



THE ASSAM GAZETTE

অসাধাৰণ

EXTRAORDINARY

প্ৰাপ্ত কৰ্তৃত্বৰ দ্বাৰা প্ৰকাশিত

PUBLISHED BY THE AUTHORITY

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No. 489 Dispur, Tuesday, 8th July, 2025, 17th Ashadha, 1947 (S. E.)

GOVERNMENT OF ASSAM

ORDERS BY THE GOVERNOR

DEPARTMENT OF HOUSING AND URBAN AFFAIRS

NOTIFICATION

The 16th September, 2024

DoHUA Ecf. No. 399812 / 2024 / 14 .- In exercise of the powers conferred by the section 9 and sub-section (1) of section 10 of the Assam Town & Country Planning Act, 1959 (as amended) and (Assam Act II of 1960) read with sub-rule (1) of Rules 3 of the Assam Town & Country Planning (Publication of Master Plan and Zoning Regulations) Rules 1962, the Governor of Assam is pleased to publish the following notice regarding the publication of the Draft Master Plan for Sarthebari.

Notice for publication of the Draft Master Plan for Sarthebari

1. It is notified that the Draft Master Plan for Sarthebari prepared by the Directorate of Town & Country Planning, Government of Assam, under section 9 of Town & Country Planning Act, 1959 (as amended) read with sub-section 1 of section 10 of Assam Town & Country Planning Act, 1959 (as amended) for the area described in the schedule below is hereby published.
2. Any person or persons affected by the Draft Master Plan may submit their objections or opinions in writing to the Director, Town & Country Planning, Government of Assam, Dispur, Guwahati-6 within two months from the date of publication.
3. The Draft Master Plan for Sarthebari with all relevant papers and maps may be inspected free of cost during the office hours at the office of Director, Town & Country Planning, Dispur, Guwahati-6, the Deputy Director, Town & Country Planning, Dist Office –Barpeta, office of the Chairman, Sarthebari Municipal Board, Sarthebari Revenue Circle office. Copies of the Draft Master Plan for Sarthebari are available at the office of the Deputy Director, Town & Country Planning, Dist Office – Barpeta for sale on payment.

SCHEDULE

1) Situation and Area:

District : Barpeta
Sub-Division : Sarthebari
Area covered by Master Plan : 47.21 Sq.km
Sarthebari Municipal Area : 2.93 sq.km

2) Villages included In the Draft Master Plan for Sarthebari :

Sl. No.	Mouza	Village
1	Sarukhetri	Haladi Bari, Karakuchi, BelbariPathar, DewanKhctri, Narnshala, Bar Amrikhow4 Bar Kapala, Belbari Gaon, Bar Gomur4 Sarthebari (Block-1,2,3,4), Patl4 Hariadi, KaldiPathar, Kamarpara, KhudraAmrikhowa, KhudraGomura, Lachima, Nakuchi, Na-Satra, BarshalabilarPathar
2	Paka	Pakadalani. Fulbari, Zabrikuchi, Na-Satra, BamunPakaSatraPaka, KaltoliPathar

3) Description of Sarthebari Master Plan Boundaries:

North : Khoria Gaon, Kharia, Batia, Parakuchi Gaon, Lakhapur
South : BhakuaTepa, PachimAladi, PurbaAladi, Kamla Bari, Chengdi
East : Barhelsa, BaliparaPathar, BatiparaPaam, Chinadi
West : NewlarBhitha, Kurihar Pam, Rawly

KAVITHA PADMANABHAN,
 Commissioner & Secretary to the Government of Assam,
 Department of Housing and Urban Affairs,
 Dispur, Guwahati-6.

1. INTRODUCTION TO MASTER PLAN AREA

1.1 INTRODUCTION

Sarthebari, a place famous for its bell metal industry since ancient times is located in the eastern most corner of Barpeta district. It was declared a town in 1955 and it encompasses 4 wards. Tourists, international and domestic, flock to Sarthebari to explore its traditional bell metal industry and carry back home, souvenirs like Bota, Thals, Ban-Bati, etc. Bell metal industry is also the commercial identity of Sarthebari with its products sold widely, not only in the state but throughout the country.

Figure 1: Barpeta District Map



1.1.1 Location

Sarthebari is located in the Brahmaputra plains. It has a plain topography with an elevation of 46 m. It is located to the north of the mighty Brahmaputra River.

1.1.2 Regional Setting

Sarthebari is primarily connected to the outer world by road network. It is about 75 kilometres from Guwahati via Hajo, and 26 kilometres from the district administrative headquarters, Barpeta town. The state highway 9A connects it to Pathsala town.

1.1.3 Brief History of the Town

Sarthebari has carved out a niche as a centre of bell metal industry, which is the second largest handicraft sector after bamboo industry. Historical records reveal that during the reign of Kumar Bhaskarvarman of the Varman Dynasty, Harshavardhana of Kannauj was gifted drinking vessels by the former. Hiuan Tsang- a Chinese Buddhist pilgrim visiting his court was gifted a pair of 'Bhortal' or cymbal, a musical

instrument. Scholars believe that it was during the period of Ahoms that the industry got highlighted in a major way. During this time, everyone ranging from kings to nobles to subjects got accustomed to the use of utensils made from bell metal.

The traditional way of making bell metal utensils in Sarthebari has survived ages. There has hardly been changes in the method of making bell metal items through time. The craftsmen locally referred to as Kahar or Orja still resort to age old tools required for burning and shaping metal. One can still hear the sound of hammering metal at furnace from almost all households as one strolls through the villages of Sarthebari.

In the Assamese society, the bell metal utensils occupy a position of pride and respect. It is important to the economy of the state and to the social and spiritual life of the people. The common items made by the artisans in Sarthebari are Kalah, Sarai, Bati, Lota, Kahi and Tal. However, with the rising cost of raw materials, artisans are finding it economically difficult to continue the industry.

Figure 2: Bell Metal Industry of Sarthebari



1.2 PHYSICAL ENVIRONMENTAL CONDITION

1.2.1 Climate

Sarthebari Master Plan area experiences humid sub-tropical climate with heavy rainfall and hot summer. The summers extend from May to August with an average temperature of 29°C. During summers temperature sometimes go as high up as 39-degree C. The monsoon starts from April and lasts up to August. The relative humidity varies from 74% to 85% during the monsoon period. Average annual rainfall is around 1900 mm with maximum rainfall during august. Winters are cold and dry and extends from October to February with an average temperature of 16-degree C.

1.2.2 Physiography

Sarthebari Master Plan Area lies on the northern bank of Brahmaputra. It lies between the highlands of Bhutan mountains in the north and the Brahmaputra river in the south.

1.2.3 Soil Condition

Almost the entire Barpeta district is occupied by an alluvial deposit with flat topography and there is a very gentle slope towards the Brahmaputra River, which makes the southern boundary of the district. Sarthebari Master Plan area has soil cover of younger and older alluvial soil which has undergone diversified pedagogical changes. The soils are characterised by medium to high organic carbon and low to medium phosphorous and potash contents. The alluvial soils are light yellow to light grey in colour of Recent age. The texture of the soil ranges from sandy loam to silty loam in nature.

1.3 MASTER PLAN: DEFINITION AND FORMULATION

Most of the urban settlements, especially smaller urban settlements, are characterized by haphazard and unplanned growth, non-conforming land uses, mushrooming unauthorized colonies, and land conversion from agriculture to urban resulting in environmental degradation and poor quality of life.

Master Plan/Development Plan is the major tool for urban land management, providing detailed land-use allocation for the sustainable development of city/town. Most master/development plans are made for 20–25 year periods, in phases of five years for periodic review and revision. A master plan is prepared either for improvement of an old city or for a new town to be developed on a virgin soil.

The purpose of the master plan is to set down as clearly and practically as possible the best and most appropriate future development of the town. For physical planning to be successful, it must develop a consensus on sound principles while balancing the visionary with the realistic. Formulation of master plans start with base map preparation, existing land use surveys and collection of socio-economic data necessary for reviewing the existing situation and proposing the future land use plan. With the advances in remote sensing and geographic information system, the plan making process can be expedited with integration of both spatial and attribute data, which enables detailed assessment of spatial growth of towns/cities, land use status, physical infrastructure facilities, etc. in anticipation of the projected population growth.

1.4 NEED OF MASTER PLAN

A master plan is a blueprint for the future. It will help the society-

- To control the development of various industries in a systematic way.
- To define public, semiprivate, and private spaces and public amenities
- To discourage the growth of town in an unplanned and unscientific way.
- To give a perspective picture of a fully developed town.
- To limit to a certain extent the unprecedented flow of rural population to the urban area.
- To offset the evils which have come up due to over-crowding of population such as acute shortage of houses, traffic congestion, inadequate open spaces and insufficiency in public amenities; etc

1.5 PROJECT OBJECTIVES AND ITS VISION

The broad objective of this project is to prepare a Master Plan Report for Sarthebari Town. Report is the final output of the research.

Vision being a cherished dream, to achieve this vision it is necessary to break it into a number of goals and subsequently to objectives.

- Identifying existing gaps in physical and social infrastructure & to bridge those gaps
- By proper policy planning and strict adherence of the land use zoning and building byelaws.
- By submerging the planning with combing funds from the state as well as the centrally sponsored schemes
- Ensuring systematic, balanced & integrated development.
- Prioritizing Environmental Sustainability
- Facilitating Economic Development
- Enhancing Heritage, Culture & Public Life
- Improving Housing and Social Infrastructure
- Developing Resilient Physical infrastructure

1.6 SCOPE OF WORK

- To identify the gaps/ incongruities between the actual land use and the Master Plan proposals.
- To assess current situations, prospects, priorities and proposals for development.
- To identify the systematic and methodological deficiencies in implementation and preparation of Master Plan.

2. DEMOGRAPHY

2.1 INTRODUCTION

Sarthebari Master Plan Area is located in the eastern part of Barpeta district and it covers an area of 47.21 sq km. It includes the urban area under Sarthebari Municipal town extending up to 4 wards and covering an area of 2.93 sq. km. The demographic statistics in this chapter have been computed for Sarthebari Master Plan Area as a whole as well area under Sarthebari Municipal Board individually.

2.1.1 Demographic Profile

2.1.1.1 Population

As per the Census of 2011, the total population of Sarthebari Master Plan Area is 34,696. In 2001, the population was 32,043, implying a decadal growth rate of 8.28%. Sarthebari Municipal Board area which is the only urban area in this Master Plan has a population of 6,913 spread over its 4 wards as per the Census 2011. The town has been consistently witnessing a decline in its population over the past decades. In 2001, the census reports its population to be 7,628 indicating that in 2011, the decadal population growth rate was -9.37%.

2.1.1.2 Population Growth

The table below shows the population trend of the Sarthebari Master Plan Area from 1991 to 2011:

Table 2-1: Population and Population Growth, 1991-2011, Sarthebari

Year	Sarthebari Municipal Area		Sarthebari Master Plan Area Excluding the Municipal area		Sarthebari Master Plan Area	
	Population	%variation	Population	%variation	Population	%variation
1991	7707		21342		29049	
2001	7628	-1.03	24415	14.40	32043	10.31
2011	6913	-9.37	27783	13.79	34696	8.28

Source: Census '91, '01, '11

The table indicates that although Sarthebari Master Plan Area has been witnessing a growth in its population, the rate of its growth has been declining. Sarthebari town, on the other hand, has undergone a negative decadal growth rate implying a fall in its population from 7707 in 1991 to 7628 in 2002 and to 6913 in 2011.

2.1.1.3 Population Trend

The following table shows the population distribution in Sarthebari Master Plan Area according to Census 2011:

Table 2-2: Ward-wise Population of Sarthebari town, Census 2011

Sl. No.	Name of Ward	No. of Households	Population
1	Ward No 1	266	1212
2	Ward No 2	303	1438
3	Ward No 3	322	1506
4	Ward No 4	5 89	2757

	Total	1480	6913
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Source: District Census Handbook, 2011

The table above shows that **Ward No 4** has the highest population amongst all the wards, i.e. 2757. The rest of the wards have almost uniform distribution of population, with **Ward No 1** having relatively less population i.e. 1212.

The table below shows the population size of the 25 revenue villages included in the Sarthebari Master Plan area excluding the municipal area. Khudra Amrikhowa has the highest population of 4081 and Hariadi has the lowest population of only 8 persons and 2 households.

Table 2-3: Population of Revenue Villages included in the Sarthebari Master Plan Area

Sl. No	Village	No of Households	Total Population
1	Satra Paka	88	441
2	Jabrikuchi	42	236
3	Bamenpaka	130	676
4	Phulbari	632	3205
5	Nastra	60	272
6	Pakadoloni	9	38
7	Kalatoli Pathar	147	605
8	Balbari Pathar	283	1341
9	Belbari Gaon	410	2020
10	Kamar Para	251	1147
11	Lachima	456	2043
12	Haladi Bari	486	2230
13	Barkapala	210	928
14	Kaldi Pathar	72	407
15	Na Kuchi	42	195
16	Khudra Amrikhowa	879	4081
17	Bar Amrikhowa	386	1806
18	Barshala Belar Pathar	56	224
19	Namshala	432	1870
20	Khudra Gomura	295	1369
21	Bar Gomura	70	274
22	Hariadi	2	8
23	Karakuchi	300	1322
24	Palla	199	880
25	Dewan Khetri	37	165
	Total	5974	27783

Source: District Census Handbook, 2011

2.1.1.4 Population and Area Distribution

The following table shows the population in person per hectare:

Table 2-4: Population and Area Distribution, Sarthebari MP Area

Category	Master Plan Area	Municipality Area
Area (HA)	4721	293
Total Population	34696	6913
Number of Wards	-	10
Density (ppha)	7.35	23.59

Source: District Census Handbook, 2011 and Sarthebari Municipal Board

2.1.1.5 Sex Ratio

As is evident from the table below, Sarthebari Master Plan Area has witnessed tremendous improvement in its Sex Ratio from 943 females per 1000 males in 2001 to 981 females per 1000 males in 2011. The urban area under Sarthebari municipality has also made remarkable leap in this social indicator from 929 females per 1000 males in 2001 to 1008 females per 1000 males in 2011. The efforts directed towards improvement of gender equality should be carried on efficiently to ensure holistic development of the Sarthebari Master Plan Area.

The following table depicts the sex ratio of Sarthebari Master Plan area from 2001 to 2011:

Table 2-5: Sex Ratio, Sarthebari MP Area

Year	Sarthebari Municipal Board Area	Sarthebari Master Plan Area excluding the municipal area	Sarthebari Master Plan Area
2001	929	947	943
2011	1008	974	981

Source: District Census Handbook, 2001, 2011

2.1.1.6 Child Population

From the table below, it can be inferred that as per Census 2011, out of a population size of 6913 in Sarthebari Municipal Area, 541 belongs to age group of 0-6 which comes to around 7.82%. In the Sarthebari Master Plan Area excluding the Municipal Area, 3059 individuals belong to age group of 0-6 out of a total population size of 27783 constituting around 11.01%.

Table 2-6: Child Population, Sarthebari MP Area

Age Group		Male Population	Female Population	Total
0-6	Master Plan Area (Excluding Municipality)	1543	1516	3059
	Municipality	258	283	541
Total Population		1705	1801	1799

Source: District Census Handbook, 2011

2.1.1.7 Age- Sex Composition

The following table shows the age-sex composition of Sarthebari MP area.

