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PREPARATION OF INTEGRATED URBAN DEVELOPMENT PLAN OF 14 MUNICIPALITIES CONTRACT ID: DUDBC/CS/QCBS – 11-074/75

Volume II/ V: Municipal Profile of Chandragiri Municipality



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Acronym & Abbreviation

| DCRN | : | District Road Core Network |
|-------|---|---|
| DTMP | : | District Transport Master Plan |
| DWSS | : | Department of Water Supply and Sewerage |
| KUKL | : | Kathmandu Upatyaka Khanepani Limited |
| MLD | : | Millions Litre Per Day |
| NWSC | : | Nepal Water Supply Corporation |
| РСС | : | Plain Cement Concrete |
| RCC | : | Reinforced Cement Concrete |
| VDCs | : | Village Development Committees |
| WSSB | : | Water Supply and Sewerage |
| BM | : | Bench Mark |
| CAD | : | Computer Aided Design |
| DGPS | : | Differential Global Positioning System |
| DUDBC | : | Department of Urban Development and Building Construction |
| DEM | : | Digital Elevation Model |
| DTM | : | Digital Terrain Model |
| GCP | : | Ground Control Points |
| GIS | : | Geographical Information System |
| GoN | : | Government of Nepal |
| Ha. | : | Hectares |
| ISO | : | International Standards Organization |
| Km | : | Kilometer |
| М | : | Meter |
| Mm | : | Millimeter |
| UTM | : | Universal Transverse Mercator |
| MSL | : | Mean Sea Level |
| NEA | : | Nepal Electricity Authority |
| NTC | : | Nepal Telecommunication Corporation |
| NWSC | : | Nepal Water Supply Corporation |
| РСО | : | Project Coordination Office |
| PIU | : | Project Implementation Unit |

- RMS : Root Mean Square
- RMSE : Root Mean Square Error
- TBM : Temporary Bench Mark
- sq. km. : Square Kilometer
- TIFF : Tagged Image File Format
- VDC : Village Development Committee

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Data Summary

Base Map

| Satellite Imagery | |
|---|--|
| Satellite Imagery | Digital Globe Worldview-4 |
| Acquisition date | 3/3/2018 |
| Spatial resolution | 0.5m |
| Image bands | RGB, 321 |
| Image format | 16 bits RGB TIFF image |
| Photogrammetric workstation/software | Erdas Imagine 2014 |
| Processing | Orthorectification using Erdas Imagine software with surveyed Ground Control Points. |

| Topographical Base Maps | | | | |
|----------------------------|------------------------|--|--|--|
| Projection System | WGS 1984 UTM Zone 45 N | | | |
| Map sheets (scale 1:2,500) | 34 sheets | | | |

Municipality GIS Datasets

| GIS Datasets | |
|------------------------|---------------------------------|
| GIS Vector Data Format | ESRI Shape file and Geodatabase |
| GIS Raster Data Format | TIFF (world) |
| Metadata standard | ISO |

Executive Summary

Rapid urbanization in many developing countries has resulted in high concentration of urban population in large cities. In Nepal, population is concentrated mainly in Kathmandu Valley and other cities of Terai or fertile valleys. As its consequence these large cities are failing to cope with the demand of infrastructure services and job opportunities and are increasingly reeling under the externalities of the haphazard urbanization. Environmental degradation, congestion, urban poverty, squatter settlements, unemployment and lagging provisions of infrastructure services have become increasingly visible phenomenon in these large cities. Hence, much of the economic gains acquired from urbanization have been eroded from its negative externalities. Despite non- agricultural sector being a major contributor to gross domestic product (GDP), urban centers in the country have yet to emerge as the engines of economic growth and contribute to reduction of urban or rural poverty alike. Despite all these problems, government's responses have been grossly inadequate. The responses tend to be scattered and ad-hoc rather than planned and coordinated. A weak institutional capability has been one of the leading factors in poor performance of the government agencies. Above all, lack of the long-term development perspectives or plans has led to uncoordinated actions of agencies involved in urban development. Therefore, the result is poor or limited impact in urban development efforts. Consequently, economic development has not taken place in the desired manner consistent with the pace of population growth.

Keeping in view of context of rapid urbanization, the Government of Nepal has enacted and has been implementing National Urban Policy since 2007 and National Urban Development Strategy since 2016. As per the constitution 2072, the country has been restructured into three level of governance, i.e. Federal, Provincial and Local levels. As the country has been restructured into 7 Provinces and 753 Local levels, numerous roles and responsibilities undertaken by the erstwhile central government has been devolved to the provincial and local governments. The role and responsibilities as well as jurisdiction of local governments has been broadened largely. However, due to the confusion in devolution of power, lack of policy and programs, and largely due to the lack of human resources and financial means, the provincial and local governments have not been able to function efficiently as anticipated. In this regard, the recently enacted Local Government Operation Act has tried to outline clearly the role and responsibilities as well as jurisdiction of local governments, and has been a stepping stone for the effective governance of the local governments.

Therefore, as a long-term policy initiative, GON is providing technical and financial support to 185 municipalities to facilitate the Integrated Urban Development Plan (IUDP) preparation, urban base map and profile of base information; building bye-laws and to promote their planned development and improvement in the quality of life of people of new urban towns.

The Integrated Urban Development Plan (IUDP) of 14 municipalities is a strategic response to the 15 year growth of these municipalities, which brings together infrastructure provision, environmental management, economic growth, disaster preparedness, municipal service delivery and mainstreaming gender equality and social inclusion.

The study is limited to the preparation of Integrated Urban Development Plan of 14 municipalities of Province 3; 11 of which are within the Kathmandu Valley and 3 outside the Valley. The municipalities

under the study are clustered in 5 different district, viz. Mahalaxmi Municipaltiy of in Lalitpur District, Suryabinayak Municipality of Bhaktapur District, Shankharapur, Kageshwori Manohara, Gokarneshwor, Budhanilkantha, Tokha, Tarkeshwor, Nagarjun, Chandragiri and Dakshinkali Municipalities of Kathmandu District, Belkotgadhi Municipality of Nuwakot District, Dhunibeshi Municipality of Dhading District and Rapti Municipality of Chitawan District.

Chandragiri Municipality situated in south-west part of Kathmandu valley in Province no 3. The total area of the municipality is 43.92 Sq.km. Chandragiri municipality has been divided into 15 wards for the efficient administration. Chandragiri Municipality was declared on 2 December 2014 merging eleven VDCs, Purano Naikap Bhanjyang, Naya Naikap, Badbhanjyang, Thankot, Mahadevsthan, Matatirtha, Machhegaun, Balambu, Dahachowk, Tinthana, Satungal of Kathmandu. Chandragiri Municipality is surrounded by Kritipur Municipality in the east, Dhunibeshi Municipality in the West, Nagarjun Municipality in the North and Dakshinkali Municipality in the south.

Vision of Chandragiri must incorporate an identity for the city.

"एतिहासिक, साँस्कृतिक नगरी समृद्ध पयटकीय चन्द्रागिरी"

Through research and community engagement, the IUDP includes analysis, strategic policy and practical actions to improve physical infrastructure, social infrastructure, risk sensitive land use, environment management at town level with proposals for capacity building and institutional strengthening of municipal authority. The IUDP also focuses on improving the conditions of women, the poor and the excluded by undertaking a community development program and gender equality and social inclusion activities through the Social Development Plan.

The IUDP consists of five volumes and includes following documents.

Volume I: Main Report Volume II: Municipal Profile Volume III: Maps Volume IV: Detail Engineering Design Volume V: Building Bye-laws

The municipal profile covers the existing scenario of the municipality. The report consists of description of the historical background, topography, demography, physical scenario, social scenario, economic scenario, environmental and ecological status, disaster scenario, land use and urbanization and institutional and financial scenario of the municipality. The existing scenario of the municipality is based on the secondary data received from the municipality.

Chapter 1: CHANDRAGIRI MUNICIPALITY

Chandragiri Municipality situated in south-west part of Kathmandu valley in Province 3. The total area of the municipality is 43.92 Sq.km. Chandragiri Municipality was declared on 2 December 2014 merging eleven VDCs, Purano Naikap Bhanjyang, Naya Naikap, Thankot, Mahadevsthan, Matatirtha, Machhegaun, Balambu, Dahachowk, Tinthana, Satungal of Kathmandu. Chandragiri municipality has been divided into 15 wards for the efficient administration. Chandragiri Municipality is surrounded by Kritipur Municipality in the east, Dhunibeshi Municipality in the West, Nagarjun Municipality in the North and Dakshinkali Municipality in the south.



Map 1: Location Map

1.1 Regional Context.

Kathmandu Valley as the capital region of the country has a primacy which is unequalled. As the capital, it is the administrative as well as political center of the country. Chandragiri municipality is one of the nearest municipality from Kathmandu metropolitan providing residential space and refreshment place to tackle chaos life of Kathmandu. Population of Chandragiri municipality is increasing due to migration of people because of the proximity to Kathmandu metropolitan city and it is accessible to transportation linkage.

Chandragiri is one of the major fringe of Kathmandu valley as it is major gateway to metropolitan city. Prithivi Highway passes through center of Chandragiri municipality connecting Kathmandu with other part of Nepal.



Legend

| International Boundary Local Bodies Boundary | Local Bodies Road Network |
|--|------------------------------------|
| | Metropolitan City National Highway |
| District Headquarters | Sub-Metropolitan City Feeder Road |
| District Boundary | Municipality |
| Source | Rural Municipality |
| Administrative Boundany Department of Suprey | National Park |
| - Road Network: Department of Road | Wildlife Reserve |

Map 2: Religious Linkage map



Map 3: Hinterland Map

1.2 Historical background

Chandragiri municipality is a historic town of Kathmandu District formed by integrating eleven villages, i.e. Purano Naikap Bhanjyang, Naya Naikap, Thankot, Mahadevsthan, Matatirtha, Machhegaun, Balambu, Dahachowk, Tinthana, Satungal. Each of these villages has their own historical importance. Chandragiri Municipality has various religious as well as historical significance. With reference to the description written in Himvatakhanda, Bhaleshwor Mahadev appeared at the spot where Sati Devi's "Bhala" or the forehead fell off from her dead body. It is believed that Sati Devi, Shiva's consort, gave her life by jumping in a fire pyre at her father Daksha Prajapati's yagna (sacred fire ritual) after Daksha insulted her husband Shiva in front of scores of gods and goddesses invited at the religious ceremony. An enraged Shiva then carried her dead body on his back and walking across the world like a madman for a long span of time without taking note of Sati Devi's decaying body. Different "Shakti-centers" were established at the sites where different parts of body fell in course of lord Shiva's mourning. A large number of people from different parts of the country thronged here to worship the Trishul (trident) believed to be of Lord Shiva.

Chandragiri hills carry historical significance as well. It was from this hills that King Prithivi Narayan Shah caught the first glimpse of a much scenic and prosperous Kathmandu Valley, which in fact installed in king's mind an idea of annexing the valley into his kingdom. According to folklore, Prithivi Narayan Shah is believed to have amassed spiritual power "sadhana" or meditation at these very hills. The Gorkhali king disguised himself while ascending the hills in order to avoid being recognized by the Malla kings of Kathmandu Valley. There is a saying that King Prithivi Narayan Shah made a wish to takeover Kathmandu valley was taken while he was in Chandragiri hills. As per the popular belief that it was the Bhaleshwor Mahadev that granted King Prithivi Narayan Shah's wishes. On the auspicious occasion of 295th Prithivi Janma Jayanti, the stone carving work that expresses the reflection of the event was installed.

1.3 Administrative boundary and Topography

1.3.1 Administrative boundary

Chandragiri Municipality situated in south-west part of Kathmandu valley in Province no 3. The total area of the municipality is 43.92 Sq.km. Chandragiri municipality has been divided into 15 wards for the efficient administration. Chandragiri Municipality was declared on 2 December 2014 merging eleven VDCs, Purano Naikap Bhanjyang, Naya Naikap, Badbhanjyang, Thankot, Mahadevsthan, Matatirtha, Machhegaun, Balambu, Dahachowk, Tinthana, Satungal of Kathmandu. Chandragiri Municipality is surrounded by Kritipur Municipality in the east, Dhunibeshi Municipality in the West, Nagarjun Municipality in the North and Dakshinkali Municipality in the south.

Different wards of previous VDCs were combined to give new structure of wards in the municipality.

| Since 2016 | 2015- 2016 | Before 2015 | |
|--|---|--------------|-------------------|
| Chandragiri Municipality (Present wards) | Chandragiri Municipality (Old wards) | VDC Name | VDC Ward No |
| 1 | 1,2 | Dahachowk | 1,2,3,4,5,6,7,8,9 |
| 2 | 3,4 | Badbhanjyang | 1,2,3,4,5,6,7,8,9 |
| 3 | 5 | Thankot | 2,8 |

Table 1: Restructuring of wards of VDC to Municipality

| 4 | 6,7 | Thankot | 1,3,4,5,6,7,9 |
|----|-------|----------------------------|-------------------|
| 5 | 8 | Mahadevsthan | 1,2,9 |
| 6 | 9 | Mahadevsthan | 3,4,5 |
| 7 | 10 | Mahadevsthan | 6,7,8 |
| 8 | 11,12 | Matatirtha | 1,2,3,4,5,6,7,8,9 |
| 9 | 13,14 | Machhegaun | 1,2,3,4,5,6,7,8,9 |
| 10 | 15,24 | Satungal | 1,2,3,4,5,6,7 |
| 11 | 16 | Satungal | 8,9 |
| 12 | 17,18 | Balambu | 1,2,3,4,5,6,7,8,9 |
| 13 | 19,21 | Naikap Purano Bhanjyang | 1,2,3,4,5,6,7,8,9 |
| 14 | 20,25 | Naikap Naya Bhanjyang | 1,2,3,4,5,6,7,8,9 |
| 15 | 22,23 | Tinthana | 1,2,3,4,5,6,7,8,9 |

Source: Rajpatra 1.3.2 Topography

Kathmandu valley is oval shaped intermountain basin which stretches at about 30 km in East-West and 25 km in North-South direction and occupies about 650 sq.km and elevation ranges from 1220 to 1500m. The valley is surrounded by Shivapuri lekh in the North, Nagarkot in east, Chandragiri in the southwest and Phulchoki in the south. The major rivers in Kathmandu valley are Bagmati River, Bishnumati River, Dhobi Khola, Manohara Khola, Nakhu Khola, Godawari Khola and Balkhu Khola.





Map 5: Aspect Map

1.3.2.1 Geography

Chandragiri Municipality lies in 27°43′36.486″ N in North, 27°32′45.029″ N in South, 85°16′39.509″ E in East, 85°11′8.685″ E in West. Chandragiri Municipality has predominantly hilly terrain. Settlements and farming seem to develop along less the sloppy region. The highest altitude of the municipality is 2551 meters and lowest altitude is 1310 meters.

1.3.2.2 Geology/ Geomorphology

The Kathmandu valley is basin and it has a mild climate and fertile land. The Kathmandu valley basin is located of Midland Region. It is tectonic basins of the sub-Himalayas.

1.4 Climate

Climate zone type are based on latitude and solar radiation. There are three main climate types they are tropics, temperate and polar or artic: Tropics- between Tropic of cancer and Tropic of Capricorn; Temperate- north and south of the tropic lines to the Artic circles and polar or artic- north and south of the Artic circles. These three zones can be further divided into different climate regions based upon the seasonal temperatures, precipitation rates, altitude and topography, distance from oceans and atmospheric circulations. They are tropical- warm and wet, Arid- dry desert, Warm Temperate- warm wet and dry seasons, cool temperate- cool wet and dry seasons, and polar cold. For a mountainous region altitudinal limits are most convenient to define zones.

Chandragiri Municipality lies in subtropical climate zone (1000 to 2000 meters) and Deciduous Monsoon Forest Zone (altitude range of 1,200–2,100 meters). The highest temperature in Chandragiri is recorded to be maximum during the month of May and June and the lowest temperature is recorded in December and January.

1.5 Natural Resources

1.5.1 Watershed and Water Bodies

There are 3 major rivers in Chandragiri Municipality. The major rivers flowing through the municipality are Balkhu khola, Daudali Khola and Ghatte Khola. These rivers are perennial rivers. The Balkhu river flows through wards 1,2,4,12,14,15. Ghatte khola flows through wards 8,10 and 15 and Daudali Khola flows though wards 12,13,14 and 15.



Map 6: Water Bodies Map

1.5.2 Forest

There are 176 community forest in Kathmandu district among them 23 community forest lies in Chandragiri municipality which covers 1170.78 ha. These community forest serves 3880 households. Chandragiri municipality also consist 1 kabuliyat forest covering 36.00 ha.

1.6 Demography

1.6.1 Population Distribution

The total population of the municipality as per the census 2068 B.S. is 85,198 with male population 42,881 and female population 42,317, municipality holds 3.38% population of Kathmandu valley. The total population of Kathmandu valley in 2068 is 2,517,023 (CBS 2068). From 2058 B.S to 2068 B.S, total population of Chandragiri Municipality increased from 55,032 to 85,198 at population growth rate of 4.44 %.

