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ITEKA RYA MINISITIRI N° 006/25/10/TC RYO KU WA 28/07/2025 RISHYIRAHU IGISHUSHANYO MBONERA CY'IMIKORESHEREZE N'IMITUNGANYIRIZE BY'UBUTAKA CY'AKARERE KA MUSANZE Minisitiri w'Imari n'Igenamigambi; Ashingiye ku Itegeko Nshinga rya Repubulika y'u Rwanda; Ashingiye ku Itegeko n° 27/2021 ryo ku wa 10/06/2021 rigenga ubutaka, cyane cyane mu ngingo yaryo ya 59; Bimaze kemezwa n'Inama Njyanama y'Akarere ka Musanze yateranye ku wa 30/06/2023; Inama y'Abaminisitiri yateranye ku wa 22/05/2024 imaze kubisuzuma no kubyemeza; ATEGETSE: <u>Ingingo ya mbere: Ishyirwaho</u> Hashyizweho igishushanyo mbonera cy'imikoreshereze n'imitunganyirize by'ubutaka cy'Akarere ka Musanze.	MINISTERIAL ORDER N° 006/25/10/TC OF 28/07/2025 ESTABLISHING LAND USE AND DEVELOPMENT MASTER PLAN OF MUSANZE DISTRICT The Minister of Finance and Economic Planning; Pursuant to the Constitution of the Republic of Rwanda; Pursuant to Law n° 27/2021 of 10/06/2021 governing land, especially in Article 59; After approval by the Council of Musanze District, in its meeting of 30/06/2023; After consideration and approval by the Cabinet, in its meeting of 22/05/2024; ORDERS: <u>Article One: Establishment</u> The land use and development master plan of Musanze District is established.	ARRÊTÉ MINISTÉRIEL N° 006/25/10/TC DU 28/07/2025 ÉTABLISSANT LE SCHEMA DIRECTEUR D'UTILISATION ET D'AMÉNAGEMENT DES TERRES DU DISTRICT DE MUSANZE Le Ministre des Finances et de la Planification Économique ; Vu la Constitution de la République du Rwanda ; Vu la Loi n° 27/2021 du 10/06/2021 portant régime foncier, spécialement en son article 59 ; Après adoption par le Conseil du District de Musanze, en sa réunion du 30/06/2023; Après examen et adoption par le Conseil des Ministres, en sa séance du 22/05/2024 ; ARRÊTE : <u>Article premier : Établissement</u> Il est établi le schéma directeur d'utilisation et d'aménagement des terres du District de Musanze.
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<u>Ingingo ya 2: Ibigize igishushanyo mbonera</u> Igishushanyo mbonera cy'imikoreshereze n'imitunganyirize by'ubutaka cy'Akarere ka Musanze, kigizwe n'ibi bikurikira: (a) raporo rusange y'igishushanyo mbonera cy'imikoreshereze n'imitunganyirize y'ubutaka cy'Akarere; (b) amakuru ndangahantu y'igishushanyo mbonera; (c) amabwiriza agenga ishyirwa mu bikorwa ryacyo.	<u>Article 2: Composition</u> The District land use and development master plan of Musanze District is composed of the following: (a) the main report of the District land use and development master plan; (b) zoning plan; (c) zoning regulations.	<u>Article 2 : Composition</u> Le schéma directeur d'utilisation et d'aménagement des terres du District de Musanze est composé de ce qui suit : (a) le rapport général du schéma directeur d'utilisation et d'aménagement des terres du District ; (b) le plan de zonage ; (c) le règlement de zonage.
<u>Ingingo ya 3: Itangazwa</u> (1) Raporo rusange y'igishushanyo mbonera cy'imikoreshereze n'imitunganyirize y'ubutaka cy'Akarere ka Musanze iri ku mugereka w'iri teka. (2) Amakuru ndangahantu y'igishushanyo mbonera cy'Akarere ka Musanze n'amabwiriza agenga ishyirwa mu bikorwa ryacyo bitangazwa ku rubuga rw'ikoranabuhanga rwagenwe n'urwego rufite imicungire	<u>Article 3: Publication</u> (1) The main report of the land use and development master plan of Musanze District is annexed to this Order. (2) The zoning plan and zoning regulations of the land use and development master plan of Musanze District are published on the website designated by the organ in charge of land use management.	<u>Article 3 : Publication</u> (1) Le rapport général du schéma directeur d'utilisation et d'aménagement des terres du District de Musanze est annexé au présent arrêté. (2) Le plan de zonage et le règlement de zonage du schéma directeur d'utilisation et d'aménagement des terres du District de Musanze sont publiés sur le site web désigné par l'organe ayant l'utilisation et la gestion des terres dans ses attributions.

n'imikoreshereze by'ubutaka mu nshingano. <u>Ingingo ya 4: Igihe igishushanyo mbonera kimara</u> Igishushanyo mbonera cy'imikoreshereze n'imitunganyirize by'ubutaka cy'Akarere ka Musanze gikurikizwa kugeza mu 2050. <u>Ingingo ya 5: Ivugururwa</u> (1) Igishushanyo mbonera cy'imikoreshereze n'imitunganyirize by'ubutaka cy'Akarere ka Musanze gishobora kuvugururwa cyose nyuma y'imyaka icumi cyangwa ikindi gihe bibaye ngombwa uhereye ku muni gishyiriweho. (2) Ivugururwa ry'igishushanyo mbonera cy'imikoreshereze n'imitunganyirize by'ubutaka cy'Akarere ka Musanze rishobora kandi gukorwa rireba agace gato igihe bibaye ngombwa bitabangamiye iterambere ry'utundi duce kandi hakurikijwe amategeko abigenga. <u>Ingingo ya 6: Ingingo y'ururimi</u> Iri teka ryateguwe mu rurimi rw'Ikinyarwanda.	<u>Article 4: Period of validity</u> The land use and development master plan of Musanze District is implemented until 2050. <u>Article 5: Revision</u> (1) The land use and development master plan of Musanze District may be comprehensively reviewed after ten years or whenever considered necessary from the date of its establishment. (2) The revision of land use and development master plan of Musanze District may also be done on a specific area, when considered necessary, without compromising the development of other areas in accordance with relevant laws. <u>Article 6: Language provision</u> This Order was drafted in Ikinyarwanda.	<u>Article 4 : Période de validité</u> Le schéma directeur d'utilisation et d'aménagement des terres du District de Musanze est mis en œuvre jusqu'en 2050. <u>Article 5 : Révision</u> (1) Le schéma directeur d'utilisation et d'aménagement des terres du District de Musanze peut être entièrement révisé après dix ans ou chaque fois que cela est jugé nécessaire à partir du jour de son établissement. (2) La révision du schéma directeur d'utilisation et d'aménagement des terres du District de Musanze peut également être effectuée sur une zone spécifique, en cas de besoin, sans compromettre le développement des autres zones conformément à la législation en la matière. <u>Article 6 : Disposition linguistique</u> Le présent arrêté a été rédigé en Ikinyarwanda.
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<u>Ingingo ya 7: Gutangira gukurikizwa</u> Iri teka ritangira gukurikizwa ku munsu ritangarijweho mu Igazeti ya Leta ya Repubulika y'u Rwanda. Agaciro karyo gahera ku wa 30/06/2023.	<u>Article 7: Entry into force</u> This Order comes into force on the date of its publication in the Official Gazette of the Republic of Rwanda. It takes effect as of 30/06/2023.	<u>Article 7 : Entrée en vigueur</u> Le présent arrêté entre en vigueur le jour de sa publication au Journal Officiel de la République du Rwanda. Il prend ses effets à partir du 30/06/2023.
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Kigali, 28/07/2025

(sé)

MURANGWA Yusuf

Minisitiri w’Imari n’Igenamigambi
Minister of Finance and Economic Planning
Ministre des Finances et de la Planification Économique

Bibonywe kandi bishyizweho Ikirango cya Repubulika:
Seen and sealed with the Seal of the Republic:
Vu et scellé du Sceau de la République :

(sé)

Dr UGIRASHEBUJA Emmanuel

Minisitiri w’Ubutabera akaba n’Intumwa Nkuru ya Leta
Minister of Justice and Attorney General
Ministre de la Justice et Garde des Sceaux

UMUGEREKA W'ITEKA RYA MINISITIRI N° 006/25/10/TC RYO KU WA 28/07/2025 RISHYIRAHU IGISHUSHANYO MBONERA CY'IMIKORESHEREZE N'IMITUNGANYIRIZE BY'UBUTAKA CY'AKARERE KA MUSANZE	ANNEX TO MINISTERIAL ORDER N° 006/25/10/TC OF 28/07/2025 ESTABLISHING LAND USE AND DEVELOPMENT MASTER PLAN OF MUSANZE DISTRICT	ANNEXE À L'ARRÊTÉ MINISTÉRIEL N° 006/25/10/TC DU 28/07/2025 ÉTABLISSANT LE SCHÉMA DIRECTEUR D'UTILISATION ET D'AMÉNAGEMENT DES TERRES DU DISTRICT DE MUSANZE
IGISHUSHANYO MBONERA CY'IMIKORESHEREZE N'IMITUNGANYIRIZE BY'UBUTAKA CY'AKARERE KA MUSANZE	LAND USE AND DEVELOPMENT MASTER PLAN OF MUSANZE DISTRICT	SCHÉMA DIRECTEUR D'UTILISATION ET D'AMÉNAGEMENT DES TERRES DU DISTRICT DE MUSANZE



MUSANZE

District Land Use Plan 2023-2050



“Centre of Excellence in Tourism”

2023

Report Title	Musanze District Land Use Plan 2023 – 2050
Project title	Musanze District Land Use Plan Report
Owner	Musanze District
District Council Approval	30 th June, 2023
Cabinet's Approval	22 nd May, 2024

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List of Acronyms

AfDB:	African Development Bank Group
BPMIS:	Building Permitting Management Information system
BRT:	Bus Rapid Transit
CCP:	Continuous Compliant Planning
CBD:	Central Business District
DDS:	District Development Strategy
DHS:	Demographic and Health Survey,
DLUP:	District Land Use Plan
DU:	Dwelling Unit
EDPRS:	Economic Development and Poverty Reduction Strategy
EIA:	Environmental Impact Assessment
EICV 5:	Integrated Household Living Conditions Survey
ENR:	Environment and natural resources
FBO:	Faith Based Organizations
GDP:	Gross Domestic Product
GGCRS:	Green Growth and Climate Resilient Strategy
GGGI:	Global Green Growth Institute
GIS:	Geographic Information System
GoR:	Government of Rwanda
GPS:	Geographic Positioning System
HH:	House Hold
HIC:	Higher Income Country
ICT:	Information Communication and Technology
IDP:	Integrated Development Programme
IUCN:	International Union for Conservation of Nature
LED:	Local Economic Development
LUCA:	Land Use Category
LUDP:	Local Urban Development Plan
MCC:	Milk Collection Center
NLA:	National Land Authority
NLUDMP:	National Land Use and Development Master Plan
NSTI:	National Strategy for Transformation

PHC: Rwanda Population and Housing Census

PUSH: Population, Urbanization, Settlement and Housing

RAB: Rwanda Agriculture Board

RDB: Rwanda Development Board

REMA: Rwanda Environment Management Authority

RHA: Rwanda Housing Authority

RLFS: Labour Force Survey

ROW: Right of Way

RTDA: Rwanda Transport Development Agency

SDGs: Sustainable Development Goals

SME: Small and Medium Enterprise

SUDS: Sustainable Urban Drainage Systems

TTC: Teacher Training College

TVET: Technical and Vocational Education and Training

UMIC: Upper Middle-Income Country

UR: University of Rwanda

VNP: Volcanoes National Park

WASAC: Water and Sanitation Corporation

EXECUTIVE SUMMARY

Musanze District is one of five districts forming the Northern Province in the Republic of Rwanda. The District Land Use Plan (DLUP) determines the allocation of land for the entire district in both urban and rural areas, considering the accumulation of all thematic areas to manage the effective use of resources and guide future development.

The first version of Musanze DLUP was elaborated in 2013 to guide land use while implementing the NLUDMP 2010-2020, Vision 2020 and EDPRS II. In line with Vision 2050, the NLUDMP 2020-2050 was approved by the Cabinet in July 2020, which proposed the revision of all DLUP Clusters across the country to support its implementation.

Musanze DLUP includes land use plans for the urban areas covering Musanze Secondary City, the Urban Centers of Kinkware-Kampara and Byangabo, the Rural Settlement Sites and the remaining rural areas, mainly comprising the entire Imidugudu complex, agricultural areas, forests and infrastructure in the district. This DLUP was revised to support the implementation NLUDMP 2020-2050.

Musanze DLUP was developed considering the specific geographical location, topography, hydrography, soil, vegetation, population and demography as well as their specialization and economic opportunities of the district in its 15 administrative Sectors (Busogo, Cyuve, Gacaca, Gashaki, Gataraga, Kimonyi, Kinigi, Muhoza, Muko, Musanze, Nkotsi, Nyange, Remera, Rwaza and Shingiro).

The Volcano National Park and gorilla tourism of Musanze District forms the basis in making the district a regional and international tourism destination site and regional trade center.

The landscape in Musanze District is largely dominated by the volcanoes, with the highest peak at over 5000m altitude. It has a rugged topography, with a succession of higher mountains and V-shaped valleys that influence a high rate of erosion. The district has some natural and planted vegetation in all sectors that favor faunal diversity and have been considered in the preparation of Musanze DLUP. The hydrography of the district consists of Mukungwa and Mutobo rivers and Ruhondo Lake with its surrounding environs.

The Development of Musanze DLUP was framed by several laws, strategies, policies, guidelines, and directive documents to support the framework of this plan. Various stakeholders were consulted, including the involved institutions at the national level, local authorities, and

communities, as well as non-governmental groups, to ensure that the plan is inclusive of their participation. In addition to this consultation, both spatial and statistical data were collected and analyzed on field to produce the spatial database and map of the existing land use and development plan of the district and to assist in the report compilation.

The process of elaborating the DLUP was conducted in collaboration by the Musanze District technical team and the National Land Authority (NLA).

Musanze DLUP was developed to cover eight thematic areas indicated in the NLUDMP 2020-2050: (i) PUSH i.e., Population, Urbanization, Settlement and Housing; (ii) Transportation; (iii) Public Facilities and Services; (iv) Public Utilities; (v) Agriculture and Livestock; (vi) Environment and Natural Resources; (vii) Tourism and Conservation; and (viii) Economic Development. All these thematic areas were analyzed in the light of the current situation to formulate the planning perspectives.

As the vision of Musanze DLUP is Center of excellence in Tourism, its economic specialization t is based on the Volcano Gorilla Tourism, industry, mining and agriculture. This influenced the land use allocation to ensure sustainability of the DLUP and easy implementation supported by the local economic enabling factors. The alignment with the recommendations from the NLUDMP 2020-2050 concluded the land use balance sheet for the main proposed land uses are agriculture (36%), forests (35%), and built-up areas (19%).

In addition to alignment with NLUDMP 2020-2050, Musanze DLUP has been developed based on the recommendations of the Vision 2050, NST1, Musanze DDS (2018-2024), Musanze LED Strategy (2017-2024), and the Musanze District Potentialities Report. Findings from public consultations and focus group discussions paid particular attention to the urban boundaries forming Musanze Secondary City, the Rurban Centers and the rural settlement sites located in the rural areas.

Among land use issues identified during the situational analysis which will be addressed in the implementation phases of the Musanze DLUP include:

- Issues of informal and unplanned settlement proliferation mainly in urban areas.
- Issues related to land tenure and property rights.
- Lack any planning guidance on housing development in rural areas.
- Built up areas in high-risk zones.
- Imbalanced land uses for sustainable development and environmental conservation.

- Unprotected agricultural land.

The implementation of the DLUP Musanze will be done in different clusters through the elaboration of Detailed Physical Plans and Land Readjustment Plans by the District under the supervision and technical support of NLA and RHA in the zones to be developed, such as residential zones. Land use planning and zoning regulations will play a vital role in the implementation of the DLUP. The mid-term review and regular monitoring and evaluation exercises will be conducted to assess whether implementation is complying with the NLUDMP 2020-2050.

1. INTRODUCTION

1.1 Background of District Land Use Plan (DLUP)

The District Land Use Plan (DLUP) determines the allocation of land use for the entire District in both urban and rural areas, considering the accumulation of all eight-land use's thematic areas to manage the effective use of resources and to guide future development.

Musanze District approved the first version of the DLUP in 2013, and in the same year approved the District Local Urban Development Plan (LUDP 2013). These plans have guided land use planning in the district while implementing the National Land Use Master Plan (NLUDMP) 2010-2020, Vision 2020 and EDPRS II.

Since 2018, the Government of Rwanda has revised and updated the NLUDMP 2010-2020. The newly updated NLUDMP 2020-2050, approved by the Cabinet in July 2020, has the overall objective of finding solutions to identified issues and providing specific guidelines for implementation. In addition, it proposes a national spatial structure to guide the development. All settlements, urban and rural, are part of the national spatial puzzle, including Kigali, Satellite Cities, and Secondary Cities.

According to the directives of NLUDMP 2020-2050, each land use sector is urged to update land requirements and strategies following the provided guidelines. The NLUDMP 2020-2050 further proposes District Land Use Plan Clusters, as a new concept of planning. This concept has the advantage of built-in compliance by simultaneous preparation of a package of plans at District and Kigali City Level. The District Land Use Plan Cluster includes urban and rural zoning plans. It is detailing planning on District level (DLUP) by integrating urban land use zoning (cities and urban centers) and rural zoning including rural Villages (Imidugudu), agriculture zones, forests and infrastructure in the District.

Elaboration of any master plan in the District should be done as a combined package of Urban and Rural areas plans to allow for integration at the District level. The product will be a District Detailed Zoning Map with zoning regulations, useful for cadastral, construction permitting systems and for further local detailed physical planning. With enforcement and smart permitting services, this type of planning will play a big role in eliminating the settlement sprawl, thus leading to a compact

development. The District Land Use Plan cluster should also comply with green growth principles and climate resilient strategies to become a Green District Land Use Plan.

Statutory phasing of implementation of each land-use plan will be compulsory for all Districts, including Rubavu. The leading idea in phasing is tiling, which prevents random or remote locations of development. Each new phase must connect to the previous stage geometrically. A five years' phase is recommended to be used by all District land use plans.

Musanze District is one of five Districts forming the Northern Province in the Republic of Rwanda. The District Land Use Plan (DLUP) determines the allocation of land for the entire District land area in both urban and rural areas, taking into account the accumulation of all thematic areas to manage the effective use of resources and guide future development.

The preparation and revision of Musanze DLUP was undertaken from June 2021 and is in compliance with NLUDMP 2020-2050. Other guiding documents include Vision 2050, NST1, and the District Development Strategy (DDS).

1.2 Objective and Scope

1.2.1 Objective

The District Land Use Plan (DLUP) aims at allocating land to different uses within the District by clustering all thematic areas, so as to manage the efficient use of resources and guide future development in line with the NLUDMP 2020-2050, thereby promoting social, economic and environmental benefits.

Musanze DLUP emerged with the 2050 target to align with NLUDMP 2020-2050 and the country planning horizon. It gives details in terms of land allocation with specifications and potentialities of the District, unlike the NLUDMP 2020-2050 which gives general guidelines to facilitate the planning balance of land use at national level.

More specifically, the objectives of Musanze DLUP include:

1. To preserve agricultural land by encouraging land consolidation, also in rural areas;
2. To promote tourism as a key driver of District, generating income and revenue by introducing new tourism segments;
3. To provide different scales and cost range for commercial, heavy and light industrial developments, following current and expected market dynamics;

4. To allow and facilitate vertical and horizontal incremental development allowing phased construction of commercial, mixed-use and residential buildings following the investment capacity of investors and developers;
5. To integrate micro-enterprise zones in residential areas, promoting mixed-use developments with social infrastructure and green open spaces;
6. To promote densification incentives to modify building typologies and densities, thus reducing residential zones dedicated to single family housing;
7. To promote upgrading and redevelopment in high value areas where land pooling approach will be effective due to cross financing mechanism;
8. To preserve open space, historic related resources, water resources, wetlands, forests, and other environmentally important areas;
9. To facilitate adequate provision of community utilities and facilities such as transportation, water, sewerage, schools, parks, and other public requirements;
10. To mitigate impacts of natural disasters, e.g. earthquakes and volcanic eruptions, around the areas which are more vulnerable.

1.2.2 Scope

The scope of the DLUP covers the whole District, consisting of both urban and rural components. It covers all thematic land uses. Taking all land uses into consideration, land has been allocated to different uses through zoning, and an efficient land use balance sheet, which is complemented by implementation strategies for guiding the future land development toward Vision 2050.

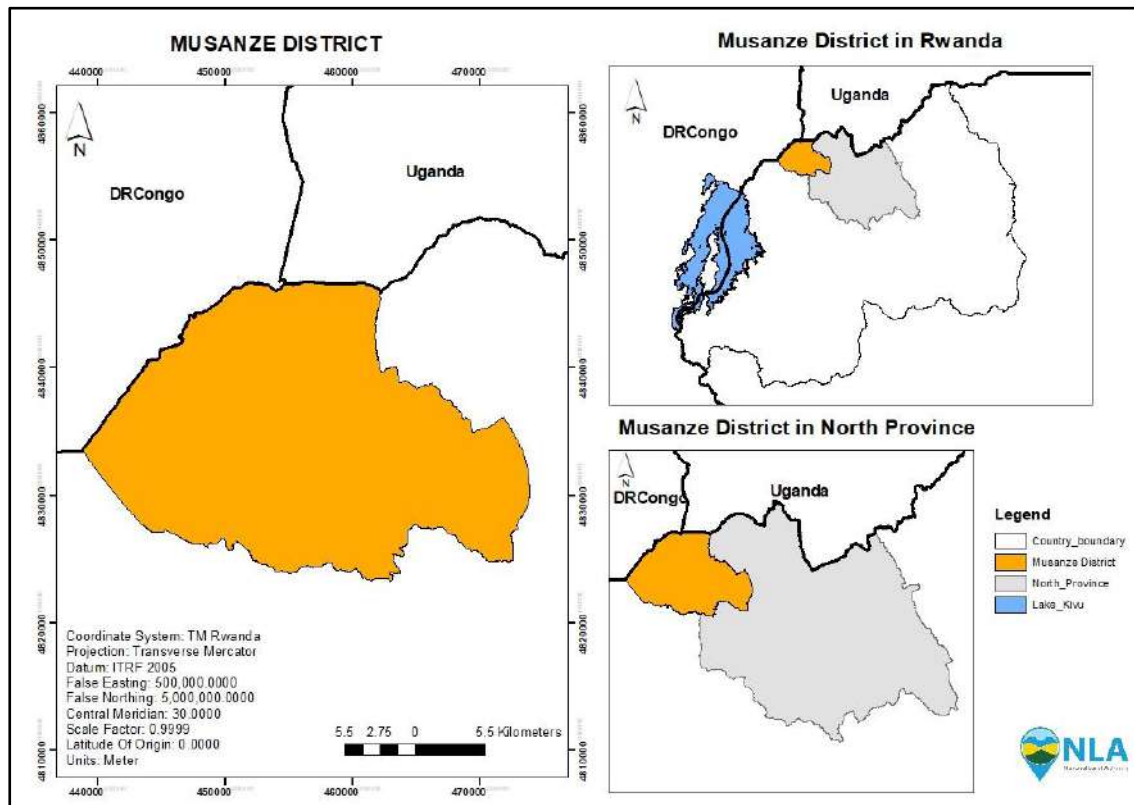
Musanze DLUP is aligned with the NLUDMP 2020-2050 guidelines and instructions, Vision 2050 and other sectoral strategic and master plans.

1.3 Musanze District Descriptions

1.3.1 Geographical Location of Musanze District

Musanze Secondary City is a gateway to five of the eight famous volcanic mountains. Musanze District is one of the five Districts comprising the Northern Province of Rwanda and is one of the eight Secondary Cities, based on the national urban hierarchy. Musanze District is one of Rwanda's most mountainous Districts, containing the largest part of the Volcanoes National Park and the Rwanda Development Board (RDB) head office located in Kinigi Sector.

The total area of Musanze District is 530 km², of which Volcanoes National Park covers 60 km² and Lake Ruhondo 28 km². Musanze Secondary City is located about 110 km from Kigali, along the national road NR2. The District borders Uganda and DR Congo to the north, Gakenke District to the south, Burera District to the east and Nyabihu District to the west. Musanze District is administratively organized into 15 Sectors, (Kinigi, Musanze, Muhoza, Nyange, Cyuve, Gacaca, Shingiro, Gataraga, Busogo, Nkotsi, Kimonyi , muko , Rwaza, Remera, Gashaki), 68 Cells and 432 Villages.



Map 1. Musanze District in the National Context

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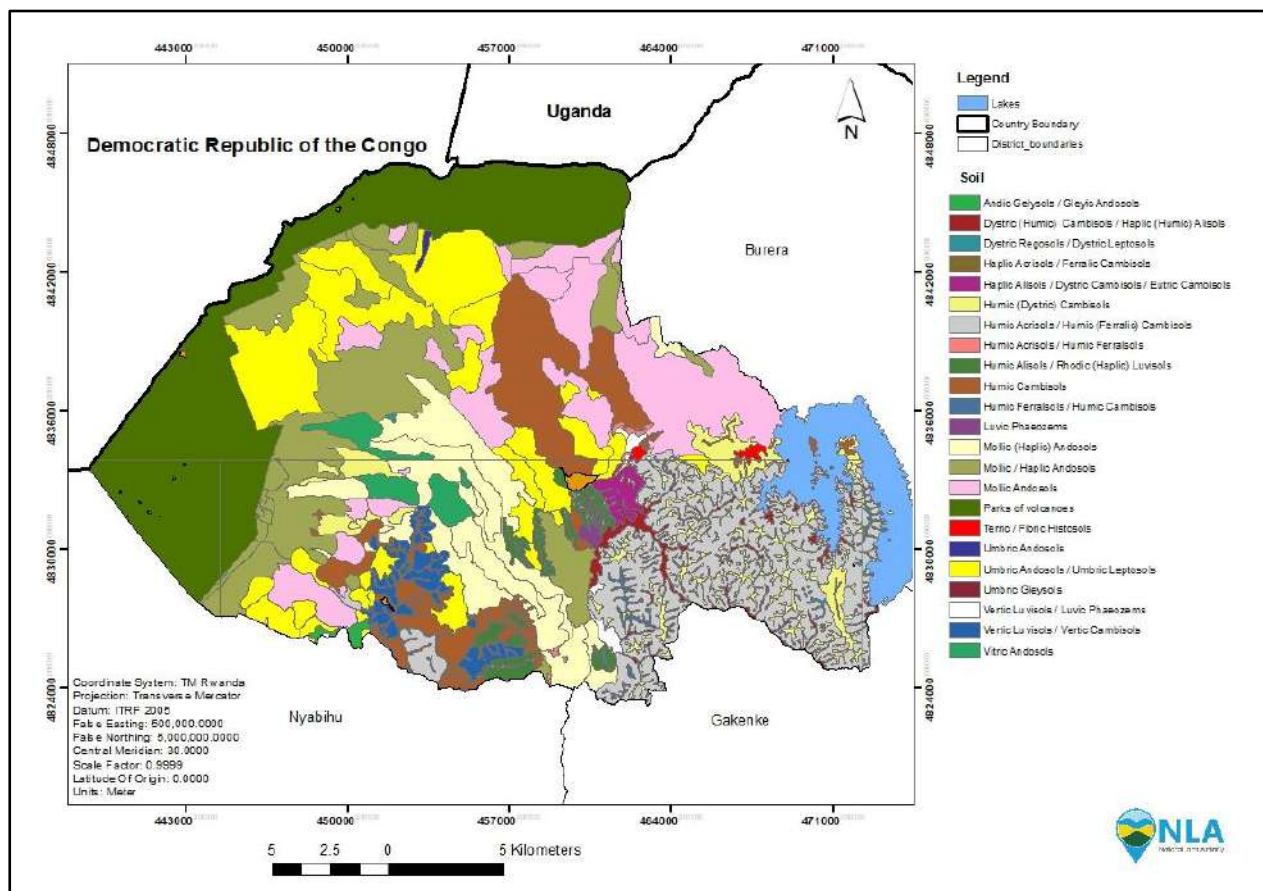
2.3 m³

1.3.3 Soil and Erosion

1.3.3.1 Soil in Musanze District

Musanze District has two distinct landscape zones, the volcanic plains and the mountain range, and related types of soils. The plains are moderately sloping with volcanic ash soils and lava predominant stones. The mountains are steep with frequent erosion on the slopes.

Within the Secondary City of Musanze soils can be categorized as volcanic on moderate to steep slopes, with volcanic ash soils and volcanic lava predominating with stones and shallow rocks. The rich volcanic soils are ideal for agriculture.



