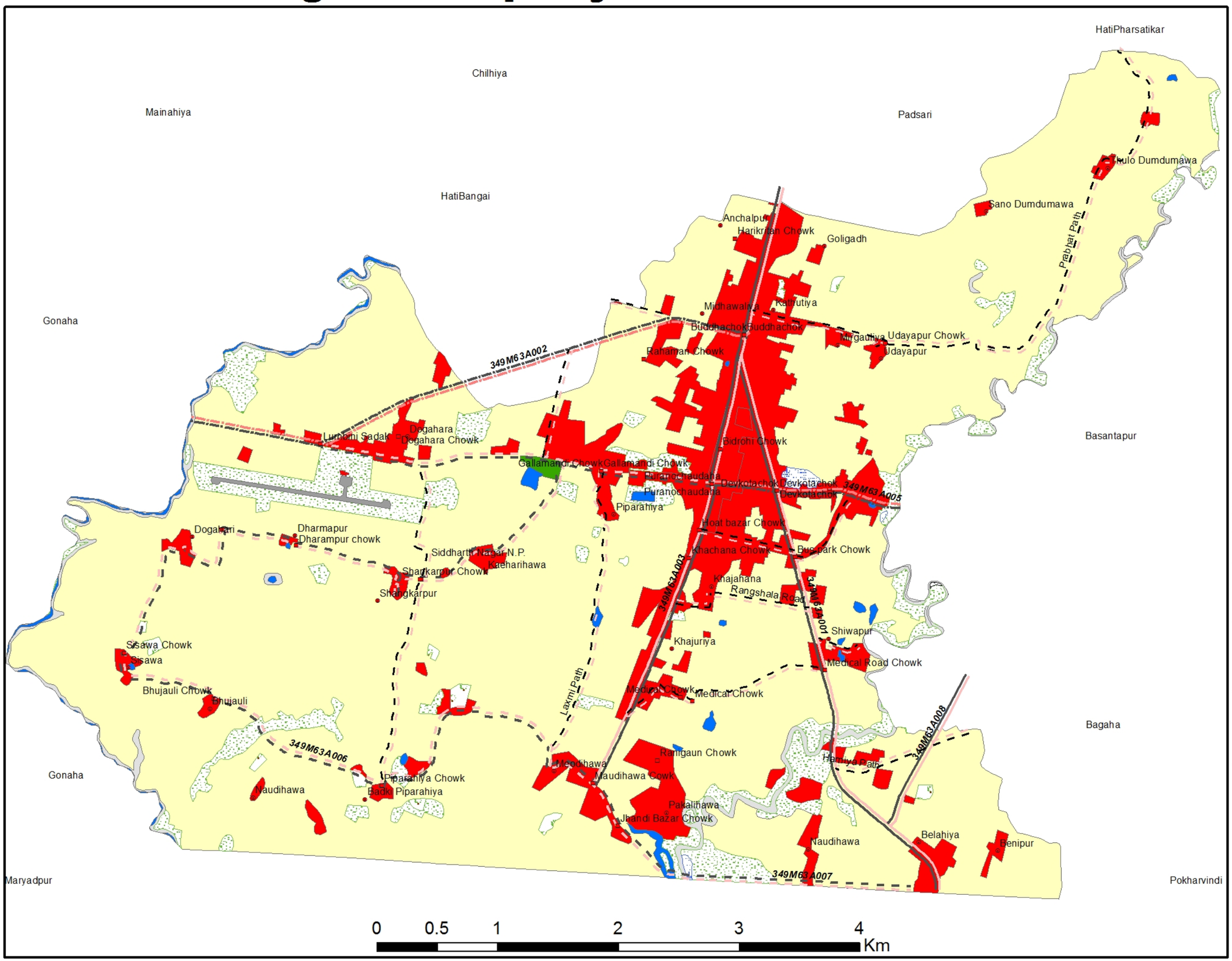
–Law, Siddharthanagar Municipality

Annex

Siddarthanagar Municipality Road class A and B



Legend

- Settlement
- Name of Chowk
- Road Class B
- AIRPORT
- BUILT-UP AREA
- BUSH/SHRUB LAND
- CULTIVATED LAND
- FOREST LAND
- ORCHARD/NURSERY
- PONDS LAKES
- ROCK/CLIFF
- SANDY AREA
- SWAMP
- WATER BODIES
- Catchment Area