The ward wise population distribution of the municipality is as shown in the table below.

| Ward | No. of household | Household size | Population (As per 2068 Census) | Male | Female | Sex Ratio (in 1000 female) | Area in hectare | Population Density (pph) |
|-------|---------------------|-------------------|--|-------|--------|-------------------------------------|--------------------|--------------------------------|
| 1 | 878 | 4.6 | 4036 | 1991 | 2045 | 97.36 | 635.43 | 6.4 |
| 2 | 817 | 4.6 | 3779 | 1873 | 1906 | 98.27 | 480.29 | 22.2 |
| 3 | 1342 | 4.1 | 5563 | 2888 | 2675 | 107.96 | 322.93 | 26.1 |
| 4 | 1478 | 4.4 | 6484 | 3218 | 3266 | 98.53 | 291.78 | 34.6 |
| 5 | 1142 | 4.2 | 4838 | 2427 | 2411 | 100.66 | 97.94 | 41.3 |
| 6 | 1282 | 4.1 | 5259 | 2615 | 2644 | 98.90 | 296.83 | 49.1 |
| 7 | 1307 | 4.1 | 5417 | 2689 | 2728 | 98.57 | 307.17 | 49.4 |
| 8 | 1413 | 4.2 | 5982 | 3004 | 2978 | 100.87 | 619.70 | 63.5 |
| 9 | 872 | 4.4 | 3849 | 1884 | 1965 | 95.88 | 466.29 | 75.5 |
| 10 | 1372 | 3.9 | 5350 | 2725 | 2625 | 103.81 | 129.46 | 7.9 |
| 11 | 1354 | 3.8 | 5102 | 2700 | 2402 | 112.41 | 103.86 | 8.3 |
| 12 | 1734 | 4.2 | 7323 | 3625 | 3698 | 98.03 | 211.86 | 9.7 |
| 13 | 1054 | 4.3 | 4546 | 2251 | 2295 | 98.08 | 173.99 | 17.2 |
| 14 | 1980 | 4.0 | 7944 | 4025 | 3919 | 102.70 | 125.19 | 17.6 |
| 15 | 2507 | 3.9 | 9726 | 4966 | 4760 | 104.33 | 128.87 | 17.7 |
| Total | 20532 | 4.2 | 85198 | 42881 | 42317 | 1516.37 | 292.77 | 1.29 |

Table 2: Ward-wise Population Distribution

Source: C.B.S. 2011

The highest population is in Ward no. 15, the lowest population is in Ward no. 2, and the average population is in Ward no. 4. Similarly, the highest population density is in Ward no. 9, and the lowest population density is in Ward no. 1. The household count in the municipality is 20,532. The average household size is 4.2.



1.6.2 Age-sex Composition

The population pyramid below demonstrates the distribution of male and female population by their different age groups. The dominant presence of both male and female of economically active age group shows availability of working group in the municipality which is the positive point for leading development works of the municipality. However, the less number of male population compare to female in the age group 20 - 24, 25 - 29 & 30 - 34 might be due to migration of youth to foreign countries for education and foreign employment.



Figure 1: Population Pyramid

1.6.3 Population Growth

The population of the current municipal area increased from 55,032 in 2001 to 85,198 in 2011. The average annual growth rate increased from in 2001 to 3.38% in the following 10 years.

| Table 3: Households | , population | and average | household size |
|---------------------|--------------|-------------|----------------|
|---------------------|--------------|-------------|----------------|

| Census Year | No.HHs | Population | | | Sex ratio | HH size | Density (p/ha) | Decadal | Change | |
|----------------|--------|------------|--------|--------|--------------|------------|-------------------|---------|------------|---------|
| | | Total | Male | Female | | | | No.HHs | Population | AAGR(%) |
| 1991 | | | | | | | | | | |
| 2001 | | 55,032 | | | | | | | | |
| 2011 | | 85,198 | 42,881 | 42,317 | | 4.2 | | | | |

Source: CBS 1991, 200, 2012.AAGR= average annual growth rate (exponential); p/ha = persons per hectare

Population growth rate in Kathmandu valley is 4.25 % while population growth percent in Chandragiri municipality is 4.44%. This indicates that Chandragiri municipality is attracting more population.

| WARD N.O | TOTAL PO | PULATION | EXPONENTIAL | Growth Percent |
|-------------|----------|----------|--------------------|-----------------------|
| | 2058 | 2068 | GROWTH RATE | |
| 1 | 3860 | 4036 | 0.004459 | 0.45 |
| 2 | 3286 | 3779 | 0.013979 | 1.40 |
| 3 | 2808 | 5563 | 0.068367 | 6.84 |
| 4 | 5775 | 6484 | 0.011580 | 1.16 |
| 5 | 2549 | 4838 | 0.064080 | 6.41 |
| 6 | 2674 | 5259 | 0.067637 | 6.76 |
| 7 | 2685 | 5417 | 0.070186 | 7.02 |
| 8 | 3653 | 5982 | 0.049321 | 4.93 |
| 9 | 2871 | 3849 | 0.029315 | 2.93 |
| 10 | 2611 | 5350 | 0.071736 | 7.17 |
| 11 | 3223 | 5102 | 0.045932 | 4.59 |
| 12 | 5164 | 7323 | 0.034931 | 3.49 |
| 13 | 3456 | 4546 | 0.027414 | 2.74 |
| 14 | 4425 | 7944 | 0.058515 | 5.85 |
| 15 | 5992 | 9726 | 0.048438 | 4.84 |
| Grand Total | 55032 | 85198 | 0.043706 | 4.44 |

Table 4: Households, population and average household size

Source: CBS 2001, 2011

1.6.4 Migration

Generally, people migrate from one place to another for better opportunities and facilities. In the context of Chandragiri municipality, people, especially young generation must have migrated for better education and job opportunities. Migration can be accounted from the absent population. 13.02 % of total household have at least one absent population. This data indicates the migration from this municipality. Total absent population is 3,475 and among this 2,774 are male which is 79.82 % of total absent population.

Table 5 Total absent population

| | Total household | Absent household | Total | Male | Female |
|-------|-----------------|---------------------|-------|----------------|--------|
| Total | 20532 | 2674 | 3475 | 2774 | 701 |
| | | | | (Source: C.B.S | 2011) |

The vital registration data of the municipality shows altogether 63 In-migration and 2 out-migration.

Table 6: Migration Detail

| S. N | Migration | Family No. | Percentage |
|-------------|---------------|------------|------------|
| 1 | In-migration | 600 | 84.03 |
| 2 | Out-migration | 114 | 15.97 |
| | Total | 714 | 100 |

Source: Ward Municipality, Vital Registration (Date 2075-2-30)

The data indicates, in the Chandragiri municipality; out-migration is less in number than in-migration.

1.6.5 Ethnicity

In the municipality, the highest percentage is of Newar which accounts 29.21%, followed by Chhetri, 23.39%, followed by Brahmin- Pahad, 15.49%. Different Caste and Ethnicity present in the municipality is as follows.



Figure 2: Caste and Ethnicity of Municipality

Source: Municipality Profile

1.6.6 Differently able population

Regarding differently able population, there are altogether 962 disable population, out of which 516 are male and 452 are female. Among different type of disabilities, people having physical disability is comparatively high which counts 283 in total, out of which 164 are male and 119 are female. People having blindness/low vision counts 250 out of which 122 are male and 128 are female. The detail count of disabilities present is listed below.

| Table | 7: | Details | of | population | with | disability |
|-------|----|---------|----|------------|------|------------|
|-------|----|---------|----|------------|------|------------|

| Population having disability of | | | | | | | | | | |
|---------------------------------|---------------------|-------------------------------------|----------|--------------------------|------------------------------|-----------------|-------------------|-------------------|--------------------------|---------------------|
| | Total population | Population without disability | Physical | Blindness/ low vision | Deaf / hard to hearing | Deaf – blind | Speech problem | Mental disable | Intellectua I disable | Multiple disable |
| Male | 42881 | 42365 | 164 | 122 | 68 | 9 | 49 | 33 | 21 | 50 |
| Female | 42317 | 41865 | 119 | 128 | 74 | 8 | 54 | 28 | 13 | 28 |
| Total | 85198 | 84236 | 283 | 250 | 142 | 17 | 103 | 61 | 34 | 72 |

Source: C.B.S. 2011

The percentage of physical disability among the different disabilities is higher which counts 29.41%, followed by blind which counts 25.98%. Similarly, deaf/hard to hearing accounts 14.76%.

1.6.7 Literacy

The total literacy rate of population is 80.38, of male population is 88.51% and of female is 72.34%.

| VDC/ | Population | Population | who | Literacy | Literacy | |
|-------------------------|-------------------------|---------------------|------------------|-----------------------|---------------|-------|
| Municipality and sex | aged 5 years & above | Can read & write | Can read only | Can't read & write | not stated | rate |
| Male | 39573 | 35145 | 640 | 3771 | 17 | 88.51 |
| Female | 39453 | 28989 | 793 | 9622 | 49 | 72.34 |
| Total | 79026 | 64134 | 1433 | 13393 | 66 | 80.38 |

Table 8: Details of Literacy

(Source: C.B.S 2011)

1.6.8 Occupation

The rural urban divide is also among the leading determinants of inequality in access to various household-based opportunities, particularly improved sanitation, drinking water, electricity and clean fuels. (Source: Key social development challenges in the Asia-Pacific region in the context of the 2030 Agenda for Sustainable Development)

Social protection and decent work can play a key role in achieving several Sustainable Development Goals by reducing vulnerabilities, preventing people from falling into poverty, empowering vulnerable populations, addressing inequalities in income and improving access to basic social service. The disconnect between wages and productivity means that fewer people benefit from decent jobs and economic growth, while the majority see only marginal changes in their income. Moreover, since household consumption is a major component of demand, and because lower income groups tend to spend any increase in income on purchasing necessary goods, connecting poorer groups with better paid jobs yields a strong multiplier effect.

Regarding occupation, in the whole Kathmandu district, people are engaged in different types of small business. The number of household involved in small scale entrepreneurship are as follows:

 Table 9: Details of Small scale entrepreneurship in Kathmandu district

| District | Yes | No | Not reported | Total | Total adjusted | % Engaged |
|-----------|--------|---------|--------------|-------------------|-------------------|-----------|
| Kathmandu | 55,275 | 379,500 | 643 | 435,418 | 434,775 | 12.71 |
| | | | | Courses Domulatio | n Managuan Malu | |

Source: Population Monograph, Volume III, C.B.S,2011

The households involved in different types of small scale business of Kathmandu district is as follows:

Table 10: Households involved in small scale business in Kathmandu district

| Cottage Industry | Business | Transportation | Service | Others | Total |
|---------------------|----------|----------------|---------|--------|--------|
| 4,062 | 30,428 | 1,871 | 15,230 | 3,684 | 55,275 |

In Chandragiri municipality the highest number of people are involved in business which counts 10,452 in number and accounts 51%. Similarly, people involved in Service is 7,198 which accounts 35% and

following Agriculture as their occupation counts 1,243 which is 6.05%. And very few number of people are involved in fishery which counts only 13 in number.

| Table 11: Households involved indifferent | occupation in Chandragiri |
|---|---------------------------|
|---|---------------------------|

| S. N. | Occupation | No. of Household |
|-------|--------------------|------------------|
| 1 | Business | 10,452 |
| 2 | Service | 7,198 |
| 3 | Agriculture | 1,243 |
| 4 | Foreign employment | 760 |
| 5 | Wages | 645 |
| 6 | Poultry | 81 |
| 7 | Livestock | 73 |
| 8 | Industry | 67 |
| 9 | Fishery | 13 |
| | Total | 20,532 |

Source: Chandragiri Municipality Profile

1.7 Physical Scenario

1.7.1 Transportation

The major transportation network system in Kathmandu valley is via road. Tribhuwan international Airport in Kathmandu is the only international airport in Nepal at present. Also, domestic flights connect major cities in different provinces. The urban growth of Kathmandu valley has been induced through the construction of two highways Tribhuwan highway and Arniko Highway and international airport. The construction of Ring road and radial roads accelerated the urban development along these roads. Further the government has planned to develop outer ring road connecting the fringe areas in the valley to cater the expanding urbanisation areas.

The total length of the road in this Municipality is 433.04 Km. About 33% of the road is Black topped, 46% of the road is Earthen and 18% of the road is Gravel. Tribhuwan highway of total length 14.16 km passes through this Municipality.

Most of the road in this municipality requires immediate attention for maintenance and roadside drain is necessary for all wards. Further, the road infrastructure lacks proper footpaths, shoulder, zebra crossing, and traffic sign.

| Ward | Road Surface Type | | | | | Grand |
|------|-------------------|----------------|----------|---------|--------|-------|
| No. | Black topped | Brick pavement | Concrete | Earthen | Gravel | total |
| 1 | 8.4 | | 0.1 | 58.0 | 4.6 | 71.12 |
| | | | | | | |
| 2 | 17.4 | | | 35.7 | 0.1 | 53.24 |
| 3 | 5.5 | | 1.5 | 8.7 | 12.5 | 28.24 |

Table 12: Length of roads based on surface type

| Total | 144.55 | 0.11 | 8.43 | 200.54 | 79.39 | 433.04 |
|-------|--------|------|-------|--------|-------|--------|
| 15 | 4.00 | | 0.966 | 4.8 | 12.45 | 22.22 |
| 14 | 12.5 | | 0.7 | 2.0 | 6.2 | 21.43 |
| 13 | 6.2 | | 0.7 | 10.0 | 5.8 | 22.75 |
| 12 | 10.4 | 0.1 | | 11.8 | 5.2 | 27.48 |
| 11 | 11.9 | | 0.4 | 3.4 | 4.5 | 20.26 |
| 10 | 10.9 | | | 4.3 | 4.9 | 20.12 |
| 9 | 6.7 | | | 8.7 | 2.3 | 17.67 |
| 8 | 10.7 | | 0.2 | 19.9 | 9.4 | 40.16 |
| 7 | 11.2 | | 0.5 | 5.4 | 6.3 | 23.42 |
| 6 | 4.2 | | 0.5 | 11.1 | 6.5 | 22.37 |
| 5 | 6.9 | | | 2.1 | 6.8 | 15.75 |
| 4 | 5.0 | | 2.8 | 17.0 | 1.9 | 26.80 |

Table 13: Length of roads based on width of road

| | ROAD WID | ROAD WIDTH CLASS (KM) | | | | | | | | |
|-------------|----------|-----------------------|----------|-----------|-------|-------------|--|--|--|--|
| WARD NO. | up to 3m | 3m to 5m | 5m to 8m | 8m to 12m | 22m | Grand Total | | | | |
| 1 | 0.20 | 67.39 | 3.50 | | | 71.09 | | | | |
| 2 | 15.82 | 20.96 | 2.00 | | 14.48 | 53.26 | | | | |
| 3 | 10.18 | 14.58 | 0.40 | | 3.15 | 28.31 | | | | |
| 4 | 12.95 | 11.80 | 0.50 | | 1.52 | 26.77 | | | | |
| 5 | 1.20 | 11.97 | 0.01 | | 2.60 | 15.78 | | | | |
| 6 | 9.34 | 12.32 | 0.66 | | 0.30 | 22.62 | | | | |
| 7 | 2.79 | 17.70 | 0.65 | | 2.24 | 23.38 | | | | |
| 8 | 1.10 | 35.08 | 3.90 | | | 40.08 | | | | |
| 9 | 2.70 | 14.53 | 0.40 | | | 17.63 | | | | |
| 10 | 2.60 | 16.70 | 0.30 | | | 19.60 | | | | |
| 11 | 1.57 | 13.80 | 0.30 | | 4.09 | 19.76 | | | | |
| 12 | 0.2 | 21 | 3.2 | | 1.85 | 26.27 | | | | |
| 13 | 2.1 | 14.54 | 6.1 | | | 22.74 | | | | |
| 14 | 0.6 | 19 | 0.5 | | 1.65 | 21.76 | | | | |
| 15 | 0 | 19.85 | | | 4.12 | 23.97 | | | | |
| Grand Total | 63.35 | 309.44 | 22.46 | 0.00 | 36.00 | 433.04 | | | | |

National highways and feeder roads

The municipality has one national highway and 3 feeder roads. Tribhuwan national highway and the feeder roads from Thankot to Chandragadhi markhu Road (F180), Khasibazar to Machhegaun Road

(F104) and Naghdhunga to Tankeswor (F105). According to the District Transport Master Plan (DTMP) of Kathmandu district, nine roads of total length 45.58 km of this municipality are listed as district road core networks (DRCN) which are under the responsibility of the District Development Committee. The total length of the highway road within the municipality is 14.16 km.

| Table 14: List | of DRCN roads | | | | | | |
|----------------|---|--------|----------|--------|---------|----------------|-----------------|
| Code | Description | Length | Blacktop | Gravel | Earthen | All Weather | Fair Weather |
| 27DR006 | Satungal-Matatirtha-Deurali- Makwanpur road | 9.26 | 2.919 | 0.788 | 5.557 | 3.71 | 5.56 |
| 27DR007 | Ganeshman Shanti Marg(Thankot- Chitlang Bhanjyang) | 5.38 | 1.789 | 1.808 | 1.784 | 3.60 | 1.78 |
| 27DR008 | Mahadevsthan-Matatirtha- Machhegaun road | 3.38 | 2.179 | 1.204 | | 3.38 | |
| 27DR009 | Thankot-Balambu-Dahachowk road | 3.36 | 3.359 | - | - | 3.36 | - |
| 27DR010 | Tinthana-Kritipur Road | 2.11 | - | 2.114 | | 2.11 | - |
| 27DR011 | Naya Naikap-Purano Naikap road | 0.96 | 0.959 | - | - | 0.96 | - |
| 27DR02 | Kalanki-Ghampedol-Badbhanjyang road | 8.55 | 8.554 | - | - | 8.55 | - |
| 27DR013 | Badbhanjyang-Dahachowk- Bhimdunga road | 8.62 | - | 1.435 | 6.114 | 1.44 | 6.11 |
| 27DR014 | Miteri Marga (Dahachowk) | 3.96 | - | - | 2.484 | - | 2.48 |