Map 3. showing soil classification in Musanze District (FAO)

1.3.3.2 Erosion in Musanze District

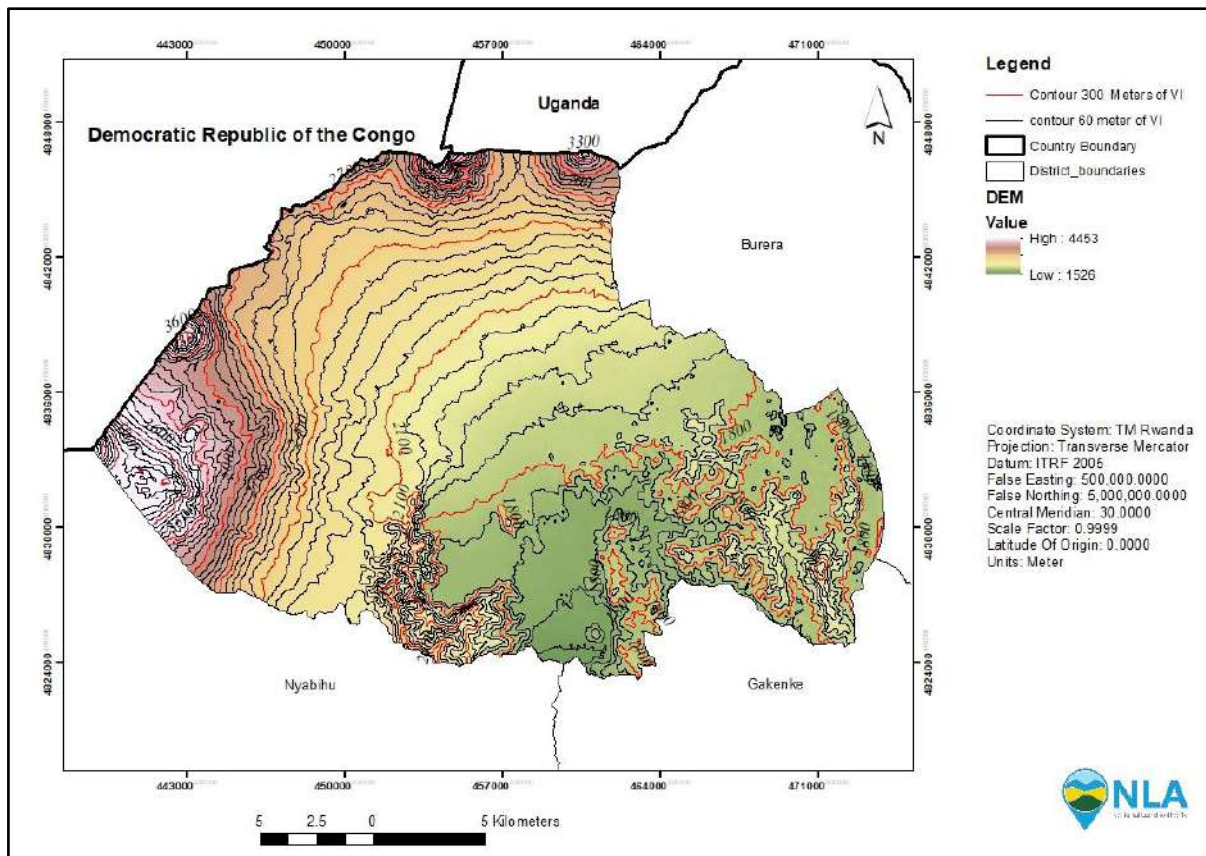
Soil erosion and soil nutrient loss are major problems, with only about half the land protected against soil erosion. The zone adjacent to the Volcano National Park (the peripheral zone) is divided into two topographic units, the volcanic region and the Crête Congo-Nile Region. The volcanic region extends from the foot to the top of the volcanoes. This area is prone to soil erosion due to steep slopes and high rainfall. The Crête Congo-Nile region is composed of granitic soils of high altitude.

1.3.4 Topography

Musanze District located in the area of the Volcano National Park and its environs is influenced by the chain of five volcanoes, this park is famous for its population of mountain Gorillas. The high altitude, between 2,300m and 4,507m above main sea level, and the presence of volcanic soils make the region naturally diverse in terms of relief, substrate and vegetation cover. The volcanic plains cover the central and north part of the District, its average altitude is 1,886 m where in Busogo the average is 2,105m.

A mountain range located in the south-east of the District covers over a third of the total surface of the District. Its altitude ranges from 1,900m to 2,300m above main sea level.

The topography of Musanze District is characterized by a series of hills and valleys, with steep slopes (up to 1:10). The topography poses a challenge for urban development and infrastructure provision.



Map 4. Topographic Map of Musanze District

1.3.5 Climate and Rainfall

Musanze District has a high-altitude tropical climate, with an average temperature of 20°C. Rain is generally abundant throughout the year. There are two rainy seasons as well as two dry seasons: the

long dry season, from June to mid-September; the short rainy season, from January to mid- March; the big rainy season, from March till the end of May; and the short rainy season, from September to December.

April and May bring about the heaviest rains, whereas October and November have a much more moderate rainy period. A significant temperature anomaly was recorded in Musanze where 13°C below normal minimum temperature was recorded.

1.3.6 Flora and Fauna

Rwanda's mountain gorillas (*Gorilla beringei beringei*) are found in the Volcanoes National Park, making Musanze District the most popular tourist destination in the country. It is this popularity that has also prompted the government to promote Musanze as a Secondary City for ecotourism.

Biodiversity in the District is under threat mainly from the huge proportion of the population working in agriculture. Agricultural activities have stripped away much of the natural vegetation to grow food crops such as potatoes and sorghum or cash crops such as pyrethrum.

Forests cover an area of about 11,600 ha in the District, with mountain humid forests covering 5,250 ha, bamboo forests 2,520 ha, degraded natural forests 2,220 ha, and eucalyptus forest plantations 1,630 ha. State and District forests comprise 24% and 2% respectively, while private forests comprise 74%.

1.3.6.1 Fauna

A study to establish threatened terrestrial ecosystems and species in Rwanda was conducted by REMA in 2015. Identified threatened animal species in Musanze Secondary City includes the *Torgos tracheliotus* (English: Lappet-faced Vulture, French: Vautour oricou), a specie of the Accipitridae Family and the largest vulture in Africa easily recognised by its conspicuous size, bare, pinkskinned head.

Musanze District is renowned for its proximity to Volcanoes National Park, which is home to the endangered mountain gorillas. These gorillas are a major attraction in the region, drawing tourists from around the world who come for the unique experience of gorilla trekking. Musanze has thus become a key location for both wildlife enthusiasts and researchers focusing on primate behavior and conservation.

Besides mountain gorillas, the forest is home to other primates such as golden monkeys, black-fronted duikers, buffalo, spotted hyenas, and over 200 bird species, many of which are endemic to the Albertine Rift.

The 33 ha Buhanga Relict Forest has a high level of biodiversity and cultural significance. It hosts 83 bird species, three of which are endemic to the Albertine Rift. It is also a stopover for the African Pitta, a migratory bird species. There are 13 mammal species. Some of the fauna in the area are the porcupine, jackal, wildcat, mongoose, hyrax and leopard.

1.3.6.2 Flora

Most of the tree species found in Musanze District are planted and harvested for commercial use. The main species are Arinus, Cypress, Eucalyptus, Grevillia, and Pinus near the roads.

Forest in the National Park boasts a wide variety of plant species, including bamboo, Hagenia, Hypericum, and other indigenous flora. The dense vegetation provides shelter and food for numerous wildlife species. At altitudes between 2,500 to 3,000 meters, this area is a favorite feeding ground for mountain gorillas. At altitudes of 2,600 to 3,600 meters, characterized by trees like Hagenia abyssinica and Hypericum revolutum. Above 3,600 meters, featuring heath and thicket, as well as lobelias and groundsels.

Lake Burera and Ruhondo are surrounded by a rich variety of flora that contributes to the scenic beauty and ecological diversity of the region. These twin lakes, situated near the base of the Virunga Mountains are not only important water bodies but also support diverse plant life. For instance, the areas around the lakes include extensive wetlands, which are home to various aquatic plants and grasses. These wetlands are crucial for maintaining the ecological balance and supporting birdlife. Common wetland plants include species of papyrus (*Cyperus papyrus*), reeds (*Phragmites*), and various excluding Volcanoes National Park, the forest types in Musanze District still showcase a variety of ecosystems that contribute to the region's biodiversity and ecological significance. These forests are found in different landscapes, including hills, valleys, and riparian zones, and support both natural vegetation and areas influenced by human activity.

The dominant species is *Eucalyptus globulus*, which is fast-growing and resilient, Common tree species in agroforestry include *Grevillea robusta*, *Markhamia lutea*, and fruit trees such as avocados and bananas and Riparian Forests mainly found along rivers, streams, and wetlands in the district.

1.3.7 Spatial SWOT Analysis

Spatial SWOT analysis is a methodology to understand the strengths and weaknesses, and for identifying opportunities and threats linked to land use planning and development strategies. The methodology aims to identify synergies between land uses and help mitigate any negative impact a certain land use can pose on neighboring activities. For Musanze District, it is a tool to develop land-use planning strategies grouped into four (4) thematic areas:

a) agriculture and livestock

Strengths	Weaknesses
● Volcanic soils suitable for agriculture. ● Favorable weather for agricultural activities. ● Existing Agriculture University (CAVM) and Polytechnic schools. ● Existing seed production facilities. ● Existing agro-processing industries (SOPYRWA, AGROPY); ● Consolidated land for agriculture. ● Presence of Veterinary Hospital (at Mukinga).	● Inadequate provision of consolidated land for agriculture mechanization in the steep sectors; ● Poor road quality (feeder roads). ● Scattered settlements reduce available land for agriculture. ● Insufficient agro processing industries for value addition
Opportunities	Threats
● Agricultural development resulting from the progressive adoption of land consolidation practices. ● Potential for agro-processing facilities development; ● Planned feeder roads for improving supply chain and input distribution;	● Area prone to natural disasters (soil erosion, flooding, landslide, cold temperatures) ● Difficulty in agriculture field preparation due to presence of volcanic rocks;

Table 1. SWOT: Agriculture and Livestock

b) economy, social aspects

Strengths	Weaknesses
• High revenues from tourism industry (Gorilla, Ruhondo lLake, Nkotsi na Bikara and volcanoes, caves); • Hospitality facilities; • Quarries (volcanic rocks); • Existing general and light industries (Prime Cement) • Proximity to Uganda and DRC for cross border trade. • Availability of road networks connecting Musanze with neighboring Districts; • Presence of hydro power plants; • Existence of financial institutions and micro-finances; • Availability of markets and trading centers;	• Limited number of small factories, small and medium enterprises (SMEs); • Insufficient public utility facilities (ICT and Telecommunication); • Insufficient local markets; • Poor road quality (Feeder roads);
Opportunities	Threats
• Tourism industry to create of off-farm jobs; • Hospitality (MICE) • Potential investment in trading and industry development; • Cross border trade (DRC and Uganda); • Planned projects of Musanze Inauguration Center;	• Prone to natural disasters that affect public infrastructure (markets, roads and bridges etc);

Table 2. SWOT: Economy

c) *environment*

Strengths	Weaknesses
• Water treatment plant for access to safe water; • Presence of power supply station that distribute the electricity; • Availability of public facilities (hospitals, churches, stadium and schools); • Existence of IDP models (Kinigi); • Opportunity in construction and management of cemeteries; • Opportunity in public taps development; • Opportunity in investing in recreation spaces development; • Redevelopment of public buildings like youth center; • Planned project of Musanze Youth Empowerment Center	• Limited access to clean water; • Difficulty in constructing sanitation facilities (pit latrines) due to heavy volcanic rocks; • Lack of cemeteries; • Insufficient of public facilities; • Inefficient management of cemeteries;
Opportunities	Threats
• Opportunity in new construction and maintaining educational facilities due to overcrowding; • Improve access to potable water; • Increase amount of recreational space; • Development of public buildings like youth center; • Planned project of Musanze Youth Empowerment Center;	• Topographic condition that hinders access to public services; • Geographic location near volcanic area that promote spread of elephantiasis Diseases;

Table 3. SWOT: Social Theme

Strengths	Weaknesses
• Availability of natural resources (Volcanoes national park, forest, quarries, lakes, wetlands and rivers); • Presence of wetlands that helps in managing surface water, pollution and floods (Mukungwa and Mpenge wetlands); • Presence of solid waste management facilities; • Presence of wildlife; • Presence of abundant spring water;	• Over exploitation of forest resources; • Inadequate solid and liquid waste management; • Inadequate management of quarries and mining activities; • High population density that leads to habitat loss and fragmentation; • Land degradation and water pollution caused by quarries • Intensive use of chemical fertilizers and pesticides; • Water, soil and air pollution due to upstream quarries activities (Ruhondo lake shores);
Opportunities	Threats
• Potential for ecotourism development linked to Volcanoes National Park, Ruhondo Lake and Musanze caves • Planned extension project of Volcanoes National Park; • Promotion of environmental conservation and Gorilla Protection based researches	• Likelihood of natural disaster for instance flooding, earthquake and landslide. • Increase of informal settlements • Rapid population growth

Table 4. SWOT: Environment

2. REGULATORY AND POLICY FRAMEWORK

During the process of elaboration of Gakenke District Land Use Plan (DLUP), reference was made to several policies, laws and regulations and guidelines officially recognized by the Government of Rwanda which regulate land use, development, planning and management in Rwanda, as discussed in this section.

2.1 Policies

- National Land Policy, June 2019, MoE

The revised Land policy of June 2019 focuses on the efficient utilization and management of land to support the national transformation goals without compromising the benefits of future generations. To achieve this objective, the policy outlines actions organized into three core pillars: land use planning, surveying, and mapping; land use management; and land administration. These pillars encompass eight thematic areas:

- (a) Land use planning, surveying, and mapping;
 - (b) Integration of land utilization across various Sectors;
 - (c) Effective land use management;
 - (d) Facilitation of private sector investment in land;
 - (e) Land registration procedures;
 - (f) Administration of land lease fees, real property taxes, and land markets;
 - (g) Ensuring land rights security and managing land disputes;
 - (h) Institutional framework and coordination mechanisms within the land sub-sector.
- National Urbanization Policy, December 2015, MININFRA;
 - National Human Settlement Policy in Rwanda, May 2009, MININFRA;
 - National Housing Policy, March 2015, RHA.

2.2 Laws and Regulations

Law n° 27/2021 of 10/06/2021 governing land, which regulates land affairs, contains detailed provisions concerning land use management and development, as well as the institutional framework and procedures governing the initiation, development, adoption, and establishment of land use and development plans at the district level. This legislation specifically governs land occupancy and construction activities on areas designated for human habitation. Moreover, it encompasses the planning of plots and site development to facilitate the realization of national, City of Kigali, and district land use master plans.

Presidential Order n° 038/01 of 20/05/2022, establishing the National Land Use Development Master Plan, delineates a planning horizon spanning the next three decades. The Order outlines the revision process, ensuring alignment with other plans, and assigns responsible institutions for implementation, emphasizing the pivotal role of all sectors. With the NLUDMP gazetted, the focus now shifts to effectively implementing it through DLUPs and other tools, ensuring strict adherence to alignment principles between NLUDMP and DLUPs. It is against this backdrop, that Gakenke District revised its Land Use Plan, ensuring compliance with the directives set forth in NLUDMP 2050.

Gakenke DLUP was revised taking into consideration other laws related to land management and utilization such as:

- Law n°10/2012 of 02/05/2012 governing urban planning and building in Rwanda. Urban planning should strive for the gradual and adaptable advancement of urban centers within the context of economic and social development policies, incorporating rural planning and environmental preservation objectives;
- Law n°20/2011 of 21/06/2011 governing human habitation in Rwanda. This law governs land occupation and construction on lands reserved for human habitation;
- Ministerial Order n° 04/Cab.M/015 of 18/05/2015 determining urban planning and building in Rwanda;
- Ministerial Order N° 005/MoE/22 of 15/02/2022 determining modalities of change of land use.

2.3 Guidelines

Numerous land use planning guidelines established in previous years remain pertinent and continue to inform current practices. While we can mention a few examples, it's important to note that the list includes:

- Ministerial Instructions relating to the implementation of the National Grouped Settlement Program in Rural Areas (27 May 2009);
- Urban Planning and Building Codes (June 2019, MININFRA);
- Land Use Planning Guidelines (December 2017, NLA);
- Land Readjustment guidelines (October 2021, NLA);
- Land use plans zoning regulations edition 1, November 2022.

oMinisterial Instructions n° 001 of 23/04/2018 determining the management and use of the lands allocated for agriculture and livestock.

2.4 Sectoral Plans

Gakenke District Land Use Plan To effectively integrate sectoral plans elaborated by other sectors to ensure a balanced inclusivity approach. The following are key sectoral plan integrated in Gakenke DLUP:

- Strategic Plan for agriculture transformation (2018-24)
- National Transportation Policy and Strategy for Rwanda (April,2021)
- National Wetlands Management Framework for Rwanda (December,2020)
- The state of soil erosion in Control in Rwanda (May,2022)
- Rwanda Irrigation Masterplan (2020)
- Rwanda Transmission Masterplan (2020-2028)
- National Feeder Roads Masterplan (2023)
- Rwanda Forest Cover Report (November,2019)

- Revised Green Growth and Climate Resilience Strategy (September 2022)
- National Determination Contribution (May 2020)
- National Water and Sanitation Policy (October 2023)

Rwanda Electricity Distribution Master Plan (June 2022)

3. METHODOLOGY

Musanze District, in collaboration with NLA, conducted the preparation of Musanze DLUP. The two parties' staff worked together step by step in the preparation of the DLUP. This supported sharing of relevant data from both NLA and Musanze District. The review of the DLUP was updated in the framework of alignment with the NLUDMP 2020-2050, hence the preparation of the plan was made to harmonize with not only NLUDMP 2020-2050 but also DDS, NST1 and Vision 2050 etc.

The NLUDMP 2020-2050, approved by the Cabinet, was presented to the District authority and its partners by NLA. This provided information and awareness to the district leaders, staff and stakeholders. The planning activities started with situational and desktop analysis to source available data, identify what tools to be used to efficiently consolidate the data, methodologies to be applied, what consultative meetings and investigations to be conducted, data collection including land surveying and physical analysis, and assessment of boundary compliance for urban, rurban, and rural settlement sites.

Dissemination and public awareness were conducted in all sectors where the District and NLA teams engaged with local communities for primary data gathering, urban and rural settlement urban boundaries verification and reshaping, to propose location for new or additional land uses, and also to identify and understand the needs and priorities of the local communities.

After the District Land Use Plan and planning report was drafted, validation meetings were organized with the District Council. The District Council and various stakeholders provided input prior to the final approval of the Musanze DLUP at District level. The following figure illustrates the steps undertaken during the elaboration of the Musanze DLUP.

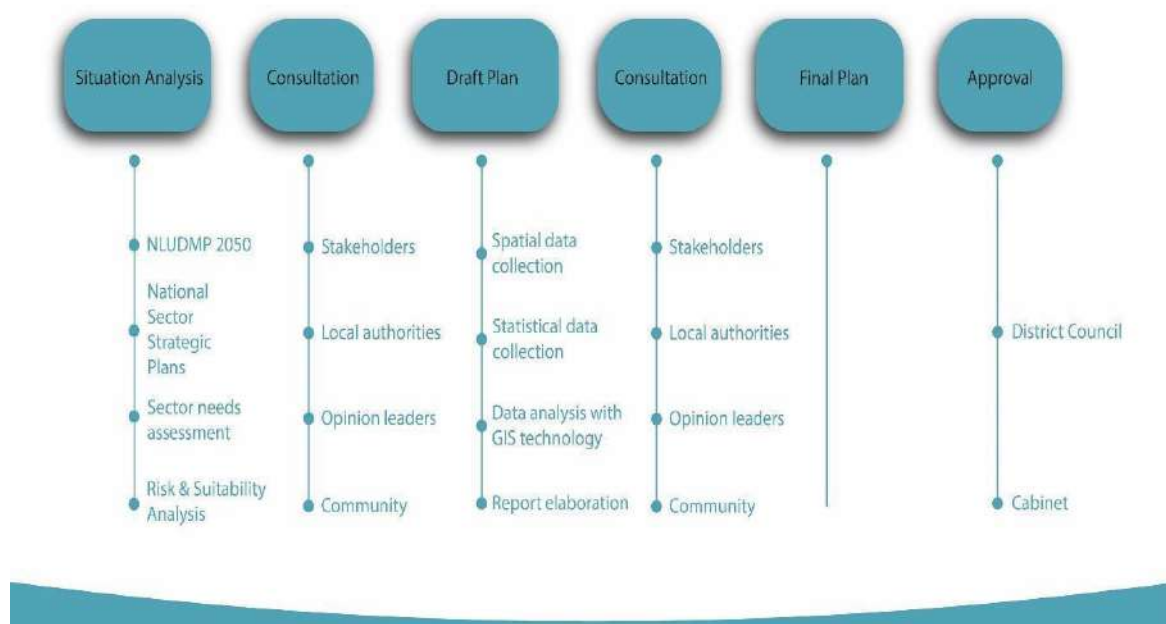


Figure 1: Planning steps used during elaboration and review of Musanze DLUP

3.1 Public Consultation

Consultation emerged as one of the methodologies used in the development of the DLUP for Musanze District. This method was intended to build awareness of the project among different stakeholders, including partner institutions, local authorities and the community concerned. The consultation provided a clear understanding of the Musanze DLUP, its targets for the community and the country, the scope of the project, its time frame, the activities to be covered and how they should be carried out to ensure a reliable result. During the development of Musanze DLUP, consultation meetings were held among the different institutions, local authorities and the community.

3.1.1 Consultation with local people

The community is the prime user of the land for diverse activities to feed itself and sustain its life in numerous ways. Given the high population growth in almost all parts of the country, and the limited skills in land use planning and management, the population poses the issue of land fragmentation, whereby land is split into extremely small pieces.

This leads to growing land conflicts as well as poor production and management. However, the DLUP has emerged as a solution to facilitate better land management and efficient use of available land resources. This provides a clear guidance for the local authority and a proper planning framework to help the community to use and manage its land resources. With the DLUP, land

conflicts are eradicated, and people are given the opportunity to work and develop their land. Hence, people must have knowledge about and understand the plan to be able to develop their land according to the national vision and long term planning.

During the development of Musanze DLUP, community consultation meetings were conducted in each Sector to raise awareness of the project and its objective. These consultations were also intended to engage the population by helping to clarify current land issues, assisting in effective data collection and allocation of land to the most suitable areas.

In addition, this is the best way to make people understand the purpose of the plan for their future perspectives and their contributions. From the consultation meetings, the community learned about their rights and responsibilities during the development of the DLUP and reflected on their involvement in the implementation.

The community was given the opportunity to guide the technical team in collecting data in the field and to integrate their insights. Through the consultation meetings, the community has been engaged in Musanze DLUP planning activities by contributing their ideas that have guided the planning process, and has become aware of the structure of DLUP in line with the NLUDMP 2020-2050, and how it will be implemented.

Thus, the development of Musanze DLUP has been a participatory process, which encompasses people in all Sectors, and has also improved the understanding of their rights, roles and responsibilities during implementation.



Figure 2. Musanze District, consultation with local people

3.1.2 Consultation at Sector and District level

At the local level, the DLUP was developed through the combined efforts of the concerned District (consultation meeting with District OSC staff), its Sectors, Cells and Villages. The District takes the lead in the DLUP, then the Villages, Cells (consultation meeting at cell level, including Imidugudu) and Sectors act as the closest authority to the community as well as to opinion leaders. The DLUP consultation with local authorities aims at improving the understanding of the benefits of the project in terms of enhanced land management and economic development.

This type of consultation aims to engage local communities as well as to build their sense of ownership in the project, as it concerns their territories and benefits them and their community. The local authorities are the main implementers and regular supervisors in the implementation of the DLUP.

Consequently, raising awareness of the project is essential for its success. In the planning process, local authorities are the ones who have detailed knowledge about the terrain and provide important and accurate information for good planning and development. They know the needs and efforts of the local people, potential areas for development, and understand the appropriate land use to be allocated in each part of the locality.

In the case of Musanze District, the local authorities are the ones who guided on what locations are suitable for agriculture, mining, tourism, forestry, etc. and assisted in good land allocation in an efficient manner. In addition, it is beneficial for the local authorities to participate in the process as they are the one to mobilize the community in the planning phase to make the project more participatory, and in the implementation phase to make the project more successful.

Various consultative meetings were held at District level, bringing together different stakeholders in the district, including representatives of Sectors, Cells, Villages, religious figures, civil society organizations, security bodies and private sector operators. NLA, as the coordinating institution for this mission, and the district organization aimed to ensure a participatory approach, including discussion and agreement on priority areas and implementation strategy.



Figure 3. Musanze District, consultative meetings with local leaders

3.1.3 Consultation with National Stakeholders

Many stakeholders at national level may be involved in the DLUP implementation process. Thus, institutional consultation aims to make the various governmental and non-governmental institutions aware of the need to participate in its development and implementation.

The collaboration of the different institutions play an important role in the success of the project in terms of planning, coordination, information sharing, development and implementation. In the case of the DLUP, various institutions work together in accordance with their mandate, with the NLA as the lead institution, to support the overall land use and development project.

During the elaboration of the DLUP, all Sectors have to work together as all activities need land to sustain current and future projects that revolve around their mandates. In this case, they have to maximize their demand for land, which may raise land conflicts between various interests.

However, the DLUP is put in place to provide the best land use balance for the different Sectors, as all are interdependent during development. The DLUP is a solution to efficiently allocate land to different sectors, to effectively manage the use of available resources by different institutions, to guide the future development of communities, and to promote more social, economic and environmental outcomes.

During Musanze DLUP, the various institutions involved in the project and consulted by NLA were RDB (field consultation on tourism zone), RHA, RTDA, NISR, LODA, REMA (field consultation on conservation), RWB (field consultation on stormwater management plan), RWFA, FONERWA, WASAC, REG, RAB, and various ministries such as MINEDUC, MINISANTE, MINAGRI, MINISPORT, etc. The institutions and ministries, depending on their mandates, have to achieve their objectives in the district concerned, whereby it is necessary to find a good balance in terms of land use.

3.2 Data Collection

Two categories of data were collected during Musanze DLUP elaboration: non-spatial data and spatial data.

3.2.1 Literature Review

In order to undertake a literature review of the comprehensive secondary data available for Musanze District, the following documents were referred to :

- Vision 2050 of Rwanda.
- National Strategy for Transformation (NST 1)
- EICV 4 & EICV 5
- The National Land Use and Development Master Plan (NLUDMP 2020-2050).
- Musanze District Development Strategy (DDS) 2018-2024.
- Musanze Local Urban Development Plan (Final Document approved by the District Council) 2021.
- Rwanda National Land Use Planning guidelines 2017.
- Rwanda National Base Map 2020.
- Rwanda Conceptual Tourism Master Plan.
- Law n° 042/2023 of 02/08/2023 governing land and waterways transport
- Rwanda forest covers the GIS Dataset.
- Ministerial order N° 006/03 of 30/01/2017 establishing wetland boundaries.
- Environmental law 2018.
- Musanze District Potentialities Report 2019.
- Rwanda building Code 2019.
- Rwanda Urban Planning Code 2015
- Secondary image and Google earth for updating the aerial photos.
- Existing maps: Geology, Soil, Topography, Hydrology, Demography, Infrastructure.

3.2.2 Spatial Data Collection

Spatial data includes geographic information about the earth and its features. The most common method of collecting spatial data is through the use of Global Positioning System (GPS) receivers.

The development of Musanze DLUP required the collection of spatial, or geographical data, for all areas considered in the Land Use Plan. The spatial data collected for the elaboration of the DLUP includes existing infrastructure (roads, electricity, water supply, educational and healthcare facilities, markets, administrative offices, mining sites etc.), as well as the location of potential settlements to delineate their boundaries, from urban to rural areas, to differentiate these from other land uses.

Spatial data collection also included identifying and marking areas likely to be protected or conserved, such as tourism sites, and disaster-prone areas such as steep slopes or wetlands.

The focus of spatial data collection has been to support the development of Musanze DLUP with accurate data and a clear understanding of the terrain, used to allocate land for various uses. Spatial data collection was carried out using tools such as Garmin GPS, DGPS, Earth collector, and SW Maps during the fieldwork.

A collateral methodology was used to collect spatial data available from various institutions involved in the DLUP. The accumulation of these spatial data and projects provides the basis for data collection on the ground, and provides detailed information for zoning and subsequent implementation support. During this collateral spatial data collection, existing data on the current situation and future prospects informed the planning and allocation of land within each sector.

3.2.3 Field Work and Study

Based on the desktop analysis, the NLA team together with the District One-Stop Center conducted a field land survey and physical analysis within the priority areas in both urban, rural, and rural settlements sites. The following photos were taken during our field survey and data collection exercises.