Table 2-7: Age-Sex Composition, Sarthebari MP Area

Age Group	Sarthebari Municipal Area			Sarthebari Master Plan area Excluding Municipal Area		
	Male Population	Female Population	Total Population	Male Population	Female Population	Total Population
0-6	258	283	541	1543	1516	3059
7-60+	3184	3188	6372	12529	12195	24724
Total	3442	3471	6913	14072	13711	27783

Source: District Census Handbook, 2011

2.1.1.8 Literacy Rate:

The table below shows the literacy rate of Sarthebari. In the Sarthebari Municipal Area, the total literacy rate is 91.79%. The male and female literacy rate here is 96.39% and 87.20% respectively. Although, the literacy rate in Sarthebari Municipal Area is decent, there prevails a significant disparity between the male and the female literacy rate which needs be addressed to ensure all-round development of the area. In the Sarthebari Master Plan Area excluding the Municipal Area, the total literacy rate is 82.92% out of which male literacy rate is 87.97% and female literacy rate is 77.74%.

Table 2-8: Literacy Rate, Sarthebari MP Area

	Sarthebari Municipal Area	Sarthebari Master Plan area excluding the municipal area	Total Sarthebari Master Plan Area
Male Literacy	3069 (96.39%)	11022 (87.97%)	14091 (89.68%)
Female Literacy	2780 (87.20%)	9480 (77.74%)	12260 (79.70%)
Total Literacy	5849 (91.79%)	20502 (82.92%)	26351 (84.74%)

Source: District Census Handbook, 2011

2.1.1.9 SC-ST Population

The following table shows the SC-ST Population in Sarthebari MP area.

Table 2-9: SC-ST Population, Sarthebari MP Area

Year	Sarthebari Municipal Area				Sarthebari Master Plan Area excluding the Municipal Area			
	SC Pop n.	% of SC Popn	ST Popn.	% of ST Popn.	SC Popn.	% of SC Popn	ST Popn.	% of ST Popn.
2001	31	0.41%	1	0.013%	1085	4.44	488	1.99%
2011	55	0.80%	2	0.03%	1349	3.89	302	0.87%

Source: District Census Handbook, 2011

2.2 MIGRATION

Migration is the key force driving urbanisation. Urbanisation is the shift of population from rural areas to urban areas. It is the process by which towns and cities grow as more people come to live in it. It provides both opportunities and challenges to the urban centres. Migrants offer their skills at reasonable cost driving the growth of these centres. Challenges mostly appear in the area of their accommodation. The unskilled workers working at minimal wage find it difficult to land in a decent accommodation. Another challenge which the migrant workers especially the vendors create, is the haphazard and unorganized manner in which they conduct their vocation, often by the roadside, obstructing the free flow of traffic. They also do not practise sound waste disposal methods and litter here and there, creating an unsanitary environment.

In Sarthebari, migration takes place during the non-farming and non-harvesting seasons. The rural folks seek employment in sectors like hotels and restaurants. To ensure a holistic growth and development of Sarthebari, it is very important to thoughtfully manage the migrants. As of now, we do not have data regarding the migrant population of Sarthebari Town.

2.3 URBAN HOUSING

Traditionally, the people have been living in individual houses made up of bamboo and wood due to easy availability of the raw materials. Many of these buildings are not earthquake resistant. Further elaboration on *Housing* can be referred from Chapter 4.

2.3.1 Housing Density

The average household size of Sarthebari MP Area is 4.65 as per Census of 2011.

Table 2-10: Population and Household Size, Sarthebari Master Plan Area – 1991, 2001 & 2011

Town/ State/ Country	1991			2001			2011		
	Total Population	Number of Households	Household Size	Total Population	Number of Households	Household Size	Total Population	Number of Households	Household Size
Sarthebari Master Plan Area	29049	4362	6.65	31025	5373	5.77	34696	7454	4.65
Assam Urban Population	24,87,795	-	-	34,39,240	-	-	43,98,542	-	-
India Urban Population	21,32,83,817	3,99,37,922	5.3	2,81,61,19,689	5,58,32,570	5.12	37,71,05,760	7,88,65,937	4.78

Source: Compiled from Housing and Household Tables, Census of India, 1991 & 2001, * Provisional Population Totals 2011

As per Census 2011, Sarthebari Municipal Board has total administration over 1480 houses to which it supplies basic amenities. It is also authorized to build roads within Municipal Board limits and impose taxes on properties coming under its jurisdiction.

2.4 POPULATION PROJECTION

Population is the most important factor which is directly related to the various needs of the area. The prime objective of any Master Plan is to assess the present situation and project the future population for plan period, and accordingly calculate the requirements of both physical and social infrastructure in order to cater to the needs of such population. Therefore, population projection is the basic requirement for the projection of other needs of the area. From all these projections, the developmental plan of an area should be prepared which can fulfil the different needs of the people living therein.

a) **Sarthebari Master Plan Area:** To arrive at a conclusive projection figure, three methods of population projections have been used for the town as well as the whole MP Area. The methods used for projecting population are:

- i. Arithmetic Progression Method.
- ii. Geometric Progression Method.
- iii. Incremental Increase Method.

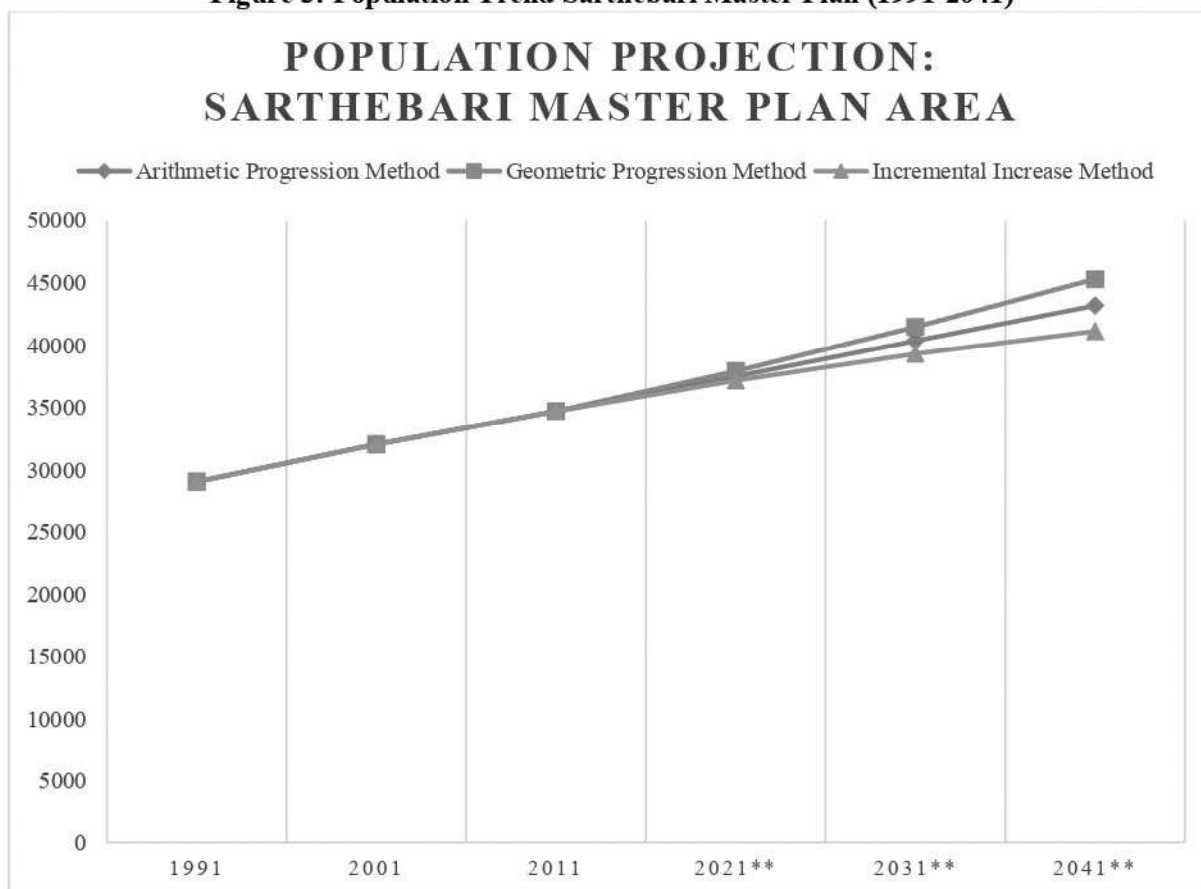
The table below shows the population projected for 2021, 2031 and 2041 using census date of 1991, 2001 and 2011

Table 2-11: Population estimates for Sarthebari Master Plan Area

Year	Arithmetic Progression Method	Geometric Progression Method	Incremental Increase Method
1991	29049	29049	29049
2001	32043	32043	32043
2011	34696	34696	34696
2021**	37520	37920	37179
2031**	40343	41444	39320
2041**	43167	45296	41121

** Calculated Values

Out of the 3 methods of population projection, the Geometric Progression Method exhibits the highest estimates of the population for the plan period up to 2041. If we take the average of the 3 methods, the population estimate for 2021 will be 37539, for 2031- it will be 40369 and for 2041- it will 43194.

Figure 3: Population Trend Sarthebari Master Plan (1991-2041)

b) **Sarthebari Municipal Board Area:** To arrive at a conclusive projection figure, three methods of population projections have been used for the town as well as the whole MP Area. The methods used for projecting population are:

- i. Arithmetic Progression Method.
- ii. Geometric Progression Method.
- iii. Incremental Increase Method.

The table below shows the population projected for 2021, 2031 and 2041 using census date of 1991, 2001 and 2011

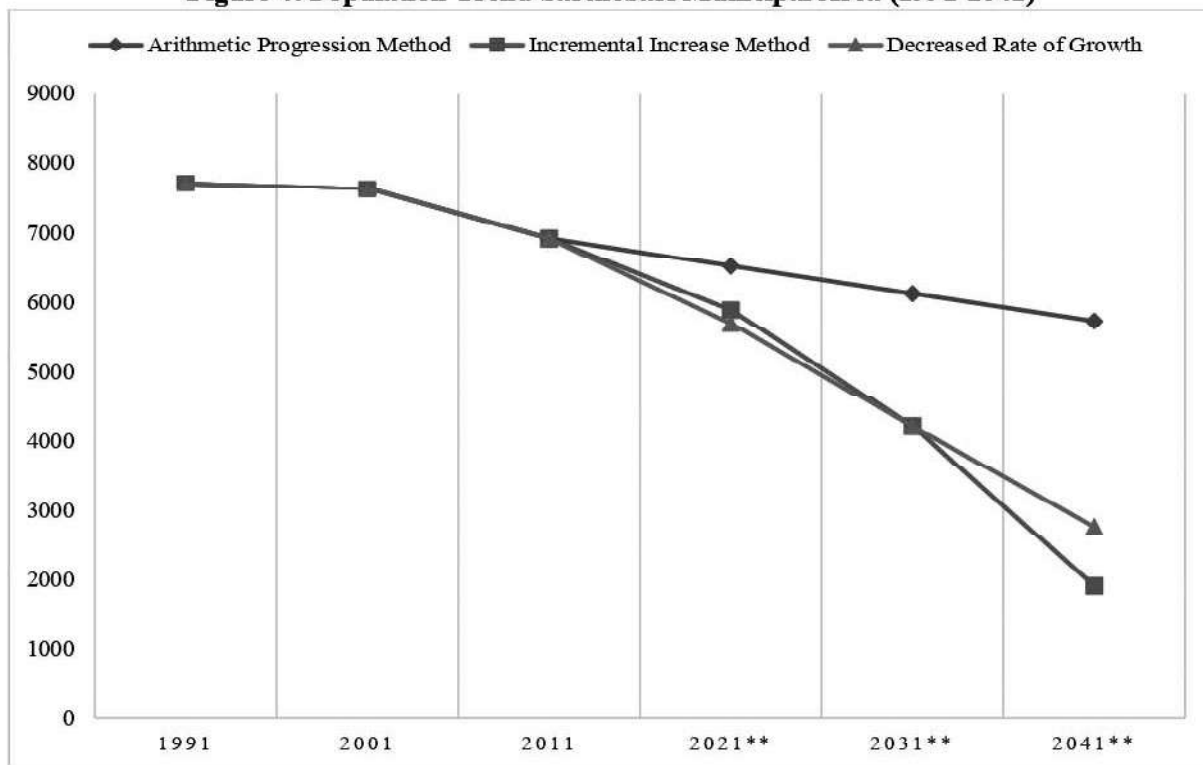
Table 2-12: Population estimates for Sarthebari Municipal Board Area

Year	Arithmetic Progression Method	Geometric Progression Method	Incremental Increase Method
1991	7707	7707	7707
2001	7628	7628	7628
2011	6913	6913	6913
2021**	6516	5880	5688
2031**	6119	4211	4205
2041**	5722	1906	2758

** Calculated Values

The table above shows that for the plan period up to 2041, the Arithmetic Progression Method estimates the largest size of population relative to the other two methods; accordingly, the population projected are 6516 in 2021, 6119 in 2031 and 5722 in 2041.

Figure 4: Population Trend Sarthebari Municipal Area (1991-2041)



3. **ECONOMIC BASE AND EMPLOYMENT**

3.1 INTRODUCTION

The livelihood of people in Sarthebari revolves around bell-metal industry since the ancient times. Bell-metal is an alloy of copper and tin, and the tradition of making utensils with bell metal runs through generation. There has hardly been a change in the mechanism of moulding bell metal utensils, with the people of Sarthebari taking pride in the tradition. The present day Sarthebari town has developed with the bell-metal industry being in the centre of all the form of development that has ensued so far. The money flowing from the trade of bell metal items is a dominant source of income for the people of Sarthebari and it drives its economy. However, in the present day, the people are facing problems in carrying onwards the legacy of the bell metal industry due to rising cost of raw materials which have be sourced from other states. Besides this, there is stiff a competition of machine-made similar products from different states, the cost of which are significantly lower. The need of the hour is to make the assamese society aware of the traditionally made bell metal utensils so that they purchase only these for any occasion, be it day-to-day use or for social and religious ceremonies.

Other than the bell metal industry, mustard oil and jute are also notable industry in Sarthebari with revenue arising from trading these contributing to upliftment of its people.

A decent section of residents in Sarthebari town are also involved in the organised sector. There are administrative offices, banks and educational offices catering to the need of the town and its peripheral villages. And just like any other town in the state, there is a sizeable informal sector like street vendors, construction workers, drivers and domestic helpers, assisting the residents in easing the routines of everyday life.

3.2 WORK PARTICIPATION RATE AND NON-WORKERS

As per the Census of India, the population can be divided into main workers, marginal workers and non-workers. They can be defined as:

- **Main Worker:** One who has worked in any economically productive work for at least 183 days/6 months in a year.
- **Marginal Worker:** One who has engaged in economically productive work for less than 183 days/6 months in a year.
- The ones who have not participated in any economically productive activity constitutes the '**Non-Workers**'.

These main workers and marginal workers can again be classified as Cultivators, Agricultural Labourers, Household Industry Workers, and Other Workers. They can be defined in the following way:

1. **Cultivator:** One who is engaged in the cultivation of land owned or held from Government or held from private persons or institution for payment in money, kind or share, is a cultivator. A person who gives out his/her land for cultivation to another person(s) or institution for money, kind or share of crop, and is not involved in the supervision or direction of the cultivation of land, does not constitute a cultivator. Similarly, a person who is working on someone else's land for cash or kind or combination of both is not a cultivator.
2. **Agricultural Labourer:** An agricultural Labourer is one who works on someone else's land for wages or kind or share. He/she has no right of lease or contract on land on which he/she works.