Source: (DTMP, 2013)

Table 15: Category-wise total road length

| Class | Blacktopped(KM) | Gravel road(KM) | Earthen road(KM) | Brick Paved(KM) | PCC(KM) | Total(KM) | |
|---|-----------------|--------------------|---------------------|--------------------|---------|-----------|--|
| NH | 14.16 | | | | | 14.16 | |
| FR | 11.588 | | 4.83 | | | 16.418 | |
| DR | | | | | | | |
| UR | 118.802 | 79.39 | 200.54 | 0.11 | 3.62 | 402.462 | |
| Key NH = National Highway, FR= Feeder road, DR = District road, UR = Urban road | | | | | | | |

Table 16: Available Public Bus Routes

| Means of | No of daily | Route | | Objective (Service, |
|-----------|---------------|-------------------------------|-----------|------------------------|
| transport | vehicle trips | From | То | Agriculture, Business) |
| Mini Bus | - | Chandragiri cable car station | Ratnapark | Agriculture/Service |
| Bus | - | Dahachowk, kalanki | Ratnapark | Service |
| Bus | | Matatirtha | Kapan | Public Service |



Map 8: Road Hierarchy Map



Map 9 Road Network (Surface Type)



Map 10 Road Network (Width of Road)

There are three bus routes from Dahachowk to Ratnapark, Cable car station to Ratnapark and atatirtha to Kapan. The major stops in the municipality are at Naikap, ward 7 along Naikap-Kalanki-Ratnapark road, Matatirtha bus stop, ward 8, Matatirtha-Balambu-Ratnapark-Kapan route and Nagdhunga stop along highway. Among the wards in the municipality, ward 1 (Basundol, Dandagaun, odare etc) has no access to public transportation.

| Place | Ward no. | Name of the road |
|------------|----------|------------------------------|
| Naikap | 15 | Naikap-Kalanki-Ratnapark |
| Machhegaun | 9 | Tinthana-Kritipur-Machhegaun |
| Matatirtha | 8 | Matatirtha-Kapan |
| Naghdhunga | 2 | Highway |

Table 17 Description of existing bus-stops

(Source: Field Survey)

1.7.2 Water Supply

The water supply effort in Nepal started from Bir Dhara piped water in 1891 in few selected parts of Kathmandu which later was succeeded by Pani Goswara. The Department of Water supply and Sewerage (DWSS) was established in 1972 to manage drinking water for urban, semi urban and rural areas throughout the country. Water supply and Sewerage (WSSB)) was established in 1974 to manage drinking water in Kathmandu valley and some urban areas outside the valley which was later succeeded by Water supply and sewerage corporation (WSSC). Nepal Water Supply Corporation (NWSC) was established in 1990 with the objective of improving drinking water supply services in Kathmandu valley and expand services in rural areas as well. Kathmandu Upatyaka Khanepani Limited (KUKL) was` established in 2008 to manage drinking water and sanitation in urban areas of Kathmandu valley and separated from NWSC.

In Nepal 44.5% percent of population use piped water source and remaining use other sources of water such as well, river, boring, spout and spring water. (NPC/UNDP, 2013) The supply of water in piped system is intermittent supply therefore larger portion of household constitute of water source other than piped water. The daily demand of water in Kathmandu valley is 320 million litres per day (MLD) but the water supplying agency could only provide 106 MLD and 76 MLD in wet and dry seasons, respectively (KUKL 2010). In order to fulfil the deficit in the supply system other improved sources such as ground water (tube well, protected bore well, dug well), spring water, rainwater and unimproved sources such as unprotected dug well, vendor's water tanker, unprotected spring water, bottled water and surface water are used excessively. The Melamchi Water Supply Project (MWSP) is underway with initial design capacity of 170 MLD and expandable to 510 MLD, which will be the major source of water for the valley within the ring road after its completion.

| S.N | Description | НН | Percentage |
|-----|----------------|-------|------------|
| 1 | Tap/Piped | 13804 | 67.2 |
| 2 | Covered well | 2651 | 12.9 |
| 3 | Sprout water | 2428 | 11.8 |
| 4 | Others | 1069 | 5.2 |
| 5 | Uncovered well | 224 | 1 |
| 6 | Tube well | 170 | 0.88 |
| 7 | Not stated | 158 | 0.7 |
| | Diversion | 20 | 0.1 |
| 8 | River/Stream | 28 | 0.1 |
| | Total | 20532 | 100 |

The largest source of water in Chandragiri Municipality is Tap/ piped water supply. According to census 2068, 67.2% of household have piped connection for drinking water

Table 18:Water supply distribution

Source: CBS data 2011



Figure 3: Household by main source of drinking water

Table 19: List of water supply projects

| S.N | Name of the project | Source | Ward |
|-----|---------------------------------------|--------|---------|
| 1 | Chisapani water supply | | Ward 2 |
| 2 | Gairigaun amarsingh tole water supply | | Ward 2 |
| 3 | Haddhunga gaira water supply | | Ward 2 |
| 4 | Thosne chaur gairigaun water supply | | Ward 2 |
| 5 | Sangam basti water supply pipe laying | | Ward 11 |
| 6 | Balambu water supply | | Ward 12 |
| 7 | Tinthana water supply | | Ward 15 |

The water supply in this Municipality has been managed by different committees

Table 20: Water supply projects

| S.N | N Water supply system | | Source/Location |
|-----|--|--------|--------------------|
| | | wards | |
| 1 | Water supplied by "Bosigaun khanepani Committee" | Ward | Ward 8/khanglang |
| | • the system of "Ek Ghar Ek dhara" | 10 | |
| 2 | Supplied by 9 committee's | Ward | Bhusinkhel / Dip |
| | system of "Ek Ghar Ek dhara" | 8,9 | boring |
| 3 | Water supplied by "Matatirtha water supply | Ward 6 | Boring |
| | committee" | | |
| | No system of "Ek Ghar Ek dhara" | | |
| | Water supply problem in 300-400 HH | | |
| 4 | Water supplied by the committee | Ward | |
| | Water supply problem in 300-400 HH | 5,6,7 | 3 Dip boring |
| | No system of "Ek Ghar Ek dhara" | | |
| | Proposed water supply project at bandevi ward 7 | | |
| 5 | Dip boring for drinking water | | |
| 6 | No system of "Ek Ghar Ek dhara" | | Hill of Ward 1 and |
| | Water supply problem in 400 HH | | 2 |
| | Water supplied by 5 committee's | | |



1.7.3 Drainage and Sewerage System

There is no proper sewerage network in Chandragiri Municipality. After the declaration of municipality provision of septic tank has become mandatory for the buildings to get approved.
1.7.4 Energy

1.7.4.1 Electricity

The main source of household lighting is electricity. The electricity line in this municipality is connected with the National Grid. There is one electricity substation named as Matatirtha substation located at Gurjudhara. No any area of this Municipality was found to be deprived of electricity facilities. Transformers were noted at various points which were directly connected to the main line. Industries that depend on the electricity were found to be in a running state at various places. These industries include the metal industry, furniture industry, brick kiln etc.



According to the census 2068, 97.3% of household use electricity for household lighting.

Table 21: Population according to use of source of light

| S. N. | Source of lighting | No. of household | Percentage |
|-------|--------------------|------------------|------------|
| 1 | Electricity | 19975 | 97.3 |
| 2 | Kerosene | 297 | 1.44 |
| 3 | Biogas | 81 | 0.4 |
| 4 | Solar | 6 | 0.03 |
| 5 | Others | 10 | 0.05 |
| 6 | Not Stated | 163 | 0.8 |
| 7 | Total | 20532 | 100 |

(Source: C.B.S 2011)



Map 12: Electrical lines Map

| Ward | Number of transformer |
|------|-----------------------|
| 1 | 10 |
| 2 | 10 |
| 3 | 8 |
| 4 | 17 |
| 5 | 11 |
| 6 | 7 |
| 7 | 5 |
| 8 | 8 |
| 9 | |
| 10 | 13 |
| 11 | 33 |
| 12 | 18 |
| 13 | 8 |
| 14 | 8 |
| 15 | 20 |

(Source: Field Visit)

1.7.4.2 Cooking fuel

The residents of Ward Municipality use different types of fuel for cooking. Maximum people i.e. 75.94% of people use LP gas for cooking, which is followed by Wood/firewood which counts 18.86% and few people use Kerosene oil for cooking that counts 3.70 %. Use of bio-gas, electricity and cow dung is nearly negligible.

| Total | Fuel usually used for cooking | | | | | | | | | |
|-----------|-------------------------------|----------|--------|------------------------------------|---------|-------------|--------|------------|--|--|
| household | Wood / firewood | Kerosene | LP gas | Santhi/ guitha (cow dung) | Bio gas | Electricity | Others | Not Stated | | |
| 20532 | 3874 | 761 | 15594 | 15 | 32 | 11 | 80 | 165 | | |
| | 0141 | | | | | | | | | |

Table 23 Fuel used by Households

[Source: C.B.S. 2011]

1.7.5 Information and Communication

There seems easy access of telecommunication in the municipality. Regarding different facility available, people having only one service is highest in number which counts 19,812. Similarly, people having Mobile Phone counts 18,009 in number, having T.V counts 15,450 in number and Cable T.V is 12,286 in number.

Table 24: Number of HH having different communication means

| S.N. | Services used by Household | Household number |
|------|----------------------------|------------------|
| 1 | Having only one service | 19,812 |
| 2 | Mobile phone | 18,009 |
| 3 | T.V | 15,450 |
| 4 | Cable T.V | 12,286 |
| 5 | Radio | 11,222 |
| 6 | Telephone | 5,529 |
| 7 | Computer | 5,274 |
| 8 | Internet | 2,182 |
| 9 | No service | 514 |
| 10 | Not stated | 208 |



Map 13: Telecommunication Map

1.7.6 Solid Waste Management

Solid waste in this municipality is so unmanaged. Solid waste is thrown in roads and open space causing pollution and unpleasant view. Balkhu river has been major disposition area as this river is filled with organic, inorganic and plastic waste. Number of family members who are using different types of solid waste management are:

| S.N. | Description | No of Family members |
|------|------------------------|----------------------|
| 1 | River | 1286 |
| 2 | Road | 734 |
| 3 | Landfill site | 7341 |
| 4 | Waste collected by van | 1325 |
| 5 | Own compound | 871 |

Table 25: Number of household using different types of SWM

| 6 | Compost manure | |
|---|----------------|------|
| 7 | Not stated | 3918 |
| | Total | 4296 |

NGOs and private waste collectors are involved in managing solid waste of the municipality. Private organisation named Nepal Batawaran Pvt.Ltd, Srijana Pvt.Ltd, Yuva Krishak Bahudashya sahakari santhan limited, Sarwakalyan watawaran sewa Pvt.Ltd and Manakamana Cleaning service Pvt.Ltd are currently associated from the municipality for community waste management services. Total number of Number of Vehicles used for solid waste collection in Chandragiri municipality is 46 including Tipper Garbage Truck Tractor, Rickshaw. Estimated total waste generation from the municipality is 22.67 tons/ day with assumption of 0.32 kg/capita/day. Waste collected from this municipality goes almost 60% to landfill, 10% to Recycled, 25% composted and remaining 5% are managed in other ways



Figure 4:Treatment of collected solid waste

1.8 Social Scenario

1.8.1 Education

The municipality comprises people of different education level. Children attaining primary classes are maximum in number which counts 915 number of male and 830 female followed by students acquiring lower secondary i.e.707 male students and 628 female students. There is a gradual decrease in number of people achieving Graduate and equivalent education and Post graduate equivalent and above simultaneously. The population achieving non-formal education counts as 23 males and 54 females.



Figure 5: Population attaining different education level

Source:CBS 2011

The highest percentage is of primary level 22.82%, which is followed by Lower Secondary 17.46 % and Secondary 14.15% simultaneously.

According to field survey 2075, there are 2 higher secondary school and 1 college. The total number of educational institutions according to province data is tabulated below.

| S.N. | No. of Educational Institution | No. of Institution |
|------|--------------------------------|--------------------|
| 1 | Secondary School | 46 |
| 2 | Basic | 12 |
| 3 | Primary | 9 |
| | Total | 67 |

Table 26: Educational institution

Source: Province wise School & student details/ Education and Human Resource Development Center, 2075

In the present context, there are altogether 40 Private Early Childhood Development Centre and 22 Public Early Childhood Development Centre, 26 Community/Government Schools, 41 Private Schools

Institutional or Private schools are more in number than public schools in the municipality. The level wise school count is presented in the table below.

Table 27: Level wise Private and Public Schools

| Ward | Primary | y School | Basic | | Second | ary | Total | | |
|-------|---------|---------------|--------|---------------|--------|---------------|--------|---------------|-------------|
| No. | Public | Institutional | Public | Institutional | Public | Institutional | Public | Institutional | Grand Total |
| Total | 4 | 5 | 6 | 6 | 16 | 30 | 26 | 41 | 67 |

Source: Province wise School & student details/ Education and Human Resource Development Center, 2075 Table 28: Ward wise Distribution of Schools

| Ward | Dro Drimony | | | Higher | | |
|-------|--------------|---------|-----------------|-----------|---------|-------|
| no | FIE-FIIIIaly | Primary | Lower Secondary | Secondary | College | Total |
| 1 | | 3 | 4 | | | 7 |
| 2 | | | 3 | 1 | | 4 |
| 3 | | | 2 | 1 | | 3 |
| 4 | | | 3 | 1 | 1 | 5 |
| 5 | | | 3 | 2 | | 5 |
| 6 | | | 4 | | | 4 |
| 7 | | 2 | 2 | 2 | | 6 |
| 8 | | | 5 | 2 | | 7 |
| 9 | | | 3 | | | 3 |
| 10 | | | | | | 0 |
| 11 | 2 | | 4 | | | 6 |
| 12 | | | 3 | | | 3 |
| 13 | | | 7 | | | 7 |
| 14 | | | 5 | | | 5 |
| 15 | | | 5 | | | 5 |
| Total | 2 | 5 | 53 | 9 | 1 | 70 |



Map 14: Distribution of Educational Institutions

1.8.2 Health

In the municipality, there are altogether six hospitals. There are four private hospitals, one Ayurved Hospital, and one Cancer hospital. And there are 11 health post,1 T.B. Treatment Center and 20 Pharmacy.

Table 29: Health Institutions

| S. N. | Health Institution | No. of Institution | Address |
|-------|--|--------------------|------------------------------|
| 1 | Ayurveda Hospital | 1 | |
| 2 | Health Post | 11 | All wards of municipality |
| 3 | Private Hospital | 4 | Ward no. 1,4,5,12 |
| 4 | Cancer Hospital | 1 | Ward no. 3 |
| 5 | Female Health Volunteers | 34 | All wards |
| 6 | T.B. Treatment Center | 1 | |
| 7 | Doctors | 25 | Including in all health post |
| 8 | Percentage of delivery in Health institute | 80% | All wards |
| 9 | Pharmacy | 20 | Settlements of all wards |

Source: Municipal Profile, Field Survey 2074



Similarly, in the case of health related manpower, there are 25 doctors and 34 Female Health Volunteers.

| Ward | Polyclinic | Hospital | Clinic | Health post | Community Health Centre | Total |
|------|------------|----------|--------|-------------|--------------------------------|-------|
| 1 | | 1 | | 1 | | 2 |
| 2 | | | | 1 | | 1 |
| 3 | | 1 | | 1 | | 2 |
| 4 | | 1 | | 1 | | 2 |
| 5 | | 1 | | 1 | | 2 |
| 6 | | | | 1 | | 1 |
| 7 | | | | 1 | | 1 |
| 8 | | | | 1 | | 1 |
| 9 | | | | 1 | | 1 |
| 10 | | | | 1 | | 1 |
| 11 | | | | 1 | | 1 |

Table 30: Ward wise distribution of health institution

| 12 | 1 | 1 | 2 |
|-------|---|----|----|
| 13 | | 1 | 1 |
| 14 | | 1 | 1 |
| 15 | | 1 | 1 |
| Total | 5 | 15 | 20 |

1.8.3 Community Buildings

There are different types of community buildings. And these buildings are used for organizing different programmes, ward meetings etc. The ward-wise distribution of community buildings is presented in the table below.

The list of different community building are as follows:

Source: Chandragiri Municipal Profile, Field Survey 2074 The highest number of community building is in Ward no 1 which accounts 6 in number, followed by 5 in Ward no. 6, 4 in Ward no. 7 & 13 and 3 in Ward no. 2.