HORIZONTAL DATUM

Spheroid: Everest 1830
Projection: Modified Universal Transverse Mercator
False Easting: 500000.00000000
False Northing: 0.00000000
Central Meridian: 84.00000000
Scale Factor: 0.99990000
Latitude of Origin: 0.00000000

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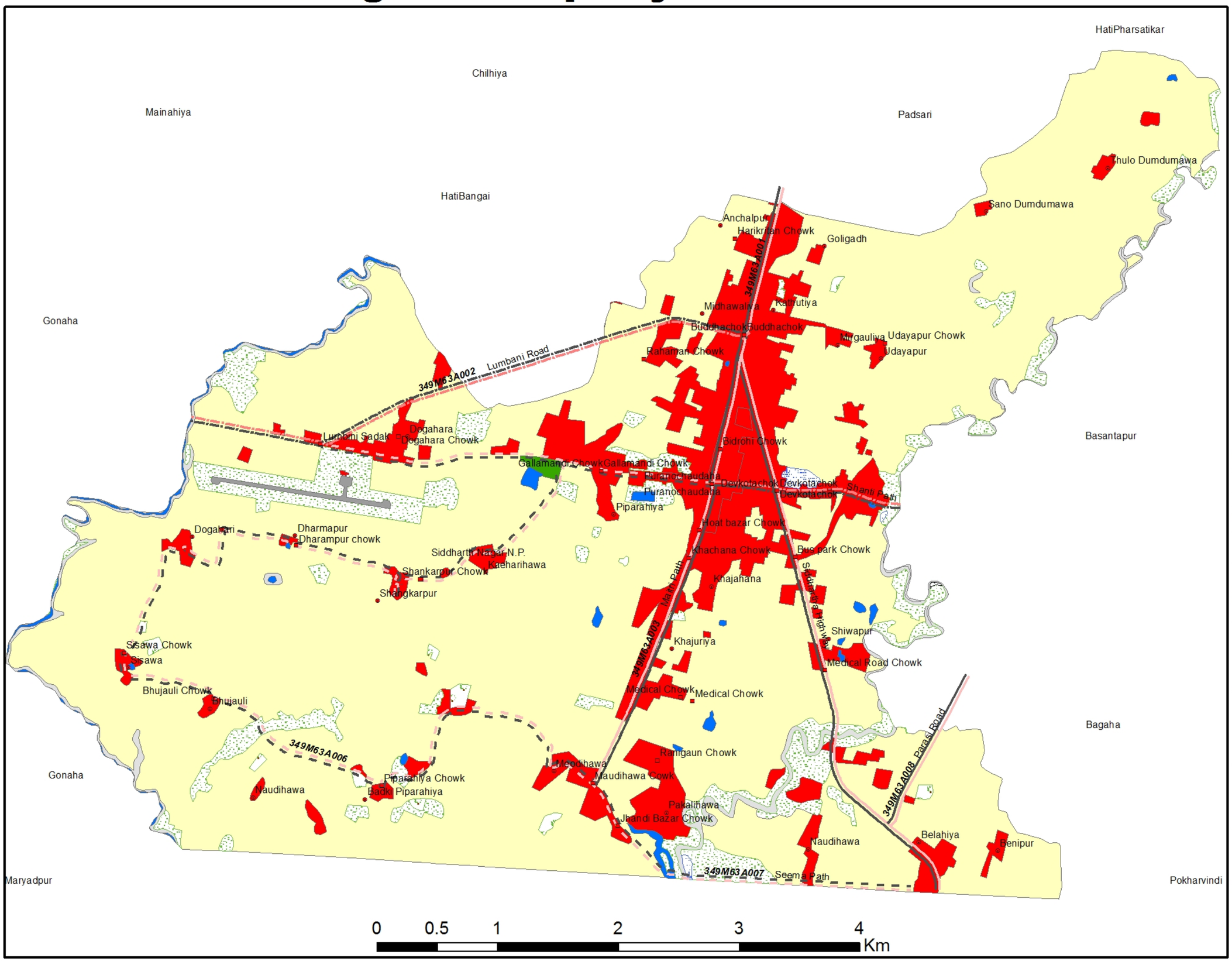
Siddarthanagar Municipality Road class A