3. **Household Industry:** It may be defined as an industry conducted by the head of the household and/or by the members of the household at home or within the village in rural areas, and only within the precincts of the house where the households live in urban areas. The larger proportion of workers in the household industry consists of members of the household. Household industry relates to production, processing, servicing, repairing or making and selling of goods.
4. **Other Workers:** All the workers other than cultivators or agricultural labourers or household industry workers are Other Workers. They include all government servants, municipal employees, teachers, factory workers, plantation workers, those involved in trade, commerce, banking, construction, political or social works, etc.

3.2.1 Working Population

The table below shows the work participation rate in Sarthebari MP Area from 2001 to 2011:

Table 3-1: Working Population of Sarthebari Master Plan Area

Year	Sarthebari Municipal Area (A)			Sarthebari Master Plan Area excluding the Municipal Area (B)			Total Master Plan Area (A)+(B)		
	Total Population	Total Workers	Work Participation Rate	Total Population	Total Workers	Work Participation Rate	Total Population	Total Workers	Work Participation Rate
2001	7628	2257	29.59	24415	6716	27.51	32043	8973	28.00
2011	6913	2245	32.48	27783	8769	31.56	34696	11014	31.74

Source: District Statistical Handbook, Census of India 2001, 2011

The work participation rate shows the percentage of the population engaged in any economically productive activity. There has been a steady improvement in work-participation rate from 2001 to 2011. This is a positive sign and it indicates a reduction in the dependent population of Sarthebari. Improvement of work-participation rate is crucial for reaping the benefits of demographic dividend that a favourable population composition presents. In the Sarthebari Municipal Board Area, the work participation rate has improved from 29.59% in 2001 to 32.48% in 2011. In the total Sarthebari Master Plan Area, the work participation rate has improved from 28.00% in 2001 to 31.74% in 2011.

3.2.2 Non-Working Population

The table below shows the non-working participation rate from 2001 to 2011:

Table 3-2: Non-Working Population of Sarthebari Master Plan Area

Year	Sarthebari Municipal Area (A)			Sarthebari Master Plan Area excluding the Municipal Area (B)			Total Master Plan Area (A)+(B)		
	Total Population	Total Non-Workers	Non-Worker Participation Rate	Total Population	Total Non-Workers	Non-Worker Participation Rate	Total Population	Total Non-Workers	Non-Worker Participation Rate

2001	7628	5371	70.41	24415	17699	72.49	32043	23070	71.99
2011	6913	4668	67.52	27783	19014	68.44	34696	23682	68.25

Source: District Statistical Handbook, Census of India, 2001, 2011

3.3 OCCUPATION PATTERN:

The size of the total workers in Sarthebari Master Plan Area is 11014, out of which 2245 belongs to the Sarthebari Municipal Board area and 8769 belongs to the Sarthebari Master Plan area excluding the Municipal Area. This implies that 20.38% of the total workers belong to Sarthebari Municipal Area and 79.62% belongs to Sarthebari Master Plan Area excluding the Municipal Area. The table below shows the occupation pattern in Sarthebari Master Plan Area.

Table 3-3: Occupational Structure of Sarthebari Master Plan Area

Sl. No.	Category	Municipality	Percentage (%)	Male	Female	Master Plan Area (Excluding Municipality)	Percentage (%)	Male	Female
1	Main Workers	1918	-	1703	215	7362		6779	583
i	Main Cultivators	71	3.70%	63	8	1686	22.90%	1623	63
ii	Main Agriculture Labourers	16	0.83%	14	2	1054	14.32%	914	140
iii	Main Household Main Industry workers	372	19.39%	347	25	939	12.75%	866	73
iv	Other workers	1459	76.07%	1279	180	3683	50.03%	3376	307
2	Marginal Workers	327	-	243	84	1407		875	532
i	Marginal Cultivators	9	2.75%	7	2	116	8.24%	75	41
ii	Marginal Agriculture Labourers	31	9.48%	24	7	277	19.69%	201	76
iii	Marginal Household Industry workers	60	18.35%	45	15	220	15.64%	107	113
iv	Marginal Other workers	227	69.42%	167	60	794	56.43%	492	302
Total Workers (Main + Marginal)		3468	2245		1946	299	8769		7654

Source: District Statistical Handbook, Census of India, 2011

It is evident from the table that in the Sarthebari Master Plan Area excluding municipality, a sizable proportion of the workers are either cultivators or agricultural labourers. In order to improve the condition of this lot, the agricultural infrastructure needs to be augmented, ranging from modern and smart methods of irrigation to accessibility to high standard seeds. In the Sarthebari Municipal area, most of the workers are in the service sector or in trade and commerce.

3.4 INFORMAL SECTOR

Sarthebari town has been witnessing steady urbanisation which has inflated the size of informal sector practising various vocation. They usually locate themselves strategically near work centres, commercial areas outside the boundaries of schools, colleges and hospitals, transport nodes and near large housing clusters. Often times, they create problems like obstruction of traffic. They also cause overcrowding and unsanitary conditions in public spaces and streets.

The size of informal sector is only bound to expand. The sector must be integrated with city planning and development process in order to rationalise the town's growth and development. A supportive environment should be created to enable the vendors to carry out their vocation. The area where they carry out their trade should have suitable public convenience arrangements and must be kept clean.

3.5 MAJOR TRADE AREA: TRADE AND COMMERCE

Trade and commerce in Sarthebari town is along the main thoroughfares. Commercial establishments are packed especially along the State Highway 9. The loading and unloading of goods in these establishments take place along the road, creating bottlenecks in the flow of traffic.

The Sarthebari Cluster has 91 brass metal producers and 40% of the craftsmen concerned.

3.6 INDUSTRIAL DEVELOPMENT

Sarthebari MP Area is lagging behind industrially. There are no major industries here. Industries as per the natural resource endowment of the area may be taken up to promote sustainability and employability.

3.7 AGRICULTURAL DEVELOPMENT

Sarthebari Master Plan area has a significant agrarian sector. The major crops are mustard, paddy, jute, etc. The scale of commercialisation of agriculture is moderate here. Most of the farmers in the Sarthebari Master Plan area are small and marginal which places a financial constraint in the way of mechanising farming and consequently increasing the productivity and yield of the land. Lack of irrigational facilities and fragmented land holdings also diminishes agricultural productivity, making them unviable in terms of agricultural produce.

4. **HOUSING AND SHELTER**

4.1 HOUSING SCENARIO

Housing may be defined as a unit of accommodation to protect its occupants from the forces of nature. It is an important component of human resource development, and is a prerequisite for healthy living. Defined broadly, housing encapsulates adequate space, lighting, ventilation, security and amenities like water supply, proper drainage, and sanitation, etc., to lead a dignified life. Houses provide physical and economic security and is considered a status symbol across the world. The United Nation's Universal Declaration of Human Rights, 1948, recognizes the need of housing along with food, clothing, medical care, etc. as a right to a standard living required for health and well-being of everyone.

In India, the Census office defines a house as a building or part of a building having separate main entrance from the road or common courtyard or staircase, etc. used or recognised as a separate unit. It may be occupied or vacant. It may be used for residential or non-residential purpose, or both.

The housing scenario in Sarthebari Master Plan Area has witnessed a change in the recent years due to government schemes and spread of loan related financial literacy, but there still persists a gap between the demand and supply of dwelling units. This has necessitated the development of shelters and low cost houses to prevent sprouting of slums and squatters without basic amenities. As per the Census of 2011, 1 slum with a population size of 308 has been identified in Sarthebari town. Also, the problem regarding housing in Sarthebari Municipal Area is of unsatisfactory physical and social conditions of the structure. In the rural areas, the problem is of unsound housing quality. Some of the housing problems being faced in rural areas are:

- Rural houses lack basic amenities like sanitation.
- The houses do not provide adequate protection to occupants against wind, rain and cold.
- The houses are infested with insects and rodents, which are major health hazards.

While changes are happening in the housing scenario of Sarthebari, the process has been slow primarily due to high construction costs which most people are unable to afford. As a result, Sarthebari is lagging behind in terms of adequate housing backed by proper facilities and basic amenities to lead a dignified life.

4.1.1 Types of Houses

In Sarthebari MP Area, basically 3 types of houses are being built-

- **Kutch House:** A house having mud floor, bamboo wall plastered with mud and thatch roof.
- **Assam Type (Semi pucca):** A house having brick wall, cement concrete flooring, CGI/AC sheet roofing.
- **Pucca House:** A house having cement concrete flooring, brick wall and RCC slab roofing.

Most of the houses in Sarthebari are self-built. There is no presence of private builders in the scene. To provide assistance for house construction and renovation, especially to the Economically Weaker Section (EWS), Low Income Group (LIG), Middle Income Group (MIG), minorities, socially backward sections of society and physically challenged, the government has put in place affordable housing schemes. These have brought about a perceptible change in the housing scenario.

The houses constructed in Sarthebari are either self-occupied or rented. Rented accommodation is not that significant in Sarthebari. The Table below shows the status of owned and rented houses in Sarthebari as per Barpeta District Census Handbook, 2011.

Table 4-1: Housing Typology of Sarthebari Master Plan Area

Ownership Status	Sarthebari Municipal Area	Sarthebari Master Plan Area excluding the municipal Area	Total Sarthebari Master Plan Area
Owned	1406	5763	7169
Rented	62	117	179
Any others	12	95	107
Total	1480	5974	7454

Source: District Census Handbook, Census of India 2011

4.2 HOUSING SUPPLY MECHANISM

Majority of the houses in Sarthebari are self-built. However, there are government schemes in place to provide affordable housing to economically and socially backward sections of the society

4.2.1 Housing Schemes in Sarthebari

1. **Integrated Housing & Slum Development Programme (IHSDP):** This scheme was launched in December 2005. The objectives are:
 - To provide an integrated approach to ameliorate the conditions of slum dwellers who do not possess adequate shelter and basic facilities.
 - To strive for slum less cities with healthy living and good environment.
 - To enhance public and private investments in housing and infrastructure development in urban areas.
2. **Prime Minister Awas Yojana (Urban) {PMAY (U)}:** This scheme launched in 2015, aims to provide housing for all in the urban areas by 2022. The mission seeks to address the housing requirement of urban poor including slum dwellers through the following programme verticals:
 - Slum rehabilitation of slum dwellers with participation of private developers using land as a resource.
 - Affordable housing through credit linked subsidy.
 - Affordable housing in partnership with public and private sector.
 - Subsidy for beneficiary led individual house construction/enhancement.
3. **Individuals Household Latrine (IHHL) under Swachh Bharat Mission (SBM):** IHHL under SBM aims to eliminate open defecation in the country. Here applicants can approach the local authorities in their area to get central assistance for construction of toilets. They can also complete the process online through an official portal of the central government. Conversion of old toilets can also be applied for.
4. **National Urban Livelihood Mission (NULM):** Launched in 2013, NULM aims to provide permanent shelter equipped with essential services to the urban homeless in a phased manner under the scheme of Shelter for Urban Homeless (SUH). The objectives of the Shelter for Urban Homeless (SUH) component of NULM scheme are to:

- Ensure availability and access of the urban homeless population to permanent shelters including the basic infrastructure facilities like water supply, sanitation, safety and security.
 - Cater to the needs of especially vulnerable segments of the urban homeless like the dependent children, aged, disabled, mentally ill and recovering gravely ill, by creating special sections within homeless shelters and provisioning special service linkages for them.
 - Provide access to various entitlements, viz. social security pensions, PDS, ICDS, identity, financial inclusion, education, affordable housing etc. for homeless populations.
 - Formulate structures and framework of engagement for development, management and monitoring of shelters and ensuring basic services to homeless persons, by state and civil society organisations including homeless collectives.
5. **Apun Ghar Home Loan:** The Government of Assam has initiated a housing scheme known as Apun Ghar Home Loan scheme to provide home loan for State Government employee on subsidized interest rates. Assam Government has signed a Memorandum of Understanding (MOU) with State Bank of India for the same. Under the home loan scheme, the eligible beneficiaries who are permanent residents and employee of State Government can avail a maximum loan amount of Rs.15 Lakhs without collateral security from the concerned bank. The Assam Government will provide 3.5% subsidy of interest to the Government employee under this scheme. Once the application is approved, the interest of home loan will be 5% for women and 5.05% for men.

4.3 SARTHEBARI HOUSING STATUS

4.3.1 Housing Condition

Housing condition indicates the physical state of the house or dwelling unit. It can be classified into good, livable, and dilapidated. They can be defined in the following manner-

- Those houses which do not require any repairs and are in good condition may be considered as 'Good'.
- Those houses which require minor repairs may be considered as 'Livable'.
- Those houses which are showing signs of decay or those breaking down and require major repairs or those houses decayed or ruined and are far from being in conditions that can be restored or repaired may be considered as 'Dilapidated'.

The distribution of households based on different housing condition in Sarthebari MP Area can be understood from the following table:

Table 4-2: Overall Housing condition in Sarthebari MP Area

Condition	Sarthebari Municipal Area	Sarthebari Master plan Area excluding the Municipal Area	Total Master Plan Area
Good	755	1449	2204
Livable	604	3430	4034
Dilapidated	121	1095	1216
Total	1480	5974	7454

Source: District Census Handbook, Census of India 2011

According to the table above, 16.31% or 1216 households live in dilapidated structure in Sarthebari Master Plan Area. In the Municipal Area, the dilapidated condition of houses is 121 households or 8.18%.

4.3.2 Housing Structure:

The Housing Structure can be classified into the following categories:

- **Permanent:** Houses with wall and roof made of permanent materials. Wall can be made of G.I., Stone packed with Mortar, Stone not packed with Mortar, Metal, Asbestos sheets, Burnt bricks, Stone or Concrete. Roof can be made of Hand-made tiles, Machine made tiles, Slate, G.I., Metal, Asbestos sheets, Brick, Stone or Concrete.
- **Semi-Permanent:** Either wall or roof is made of permanent material, and the other is made of temporary material.
- **Temporary:** Houses with wall and roof made of temporary material. Wall can be made of Grass, Thatch, Bamboo etc., Plastic, Polythene, Mud, Unburnt brick or Wood. Roof can be made of Grass, Thatch, Bamboo, Wood, Mud, Plastic or Polythene.
- **Serviceable temporary:** Wall is made of Mud, Un-burnt brick or Wood.
- **Non-serviceable:** Wall is made of Grass, Thatch, Bamboo etc., Plastic or Polythene.

The following table shows the distribution of households based on the structure:

Table 4-3: Housing Structure of Sarthebari MP Area

Structure of the Households		Sarthebari Municipal Area	Sarthebari Master plan Area excluding the Municipal Area	Total Master Plan Area
Permanent		679	1617	2296
Semi-Permanent		767	3765	4531
Total Temporary	Serviceable	4	16	20
	Non-Serviceable	25	569	594
Unclassifiable		4	7	12
Total		1480	5974	7454

Source: District Census Handbook, Census of India 2011

A good percentage of people in the Sarthebari Master Plan Area live in Non-Serviceable Total Temporary Structure. This is about 7.97% or 594 households.

4.3.3 Type of Material

The following table depicts data on the type of predominant material of roof across households in Sarthebari

Table 4-4: Housing roofing Material of Sarthebari MP Area

Material	Percentage of HHs		
	Sarthebari Municipal Area	Sarthebari Master Plan Area (excluding MB area)	Total Master Plan Area
Grass/Thatch/Bamboo/ Wood/Mud etc.	22	479	501
Plastic/ Polythene	13	119	132
Handmade Tiles	0	2	2
Machine made Tiles	5	0	5
Burnt Brick	0	27	27
Stone/ Slate	78	14	93
G.I./Metal/Asbestos sheets	1348	5326	6674
Concrete	10	6	16
Any other material	2	1	3
Total	1480	5974	7454

Source: District Census Handbook, Census of India 2011

The use degradable natural products like grass, thatch, bamboo, wood, mud, etc. would require frequent maintenance and change in the roofing material to keep the houses safe from the heavy monsoon rains. 501 households or 6.72% of the households in Sarthebari Master Plan Area have roofs made of such items.