1.8.4 Different Social Institutions

The residents of the Chandragiri Municipality are affiliated to different institutions. Most of the residents are affiliated to different Co-operatives too. In the social institutions, different consumer committee, Youth Club, Children Club, Women and Mother's group, Nagarik Manch and Co-operatives are associated. The different existing social institutions working for the long- term development in the municipality is as follows:

| S.N. | Name of Community Building | Address | Present Use |
|------|---------------------------------------|-------------------|--------------------|
| 1. | Ward Office | Ward 1, Cha.Mun. | - |
| 2. | Radha Krishna Mahila Samudayik Bhawan | Ward 1, Cha.Mun. | - |
| 3. | Clubhouse | Ward 1, Cha.Mun. | - |
| 4. | Ganeshthan Community Building | Ward 1, Cha.Mun. | - |
| 5. | Ghattedada Community Building | Ward 1, Cha.Mun. | - |
| 6. | Gahate Community Building | Ward 1, Cha.Mun. | - |
| 7. | Nagdhunga Yuba Club Building | Ward 2, Cha.Mun. | Programme Hall |
| 8. | Baghchandi Community Building | Ward 2, Cha.Mun. | Programme Hall |
| 9. | Kalidevi Yubak Agriculture Group | Ward 2, Cha.Mun. | - |
| 10. | Nagarik Sachetana Kendra | Ward 5, Cha.Mun. | - |
| 11. | Gumal Chowki | Ward 6, Cha.Mun. | - |
| 12. | Wala Gaun | Ward 6, Cha.Mun. | - |
| 13. | Ganesh Mahila Bhawan | Ward 6, Cha.Mun. | - |
| 14. | Matatirtha | Ward 6, Cha.Mun. | - |
| 15. | Bihar | Ward 6, Cha.Mun. | - |
| 16. | Bandevi Community Building | Ward 7, Cha.Mun. | School |
| 17. | Banasthali Community Building | Ward 7, Cha.Mun. | School |
| 18. | Kiryaputri Bhawan Triveni | Ward 7, Cha.Mun. | - |
| 19. | Kiryaputri Bhawan Chapabot | Ward 7, Cha.Mun. | - |
| 20. | Taukhel Community Building | Ward 9, Cha.Mun. | - |
| 21. | Bishnudevi Community Building | Ward 10, Cha.Mun. | Under Construction |
| 22. | Chundevi Community Building | Ward 12, Cha.Mun. | Ward meeting |
| 23. | Chandra Surya Club | Ward 13, Cha.Mun. | - |
| 24. | Dipsikha Youth Club | Ward 13, Cha.Mun. | - |
| 25. | Rising Star Club | Ward 13, Cha.Mun. | - |
| 26. | Panchakanya Community Building | Ward 13, Cha.Mun. | - |

| S. N. | Name of Tole Development Institution | Address |
|--|--------------------------------------|-------------|
| 1 | Aieselu Chowk Jagaran Samaj | Ward no. 2 |
| 2 | Nagdhunga Yuwa Club | Ward no. 2 |
| 3 | Kisipidi Tole Sudhar Samiti | Ward no. 5 |
| 4 | 10 no. Tole Sudhar Samiti | Ward no. 5 |
| 5 | Aawash Tole Sudhar Samiti | Ward no. 5 |
| 6 | Aashapuri Tole Sudhar Mandir | Ward no. 6 |
| 7 | Astamatrika Tole | Ward no. 6 |
| 8 | Nasuri Tole | Ward no. 6 |
| 9 | Balagau | Ward no. 6 |
| 10 | Kankakali Tole Sudhar | Ward no. 13 |
| 11 | Sadbhav Nagar Tole | Ward no. 13 |
| 12 | Samsari Youth Club | Ward no. 13 |
| Courses Chandragizi Municipality Profile | | |

Table 31: Major Community Institutions

Source: Chandragiri Municipality Profile

The different NGOs are working in the municipality. These NGOs are working for disabled children, awareness Programme, drinking water, health, agriculture, religious social service, support for helpless, providing treatment to sick people, free education etc. The list of different NGOs present in the municipality is as follows:

Table 32: Different NGOs

| S. N. | Name of NGOs | Address | Objective |
|-------|---|------------------|---------------------------------------|
| 1 | Maunsek Nepal | Ward 5, Cha.Mun. | |
| 2 | Bikalpa Ko Lagi Awaj Nepal | Ward 5, Cha.Mun. | |
| 3 | Chandragiri Samaj | Ward 5, Cha.Mun. | |
| 4 | Laliguras Club | Ward 7, Cha.Mun. | |
| 5 | Samaj Sudhar Club | Ward 7, Cha.Mun. | |
| 6 | Omkaryashowr Samaj | Ward 7, Cha.Mun. | |
| 7 | Hivision Samaj | Ward 7, Cha.Mun. | |
| 8 | Bandevi Samaj, Sudhar | Ward 7, Cha.Mun. | |
| 9 | Saheed Smarak Pratisthan | Ward 7, Cha.Mun. | |
| 10 | Baba Ashram Sewa Sansthan | Ward 8, Cha.Mun. | |
| 11 | Divine Mystery School | Ward 8, Cha.Mun. | Religious Social Service |
| 12 | Baikunthanath Divyadham Bhagwat Sewa Ashram | Ward 8, Cha.Mun. | Awarness Campaign |
| 13 | Nepal Ivanjalikal Holyness | Ward 8, Cha.Mun. | Support to Helpless |
| 14 | Ananda Yog Kendra | Ward 8, Cha.Mun. | Religious Education |
| 15 | Nabodaya Takhel Mandali | Ward 8, Cha.Mun. | Teaching Yog |
| 16 | Spark Health Home Hospital | Ward 8, Cha.Mun. | Religious service |
| 17 | CDP BalBikas Karyakram | Ward 8, Cha.Mun. | Provide treatment to sick people |
| 18 | Bright Horizon Children Home | Ward 8, Cha.Mun | To provide free education |
| 19 | Children Welfare Center | Ward 8, Cha.Mun | Free education for orphan children |
| 20 | Chandragiri Mahila Samuha | Ward 9, Cha.Mun. | |
| 21 | Navajiwan Nepal | Ward 9, Cha.Mun. | |
| 22 | Chundevi Didi Bahini Samuha | Ward 9, Cha.Mun. | |

| 23 | Matsya Narayan Yuba Club | Ward 9, Cha.Mun. |
|----|--------------------------|-------------------|
| 24 | Sabal Sahakari | Ward 13, Cha.Mun. |
| 25 | Moonlight Sahakari | Ward 13, Cha.Mun. |
| 26 | Grihani Sahakari | Ward 13, Cha.Mun. |

Source: Chandragiri Municipality Profile

The maximum number of NGOs are in Ward 8 which accounts 10 in number, followed by Ward 7 in which there are 6 NGOs working.

1.8.5 Social welfare

The number of people getting security allowances in the Chandragiri Municipality of the first quarter in the fiscal year 2074/075 is as follows:

Table 33: Description of Security Allowances

| S.N. | Description | Female | Male | Total |
|-------|---------------------------------|--------|------|-------|
| 1 | Senior Citizen (above 70 years) | 638 | 565 | 1203 |
| 2 | Senior Citizen -Dalit | 46 | 44 | 90 |
| 3 | Single Women | - | - | 694 |
| 4 | Endanger caste | - | - | 116 |
| 5 | Fully Disable | 23 | 38 | 61 |
| 6 | Partially Disable | 14 | 26 | 40 |
| Total | | 721 | 673 | 2204 |

Source: Chandragiri Municipality Profile

The total number of people getting security allowances are 2204, out of which 1203 are senior citizens (above 70 years) and 90 are the Dalit senior citizens. Similarly, 694 single women are getting social security along with 116 endanger caste, 61 fully disable citizen and 40 partially disable citizen.

1.8.6 Security

There are altogether six police stations available in this Municipality. The overall security services in this Municipality is satisfactory. There distribution of Security services in Chandragiri Municipality is as follows:



Photograph 1: Police Station at ward 2

Table 34:List of Security Service

| S.N. | Security Service | Location |
|------|--|-------------------|
| 1 | Mahanagar prahari pravag | Satungal ward 11 |
| 2 | APF | Balambu ward 12 |
| 3 | Nagdhunga checkpost | Nagdhunga ward 2 |
| 4 | Machhegaun police station | Machhegaun ward 9 |
| 5 | Check post police station | Check post ward 6 |
| 6 | Metropolitan traffic police department | Ward 7 |

Source: Field inventory,2075

1.8.7 Social Inclusion

The area is socially inclusive in terms of ethnicity, caste, gender, and economic class. The space for social and cultural diversity and sensitivity particularly to disadvantaged, marginalized and minority groups, and poor people and youth in general reveals social inclusion. Among the total 25 board members of the municipality, 8 are women which constitutes 32%. And among the total 55 ward members, 25 are female which accounts more than 45.45%. Similarly, out of 15 dalit members, 13 are women.

1.8.8 Religious Places

There are many religious places in the municipality. There are altogether 35 Hindu temples, 2 Church, 3 Bihar and 1 stupa. The ward-wise distribution of temple, Bihar, Stupa and Church is presented in the table below.

| Ward | Temple | Bihar | Stupa | Church |
|------|------------------------------|--------------|--------------|--------|
| 1 | Ganesh Temple | | | |
| | Shiva Temple | | | |
| | Manakamana Temple | | | |
| 2 | Chandika Devi Temple | | | |
| | Masiney, Bhakteshowr Mahadev | | | |
| | Temple | | | |
| | Chande Bhairab Temple | | | |
| | Eakcheshowrdham Temple | | | |
| | Chandika Devi Temple | | | |
| 3 | Kapaleshowr Mahadev Temple | Buddha Bihar | | |
| | Matatirtha Temple | | | |
| 4 | Mahalaxmi Temple | | Buddha Stupa | |
| | Aadinarayan Temple | | | |
| 5 | Kaalika Pith Temple | | | |
| 6 | Matatirtha kunda Temple | | | |
| | Chandan Bharateshowr Temple | | | |
| | Tinkanya Temple | | | |

Table 35: Religious places

| | Krishna Temple | | |
|----|--------------------------|-----------------|-----------------|
| 7 | Omkareshowr Temple | | |
| | Tribenidham Temple | | |
| | Jwaladevi Temple | | |
| 8 | Bishnudevi Temple | | |
| | Chandikadevi Temple | | |
| 9 | Machhenarayan Temple | | |
| | Bishnudevi Temple | | |
| | Satyanarayan Temple | | |
| | Chundevi Temple | | |
| 10 | Bhairabnath Temple | | |
| 11 | Bishnudevi Temple | | |
| 12 | Bhimsen Temple | Bijayaram Bihar | |
| | Mahalaxmi Temple | | |
| 13 | Kamkali Temple | | Church |
| | Daneshowr Mahadev Temple | | |
| 14 | Kalika Temple | | |
| | Baal kumari Temple | | |
| 15 | Bishnudevi Temple | Bihar | Meluk Church |

Source: Field Inventory,2075



Map 15: Religious Map

1.9 Culture

1.9.1 Festivals

There are many religious monuments in Chandragiri municipality. The census of 2068 shows Hindu Dharma 79% and Buddhist Dharma 10.5%. Other than this, the Newar community of this municipality is the worshiper of both religions. Dashain, Tihar, Ram Navami, Shiva Ratri, Chaite Dashain, Kushe Aunsi, Krishna Janmasthami etc are the main festivals that are celebrated traditionally whereas festivals like Maha puja, Sity Nakh, Loshar, Yomari Purne, Sama chakewa etc are considered specially in the race. Other main festivals are:

Matatirtha Aunsi:

The word Matatirtha comes from two Sanskrit words, "Mata" meaning mother and "tirtha" meaning a sacred place. The VDC owes its name from a sacred pond in the VDC dedicated to mother. Matatirtha Aunsi is marked as the Mother's Day by Nepali Hindus and every year devotees throng the religious

site for a holy dip and paying homage to the deities there. People from Kathmandu Valley and surrounding districts as well as other places come to Matatirtha pond, about 12 kilometers to the south-west of the capital. Especially people whose mothers have passed away visit the holy place to take bath in the pond, and make offerings and homage to the departed mothers. A myth has it that in the ancient times a herder went to the Matatirtha pond to quench his thirst and upon drinking water happened to see the reflection of his departed mother's face in the pond. It is believed that from that time the Matatirtha pond assumed the veneration. Matatirtha Aunsi falls on the new moon day in the Nepali month Baisakh every year as per the lunar calendar.

Shivaratri

In the honor of Lord Shiva, Shivaratri is celebrated annually by the Hindu people in the late winter and before arrival of the summer. In this day most of the people goes to the Shiva temple for worship and stay whole night with fire. Celebrated in Bhaleshwor Mahadev temple.

Saatgaule Jatra

Saatgaule Jatra is one of the popular festival of Chandragiri municipality of Kathmandu valley. It is celebrated in Bishnu Devi Temple. The word Saatgaule means Seven village and seven village includes Naikap, Satungal, Bosigaun, Nunkot, Tinthana, Machhegaun and Kritipur. There is a saying in the introduction of this festival that in an ancient period when priests were playing homage to the god suddenly seven pigeons fell on the fire so it was named as Saatgaule Jatra. There is also a saying that all these gods and goddesses were the member of a family but due to the critical situation they were forced to be apart from the family. In this festival villagers bring image of gods and goddesses at Bishnu Devi Temple site and celebrate the festival. In this day, they decorate the gods and goddess's images with jewellery, tikas, sugarcane, flowers. People also sacrifice different goats in order to please them. It is celebrated for three days. The first day is known as Choyala Bho (in Newari language), second day is known as Sinaya and third day is also known as Sinaya. In both first day and third day gods and goddesses are worshipped.

Machhenarayan Mela

Machhenarayan is an avatar of god Bishnu. Is is said that during the ancient time Manu found a small fish about to die. He brought the fish to his home and put it into a small pot of water, next day the fish grew up amazingly and no longer fit in the pot so he put this fish in the pond, next day that fish was found much bigger and no longer fit in the pond as well. Knowing that, this fish is not an ordinary fish, Manu bowed with respect and asked the fish to disclose the reality. Then god Bishnu emerged from the mouth of fish. To remember this event Manu established Machhenarayan temple in the center of the pond.

Machhe Narayan Mela (Fair) named Magalmas is organized in every three years in Machhegaun. This Mela is celebrated for a whole month mostly from April to July. During this month God Vishnu is worshipped all over the country.

1.10 Economic Scenario

Regional or state three context

This municipality falls in state number 3 and state no.3 is the most developed state compared to other six states in terms of socio-economic, contribution to GDP, concentration of banks and financial institutions, urbanization level etc. For instance, the share of GDP of this state in national economy is

31.9%, per capita income and productivity of labour both is the highest accounting for US\$ 1534 and Rs.182, 223 respectively. As much as one-third or 34.4% of banks and financial institutions are located in this state. Being the capital region of the country until recently, the share of service sector to GDP is 44.5% which is also highest among all states. The number of households with access to water supply, electricity, toilet facilities etc. is relatively high in this state. It accommodates one-fifth or 20.9% of country's total population with 13.8% of total land therefore density of population is high which is 272 persons per sq.km. The level of urbanization in Kathmandu, Bhaktapur, Lalitpur, Chitwan and Makanpur is 59.7,54.1,47.2,45.4 and37.4 respectively in 2014 (Population Monograph of Nepal,Vol.2,CBS,2014).With increase in number of municipalities after 2014,the urbanization level of Kathmandu,Lalitpur and Bhaktapur etc.must have increased further.

Despite of all these positive side of the picture, there are many problems/challenges which this state has to confront. For instance, haphazard urbanization particularly in three cities of the Kathmandu Valley resulting into tremendous pressure on the existing facilities and services, traffic congestion, rising prices of land and housing leading to informal settlements etc. The level of poverty is 15.3% and food balance sheet is alarming indicating deficit as much as 535,028 Metric tons in FY2015/16.

Kathmandu district context

Kathmandu district being the capital city of the nation until recently is undoubtedly the most developed and prosperous city in terms of socio-economic, urbanization, provision of infrastructure services and facilities etc. More than 60% of the population in Kathmandu district lives in the urban areas and this is the highest level of urbanization in Nepal compared to urbanization level of remaining districts in Nepal. The city of Kathmandu is equally rich in ancient historical, archaeological cultural heritage both tangibles and intangibles. For instance, Boudha, Kathmandu Durbar Square, and Swoyambhu three out of seven belonging to World Heritage Sites are located in this city alone. In innumerable number of interesting addition to this, there are and beautiful temples, bihar, chaityas, bahi/bahal and bihar with fascinating traditional architecture, wood carving, metal casting and stone crafting which can be seen in this city and this attracts not only lures foreign tourists but also Nepali people alike.

Kathmandu is probably the most crowded and unplanned city in Nepal where regular traffic jam, lack of water supply, frequent occurrence of solid waste management problem, pollution of both dust and fumes etc has become part of daily life to city dwellers. Until recently the city had faced more than 16 hours of load shedding which now has become just a nightmare nobody likes to remember. Most of the city black topped city roads are dusty in sunny days and muddy and slippery in rainy days where one has to struggle to cross the road avoiding the potential accident in the mean time.