Regarding Musanze Secondary City and Rural areas, Muhoza, Cyuve, Kimonyi, Kinigi, Nyange, Musanze, and Gacaca Sectors were visited. For the Rural centers of Byangabo and Kinkware-Kampara, Busogo, Muko and Nkotsi Sectors were visited.

Regarding rural settlement sites, all 81 sites were visited with an emphasis on identifying the boundaries and zoning using Geographic Positioning System (GPS) coordinates. Primary data were collected by face-to-face conversations with local communities, as well as through direct observations.

3.2.4 Non-Spatial Data Collection

Non-spatial data, such as attribute or characteristic data, consists of information that is independent of any geometric considerations. It includes data that is not demonstrated with location-based and geographic location. Basically, non-spatial data accumulate statistical and quantitative data that provide information about features or phenomena in the form of definitions, explanations and can be displayed in graphs, tables, but not maps.

When elaborating the Musanze DLUP, non-spatial data is needed to support the analysis and inform the planning of the District. Statistical data, e.g. on neighborhood level regarding economy, environment and livelihoods, is needed and guides the preparation of Musanze DLUP.

Non-spatial data collected and used during the elaboration of Musanze DLUP includes demographic statistics including current and projected status, allocation of economic data such as income generation and economic activities, trade (goods and services), security data and its organs, and religious statistical data etc.

In Musanze District, non-spatial data was collected during fieldwork by visiting each situation on site, and consulting different institutions, local authorities, and nongovernmental groups. The non-spatial data adds valuable input in addition to the spatial data and provides information for decision-making in effective planning. The data has also emphasized the need for various efforts in specific sectors.

3.3 Data Analysis

Data analysis encompasses the process of reviewing, cleaning, transforming, and modeling data with the goal of discovering useful information, drawing conclusions, and supporting decision making. Land use plan data analysis involves applying spatial and non-spatial data on infrastructure, zoning, and other features to describe, illustrate, summarize, and interpret the data. Spatial and non-spatial data are analyzed to generate the land use zoning layers, and for the compilation of tabulations and graphs in the DLUP report. The analysis of spatial and non-spatial data assists in effective land use allocation, effective planning and balancing of different thematic areas. The analysis helped to identify suitable areas for different land uses, e.g. zoning the settlements into convenient locations and allocating other land uses in different areas.

Through data analysis, the urban and rural settlement areas were mapped out and the associated land use zones were planned. Steep slopes zones of up to 1:10 were identified, where forest plantations will be allocated, and disaster-prone areas were identified.

For the data analysis geospatial technology, especially GIS software, were used to acquire data from the field and manipulate it in the office to get a clear representation. With regard to GIS software, the technical team used ArcGIS 10.8 version, as well as ArcGIS pro, to create shape files and associated maps for zoning. GIS further helped in creating tabular data by referring to the attribute tables of the geospatial data. These tabulated data were later analyzed using Excel and SPSS to ensure a good and accurate representation in the report.

The results of Musanze DLUP data analysis represent the distinct land use planning layers for the current and planned land use. The result includes the maps, tables, and graphs that describe the land use planning outcomes in Musanze District.

3.4 Musanze DLUP Report Compilation

The DLUP report presents all land use planning related concepts, data, and other information that illustrates how land is allocated to support the effective use of resources and guide future development at the district level. The report serves to document the current status and projected situation with respect to land use in the district. The DLUP report compiles the data collected into a single document that represents the district master plan. The document consists of text, maps, tables, diagrams, and other outlines that describe the district in concern given the background of all the issues.

The DLUP report presents the planning situation of the district considering PUSH (population, urbanization, settlement and housing), spatial economy (mining, trade, industrialization, agriculture, etc.), tourism and conservation, infrastructure and services, and environment.

The DLUP report was drafted by NLA, with input from the district. A retreat, with the district and relevant stakeholders, was held to harmonize the report and collect comments from various partners. The outcome of the retreat was constructive comments, gathering of various missing data, and validation of the report.

Musanze DLUP report is structured to give an introduction to the DLUP, the relevant regulatory and policy framework guiding the DLUP, the methodology used, the land use and development planning, implementation strategies, compliance and monitoring.

4. MUSANZE DISTRICT LAND USE PLANNING

4.1 Visioning and economic specialization of Musanze District

In this chapter, the vision for Musanze District is outlined. The vision for Musanze District is closely linked to the overall vision of NLUDMP 2020-2050 and NST1.

4.1.1 Vision of Musanze District

The vision of Musanze District is aligned to the country's target of becoming a middle-income country by 2035, and a high-income country by 2050. The district vision is aligned with NLUDMP 2020-2050, NST1 and in line with Musanze DDS. The district is committed to protecting the environment and fighting against the effects of climate change to support the attainment of various species in the District.

In this regard, Musanze District has a vision to become “*an Excellent Center of Tourism Industry*”. The formulated objective is specific, measurable, achievable, realistic, and time bound (SMART).

These objectives are reflected in the Musanze DDS which include new tourism sites to be identified, new tourism facilities, increase of local revenues, increase in food security, infrastructure to extend basic infrastructure, accessibility to clean water, promoting export and the creation of off farm jobs.

4.1.2 District Spatial Planning Development Strategies

After creating the Musanze District Spatial SWOT, some recommendations and strategies have been formulated, based on the results. In Musanze District, strategies are needed to focus on leveraging strengths and opportunities to overcome weaknesses and threats. Strategy development creates for Musanze District the opportunity to be most creative with emerging innovative ideas; a result of the analysis that has been appropriately prepared. Below is a Spatial SWOT map and key strategies for Nyaruguru DLUP to achieve “*an Excellent Center of Tourism Industry*”.

To keep sustainable tourism industry and improve hospitality services

Musanze District is a prominent tourist destination. It is known for its stunning landscapes, rich biodiversity, and close proximity to Volcanoes National Park, which is home to the endangered mountain gorillas. The District also has a range of accommodation options, from hotels, luxury

lodges to budget guesthouses to cater to the various needs of tourists. The local government has invested in developing infrastructure to support the tourism industry and ensure visitors have a comfortable and enjoyable experience.

To keep agriculture and improve sustainable agro-processing industry

Musanze District is characterized by a diverse and thriving agricultural sector. Sustaining agriculture plays a crucial role in the District's economy and livelihoods of its residents. The region's fertile soils, favorable climate, and suitable topography create an ideal environment for various agricultural activities. From small-scale family farms to larger commercial ventures, agriculture in the District contributes to food security, income generation, and overall rural development. The District's agricultural activities encompass a wide range of crops, including staple foods such as maize, beans, potatoes, and bananas. Most of the agro-processing activities in the District were carried out by small and medium-sized enterprises. Improving agro processing industries will play a crucial role in adding value to agricultural products and bridging the gap between producers and consumers.

To develop sustainable road network connectivity within the District

The development of a sustainable road network connecting agricultural zones, commercial centers and residential areas is a key to spur economic development in Musanze District. Musanze has roads of various categories and standards. In the DLUP, road reserves have been established and missing roads are planned.

To keep and conserve natural resources

Musanze District boasts a stunning natural environment characterized by diverse landscapes, abundant flora and fauna, and a pleasant climate. This region's unique geographical features and rich biodiversity make it an attractive destination for both tourists and nature enthusiasts. The natural environment should be sustainably managed and controlled by applying buffer zones to the wetlands, dams, the National Park and to rivers.

To develop formal settlements and sustainably improve Musanze Secondary City

Musanze District is one of eight Secondary Cities in the urbanization and settlement hierarchy of Rwanda. The District consists of Musanze Secondary City, two Rurbans (Byangabo and Kinkware)

and other emerging centers. These settlements are established in the DLUP and will drive the development of formal settlements.

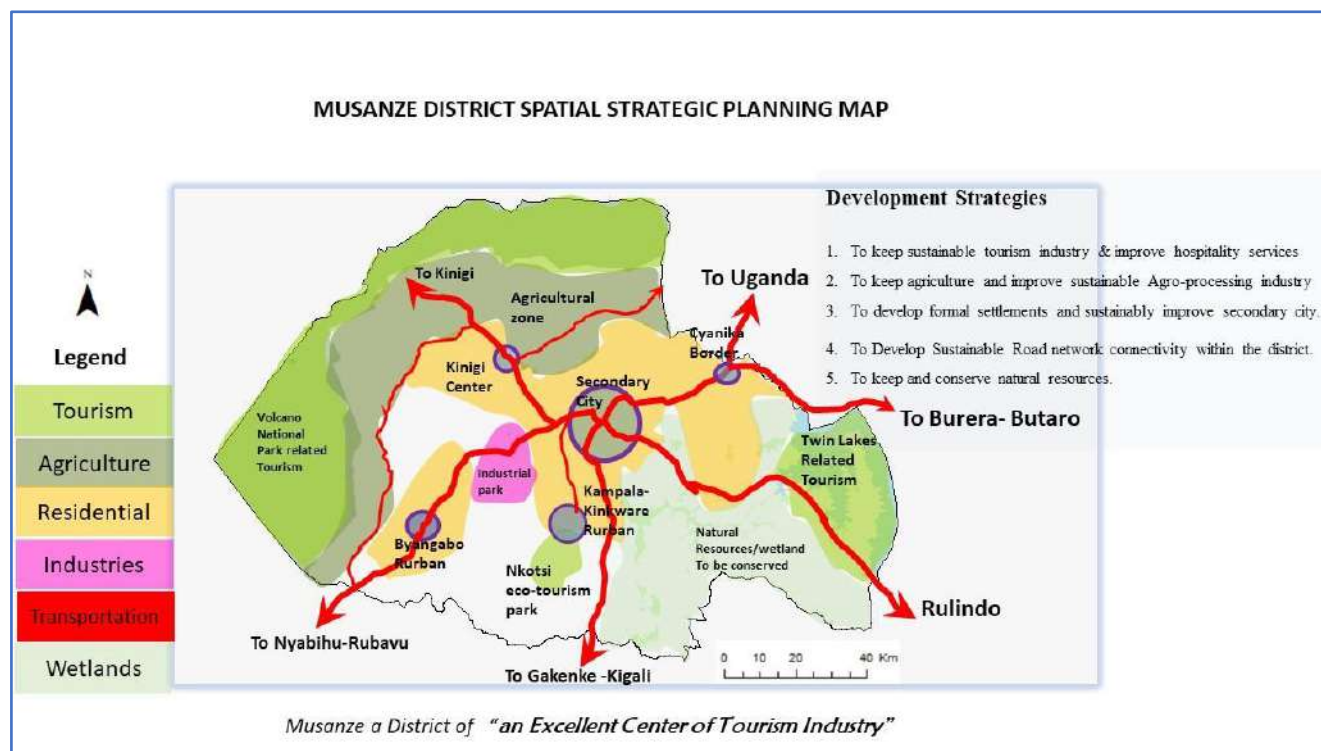


Figure 4. Musanze District Spatial Planning Strategic Map

4.1.3 Musanze Economic Specialization

4.1.3.1 The Current economic specialization in Musanze District

Volcano Gorilla Tourism is economic specialization of the district. Other economic drivers in the district include mining and industry (value addition of minerals and quarry products), agribusiness, modernizing and increasing agricultural productivity and livestock, and sustainable management of natural resources and the environment.

For the District development and for the growth of the country's economy, this specialization plays an essential role in attracting investors for tourism industry activities and promoting employment. The DLUP has been prepared in Musanze District to support the allocation of land to all sectors that promote economic transformation implementation strategies. The Tourism Sector Perspective Plan in Musanze District was drawn up with a view to developing tourism in line with environmental protection and community development.

With regard to trade, logistics and hospitality, these sectors have developed immensely in Musanze District, especially in Musanze Secondary City that serves southern Uganda and eastern DRC

regions, and tourists worldwide visiting the District due to its gorilla and volcanoes attractive features.

Musanze DLUP has been elaborated considering all aspects that support the vision of the District to enable the District to achieve sustainable development. The following photos were taken from Musanze District to illustrate some tourist attractions in the area.



Figure 5. Tourist attractions in Musanze District (kwita izina location, Musanze District)



Figure 6. Ruhondo Lake

4.1.3.2 Planned Economic Specialization in Musanze District

Priority projects of Musanze DDS have been incorporated in the DLUP. These priority projects include seven new tourism sites to be identified, new tourism facilities, infrastructure to extend basic infrastructure, promoting exports, and creating off farm jobs.

a) Tourism industry in Musanze

The DLUP guides the development of the tourism sector for a long-term period, up to 2050, without negatively affecting other sectors. The following table presents touristic sites and cultural heritage areas to be developed in the same framework.

N°	Names of sites	Tourism activity	Sector
1	COOPAB Munaro	Art and Craft	Kinigi
2	COOPAB NYANGE	Art and Craft	Nyange
3	MASHA ARTS	Art and Craft	Cyuve
4	INSHUTI ARTS GALLERY	Art and Craft	Muhoza
5	KINIGI COMMUNITY ARTS	Art and Craft	Kinigi
6	AZIZI LIFE	Historical	Kinigi
7	BEYOND THE GORILLAS EXPERIENCE	Historical	Kinigi
8	Red Rocks	Historical	Muko
9	GORILLAS GUARDIANS' Village	Historical	Kinigi
10	Kinigi	Genocide memorial site	Kinigi
11	Busogo	Genocide memorial site	Busogo
12	Musanze	Genocide memorial site	Muhoza
13	Musanze caves	Historical	Kinigi, Musanze

Table 5. Tourism and cultural heritage sites in Musanze District

b) Musanze General Industrial Park

Given the development of trade in Musanze and the category of the city in terms of supporting urbanization in Rwanda, Musanze DLUP proposes a significant area to be allocated for trade and for the commercial sector. Industrialization will be spurred by an industrial park for general industries, and with significant areas for light industries in Musanze Secondary City, Byangabo and Kinkware Rurban centers.

The General Industrial Park of Musanze is located within the urban boundaries of the Secondary City for easy access and providing employment opportunities to urban citizens. The following photos show the current situation, planned use including General Industrial zone (I2) and its buffer zone.



Figure 7. Musanze Industrial Park

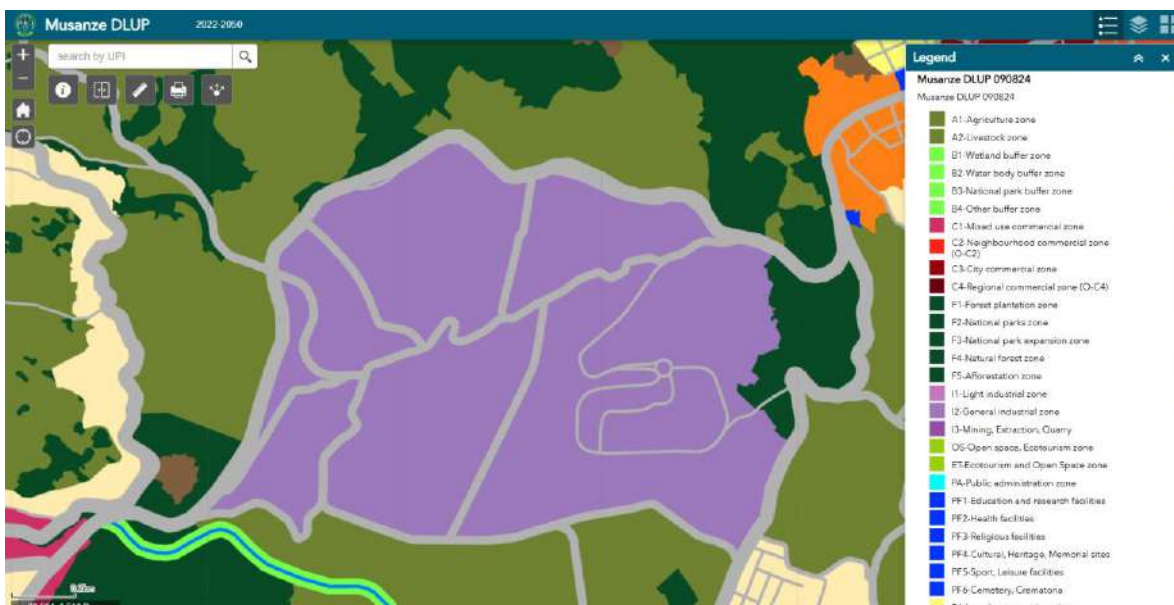


Figure 8. General Industry Park in Musanze District with planned land use

c) Light Industrial Zone

The Planned light Industrial Zone (I1) in Cyuve Sector, Bukinanyana Cell was proposed to accommodate agro processing and non-polluting industries in Musanze District. This Zone will support General Industrial Park for driving economic growth, creating jobs, and fostering innovation in Musanze District. The following photo shows the existing situation of Bukinanyana Light Industrial Zone (I1).



Figure 9. Light Industry Zone in Musanze District, Cyuve Sector/ Bukinanyana

Industrial areas are zoned and planned for the purpose of industrial development and business parks for light and heavy industries. Both light and general industrial parks are located outside of the residential zones to protect residents from pollution and contamination from the industrial activities. Further zoning regulations are developed and attached to this DLUP as its integral part.

4.2 Population, Urbanization, Rural and Housing Development

4.2.1 Population, urbanization, settlement, and housing (PUSH)

4.2.1.1 Existing population

According to the NISR, the population of Musanze District increased from **368,267** in 2012 to **476,522** in 2022. The population is predominantly rural, with 51% living in rural areas in 2022. Additionally, the female population is slightly higher than the male population, with females representing **52%** of the total population. People aged 0-17 years accounted for **48%** of the population in 2012 as compared to **43%** (206,471) in 2022 reflecting a decrease in fertility rate over a ten-year period.

In 2022, the population of Musanze District represented 23% of the total population in the Northern Province. Private households are estimated to **119,387**. The district increased from **694** inhabitants/km² in 2012 to **1,157** inhabitants/km² in 2022. This indicates that the District has become more densely populated over the ten-year period (RPHC, 2022).

Sector Name	Type of Sector: Urban; Rural	2012 Census				2022 Census			
		Population			Number of HHs	Population			Number of HHs
		Male	Female	Total		Male	Female	Total	
Busogo	Urban & Rural	10,203	11,309	21,512	4,771	13,290	14,974	28,264	6,940
Cyuve	Urban & Rural	18,358	20,733	39,091	8,962	29,347	32,832	62,179	15,444
Gacaca	Urban & Rural	11,208	12,397	23,605	5,379	14,591	16,128	30,719	7,384
Gashaki	Rural	6,509	7,139	13,648	3,031	6,761	7,511	14,272	3,460

Gataraga	Urban & Rural	10,820	11,890	22,710	4,949	12,686	14,035	26,721	6,333
Kimonyi	Urban & Rural	7,225	8,364	15,589	3,644	10,114	11,567	21,681	5,629
Kinigi	Urban & Rural	12,818	14,403	27,221	6,311	15,423	16,874	32,297	8,201
Muhoza	Urban & Rural	25,377	26,501	51,878	12,091	35,311	34,430	69,741	16,900
Muko	Urban & Rural	8,959	9,978	18,937	4,561	12,496	13,976	26,472	6,937
Musanze	Urban & Rural	14,833	17,031	31,864	7,371	22,478	25,242	47,720	12,335
Nkotsi	Urban & Rural	6,204	7,342	13,546	3,292	8,108	9,241	17,349	4,556
Nyange	Urban & Rural	12,794	14,672	27,466	6,354	14,612	16,662	31,274	8,174
Remera	Rural	9,202	9,910	19,112	4,294	9,522	10,465	19,987	4,953
Rwaza	Urban & Rural	9,967	10,959	20,926	4,952	10,998	12,122	23,120	6,044
Shingiro	Urban & Rural	9,922	11,240	21,162	4,794	11,603	13,123	24,726	6,097
Total		174,399	193,868	368,267	84,756	227,340	249,182	476,522	119,387

Table 6. showing existing population in Musanze District

The following figure is providing clarification on the demographic trends based on the comparison of demographic growth between 2012 and 2022

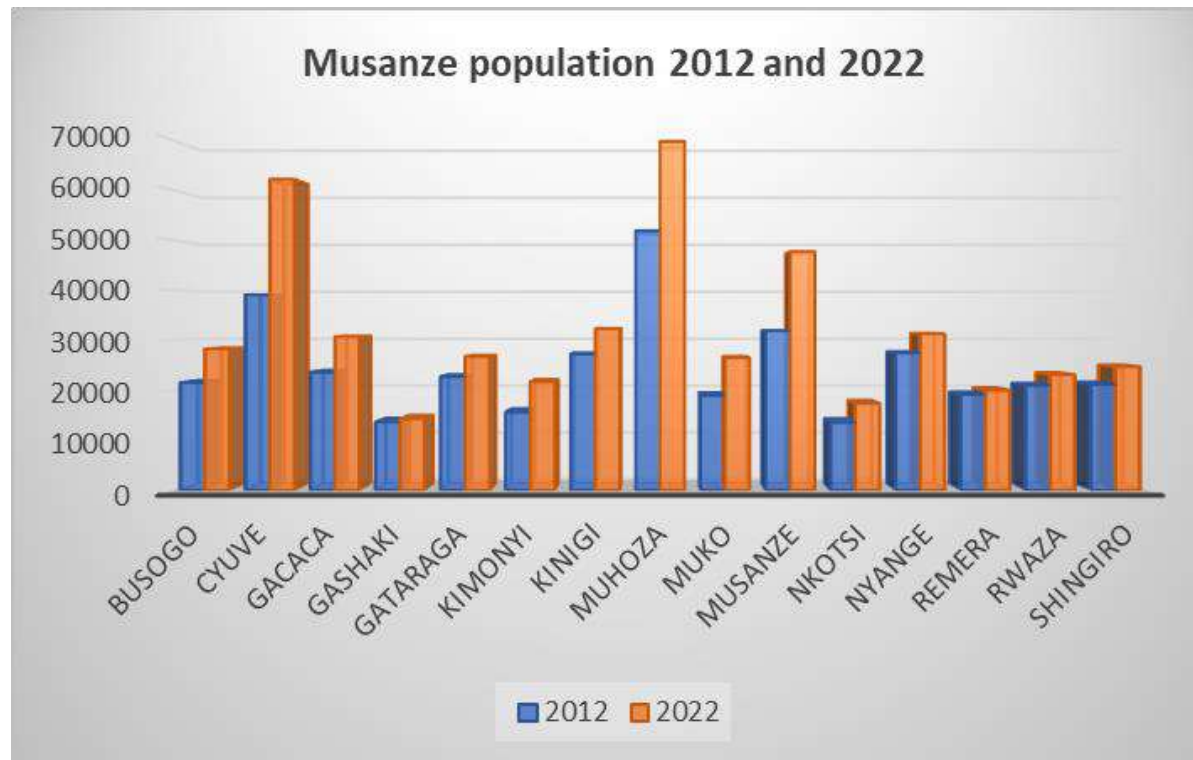


Figure 10. Demographic Trends in Musanze District

Based on the information provided by the table and the graph as presented above, the following observations are made:

- Muhoza Sector is the most populated sector in the district with a population of 69,741 in 2022, and a density of 3,297 inhabitants/km² in 2022
- Gashaki Sector is the least populated sector with 14,272 inhabitants in 2022.

In 2022, the rural population of Musanze District in Rwanda was 242,264 people (51%). This District has seen significant population growth over the years. The total population of Musanze District was recorded at 476,522, with an almost even split between rural and urban residents, as the urban population was 234,258 people (49%).

4.2.1.2 Projected Population in Musanze District

Population projection using NLUDMP 2020-2050 guidelines

According to the NLUDMP 2020-2050 it is assumed that for cities, the population will be distributed based on the recommended settlement hierarchy and economic potentials. For the purpose of land allocation, the DLUP has adopted the NLUDMP 2020-2050 guidelines on the lowest scenario which apply family planning initiatives with a national growth rate 2 %, Therefore, the total population of Musanze District is estimated at **607,163** inhabitants by the year 2035 and **803,000** inhabitants by 2050. The urban population is estimated at **273,579** by 2035 and **503,000** by 2050.

Sector	Type of Sector	Population 2022	HHs 2022	Population 2035	HHs 2035	Population 2050	HHs 2050
Busogo	Urban & Rural	28,264	6,940	38,953	9,738	48,457	12,114
Cyuve	Urban & Rural	62,179	15,444	84,366	21,091	121,900	30,475
Gacaca	Urban & Rural	30,719	7,384	35,829	8,957	43,488	10,872
Gashaki	Rural	14,272	3,460	15,761	3,940	17,673	4,418
Gataraga	Urban & Rural	26,721	6,333	33,219	8,305	39,570	9,893
Kimonyi	Urban & Rural	21,681	5,629	29,730	7,432	43,399	10,850
Kinigi	Urban & Rural	32,297	8,201	38,096	9,524	46,943	11,736
Muhoza	Urban & Rural	69,741	16,900	99,841	24,960	151,639	37,910
Muko	Urban & Rural	26,472	6,937	33,444	8,361	40,097	10,024
Musanze	Urban & Rural	47,720	12,335	61,667	15,417	84,744	21,186
Nkotsi	Urban & Rural	17,349	4,556	21,691	5,423	25,838	6,460
Nyange	Urban & Rural	31,274	8,174	39,388	9,847	52,601	13,150
Remera	Rural	19,987	4,953	22,072	5,518	24,750	6,188

Rwaza	Rural	23120	6044	24,449	6,112	27415.1	6,854
Shingiro	Urban & Rural	24726	6097	28,658	7,164	34485.6	8,621
Total		476,522	119,387	607,163	151,791	803,000	200,750

Table 7. Musaze District Population projection for the years 2022 up to 2050

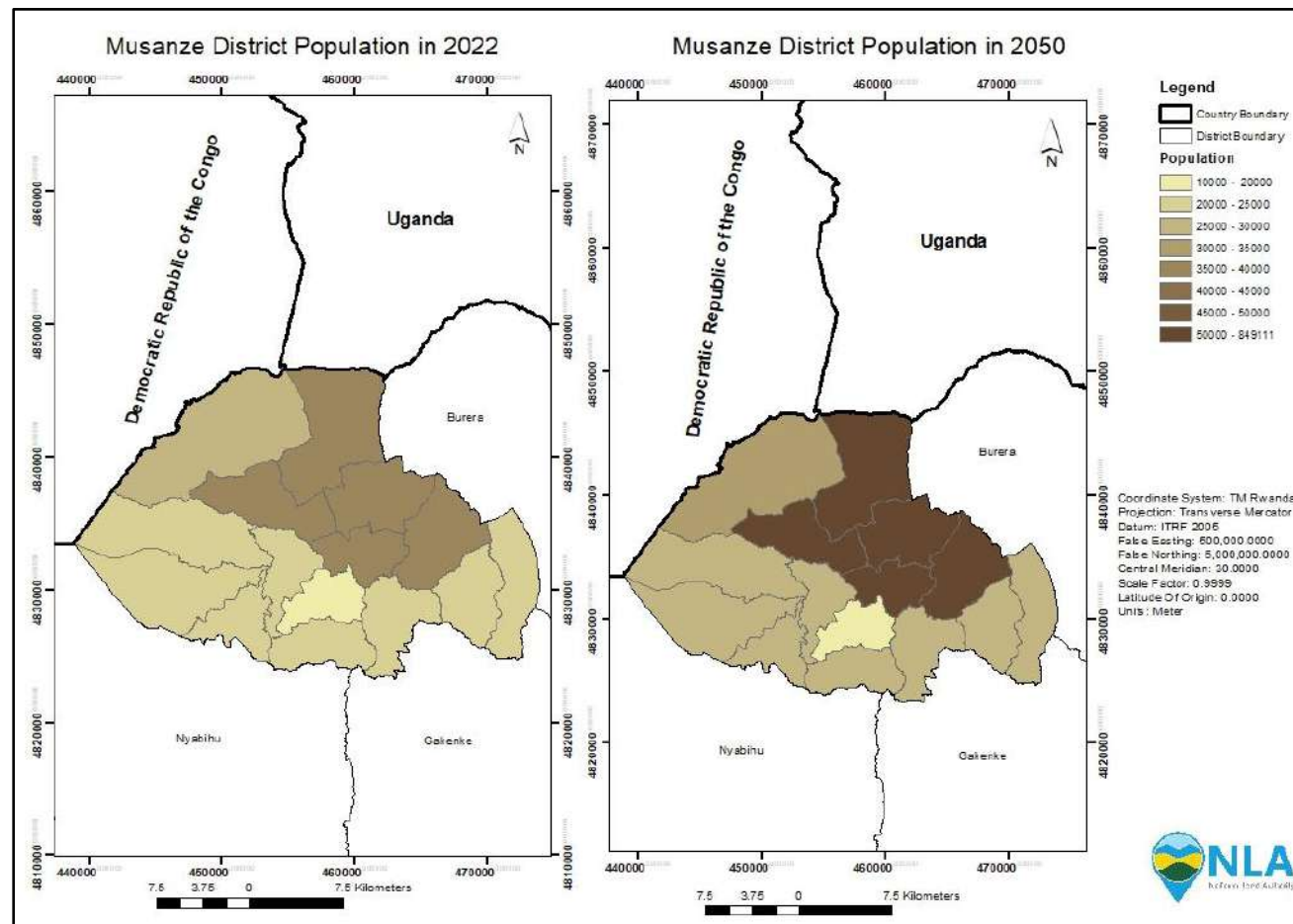


Figure 11. showing population in 2022 and 2050.