Legend

- Settlement
- Name of Chowk
- Needs No Intervention
- Needs Rehabilitation
- Periodic Maintenance
- AIRPORT
- BUILT-UP AREA
- BUSH/SHRUB LAND
- CULTIVATED LAND
- FOREST LAND
- ORCHARD/NURSERY
- PONDS LAKES
- ROCK/CLIFF
- SANDY AREA
- SWAMP
- WATER BODIES
- Catchment Area

HORIZONTAL DATUM

Spheroid: Everest 1830
Projection: Modified Universal Transverse Mercator
False Easting: 500000.00000000
False Northing: 0.00000000
Central Meridian: 84.00000000
Scale Factor: 0.99990000
Latitude of Origin: 0.00000000

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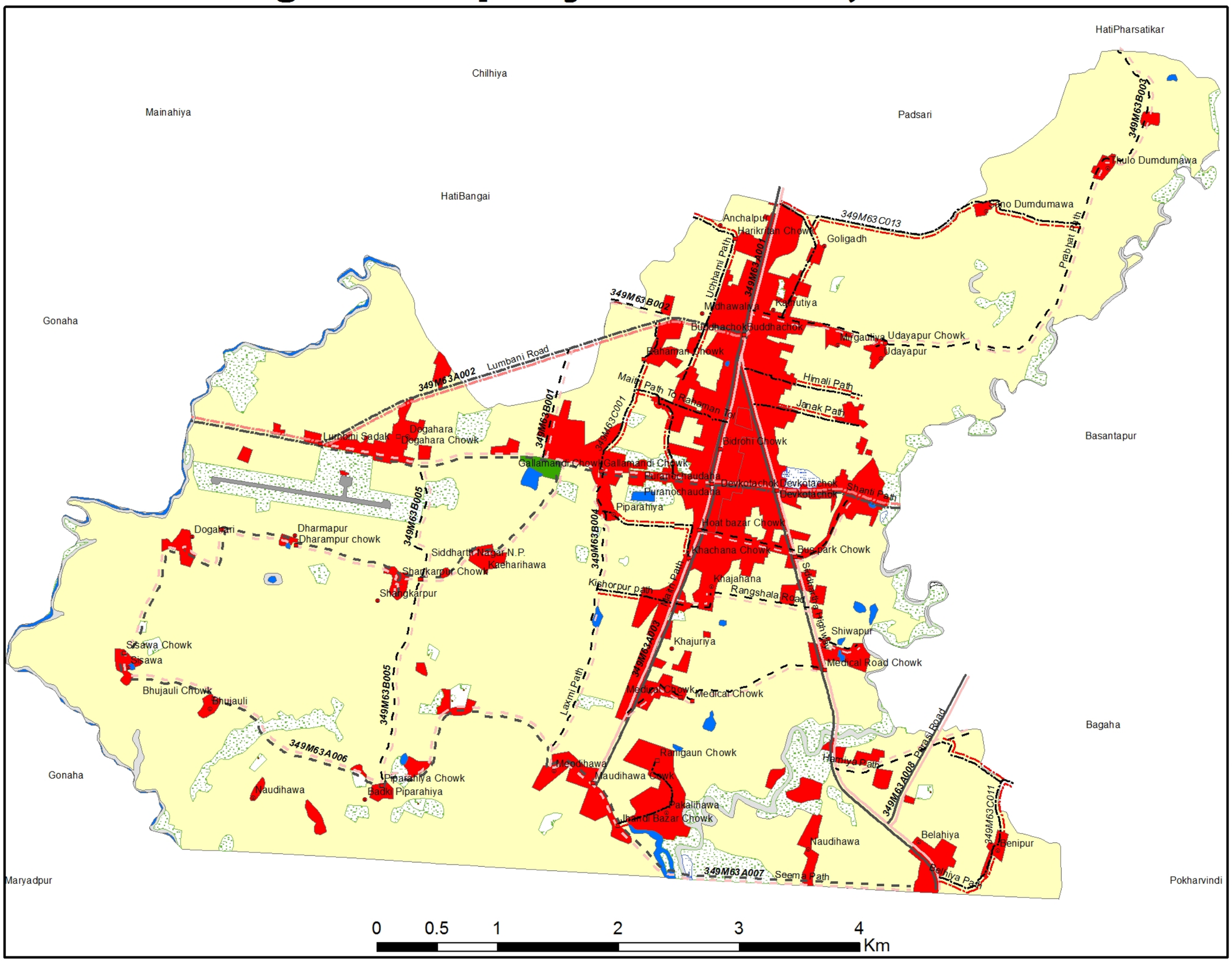
Siddarthanagar Municipality Road class A,B and C