Due to rapid urbanization resulting from accelerated inflow of population from all over the country the housing construction is booming regardless of rocketing prices of land and their location. As the area of precious agricultural land is dwindling at faster rate annually, obviously leading to tremendous decrease in food grain production. This is clearly shown by the level of food deficit to the extent of 386,515 metric ton in FY 2015/16 and this deficit is increasing year after year.

According to preliminary result of National Economic Census conducted by Central Bureau of Statistics in 2018, there are 123,994 establishment in this district and the number of persons engaged are 575,003.

Municipality context

Introduction

This municipality is endeavoring to drive its development process through tourism, agriculture and industrial development. There are immense explored and unexplored archaeological and historical heritage sites which can really attract tourist local as well as international provided it is properly disseminated nationally and internationally. This economy at present is based on industry and trade. Population is increasing at fast rate primarily due to inflow of people from outside rather than natural birth of population.

Chandragiri Cable Car has really boost the local economy resulting into opening of many hotels, lodges, restaurants and other related shops in and around this area. The number of cable car riders is increasing so also the income of local people in recent years. This has become one of the strong strengths of this municipality to drive its economy through religious tourism as there is temple of Bhaleshwor Mahadev nearby cable car landing area. Thus people rides cable car for sightseeing of panoramic view of the valley including Himalayas and to pay homage to Mahadev temple simultaneously. It serves twin purposes in one ride besides lots of enjoyments associated with this ride as there are lovely green forest and natural beauties. It can be said that the impact and contribution of cable car in the economy is significant.

According to agriculture officer/expert there is great potentialities for tomatoes and mushroom production in this municipality.

According to preliminary result of National Economic Census conducted by Central Bureau of Statistics in 2018, there are 7005 establishment in this municipality and the number of persons engaged are 36,583.

1.10.1 Trade & Business

It is estimated that there are about 3000shops at present. Assuming daily sales of Rs.10, 000 per shop, the annual turnover would be Rs.10.8 Arab which is significant amount for a municipality like this.

| S.No. | Business Description | Number |
|-------|-----------------------|--------|
| 1 | Dairy Products | 23 |
| 2 | Tailors | 79 |
| 3 | Gold and silver | 38 |
| 4 | Rental business | 45 |
| 5 | Hotel | 182 |
| 6 | Fancy business | 175 |
| 7 | Pharmacy and Clinic | 81 |
| 8 | Vegetables and Fruits | 80 |
| 9 | Electronic | 39 |
| 10 | Fresh House | 89 |
| 11 | Salon/ Beauty Parlour | 65 |
| 12 | Industry | 34 |
| 13 | Arts Gallery | 4 |
| 14 | Bakery and Sweets | 22 |
| 15 | Pig Farm | 4 |

Table 36: Number and type of shops

| 16 | Operation of Boarding School | 23 |
|----|--|------|
| 17 | Contractor | 2 |
| 18 | Shoe Shop | 47 |
| 19 | Photo Studio | 18 |
| 20 | Furniture | 50 |
| 21 | Kirana Pasal | 733 |
| 22 | CD Shop | 23 |
| 23 | Pool House | 10 |
| 24 | Auto Workshop | 19 |
| 25 | Cotton Industry | 6 |
| 26 | Rice Mill | 15 |
| 27 | Repair House (watch, radio, TV) | 25 |
| 28 | Petrol Pump | 7 |
| 29 | Masala Industry | 6 |
| 30 | Chasma House | 16 |
| 31 | Pasmina Shop | 1 |
| 32 | Pottery, Mask & Ceramic Shop | 3 |
| 33 | Film hall | 1 |
| 34 | Khaja & Tea Shop | 756 |
| 35 | Transport Service | 5 |
| 36 | Pango Mato | 1 |
| 37 | Tuition Center | 2 |
| 38 | Housing | 1 |
| 39 | Carpet Shop | 22 |
| 40 | Sewages Collection & Sanitation | 2 |
| 41 | Nursery | 5 |
| 42 | Courier service | 3 |
| 43 | Alcoholic shop | 72 |
| 44 | Gas Dealer | 36 |
| 45 | Dance & Music Center | 3 |
| 46 | Pau Store | 4 |
| 47 | Catering service | 1 |
| 48 | Law & Counselling Service | 2 |
| 49 | Construction & Supplier | 22 |
| 50 | Stationery & Photo Copy | 25 |
| 51 | Scrap Collection Center | 4 |
| 52 | Gym center | 17 |
| 53 | Cyber Center, Computer Training Center | 1 |
| 54 | Glass house | 7 |
| 55 | Money Transfer | 23 |
| 56 | Co-operative | 31 |
| 57 | Bank | 4 |
| 58 | Advertisement, Media & Cable Network | 1 |
| 59 | Paper Industry & Press House | 4 |
| 60 | Party Palace | 4 |
| 62 | Veterinary | 2 |
| | Total | 3025 |

(Source: Chandragiri municipality profile)

Major problems

- 1. Lack of organized market
- 2. Haphazard expansion of trades or shops
- 3. Lack of consistency in price and quality
- 4. Lack of supervision by regulating agencies to control in price and quality

1.10.2 Tourism

The vision setting workshop unanimously agreed and decided tourism as the lead sector and it is expected that this sector will drive the economy of municipality to the road of prosperity in near future.

The recently constructed cable car has attracted lots of domestic tourists in this municipality everyday and the number of visitors is more than double during holidays. This has encouraged many private sectors to establish hotels and restaurants in and around this cable car area and they are making good return from their investments.

Chandragiri has lots of historical, archaeological and religious sites which can attract many local and international tourists if properly developed and disseminated to outside world through appropriate channels. However, most of these sites are yet to be excavated and explored by concerned agencies assigning top most priority to such sites in the days to come if tourism sector is considered as one of the important leading sectors of the economy for growth and prosperity of this municipality in future.

| S No. | Type of tourism | Potential area/s |
|-------|------------------------|--|
| 1 | Religious | Bhaleshwor Mahadev, Matatirtha temple etc |
| 2 | Hiking/trekking | From Thankot Godam-Chandragiri-Toplang to Naubise (14 km). From Naikap to Gumba-Indradaha-Naghdhunga |
| 3 | Botanical/zoological | Tribhuwan Park |
| 4 | Historical | Dahachowk (Kalu Pandey burial place) |
| 5 | Park/Picnic spot | Switzerland park, Sakura park, Sahid park, Matatirtha jungle etc |
| 6 | Yoga/meditation center | Yoga Ashram Arbindo |
| 7 | Home stay | Pataleban Vineyard Resort, Heavenly Resort Masine |
| 8 | Natural/Sight seeing | View Tower, Indradaha |
| 9 | Adventure | Chandragiri hills, Bad Bhanjyang hills, Matatirtha hills |
| 10 | Agriculture | Balambu Mushroom farm, Fishing, |
| 11 | Sports | |
| 12 | Weekend tourism | Cable car Chandragiri hills |

Table 37: List of Tourism Potential area

Table 38: List of Tourism Spot

| S. | Important Tourism Spot | Address |
|----|--------------------------------|-------------|
| N. | | |
| 1 | Patley Ban, Masiney | Ward no. 1 |
| 2 | Tribhuvan park | Ward no. 3 |
| 3 | Kisipidi gaun | Ward no. 5 |
| 4 | Matatirtha kunda | Ward no. 6 |
| 5 | Bandevi, Mahakalesthan | Ward no.7 |
| 6 | Shanti Ban | Ward no. 9 |
| 7 | Saatgauley | Ward no. 10 |
| 8 | Balambu Purano Basti, Rani Ban | Ward no. 12 |
| 9 | Kotko Dado, Bhimsenthan | Ward no. 13 |
| 10 | Ganeshman Park, Magar Basti | Ward no. 14 |

Source: Chandragiri Municipality Profile

1.10.3 Industry

There are about 45 industries and the major industries are Frooti, hume pipes production, Samsung's assembly plant, Sipradi Trading etc.

Major problems

1. Lack of investment -friendly environment and policy to encourage private sector

2. Limited knowledge on the part of municipality about feasible industries based on agriculture, forest, minerals etc.

3. Lack of marketing and promotion of traditional skill based industries

- 4. Lack of skilled manpower
- 5. Lack of proper area or Uddyog Gram for planned industrial development
- 6. Lack of infrastructure like roads, energy etc.

Table 39: Type of Industry

| S.N. | Type of industry | Ward no |
|------|------------------------|---------|
| 1 | Carpet factory | 4 |
| 2 | Heritage karkhana | 4 |
| 3 | Carpet factory | 4 |
| 4 | Medicine factory | 4 |
| 5 | Panchakanya steel | 7 |
| 6 | Pani Prasodhan Factory | 8 |
| 7 | Bottle factory | 11 |
| 8 | Pasmina industry | 11 |
| 9 | Dalmot factory | 11 |
| 10 | Frooty factory | 11 |
| 11 | Paper factory | 12 |
| 12 | Pusmina Factory | 12 |
| 13 | Bishnu devi housing | 15 |

(Source: Vision review meeting)

1.10.4 Agriculture

The table below shows in terms of area maize occupies the first place (1181.82 Ha.) whereas in terms of production paddy occupies the first place (4787.82 MT). Compare to yield rate also, yield rate of paddy (5.08MT/Ha) is the highest compared to all cereal crops followed by maize (3.39 MT/Ha) and wheat (3.20 MT/Ha).

| Сгор | Area in Ha. | Production in MT | Yield in Mt/Ha |
|------------|-------------|------------------|----------------|
| Paddy | 941.48 | 4787.82 | 5.08 |
| Maize | 1181.82 | 4007.72 | 3.39 |
| Wheat | 464.49 | 1486.37 | 3.20 |
| Millet | 101.43 | 102.43 | 1 |
| Buck Wheat | 0.59 | 0.59 | 1 |
| Barley | 0.47 | 0.47 | 1 |

Table 40: Area, production and yield of cereal crop and vegetable FY2017/18

(Source: Statistical Information on Nepalese Agriculture, Ministry of Agriculture, Land Development and Cooperatives Development, 2017.)

Major problems

- 1. Existence of traditional and subsistence type of agriculture practice with limited use of modern inputs
- 2. Lack of irrigation facilities
- 3. Lack of adequate marketing
- 4. Lack of utilizing or harnessing the existing immense potentialities in agriculture and livestock
- 5.Lack of manpower
- 6. Lack of improved type of horticulture
- 7.Lack of agriculture trade school and training centre
- 8.Lack of collection centre and marketing
- 9. Lack of modern slaughter house
- 10. Use of pesticides and insecticides
- 11.Lack of cold store

1.10.5 Livestock

According to 2070/71 data, there are about 6000 cows and buffaloes in this municipality. There are altogether 20 farms with more than 10 livestocks. Similarly, farm with livestock number between 10 to 50 is 10. The total number of chickens is more than 15,000 and there are two hatcheries in this municipality. The total production of eggs, chicken meat, and milk is 4320000 units, 300,000 kg and 21600000 liters per year respectively. Mushroom block farming programme is currently in operation in Balambu, Dahachowk andThankot with 50 farmers in each programme area. Similarly, pocket vegetable production programme is going on in Dahachowk, Thankot and ward.no.15 Bosi gaon and Matatirtha. In addition to this, 70 farmers in group are cultivating tunnel tomato in commercial scale.

Table 41: Number of farm and livestock

| S.N | Number of Farm | Number of Livestock | Remarks |
|-----|----------------|---------------------|-----------|
| 1 | 20 | 10 | |
| 2 | 1 | 50 | |
| 3 | 5 | 250 | |
| 4 | 2 | 50 | Goat farm |
| 5 | 1 | 3000 | Pig |
| 6 | 10 | 10-50 | |

(Source: Data provided by official from Livestock Office of Chandragiri Municipality during Ward Consultative Meeting.)

Major problem faced in Livestock:

1.Lack of adequate knowledge about existing potentialities

2.Lack of knowledge about new possibilities and limited dissemination from concerned agencies to local farmers

3. Limited exploitation of potentialities existing in poultry, dairy farming, meat production

4.Lack of commercialization in livestock

1.11 Environmental and Ecological Status

1.11.1 Forest

There are 176 community forest in Kathmandu district among them 23 community forest lies in Chandragiri municipality which covers 1170.78 ha. These community forest serves 3880 households. Chandragiri municipality also consist 1 kabuliyat forest covering 36.00 ha.

| S.No | Name | Туре | Area(hec.) | Benefited Household |
|------|-----------------------------------|-------------------------|------------|------------------------|
| 1 | Laglagae Pakha | Community Forest | 22.12 | 72 |
| 2 | Subbako Ban | Community Forest | 7.93 | 50 |
| 3 | Mahakalsthan | Community Forest | 34.50 | 119 |
| 4 | Ganeshdevi Ban | Community Forest | 10.76 | 53 |
| 5 | Masinae | Community Forest | 21.68 | 110 |
| 6 | Chandragiri Sachet | Community Forest | 93.75 | 202 |
| 7 | Gumalchowki | Community Forest | 88.27 | 131 |
| 8 | Mahalaxmi | Community Forest | 54.25 | 160 |
| 9 | Jamunadanda | Community Forest | 109.80 | 149 |
| 10 | Baghbacchaladevi | Community Forest | 50.84 | 102 |
| | | | | |
| 11 | Kafaldanda | Community Forest | 15.50 | 104 |
| 12 | Dharapani | Community Forest | 112.68 | 23 |
| 13 | Ratomatodanda | Community Forest | 13.90 | 145 |
| 14 | Mahalaxmi Matatirtha | Community Forest | 28.29 | 72 |
| 15 | Setidevi | Community Forest | 44.75 | 93 |
| 16 | Bambudanda | Community Forest | 21.22 | 25 |
| 17 | Patlae Thosnae Khola Chisapani | Community Forest | 159.33 | 918 |
| 18 | Jhagajhiti | Community Forest | 15.50 | 135 |

Table 42: List of Forests

| 19 | Keurani | Community Forest | 51.90 | 435 |
|-------|-----------------------------|-------------------------|---------|------|
| 20 | Raniban | Community Forest | 20.10 | 230 |
| 21 | Machhenarayan | Community Forest | 30.00 | 396 |
| 22 | Chundevi Mahila | Community Forest | 127.00 | 96 |
| 23 | Bishnudevi Mahila | Community Forest | 0.71 | 60 |
| 24 | Kathmandu Fun Park Pvt.Ltd. | Kabuliyati Ban | 36.00 | - |
| Total | | | 1170.78 | 3880 |

Source: District Forest Book,2073/074



Map 16: Spatial Distribution of Forests

1.11.2 Air Pollution

Air quality in Kathmandu valley is worsening. The main reason for degrading air quality in Kathmandu valley is due to vehicle and brick kiln in valley.

About 46% of the total road network of Chandragiri Municipality is earthen which is causing air pollution due to dust.

After earthquake in 2015, many damaged house were constructed and construction materials are present along road and open space which is causing air pollution.

1.11.3 Water Pollution

Kathmandu valley has been having severe water treatment problem since many years because of unplanned urbanization and rapid population growth.

Table 43: List of river in Chandragiri Municipality (Source: field survey)

| S.no | Name of river | Name of VDC /Municipality |
|------|---------------|--|
| 1 | Balkhu river | Chandragiri Municipality (Ward covered-1,2,3,12,14,15) |
| 2 | Daudali river | Chandragiri Municipality |
| 3 | Bosan river | Chandragiri Municipality |

Water pollution on these rivers are seen due to disposal of solid waste on bank of the river. Water pollution can also be seen in traditional ponds in Chandragiri municipality. These traditional ponds are covered by solid waste and plastics causing water pollution.

1.11.4 Noise Pollution

In Urbanizing area there are many building construction on process. This construction of building and road is causing noise pollution on these areas. Noise pollution can also be felt in bus park due to unmanaged parking space.

1.11.5 Open space

Open space is those space where there is no built structure. Open space can be used for recreational space, shelter during disaster, open green space, parks etc.

District coordination committee have identified open space suitable to take shelter during disaster. Some open spaces in Chandragiri municipality with their areas are given below:

Table 44: List of Open Spaces

| S.N. | Place | Туре | Area |
|------|-------------------------|---------------------------------|------------|
| 1. | Naikap Purano Bhanjyang | Football ground | |
| 2 | Badbhanjyang | Open playground | 50 ropani |
| 3 | Thankot | Open playground, Community hall | 100 ropani |
| 4 | Mahadevsthan | Matatirtha kunda parisar | 200 ropani |
| 5 | Balambu | Balambu Secondary school | 35 ropani |
| 6 | Naikap Naya Bhanjyang | Football ground | |
| 7 | Matatirtha | Matatirtha kunda parisar | |
| 8 | Machhegaun | Machhenarayan mandir parisar | |

1.11.6 Sanitation

Regarding Sanitation, use of toilet also plays a vital role. The household without toilet facility is also in significant number which is 2.12 %.

Table 45: Number of Household used toilet facility

| V.D.C. / Municipality | Total households | Households without toilet facility | Households with toilet facility of | | Toilet facility not stated | |
|-----------------------|---------------------|--|------------------------------------|--------------------|-------------------------------|--|
| | | | Flush toilet | Ordinary toilet | | |
| Total | 20,532 | 436 | 16840 | 3092 | 164 | |

[Source: C.B.S 2011]

Solid waste is thrown in roads and open space causing pollution and unpleasant view. Balkhu river has been major disposition area as this river is filled with organic, inorganic and plastic waste.