Population/ Year	2012		2022		2035		2050	
	Population	Number of HHs	Population	Number of HHs	Population	Number of HHs	Population	Number of HHs
Total Population	368,267	84,756	476,522	119,387	607,163	151,791	803,000	200,750
Musanze secondary city	102,082	24,990	183,701	45,654	266,683	66,671	410,000	112,500
Byangabo Rurban Center	-	-	32,016	7,818	46,190	11,547	58,893	7,533
Kinkware-Kampara Rurban Center	-	-	18,541	4,503	26,750	6,687	34,107	5,717
Sub-total(rurban)	-	-	50,557	12,321	72,939	18,235	93,000	13,250
Sub-total(urban)	102,082	24,990	234,258	57,975	339,622	84,906	503,000	125,750
Rural population	266,185	59,766	242,264	61,412	267,541	83,396	300,000	75,000
Musanze secondary city (%)	-		38.6%	38.2%	43.9%		51.1%	
Rurban (%)	-		10.6%	10.3%	12.0%		11.6%	
Urban (%)	27.7%	29.5%	49.2%	48.6%	55.9%		62.6%	
Rural (%)	72.3%	70.5%	50.8%	51.4%	44.1%		37.4%	
Urban + Rural (%)	100%		100%		100%		100%	

Table 8. Population projection in Musanze District per residence according to NLUDMP 2020-2050

4.2.2 Urbanization and Settlement Patterns in Musanze District

Musanze DLUP caters for the projected urban population to be accommodated within Musanze District by 2050. The Musanze Secondary City Master Plan provides a development plan till the year 2035 for the urban areas only. While the DLUP covers land use in the entire District of Musanze. The proposed land use plan takes into consideration the approved projects and development trends within the Musanze Secondary City boundary. Kabumba Rurban Center and other rural settlement areas, and provides strategic development direction for long, medium and short-term interventions. The proposed zoning plan guides the development within the whole district.

The urbanization in Musanze District has contributed to the development of infrastructure such as roads, schools, Healthcare Facilities, touristic infrastructures, etc. It also contributed to the business development (new commercial activities, new job creation, hand craft, housing development).

The NLUDMP 2020-2050 has recommended to have a Secondary City (Musanze Secondary City), two rurbans (Byangabo and Kinkware-Kamapara Rurbans), as well as rural settlement sites. Musanze Secondary City, Byangabo and Kinkware-Kamapara Rurban Centers will serve as an important role in supporting urbanization and trade in the district. There are also 81 rural settlement sites that have been integrated into the urbanization hierarchy to support the harmonization of rural settlements. The following figure is providing a summary of the settlement hierarchy in Musanze District.

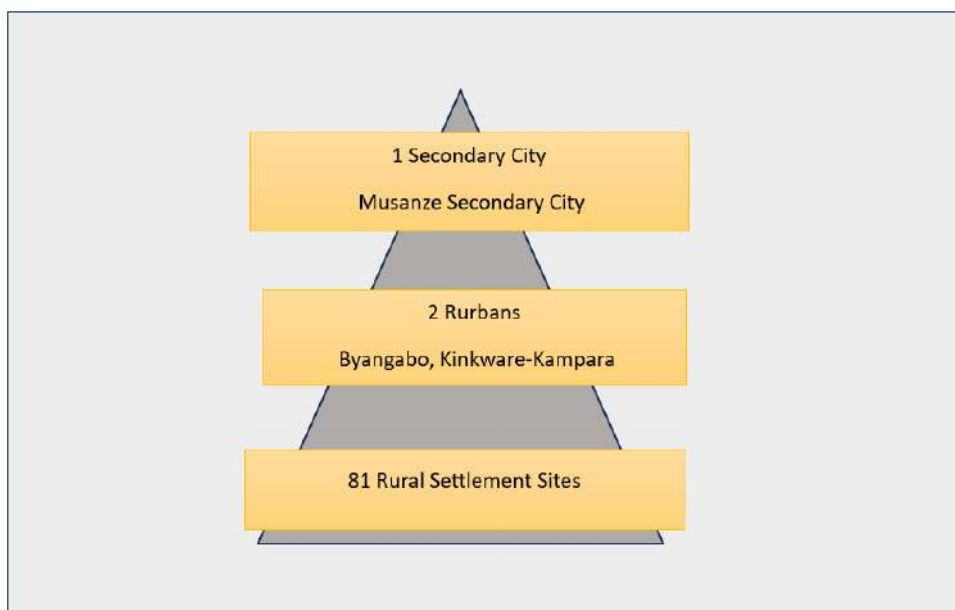
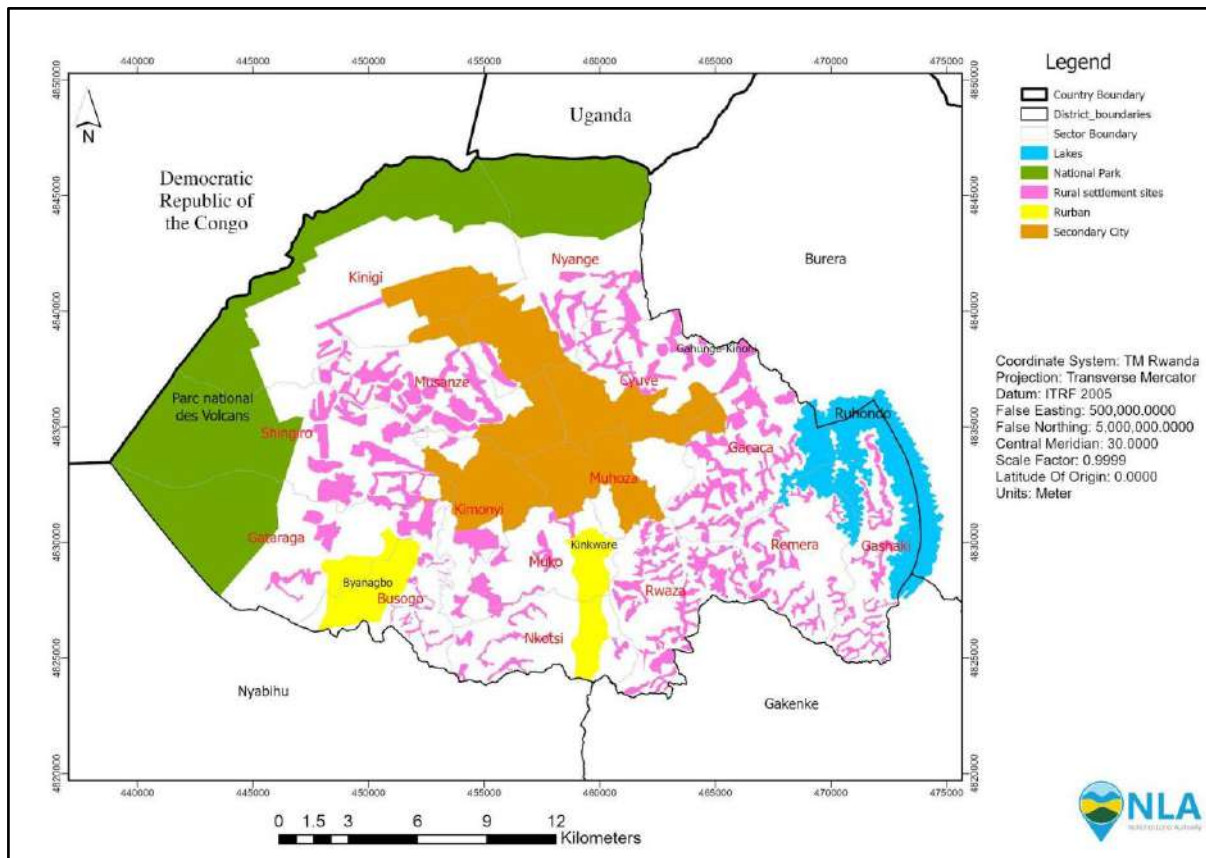


Figure 12. Musanze Settlement Patterns and Hierarchy



Map 5. showing Musanze Urban and settlement hierarchy

4.2.2.1 Musanze Secondary City

Musanze Secondary City was and remains to be a Secondary City that has the potential to welcome a large number of tourists throughout the year due to its tourism attractions and geographical features. Musanze Secondary City is located 110 km from Kigali City and it is among the areas that supply the capital with food, especially irish potatoes and fruits. Located in the north of the country, Musanze Secondary City has the advantage of being at the borders with Uganda and DRC connecting Rwanda to the neighboring countries. This strategic position provides opportunities to develop cross-border trade. This position is an advantage for the promotion of the private sector and possibility of expanding urbanization for the development of socio-economic infrastructures to meet urban standards.

The Secondary City plays an important role in the tourism industry development and serves as the northern urban area of the country. Musanze District has the potential to support the urbanization hierarchy in Rwanda, as it comprises Musanze Secondary City, which was proposed by the NLUDMP 2020-2050 as **“A Tourism Industry City ”**.

Musanze Secondary City displays an urban character which can be witnessed through the presence of hotels, bars, cafes and restaurants in the vibrant city center. The two hillocks mark the entry to the city, followed by the CBD and the administrative district. The roads in the city center connect in three directions, to the serene landscapes of Kinigi to the north, to the humble yet bustling market of Karwasa to the east and to the institutional and bungalow dominated area of Kimonyi to the west.

Musanze Secondary City has four seasonal rivers, Muhe, Susa, Mpenge and Rwebeya pass through the Secondary City's boundary. The area within the urban boundary has mostly flat terrain with vast fertile soils in the north. The volcanoes range is visible from almost all vantage points of the city.

Musanze is structurally organized by existing roads, the proposed Western Expressway, and the road towards Kinigi. Musanze has a densely developed city center, with Isolated and sparse settlements scattered along the roads.

Commercial activities contribute to 1.5% of the total area of the District and are primarily located along the national highways, and the proposed Western Expressway. Musanze offers small trading centers and markets for local agro-pastoralist to sell their products. The existing markets in the city are well planned with a scope for expansion in the future. Some of the key issues in development of commercial areas in Musanze is the scattered and unplanned incremental development.

Only 0.5% of the land within the urban boundary is for industrial use. There is a shortage of industries in Musanze, and industrial activities should be promoted to attract investments. In addition, the government needs to ensure that as urbanization takes place, that there is even distribution of industrial land, and that all industrial activities take place within the designated industrial areas. This will ensure harmonized growth of the industrial sector and provide infrastructure to existing and proposed industrial sites.

The following photo was taken during our field visits in May 2022 from Musanze Secondary City



Figure 13. Musanze Secondary City

The population of Musanze Secondary City is mainly engaged in non-agricultural activities like manufacturing, trade and commerce, services and other professions. There is a higher concentration of highly skilled and knowledge-based work in Musanze Secondary City, and more opportunities for high skilled work.

Currently, Urban development is taking place especially toward Kinigi Sector, north of the city center. As land in the City of Kigali is more expensive than in Musanze, there is an opportunity to attract investors in real estate and housing for urban development.

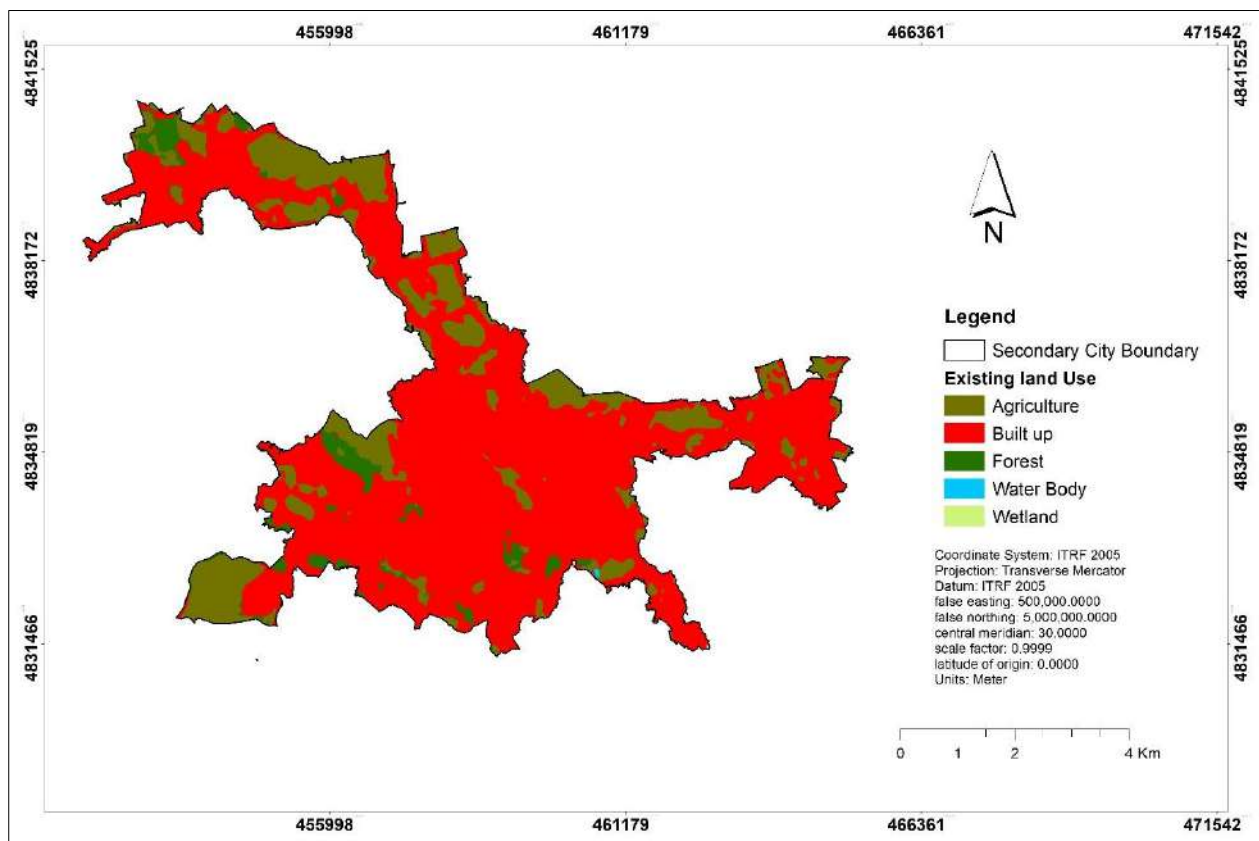
In 2021, The Urban Development Master Plan for the Urban Areas of Musanze District was developed and approved by the District Council in June 2021. The Musanze District Council resolution of 10th September 2021 recommended the effective implementation of Residential Components of the Master Plan starting with the elaboration of Detailed Physical Plans for Urban Residential Sites through Community approaches in line with the Participatory Land Readjustment Guidelines published on 13th October 2021. The table below tabulates the existing land use balance sheet of Musanze Secondary City.

a) Existing Land use in Musanze Secondary City

In 2023, Secondary City provides opportunities to develop trade of agricultural products such as fruits and vegetables. In the existing situation, **20.5%** is used for agriculture, **3.9%** for forest, and **75.6%** for built up areas. The table below is the existing land use balance sheet and the existing land use map.

Land Use	Area in Ha	Percentage
Agriculture	854.7	20.5
Built up	3152.6	75.6
Forest	161.0	3.9
WaterBody	1.0	0.0
Wetland	0.3	0.0
Total	4169.5	100.0

Table 9. Musanze Secondary City's Existing Land Use Balance Sheet in 2023



Map 6. Showing Musanze Secondary City Existing land Use

b) Proposed land use in Musanze Secondary City

The proposed urban boundary for the city of Musanze Secondary City is 41.69 km² (**4,169ha**) spreading over 8 Sectors (Kinigi, Nyange, Musanze, Cyuve, Gacaca, Muhoza, Kimonyi, and Shingiro). There is a concentration of settlements mainly in Muhoza Sector, which forms the current city. Two major roads, and the proposed Western Expressway, passes through the heart of this city center. Apart from the city center, other smaller nodes within the urban boundary are Karwasa in the east (approximately 4 km from city center), Kimonyi in the west (approximately 5 km from city center) and Kinigi in the north (approximately 8 km from city center). The urban boundary is engulfed by natural features like the Virunga Volcanoes Chain and the National Park in the north (approximately 10 km from the city center), and wetlands to the south.

Musanze Secondary City has been given a city commercial zone-C3 as the CBD and mixed-use commercial zone-C1 to improve the commerce and trade. Residential zones including R1, R1A, R2 and R3 have been planned to accommodate 247, 500 and 450,000 people in 2050 and 2050 respectively as recommended by NLUDMP. According to the proposed Musanze Secondary City land use balance sheet, residential is the leading land use with 49% of the total area, commercial zone with 6.7%, public facility with 3.6%, transportation with 14.3% Forest covers 4.4%, urban agricultures cover 8.6% and industries covers 4.1 %

Land Use	Area in Ha	Percentage
Agriculture	356.6	8.6
Buffer	102.7	2.5
Commercial	278.3	6.7
Ecotourism	163.1	3.9
Forest	185.2	4.4
Industry	169.9	4.1
Public administration	82.6	2.0
Public Facility	148.2	3.6
Public Utility	11.0	0.3
Residential	2044.3	49.0
Transportation	597.8	14.3
Water body	26.0	0.6
Wetland	3.8	0.1
Total	4169.5	100.0

Table 10. Musanze Secondary City's proposed Land Use Balance Sheet

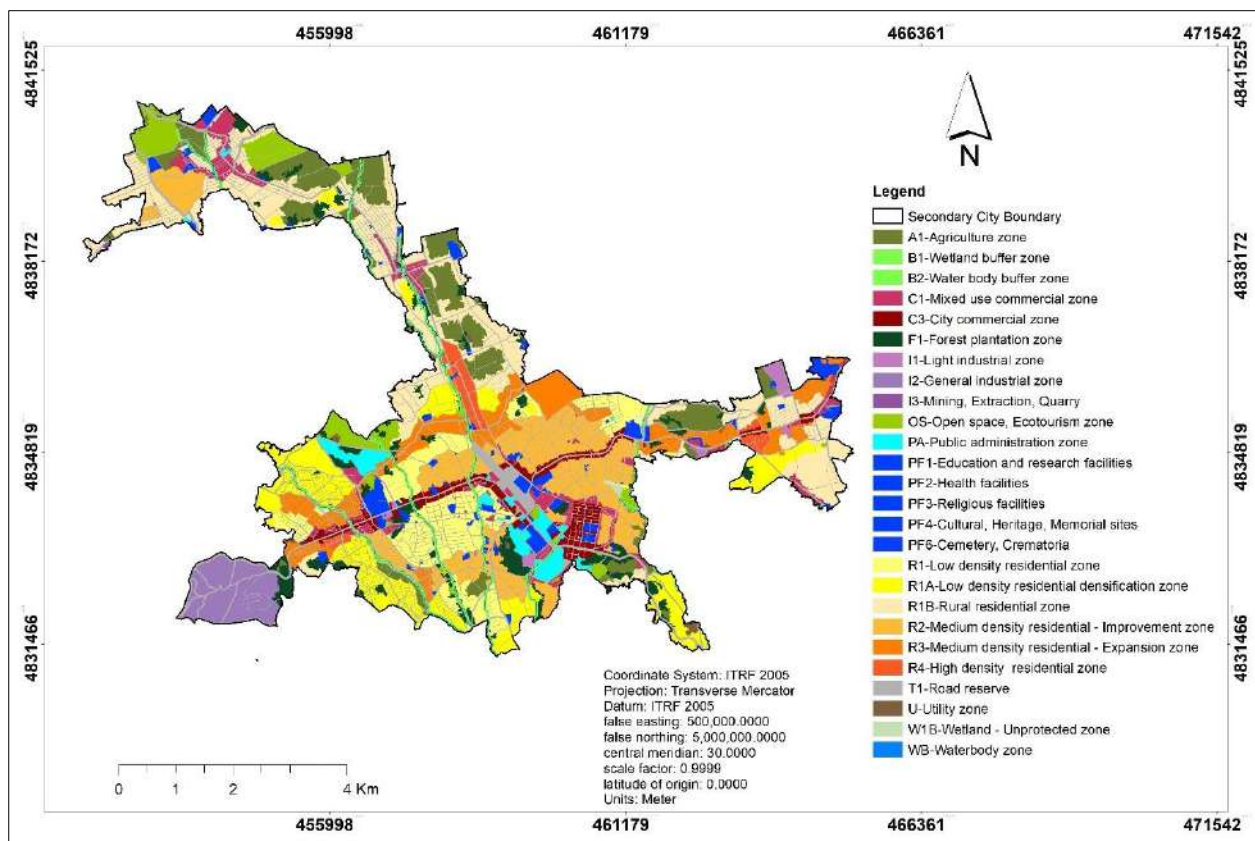


Figure 14. Showing Musanze Secondary Proposed land Use

This Musanze DLUP is integrating the proposals from the 2021 Master Plan for Urban Development. Further discussions on its implementation phases and implications are detailed in the next chapter related to the implementation of this DLUP.

4.2.2.2 Musanze Rurbans Centers

The Rurban Centers are emerging centers of linkage between rural and urban areas of the district. However, Rurban Centers are classified among urban land with appropriate zoning regulations and planning guidelines for urban areas. The word Rurban (rural and urban) refers to a geographic territory which possesses the economic characteristics and lifestyles of an urban area while retaining its essential rural area features. Rurbanisation may be due to either urban expansion or rural migration.

Rurban communities are rural socio-geographic spaces where styles of life and standard of living have changed through urban-rural interactions, including accumulation of capital and exposure to modern ideas and lifestyles that eventually build new mindsets. The Rurban Centers are part of the urbanization realm due to their potential to emerge and become small cities.

A number of factors were considered while selecting the Rurban Centers, taking into consideration the District Council guidance e.g. existing or potential trading centers, growing residential settlements, geographic location, and existing and developing infrastructures.

NLUDMP 2020-2050 recommended Byangabo and Kinkware-Kampara to be Rurban Centers of Musanze District with 8.4 Km². However, during elaboration of DLUP some adjustment has been made in collaboration with District, communities and Stakeholders, some areas have been removed and added due to environmental constraints. Therefore, These two rurbans areas cover 10.6 km² as the final area after elaboration of DLUP but this area includes undevelopable zones like forest, wetland, urban agriculture and water bodies this leads to increase of total area. Byangabo Rurban is on the national road Musanze-Rubavu-Goma and it is where National University Busogo College is located. Kinkware-Kampara Rurban is on the road Musanze-Nyakinama and it is where the Rwanda Military Academy is located.

However, both Byangabo and Kinkware-Kampara trading centers face challenges that hinder their development including steep topography, outdated infrastructure, limited land for extension of the centers, lack of bus stations, scattered settlements, poor sanitation, and a high population growth which is not corresponding to available land.

4.2.2.3 Byangabo Rurban Center

Byangabo Rurban Center is located in Busogo Sector and cover 448.9 ha. Byangabo Rurban Center is located around 12 km from the city center of Musanze via the proposed Western Expressway (NR4). It has an existing thriving market, located in close proximity to Rubavu and falls on the proposed freight corridor by Transport Master Plan for Rwanda (STMP) that further connects to Uganda on the north-east. This makes it a potential trade and industrial node with employment opportunities in the industrial sector. Byangabo Rurban Center will continue to grow strongly.

Handicraft (Agakiriro), will be developed around the market in order to increase jobs creativity in Busogo Sector. The following photos were taken during our field visits in June 2022 from Byangabo Rurban Center.

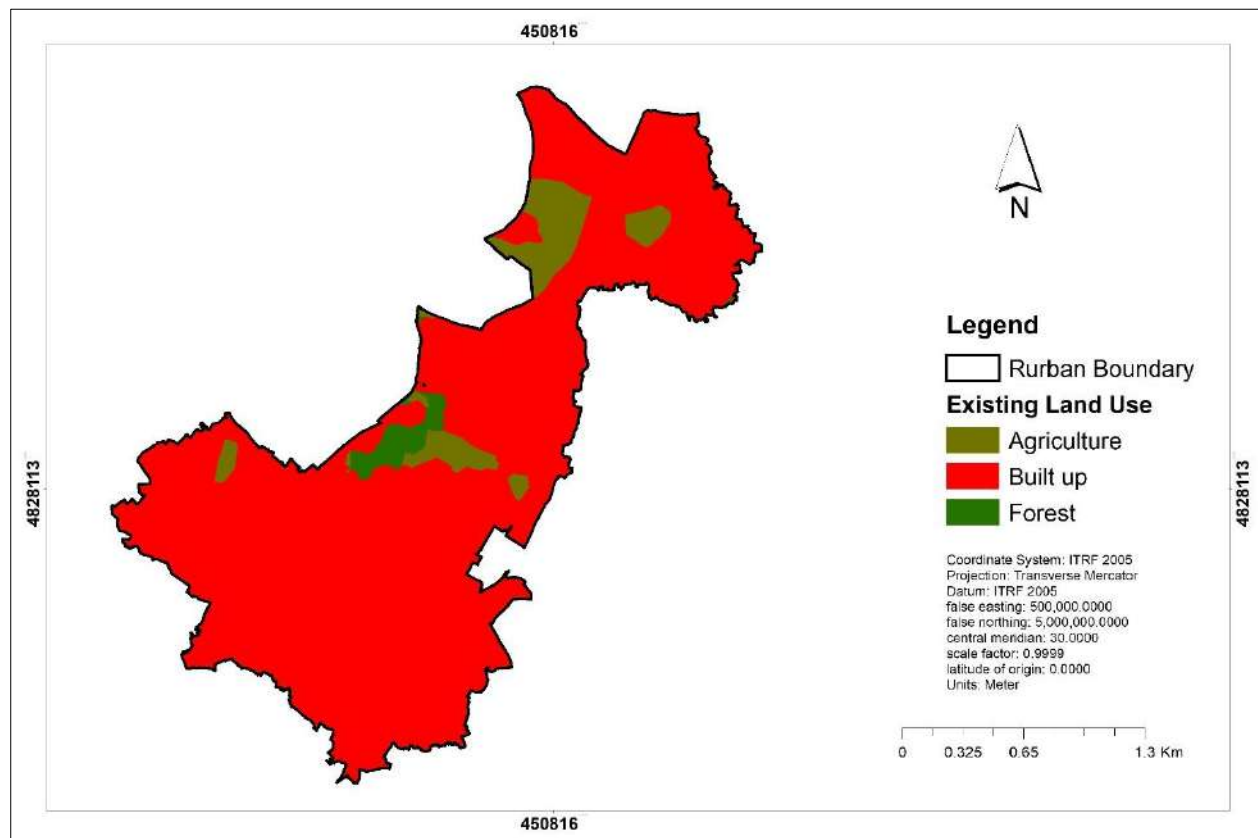


Figure 15. Byangabo Rural Center

In Byangabo rural, built up is the leading land use with 91.5%(410.7ha), agriculture with 6.5%(29.4ha), forest with 2%(8.9ha). The built up grow along national road (Ruhengeri-Gisenyi) with dominant of commercial activities and extend toward North-West of the rural with scattered residential uses consuming agricultural land. The following land use balance sheet and map provides the existing conditions of Byangabo Rural in 2023.

Land Use	Area in Ha	Percentage
Agriculture	29.4	6.5
Built up	410.7	91.5
Forest	8.9	2.0
Total	448.9	100.0

Figure 16. Existing Land Use in Byangabo Rural Center in 2023



Map 7. Existing Land Use in Byangabo Rural Center in 2023

a) Proposed Land Use in Byangabo Rurban

During elaboration of DLUP, Byangabo Rurban was clearly analyzed and various potential projects have been proposed to improve commercial business in Byangabo Rurban Center. For instance, the existing market will be upgraded and extended in size with high rise modal typologies in order to accommodate various economic developments.

Due to various pull factors, traffic will continue to increase on the Musanze-Rubavu Corridor. Traffic congestion is generated from motorcycles, public transport, cyclists and pedestrians. To align with the Musanze Transportation Plan, a car park is planned to allow rapid development of private and public mobility in Musanze District.