Table 4-5: Housing Wall Material of Sarthebari MP Area

Material	Sarthebari Municipal Area	Sarthebari Master Plan Area excluding the municipal area	Sarthebari Master Plan Area
Grass/ Thatch/ Bamboo etc.	608	3853	4461
Plastic/ Polythene	13	39	53
Mud/ Unburnt brick	25	300	325
Wood	144	147	291
Stone not packed with mortar	37	28	65
Stone packed with mortar	31	66	97
G.I./ Metal/ Asbestos sheets	1	7	9
Burnt brick	531	1336	1867
Concrete	86	192	278
Any other material	3	6	9
Total	1480	5974	7454

Source: District Census Handbook, Census of India 2011

From the table above, we can see that 59.85% or 4461 households in the Sarthebari Master Plan Area live in houses with walls made of degradable natural products like grass, thatch, bamboo, etc. In the Sarthebari Municipal Area, the figure is 43.18% or 608 households.

4.3.4 Availability of Kitchen

Meals may be prepared by the household under the following settings:

- In a separate room inside the house.
- Inside the house but in an unenclosed space. No separate kitchen is available.
- In a separate room outside the house.
- Outside the house in an open space.

The following table depicts the availability of kitchen across households in Sarthebari:

Table 4-6: Availability of Kitchen in Sarthebari MP Area

Kitchen Facility		Sarthebari Municipal Area	Sarthebari Master Plan Area excluding the Municipal Area	Total Master Plan Area
Cooking inside house	Has Kitchen	1427	4990	6417
	Does not have kitchen	21	274	295
Cooking outside house	Has kitchen	27	513	540
	Does not have kitchen	4	161	165
No Cooking		1	36	37
Total		1480	5974	7454

Source: District Census Handbook, Census of India 2011

The table above indicates that 3.96% of the households or 295 household in Sarthebari Master Plan Area cooks inside the house without having kitchen facility. Here meals are cooked without proper ventilation which can cause nausea and headaches among other health effects. The figure is 21 households coming to 1.42 % In the Sarthebari Municipal area.

4.3.5 Availability of Latrines

Availability of proper latrine with piped sewer system or septic tank is a must for households to lead a dignified life. Lack of access to latrine results in a plethora of problems. Open defecation and outdated latrines like Pit Latrine and Service Latrine creates an unhealthy environment by attracting flies and contaminating land and water sources. It is known to spread fatal diarrhoeal diseases especially among children. It also creates discomfort and raises security issues among adolescent girls and women.

The following table depicts the distribution of the availability of latrine facilities across households in Sarthebari:

Table 4-7: Availability of Latrine in Sarthebari MP Area

Latrine Facility	Sarthebari Municipal Area	Sarthebari Master Plan Area excluding the Municipal Area	Total Master Plan Area

Flush/pour flush latrine	Piped sewer system	182	402	584
	Septic tank	400	824	1223
	Other system	19	406	426
Pit latrine	With slab/ventilated improved pit	333	929	1262
	Without slab/open slab	65	1040	1105
Night soil disposed into open drain		10	39	49
Service latrine	Night soil removed by human	33	86	118
	Night soil serviced by animal	46	57	103
Households not having latrine		392	2191	2583
Total		1480	5974	7454

Source: District Census Handbook, Census of India 2011

Irrespective of data featuring in the Census report 2011, it should be noted that remarkable progress has been made in providing access to latrine, with the aim of the government being reiterated, time and again, to promote Open Defecation Free status in every village of the country.

4.3.6 Availability of Bathroom

The following table shows the availability of bathroom across households in Sarthebari:

Table 4-8: Availability of Bathroom in Sarthebari MP Area

Bathroom Facility		Sarthebari Municipal Area	Sarthebari Master Plan Area excluding the Municipal Area	Total Master Plan Area
Yes	Bathroom	830	1792	2623
	Enclosure without roof	161	961	1122
No Bathroom		488	3221	3709
Total		1480	5974	7454

Source: District Census Handbook, Census of India 2011

From the table, we can see that 3709 households coming to around 49.76% in the Sarthebari Master Plan Area do not have bathroom facility. The figure is 32.97% or 488 households in the Sarthebari Municipal Area. This is a major barrier in the way of living a dignified life, and reflects how the master plan area is lagging behind.

4.3.7 Availability of Drainage Facility

Drainage system is used for disposal of waste water and other liquid waste from the house. It can be either closed or open. If a house has water outlet to carry away the waste water to an underground network, it is termed as closed drainage. If the water outlet is connected to open drains, it is called open

drainage. If open drainage is used to carry sanitary wastes, it can be very unhygienic and pose health risks. Proper drainage system is crucial to prevent water logging and property damage.

The following table shows the availability of drainage facility in Sarthebari:

Table 4-9: Availability of drainage in Sarthebari MP Area

Waste water outlet connected to-	Sarthebari Municipal Area	Sarthebari Master Plan Area excluding the Municipal Area	Total Master Plan Area
Closed Drainage	77	125	202
Open Drainage	174	293	467
No Drainage	1229	5555	6784
Total	1480	5974	7454

Source: District Census Handbook, Census of India 2011

The Table paints a gloomy picture of the overall sanitation condition in Sarthebari. The access to closed drainage in both Sarthebari Municipal Area and the overall Master Plan area is meagre.

4.4 ADEQUACY FOR HOUSES FOR FAMILIES: CONGESTION FACTOR

Addressing the issue of congestion is very essential in understanding the adequacy of housing and estimating the shortage of housing in a planning area. It is desirable that a married couple should have one separate room to themselves and their small children.

The table below shows that most of the households in Sarthebari Master Plan area have one married couple. However, the area to be addressed is for the households with more than one married couple, who shall require a separate house, either owned or rented if the current house they live in has one Bedroom-Hall-Kitchen set-up. Two married couples are usually seen in Indian households, when married son and parents live together. Yet there are 874 households in Sarthebari Master Plan Area with more than two-married couple in the household.

Table 4-10: Percentage of Households with the number of Married Couples, Sarthebari

Married Couples	Sarthebari Municipal Area	Sarthebari Master Plan Area excluding the municipal area	Sarthebari Master Plan Area
None	278	807	1085
1	1015	4480	5495
2	138	559	697
3	36	107	142
4	12	20	31
5+	1	2	3
Total	1480	5974	7454

Source: District Census Handbook, Census of India 2011

Again, the table below shows that most of the households in Sarthebari Master Plan area have two (35% HHs) to three (25.3% HHs) rooms per household. However, the area to be addressed is for the households with one room or no exclusive rooms. In Sarthebari Master Plan Area 58 households have no exclusive rooms in the house. Such households are mostly likely to look for alternate housing as the family grows.

Table 4-11: Number of Rooms available in a House per Household, Sarthebari

Number Dwelling Rooms	Sarthebari Municipal Area	Sarthebari Municipal Area (in %age)	Sarthebari Master Plan Area	Sarthebari Master Plan Area (in %age)
No exclusive room	4	0.3	58	0.78
One room	250	16.9	1318	17.68
Two rooms	478	32.3	2831	37.98
Three rooms	340	23	1753	23.52
Four rooms	178	12	757	10.15
Five rooms	118	8	366	4.91
Six rooms and above	111	7.5	371	4.98
Total	1480	100	7454	100

Source: District Census Handbook, Census of India 2011

Here again the table below shows that in the Sarthebari Master Plan Area, majority of households have more than 3 members in the households. There are 257 households which are single member households, meaning these are most likely migrant workers, who living alone within the Sarthebari planning area for work or studies. The area to address is households with more than 6-8 members up to 9 plus members, who would most likely have more than 2 married couples and shall be likely to look for alternate housing for the additional married couples in the family.

Table 4-12: Number of family members per Household, Sarthebari

Household Size	Sarthebari Municipal Area	Sarthebari Municipal Area (in %age)	Sarthebari Master Plan Area	Sarthebari Master Plan Area (in %age)
1	53	3.78	257	3.45
2	89	6.31	511	6.85
3	219	15.56	1154	15.48
4	380	27.01	1952	26.18
5	318	22.60	1595	21.40
6-8	326	23.13	1657	22.23
9+	95	6.73	329	4.41
Total	1480	100	7454	100

Source: District Census Handbook, Census of India 2011

4.5 HOUSING SITUATION

The following table shows the no. of person per house in Sarthebari MP area:

Table 4-13: Family household size in Sarthebari MP Area

Year	Number of Residential Houses	Total Population	Number of Persons per Houses
2011	7454 (1480+5974)	34696 (6913+27783)	4.65

Source: District Census Handbook, Census of India 2011

4.5.1 Housing Shortage

Housing shortage in Sarthebari Master Plan Area considering census 2011 housing data has been taken into consideration.

Table 4-14: Factors taken into considerations for Housing Shortage

Sl. No	Factors	Description	Remarks
1	Obsolescence factor	As decided by ninth plan working group committee of GoI, dwelling units aged 80 years or more are treated as obsolete. Percentage of households living in the dwelling units having age 40-80 years and in bad condition and percentage of households living in all structures aged 80+ years, irrespective of condition of structure, taken together as obsolescence factor and considered as housing requirement.	1216 HHs (refer in Table 4-2)
2	Temporary housing	All temporary houses should be considered as housing requirements as per recommendations. According to census data both Temporary houses and unclassifiable houses should be taken into consideration to arrive at the total number of temporary housing	626 HHs (614+12) of total no. of HHs in Master plan area lived in temporary structure. (refer in Table 4-3)
3	Houses with predominantly katcha or semi pucca roof material	Houses with Katcha and Semi Pucca roof in the cities are considered to be contributing towards the actual housing stock	667 HHs (refer in Table 4-4)

Therefore the total housing shortage for Sarthebari Town is calculated as follows:

Table 4-15: Computation of Current Housing Shortage in Sarthebari

Parameter	Number of Housing Units
1. Obsolescence factor	1216
2. Temporary housing	626
3. Houses with predominantly katcha or semi pucca roof material	667
Total Housing Shortage	2509
Total HHs in Sarthebari MP area (as per 2011 census)	7454
Housing Shortage in percent (Housing Shortage / No. of Urban HHs)	33.66%

Source: Calculated Values

Based on the above table, in 2011 the housing shortage works out to be around 2509 in Sarthebari Master Plan Area. However, it should be noted that these figures are tentative and there may be overlap between different housing shortage parameters.

4.5.2 Housing Need Assessment

The projected housing requirement in Sarthebari MP Area in 2041 is as follows:

Table 4-16: Future Housing Shortage in Sarthebari MP Area in a decade

Year	Projected Population	Incremental Population in a decade	No. of persons per households	No. of HHs needed	No. of HHs Available	Housing Demand	Shortage in 2011	Total Deficit
2021	37539	-	4.65	8072	7454 (Census 2011)	618	2509 (Refer Table 4-12)	3127
2031	40369	2830	4.65	8681	-	1227	-	3736
2041	43194	2825	4.65	9289	-	1835	-	4344

Source: Calculated Values

It is seen from the Table that approximately 4344 new housing units needs to be distributed in the existing and new developments in the next 20 years.

4.6 IDENTIFICATION OF SUITABLE GOVERNMENT/ ULB LAND FOR HOUSING

The government land parcels in and around the Sarthebari town can be used for developing affordable housing. Most of these lands are underutilized and prone to encroachment. Rental housing complexes can be developed to accommodate migrant workers and prevent the sprouting of slums and squatters. Private investments in government lands can be explored. Different models of PPP can be adopted to make use of these underutilized lands and move closer to the target of achieving Housing for All by 2022. Private real estate developers should be invited to partner with the government to build affordable residential projects. This will ensure efficiency and faster delivery of houses.

5. **TRANSPORTATION**

5.1 INTRODUCTION

Transport is the backbone of economy and social structure of any region. If urban centres have been recognized as engines of economic growth, Traffic and Transportation has rightly been termed as wheels of such engines. Road and Rail network plays a vital role in the urban planning and traffic & transportation has been considered as a function of land use planning. Transport network is considered as the life line of the city and if any bottleneck or obstruction arises, it will pose a severe threat to day to day life of the city people. The good road and rail network is the symbol of the sound development of any city and the study of transportation helps in understanding the existing situation, potentials, weaknesses etc. and helps to draft out strategies and projects for the future development. A bad transportation infrastructure on the other hand makes vehicles susceptible to wear and tear, increases fuel consumption of automobiles, and increases the likelihood of accidents.

5.2 ROAD NETWORKS OF SARTHEBARI

Sarthebari town is connected to the District Headquarters, Barpeta by Barpeta- Nalbari Road via SH-9. The distance between these two towns through this road is approximately 26.3 km.

Sarthebari Municipal Area have 18kms of Road Length

5.2.1 Major Roads and Intersection in Sarthebari

The major roads in Sarthebari along with their length and average width are as follows:

Table 5 1: Roads with their length and average width, Sarthebari

Roads	Length (meters)	Width (meters) approx
Sarthebari-Barpeta	26300	8
Sarthebari-Nalbari	25700	7.5
Sarthebari-Pathsala	21500	5.5
Sarthebari-Tihu	13900	5.5

5.2.2 Traffic Volume at Major Locations

Traffic volume surveys was conducted along the major transport routes and at the major intersection. This was carried out in order to generate an idea about the traffic volume along the major routes and at the major intersections, the peak hour timing, the peak hour traffic, and the peak hour traffic composition.

**Table 5-2: Traffic Volume Survey 2022, Sarthebari Town,
Morning (9 A.M to 12 Noon) - Incoming**

Road Name/Location	M-Cycle/Scooter	Car	Bicycle	E-Rickshaw	Rickshaw	Auto/Tempo	Mini-Bus/ Traveller/ Winger	Truck	Bus	Thela	Tractor	Mini-Truck, Ape, Pick-Up	Total
Pathsala-Tihu Main Road to Sarthebari Location: Junction point	120	30	76	67	0	55	8	3	0	3	10	17	389
Nalbari to Sarthebari Location: Circle Office	89	36	33	58	7	24	12	8	2	5	6	33	313
Barpeta to Sarthebari Location: Sarukhetri High School	113	44	61	63	6	39	14	12	2	9	12	27	402
Total	322	110	170	188	13	118	34	23	4	17	28	77	1104

It can be seen from the table above that Barpeta to Sarthebari Main Road faces the highest incoming traffic volume in the morning hours. E-Rickshaw has also emerged as a much sought-after mode of transportation in all the three roads wherein the survey was conducted.

**Table 5-3: Traffic Volume Survey 2022, Sarthebari Town,
Morning (9 A.M to 12 Noon) – Outgoing**

Road Name/Location	M-Cycle/Scooter	Car	Bicycle	E-Rickshaw	Rickshaw	Auto/Tempo	Mini-Bus/ Traveller/ Winger	Truck	Bus	Thela	Tractor	Mini-Truck, Ape, Pick-Up	Total
Sarthebari to Pathsala-Tihu Main Road Location: Junction point	133	47	48	76	1	40	16	2	1	2	11	25	402
Sarthebari to Nalbari Location: Circle Office	97	41	37	47	5	19	10	4	2	6	6	27	301
Sarthebari to Barpeta	91	57	32	75	4		6	5	3	9			353

Location: Sarukhetri High School						3					1	2	
						9					1	1	
Total	32	14	11	19	1	9	3	1	6	1	2	7	105
	1	5	7	8	0	8	2	1		7	8	3	6

In the morning hours, Sarthebari to Pathsala-Tihu Main Road faces the highest volume of outgoing traffic from Sarthebari town. Again, two-wheelers are the dominant mode of transportation followed by E-Rickshaws.