1.12 Disaster

Disaster brings serious disruption in the functioning of a community or society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community to cope using its own resources (UNISDR, 2009). Epidemics, landslide, floods, fire, thunderstorm, accident and earthquake are some of the main hazards in Nepal. Among these flood, fire, landslide and epidemics are major disaster.

In Kathmandu district data from 1971-2016 shows that earthquake is major disaster as it has damaged 43605 house completely killing 1230 people.

| Table 16. Damage due | to different disactor in | Kathmandy district | $(1071 \ 201c)$ |
|------------------------|--------------------------|--------------------|-----------------|
| TUDIE 40. DUITIUGE UUE | | | (19/1-2010) |

| Type of disaster | Frequency | Death | Injured | Affected population | Affected buil | ding |
|------------------|-----------|-------|---------|---------------------|---------------------|-----------------------|
| | | | | | Totally affected | Partially affected |
| Earthquake | 10 | 1230 | 8076 | 99936 | 43605 | 56568 |
| Fire | 703 | 120 | 283 | 4180 | 464 | 472 |
| Accident | 93 | 93 | 26 | 32 | 1 | 1 |
| Landslide | 40 | 71 | 28 | 531 | 66 | 40 |
| Epidemic | 60 | 41 | 377 | 4132 | 0 | 0 |
| Flood | 43 | 36 | 13 | 196 | 31 | 228 |
| Blast | 15 | 11 | 15 | 4 | 1 | 1 |
| Lightning | 14 | 7 | 7 | 11 | 5 | 4 |
| Strom | 18 | 6 | 26 | 0 | 0 | 12 |
| Hurricane | 5 | 0 | 0 | 0 | 0 | 10 |
| Others | 147 | 179 | 254 | 2255 | 78 | 33 |
| Total | 1148 | 1794 | 9105 | 111277 | 44251 | 57369 |

(source: DesInventar Database of Nepal 1971-2016)

Chandragiri Municipality is also hazard prone in the context of disaster. The earthquake of 2072 Baisakh 12 has made lots of destruction. In the time period, 28 people have been killed and more than 2500 people got injured. Similarly, the earthquake destroyed 4481 houses totally.

Mostly the municipality faces epidemics, fires, storm, landslide, flood and animal attacks. So, to minimize the loss and affect cause by different disasters and be prepared to face such disasters Local Disaster Risk Management Plan has been prepared with the leading participation of local disaster management committee in support of Environment and Public Health Organization (ENPHO) and Oxfam. In coordination with Municipality, Environment and Public Health Organization and Oxfam has conducted different programmes for disaster mitigation related to drinking water, sanitation and first aid.

1.12.1 Earthquake

Nepal is most susceptible to earthquake as a consequence of the collision between Indian Plate and Eurasian Plate. Nepal is in the 11th position in the list of most vulnerable country to earthquake in the world and from the perspective of the total number of human casualties in the city, it stands in the 1st (Dakhal, 2015).

Kathmandu valley is considered as one of the most vulnerable cities in the world from earthquake because of its huge population, haphazard unplanned urbanization, unscientific building construction, weak policies and co-ordination mechanism among different government organization. In 2015 earthquake hit Nepal which caused massive damage to the country affecting eight million people. The death toll crossed over 8,000 and injured 20,000 and half million homes were destroyed.

Chandragiri was one of the most affected during 2015 earthquake. The earthquake of 2072 Baisakh 12 has made lots of destruction. In the time period, 28 people have been killed and more than 2500 people got injured. Similarly, the earthquake destroyed 4481 houses totally.

1.12.2 Flood

Observing rainfall data of 1980-2004 indicates total monsoon rainfall is increasing which is increasing the discharge of the river. The increased discharge has high capacity to erode riverbanks and occurrence of flood. In Chandragiri municipality also during monsoon season there is problem of flood making the cultivable Land in the risk of Flood. There is need of construction of retaining wall in Balkhu River Corridor to stop flood.

During construction of cable car deforestation was done which is causing problem of flood and landslide during rainy season.

1.12.3 Landslide

Landslide are the most geological hazard in Nepal in terms of its occurrence which is mainly triggered by earthquake and intense rainfall (Dakhal, 2015). Due to topography of Nepal also landslide is frequent and occurs more losses. Chandragiri municipality consists of hill and hillock which had put it in risk of landslide and flood.



Map 17: Terrain of Chandragiri

According to ward workshop places like, Industhan hill (ward 1), Masine and jhapley khola (ward 2), Chandragiri hill (ward 4), Puldol and Miteri Marg (ward 12) etc lies in high risk of landslide.

1.12.4 Fire

During ward consultative workshop it is found that ward 1,2,4,6,12, have taken fire as one of the main disaster in those wards. In case of outburst of fire, fire brigade has to arrive from Kathmandu and Lalitpur.

1.13 Land use and Urbanization

1.13.1 Land use

The Landscape is dominated by cultivated land covering an area of about 22% of total area. Forest and Bush cover about 7.18 % and 19.17% of total area. while rivers and ponds cover 0.03% and 0.002% of the total area. The built-up area consisting of largely residential area covers an area of about 51.42%. The table below shows the land use pattern of Chandragiri Municipality.



Map 18: Existing Land Use of Chandragiri Municipality



Figure 6: Land Use

| Tahle 17. Evistina | land use o | f Chandraairi | Municipality |
|--------------------|------------|---------------|---------------|
| TUDIE 47. LAISUNY | iunu use o | Chunarayin | wanticipality |

| S.N | Description | Area in ha | Percent |
|-----|------------------|------------|---------|
| 1 | Agriculture | 1924 | 21.62 |
| 2 | Built-up | 4576 | 51.42 |
| 3 | Bush | 1706 | 19.17 |
| 4 | Forest | 639 | 7.18 |
| 5 | Industrial | 5.9 | 0.07 |
| 6 | Pond | 0.18 | 0.00 |
| 7 | River | 2.69 | 0.03 |
| 8 | Rural settlement | 45 | 0.51 |
| | Total | 8898.77 | 100 |

1.13.2 Housing and Squatter

The maximum number of houses in the Chandragiri municipality are of Cement bonded bricks/stone which accounts nearly 39.37 % followed by Mud bonded bricks/stone 31.60 % and RCC with pillar 25.75 %.

Table 48: Households by foundation of house/housing unit

| Total | Type of foundation of house | | | | | | |
|-------|-----------------------------|-----------------------------------|--------------------|---------------|--------|------------|--|
| | Mud bonded bricks/ stone | Cement bonded bricks /stone | RCC with pillar | Wooden Pillar | Others | Not stated | |
| 20532 | 6489 | 8085 | 5287 | 68 | 23 | 584 | |

Source: C.B.S – 2011

1.14 Institutional and Financial Management

1.14.1 Institutional Capacity

Human Resource and Institutional Set up

Committee Formulation:

For proper management of municipality's functions and programs, municipality has formed various Committees and sector-wise committees at municipal level in accordance with the section 14 of Local Government Operation Act, 2074 (LGOA). Most of the major committees of municipality are formulated in the chair of Deputy Mayor except Resource Estimation and Ceiling Committee, and others are composited in the head of Executive Board Members. There are five different major committees, i.e. Public Service and Capacity Development Committee; Revenue Consultative Committee; Legal Draft Committee; Transportation Committee; and Organization Co-ordination Committee in functions. Likewise, Sectorial Committees in the municipality are also formed and carry out their functions accordingly. There are seven sectorial committee; Infrastructure Development Committee; Economic Development Committee; Social Development Committee, Disaster Management Committee, and Financial Management and Good-Governance Committee. Thus, most of the Executive Board Members are directly responsible and involved in the municipality's functions. The duties and responsibilities of each committee are also prepared and classified properly.

Manpower:

There are 58 number of manpower are working in various sections of the municipality. 6 numbers out of 48 are officers and rest are assistant level and level less. Maximum number of staff are level less. They are working in various sections like Administrative; Account; Infrastructure Development and Environment Management Section. The personnel administration is led by Chief Administrative Officer (CAO).

As per the MOFAGA, there are 88 nos. of manpower has been provisioned in total including ward office. 43 nos. of manpower have been set up at municipal office, and 45 nos. in ward offices. 15 nos. of technical manpower (Sub-Engineers and Assistant sub-engineers) in total will be at ward offices. At the main office of municipality, 4 nos. of engineers are arranged including Engineer of L.G.C.D.P. One sub- engineer and one Amin also are arranged at main office of municipality. However, manpower for town police, plumbing, ambulance and fire- bridged operation has not managed as per the manpower detail of MOFAGA.

In the existing situation, Administration, Account, Infrastructure Development, Solid Waste Management Section are in functions; and necessary manpower in aforesaid sections has also been arranged. Most of the staffs are working in Administration section, whereas 2 numbers in Account section, and two in Revenue section.

However, as per the provision (above 75 thousand populations) of MOFAGA, there should be seven different sections, i.e. Administration, Planning and Monitoring section; Infrastructure development and Environment management section; Health and Social Development section; Legal Section; Education, Youth and Sports section; Economic development section; and Account Administration section. Administration sub-section, Planning and Monitoring sub-section, Revenue sub-section, Information and Communication Technology Sub-section, and Ward offices come under the administration section. Likewise, four sub-sections are provisioned under the Infrastructure Development and Environment management section, i.e. Roads and other infrastructure; Building and settlement development; Environment & Sanitation, and Disaster

management; whereas, Social security and vital registration; Women, Children and Social Welfare; and Public Health Promotion sub-sections comes under the Health and Social Development section. Industry and Business Promotion Sub- section, Tourism, Cottage and Small industries; Agriculture Service Center, Livestock service center and others are under the Economic Development section; and School, Child Development Center, Sports Committee, and Local Level Technical and Vocational Training Center are provisioned under the Education, Youth and Sport Section. The Internal Audit unit is provisioned as a separate unit

Organizational Capacity and Capacity building:

For the purpose of capacity strengthening of manpower and elected officials as well as municipality programs, have not been conducted yet. Similarly, members of User's Groups, Child Clubs, and Community Based Organizations (CBOs) has also not been benefited from the municipalityHowever, for the capacity enhancement of human resources through trainings, municipality has determined to undertake the work through policy.

Acts and Laws provision:

3rd Municipal Assembly has approved different Act and Guidelines, for the Fiscal year 2074/2075. The different acts and guidelines are as follows:

- Chandragiri Municipality, Social Security Program Operation Guidelines, 2075
- Chandragiri Municipality, Appropriation Act, 2075 (Local Gazette)
- Chandragiri Municipality Policy and Program, 2075 (Local Gazette)
- Chandragiri Municipality, Municipal Seminar Operation Guidelines, 2075 (Local Gazette)
- Chandragiri Municipality, Market Monitoring Guidelines, 2075 (Local Gazette)
- Chandragiri Municipality, Co-operatives Act, 2075 (Local Gazette)
- Chandragiri Municipality, Administrative Guideline, 2075 (Local Gazette)
- Chandragiri Municipality Decision, Command and Authority Letter Verification Guideline, 2075 (Local Gazette)
- Chandragiri Municipality, Officers Code of Conduct, 2075 (Local Gazette)
- Chandragiri Municipality, Judicial Committee (Local Gazette)
- Chandragiri Municipality, Education act, 2075
- Chandragiri Municipality, Rajpatra Publication related Guidelines, 2075 (Local Gazette)
- Chandragiri Municipality, F.M Radio Operation and Management Guidelines, 2075 (Local Gazette)
- Chandragiri Municipality, Economic Act, 2075 (Local Gazette)
- Chandragiri Municipality, Education Draft Regulation ,2074
- Chandragiri Municipality, Local Government Operation Act, 2074

Good Governance Practice:

Chandragiri Municipality is in practice of maintaining Good Governance. Some progresses have been made in the field of Accountability, Transparency, and Public Participation. Likewise, municipal staff will be motivated, will be made technology friendly, competitive, able and output oriented through capacity building. Similarly, Citizen charter, information dissemination, help desk and grievience handling will be made more efficient.

Chandragiri Municipality prepares the annual programs in participation of local level organizations, such CBOs, NGOs, Private sector, line agencies, and stakeholders with accomplishing eight steps of planning. Likewise, municipality publishes its decisions through publications. Municipality is organizing Public hearing

and social audit every year for the dialogues with public directly. Similarly, under the fiduciary risk reduction, municipality has carrying out internal as well as final auditing, income and expenditure publication, financial irregularities control, proper budget allocation, and preparing procurement plans.

Institutional Coordination and Network Establishment:

Chandragiri Municipality has established network with various organizations basically for generating awareness, provide support for needy ones, health programmes and socio-economic upliftment of local people.

In cooperation with stakeholders Chandragiri municipality has been carrying out various projects and programs in community level.

Likewise, Child Club, Youth Club, User's Group, Target Groups, Women's Groups are community based organizations; working with Municipality; and carried out number of projects and programs of this municipality.

In coordination with as well as grants of Federal Government, Province Government and Department of Roads this municipality is carrying out special infrastructure constructions.

Key Problems and Issues:

Some key problems and issues of the municipality has been listed as following

- Inadequate skilled and trained manpower in the municipality
- Not organizing basic as well as refreshment trainings to municipal staffs and elected officials
- Citizen awareness and educational campaigns as well are not being organized time to time
- Smoothness less and complex working procedures of municipality.
- Service recipients are less educated about the municipality services.
- Lack of social feelings and harmony in the social functions.
- Absence of technical manpower in the ward offices
- Literacy and educational programs for seniors not being conducted.
- Lack of official building of municipality and ward offices as well.
- Physical infrastructures are not disabled and GESI friendly.
- Weak coordination and cooperation established between inter sections, and poor communication.
- Technology friendly services not available in the municipality.
- Ethics and moral value less prioritized

1.14.2 Financial Capacity

For Financial Capacity building, municipal finance plan should be developed and activated. The objective of the plan is to improve and increase revenue collection, explore new avenues for revenue generation and optimize investments and expenditures ensuring value for money.

Chapter 2: Base Map

Base Map of Chandragiri

2.1 Background

Base map or in general is a topographic map indicating a large scale detail and quantitative representation of the existing physical features of an area such as streets, rivers, parks etc. and serving as a foundation for all subsequent mapping with a geographic reference such as latitude and longitude or Universal Transverse Mercator (UTM) grid information. Over the years, the paradigms of topographic base maps based on topographic surveys have been superseded by digital photogrammetry and remote sensing techniques using high resolution aerial and satellite imagery. The availability of such technologies has enabled cost-effective and rapid development of base maps in digital form with very high levels of details and accuracy. Consequently, this has opened up opportunity of usages of base map for multitude of applications. Amongst such applications domains, urban planning and management is one of the sectors, where the usages of large scale digital base map has been growing. The consequent update of such base map will ease the agencies like Department of Urban Development and Building Construction, Municipality, Road Department, Water Supply & Sewerage Department, Electricity Department, Telecom companies, etc.

In context of Nepal, the trend started from the preparation of base map of Kathmandu Valley in 1998 by Department of Urban Development and Building Construction (DUDBC). Since then, large scale digital base maps have been prepared for Butwal, Birgunj, Itahari, Inaruwa, Tansen, Janakpur, Ilam, Mechinagar, Kalaiya, Gaur, Baglung, Pokhara, Bhadrapur, Siddharthanagar, Hetauda, Panauti, Banepa, Dhulikhel and other municipalities.

Under this project, large scale digital topographic base maps and GIS system is developed for Chandragiri Municipality to enhance its decision making capability in urban and environment planning and management. The base maps are produced at the scale of 1:2,500 for Urban area and 1:5000 for Rural area. The base map is prepared using the latest technology in digital photogrammetry and high resolution (0.5m) satellite image of Digital Globe.

2.2 Components of Base Map

Base map contains topographic features, land cover, hydrography, man-made structures like buildings, roads, electric poles and lines, telephone pole and lines, drainage networks etc., mapping planimetric and vertical control points, characteristics areas, administrative boundaries, Project boundary, toponyms of geographical places and other features. In addition, the digital base map contains the digital spatial datasets of these features, different variants of these data for various purposes as well as high resolution satellite image based on which these maps and data have been made. In general, the base map contains the following components:

2.2.1 Orthophoto

Orthophoto is geometrically corrected high resolution aerial or satellite imagery. Orthophoto is digitally corrected for terrain relief displacement, camera/sensor distortions, radiometric distortions as well as corrected for coordinate reference system. Orthophotos is the fundamental reference data used for feature extraction for topographical base map and associated GIS datasets. High resolution satellite orthophotos are in general created from high resolution satellite imagery or by Arial survey.

2.2.2 Terrain Topography

The terrain topography features contain the terrain landform represented by contour lines, elevation spot levels and digital elevation model (DEM) using shaded relief.



Figure 8 Hillside and Digital Elevation Model

2.2.3 Characteristics Topography

Characteristics topography is the features representing the characteristic surface of the ground. Such features include cliff, embankment, escarpment, peaks, pass, pits, depression, cutting, quarry, landslides etc.

2.2.4 Geodetic Control

Geodetic control points are the planimetric and elevation national reference points established by the Survey Department. The geodetic control points are categorized as bench marks for vertical control, planimetric control points for horizontal control and 3D GPS points for both horizontal and vertical controls.