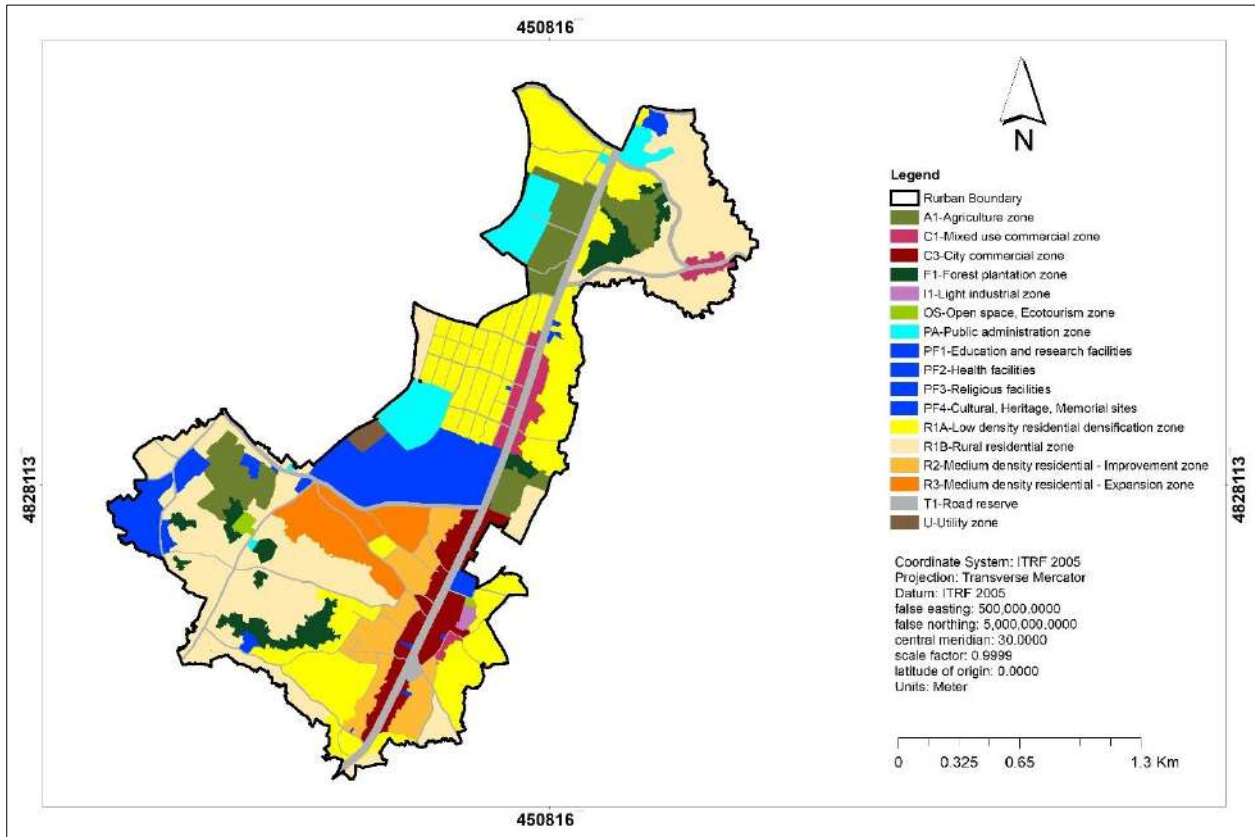
A waste disposal site is proposed in Byangabo Rurban Center to facilitate solid waste collection from commercial business and residence zones and to enhance city cleaning programs.

In Byangabo Rurban different inclusive residential zones has been proposed including R2, R1A, R1B and R3, Mixed use commercial zone-C1 has been encouraged especially in trading center, main infrastructures including Agakiro, bus parking for public transport, market extension has been planned to facilitate the sustainable development. In Byangabo Proposed land use 2050, urban agriculture covers 7.3%, forest 4.2 % and residential 56.8%. The table and map below represent the proposed land use in Byangabo Rurban

Land Use	Area in ha	Percentage
Agriculture	32.8	7.3
Commercial	25.3	5.6
Ecotourism	1.3	0.3
Forest	18.9	4.2
Industry	1.0	0.2
Public administration	22.4	5.0
Public Facility	46.4	10.3
Public Utility	2.0	0.4
Residential	254.9	56.8
Transportation	43.9	9.8
Total	448.9	100.0

Table 11. Proposed land Use balance sheet of Byangabo Rurban

The following map and figure are providing more information on Byangabo existing and proposed land uses as well as the proposed Byangabo Urban Design



Map 8. Proposed Land Use of Byangabo Rurban Center



Figure 17. Proposed Byangabo Urban Design

4.2.2.4 Kinkware-Kampara Rurban Center

Kinkware-Kampara Rurban Center covers 620 ha, is a consolidation of two existing commercial centers located around 7 km from the city center of Musanze on NR8. There are multiple educational institutes in the Rurban like Nyakinama Military Academy, Rwanda Peace Academy, Musanze Polytechnic, and IPRC Musanze, making it a potential educational node with employment opportunities in the education sector. The following photos indicates the current situation of Kinkware-Kampara Rurban Center.



Figure 18. Kinkware-Kampara Rurban Center in Nkotsi and Muko Sectors

a) Existing Land Use of Kinkware-Kampara Rurban in 2023.

The following map provides more details on existing and proposed land use in Kinkware-Kampara Rurban Centers

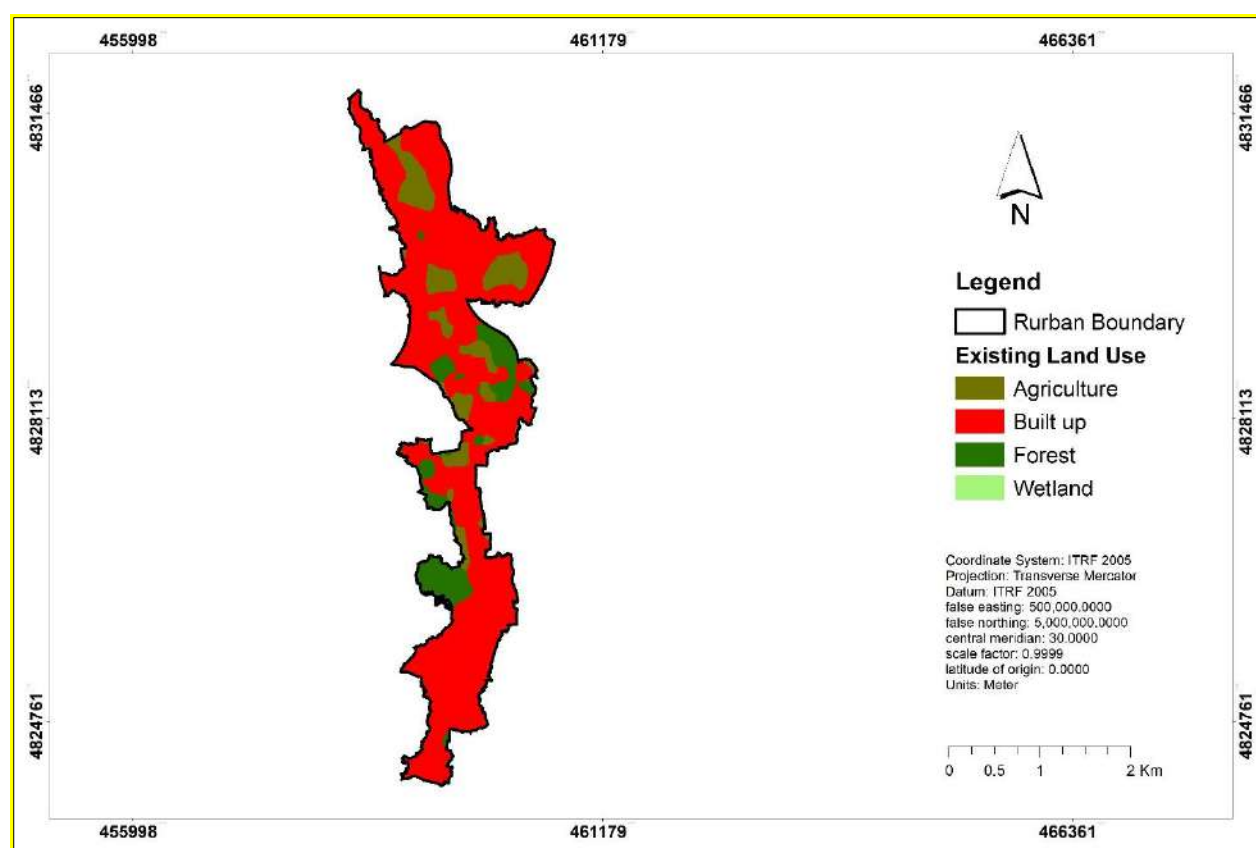


Figure 19 Existing Land Use of Kinkware-Kampara Rural Center in 2023

The existing land use balance sheet indicates that built up cover 76.8%, agriculture cover 12.9% while forest and wetland cover 10.2 and 0.003 % of the total area of Rural. the existing land use informed the planning perspectives of the area during DLUP elaboration while making sure of taking into consideration the existing features highlighted on the above map as reflected within the following table:

Land Use	Area in Ha	Percentage
Agriculture	80.2	12.9
Built up	476.5	76.8
Forest	63.4	10.2
Wetland	0.0	0.0
Total	620.1	100.0

Table 12. Existing Land Use balance sheet in Kinkware-Kampara Rural Center in 2023

Proposed Land Use in Kinkware-Kampara Rural

Kinkware-Kampara Rural Center will continue to grow rapidly due to its strategic location and various economic opportunities. Education facilities and training centers, tourism development,

small scale enterprises such as crafts, maize mills, mining, tailoring workshops, carpentry, bicycle and shoe repairs etc. are generally regarded as key activities for Kinkware development.

To ensure the sustainable development of this center, a handicraft space (Agakiro) has been planned to generate job opportunities and creativity in the rural and in Musanze District.

To promote sustainable urban mobility; upgrading Musanze-Nyakinama-Vunga-Janja road network corridors as paved roads with relevant bus stops, will be significant at Kinkware-Kampara Rural center.

Renovating Nkotsi ya Bikara tourism destination as it is planned in DLUP will continue to be developed in order to increase the rate of tourism contribution in Musanze District.

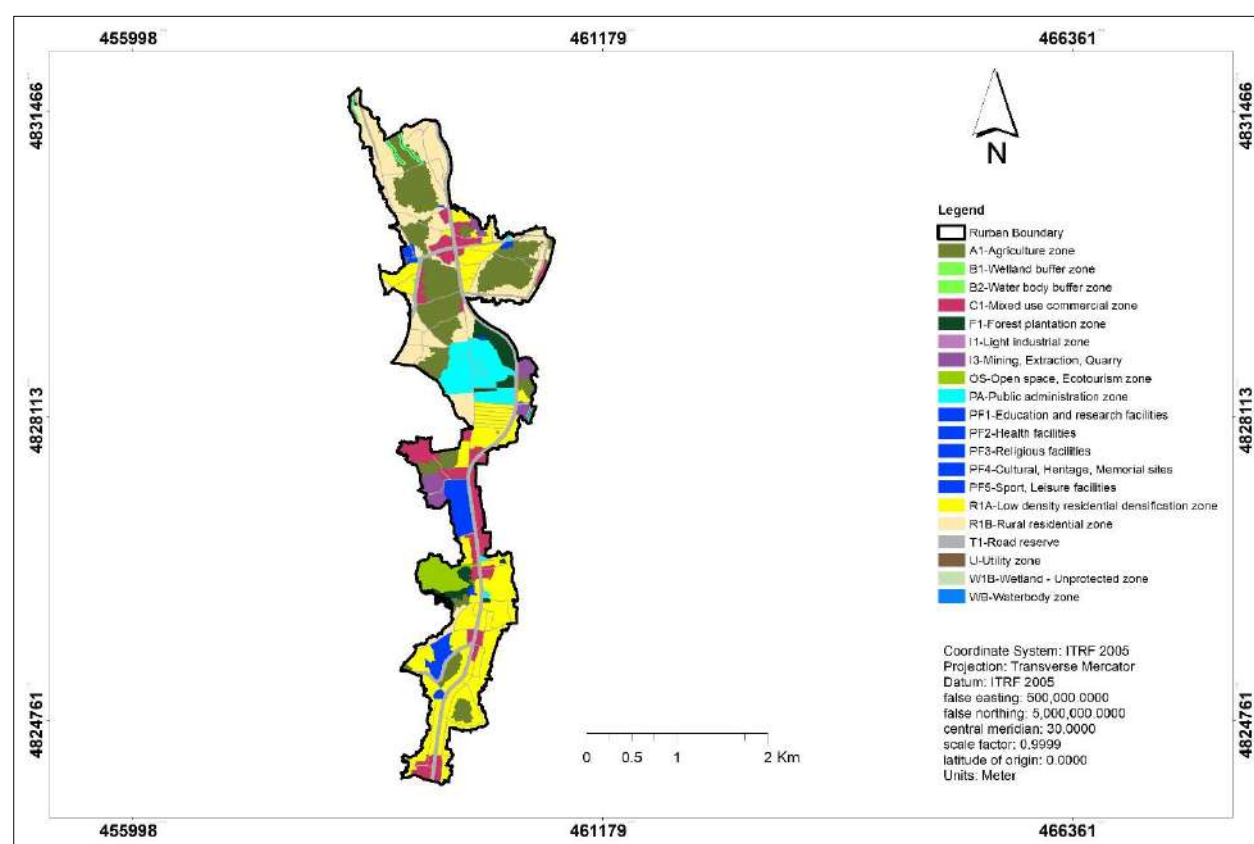
The solid waste disposal site is recommended in this site to ensure green growth, smart, waste management from commercial business, local factories, education facilities and local communities. To improve commercial business and other services in Kinkware-Kampara Rural Center, the existing linear business center and the open-air selling point will be upgraded with modernized modal typologies in order to accommodate enough economic developments.

In Kinkware-Kampara Rural different inclusive residential zones has been proposed including R2, R1A, R1B and R3, Mixed use commercial zone-C1, Nkotsi ya Bikara tourism destination, solid waste disposal has been encouraged especially in trading center, main infrastructures including Agakiro, upgrading Musanze-Nyakinama-Vunga-Janja road network corridors as paved roads with relevant bus stops which will strongly facilitate rural development. In Kinkware-Kampara rural Proposed land use 2050, urban agriculture covers 19.3%, forest 3.1% and residential 39.3%. The table and map below represent the proposed land use in Kinkware-Kampara Rural.

Land Use	Area in Ha	Percentage
Agriculture	119.8	19.3
Buffer	5.4	0.9
Commercial	51.3	8.3
Ecotourism	16.6	2.7
Forest	18.9	3.1
Industry	15.7	2.5
Public administration	39.4	6.4

Public Facility	27.0	4.4
Public Utility	0.4	0.1
Residential	243.5	39.3
Transportation	80.6	13.0
Water body	1.4	0.2
Wetland	0.0	0.0
Total	620.1	100.0

Table 13. Proposed land Use balance sheet of Kinkware-Kampara Rurban



Map 9. Proposed land Use map of Kinkware-Kampara Rurban

4.2.2.5 Rural Settlement Development

The rural settlements system suffers traditionally from continuous isolation of homesteads which prevents improvement in agricultural yield and inefficient supply of services and infrastructure. An audit survey conducted in 2019 by RHA and NLA, indicated that 210,000 houses out of 570,000 were found outside of settlement plans in a sample of districts. In 2017-2018, the districts reported that the population accommodated in rural settlement sites was 93%.

A variety of Imidugudu and scattered single family homesteads in rural areas do not favor economies of scale. Therefore, a transformation of the rural settlement structure is needed in Rwanda in order to improve efficient land use planning, to avail and protect agricultural land and to promote densification in rural settlements. Agricultural arable land, and other land uses, are declining due to 14,000 Imidugudu currently scattered on 11,000 km². The rural population is currently 10,6 million equalling 2,36 million households (2022).

a) Principal of freeze and consolidation

There is an urgent need to consolidate and freeze rural settlement sites to prevent further sprawl. Therefore, the 2050 projected population of 6.6 million (30% of the population) will be clustered into about 3,000 settlement sites. An average of 1 or 2 settlement site(s) per cell is required depending on the topography of the area. Where the topography is not favorable, proposed sites can be shifted to other nearby cells that fulfill the conditions.

This calls for districts to enlist all the best settlement sites per district and select those based on NLUDMP 2020-2050 parameters and criteria. Combined, all rural settlement gross boundaries should not exceed 1,241km² by 2050 from about 1500 km² in 2019. Housing density in rural settlement sites will need to increase considerably. High density housing typologies and models are recommended in rural areas, including exploiting the underground. A decrease in the size of rural residence plots from 615m² to 300m² and dwelling models of 4x1 and 8x1 (and other high-density models) are promoted. Housing models that utilize less than 300m² plot size are also encouraged.

b) Musanze freeze and consolidation of rural settlement patterns

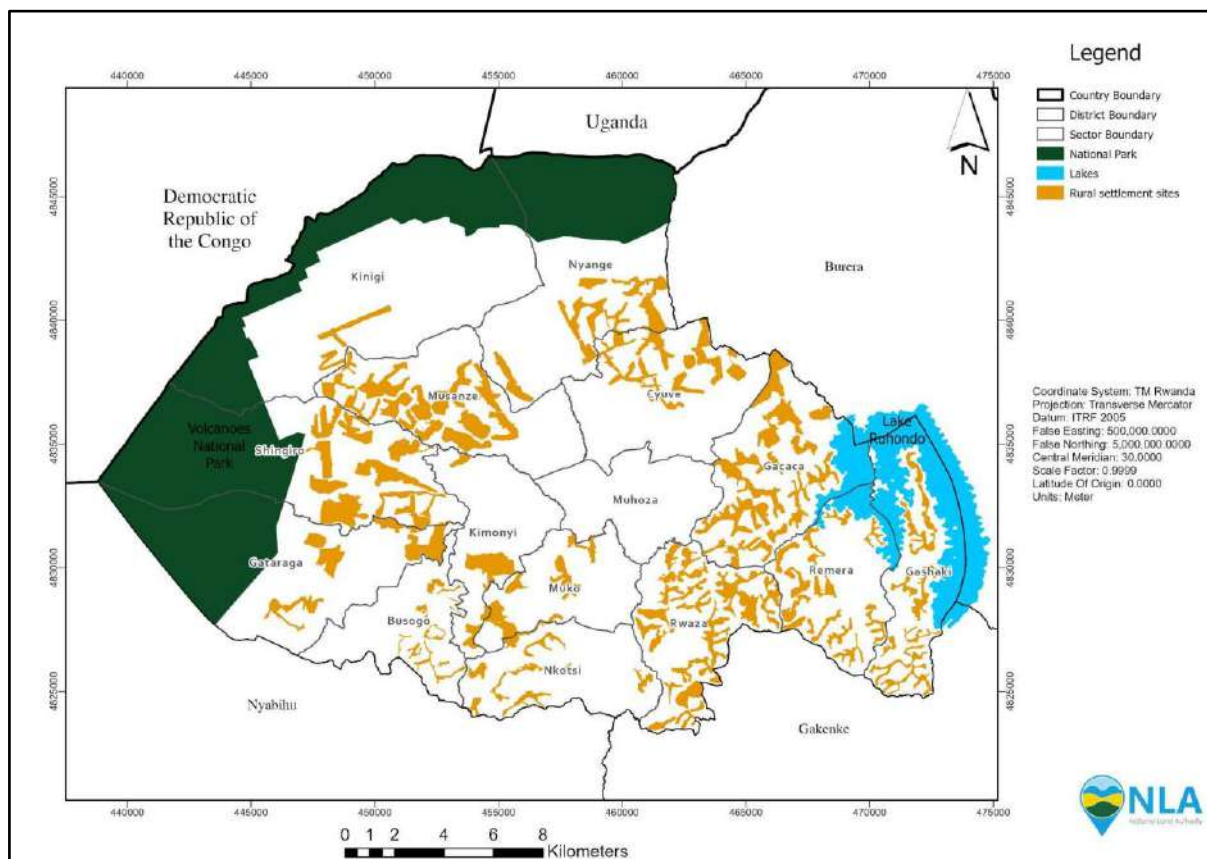
The key economic activities in Musanze District are tourism, agriculture and commercial business. As agriculture and tourism are strategic sectors for the development of the district, scattered settlement in various sectors poses a challenge.

To ensure agriculture land and improving tourism development, the concept of freeze and consolidation is urgent in Musanze District. During the data collection, field verification and consultation meetings have been conducted in each sector and cell in order to prioritize rural settlement to be maintained based on NLUDMP 2020-2050 principles, however remaining scattered settlements will be frozen and people will be relocating to selected settlement sites gradually.

c) Proposed Rural Settlement Sites in Musanze District

The proposed rural settlement typology in Musanze District is the clustered rural settlement (known as Umudugudu) of private households. However, the surrounding scattered settlement with squatter housing and isolated houses on agricultural land will gradually relocate to planned rural settlement sites.

After analyzing and consulting the NLU DMP 2020-2050, NLA and the Musanze District Team identified 81 sites for rural settlement covering a total of 46.4 km², allocating the remaining rural land for agriculture development. The boundaries of the sites enable further development while complying with the NLU DMP 2020-2050. The following map provides details on spatial distribution of proposed rural settlement sites in Musanze District.



Map 10. Proposed land Use map of Kinkware-Kampara Rurban

The following table is providing information on proposed distribution of Rural Settlement Sites in Musanze District by all administrative sectors:

N°	Sector	Number of Sites
1	Shingiro	4
2	Garaga	3
3	Kinigi	1
4	Busogo	3
5	Nkotsi	3
6	Rwaza	12
7	Muko	4
8	Kimonyi	2
9	Musanze	6
10	Muhoza	2
11	Cyuve	9
12	Nyange	5
13	Gacaca	11
14	Remera	9
15	Gashaki	7
Total		81

Table 14. Musanze Rural Settlement Sites by Sector

d) Typical Rural Settlement: Cyahafi Rural Settlement

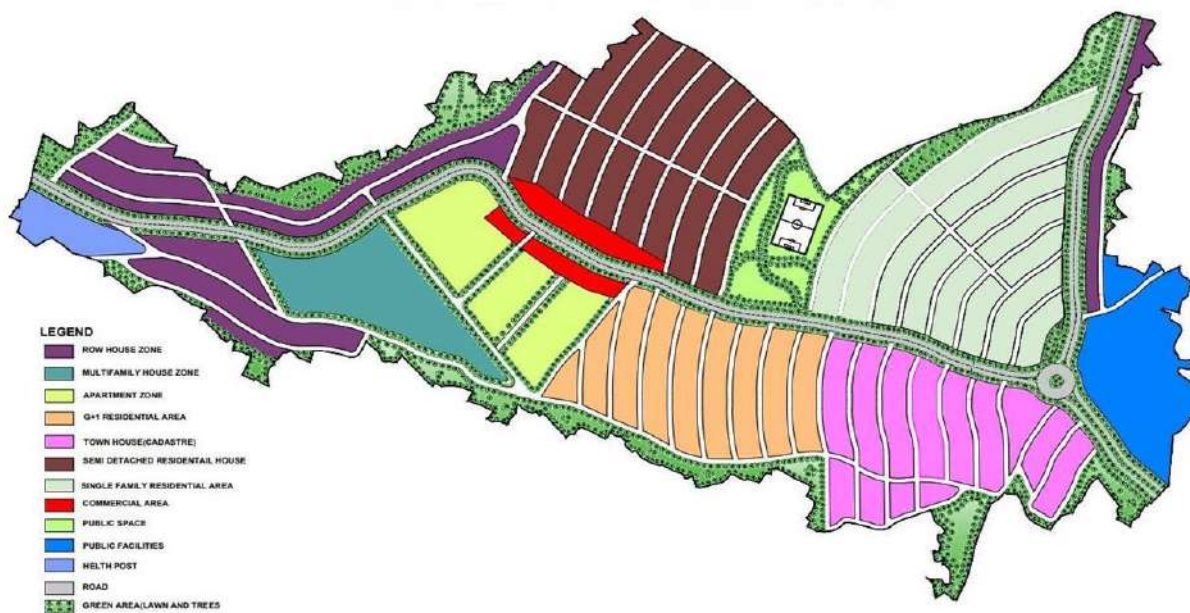
Residential use in the rural settlement is zoned as Rural Residential Zone, R1B. The zoning allows for various types of residential houses such as all types of single family houses, semi-detached houses, row houses and townhouses, multifamily and apartment buildings. In addition, conditional uses such as commercial and retail use as well as public facilities are allowed.



Map 11. Cyahafi Rural Settlement Site Design model one

From the permitted use in the rural settlement sites, a model has been applied within the boundary of all rural settlements. In addition, services that are required to support the community should be provided such as:

- Open space for recreation, meetings, events, and playgrounds.
- Health Post (poste de sante) that can provide emergency, first aid and other basic health care.
- ECD for children below school age to help monitor their growth.



Map 12. Cyahafi Rural Settlement Site Design model two

The site of Cyahafi rural settlement is designed to accommodate both the existing and the envisioned population, and to cater for a variety of housing segments aligned with the income levels in the area, a mix of typologies is proposed. This mix consists of single-family housing (row houses, townhouses and semidetached houses) and apartment buildings. In addition, commercial areas, public facilities and public space is proposed to cater for the needs of the community. The following 3D renders illustrate the rural settlement site.



Figure 20. Cyahafi Rural Settlement Site 3D Design model (single-family housing)



Figure 21. Cyahafi Rural Settlement Site 3D Design model (multi-family building)



Figure 22. shows townhouses within the Cyahafi rural settlement site



Figure 23. shows apartment buildings within the Cyahafi rural settlement site.



Figure 24. shows row houses within the Cyahafi rural settlement site.



4.2.2.6 NLUDMP 2020-2050 National Directives vs Musanze DLUP 2022-2050 alignment

Changes have been observed in the settlement boundaries initially proposed by the NLUDMP 2020-2050. This is due to the incorporation of participatory planning principles during the DLUP development. This participatory method led to adjustments that are supporting Musanze's vision. The following table provides remarks on the observed changes about the DLUP proposal vs NLUDMP 2020-2050 proposals.

Settlement	NLUDMP 2020-2050 directives				DLUP 2023-2050 proposals				
Type	Nbr	Area (2035) (km²)	Area (2050) (km²)	Pop in 2025 (2050)	Nbr	Area 2035 (km²)	Pop 2035	Area 2050 (km²)	Pop 2050
Musanze Secondary City	1	31	56	247,500 (450,000)	1	41.6	266,683	TBD	410,000
Remarks: The Secondary City boundary is bigger than the size recommended by NLUDMP 2020-2050. This was mainly due to the rapid development of the secondary city in recent years. The anticipated city development in 2035 could be reached sooner hence the increase in the city boundary. In 2035 revision, there will be analysis to increase the Secondary City boundary to 56 km ² proposed for 2050.									
Rurbans	2	N/A	8.4	53,000	2	10.6	72,939	TBD	93,000
The size of rurban boundaries is bigger than the size recommended by NLUDMP 2020-2050. This was mainly due to the rapid development of these rurban centers in recent years, where there is large scale migration of the population from rural settlements to rurban centers, In order to accommodate this population demand, rurbans boundaries have been enlarged.									
Total Urban areas	3	N/A	64.4	300,5000	3	52.2	339,622	TBD	503,000
Rural settlement sites	136	N/A	56	300,000	81	46.4	267,540	TBD	300,000

Remarks:

Regarding to the rural settlement sites, the number recommended by NLUDMP 2020-2050 has been reduced due to rural settlement sites which were planned in the area later affected by the expansion of National Park. While, other sites have been removed due to environmental constraints (high slopes, area prone to floods). The reduction in number of Rural Settlement Sites led to the reduction of area recommended by NLUDMP 2020-2050. In order to accommodate the future population urbans and secondary city boundary have been enlarged.

Table 15. NLUDMP 2020-2050 National directives vs Musanze DLUP 2022-2050 alignment

In 2035, a revision of the DLUP is recommended in order to reassess settlements, potentially leading to adjustments in the size or number, either by increasing or decreasing them as necessary, while taking into consideration the NLUDMP 2020-2050's flexibility on proposal of 10% change in settlement boundaries.

4.2.3 Housing

Housing is the largest land consumer in every settlement. Therefore, future demands must be based on desired and sustainable housing typologies to accommodate the residents of Musanze District. Within this context, the size, model, and tenure of dwellings needed for 2050 is essential. According to NLUDMP 2020-2050, the spatial planning component linked to housing is driven by the following:

- Characterization of housing types in 2050 by spatial and architectural parameters;
- Correlation between housing types and settlement categories, for maximum suitability and densification;
- Assessment of the demands for housing types, based on population targets in each District;
- Measurements of land requirements for residential areas in 2050;
- Extrapolating the land requirements for residential areas to land requirements for entire cities;

The NLUDMP 2020-2050 recommends mixed-use housing development in which different functions such as residential, commercial, cultural, institutional etc., are blended in one building, block or neighborhood. This concept should be applied in both urban and rural areas. Further, a mixed-income approach is recommended whereby low, medium and high-income earners are settling within the same neighborhood to mitigate social segregation.