Legend

- Settlement
- Name of Chowk
- Road Class C
- Road Class B
- Needs No Intervention
- Needs Rehabilitation
- Periodic Maintenance
- AIRPORT
- BUILT-UP AREA
- BUSH/SHRUB LAND
- CULTIVATED LAND
- FOREST LAND
- ORCHARD/NURSERY
- PONDS LAKES
- ROCK/CLIFF
- SANDY AREA
- SWAMP
- WATER BODIES
- Catchment Area

HORIZONTAL DATUM

Spheroid: Everest 1830
Projection: Modified Universal Transverse Mercator
False Easting: 500000.00000000
False Northing: 0.00000000
Central Meridian: 84.00000000
Scale Factor: 0.99990000
Latitude of Origin: 0.00000000

PREPARED BY:
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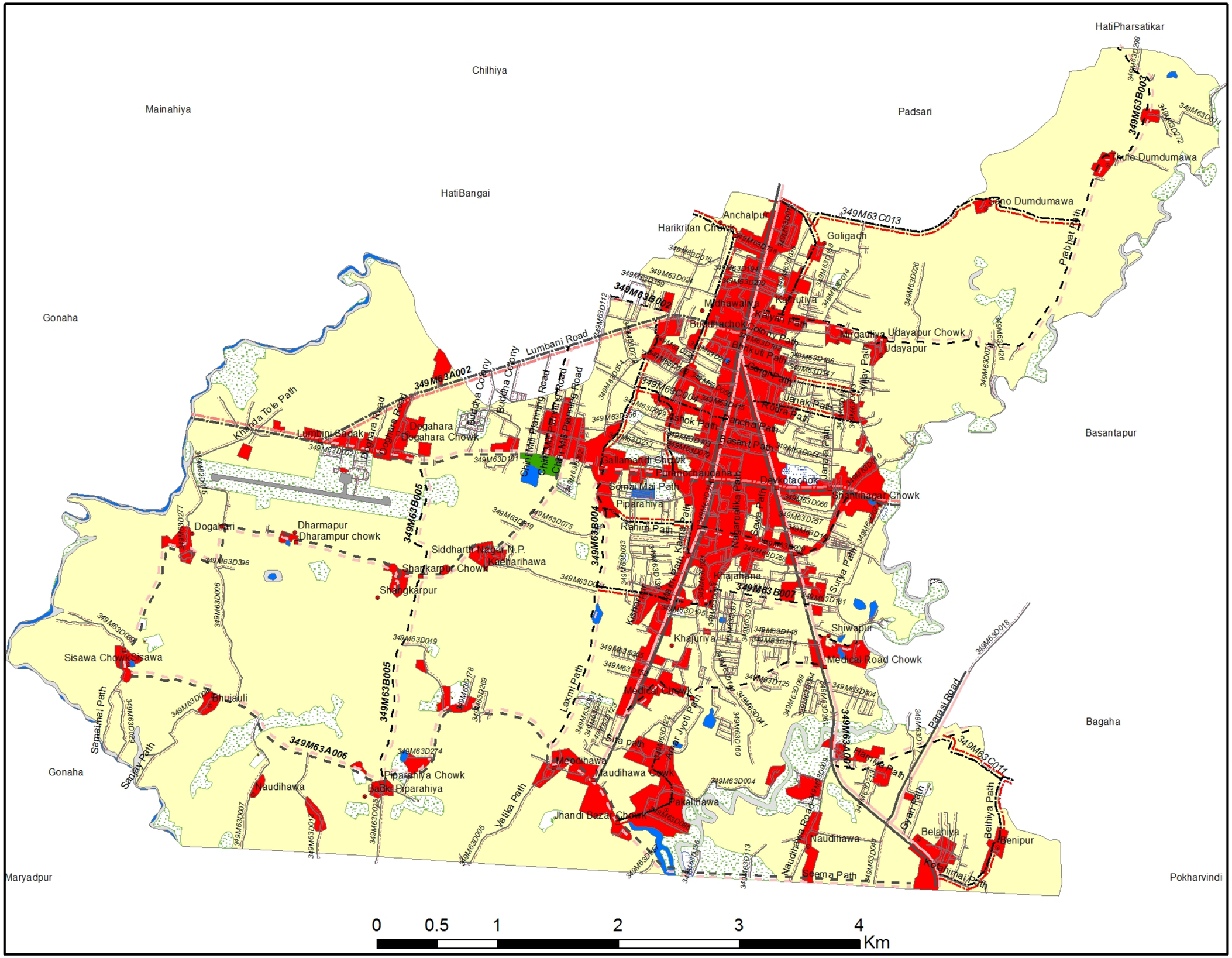
Siddarthanagar Municipality Road class A,B,C and D



Legend

- Settlement
- Name of Chowk
- Road Class D
- Road Class C
- Road Class B
- Needs No Intervention
- Needs Rehabilitation
- Periodic Maintenance
- AIRPORT
- BUILT-UP AREA
- BUSH/SHRUB LAND
- CULTIVATED LAND
- FOREST LAND
- ORCHARD/NURSERY
- PONDS LAKES
- ROCK/CLIFF
- SANDY AREA
- SWAMP
- WATER BODIES
- Catchment Area