2.2.5 Hydrography

Hydrography represents features related to watercourses, water bodies, water related structures. The feature categories in hydrography include river, stream, lake, pond and reservoir, glacier, canal, natural spring and hydrological structures such as dams, sluice gates and other structures.

River/Stream represents the natural flowing watercourse system. If the watercourse is perennial and has width greater than 5m, it is categorized as a river. River is represented by both the flow line, which is, in general the centre line representing the deepest line of flow and the polygon, bounding the limiting edges of the flow. The network of flow lines represents the hydrological pattern (i.e. river system of an area). Streams which are not perennial and have width less than 5m, are termed as rivulets (Kholsi) and are represented only by flow line, generally the centreline of the flow.

Lake/Pond/Reservoir is a natural or manmade body of standing water. It is represented by its bounding line and area extent. Glacier is a large slow moving river of ice found in high altitudinal Himalayan regions.
Canal is manmade watercourse for conveyance of water for irrigation or hydropower generation purposes. Canal is represented by flow line. If the width is greater than 5m, it is represented by flow line, flow edges and water body area.

Hydrological structures are manmade infrastructures/structures used for controlling water flow, conveyance, diversion, protection etc. These structures include dam, sluice gates, river protections, spillways etc.

Spring is naturally occurring point where groundwater from underground aquifer flows out to the ground surface.

2.2.6 Land Cover

Land cover is the characteristics of the physical material covering the ground surface. Land cover, in general includes cultivation, vegetation, built-up, water body and other. The sub-classes include forest, grass, shrubs, river, lakes/ponds, bare-ground, snow, rock, sand and others.

2.2.7 Buildings

Buildings contain footprints of building with its yard and structures used for human habitation, financial/commercial activities, recreational activities and other activities.

2.2.8 Religious Buildings

Buildings specifically related to religious activities are represented separately as Religious Building feature class. Such buildings include temple, stupa, monastery, church, mosque etc. these buildings are represented by footprint polygon as well as locating points with associated annotation class.

2.2.9 Other Structures

Other structures include buildings not used for human residence or religious or other activities are categorized under this feature class. Landmark features such as statue, city gate, fountains, clock tower, other monuments etc also falls under this feature category. These features are represented by polygons as well as points for locations with associated annotations.

2.3 Mapping Standards

The mapping standards followed are in accordance with the specifications and guidelines of the "Specifications for Geographic Information Service and National Topographic Database" and the "Specification for National Urban Geographic Information Service in Nepal" prescribed by the Survey Department. The standards for digital photogrammetry, data capture, and mapping, GIS database and map production works are in accordance with the aforementioned specification documents. Certain modifications and extensions have been made as required for the current scale of mapping and digital data products. International metadata standards ISO have been adopted for metadata management.

All the mapping and GIS works have been done adopting internationally recognized best practices and methods using industry standard software and hardware platform. The digital data products are stored in the standard interoperable data formats. The standards adopted described here in brief.

2.3.1 Coordinate Reference System

The coordinate reference system used for the mapping and GIS is as prescribed in "National Map Projection and Coordinate System" in the aforementioned specification document. The details of the coordinate system used are presented in the following table:

| Projection | WGS 1984 UTM Zone 45N |
|----------------------------------|-----------------------|
| Spheroid | WGS 1984 |
| Semi-Major axis | a=6378137.0m |
| Semi-Minor axis | b=6356752.314 |
| 1/f | 295.257 |
| Central Meridian | 87° E, 0° N |
| False Coordinate | 500,000 m E, 0 m N |
| Scale Factor at Central Meridian | 0.9996 |

The reference of the vertical datum is the Indian Mean Sea Level (MSL).

2.3.2 Ground Controls

Digital photogrammetric mapping method requires certain number of ground control points in order to relate photogrammetric block with the actual terrain geometry. These points are further used for establishing required numbers of ground control points for aerial triangulation, stereo model and orthorectification of aerial and satellite imagery.

Survey Department has established a national network of ground control points of different order. These ground control points forms the reference on which new control points shall be established as required.

2.4 Methodology

The approach methodology adopted for the preparation of digital base map is described in the following sub-sections.

2.4.1 Acquisition of Primary and Secondary Data

The study is based on both primary data from various sources and collected in the field and secondary data/information collected from various sources and agencies. The primary data sources include the followings:

2.4.1.1 High resolution Arial imagery

2.4.1.2 Topographical maps of 1:25,000 scale published by the Survey Department

The secondary data/information collected from various concerned agencies for the study are:

2.4.1.3 Electricity network single line diagram from NEA

2.4.1.4 Telephone network design maps from NTC

2.4.1.5 Water supply and sewerage network design drawings from KUKL

2.4.1.6 Various other municipal profiles, documents and digital data from Chandragiri Municipality.

2.4.2 Digital Compilation of Secondary Data

The secondary maps acquired in analogue format were scanned using wide scanner at 300 dpi resolution. The scanned maps were appropriately geo-referenced and vectorized in GIS environment.

Digital maps and design drawings acquired from various sources were converted to compatible CAD and/or GIS formats. These maps and drawings were geo-referenced appropriately and attribute data were attached to crate GIS datasets.

2.4.3 Satellite Imagery Orthophoto

Satellite imagery 'Multi-spectral(2m)/Panchromatic(0.5m)' resolution latest available on Archive covering the entire Municipal area is acquired. The imagery is then pansharpened to 0.5m spatial resolution in Erdas Imagine ver. 2014 Software with Modified Intensity Hue Saturation pan.



Figure 9 Panchromatic and Multispectral Image

sharpening technique. The imagery is then orthorectified in worldview RPC Model. GCP collected from the DGPC surveys works in addition with the references from previously created aerial ortho-photos were used as control points along with the above created DEM. The image-to-image registration method correlates already corrected pixel coordinates of orthorectified aerial images to uncorrected satellite imagery pixels. This helps perfect spatial correlation between corrected aerial and satellite ortho-photos.



Figure 10 Pansharpened Image Using Erdas Imagine Ver. 2014

2.4.4 Updating from Satellite Imagery

The base map is prepared using the satellite imagery of Digital Globe worldview-4 which is then orthorectified and features are digitized over it. The figure below shows the vectorized features over aerial photo, updated vectorization over the arial ortho image.



Figure 11 Vectorization over ortho image

2.4.5 GIS Database Creation

The vectorized features were cleaned to remove redundant objects such as sliver lines, short objects, crossing breaks, dangling objects, undershoot and overshoot; clustered nodes were simplified. The cleaned feature vectors were used to create respective topologies (point, line or polygon).

Attribute databases were created for each feature class following the data model presented in chapter 2.

2.5 Digital Base Map GIS Database

GIS database for all the base map features was developed based on the data model presented in *Chapter* 2 in accordance with the "Specifications for Geographic Information Service and National Topographic Database" and the "Specification for National Urban Geographic Information Service in Nepal" prescribed by the Survey Department. The feature and attribute codes were adopted following these standard specifications. The detailed topographic base map data model is presented in Chapter 2.

2.6 Topographic Base Maps

Topographical base maps were prepared at 1:2,500 scale for Urban area and 1:5000 for Rural area. The topographic base maps were prepared with appropriate cartographic representations using "database driven cartography" technique in ArcGIS 10.5 platform. The maps were composed with appropriate cartographic layouts and elements, symbology, and descriptive notes. The maps were legends, printed/published in A1 size paper in colour. Digital "press- ready" versions of maps were produces in TIFF image format.

2.7 GIS Data Model

The GIS Database contains six data themes representing and modelling various aspects of urban land, environment, physical infrastructures, socio-economy and demographics and topography. The components of GIS Database model are represented in the figure below.



Figure 12 Municipal GIS Data Model

Demography Environment

These data themes contain feature classes that physically represent the real-world scenario (objects). These feature classes contain feature types and sub-types to represent the categorical hierarchy of the objects. The attributes of feature classes distinguish physical or abstract properties of the real world objects. The digital representation or the model of the data themes and their feature classes are presented in the following sub-sections.

2.8 Administrative

Administrative data theme contains administrative units in the municipality. The administrative units are the municipal boundary, ward boundaries within the wards.

The descriptions and data model of feature classes in administrative area data theme is presented below.

- Municipal Area
- Wards
- Locations

2.8.1 Municipality Area

Municipality Area feature class include the area extent covered by the municipality and the boundary line bounding the municipality area.

| Feature Class | Description | Feature | Feature Attributes |
|----------------|--------------------|---------|---------------------------------------|
| Municipal | Municipal area | Line | Feature Code: <integer></integer> |
| Boundary Line | boundary line | | Municipality Name: <string></string> |
| | | | MunicipalityCode: <integer></integer> |
| | | | Length: <double></double> |
| Municipal Area | Municipal coverage | Polygon | Feature Code: <integer></integer> |
| | area | | District Name: <string></string> |
| | | | District Code: <string></string> |
| | | | Municipality Name: <string></string> |
| | | | MunicipalityCode: <integer></integer> |
| | | | Area: <double></double> |
| | | | Perimeter: <double></double> |

2.8.2 Ward Area

Ward Area feature class include the area extent covered by the wards and the boundary lines bounding these wards.

| Feature Class | Description | Feature | Feature Attributes |
|---------------|--------------------|----------|-----------------------------------|
| Category | | Geometry | |
| Ward Boundary | Ward boundary line | Line | Feature Code: <integer></integer> |
| Line | | | Length: <double></double> |

| Ward Area | Ward coverage area | Polygon | Feature Code: <integer> Municipality Name: <string> Municipality Code:<integer> Ward Number:<integer></integer></integer></string></integer> |
|-----------|--------------------|---------|--|
| | | | Area: <double></double> |
| | | | Perimeter: <double></double> |

2.8.3 Locations

The locations represent the tentative center of designated place without any administrative boundary. For instance, a community, which do not have an administrative unit and as such do not have specifically designated administrative boundary. Such locations for example, community, road junctions/chowks, common designated places comes under this feature class.

| Feature Class | Description | Feature | Feature Attributes |
|---------------|-------------------------|------------|------------------------------------|
| Category | | Geometry | |
| Locations | Location of designated | Point | Feature Code: <integer></integer> |
| | places | | Location ID: <integer></integer> |
| | | | X Coordinate: <double></double> |
| | | | YCoordinate: <double></double> |
| | | | Designated Name: <string></string> |
| Annotations | Annotations of location | Annotation | Annotation ID: <integer></integer> |
| | names | | Text String: <string></string> |
| | | | String Parameters: (list of |
| | | | annotation class parameters) |

2.9 Base Map

Base map datasets are the fundamental datasets, which are used to derive other secondary datasets. Base Map data theme contains feature data sets related to fundamental topographic features, planimetric and vertical control points, building footprints, land cover, river system, characteristics areas and raster images and derived raster datasets. These data sets form the base for any Municipal GIS functions and related applications. The Base Map theme contains following fundamental feature classes.

- Aerial and/or high resolution satellite imagery
- Terrain topography-contours and spot level, digital elevation model (DEM)
- Characteristics topography (embankment, escarpment, cliff, quarry, pit, peak etc)
- Geodetic control
- Hydrography (watershed area, rivers, streams, water body)
- Land Cover
- Building
- Other Structure
- Land Use for Specific Purposes (industrial zone, army/police barrack, parking lot, cremation ground, cemetery, temple compound periphery, institutional compound periphery etc)

2.9.1 Orthophoto

Orthophoto is geometrically corrected high resolution aerial or satellite imagery. Orthophoto is digitally corrected for terrain relief displacement, camera/sensor distortions, radiometric distortions as well as corrected for coordinate reference system. Orthophotos are fundamental

reference data used for feature extraction and database creation. Orthophotos in Chandragiri Municipality are satellite imagery of 0.5m spatial resolutions.

| Feature Class Category | Description | Feature Type | Metadata Attributes |
|---------------------------|-----------------------------------|-----------------|---|
| Arial Orthophoto | Orthophoto of HR Arial Imagery | Raster | Image Type: <string> Acquisition Date:<date> Acquisition Organization:<string> Processed Date:<string> Processed Organization:<string> Spatial Resolution:<float> Processed Method:<string> Accuracy Level:<float> Prointion System:<float></float></float></string></float></string></string></string></date></string> |

2.9.2 Terrain Topography

The terrain topography features contain the terrain represented by contour lines, elevation spot levels and digital elevation model (DEM). Derived datasets from digital elevation models such as slope, aspect and landform are also included in terrain features.

| Feature Class | Description | Feature | Feature Attributes |
|---------------|-------------------|----------|---|
| Category | | Geometry | |
| Contours | Elevation contour | Line | Feature Code: <integer></integer> |
| | lines | | Elevation: <float></float> |
| | | | ContourType: <string><subtypes></subtypes></string> |
| Spot Level | Elevation spot | Point | Feature Code: <integer></integer> |
| | levels | | Elevation: <float></float> |

<Subtype>

| Feature Class | Feature Attribute | <subtypes></subtypes> |
|---------------|---------------------------------|-----------------------|
| Contours | Contour Type: <string></string> | Index Intermediate |

| Feature Class | Description | Feature Type | Feature Attributes | Metadata Attributes |
|------------------|-------------|-----------------|-----------------------------|--------------------------------------|
| DEM | Digital | Raster | Grid Value: <float></float> | Spatial Resolution: <float></float> |
| | elevation | | | Processed Date: <string></string> |
| | model | | | Processed Method: <string></string> |
| | | | | Projection System: <string></string> |

| Feature Class | Description | Feature Type | Feature Attributes | Metadata Attributes |
|------------------|---|-----------------|-----------------------------|---|
| Slope | Terrain slope data derived from DEM | Raster | Grid Value: <float></float> | Spatial Resolution: <float> Processed Date:<string> Processed Method:<string> Projection System:<string></string></string></string></float> |
| Aspect | Terrain aspect derived from DEM | Raster | Grid Value: <float></float> | Spatial Resolution: <float> Processed Date:<string> Processed Method:<string> Projection System:<string></string></string></string></float> |

2.9.3 Hydrography

Hydrography feature classes are related to watercourses, water bodies, water related structures and other water related features. The feature categories in hydrography include

2.9.3.1 River/stream

2.9.3.2 Lake/pond/reservoir

2.9.3.3 Glacier

2.9.3.4 Canal

2.9.3.5 Natural Spring

2.9.3.6 Hydrological structures

River/Stream represents the natural flowing watercourse system. If the watercourse is perennial and has width greater than 5m, it is categorized as a river. River is represented by both the Flow Line, which is, in general the centre line representing the deepest line of flow and the polygon, bounding the limiting edges of the flow. The network of Flow Lines represents the hydrological pattern (i.e. river system of an area). In the cases, where such bounding polygon include river banks with sand during low flow period, sand bars forming as islands in the middle of the flow, the river polygon includes them as attribute subtypes. In this case, the main river course, during the time of mapping is represented as water body. If the river has multiple flow lines, each of the flow lines are represented as Flow Line as well as water body polygon. Streams which are not perennial and have width less than 5m, are termed as rivulets (Kholsi) and are represented only by flow line, generally the centreline of the flow.

| Feature Class Category | Description | Feature Geometry | Feature Attributes |
|---------------------------|---|---------------------|--|
| River Flow CL | The center line of flow representing the deepest flow of river and rivulets. | Line | Feature Code: <integer> River ID: <integer> River Type:<string><subtype> Name:<string></string></subtype></string></integer></integer> |
| River | River/stream watercourse polygon | Polygon | Feature Code: <integer> River ID:<integer> Feature Type:<string><subtypes></subtypes></string></integer></integer> |

<Subtypes>

| Feature Class | Feature Attribute | <subtypes></subtypes> |
|-----------------|---------------------------------|-----------------------|
| River Flow Line | River Type: <string></string> | River |
| | | Rivulet (Kholsi) |
| River | feature Type: <string></string> | Waterbody |
| | | River Bank |
| | | Sandy area |

2.9.4 Lake/Pond/Reservoir

Lake/Pond/Reservoir is a natural or manmade body of standing water. It is represented by its bounding line and area extent.

| Feature Class | Description | Feature | Feature Attributes |
|---------------|------------------|----------|--|
| Category | | Geometry | |
| Lake/Pond | Boundary of | Line | Feature Code: <integer></integer> |
| boundary | natural or | | Waterbody ID: <integer></integer> |
| | manmade | | |
| | standing water | | |
| | body | | |
| Lake/Pond | Area occupied by | Polygon | Feature Code: <integer></integer> |
| Waterbody | lake/pond water | | Waterbody ID: <integer>></integer> |
| | body. | | Waterbody Type: <string><subtype></subtype></string> |
| | | | Name: <string></string> |
| | | | Usage: <string><subtype></subtype></string> |

<Subtypes>

| Feature Class | Feature Attribute | <subtypes></subtypes> |
|----------------------|-----------------------------------|-----------------------|
| | Waterbody Type: <string></string> | Lake |
| | | Pond |
| | | Reservoir |
| Lake (Band Waterbady | | Pool |
| River Edge | Usage: <string></string> | Natural |
| | | Conservational |
| | | Recreational |
| | | Fishery |
| | | Others |

2.9.5 Canal

Canal is manmade watercourse for conveyance of irrigation or hydropower generation purposes. Canal is represented by flow line. If the width is greater than 5m, it is represented by flow line, flow edges and water body area.