The NLUDMP 2020-2050 also takes into account the efficient and optimal use of land by encouraging the exploitation of the underground for transport facilities, cemeteries, industrial facilities, parking lots, business development infrastructure, offices and archives, etc. The NLUDMP 2020-2050 proposes five categories of housing to be considered by local-level planning to achieve the desired consolidation and agglomeration.

4.2.3.1 Existing Housing Typologies in Musanze District

The existing houses in Musanze urban areas generally have a basic typology, most commonly beehive-shaped, made of mud bricks and wooden poles, with thatched roofs and wooden construction. The following photos were taken during our field visits.

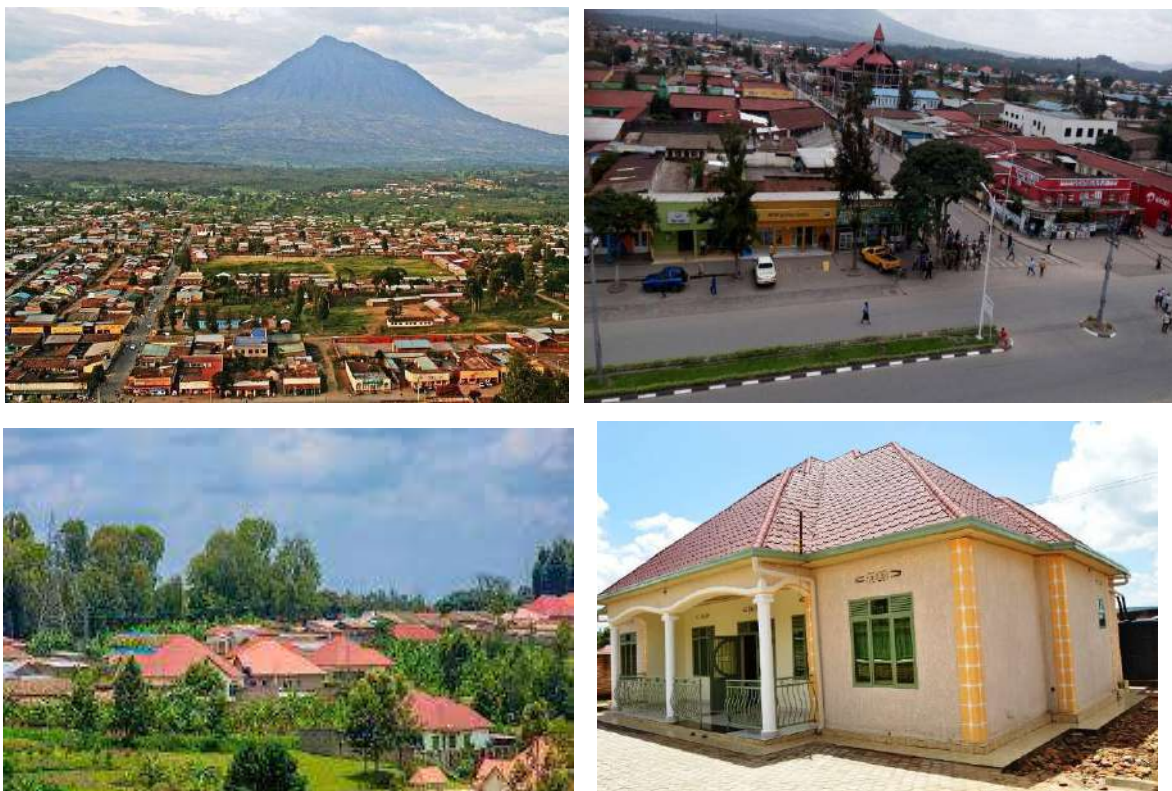


Figure 25 Housing Typologies in Musanze Urban Areas

Some of the key issues in Musanze's housing sector are:

- Low-density sprawl along proposed the Western Expressway, the NR8 and the road towards Kinigi.
- Developments are gradual, fragmented and not integrated with the existing infrastructure
- As urbanization takes place, there is a need to provide a variety of housing typologies, catering to various income groups.

4.2.3.2 Housing Stock

According to NLUDMP 2020-2050, In the year of 2050, Musanze District will host 200,750 dwelling units Whereby 112,500 dwelling units will be hosted in District town, 13,250 dwelling units in Rurbans and 75,000 dwelling units in rural settlements sites.

To comply with NLUDMP directives of dwelling units to be hosted in 2050, proposed dwelling units were calculated based on land allocated for residential zones in Urban, Rurban and rural settlements areas.

As highlighted in the table below in rural settlement sites, NLUDMP 2020-2050 planned 75,000 dwelling units in 2050 whereas Musanze DLUP indicates that the planned area has a carrying capacity to host a total of 143,660 dwelling units (Minimum density) which will be reduced further

in 2035 after observing the trends of progressive rural-urban migration due to employment opportunities.

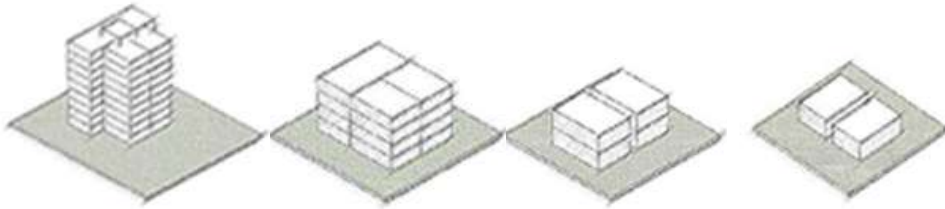
Settlement category	Number of DU by 2050 (NLUDMP 2020-2050)	Residential categories	DU carrying capacity during DLUP implementation by 2050				
			Area (Ha)	Number of DU (min. density)	Number of DU (Medium density)	Number of DU (Max. density)	% of Areas
Secondary City	112,500	R1	307.40	3,074	3,843	4,611	3.40
		R1A	368.49	7,370	9,212	11,055	8.14
		R1B	712.16	28,486	39,169	49,851	34.62
		R2	435.95	26,157	34,876	43,595	30.83
		R3	278.29	16,698	20,872	25,046	18.45
		R4	54.33	4,890	5,161	5,433	4.56
Sub-Total			2,157	86,674	113,133	139,591	100
Rurbans	13,250	R1		-	-	-	-
		R1A	236.6	4,732	5,915	7,098	26.74
		R1B	232.4	9,296	12,782	16,268	57.78
		R2	23.2	1,389	1,853	2,316	8.37
		R3	21.0	1,259	1,574	1,889	7.12
Sub-Total			513	16,677	22,124	27,571	100
Rural settlements	75,000	R1A	7.52	150	188	226	0.10
		R1B	3,588	143,510	197,327	251,143	99.90
		R2	23.29	1,398	1,864	2,329	0.94
		R3	4.22	253	317	380	0.16
Sub-Total			3,595	143,661	197,515	251,369	100
Total	200,750		6,265	247,012	332,771	418,531	

Table 16. Housing Stock/Proposed Residential zones and Number of Dwelling units

4.2.3.3 Musanze proposed housing typologies

According to NLUDMP 2020-2050, the following housing typologies are proposed to align with the settlement hierarchy:

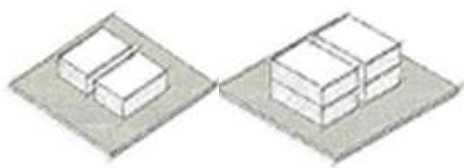
Musanze Secondary City: various housing typologies are proposed in order to facilitate the projected population and various income segments. **10%** of dwelling units are allocated within category A+ (low-density single-family housing), **35%** in categories A (medium-density single-family buildings), **35%** B (multi-family buildings), and **20%** in categories C and D (high density apartment buildings).



Byangabo and Kinkware-Kampara Rurbans: Different housing typologies are proposed to promote housing development in the selected centers. **52%** of the units are allocated in category A+ (low-density single family housing), **45%** in category A (medium-density single family housing), **2%** in category B (medium density multi-family housing), and **1%** in category C (high-density multi-family buildings).



Consolidated rural settlement sites: Within the planned rural settlement sites, **50%** of the units are allocated in category A+ (low-density single-family housing), and **50%** is allocated for category A (medium-density single family housing).



Densification Principles in Musanze DLUP 2022-2050

The following housing densities and zoning is proposed for Musanze District/Secondary City to achieve the required population density and accommodate the projected population.

Musanze Recommended Density, DU/Ha		
Housing Type	DU/Ha	Density
R1B-Residential	40-70 DU/Ha	Low Density
R1-Residential	10-15 DU/Ha	
R1A-Residential	20-30 DU/Ha	
R2-Residential	60-100 DU/Ha	Medium Density
R3-Residential	60-90 DU/Ha	
R4-Residential	80-120 DU/Ha	High Density
C1, C3, Commercial	Mixed use, City Level Commercial	

Table 17. Recommended Residential Densities in Musanze District

Beside single story or multi story, housing typologies are generally classified as single family or multifamily housing. To increase residential density, and enable effective use of land, an increase in the number of stories in combination with prescribing multi-family housing is often adopted. In line with the national zoning guidelines, various residential zones are proposed based on location, character, and scale of the residential area. Six residential housing categories and two categories of commercial zoning are proposed in the DLUP in order to accommodate an estimated population of 803,000 in 2050.

a) Low Density Residential Zone (R1)

The R1 zone is intended for single family housing, e.g. standalone villa or bungalow, and complementary commercial and public facilities as needed. The zoning is limited to existing consolidated areas with the objective of limiting low-density urban development and encouraging compact and dense developments. In all R1 zones, R1A regulations are permitted (see R1A). Maximum plot size is 500m². For plots bigger than 500m², existing developments can retain their use. For plots less than 300m², R1A regulations shall apply.

The maximum number of stories allowed are three (3) plus penthouse, equalling ground, first, second floor and penthouse (G+2+P). For single family use a density of maximum 15 DU/Ha is allowed. For mixed-use developments a density of maximum 10 DU/Ha is allowed.

In Musanze District, the R1 zoning is applied in Secondary City and urban centers to enable the exclusivity of low density residents in the DLUP implementation within a large plot of 500m².

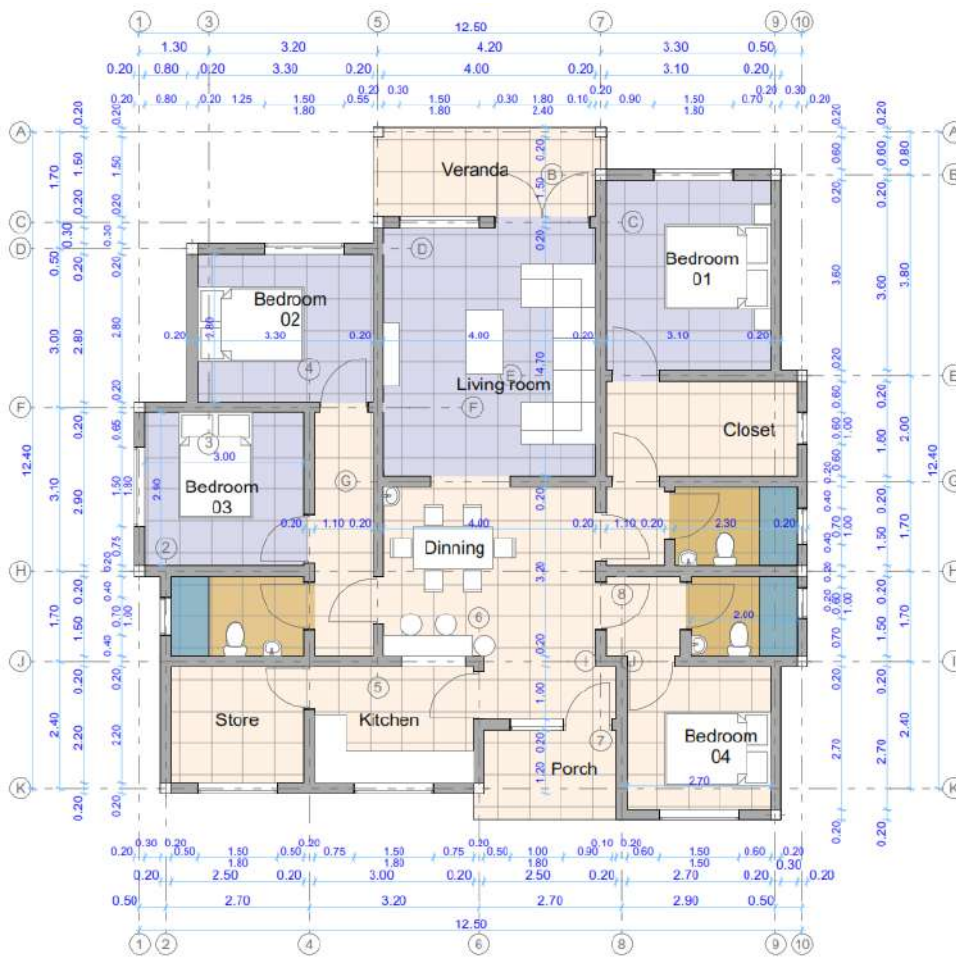


Figure 26: Illustration of housing typology in R1

b) Low Density Residential Densification Zone (R1A)

The R1A zone is intended for low density residential areas and low-density densification zones. The purpose is to promote more efficient use of land in prime locations of the urban areas by

allowing for intensification and mix of uses within the existing low-density housing development. Within the R1A zone, all types of single-family houses are allowed including stand alone, semi-detached, townhouses and row houses, as well as multi-family housing. In addition, complementary commercial and public facilities are allowed as needed.

Prescribed plot size, maximum 300m², is smaller than in the Low-Density Residential Zone (R1) to distinguish the R1A zone as a higher density low rise residential area.

The maximum number of stories allowed are three (3), equaling ground, first and second floor (G+2). For single family use a density of maximum 30 DU/Ha is allowed. For mixed-use developments a density of maximum 20 DU/Ha is allowed.

In Musanze District, the R1A zoning is applied in Secondary City and urban Center to enable the inclusivity of low-density residents in the DLUP implementation.



Figure 27: Illustration of housing in R1A

c) Rural Residential Zone (R1B)

The R1B residential zone enables compact developments in rural areas. The zoning is intended to offer low-rise housing as part of the farming community, and complementary public facilities as needed. The purpose is to create sustainable and compact residential neighborhoods in the rural areas of the city, limiting encroachment towards agricultural land or other land uses. Within the R1B zone, all types of single-family houses are allowed including stand alone, semi-detached, townhouses and row houses, as well as multi-family housing as per the IDP Model Villages. In

line with the NLUDMP 2020-2050 guidelines and zoning regulations, maximum plot size is 300m² for single family housing and 500 m² for multi-family housing.

The maximum number of stories allowed are three (3) plus penthouse, equalling ground, first, second floor and penthouse (G+2+P). For single family use a density of maximum 30 DU/Ha is allowed. For mixed-use developments a density of maximum 20 DU/Ha is allowed.

In Musanze District, the R1B zoning is applied in Secondary City , urbans and rural settlement site to enable the enclusivity in the DLUP implementation.

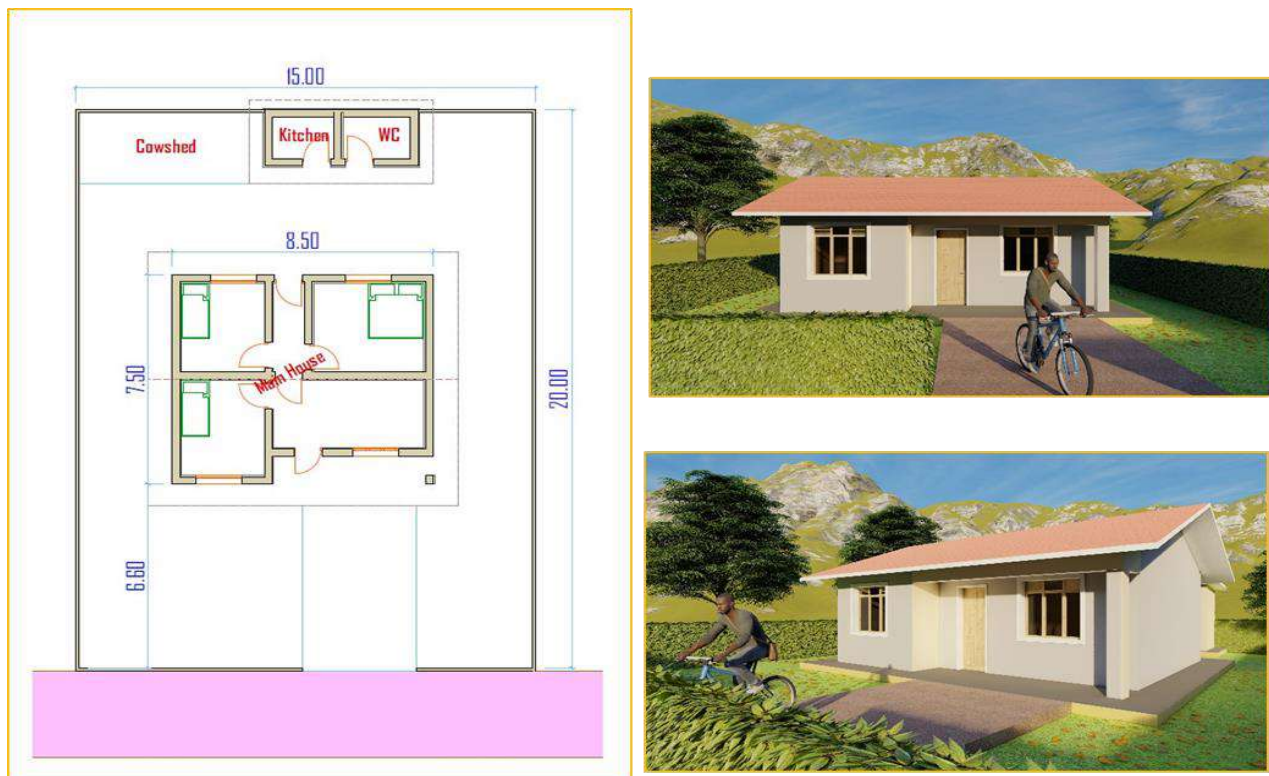


Figure 28: Illustration of housing in R1B

d) Medium Density Residential – Improvement Zone (R2)

The R2 residential zone is intended for upgrading of informal settlements or redevelopment of urban renewal areas, wherever feasible in brownfield sites. A variety in housing typologies and developments are encouraged, intended to stimulate the upgrading, redevelopment, and densification of these areas. Stand-alone single-family housing is however not allowed.

The objective is to improve the overall physical appearance of the area as well as improve living conditions for residents. By enabling upgrades in the short term, and redevelopment through land assembly in the medium-long term, developable land in prime areas of the city can be better utilized

to create integrated and affordable neighborhoods and provide adequate infrastructure and public facilities.

Within the R2 zone, multi-family housing as well as single family row houses are allowed. In addition, complementary commercial and public facilities are allowed as needed.

The maximum plot size for single family housing (rowhouse) is 200m². For apartment buildings, no maximum plot size is prescribed.

The maximum number of stories allowed are four (4), equalling ground, first, second and third floor (G+3). One (1) extra floor may be permitted if allowed by topographical conditions. For single family use a density of maximum 100 DU/Ha is allowed. For mixed-use developments a density of maximum 70 DU/Ha is allowed.

In Musanze District, the R2 zoning is applied in Secondary City and suburbs to enable the densification.

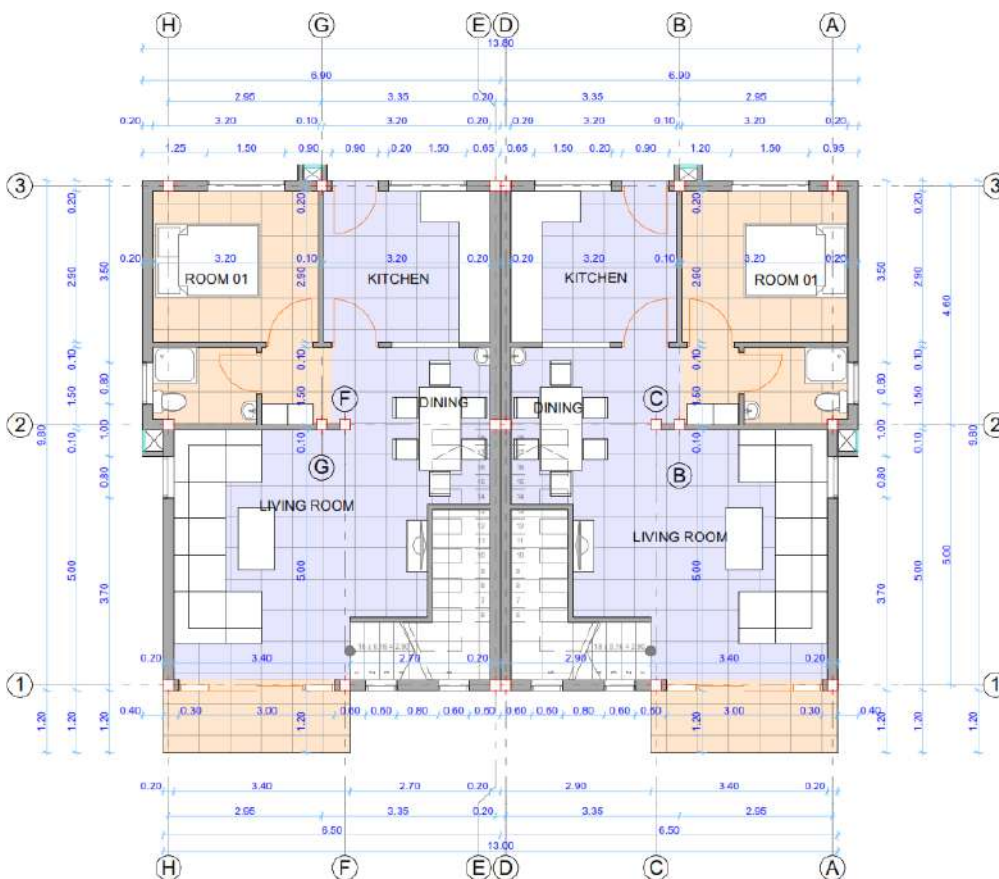
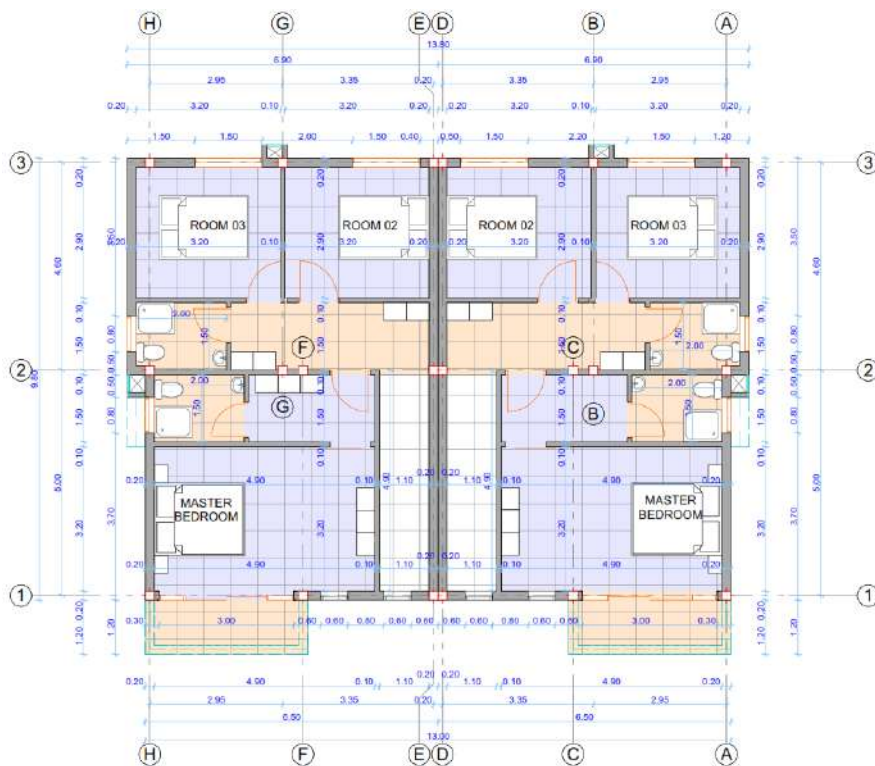


Figure 29: Illustration of housing in R2

Ground floor plan



First floor plan



e) Medium Density Residential – Expansion Zone (R3)

The R3 residential zone allows for densification and redevelopment of peri-urban and green field areas and a variety of housing typologies. The zoning is intended to stimulate development of low-cost incremental housing, to facilitate the provision of affordable housing dedicated to the low-income segment of the population.

To ensure a mix of use and mix of income, several housing typologies are allowed including self-build to cater for the lowest income segment. The R3 zones are located in peri-urban areas.

Within the R3 zone, multi-family housing as well as single family row houses are allowed. In addition, complementary commercial and public facilities are allowed as needed.

The maximum plot size for single family incremental housing is 100m², and 150m² for rowhouses is 200m². For apartment buildings, no maximum plot size is prescribed.

The maximum number of stories allowed are four (4), equalling ground, first, second and third floor (G+3). One (1) extra floor may be permitted if allowed by topographical conditions. For single family use a density of maximum 90 DU/Ha is allowed. For mixed-use developments a density of maximum 70 DU/Ha is allowed.

In all R3 Zones, R2 regulations are permitted.

In Musanze District, the R3 zoning is applied in Secondary City and suburbs to enable the densification .



Figure 30: Illustration of housing in R3

f) High-Density Residential Zone (R4)

The R4 residential zoning intends to create medium-rise housing and multi-family buildings (apartment complexes) with integrated commercial and public facilities, and open space. To promote high-density residential mixed-use neighborhoods with green character, the plot sizes are bigger compared to the Medium Density Residential Zone (R3).

Minimum lot size prescribed is 750m². For plots below 750m², R2 regulations shall apply.

In Musanze District, the R4 zoning is applied in Secondary City to enable the densification with the City.



Figure 31: Illustration of housing in R4

4.2.4 Urban Design

4.2.4.1 Identification of Key Nodes

On overlapping the initial two studies of identification of urban sectors and the previously identified urban areas, four major centers in the district have been established as centers exhibiting urban potential. These are Musanze Secondary City, Kinigi, Byangabo and Nkotsi. Each growth node has a thematic economy that focuses on providing a distinct type of service and trade that contributes to Musanze's socio economic growth.

a) Musanze Secondary City CBD

Musanze Secondary City CBD is the heart of Musanze District with existing public administration, government and public facilities such as the Musanze High Court, District Office, Agriculture Board, Police Headquarters, Musanze Stadium, Musanze Hospital and an airport. In addition, there are numerous commercial activities and outlets such as offices, banks, hotels and multiple restaurants, cafes and bars. Musanze Secondary City CBD has potential to provide employment opportunities in the private and service sector.

b) Kinigi

Kinigi is located around 8 km from Musanze city center. Kinigi hosts several resorts and hotels and a public market. There is also an RDB office in Kinigi. At the foothills of the Volcanoes National Park, the Kwita Izina convention ground is used for the renowned naming ceremony of the mountain gorillas. This makes Kinigi a potential node for tourism with major employment opportunities in the tourism sector.

c) Byangabo Rurban Center

Byangabo is located around 12 km from Musanze city center via the proposed Western Expressway (NR2). Byangabo has an existing thriving market, it is in close proximity to Rubavu and lies within the proposed freight corridor by Strategic Transport Master Plan for Rwanda (STMP) that connects to Uganda in the north-east. This makes it a potential trade and industrial node with major employment opportunities in the industrial sector.

d) Nkotsi

Nkotsi is located around 7 km from Musanze city center via NR8. Multiple educational institutes are located in Nkotsi and surrounds, such as Rwanda Military Academy, Nyakinama Military Academy, Rwanda Peace Academy, Musanze Polytechnic, and IPRC Musanze making it a potential education node with employment opportunities in the education sector.

4.2.4.2 Urban Design Area of Musanze Secondary City

The Urban Design Area of Musanze Secondary City includes the CBD, Kigombe Stream, the core urban area, the modern market, the agri-market, the bus terminal and any other zoning areas suitable for urban development, e.g. residential and commercial areas.

The sites were selected after interaction with Musanze Secondary City authorities and stakeholder consultations. Thus, each development within the Urban Design boundary provides an opportunity to develop the city center's-built environment. The urban design area measures about 106 Ha.

In terms of topography, the Urban Design Area is mainly flat with a small hillock to the south-east. The area is well connected to the rest of the city and to the district by extensive road network.

a) Urban Design Structure

To create an attractive and thriving urban realm, it is necessary for urban design to be people oriented. Along with addressing the city requirements, the Urban Design Area intends to increase tourism by:

- Diversifying tourism products;
- Providing Beyond-the-Gorillas experience;
- Curating the commercial programs through tourism.

The urban design proposal has two pivotal projects, the Integrated Lake Tourism Development and the Agri Food Park focusing on urban tourism and agro tourism by boosting nightlife and by

promoting the rich agro produce. The two projects are linked through multiple routes in the Urban Design Area. Each route lends a new experience to the visitors and residents alike.