The figure below illustrates a comparative incoming and outgoing traffic volume in the 3 roads of Sarthebari town between 9 A.M and 12 Noon.

Figure 5: Traffic Volume in Sarthebari Town: 9 A.M-12 NOON

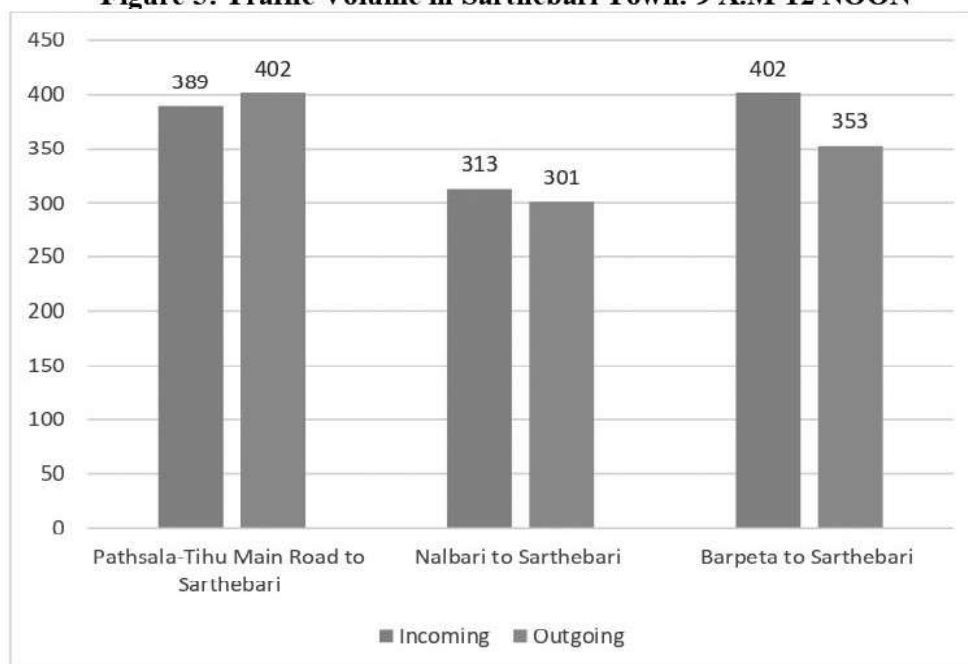


Table 5-4: Traffic Volume Survey 2022, Sarthebari Town, Afternoon (1 P.M to 4 P.M) – Incoming

Road Name/Location	M-Cycle/Scooter	Car	Bicycle	E-Rickshaw	Rickshaw	Auto/Tempo	Mini-Bus/ Traveller/ Winger	Truck	Bus	Thela	Tractor	Mini-Truck, Ape, Pick-Up	Total
Pathsala-Tihu Main Road to Sarthebari Location: Junction point	11 1	48	51	79	2	37	1 2	5	1	1	7	2 1	375
Nalbari to Sarthebari Location: Circle Office	11 2	37	27	44	8	27	1 2	7	1	2	3	2 2	302

Barpeta to Sarthebari Location: Sarukhetri High School	10 2	65	41	38	2	44	9	5	2	5	1 0	1 7	340
Total	32 5	15 0	11 9	16 1	1 2	10 8	3 3	1 7	4	8	2 0	6 0	101 7

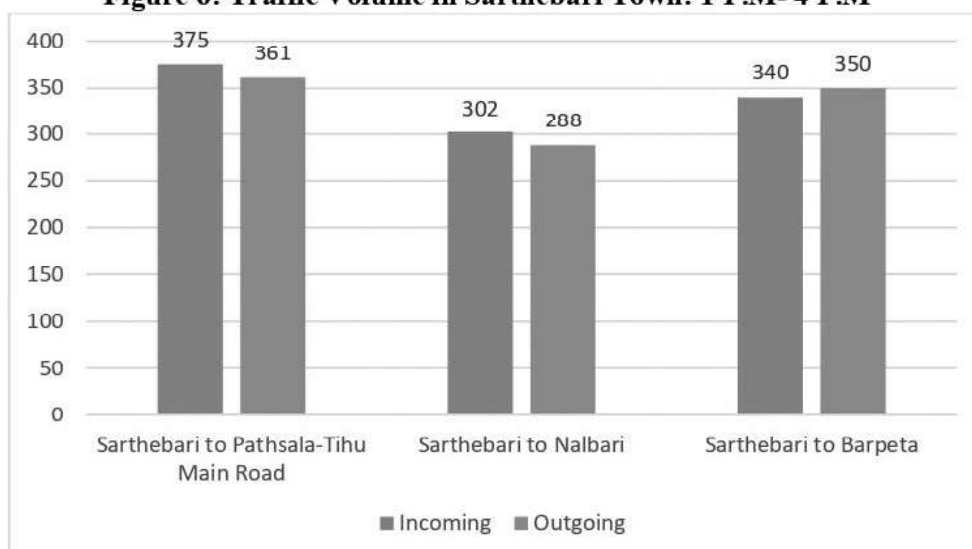
From Table 5-4, it can be seen that in the afternoon hours, Pathsala-Tihu Main Road to Sarthebari point witnesses the highest traffic volume among the 3 surveyed roads.

**Table 5-5: Traffic Volume Survey 2022, Sarthebari Town,
Afternoon (1 P.M to 4 P.M) - Outgoing**

Road Name/Location	M-Cycle/Scooter	Car	Bicycle	E-Rickshaw	Rickshaw	Auto/Tempo	Mini-Bus/ Traveller/ Winger	Truck	Bus	Thela	Tractor	Mini-Truck, Ape, Pick-Up	Total
Sarthebari to Pathsala-Tihu Main Road Location: Junction point	14 4	37	50	57	1	35	7	2	0	2	7	19	36 1
Sarthebari to Nalbari Location: Circle Office	95	40	32	42	4	22	10	4	2	3	5	29	28 8
Sarthebari to Barpeta Location: Sarukhetri High School	99	55	57	52	3	32	6	8	2	4	9	23	35 0
Total	33 8	13 2	13 9	15 1	8	89	23	14	4	9	21	71	99 9

From the above table, it can be seen that Sarthebari to Pathsala-Tihu Main Road and Sarthebari to Barpeta Main road faces the highest traffic volume in Sarthebari town.

The figure below illustrates the comparative incoming and outgoing traffic volume in the 3 roads in Sarthebari town during the afternoon hours.

Figure 6: Traffic Volume in Sarthebari Town: 1 P.M- 4 P.M

5.3 TRANSPORT INFRASTRUCTURE

Within Sarthebari town, there is no designated spot as such for bus stand, auto stand and rickshaw stand. They temporarily halt by the road side which creates traffic bottlenecks during peak hours.

Since bus-stands and auto-stands cater to a large segment of the population daily, the infrastructure around them should be equipped with standard waiting rooms, toilet facilities, and dustbins to make them accessible, comfortable and sanitary.

5.4 FREIGHT ZONE AND LOGISTICS

As in Sarthebari, a provision of efficient goods transportation facility is important to promote trade and commerce, and in turn economy of the town.

5.4.1 Movement of Goods Modes

The movement of goods modes on the road network needs to be rationalized. Goods modes can be grouped into three types as under:

- **Small sized vehicles like pickups:**

Small size vehicles like 'Pick ups' perform an essential distribution function. In space occupancy and manoeuvrability they are similar to cars. Their movement on all road sections, at all times of day may be permitted. As part of traffic management plans, separate parking areas for 'Pick ups' may be identified.

- **Medium sized vehicles like LCVs**

Medium size vehicles like LCVs are important to move goods to and from industries, warehouses and other major activities. They affect overall level of service of traffic.

- **Large size vehicles like 2/3 Axle Trucks, Truck Trailer & MAVs**

Large sized goods vehicles consume high proportion of road capacity, impede traffic flows, causes accidents, adversely affect environment and consume large extent of land for parking. As these

vehicles are bringing in/taking out traffic from/to other parts of the country, these vehicles need to be received at the urban periphery and facilitated in terms of planned terminals.

5.5 FOOTPATHS AND BICYCLE TRACKS

The length of footpath in Sarthebari town is approximately 1000 meters. However, they are prone to encroachment by the informal sector.

5.5.1 Pedestrian Facilities

Walking is a predominant mode of movement in the town. The transport system plan promotes and facilitates walking. The main strategies and measures proposed as part of the plan are as under:

- Provision of side-walks on primary arterials, sub-arterials and collectors on both sides of the road and on at least one side on local roads;
- Cross pedestrian facilities to be provided as per the warrants recommended by Indian Roads Congress;
- Side- walks on all the major roads;
- Improvement measures in terms of pedestrian controlled facilities at intersections, grade separators and widening of side- walks in the Central Area and along major corridors.
- Pedestrians should remain at ground level with comfortable and safe access and minimum detours from the most direct path, unless there is no other alternative.
- In-depth study will be made to declare many roads in market and office places as pedestrian roads.
- Local pedestrian and cyclist routes on the street will be preferred to rear and side yard pathways.
- A continuous unobstructed footpath on each side of all streets with ROW wider than 12m. Minimum width of footpath should be 1.8 m (with clear height 2.4 m.) in addition to space for trees/greenery/vending spaces and surface utilities. Width of footpath shall be determined based on pedestrian volume and have to be wider than 1.8 m wherever required.
- Natural Surveillance or “eyes on the street” should be enabled on all roads by removing setbacks and boundary walls and building to the edge of the street, wherever permitted as per norms. This would allow people from inside to look out on to the pavement, thus discouraging harassment of women on footpaths, bus-stops and public spaces.

5.6 PARKING

The Town has high inadequacy of organized parking space for the motorized vehicle. The vehicles are parked on the main road of the town creating congestion.

5.6.1 Parking Policy:

Every vehicle trip ends in a demand for parking of the vehicle at its trip end. The parking of vehicles needs extensive and exclusive land area. Otherwise parking would spill over to other use areas like road carriageway and footpaths, open spaces. In turn they would affect safety and environmental quality.

The escalating demand and varied needs of parking in Sarthebari can only be met and organized in the framework of a comprehensive Parking Policy. The recommended parking policy for the town should have the following salient features as per the Urban National Transport Policy (NUTP)-2006:

- Preferential allocation of parking space(s) for public transport vehicles and non-motorized modes of transport;
- Levy of graded scale of parking fee representing truly the value of the land occupied;
- Development of efficient accessibility to parking lots;
- Encourage to go in for electronic metering for better realization of parking fee;
- Development of underground parking in green areas (considering the social acceptance of the people);
- Encouraging people to use public transport to reach city centre(s);
- Development of parking lots on PPP format for reducing burden on public funds
- Restricted and high- priced public parking to discourage unnecessary private transport;
- Very low- priced public parking for bicycles and e-bikes to encourage bicycles and e-bikes.
- Schemes will be made for central municipal area to provide 1 Equivalent Car Space (ECS) per 100 sq.m. of covered area, with mandatory 5% of the parking area earmarked for bicycles, and wheelchairs.;
- At least 10% of the parking area shall be equipped with charging points for electric vehicles.
- Prohibit street parking or enforce high parking fines for private vehicles on public streets and Spaces (other than parking areas), in order to encourage use of other modes.

5.7 STREET LIGHTING AND PROPOSED IMPROVEMENT PLAN

Adequate street lighting is crucial for the safety of motorists and pedestrians. The provision of street lights is partly available in Sarthebari Town. The coverage of street lights is inadequate especially in the interior lanes. There is a need for installments of new street lights. Another problem is the frequent power outages affecting the lighting. It is proposed that technologies like standalone solar LED street lighting be explored. Scientific planning should go into determining the installation of street lights as lighting requirements of different areas vary. It is proposed that Sarthebari have an energy efficient street lighting, and continuity of street lighting for carriageway and pavements for safety purpose. The distance between poles should not be more than 30 meters.

5.8 SIGNAGE AVAILABILITY AND REQUIREMENTS

5.8.1 Lane Markings and Signage

Very few Lane Markings and Signage has been observed throughout the Town. Traffic signals, signs and pavement markings are used for traffic control so that-

- All on-street parking spaces are clearly defined by lane markings.
- Adequate and appropriate signage's are installed at all places on the street network to identify 'parking' and 'no parking' arcas.
- Off-street parking places are clearly identified by signs and distinguishing marks.

6. **INRASTRUCTURE, PUBLIC UTILITIES & SERVICES**

6.1 PHYSICAL INFRASTRUCTURE

To ensure that urbanization happens sustainably, a well-executed delivery of urban services is a must. A sound infrastructure of urban services is necessary for combating diseases and poverty and improving the quality of life. Accordingly, the urban service profile refers to the current state of infrastructure and utility systems in the city. It indicates the adequacy or inadequacy of infrastructure services in terms of coverage, quantity, and quality, and attempts to identify the factors responsible for inadequate development of infrastructure services. It measures the gap between demand and supply of different infrastructure services, and examines the factors that explain the gap.

6.1.1 Water Supply

As per the Census data of 2011, the demand for water in Sarthebari MP Area is met mostly through private means like hand pumps and wells. The table below shows the sources of drinking water in the Master Plan Area:

Table 6-1: Main Source of Drinking Water in Sarthebari MP Area

Area	Percentage of Households to Total Households by Amenities and Assets										Total (Percentage)
	Tap water from treated source	Tap water from untreated source	Covered well	Un-covered well	Handpump	Tube well /Bore hole	Spring	River/ Canal	Tank/Pond/Lake	Other sources	
Municipality	1.85	0.05	0.18	6.80	85.15	0.08	0.00	0.00	0.00	5.90	100
Outside Municipal Boundary (inside MP Area)	0.94	0.268	1.372	4.988	87.896	1.66	0	0.096	0.012	2.768	100

Source: District Census Handbook, Census of India 2011

Currently, the Public Health Engineering (PHE) Department, Sarthebari has been entrusted with the responsibility of providing clean drinking water to the households. Jal Jeevan Mission is being implemented actively by the department which aims to provide Functional Household Tap Connection (FHTC) with service level at 55 lpcd to the rural households.

6.1.1.1 Water Demand Estimation for Resident in Sarthebari MP Area

As per the water supply demand calculation, the existing water supply demand is 6.54 MLD, whereas the demand will increase to 7.03 MLD by 2031 and 7.52 MLD in 2041.

Table 6-2: Water Demand Assessment

Description	2021	2031	2041
Total Population of Sarthebari Master Plan Area	37539	40369	43194
Projected Water Demand (MLD)			
Total Water Demand @ 135 LPCD	5.07	5.45	5.83
15 % O & M loss	0.76	0.82	0.87
Sub Total	5.83	6.27	6.70
2% Fire Fighting	0.12	0.13	0.13
Total Water Demand	5.95	6.40	6.83
Add 10% extra (Say for defense area, Floating population, Tourism, Service population etc.)	0.59	0.64	0.68
Overhead Population Water Demand	6.54	7.03	7.52

Note: Cities provided with piped water supply where sewerage system is existing / contemplated- 135 lpcd (URDPFI Guidelines)

6.1.2 Drainage System

Sarthebari town does not have a scientific and well-defined drainage system. As per the Census of India, 2011, 83.04% of the households in Sarthebari Municipal Area and 92.98% households in the overall Master Plan Area do not have drainage facility. The rest are kutcha unlined roadside drains carrying storm waste to nearby low lying areas. Largely due to insensitivity of the public, garbage is often thrown in these open drains, causing water logging problems during rainy days. As per the information provided by Sarthebari Municipal Board, the roadside drains in Sarthebari town is approximately 500 m in length and is in poor condition. Sarthebari town is prone to inundation during rainfall due to poor drainage system and the excess water goes to Alpha Rivulet.