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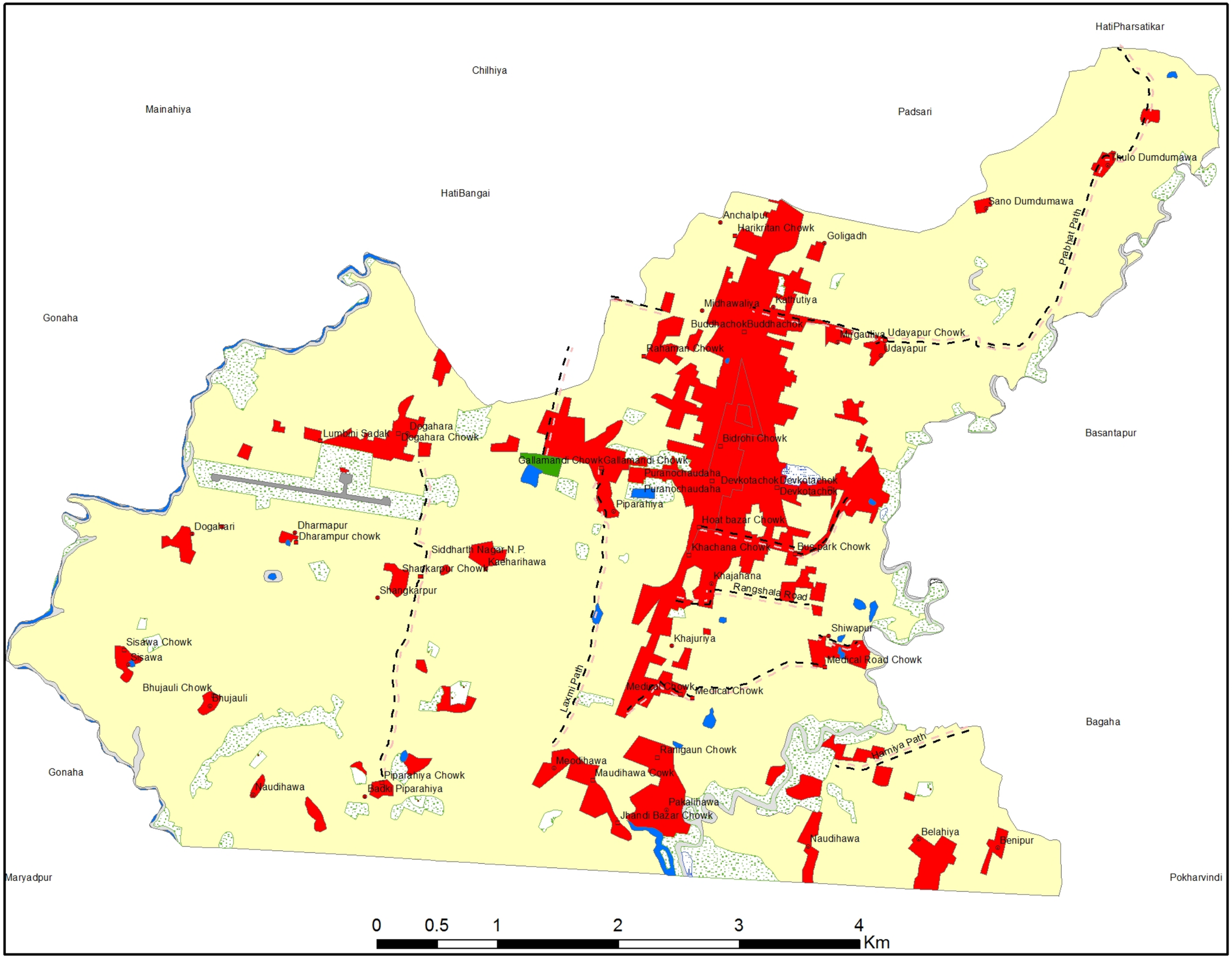
Siddarthanagar Municipality Road class B



Legend

- Settlement
- Name of Chowk
- Road Class B
- AIRPORT
- BUILT-UP AREA
- BUSH/SHRUB LAND
- CULTIVATED LAND
- FOREST LAND
- ORCHARD/NURSERY
- PONDS LAKES
- ROCK/CLIFF
- SANDY AREA
- SWAMP
- WATER BODIES
- Catchment Area