Five major catalyst streets have been identified designed to integrate a lively public realm with the Retail Avenue, the High Street, the Market Street, the Food Street and the Green Connector. Every street is characterized by a unique experience of the city. The structural plan thus acts as an urban maze for tourists wanting to explore the local flavor and culture of the city at various times of the day.

Nodes, public plazas and landmarks at strategic locations will further improve the experience of the city center. A dedicated public transport corridor has been identified for smooth mobility in the city center. A bus park acts both as a destination and as a landmark. The elements combined create an image of the city.

The urban design structure caters to:

- Economic development through tourism
- Development of recreational spaces by activating natural assets like hills, forests, streams
- Development of public buildings like youth center and bus park
- Infrastructure upgrades through pedestrian and cycling friendly streets

b) Elements of Urban Design

The following are important elements of urban design to be considered in Musanze CBD:

- Parcellation plan;
- Ground floor use;
- Building edges;
- Public space;
- Parking and vehicular ingress and egress;
- Building setbacks;
- Building heights.

c) Streetscape Guidelines

Streets comprise the majority of the public space within cities, and form the backbone of the public space network in any urban area. Thus, it is crucial to pay attention to the design of these valuable assets and their contributions to the public realm. Walkable and bikeable spaces allow for more

interactions and exchanges among city residents. Proposing shared use and active streets in the urban design area will act as a pilot for future street developments.

The street design guidelines address the elements that form part of the street to establish accessibility, character, activities and functions of the street. Street elements such as greenery, shade, lighting, benches, footpaths, cycle tracks, and bus stops all add to the attractiveness of the streetscape. Public activities should be integrated to increase the level of activity within the streetscape, such as incorporating outdoor seating areas, selling points, play areas and parklets. Universal access is essential to ensure seamless connectivity and equal access for all. Non-motorized transport, i.e. walking and cycling, should be prioritized in all urban areas.

d) Urban Design Proposals

Along with street improvement proposals, new programmes have been proposed to create new destinations and offer a variety of choices for citizens and tourists to experience and enjoy the city. These projects will contribute to the brand and identity of the city.

i. Public Transport Corridor

The transport corridor mainly caters for high-density commercial developments and has a dedicated right of way for public transport. This to promote public transport, improve mobility, and encourage green and sustainable practices. A four-lane carriageway is proposed with dedicated bus lanes of 3.5m on either side. The walkway is envisaged to be expanded as per the availability of space, with the minimum width being 1.5m.

ii. Retail Avenue Street

Retail Avenue (NR4) is the spine of the Secondary City. It is one of the major entries to the city and thus acts as the face or image of Musanze. A constant ROW of 24 m is proposed for this street, with dedicated public transport lanes (3m) in both directions and with shops and offices lining the street. 1.5m wide bicycle lanes and generous walkways (6 m) allow for multipurpose uses and contribute to the city's public realm.

Apart from the public transport corridor, the retail avenue accommodates a dual carriageway with 3.5m wide lanes with a central green verge of 1.5m.

In addition, bus stops, designated seating zones, trees, street furniture and signages are proposed. The tree lined street will add an avenue character to the city.

iii. High Street

The street (NR4) has a public character, designed to promote local urban lifestyle and nightlife. Rue du Commerce has been enhanced as a high street as it has a high number of pedestrians. The surroundings can be redeveloped into multipurpose commercial zones with cafes, bars, pubs and restaurants flanking the street. The commercial activities in the ground floors are envisioned to spill over into the outdoors activating the street.

A 6m wide central public space and minimal vehicular traffic allows for flexibility and various activities. It can host temporary events, and at night time the lighting creates beautiful scenery. Both sides of the street will be flanked by buildings (built-to-edge) with 3m public space, of which 1.2 m are walkways and 1.8 m outdoor seating area. A bicycle lane of 1.5m is provided on each side.

iv. Market Street

This street adjoins the modern market and is envisioned to promote a street market of local art and crafts lending a local cultural identity. The area will help create lucrative opportunities in the field of arts and craft.

Street vending is not only necessary but also inevitable on urban streetscapes as they provide services to all visitors with inexpensive and easily available goods. Street side selling points are a characteristic feature observed along the streets of Musanze, thus housing them is prudent to create equitable integration of informal markets into the urban area.

v. Food Street

Beside diversity, street food has the potential to preserve and mediate knowledge and values of local culture and acts as a vitalizer of urban space. Interaction is an added value of street food and simple vending structures can provide opportunities to create new places and spaces to explore the city. Food can also act as a social catalyst and culinary experience.

Based on the five human senses, the Food Street is composed of visual impressions, smells, sounds, flavors and textures. It has the potential to significantly transform the city spaces, add to the urban recreational areas and play a key role in activating the streets.

A constant ROW of 15m is proposed for this street, with dedicated walkways of 1.5 m and 2.5 m wide multipurpose zones allowing food trucks and kiosks on both sides of the street. Since the street connects to the Agri Market and Food Park, it leads visitors into the culinary world of

Rwanda. The Food Street will also encourage innovations in local cuisine and street food and become a tourist attraction in the city.

vi. Green Trail

Attractive places have well-designed green spaces. The Green Trail is a non-motorized space adding to the city's public realm, giving priority to pedestrian movement by creating a continuous pedestrian network. It links the two projects of the Agri Market and Food Park and the Integrated Lake Tourism Development.

The Green Trail links various green spaces and landscapes to recreational activities by connecting to nature trails, urban hiking and observation points. Passing the natural features of the stream, the forest and hillock, the trail links the urban and natural environs. A continuous ROW of 3 m for pedestrians, 3 m for cyclists and a 1 m constant tree verge on both edges of the trail have been provided. The space will create a continuous urban park by way of the green trail.

vii. Agri-Market and Proposed Food Park

Musanze has the highest agricultural produce in Rwanda with a few specialty crops. By promoting agro-tourism and local flavors of Rwanda, visitors can experience the local culture and buy fresh produce from the colorful agri-market and carry this to the neighboring Food Park to experience a freshly cooked Rwandan meal. The space should be used to exhibit the specific agro produce of Musanze, for tourists and locals to buy and take home.

The Agri-Market is proposed to be refurbished to create a destination in the city. It adds to the network of public space and is intended to empower Musanze's women and youth. The Food Park is designated in a way to preserve stream biodiversity and the existing ecosystem.

A major portion of the site will offer outdoor seating and areas for recreation. Some areas will be semi covered and serve as food kiosks and seating for the Food Park.

viii. Integrated Tourism Development and City Gateway

The Gateway Plaza is located at the entrance of the city center and is one of the important public spaces in the city. There is a tourist center acting as an icon and creating a sense of arrival by introducing a new city landmark.

The Integrated Lake Tourism Project capitalizes on the redundant quarry and an artificial lake in the quarry. Utilizing the quarry lake by understanding the current use, a lake side tourism development has been imagined consisting of pubs, bars, cafes, wineries and breweries, casinos,

restaurants, adventure activities and mini resorts along with a well-designed lake promenade. Numerous trees, shrubs, and water features would add to the experience.

The disused quarry would create a new recreational space in the city attracting both residents and tourists. With the aim to diversify urban tourism products, this development will add to the existing attractions. The projects have potential to attract developing partners and to create synergies that will support economic viability of the local tourism sector and create jobs for the youth.

ix. Youth Center and Market

A youth center and improvements to the fruit market (Carriere) are proposed within the CBD to help youth, women, people with disabilities, and the local community to entertain and chaperon their mind through different activities that will be organized in that center.



Figure 32. Showing 3D design of youth center and Market

4.2.5 Musanze Green urbanization

In order to implement the National Green Growth and Climate Resilient Strategy (GGCRS), green principles should be key priorities integrated in planning of different land use categories. The two program principles under urbanization planning focus on employing an integrated approach to planning and sustainable land use management and Low Carbon Urban System that focus on promoting green efficiency in master plan and building designs to minimize carbon emission.

4.2.5.1 Existing Situation

Musanze District is located in the volcanic region. Climate change and disaster management requires to be mainstreamed as well as conducting risk assessments and vulnerability mapping to develop effective disaster management systems. Many cases of deforestation, erosion and soil degradation have been documented in Musanze.

Rainwater mainly channels in three perennial rivers called Muhe, Susa and Rwebeya. These perennial rivers are found with a lot of sediments and waste in them, mainly stones from highlands, soil sediments resulting from soil erosion caused by agricultural activities and organic debris from plants. This is triggered by the local use of wood as a source of energy by the local population. ‘

4.2.5.2 Planning Perspectives

A number of interventions must be implemented in the DLUP to guarantee that the NLUDMP 2020-2050 is environmentally sustainable in its execution. It requires that numerous policies and legal frameworks are reviewed and updated in parallel with the NLUDMP 2020-2050. Therefore, for a green urbanization the following are recommended:

- ✓ All urban developments must incorporate climate risk and low-emission strategies on all proposed activities;
- ✓ Promote climate-resilient human settlements and prevent informal settlements as well as upgrading the existing ones.
- ✓ All investment in the proposed urban areas should have integrated, resilient, reliable and sustainable infrastructure which will enable the District to adapt to climate change and function efficiently at the local level;
- ✓ All green infrastructure projects should be designed to complement gray infrastructure systems performing a combination of volume management, water quality improvement, and flood control;
- ✓ For all the urban developments, there should be identification and strengthening of the value of greenbelts and green spaces.
- ✓ All urban development plans and programs must support urban agriculture areas and programs to enhance food security in urban areas.
- ✓ Have the operators in the industrial parks that go for cleaner and greener production and support the zero waste economy and circular economy in their production activities.
- ✓ Ensure that industrial parks are well supported in green planning, green technology, and production practices.

- ✓ Ensure that Strategic Environmental Assessment (SEA) is undertaken for all land-use master plans to ensure their sustainability.

Water harvesting techniques in planned settlements are proposed, to reduce water runoff for erosion control and storage of natural resources as well as addressing the water shortage issues in the district.

Moreover, to the assistance of GGGI and REMA and other stakeholders, the district aspires to integrate the district's development plans to green growth and climate resilience measures to direct the district's growth in a green and climate-resilient manner, resulting in low-carbon urban development, disaster-resilient district, and increased green investment.

To improve the greenness of the district, the natural assets, including wetlands, forests and steep slopes, are extended and connected to form a seamless and continuous green network running throughout Musanze. They will serve as the backbone of Musanze, and are to be integrated in the concept plan as part of "Green Musanze" (GGGI 2021).

a) Urban Environment Street Design

i) Multimodal Street

It is expected that by the year 2050, 75% of the world's population will be living in the cities. Even though it is expected that car ownership will increase with economic growth, multimodal street designs will need to balance the demand for personal mobility, and access to the city economy.

According to the global street design guide, streets must be designed to serve different modes of transport, and provide multiple mobility options, including cater for NMT. This allows road users to have good access to different locations within the city.

The urban streets should be designed to accommodate a high number of pedestrian movements with less cars on the road. Even though space must be provided for private cars, a greater emphasis should be on the provision for NMT space, and public open space for outside seating areas etc. Vehicular speeds should be regulated to below 40 km/h with provision of warning signs to alert motorists of a high presence of pedestrians and cyclists. A reduction of private motor vehicles on the street has a direct link to reduced traffic congestion and production of greenhouse gasses.

Musanze District has the potential to develop a network of multi modal streets, which contributes to quality of life for residents and an increase in economic opportunities for business. Roads have

been selected based on their role in overall transportation network, traffic management, pavement conditions and drainage as noted in the 2016 RUDP study for Musanze.

The 2018/2019 Master Plan assessment proposed upgrades to the road network which were included in the 2050 assessment of the Musanze road network. Multimodal street infrastructure allows for accommodation of bus lanes, on-street parking, NMT space, trees, universal access with pedestrian ramps, and energy efficient street lighting.

ii) Cyclists Facilities

Musanze has a bicycle ownership of 8%, which is higher than car ownership (0.8%) and motorcycle ownership (1%). Provision of cycle lanes and cycle parking in the city center and at destinations will attract more usage of bicycles and promote Musanze to achieve green transportation.

iii) High Pedestrian Activity Zone

For areas like parks and at recreational facilities, a pedestrian only street is recommended. These streets will have a positive impact on the quality of life of the urban environment, and also provide a safe environment for NMT users with zero emissions of greenhouse gasses. The provision of pedestrian facilities, trees and greenery, benches, and street lighting, will increase the attractiveness of the space and sense of security.

4.3 Musanze Transportation Network

4.3.1 Existing Road Network

During the development of Musanze DLUP, the main approach for the road network was to retain existing local roads as much as possible and establish a clear hierarchy of the road network. The roads identified in the zoning plan are re-assessed and additional local roads are introduced to ensure access to all plots across the entire District of Musanze.

In case of the existing unplanned settlements with space constraints, where local roads are not possible to be provided, NMT linkages are proposed. While the recommended width of a NMT link is minimum 6 m, this may vary subject to ground conditions and feasibility.

According to the Rwanda Urban Development Project (RUDP, 2016 study), there are 356 roads with a total length of approximately 216 km within the urban boundaries of Musanze Secondary City. The roads can be classified as follows:

- ✓ Paved national roads (total length 26 km)
- ✓ Unpaved national road (total length 5 km)
- ✓ District roads (total length 10 km)
- ✓ Tarmac roads other than national/district road (total length 1km)
- ✓ Gravel/earth roads (total length 174 km)

4.3.2 Issues on Road Network in Musanze District

In the framework of developing appropriate proposals to improve the road network in Musanze DLUP, an analysis of road network issues was conducted. The following deficiencies and gaps were identified:

- ✓ On some roads, there is no formalized sidewalk. Lack of sidewalks in urban areas result in pedestrians being forced to walk in the carriage way, increasing the risk of accidents between pedestrians and motorists.
- ✓ Unpaved roads, resulting in potholes and poor road quality, causing inaccessibility especially during the rainy seasons.
- ✓ No provision for on-street parking in business areas, leading to illegal stopping and parking which affect the level of service of the road.
- ✓ Walkways need to provide universal access including pedestrian ramps to allow access for persons with impaired mobility.
- ✓ Some roads lack formalized intersection control, resulting in disruption of traffic flow. Improvement of road markings and signs can further contribute to making intersections safer.
- ✓ NMT areas should be separated from vehicular traffic with kerbs to mitigate mixing vehicular traffic, cyclists and pedestrians.
- ✓ The obstruction of sight without the provision of warning signs may result in fatal road accidents.
- ✓ During peak hours, illegal stopping of vehicles can negatively impact the level of service of the road network.
- ✓ Informal access to residential properties in high density areas should be formalized to improve accessibility and traffic flow.



Figure 33. Existing Road intersections in Musanze District

4.3.3 Musanze Proposed Transportation Plan

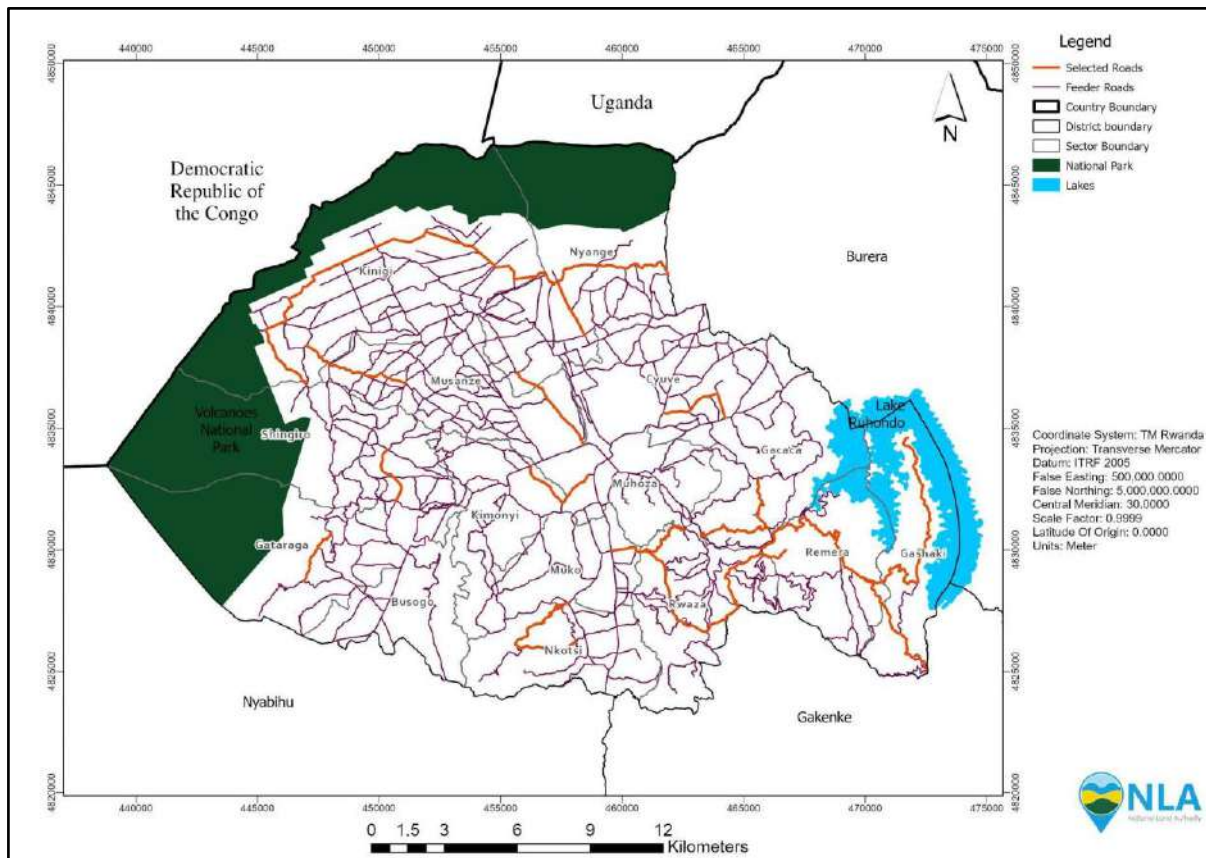
Formally, the Rwandan Public Transport Policy and National Road Code provides guidance in the establishment of the DLUP transport plan including road widths. The following table presents the road standards proposed for Musanze District in both rural and urban areas.

N°	Road Categories	Proposed Roads Width
1	National Roads	44 m (22 m x 2)
2	District Roads Class I	44 m (22 m x 2)
3	District Roads Class II	24 m (12 x 2)
4	Access Roads	12 m (6 x 2)
5	Service roads	9 m (4.5 x 2)

Table 18. Musanze Recommended Road network Classification

In Musanze DLUP, public transport is solely road-based transport. Furthermore, public transport is the main mode for motorized transport, while NMT is the most recommended mode of transportation. To improve accessibility at neighborhood level, it is necessary to provide public services and facilities to ensure an integrated and effective public transport system. This will result in the establishment of networks within neighborhoods connecting various zones and nodes through public transport.

A number of projects have been proposed by Musanze District to improve the overall condition and connectivity of the city and to cater for the urban and rural transportation demand of 2035 and



Map 14. .Proposed feeder roads in Musanze District

Larger trucks require more space due to their size, weight, and turning movements. Most urban streets should not be designed to accommodate larger trucks, but there should be an efficient road network for transporting and moving goods primarily outside of the city center. However, where larger trucks have to be accommodated, the street design must have sufficient space to allow movement of larger trucks. Smaller trucks, emergency and service vehicles can easily be accommodated in the existing street designs.

Deliveries should be limited to off-peak periods to minimize disturbance. In urban environments with high presence of pedestrians and cyclists, larger vehicle operating speeds must be limited to 30 km/h to minimize the risk of road accidents.

Fire trucks and emergency vehicles have access to dedicated bus lanes during congestion periods to minimize travel time and improve access to fire hydrants. Truck routes should have minimal impact on local residential streets, with potential disruptions like noise pollution, space requirements, and congestion.

4.3.4 Green Transport Promotion Strategies

Green transport means any mode of transport that is powered by an alternative power source, alternative fuel of physical human force such that, when in operation, it produces minimal or no greenhouse gasses. The benefit of green transportation is a reduced dependence on nonrenewable energy sources and decreased demand on fuel and gasoline. Greenhouse emissions from burning gasoline and diesel contribute to global warming and climate change. The health risks from pollution include increased hospitalizations and deaths. Numerous diseases are linked to air pollution, such as lung cancer, respiratory infection, and stroke and health disease.

In addition, an increase in public transport and NMT will reduce the number of vehicles on the roads and reduce traffic congestion. Compared with private cars, public transportation reduces CO₂ emissions by 45%, decreasing pollutants in the atmosphere and improving air quality. As electric rail travel and electric buses increase in use, the benefits to the environment from public transportation also increase.

For developing countries, it is expected that with an increase in wealth, there could be a shift from NMT to motorized transport. This means a shift from non-motorized transport to motorized transport.

To ensure that Musanze District has a sustainable transportation system, the existing culture of walking and cycling needs to be maintained and further encouraged through different techniques. The following key strategies and key performance indicators were developed for the green transport enabling strategy in Musanze District.

Green Transport Plan – Key Strategies	Key Performance Indicators
Develop a city-wide NMT network, which supports the public transport system.	Development of an NMT network
Develop a Non-Motorised Transport (NMT) network along arterial and collector roads	Inclusion of NMT in road hierarchy and cross-sections
Develop a strategic approach to providing pedestrian amenities, such as trees and street furniture.	Commission of road design manuals and guidelines

Develop a pleasant streetscape, especially along the NMT network	Inclusion of NMT in road hierarchy and cross-sections
Develop a well-connected NMT network that utilizes open spaces and the road network	Reservation of servitudes
Develop a pedestrian-friendly street design guidance manual for use in residential and urban commercial settings	Commission of road design manuals, transport legislation and guidelines
Develop a green network connecting green zones through NMT	Develop green network connectors

Table 19. Key Strategies of the Green Transport Plan

Green Transport Network Strategies consist of the provision of NMT infrastructure. The NMT network supports the public transport systems but also provides an independent transport system that should be comfortable and safe to use to encourage walking and cycling within Musanze District.

Attractive green infrastructure encourages people to walk, which will decrease the pressure on the road network. The importance of NMT networks, and ensuring that people continue to embrace a lifestyle of walking and cycling, is critical to the successful development and growth of Musanze. The NMT strategy must be rolled out to ensure that all collector and arterial roads have NMT facilities.

Walkways and bicycle lanes in areas such as schools, hospitals, public facilities and within the CBD should be prioritized. It is recommended that to improve all-weather roads accessibility, NMT infrastructure should be implemented. NMT routes should be implemented on the roads depending on available space. The NMT infrastructure must be universally accessible.

4.4 Public Facilities and Services

It is envisioned that with the implementation of the proposed settlement structure, access to public facilities and services will improve as these will be centralized and the services offered within consolidated settlements. The provision of facilities and servicing of sprawled settlements will be discontinued.

Furthermore, for any public facility, being in rural or in urban areas, zoning regulations are recommended to promote multi-story developments to enable efficient use of land.

4.4.1 Education facilities

4.4.1.1 Existing Schools in Musanze District

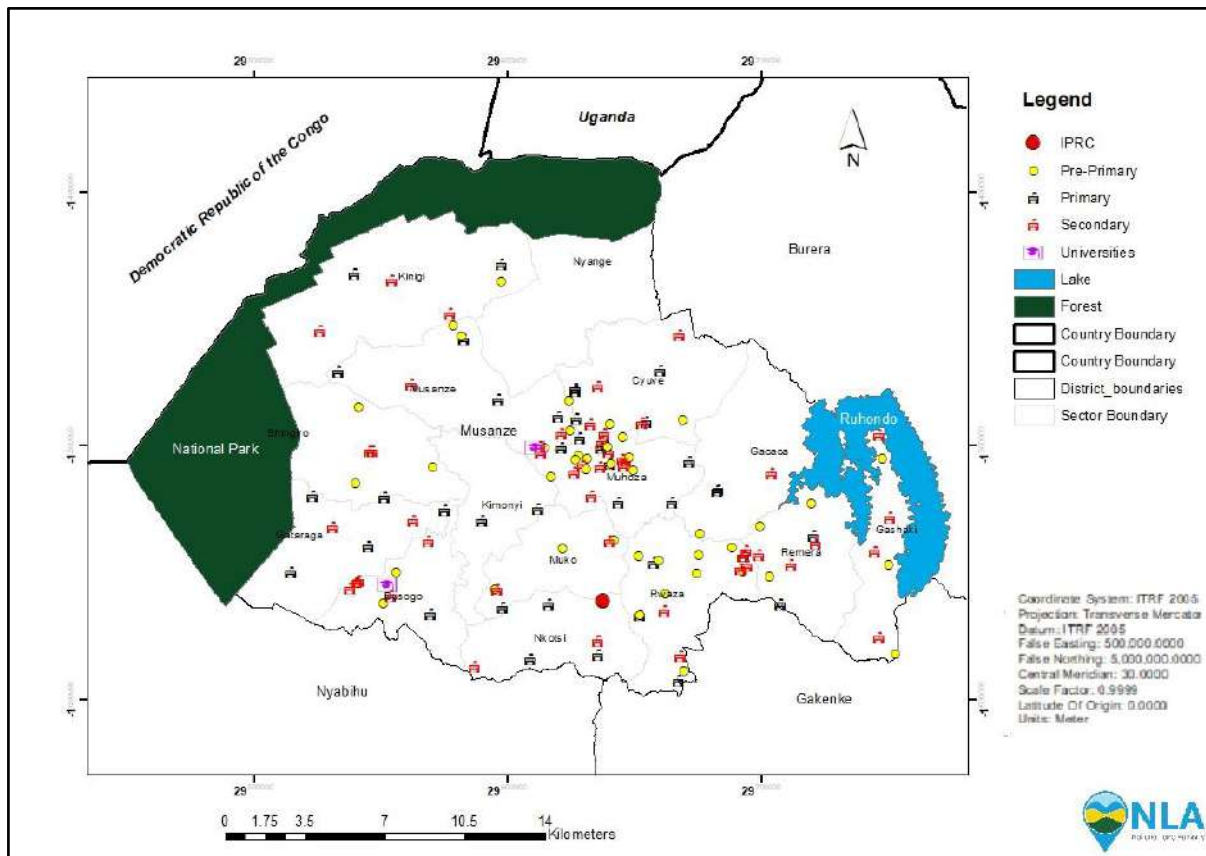
In Musanze District, the net attendance rate in primary schools is 92%. Similarly, in secondary schools, the net attendance rate is 31%. According to the Education Integrated Household Survey (EICV5) thematic report, the computer literacy rate among individuals aged 15 and above is 11.5%.

The promotion rate in primary school is 89%, and the repetition rate 10%. The promotion rate in secondary school is 91%, and the repetition rate 0.7% (EICV5).

There are 575 classrooms in Pre-primary, 1843 classrooms in primary, 686 classrooms in general and professional education, 161 classrooms in TVET. (2022/23 Education Statistical yearbook).

There are seven higher education campuses, among which four are public institutions including University of Rwanda, College of Agriculture and Veterinary Medicine located in Busogo Sector, Rwanda Police Academy located in Muhoza Sector, Rwanda Military Academy located in Muko Sector, and Musanze Polytechnic in Nkotsi Sector. INES Ruhengeri is located in Musanze Sector, and University of Kigali and Musanze Polytechnic are both located in Muhoza Sector are private higher learning institutions.

There is an increasing demand promoted by the Education for All public policy in both primary and secondary schools offering 9- and 12-years basic education. The number of dropouts is being minimized through the close cooperation between local leaders, parents, teacher associations and local NGOs. The following map is locating existing schools in Musanze District.



Map 15. School Accessibility in Musanze District

The high unemployment rate among the youth has prevented secondary school graduates from continuing their studies in higher learning institutions which have significantly decreased the number of students in the current decade (2012-2022).

4.4.1.2 NLUDMP 2020-2050 Recommendations in Education Sector

a) Nursery and Primary Education by 2050

According to NLUDMP 2020-2050, the following standards and parameters have been established for nursery and primary schools.

- ❖ Average class size: 35 pupils/class
- ❖ Average school size: 840 pupils
- ❖ Required size for a nursery school: 0.5Ha
- ❖ Required size for a primary school: 1Ha.

b) Secondary, Vocational and Technical Education by 2050

According to NLUDMP 2020-2050, the following standards and parameters have been established for secondary education, which will support the reform of quality and quantity.

- ❖ Enrolment rate will be 90%
- ❖ Average class size: 35 pupils/class

- ❖ Average school size: 840 pupils
- ❖ Required size for a secondary school: 1.5Ha
- ❖ Required size for vocational and technical school: 2Ha

4.4.1.3 Proposed Schools and Future Guidelines in Musanze District

In the preparation of Musanze DLUP for the 2050 horizon year, there will be an increase of students with direct impacts on existing schools for the whole Musanze District. There is a serious demand for new classrooms for both primary and secondary schools. Jointly both public, FBO, NGOs and private sectors must be aware of such a situation to urgently respond to this future demand. According to the statistical projections, the following tables reflect the increase in numbers of schools up to the year 2050.