A lack of proper drainage system raises serious health and sanitation issues and causes public discomfort. Modernizing the drainage system is of utmost urgency to carry Sarthebari in the path of development. A scientific drainage system goes a long way in preventing vector borne diseases and saving what could otherwise be huge medical expenses.

6.1.3 Sanitation

As per Sarthebari Municipal Board, 90% of the households have toilets within their house premises. Under the Swachh Bharat Mission (G), toilets have been constructed across Sarthebari district and subsequently, the district was declared Open Defecation Free (ODF).

6.1.4 Sewerage Network

A proper sewerage system includes collection of sewerage from source of generation through sewer network, treatment using appropriate available efficient technology, and safe disposal to natural water bodies. Sarthebari town does not have a well-integrated sewerage network. The drains here carry a mixture of domestic sewage and storm sewage. The individual households have their own septic tanks,

soak pits, artificial pond for treatment of their liquid wastes. The effluent is released untreated into nearby drains and low-lying areas.

Untreated sewage is a leading cause of pollution of water bodies in Sarthebari, causing contamination of land and water, and degradation of the environment. In this context, establishment of Sewage Treatment Plant using affordable technology is crucial. The treated sewage water can be reused for different purposes like horticulture, irrigation, fire-fighting, industrial cooling, etc. thereby decreasing the water demand from sources like underground, rivers, lakes, etc.

6.1.5 Solid Waste Management

Solid Waste Management refers to the practice of collecting, treating and disposing municipal wastes originating from materials which have lost its purpose and are of no value, in accordance with the principles of public health, engineering, economics, aesthetics, etc. The sources of municipal solid wastes are- (i) residential wastes (ii) commercial wastes (iii) wastes from rituals (iv) desilting wastes (v) treated bio-medical wastes.

As per the information provided by Sarthebari Municipal Board, a plot at **ward no. 8 (Daag No 1516) of 6B-4K-5L** has been identified for Solid Waste Management. According to the Solid Waste Management Rules, 2016, all the ULBs are responsible for Solid Waste Management activities within their respective jurisdiction. Instead of treating waste as a problem, it could be treated as an opportunity. Recovering materials from waste through recycling could potentially generate revenue. Zero-waste programmes should be adopted. Proper execution of such programmes will make it financially self-sufficient and even earn revenue in due course. Waste can be a useful resource for energy production, either through incineration or harnessing methane gas from bio-degradable waste. Public Private Partnership is key to successful Solid Waste Management.

6.1.6 Electric Sub-Station and Major Transformers

The Master Plan Area has one nos of 33/11 KV sub-station at Sarthebari which meets the power needs of the MP area with 2 nos. of Transformer of Total Capacity 8.15 MVA.

For the plan period of 2041, the MP Area would require about 27 MW power supply for domestic purposes @ 3 kW per household (average). Further, DTR augmentation will be required to address voltage issues. The local administration of Sarthebari MP Area is involving themselves in strategic and sustainable energy planning.

6.2 SOCIAL INFRASTRUCTURE

Health and education sector forms the backbone of social infrastructure. It also includes other facilities like banks, post offices, police stations, playgrounds, etc. Social Infrastructure supports the quality of life and access to it is crucial for an all-round human development.

6.2.1 Education

There are about 50 educational institutions in the Sarthebari MP Area ranging from primary schools to college.

The following table provides information of government schools and colleges in MP Area:

Table 6-3: Educational Institutions in Sarthebari MP Area

Standard	No. of Institutions	No. of Students	No. of Teachers
Primary Schools	22	-	-
M.F. schools	14	-	-
Secondary school	10	-	-
SSenior econdry school	3	-	-
College for general education	1	-	-

Source: District Elementary Education Office, Sarthebari

The Pupil Teacher Ratio (PTR) for Primary and Middle Schools are 30:1 and 32:1 respectively. The Right of Children to Free and Compulsory Education (RTE) Act, 2009, in its Schedule lays down PTR for primary and upper primary level. At primary level, the PTR should be 30:1 and at the upper primary level, it should be 35:1. Comparing these ratios, the PTR is found to be satisfactory.

As per the data collected from the District Elementary Office, Sarthebari, most of the government primary and M.E schools in the MP Area have open spaces. Open spaces is vital for students to development of vital cognitive skills, emotions and creativity.

The Master Plan envisages the establishment of integrated schools in new areas rather than opting for various levels of educational institutional facilities separately. Similarly, crèches and pre-nursery schools are permissible in the residential use as a part of the Mixed-use Policy. In all educational institutions, proper provision for differently abled children shall be made.

6.2.2 Health

An adequate and well-distributed health infrastructure is crucial for efficient and timely response to health crisis. A quality health infrastructure plays a vital role in controlling various health related parameters like life expectancy, mortality rate, etc. to respectable level, and is also found to have a positive impact on speedy recovery from diseases. A sound health system is accessible and delivers high quality care at reasonable price.

In Sarthebari MP Area, there is one Hospital, One Primary Health Centre, One Family Welfare Centre, One Maternity Homes and one Veterinary Hospital.

6.2.3 Recreational Facilities

6.2.3.1 Parks

As of now, there is no functioning parks within the limits of Sarthebari Town.

6.2.3.2 Playgrounds

There are a few playgrounds belonging to educational institutions like Bapujee College Playground, Sarukhetri High School Playground, etc. These playgrounds are not up to standard and are ill-equipped to smoothly accommodate crowd during social and political gatherings.

6.2.4 Communication and Other Facilities

6.2.4.1 Police Station

There is 1 Police Station at Sarthebari.

6.2.4.2 Fire Service

Fire Services are needed for protecting people from fire hazards, building collapses, and other unforeseen emergencies. There are one fire protection service in the MP Area.

6.2.4.3 Postal Services

The MP Area has 1 sub post office at Sarthebari town.

6.2.4.4 Banks

Assam Grameen Vikas Bank, Bandhan Bank and UCO Bank are the major banks located in the MP Area. There are Customer Service Points (CSP) and Business Correspondents to deliver banking and financial services especially to the rural areas.

6.2.4.5 Cremation and Burial Grounds

In Sarthebari town, there is 1 cremation ground near the Police Station.

6.2.4.6 Auditorium/ Community Halls

In Sarthebari town, there is 2 nos of Auditorium/ Community Halls at present and 1 public libraries.

7. ENVIRONMENT AND CITY BEAUTIFICATION PLAN

7.1 INTRODUCTION

Sarthebari town is surrounded by farm lands, open spaces and eco-sensitive areas like river banks and embankments. However, very little area is developed under recreational land-use. This Master Plan proposes an enhanced recreational land-use while preserving the natural endowment elements and promoting ecological sustainability. Trails, parks, community gardens can be additions to a town that only improves the aesthetic characteristics but also have a calming effect on the minds of people. These will propagate a high quality living environment and improve physical health and mental well-being.

Furthermore, for creating a sustainable environment, citizen participation should be promoted. As the standard of living of the people improves, the per capita waste generation increases. Awareness drives should be conducted to bring about a positive community behaviour change ranging from control of greenhouse gases to reduction of single use plastics. Innovative technologies in partnership with different groups and organization should be embraced.

The aim of this Master Plan is to make the town a healthy and an enjoyable place to live in. Diversity of choices to the citizens should be expanded by constructing theatres, community halls, libraries, museums. Proper building codes is to be enforced. It has been proven that in the event of calamities, a well governed and scientifically planned city has lower risk of fatalities and is more resilient.

7.2 CITY BEAUTIFICATION PLANS/PROPOSALS

7.2.1 Roadside Plantation

One of the best examples of planned tree plantation along city roads in India is New Delhi. It is an exemplary model of architectural, structural and aesthetic excellence. Some of the remarkable features that can be attributed to its artistry are:

- Use of structurally large trees with very tall, straight trunks that form excellent sprawling crowns.
- The use of indigenous species that are hardy, sturdy and durable that makes them easy to grow and maintain. They are able to withstand the extreme environmental pollution from toxic automobile exhausts that usually threaten delicate trees.
- Evergreen varieties of trees used which lends to year-round green effect and protection from severe weather conditions.
- The entire expanse of open space between the concrete buildings and roads covered, creating a soothing visual effect.
- Avenues planted with single kind of trees that offers a glorious collective impact. The consistency, homogeneity of structure, texture and pattern it creates has helped bind the entire city together.
- Planting trees close to the verges, has helped separate vehicular and pedestrian traffic.
- All flowering species of trees that are structurally small, short-lived and difficult to grow and maintain have deliberately not been used for roadside plantation. Instead these have been

exclusively planted in parks and various open spaces where they grow well and provide colour and beauty to the city.

Benefits of road side planting

- Reduced soil erosion: holds soils in place
- Remove dust and other pollutants from the air, protecting crops and road-side communities
Wind break
- Flood control: slow and absorb road run-off
- Carbon dioxide sequestration
- Provide important pollinator habitat (honey production)
- Provide shade and keep the road cool for road users

7.2.2 Urban Forestry

Urban agriculture can be described as the growing of plants and the rearing of animals primarily for food and other domestic use within a city or a town and its environs. It also involves activities such as the production, processing, marketing, and delivery of farming products. Urban agriculture consists of a number of production systems. They vary from domestic production and household level processing to large scale agriculture. This is usually done within the city peripherals. Urban agriculture is known to improve the livability of cities and towns and contribute to their sustainability. Urban forestry can be defined as the management of tree population in urban settings for the purpose of improving the urban environment. Besides providing sociological, economic and aesthetic benefits, urban forestry can be a tool for mitigating carbon dioxide emissions as trees can help in its sequestration. It advocates the role of trees as a critical part of the urban infrastructure.

The Indian government's Ministry of Environment, Forests and Climate Change has been advocating the concept of Urban Forestry or Nagar Van in the recent times. In consonance with this, the Sarthebari MP Area open space which can developed as recreational land-use to make it accessible to the public. Trails may be added and the general layout may be planned without felling of any trees. This will add to the beauty and environment quotient of the town while also improving the physical and mental health of the residents. The said land can be used as a venue for picnics, local festivals, theatrical performance, etc.

Types of Urban Agriculture	• Backyard Gardens • Tactical Gardens • Street landscaping • Forest gardening • Greenhouses • Rooftop gardens • Green walls • Vertical farms • Animal husbandry • Urban beekeeping • Aquaponics
Benefits of Urban Agriculture	• Food Security • Healthy community participation

	• Offsets urban heat island effect • Decreases storm water runoff Boost the local economy
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7.2.3 Rainwater Harvesting

Rain water harvesting (RWII) is the activity of direct collection of rain water. It involves the process of optimum utilization of the natural resource, i.e., water. With urbanization, increasing concrete constructions have reduced infiltration of rainwater into the sub-soil and recharging of ground water has diminished which has depleted aquifers. Many states in India has therefore formulated mandatory policies and laws to encourage construction of artificial recharge and rainwater harvesting structures. Rain water harvesting methods can be easily practiced in offices, parks, temples, and individual houses. RWH from roofs consists of collecting, storing, and putting to use rainwater from houses or any constructions. Rainwater can also be collected through percolation pits, open wells, or bore wells. The artificial recharge of ground water aims at augmentation of ground water reservoir by modifying the natural movement of surface water utilizing suitable civil construction techniques. India faces an erratic monsoon, and RHW can be an effective tool in water management and conservation.

7.2.4 Riverfront Development

Riverfront development can be undertaken as an additional buffer. Public spaces can be created to let residents enjoy the riverfront and its surrounding. Parks, walkways, and spaces to host festivals can be developed in order to enhance community culture and quality of life. The stretches of Alpha Rivulet can be developed as fully accessible immersion ghat with recreational facilities such as yoga and meditation centre, open air theatres. Chhath Puja is also annually conducted along the banks of the Alpha Rivulet, which can be improved by providing proper lighting facilities. No permanent structure is to be permitted in the buffer zone.

7.2.5 Multi-Purpose Public Spaces for Sports, Cultural Events, Ceremonies, etc.

Public spaces are an important asset to cities. They provide people with many opportunities to come together and engage with the community. They create a social space for everyone in the society to participate in. This open public space may be used for hosting various events which will bring together multiple functions to help create a more sustainable future.

7.2.6 Garbage bins

Areas of high passersby like bus stands, auto stands, and marketplace have high waste generation potential. Without proper waste disposal facilities, these places are prone to be littered. Dual bin structure, colored green and orange for organic and inorganic waste respectively should be installed to facilitate source separation. Proper graphics and labels should also be used for clear communication.

7.2.7 Road Signage

The purpose of street signage is to make it easy for visitors and residents to navigate around. It should highlight major locations in an appealing and informative manner. Old, cracked, faded and obsolete signs needs to be replaced, maintained or removed permanently.

7.2.8 Street Furniture

Street furniture including benches in areas of high pedestrian traffic and/or areas of interest is very important and the design must take into consideration the local context in terms of weather resistance and material selection.

8. LAND USE PLAN

8.1 EXISTING LAND USE

The Sarthebari Master Plan Area consists of 26 revenue villages along with the Sarthebari Municipality area, and covers a total area of 4721 hectares. Predominantly an agriculture-based land, there are also low-lying marshy lands and ecologically fragile. Illegal construction and lack of scientific land-use control has led to unplanned and haphazard growth resulting in natural drainage to get affected in many areas. Natural and semi-natural vegetated areas have witnessed exploitation with these lands being often used for residential and other development. This has given rise to a threat of potential health hazards in addition to diminishing the aesthetic appeal of the Master Plan area.