HORIZONTAL DATUM

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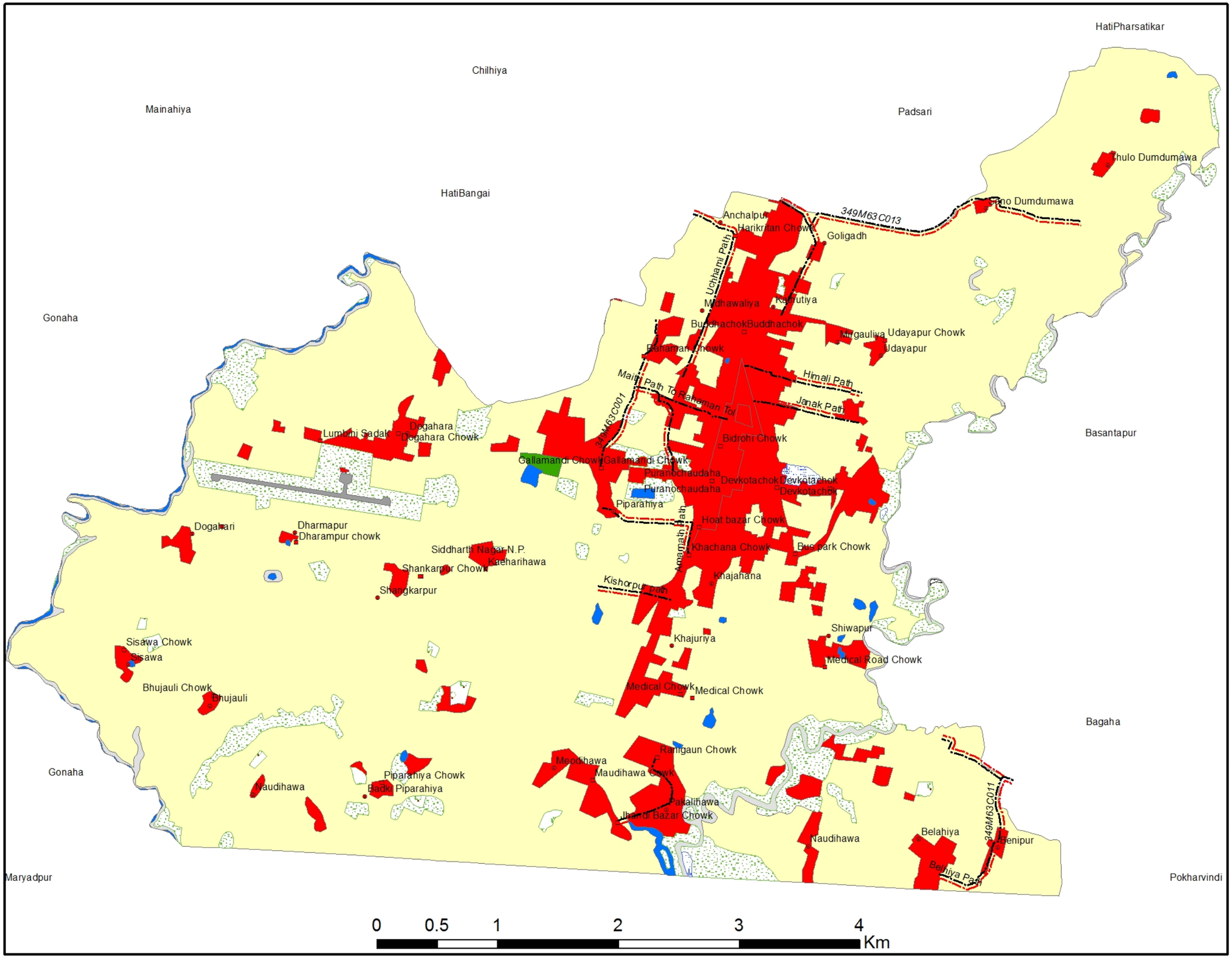
Siddarthanagar Municipality Road class C