| Feature Class Category | Description | Feature Geometry | Feature Attributes |
|---------------------------|---------------------|---------------------|--|
| Canal Flow Line | Centerline of canal | Line | Feature Code: <integer> Canal ID: <integer> Canal Name: <integer> Ward Served:<string> Command Area:<string></string></string></integer></integer></integer> |

| Canal Edge | Edge of canal flow | Line | Feature Code: <integer> Canal ID:<integer></integer></integer> |
|------------|----------------------|---------|--|
| Canal | Area extent of canal | Polygon | Feature Code: <integer> Canal ID:<integer></integer></integer> |

2.9.6 Land Cover

Land cover is the characteristics of the physical material on the ground surface. Land cover, in general, includes cultivation, vegetation, built-up, water body and other. The sub-classes include forest, grass, shrubs, river, lakes/ponds, bare-ground, snow, rock, sand and others. Land cover types may have hierarchical sub-types such as a forest may be coniferous, deciduous or mixed and further classified as dense, sparse or degraded. Similarly, a plantation may be a coffee or tea plantation. To represent such sub-types and sub-sub-types, a hierarchical approach is adopted. It should be noted that higher the hierarchy, land cover tends to represent land use. Hierarchical classification is only done in case of vegetation land cover (forest, plantation, nursery, orchard) only.

| Feature Class Category | Description | Feature Geometry | Feature Attributes |
|---------------------------|---|---------------------|---|
| Land Cover | Surface cover characteristics of land | Polygon | Feature Code: integer Land Cover ID: <integer> Class1: <string><<i>Subtype></i></string></integer> |

<Subtypes>

| Feature Class | Feature Attribute | <subtypes></subtypes> |
|---------------|---------------------------|-----------------------|
| | | Agriculture |
| | | Forest |
| | | Orchard |
| | | River/Stream |
| | | Canal |
| | | Lake/Pond |
| | | Sandy Area |
| Land Cover | Class1: <string></string> | Barren Land |
| | | Orchard |
| | | Park |
| | | Sports Ground |
| | | Residential Area |
| | | Institutional Area |
| | | Industrial Area |
| | | |

Besides, land cover, for larger scaling mapping purposes, vegetation land cover includes individual or scattered trees as points (if and only if trees are not in cluster mappable as a polygon).

| Feature Class Category | Description | Feature Geometry | Feature Attributes |
|---------------------------|----------------------------|---------------------|---|
| Tree (standing) | Standing or scattered tree | Point | Feature Code: integer Tree ID: <integer></integer> |
| | | | Species: <string></string> |

2.9.7 Building

Buildings contain footprints of building structures used for human habitation, financial/commercial activities, recreational activities and other activities. Buildings are represented by building footprint polygons. In addition to polygons, buildings locations represented by points may be used to represent certain kind of buildings for specific purposes. These specific buildings also contain associated annotation feature class.

| Feature Class Category | Description | Feature Geometry | Feature Attributes |
|---------------------------|---------------|---------------------|---|
| Building | Foot print of | Polygon | Feature Code: <integer></integer> |
| | building | | House No: <integer></integer> |
| | | | Functional Category: <string><subtype></subtype></string> |
| | | | FunctionalUse: <string><subtype></subtype></string> |
| | | | Functional Name: <string></string> |
| Building Point | Location of | Point | Feature Code: <integer></integer> |
| | building | | House No: <integer></integer> |

| Feature Class Category | Description | Feature Geometry | Feature Attributes |
|---------------------------|-------------|---------------------|--|
| | | | Functional Name: <string></string> |
| | | | Use: <string><subtype></subtype></string> |
| | | | Category: <string><subtype></subtype></string> |

<Subtypes>

| Feature Class | Feature Attribute | <subtypes></subtypes> |
|---------------|--|------------------------|
| | | Residential |
| | | Residential/Commercial |
| | | Commercial |
| | | Industrial |
| | | Financial |
| | | Public Services |
| | Functional Category: <string></string> | Educational |
| | Tunctional Category. <string></string> | Cultural |
| | | Institutional |
| | | Health Services |
| | | Security Services |
| | | Recreational |
| | | Tourism |
| | | Others |

| | | School |
|----------|-----------------------------------|-----------------------------|
| | | College |
| | | University |
| | | Hospital |
| | | Health Post |
| | | Clinic |
| | | Customs |
| Building | | Police Station |
| | | Post Office |
| | | Telephone Office |
| | | Electricity Office |
| | | Fire Station |
| | | Factory |
| | | Bus Terminal |
| | Functional Use: <string></string> | Residential |
| | | Commercial |
| | | Residential/Commercial |
| | | Industrial |
| | | GO/NGO/INGO |
| | | Power Station |
| | | Petrol Pump/Service Station |
| | | Bank |
| | | Hotel/Lodge |
| | | Restaurants |
| | | Information Center |
| | | Cinema halls |
| | | Stadium |
| | | Department Stores/Malls |
| | | Others |

2.9.8 Religious Buildings

Buildings related to religious activities are represented separately as Religious Building feature class. Such buildings include temple, stupa, monastery, church, mosque etc. These buildings are represented by footprint polygon as well as locating points with associated annotation class.

| Feature Class | Description | Feature | Feature Attributes |
|-----------------------|----------------|----------|--|
| Category | | Geometry | |
| Religious | Foot print of | Polygon | Feature Code: <integer></integer> |
| buildings | buildings used | | House No: <integer></integer> |
| | for religious | | ReligiousUse: <string><subtype></subtype></string> |
| | activities | | Designated Name: <string></string> |
| Religious | Location of | Point | Feature Code: <integer></integer> |
| Building Point | religious | | House No: <integer></integer> |
| | building | | Designated Name: <string></string> |

<Subtypes>

| Feature Class | Feature Attribute | <subtypes></subtypes> |
|-------------------|----------------------------------|-----------------------|
| | | Temple |
| | | Church |
| PoliziousDuilding | Religious Use: <string></string> | Mosque |
| Religiousbuilding | | Stupa |
| | | Monastery |
| | | Others |

2.9.9 Land Use for Specific Purposes (Characteristics Land)

Land units that are used for specific purposes (not completely land use class but land patches used for specific use that requires to be mapped for urban mapping and Municipal GIS) such as compound area of specific institution, religious buildings, cremation ground, cemetery, industrial area, housing/planning area, army/police barracks etc. These lands are termed as "characteristics land" and are represented by polygon with related attribute types.

| Feature Class Category | Description | Feature Geometry | Feature Attributes |
|---------------------------|--------------------------------------|---------------------|---|
| CharacteristicsLan d | Land patch used for specific purpose | Polygon | Feature Code: <integer> Land ID: <integer> Functional Use: <string><<i>Subtype></i> Designated Name: <string></string></string></integer></integer> |

<Subtypes>

| Feature Class | Feature Attribute | <subtypes></subtypes> |
|---------------------|-----------------------------------|---|
| | | Crematorium/Cremation Ground Cemetery Industrial Area Housing Area |
| CharacteristicsLand | Functional Use: <string></string> | Planning Area Army/Armed Police Barrack Temple Compound Stupa/Monastery Compound Institutional Compound Others |

2.9.10 Utility Infrastructure

Utility Infrastructure data themes contains feature classes related to the urban utilities such as water supply, sewerage system, electricity system, telephone system, wireless/mobile services system and cable TV network. The Municipal GIS for the project includes water supply and sewerage, electricity and telephone system infrastructures only.

2.3.10.1.Water Supply

This utility category contains infrastructures related to water supply. The feature classes represent storage reservoir, pipeline network, junctions, valves and other features. Other water sources such as artesian well, shallow/deep tube wells and others are included under this category.

| Feature Class Category | Description | Feature Geometry | Feature Attributes |
|---------------------------|-------------------|---------------------|---|
| Water Supply | Water supply | Polygon | Feature Code: <integer></integer> |
| Scheme | scheme | | Scheme ID: <integer></integer> |
| | | | Name: <string></string> |
| | | | Capacity: <float></float> |
| | | | Ward Supply: <string></string> |
| | | | SchemeType: <string><subtype></subtype></string> |
| | | | TreatmentType: <string><subtype></subtype></string> |
| | | | Organization: <string></string> |
| Reservoir | Water supply | Point | Feature Code: <integer></integer> |
| | storage reservoir | | Reservoir ID: <integer></integer> |
| | | | Capacity: <float></float> |
| | | | Name: <float></float> |
| Water Tank | Water tank for | Point | Feature Code: <integer></integer> |
| | drinking water | | Water Tank ID: <integer></integer> |
| | supply | | Capacity: <float></float> |
| | | | Type: <string><subtype></subtype></string> |
| | | | Installed Date : <date></date> |
| | | | Maintenance Date: <date></date> |

| Water Pipe Line | Water supply pipe line | Line | Feature Code: <integer> Pipe ID:<integer> Length:<float></float></integer></integer> | |
|-----------------|------------------------|------|--|--|
| | | | Diameter: <float> Type:<string><subtype></subtype></string></float> | |
| | | | Material: <string><subtype> Pressure:<float></float></subtype></string> | |

<Subtypes>

| Feature Class | Feature Attribute | <subtypes></subtypes> |
|---------------|-----------------------------------|------------------------------|
| | | Pipe Gravity |
| | Calculation and catalian as | Surface Pumping |
| | scheme type. <string></string> | Underground Overhead Pumping |
| | | Others |
| | | Untreated |
| Water Supply | | Roughing Filter |
| Schomo | Treatment Type: <string></string> | Plain Sedimentation |
| Scheme | | Slow Sand Filter |
| | | Rapid Sand Filter |
| | | Plain Chlorination |
| | | Pressure Filter |
| | | Iron Removal |
| | | Others |
| Water Tank | Typo://strings | Underground |
| | iype.~suing> | Overhead |

| Feature Class | Feature Attribute | <subtypes></subtypes> |
|-----------------|-----------------------------|-----------------------|
| | | Mains |
| | Type: <string></string> | Sub-mains |
| Water sing Line | | Distribution |
| water pipe Line | Material: <string></string> | GI |
| | | PVC |
| | | Others |

2.3.10.2.Electricity

Electricity network and infrastructures are included in this category.

| Feature Class | Description | Feature | Feature Attributes |
|---------------------------|-------------------------|----------|--|
| Category | | Geometry | |
| Electricity Line | Electricity supply line | Line | Feature Code: <integer> Line ID:<integer> Type: <string><subtype> Voltage:<string></string></subtype></string></integer></integer> |
| Electricity Substation | Electricity Substation | Point | SS name: <integer> Description:<integer></integer></integer> |

| Electrical | Electrical transformer | Point | Feature Code: <integer></integer> |
|------------------|------------------------|-------|---------------------------------------|
| Transformer | mounted on support | | Transformer ID: <integer></integer> |
| | tower/pole or placed | | Type: <string></string> |
| | on ground | | Capacity: <integer< td=""></integer<> |
| | | | Placement: <string></string> |
| Electricity Pole | tower/pole or placed | Point | Feature Code: <integer></integer> |
| | on ground | | Type: <string></string> |
| | | | Description: <string></string> |
| | | | Placement: <string></string> |

<Subtypes>

| Feature Class Feature Attribute | | <subtypes></subtypes> |
|---------------------------------|-------------------------|--|
| Electricity Line | Type: <string></string> | Transmission Line Distribution Line |

2.3.10.3.Telephone

Telephone line and infrastructure are included in this category

| Feature Class Category | Description | Feature Geometry | Feature Attributes |
|---------------------------|---|---------------------|--|
| Telephone Line | Telephone connection line mounted on poles or buried underground | Line | Feature Code: <integer> Line Id:<integer> Length: float Size:<string></string></integer></integer> |
| Telephone Cabinet | Telephone connection cabinet | Point | Feature Code: <integer> Cabinet ID:<integer> Location: <string> Installed Date: <date> Maintenance Date: <date></date></date></string></integer></integer> |
| Telephone Exchange | Telephone exchange | Point | Feature Code: <integer> Name:<string></string></integer> |

2.4. Street Network and Transportation

Street network feature classes and associated database includes road network datasets and associated geocoding database. Road networks in municipality are multi-represented by lines as well as polygons. This multiple representation is used for data management as well as for cartographic model for road mapping purposes. In multi-representation, road centerlines form a road network with associated road attributes, the edge line represents the edges of road that can be mapped as double line at the give scale and us used for cartographic works, the road polygon is the area within the edges of mappable wide road and is used for cartographic purposes.

This data theme also contains other transportation infrastructures including airport, railway, ropeway, bridge, river crossings and others.

2.4.1. Road Networks

| Feature Class Category | Description | Feature Geometry/Da | Feature Attributes |
|---------------------------|----------------|------------------------|---|
| category | | tabase | |
| Road Centerline | Road network | Line | Feature Code: <integer></integer> |
| | centerline | | Road Code: <integer></integer> |
| | | | Road Name: <string></string> |
| | | | Category Type: <string><subtype></subtype></string> |
| | | | StreetType: <string><subtype></subtype></string> |
| | | | Surface Type: <string><<i>Subtype></i></string> |
| | | | Length: <float></float> |
| | | | Width: <float></float> |
| | | | Road Number: <integer></integer> |
| | | | Status: <string><subtype></subtype></string> |
| | | | TrafficType: <string><subtype></subtype></string> |
| Road Edges | Road Edges | Line | Feature Code: <integer></integer> |
| | | | Road Code: <integer></integer> |
| Road Polygon | Road Polygon | Polygon | Feature Code: <integer></integer> |
| | | | Road Code: <integer></integer> |
| | | | Type: <string></string> |
| Road Annotation | Annotations of | Annotation | Annotation ID: <integer></integer> |
| | road names | | Feature ID: <integer></integer> |
| | | | Text: <string></string> |
| | | | Parameters: (list of annotation class |
| | | | parameters) |

<Subtypes>

| Feature Class | Feature Attribute | <subtypes></subtypes> | | |
|-----------------|----------------------------------|---|--|--|
| | | Highway | | |
| | | District Road | | |
| | | Feeder Road | | |
| | Category Type: <string></string> | Other Road | | |
| | Cart track Major trail | | | |
| | | | | |
| Dood Contarling | | Footpath | | |
| Road Centerline | | Path | | |
| | Stroot Typo: <string></string> | Other Road Cart track Major trail Footpath Path Sadak Marg Galli Black Topped Graveled | | |
| | Street Type. <string></string> | Marg | | |
| | | Galli | | |
| | | Black Topped | | |
| | Surface Type: <string></string> | Graveled | | |
| | | Earthen | | |

| Feature Class | Feature Attribute | <subtypes></subtypes> |
|---------------------------------|----------------------------|-----------------------|
| | | PCC |
| | | Stove Paved |
| | | Planned |
| Statuc estring | Statucizatring | Under Construction |
| | Status. <sti ing=""></sti> | In use |
| | | Disuse |
| Traffic Type: <string></string> | Troffic Type: cotring | One way |
| | Two Way | |

2.4.2. Bridge

Bridge over river/stream and rivulets is represented both by centerline of the crossing structure and polygon in the cases of wide bridges in the main roads. Bridges over main trail and trails are represented by centerline only.

| Feature Class Category | Description | Feature Geometry/ Database | Feature Attributes |
|---------------------------|-------------------|----------------------------------|--|
| Bridge Line | Bridge centerline | Line | Feature Code: <integer> Bridge ID:<integer> Road Code:<integer> Name:<string> Structure Type: <string><subtype> Crossing Type:<string><subtype> Width:<string></string></subtype></string></subtype></string></string></integer></integer></integer> |
| Bridge | Bridge Polygon | Polygon | Feature Code: <integer> Bridge ID:<integer> Road Code:<integer></integer></integer></integer> |

<Subtype>

| Feature Class | Feature Attribute | <subtypes></subtypes> | |
|---------------|--|--|--|
| | Structure Type: <string> Suspension Bridge Truss Bridge Girder Bridge Cantilever Bridge Bailey Bridge Rope Bridge Wood Bridge</string> | Suspension Bridge | |
| | | Truss Bridge | |
| | | Girder Bridge | |
| | | Cantilever Bridge | |
| | | Bailey Bridge | |
| | | Rope Bridge | |
| Drides Line | | Wood Bridge | |
| | | Others | |
| bridge Lille | | HighwayBridge | |
| | | Feeder Road Bridge | |
| | | Feeder Road Bridge District road Bridge | |
| | Crossing Type: <string> Other Road Bridge Cart track Bridge Trail and Track Bridge</string> | Other Road Bridge | |
| | | Cart track Bridge | |
| | | Trail and Track Bridge | |
| | | Railway Bridge | |
| | | Others | |

2.4.3. River Crossings and River Transportation

This category includes transport system used for river navigation and crossings where there are no bridges.

| Feature Class | Description | Feature | Feature Attributes |
|---------------|-------------|-----------|--------------------|
| Category | | Geometry/ | |
| | | Database | |

| Other Crossings | River crossings | Line | Feature Code: <integer></integer> |
|-----------------|-----------------|------|---|
| | | | Crossing Type: <string><subtype></subtype></string> |
| | | | Operated By: <string></string> |

<Subtype>

| Feature Class | Feature Attribute | <subtypes></subtypes> |
|-----------------|----------------------------------|------------------------------------|
| Other Crossings | Crossing Type: <string></string> | Causeway Ford Ferry Other |