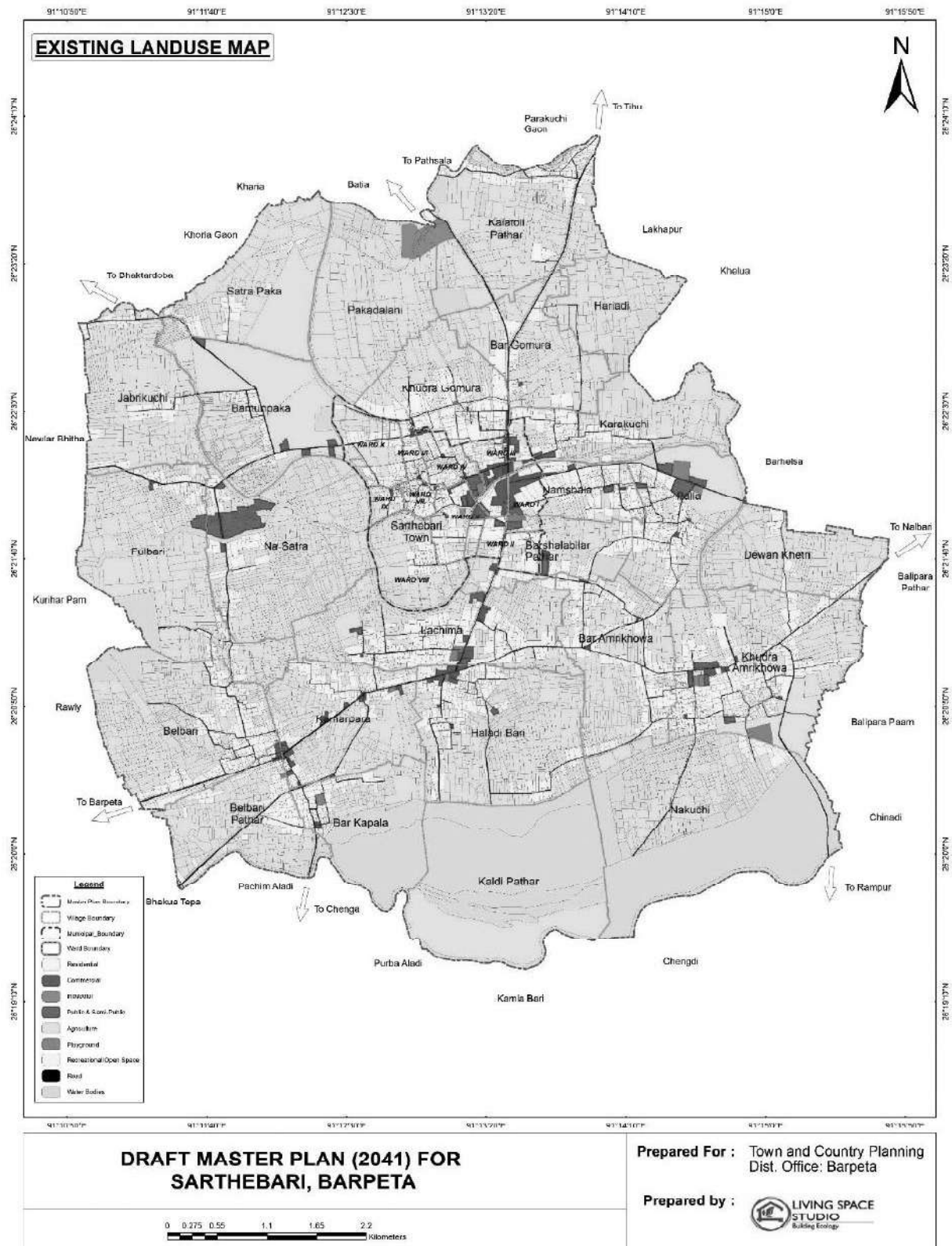
8.2 LAND-USE PATTERN

Land use survey was conducted for the Sarthebari Master Plan area by the Consultant.

Table 8-1: Existing Land-use Classification (2022)

Sl. No.	Land use	Total Master Plan Area		
		Area in Sq.km	% to Developed Area	% to Total Area
1	Residential	9.36	81.75	19.83
2	Commercial	0.3	2.62	0.64
3	Public & Semi public	0.55	4.80	1.17
4	Industrial	0.15	1.31	0.32
5	Transportation	0.81	7.07	1.72
6	Parks & Playground / Recreational	0.28	2.45	0.59
	Total developed area	11.45	100.00	24.25
7	Agriculture	28.13		59.58
8	Water Bodies	7.63		16.16
	Total Area	47.21		100.00

It can be seen from the above table that 81.75% of the total developed area is under residential land-use and accommodate primarily single family, detached houses. 2.62% of the total developed area is under commercial land-use. Commercial establishments have developed along the Feeder Road. Industries occupy 1.31% of the total developed area. 4.80% of the total developed area is under public & semi-public land use. This is not enough and indicates a possible inconvenience and discomfort of the public in accessing public services. Transportation cover 7.07% of the total developed area respectively. Recreational land-use is almost negligible covering 2.45%, indicating a lack of proper space for the people to relax and unwind.

Figure 7: Existing Land-Use, Sarthebari Master Plan Area

8.3 LAND-USE INTERACTIONS

The survey conducted by the Consultant in 2022 reveals that the planning area has mixed land-use especially within the Municipal area. This has created inefficient and non-conforming land-use and loss of inter-relationship between various land-use. It is observed that quite a no. of land-use does not have functional relationship with the surrounding area. A few of them cause nuisance in the area where they exist at present. Relocation of such incompatible land-use to suitable site is, therefore desirable.

8.4 PROPOSED LAND USE PLAN

All areas under the Sarthebari Master Plan have been designated as one of the following land use-zones, which are residential, commercial, industrial, public- and semi-public, recreational, transportation and agricultural.

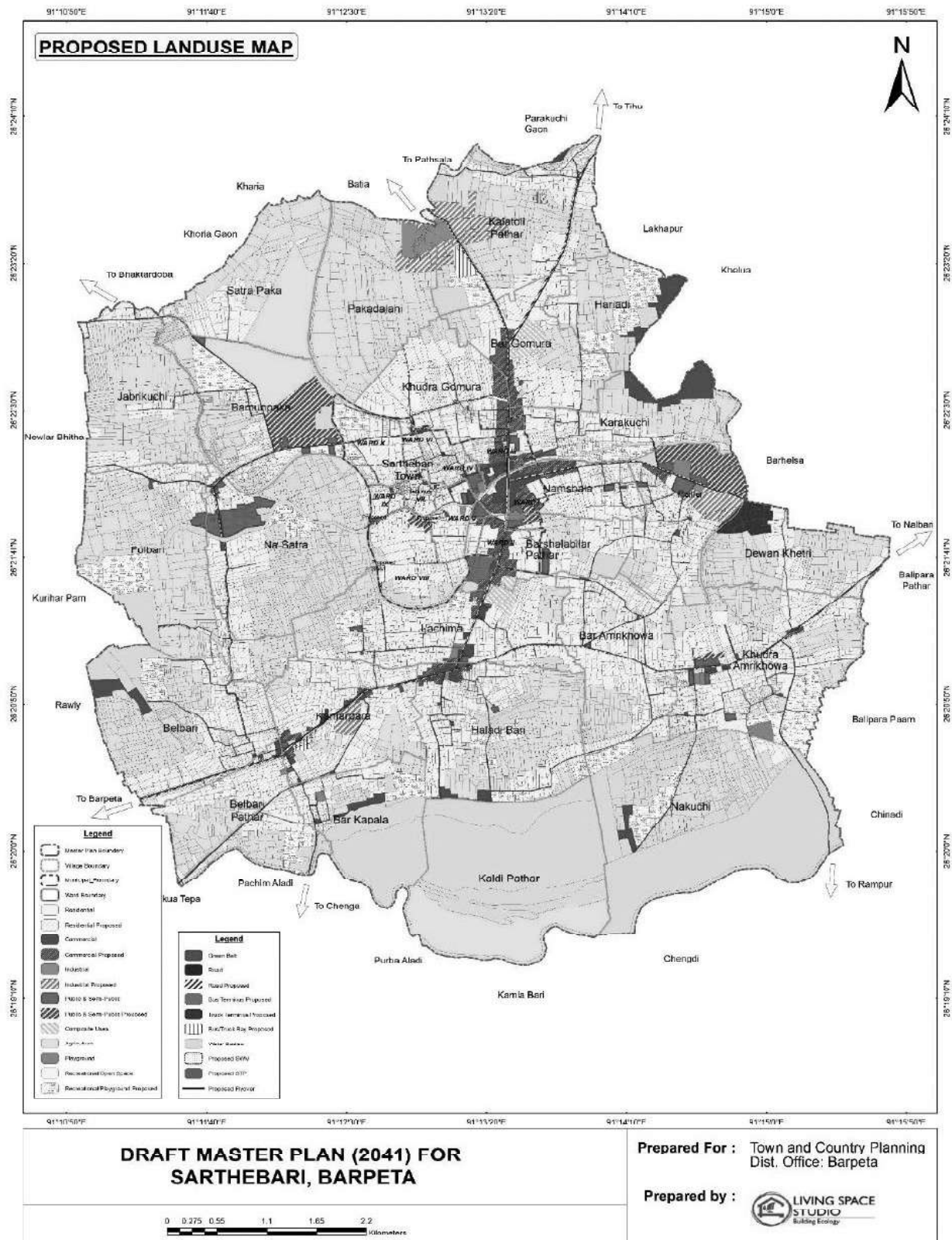
The over-all land use break-up for the new proposed Planning Area measuring 4721 hectares. is as follows:

Table 8-2: Proposed Land-Use Classification

Sl. No.	Land use	Total Master Plan Area		
		Area (in Sq.km)	% to Developed Area	% to Total Area
1	Residential	14.89	65.54	31.54
2	Commercial	0.89	3.92	1.89
3	Public & Semi public	0.98	4.31	2.08
4	Industrial	0.68	2.99	1.44
5	Composite Use	0.20	0.88	0.42
6	Transportation	2.3	10.12	4.87
7	Parks & Playground / Recreation	2.78	12.24	5.89
	Total developed area	22.72	100.00	48.13
8	Agriculture	16.40		34.74
9	Green Belt	0.47		1.00
10	Water Bodies	7.62		16.14
	Total Area	47.21		100.00

- **Residential Area**

65.54% of the total developed area has been earmarked for residential land use. The residential areas are proposed to be developed as self-contained units with provisions of all community facilities and services, and work places within reasonable distances duly served by an efficient circulation system. Accessibility of the property by road and connectivity with the important nodes of the master plan area is proposed.

Figure 8: Proposed Land-Use, Sarthebari Master Plan Area

- **Commercial Area**

Commercial activities are critical to the economy of the community. 3.92% of the total developed area has been earmarked for commercial land-use. At present, retail trade is mixed with wholesale trade in the town which creates problems like traffic obstruction during loading and unloading activities. A lot of unregulated businesses have also sprung up in the Master Plan area which will be accommodated to ensure public convenience and a sanitary environment to conduct their vocation.

- **Industrial Area**

2.99% of the total developed area has been earmarked for industrial land-use. Sarthebari Master Plan area is favourably located, with advantages of a good transportation network and proximity to market.

- **Public & Semi-Public Area**

4.31% of the total developed area has been earmarked for Public & Semi-Public land use.

- **Transportation**

10.12% of land has been earmarked for transportation and railways respectively. The improvement of transportation infrastructure will include road widening, road realignment and road extension.

- **Recreational Area**

12.24% have been proposed for recreational land-use. Public parks and immersion ghats will be developed and modernized to elevate public comfort and provide ease of access to them.

- **Solid Waste Management**

There is no organized garbage disposal site by the town Sarthebari. The garbage are generally disposed along the road side or in the existing river/streams which effects the water and lets to water contamination. Therefore, Sarthebari Municipal Board, a plot at ward no. 8 (Daag No 1516) of 6B-4K-5L has been identified for Solid Waste Management

- **Drainage and Sewerage**

To solve the drainage sewerage problem comprehensive drainage and sewerage schemes should be taken up or drainage Master plan for long term basis. From the hygienic point of view, the drainage and STP scheme should be on top priority. Accordingly, two site for FST have been proposed. The proper drainage master plan preparation has been proposed for long term solution of flood problem.

In the meantime, relief measures like opening up of blocked drains and their proper maintenance should be taken up to avoid further deterioration of drainage condition

- **Composite Use**

0.88% of land have been earmarked for Composite land use. "Composite Use Zone" is defined as a mixed-use zone, where Residential, Commercial, recreational are allowable except industrial use.

8.5 ZONING

8.5.1 CENTRAL BUSINESS DISTRICT (CBD):

Central Business District (CBD) is proposed in the Main Market area along the SH9 and SH9A and nearby to the Sarthebari Railway Station. this area contains the principal commercial streets and these areas can be developed as focal high density commercial space. Also proposed CBD will enhance its attractive as a commercial/business hub and City Centre. Adequate Physical and social infrastructure

and utilities are to be developed to ensure smooth accessibility and healthy environment so that it gives way to a bustling social and business scene.

8.5.2 TOWN PLANNING SCHEMES:

TPS is proposed to be implemented in the following Greenfield areas within the periphery of the Sarthebari Town –

Table 8 3: Proposed Town Planning Schemes

Sl. No.	Scheme Name	Location
1	TPS I	Kamarpara & Haldi Bari
2	TPS II	Barshalbilar Pathar
3	TPS III	Bar Gomura & Kalatoli Pathar

Under TPS, planning will be done at local level for planned urbanization in the future. Land owners will derive immense benefits as they will receive developed plots within organized layout along with urban services like roads, drainage, etc.

8.5.3 LOCAL AREA PLANNING:

Existing areas/city core can be redeveloped or development of public facilities by preparing a detailed Local Area based Plans (LAPs) for which One LAP's Site has been identified-

1. **LAP I:** Sarthebari, Ward No. VIII

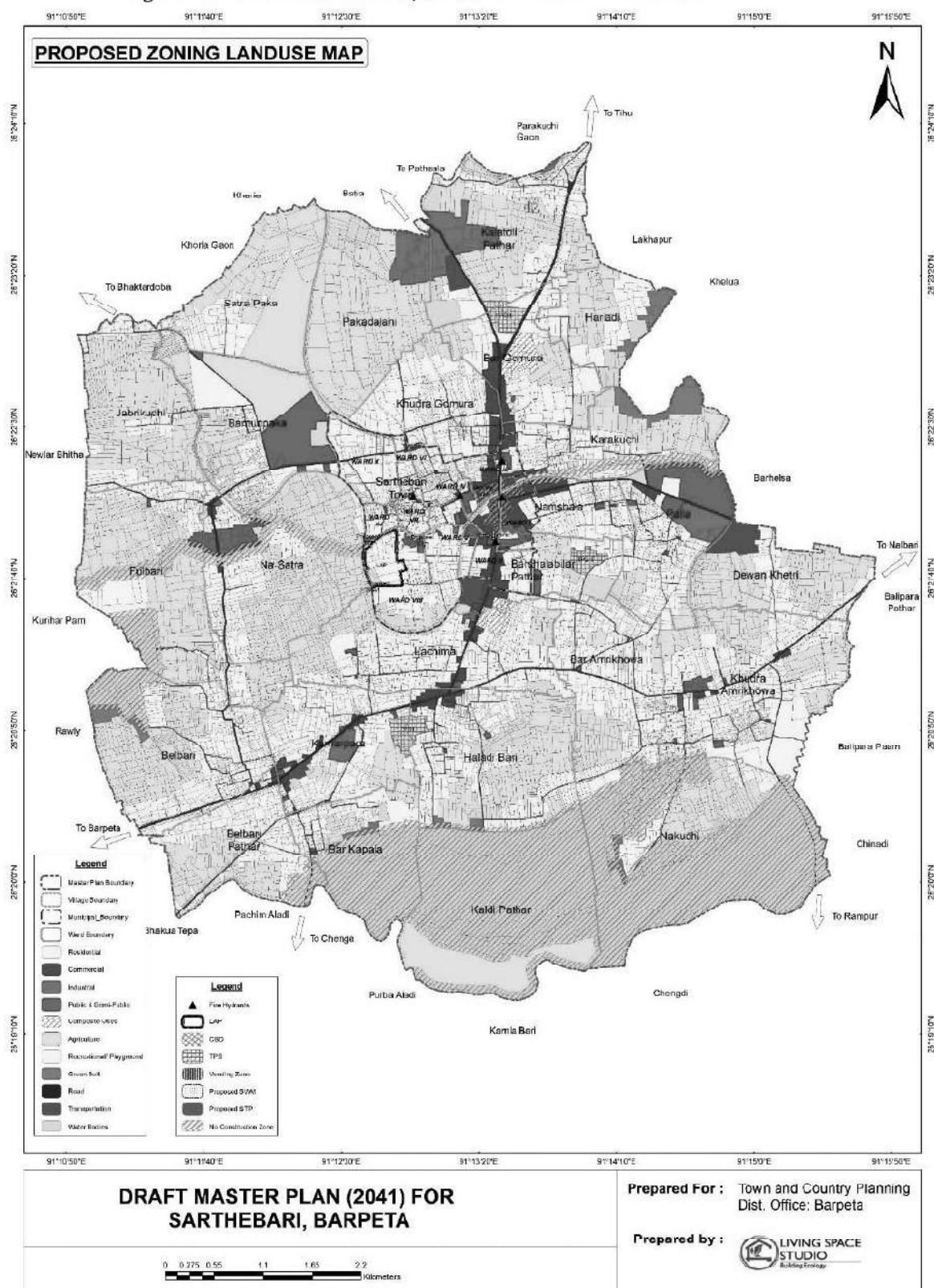
8.5.4 NO CONSTRUCTION ZONES:

The banks of Alpha Rivulet and all major water bodies is delineated as 'No Construction Zone' for protection of the fragile environment and prevention of residential encroachment. This zone will extend 15 metres in Municipal Board areas and 50 metres in rural areas from the banks of natural water bodies. No permanent construction will be permitted in the No-Construction Zone. In case, other land-uses such as 'industrial' is in vicinity or extending into this zone, their activities will be regulated and no physical alteration of the land will be permitted. The No-Construction Zone will be a sustainable zone to protect sensitive landscapes from negative external pressures.