Legend

- Settlement
- Name of Chowk
- Road_ClassC
- Road_ClassC
- AIRPORT
- BUILT-UP AREA
- BUSH/SHRUB LAND
- CULTIVATED LAND
- FOREST LAND
- ORCHARD/NURSERY
- PONDS LAKES
- ROCK/CLIFF
- SANDY AREA
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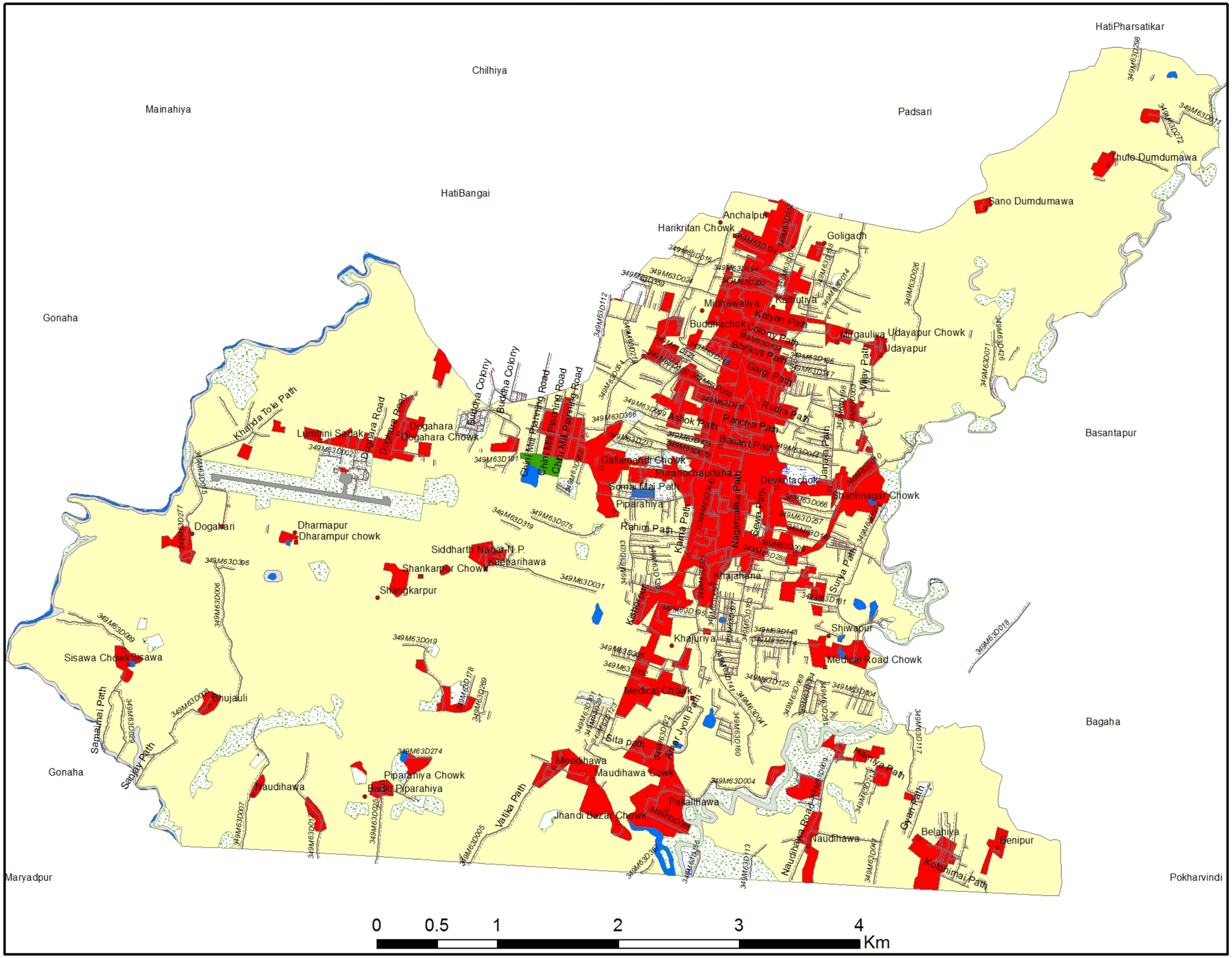
Siddarthanagar Municipality Road class D



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