8.5.5 VENDING ZONE

Keeping in mind that street vendors are indispensable part of any city, Two vending zones have been identified in Sarthebari town. These zones have been demarcated in the Zoning Map for reference and are as follows:

1. **Vending Zone I:** Near Jagannath Mandir
2. **Vending Zone II:** Near Sarthebari Higher Secondary School

Figure 9: Zonal Landuse Plan, Sarthebari Master Plan Area

9. PROPOSED PROJECTS' BRIEF AND TENTATIVE FUNDING SOURCE

9.1 INTRODUCTION

Sarthebari town can be converted into a vibrant commercial centre by reaping the advantages that its location and demography presents. A smart communication and a harmonious interrelationship between different organizations and stakeholders entrusted with the development of the region is to be established so as ensure that growth is sustainable.

For achieving this, future urban planning decisions need to be based on the judicious disposition of activities along with greater planning expediency to align its role for prosperity and planned urban development. The planning decisions of the Sarthebari Master Plan are consciously aimed at sustained and planned city development. In order to generate positive urban development, the Master Plan would focus on conscious decisions to provide impetus and support to anticipated urbanization.

9.2 BASED ON EXISTING CONDITIONS AND PROJECTED REQUIREMENTS OF THE PLANNING AREA, IDENTIFY PRIORITY SECTORS AND PROJECTS

The Guiding Principles for preparation of Sarthebari Master Plan 2041 are derived from planning experiences and challenges confronted in the city which include as following:

- Environmentally and Ecological Suitable Development
- Local Economic Development
- Sustainable and Integrated Transport System
- Inclusive and Collaborative Integrated Urban Development
- Mixed-use Development Policy

9.2.1 Environmental and Ecological Suitable Development

The topography and drainage system of this region presents a unique challenge towards attaining the perfect balance between resource conservation and utilization. The incorporation of effective environment conservation and sustainability features will be an important aspect in the preparation of this Master Plan. Environment conservation is a major issue that needs to be tackled while planning the development of any area. Efficient measures towards conserving the natural surroundings will be adopted, since the balance between natural and man- made surroundings significantly enhances the quality of life of residents.

Protecting the irrigated and fertile land as well as forest area and development in the less fertile area, will be the aspect of the planning proposal. An appropriate balance between built and un-built areas is proposed to be established so as to provide a good quality of life to the people inhabiting the area.

9.2.2 Local Economic Development

Sarthebari is an important transit place in its region. Therefore, locational advantage of Sarthebari from economic and tourism point of view needs to be viewed as important economic ingredient. To rejig its

economy, local economic indicators need to be identified and objectively assessed for taking policy decisions. To improve the economic development in the region, promotion of different economic sectors has to be carried out for diversification and strengthening of economic base of the city. Job-oriented land-uses have to be propagated in the master plan so that present level of unemployment in the region is drastically brought down. The social infrastructure of the area has to be emphasized as well so that the youths can be skilled, upskilled and reskilled in accordance with the needs of the present times, converting them into sources of demographic dividends.

9.2.3 Sustainable and Integrated Transport System

Traffic congestion, faulty parking, insufficient Road widths, decreasing Level of Service (LoS) of most of the city roads, inefficient public transport, etc. are some of the problems of urban transport and transport network in the town. Apart from this, like other cities there is complete disconnect between land-use and transport network. Keeping this in view, attempt has to be made to connect the two in scientific manner to make the land-use plan more functional.

9.2.4 Inclusive and Collaborative Integrated Urban Development

The countryside is viewed as a potential area of urbanization for Sarthebari town in next two to three decades. Having good connectivity via road network and railway, the region presents a tremendous scope of growth. The basic planning principle is to create a sustainable blend of rural-urban continuum. The growth is proposed to be inclusive of all income groups integrating sectoral vision for holistic development of the region.

9.2.5 Mixed-use Development Policy Concept

Any building(s) having a combination of more than one use at a specific point of time is said to have 'mixed use'. For example, a building having one use in the ground floor and other use(s) in the upper floor(s) is said to have mixed use. The mixed use shall not be misconstrued with the mixed use of a plot or a parcel of land. It is a vertical land use change of a building across its floors rather than a change over space laterally. Mixed use is always a combination of main use and the uses which are incidental to the main use. While the main use is defined as the Primary use, the incidental use is construed as Secondary use. It is an important planning tool to accommodate the unforeseen land use changes resulting because of competitive market forces in city centres and along important streets. Mixed use has also become inevitable because of limited scope for horizontal expansion as well as scarcity of land in such areas. For example, commercialisation along main arterials within the residential areas is an illustration of land use conversion resulting because of such factors. The main requisite underlined for the mixed use model is the compatibility of the uses in terms of their type and intensity. In no case, the uses defined as obnoxious or hazardous in this master plan under land use regulations shall be permitted under mixed use category. The secondary use has to be essentially subsidiary or conforming in nature like convenient shopping, primary health and education facilities and basic public services and amenities having manageable impact on the surrounding land use. However, this trend has to be regulated and restricted as prescribed in this Master Plan for numerous benefits and as such, has been for purposes of this Master Plan defined objectively to avoid its misuse while issuing building permissions. For purposes of this Master Plan, mixed use is defined where:

In case of mixed use distribution, the secondary use shall be restricted to one floor only (preferably the ground floor) which is more susceptible to land use changes. While issuing the mixed use permits, care

should be taken to consider the Secondary use as ancillary use to the main use in size and scale within the structure.

9.3 Fund Requirement for each sector/project identified under the sectors

No fiscal plan has been worked out at this stage. The final Master Plan would provide a basis for preparation of five yearly development programmes and yearly fiscal plans for implementation.

9.3.1 Sources of fund: Specific Central Scheme funds (10%, NLCPR, AMRUT, Infrastructure Dev Fund, etc) Assam Finance Commission funds, CM's Special Package, Public Private Participation, Loan from (Externally aided Project (JICA-World Bank-ADB), etc.

- **MLAADs:** projects under this scheme must be developmental in nature and may include parks, urban forestry, etc.
- **Externally Aided Projects:** these are important potential sources of augmenting the state resources. it plays a significant role in the development process and includes project financing international institutions like ADB, JICA, International Finance Corporation, World Bank, etc. goa has a dedicated cell called leap (lead externally aided projects) in the finance department to coordinate with external funding agencies to explore potential partnership.
- North East Special Infrastructure development Scheme
- Social & Infrastructure Development Fund
- North Eastern Road Sector Development Scheme.

Availability of adequate funds is an important determinant for successful implementation of the plan proposals. While conventional pattern of project financing is being in transition, the private investments and public private partnership modes of infrastructure development assumes greater significance. This apart, the programmes of the National Government provides greater opportunities for improving the status of infrastructure and service delivery. Hence, it is the responsibility of every development agency concerned to take initiatives to draw maximum funding for the plan implementation.

National Programmes and Funding agencies available for the resources in urban area.

Integrated development of small and medium town Programme, is a programme of national importance, which has identified the sectors and projects eligible for assistance, which include:

- i. Water Supply (including de-salination plants) and sanitation
- ii. Sewerage and Solid Waste Management
- iii. Construction and improvement of drains/storm water drains
- iv. Construction/Up-gradation of roads, highways/expressways
- v. Parking lots/spaces on Public Private Partnership basis
- vi. Development of heritage areas
- vii. Prevention & rehabilitation of soil erosion/landslides only in case of Special Category States where such problems are common and
- viii. Preservation of water bodies.

10. DISASTER PLAN

10.1 Introduction

The District Disaster Management Plan is an effective plan which envisages several measures that can be taken in the event of any kind of disaster. The State Policy recognizes that hazards are inevitable but these need not convert into disasters. This Policy is based on the twin principles of minimizing human suffering during disasters and reduction of financial losses through integration of disaster risk reduction activities into development planning.

Owing to a unique geographical and geo-climatic setting, the State of Assam has witnessed a number of disasters, ranging from incidents of fires to destructive floods and catastrophic earthquakes. The State has witnessed many natural and manmade disasters especially in the 19th and early 20th century. In the wake of recurring disasters, the State has always paid heavily in terms of loss of life and property. Like other parts of the State, Sarthebari district and Sarthebari Town is a multi-hazard prone area. Multi Hazards which are confronted are detailed in table below-

Table 10-1: Multi Hazards Areas Covered

Sl.No	Hazard	Areas Covered
I.	Floods	Sarthebari is one of the flood prone districts of Assam. The general reason of occurrence of flood in Sarthebari district is due to overflow of river Buhadiya, Mora Saulkiowa, Kaldiya, Tilu Nadi, Alpajan and their tributaries. The entire area of the district is situated at the foothills of Himalayas. The rivers and tributaries of the district originated from the foothills of the Himalayan Range and are wild in nature. Flood occurs generally in the low-lying areas of the district during May to August every year. Late flood during the later part of September & October also occurs.
II.	Earthquakes	The tectonics of the Assam region is dominated by convergence of the India, Burma and Eurasian plates and is categorized as Seismic Zone- V which would need special measures to mitigate, minimize and safeguard the life, property and infrastructure which makes structural safety important.
III.	Landslides	Areas along major Riverbank
IV.	Drought	Most of the paddy growing areas depend upon the rainfall. The monsoon commences around the middle of April/May. For timely agricultural operation, a few showers of pre-monsoon rain is absolutely necessary. Regular rainfall till the middle of October can ensure a good harvest. But, if the rainfall at any circumstances will not happen then this will lead to improper agricultural operation and growth of crop and finally the drought will occur. So drought is caused due to failure of rains in season. The areas under drought need recharging and retention of water table for both urban and agrarian activities.
V.	Wind storm	Occasional wind storms is destroying crops, horticulture and houses in Sarthebari & it is prone to high speed winds causing extensive damages to urban infrastructure and urban forestry.

VI.	Hailstorms	Although hailstorms rarely involve loss of lives, their economic impact can be severe. The damage appears to be a function of the intensity and duration of storms and the size of the hailstones, which these produce. The damage itself is often produced not only by the impact of falling hailstones, but also by the high winds and torrential rains that is part of the hailstorm.
VII.	Fires	In Assam due to peculiar housing patterns maximum fire accident cases takes place. These houses are of generally mud-built walls with thatched roofs made out of timber, bamboo and straw. They spring up in clusters. In summer fire accident becomes frequent; it destroys houses and properties and causes serious distress to the afflicted people. Incidents of fires are mostly recorded in the congested parts of the city and urban poor areas.
VIII.	Human induced disasters	All parts of the Sarthebari Town are vulnerable to man-made disasters due to competing urban uses, high cost of land and limited land resource.

District Disaster Management Authority should get area-specific hazard, vulnerability and risk maps prepared using GIS database for mitigation and emergency management. The plans so developed shall be operational, regularly reviewed and updated. This will help in the vulnerability assessment of town after proper zonation. Specific measures like micro-zonation of Sarthebari Master Plan based on disasters and integrating it with the land use planning and zoning regulations, retrofitting of infrastructure and buildings, disaster-safe construction technology and strengthening the capacities of communities shall be promoted in a time-bound manner. The construction work and other activities that may lead to situations eventually resulting in disasters shall be monitored regularly in vulnerable areas like water-bodies, hill slopes.

Hazards like earthquakes and cyclones do not kill people but inadequately designed and badly constructed buildings do. Ensuring safe construction of new buildings and retrofitting of selected lifeline buildings is a critical step to be taken towards earthquake mitigation. The Building construction, material and design specifications as laid down in the National Building Code-2005 shall have to be a mandatory requirement for important and high rise buildings. In case of areas having moderate to high vulnerability of flash floods and landslides, the buffer zones envisaged in this Master Plan need to be implemented while permitting any development in such areas.

10.2 Safety against Natural Disasters

10.2.1 Earthquakes

The application for seeking building permit shall be accompanied with a report of Architect/Structural Engineer certifying that the proposed structure has been designed structurally keeping in view the safety measures against earthquakes as indicated in the following Bureau of Indian Standards (B.I.S).

Bureau of Indian Standards (B.I.S).

- a. IS: 13935: 1993
Repair and Seismic Strengthening of building guidelines
- b. IS: 1893 (part i): 2002
Criteria for Earth quake Resistant Design of structure
- c. IS: 4326 1993 (2002-04)

- Earthquake Resistant Design and Construction of building – Code of practice
- d. IS: 13920: 1993
Ductile Detailing of Reinforced Concrete structures subjected to seismic Forces – Codes of Practice
 - e. IS: 13827: 1993
Improving Earthquake Resistant of Earthen Building – Guidelines
 - f. IS: 13828: 1993
Improving Earthquake Resistance of low strength Masonry Building Guidelines

10.2.2 Fire Protection and Fire Requirements

This part covers the requirements of the fire protection for the multi-storied buildings (high rise buildings) and the buildings which are of 15 mtr. and above in height and low occupancies of categories such as Assembly, Institutional, and Educational more than two storeyed and built-up area exceeds 1000 sq.mt. Business where plot area exceeds 500 sq. mt., Mercantile where aggregate covered area exceeds 750 sq.mt., Hotel, Hospital, Nursing Homes, Underground complexes, Industrial storage, Meeting/Banquet halls Hazards Occupancies.

Fire protection requirements: Buildings shall be planned, designed and constructed to ensure fire safety and this shall be done in accordance with Part IV Fire protection of National Building Code of India. The building schemes as such also be cleared by the District Officer of the Fire and Emergency Services Department before issuance of building permit.

10.3 Standard Operational Procedure (SOP) on Disaster: Pre-disaster, During and Post disaster

The District Disaster Management Plan-2011-12 updated by District Disaster Management Authority is an effective plan which envisages several measures that can be taken in the event of any kind of disaster within its territorial limits.

The plan deals with Risk Assessment and Vulnerability Analysis, Identification of disaster-prone areas, Response structures, Inventory of Resources, Standard Operating Procedures, Directory of Institutions and key Individuals. The plan is prepared to help the District Administration focus quickly on the essentials and crucial aspects of both preparedness and response.

The Master Plan proposes that the facilities like hospitals, fire services, police, schools, water supply, bridges, flyovers and underpasses, electricity, grid stations are critical in nature for post –disaster management. To ensure functioning of critical facilities, buildings occupying such facilities and falling in Seismic Zone- V shall be retrofitted. District Disaster Management Authority- Sarthebari, shall develop a clear cut retrofitting strategy at its own level for this purpose. Safety audit of all existing important public and assembly buildings shall be done.