The projection of education facilities will be applied to the total population with RPHC5, 2022 and 2022/23 Education Statistical Yearbook. The calculation of schools needed to accommodate all school-age children to implement the Education for all policy.

4.4.1.4 Projected number of education facilities in Primary education

Table 20. Needed classrooms for nursery education from 2022 up to 2050

Pre-primary education						
Description	2022	2030	2035	2040	2045	2050
Total Population	476,522	553,140	607,163	666,462	731,552	803,000
Nursery (3-5) years old	37,559	43,598	47,856	52,530	57,660	63,292
Existing Classrooms	575	-	-	-	-	-
Classrooms to be constructed for each planning period	498	173	122	134	147	161
Total number of classrooms at the end of each planning period	1,073	1,246	1,367	1,501	1,647	1,808
Total classrooms to be constructed (Cumulatively)	498	671	792	926	1,072	1,233

Sources: RPHC5,2022; 2022/23 Education Statistical Yearbook and NLUDMP 2020-2050

Considering the trend of population growth and number of children who would be aged 3-5 years old the projected information for Nursery level in Musanze District will need 1,233 classrooms by 2050 which will be necessary to reduce the overcrowding and promote early education for the children.

4.4.1.5 Projected number of education facilities in primary education

Table 21. Needed classrooms for primary education from 2022 up to 2050

Primary Education						
Description	2022	2030	2035	2040	2045	2050
Total Population	476,522	553,140	607,163	666,462	731,552	803,000
Primary (6-11) years old	67,139	77,934	85,545	93,900	103,071	113,138

Existing Classrooms	1,843	-	-	-	-	-
Classrooms to be constructed for each planning period	75	308	217	239	262	288
Total number of classrooms at the end of each planning period	1,918	2,227	2,444	2,683	2,945	3,233
Total classrooms to be constructed (Cumulatively)	75	384	601	840	1,102	1,390

Sources: RPHC5,2022; 2022/23 Education Statistical Yearbook and NLUDMP 2020-2050

Conferring to the projected results, this table presents the inadequate of classrooms in primary level from 2022 to 2050 as the population growth rises, there will be increase of children who joins the primary schools which implies that 1,390new classrooms will be needed in order to satisfy the standards of 35 children per classroom.

4.4.1.6 Projected number of education facilities in secondary education

Table 22. Number of Secondary schools needed up to 2050.

Secondary Education						
Description	2022	2030	2035	2040	2045	2050
Total Population	476,522	553,140	607,163	666,462	731,552	803,000
Secondary (12-17) years old	67,048	77,828	85,430	93,773	102,932	112,984
Existing secondary education classrooms	847	-	-	-	-	-
Classrooms to be constructed for each planning period in secondary education	1,069	308	217	238	262	287
Total number of classrooms at the end of each planning period	1,916	2,224	2,441	2,679	2,941	3,228
Total classrooms to be constructed in secondary education (Cumulatively)	1,069	1,377	1,594	1,832	2,094	2,381
Required TVET Classrooms (60%) (Cumulatively)	641	826	956	1099	1256	1429
Required General secondary Classrooms (40%) (Cumulatively)	427	551	638	733	838	952

Sources: RPHC5,2022; 2022/23 Education Statistical Yearbook and NLUDMP 2020-2050

Referring to the table above, if the existing schools meet the NLUDMP 2020-2050 standards, i.e. 35 children per class and 840 children per school, there will be construction for new schools and extension of classrooms in different schools. This will need to build an average of 1,429 classrooms for TVETs and 952 for General Education by 2050.

4.4.2 Healthcare facilities

4.4.2.1 Existing Healthcare Facilities in Musanze District

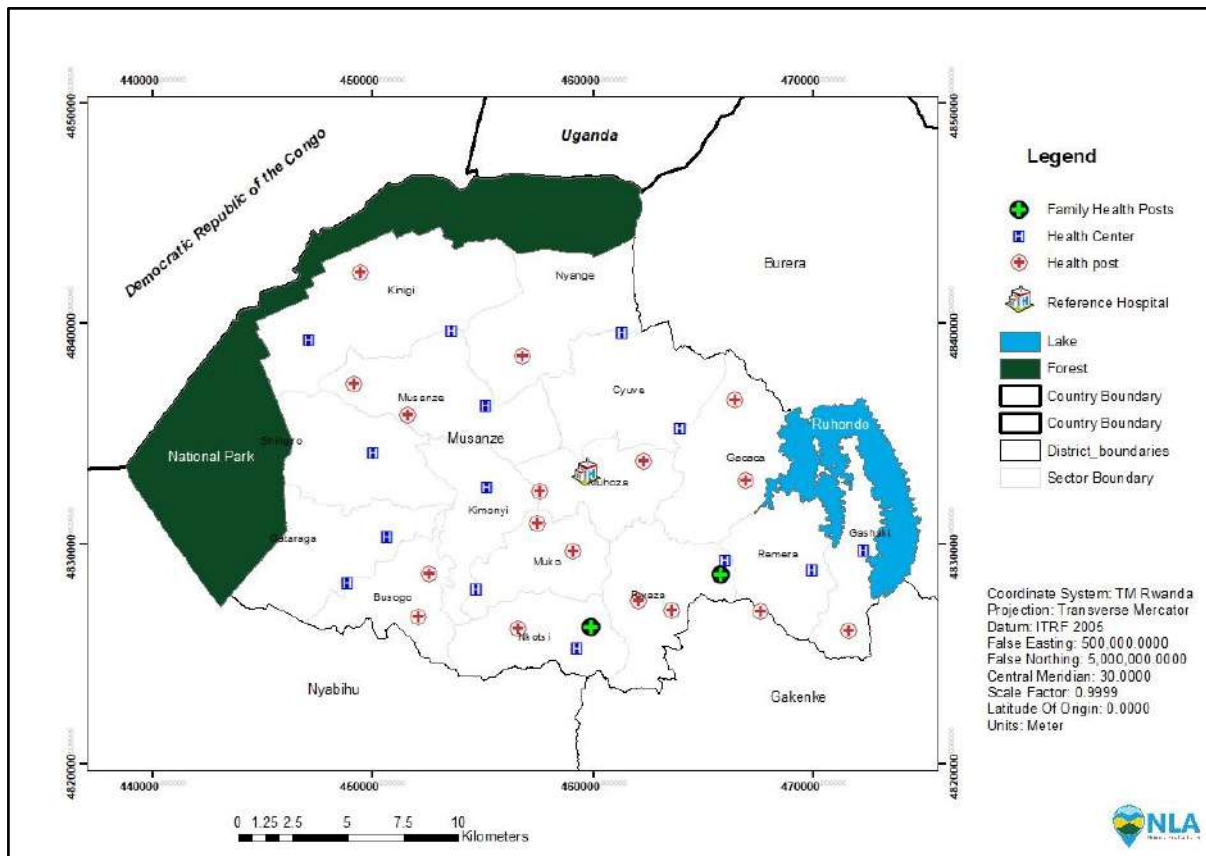
Rwanda's health system has witnessed several transformations and significant improvement. With over 84% of Rwandans insured by the Mutuelle de Santé, Rwanda has ensured that the citizens have access to primary health care, which aims to guarantee access for all to health care. Currently, the number of hospitals is 48, including 8 national referral hospitals, 4 provincial hospitals and 36 district hospitals.

There are various healthcare facilities evenly distributed throughout Musanze District. There is a District Referral Hospital (Ruhengeri Hospital) that is the front-line hospital with its own catchment area, with competence and facilities for providing secondary medical, in-patient and out-patient services.

There are 17 Health Centers in the District. Except for Cyuve Sector, which has two Health Centers, there is one Health Centre in each Sector. In addition, there are 32 Health Posts and 6 Health Clinics aimed to increase access to crucial primary care by reducing barriers such as cost, lack of insurance, and travel distance. A table of healthcare facilities in Musanze District is in the appendices.

Health Centers, Health Posts, Medical Clinic and Polyclinique are established to serve its local population in promoting health and wellness and also providing primary care, preventive care and pharmaceutical care to low- or no-income individuals in the community. Access to healthcare facilities within Musanze District is considerably good with more than 80% of its residents within 1 km of the nearest healthcare facility.

However, healthcare facilities in Musanze District are still insufficient considering its population growth and travel distance. There is also a shortage of skilled workforce in the health sector in Musanze District as this is the case at national level. The following map is locating existing healthcare facilities in Musanze District.



Map 16. Health Accessibility in Musanze District

The number of patients that Ruhengeri Hospital receives on a daily basis is high compared to its capacity. In addition, the hospital is old and in need of refurbishment as are the ambulances that need to be replaced. This is a threat to expectant mothers or sick people who would be required to be transported from their rural settings or walk long distances.

4.4.2.2 Proposed Healthcare Facilities and Future Guidelines in Musanze District

In the preparation of Musanze DLUP for the 2050 horizon year, there will be an increase of population with direct impacts on existing healthcare facilities for the whole Musanze District. DLUP recommends that new public healthcare facilities should be developed within urban and rural settlement sites boundaries in Public health facility zone (PF2), Residential and commercial zone).

4.4.2.3 NLUDMP 2020-2050 in line with Healthcare Services

According to NLUDMP 2020-2050, the following health standards are proposed:

- ❖ Community healthcare organized in all clustered rural settlements sites
- ❖ Health Posts (0.06 ha each): 81 for future proposed Imidugudu sites
- ❖ Health Centers (0.2 Ha each): 30 (2 in each Sector of Musanze District)
- ❖ District Hospitals (2 Ha each): 2 in Musanze District

- ❖ Referral Hospitals (4 Ha): 1 in the District
- ❖ For any new healthcare facility to be built within urban and rural settlement boundaries vertical construction should be mandatory.

4.4.3 Public administration facilities

4.4.3.1 Existing Public Administrations Services in Musanze District

In Musanze District, the decentralization policy has been implemented since 2000 with the aim of improving efficiency and accountability in service delivery. Strategies to achieve this was to ensure empowerment of local citizens and allowing them to participate in the planning and management of local affairs. The local governance system is regulated by a number of legal and regulatory frameworks. All these regulatory and strategic documents have put a great emphasis on the role of local population and local groups in fostering local development (governance and decentralization sector strategic plan by MINALOC (2018/19 – 2023/24).

Musanze District is categorized under local government and is divided into 15 Sectors. Additionally, these Sectors are divided into 68 Cells and lastly, into 432 Villages. All these subdivisions are headed by different people at every level and they all have different roles though directing towards the same cause.

These subdivisions have respective offices spatially distributed in each unless Villages. This decentralization is due to the willingness of service proximity and the improvement of efficiency in accountable service delivery. This positively impacts social livelihood.

4.4.3.2 Planned Public Administration and Future Guidelines in Musanze District

In the preparation of Musanze DLUP for the 2035 horizon year, the recommendations for decentralization of public services will be emphasized and implemented at local level for the purposes of citizen-based governance.

To improve public service provision in the future, there is a need to build offices for all villages, Additionally, the district, with stakeholders, to modernize offices for sectors and cells by developing a vertical structure within the current facilities' land to maximize land utilization while also accommodating all services required.

NLUDMP 2020-2050 suggests administrative transformation from a five-level hierarchy in 2020 to a four-level hierarchy in 2025. The administrative Village becomes redundant due to the decreased number of rural settlement sites. The administrative Cell will take over the functions of

the administrative Village.

As far as services are concerned, the constitution assigns executive powers to local government over services, often implemented in partnership with other government and non-government agencies. Only essential and primary services in health and education are within the responsibility of local organs.

At District level the planned services are planning and overseeing implementation of various plans, monitoring and evaluation, local economic development, construction permits issuances, environmental management, infrastructure and facility services.

At Sector level, services cover land related matters, civil registration and implementation of District plans while at Cell level the focus is on community organization for socio economic transformation.

However, some of the strategies to achieve sustainable public administration in Musanze District involve mainly continuous capacity building for all District staff and upgrading of Sector and Cells offices. Sector offices must be stored buildings whereas cell offices are single houses and supplied with all necessary infrastructure and utilities. However, additional facilities for public administration including multipurpose hall, village office etc will be planned during elaboration of the detailed physical plan in Musanze District.

4.5 Public Utilities in Musanze District

4.5.1 Energy Supply

4.5.1.1 Existing situation of energy supply

Energy will continue to be a basic requirement for urban and commercial development. Evidence shows a strong correlation between the increase in energy consumption and rise in income levels. Energy is central to Rwanda's economic ambitions and development plans as it supports all other sectors, including housing and urbanization, manufacturing, agro-processing, mining, tourism and IT. Hence, a well-functioning, efficient energy sector is vital for achieving the country's national goals.

It is anticipated that there could be a need for about 3,788MW and 13,981MW of energy capacity in 2035 and 2050, respectively. There will be a high emphasis on an adequate and stable supply of electricity for household and commercial purposes.

Vision 2050 sets out a clear path for Rwanda to achieve upper middle-income status by 2035 and high-income status by 2050. Energy will support the delivery of Vision 2050 by expanding affordable, reliable access to electricity to both citizens and industrial users, ensuring sustainability in biomass supply and securing supplies of petroleum. International experience has shown that economic development is difficult without a well-functioning energy sector, and without minimum levels of capacity and consumption.

The energy sector in Rwanda is made up of three sub-sectors: power, hydrocarbon and new and renewable sources of energy. Amongst the renewable sources of energy are biomass, solar, peat, wind, geothermal and hydropower. Biomass is the most commonly used and dominates both the demand and supply sides of the Rwandan economy. The following table is providing more information on potential energy contributions in the country.

Resource potential	Summary of current and potential energy contribution
Hydropower 313-400 MW	Hydropower has generated the bulk of electricity in Rwanda since the 1960s. Its overall potential is estimated at up to 400 MW, and the current installed hydro capacity is 98.5 MW. As a result of extremely low operational costs however, hydro is still one of the cheapest forms of generation in the long run.
Methane 140-180 MW	Kivuwatt, a 27 MW generation facility, has demonstrated the commercial and technical viability of extracting methane from Lake Kivu. Further utilization of methane resources is planned, with significant investor interest.
Peat 121-161 MW	A Peat Master Plan was first developed in 1993. Estimates of potential capacity have since been revised downwards from the initial 700 MW to 121 MW-161 MW in 2016. About 77% of the country's peat reserves are near the Akanyaru and Nyabarongo Rivers and the Rwabusoro Plains.
Geothermal (TBD)	Rwanda's geothermal resource is yet to be established. However, studies have identified Karisimbi, Kinigi, Gisenyi and Bugarama as promising areas, with potentially 47.3 MW of generation available from five

	promising sites. Further studies, exploration and test sites are required to confirm this. Following Karisimbi unfortunate results, a geothermal master plan was developed in 2015. The geothermal master plan provides potential estimates for each geothermal prospect area and gives a clear plan of priorities for the exploration of potential geothermal sites in the country. The potential was estimated at a maximum 100 MW for the country.
Solar Energy (TBD)	With a potential of 4.5 kWh per m² per day and approximately 5 peak sun hours, solar energy has a huge potential in Rwanda. Currently, Rwanda's total on-grid installed solar energy is 12.230 MW originating from 5 solar power plants namely Jali power plant generating 0.25 MW, Rwamagana Gigawatt generating 8.5 MW, Ndera Solar power plant generating 0.15 MW and the Nasho Solar plant generating 3.3 MW. The Government of Rwanda intends to increase the number of solar power plants to reduce the costs of production and take advantage of available renewable sources in Rwanda. In 2018, the Government signed a Memorandum of Understanding with Mara Corporation Ltd and SB Energy Corp from Mauritius to develop a 30 MW solar plant with a storage facility.
Biomass (TBD)	The current national energy balance statistics show that biomass (mostly wood fuel) accounts for about 83% of the total energy consumption, followed by petroleum at 9.7%, electricity at 1.3% and others at about less than 0.5%. In rural areas, the reliance on biomass is over 90%. Most Rwandans live in rural areas where traditional biomass, mainly wood fuel, has remained the leading source of energy for cooking. Biomass consumption is putting pressure on existing resources, with an estimated 870,000 tons' woody biomass deficit in 2009. Along with this, the use of biomass for fuel is having a harmful effect through health impacts and emissions. To rectify this, the Government is further developing the public sector forestry programs, has licensing for tree harvesting and is diversifying away from traditional wood fuel to look at other forms of biomass such as papyrus and rice and coffee husks, as well as biogas which benefits from the "One cow per poor family" scheme.

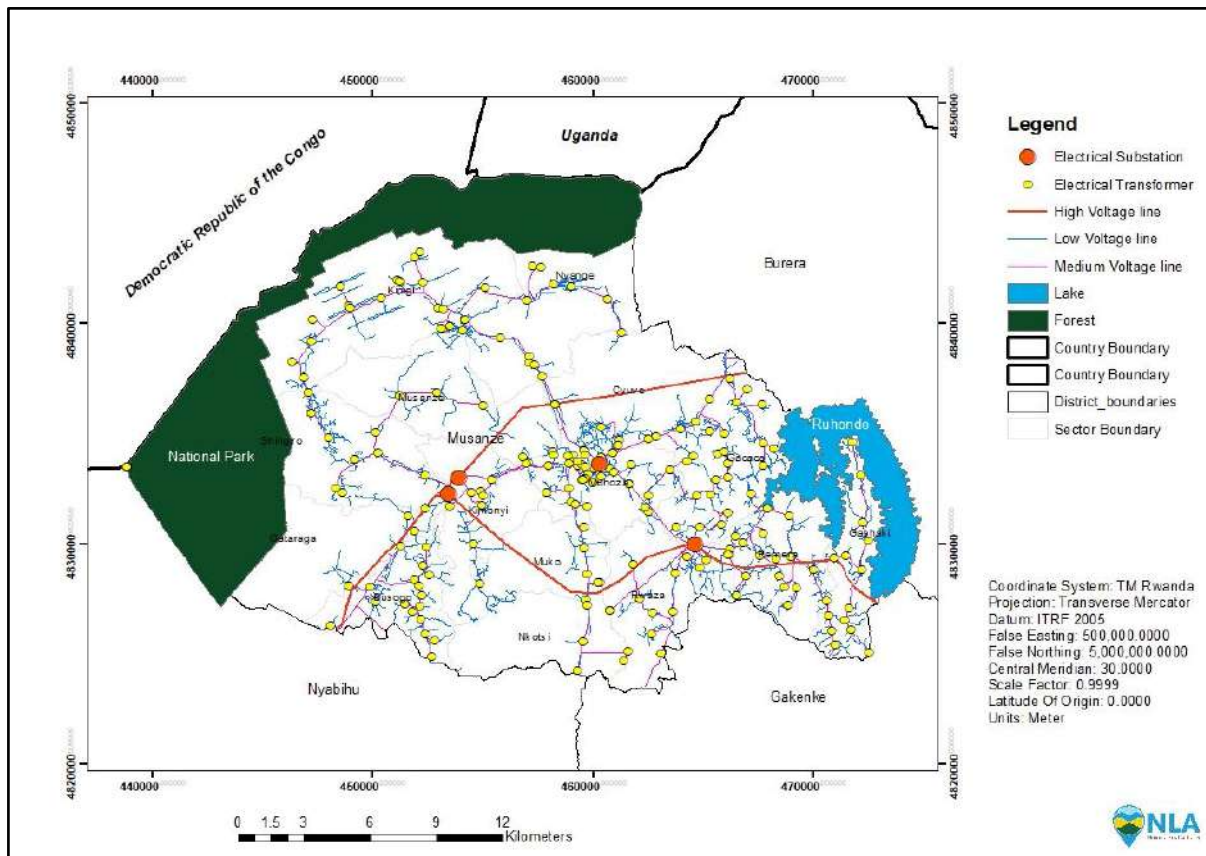
	The Government has put in place strict tree harvesting regulations; only licensed persons with permits are allowed to cut trees, including those from private lands. These measures have helped to reduce deforestation and Rwanda is one of only a handful of countries in Africa where the relationship between charcoal consumption and deforestation no longer exists, Government is to focus on alternative cooking technologies, biogas, LPG, Palettes and briquettes, etc.
Wind Energy (TBD)	Commercially viable wind power resources are not expected to be significant based on past resource assessments and modeling work. However, MININFRA will continue to assess the potential for wind to contribute to the overall power generation efforts

Table 223.. Summary of current potential energy contribution in Rwanda

4.5.1.2 Guidelines for future energy supply

There is a correlation between forecasting future energy consumption and GDP Annual Growth. The current trend of GDP growth of 8% corresponds to an electricity demand growth of 10%, and from the 140MW peak demand at present. According to Vision 2050, per capita consumption of energy will increase from 1,026 kwh in 2035 to 3,080 kwh in 2050.

As many people live in rural areas and in isolated and scattered rural housing patterns in hilly areas. A large number of people live in rural areas, with 70% living in isolated rural housing patterns in hilly areas. The main energy source for cooking is firewood (87.5%), which is also a major threat to the environment through deforestation and CO₂ emissions. In 2024, access to electricity for households in Musanze District is 77.1% including 66.4 % accessing on-grid electricity and 10.7% accessing off-grid electricity is according to <https://www.reg.rw/what-we-do/access/>



Map 17. showing electricity distribution in Musanze District

To enhance renewable energy use and align with NLUDMP 2020-2050 guidelines, stipulating utility provision solely for approved settlements, it's recommended to implement off-grid solar energy systems in dispersed settlements as an intermediate solution for Rwanda Universal Electrification's goal.

4.5.2 Water supply in Musanze District

Water and Sanitation Corporation (WASAC) is mainly responsible for supplying and managing potable water in the urban and rural areas of Musanze District. In some cases, operations and maintenance of rural water supply systems and schemes in different parts of the District are carried out by cooperatives, organized by the District. The Fifth Integrated Household Living Conditions Survey (EICV 5) assesses the current levels of service in Musanze District in terms of water supply.

According to Musanze District Statistics (Musanze, 2021), only 83% of the population have access to an improved water source, lower than the national target of 100%. In addition, the time taken to access an improved water source in Musanze is 9.7 minutes. 6.6% of households do not use their nearest water source because it either is too far or is not functioning.

Musanze Secondary City is supplied by two main water sources, Mutobo and Rubindi. There is one water treatment plant located in Gataraga. The design capacity of Mutobo Water Treatment Plant is 13,000 m³/day, after a rehabilitation project in the volcano belt funded by AfDB. After the water has been treated, it is distributed and stored in various reservoirs located in different parts of the district. The total storage capacity for the reservoirs is 10,220 m³.

4.6 Agriculture and Livestock in Musanze District

The vision of Musanze District is to become a Tourism Hub supported by agribusiness activities for socio-economic transformation. The aim is to build on and strengthen the capacity of the district as a tourism and agricultural hub, to be self-sufficient in food production with a surplus for outside markets and job creation. The district aims to increase agricultural production and productivity and establish agro-based industries for the processing of different agricultural products in the district.

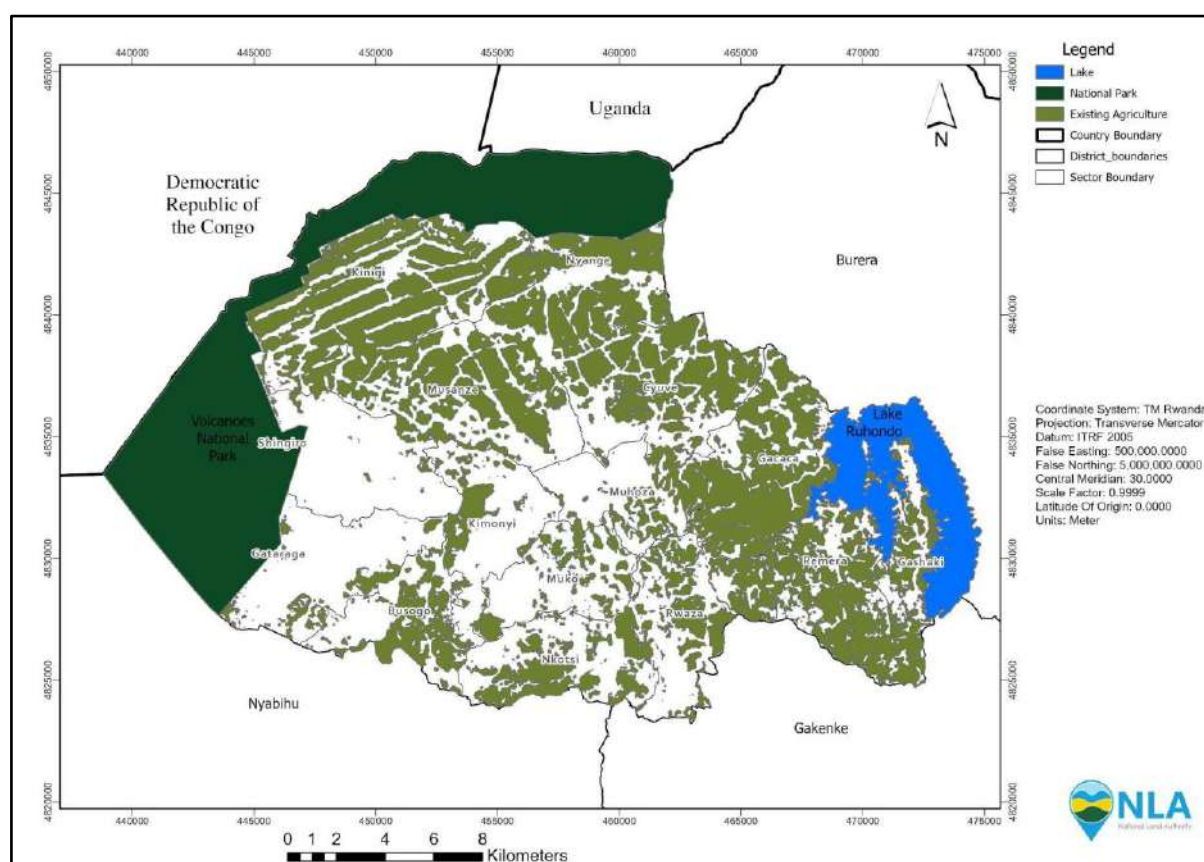
NST1 highlights that the agriculture sector has not yet reached its full potential and investments in climate-resilient techniques for farming, coupled with improvements in the value chain, are expected to yield significant future gains in growth, poverty reduction, modernization, and an increase of agriculture production. Agro-processing and horticulture are the subsectors in priority area that possess a high potential for growth and employment.

However, according to NLUDMP 2020-2050, the farmland in Rwanda will not be sufficient to feed an estimated population of 22.1 million in 2050. In a realistic scenario where, within 20 years, 80% of farmers are commercial and the consumption of livestock products rises to 10% of the diet, the farmland is still not sufficient, even if yields improve to best practices.

As per NLUDMP 2020-2050, agricultural land of 10,949 km² (41.6%) is to be protected and is to expand to 12,433 km² (47.2%) to achieve Vision 2050, and to satisfy the needs of future generations. Farmers should not be more than 30% of the projected population, only about 8% of the workforce will be employed in commercial agriculture, and agriculture should contribute less than 10% to the GDP. The average land per farmer ratio should be around 1.5 hectares in a consolidated form. Scattered settlements in agricultural land will gradually be eliminated by agglomerating the population in a national settlement structure, thus decongesting the agricultural zones and allowing for the use of technology in agriculture.

4.6.1 Existing Agriculture Land in Musanze District

Musanze District is categorized as Land Use Category B (LUCA B), meaning the land is suitable for agriculture but the land is scattered. Hence, there is a need for agricultural land use consolidation. A freezing strategy is suggested to stabilize the amount of both agricultural land and forest. Agriculture is by far the most common economic activity with 78 % of the workforce being involved in agricultural activities. The main crops in Musanze District are pyrethrum, Irish potatoes, maize, beans, wheat, and fruits where its production exceeds the national average. The following Map shows existing Agricultural land in Musanze District.



Map 18. Showing Musanze District Existing Agricultural Land

Agricultural land use of Musanze District	(.000Ha)			
	2024	2023	2022	2021
Total land area	50.9	50.9	50.9	50.9
Agricultural land	29.6	29.8	29.5	30.8
Arable land	28.52	29.1	29.0	30.4

Physical cultivated land	28.25	28.4	27.2	29.4
Area under seasonal crops	27.04	27.7	26.7	28.7
Area under permanent crops	4.52	4.2	4.1	5.1
Temporary fallow land	1.15	1.4	2.1	1.5
Temporarily meadow and pasture	0.43	0.0	0.2	0.2
Area under permanent pasture	0.25	-	-	
Percentage of agricultural land	58.2%	58.6%	58.0%	60.5%

Table 234. Agriculture in Musanze District

While the Rwandan government introduced land use consolidation to modernize agriculture, many farmers still hold onto their small plots.

Consolidated Land

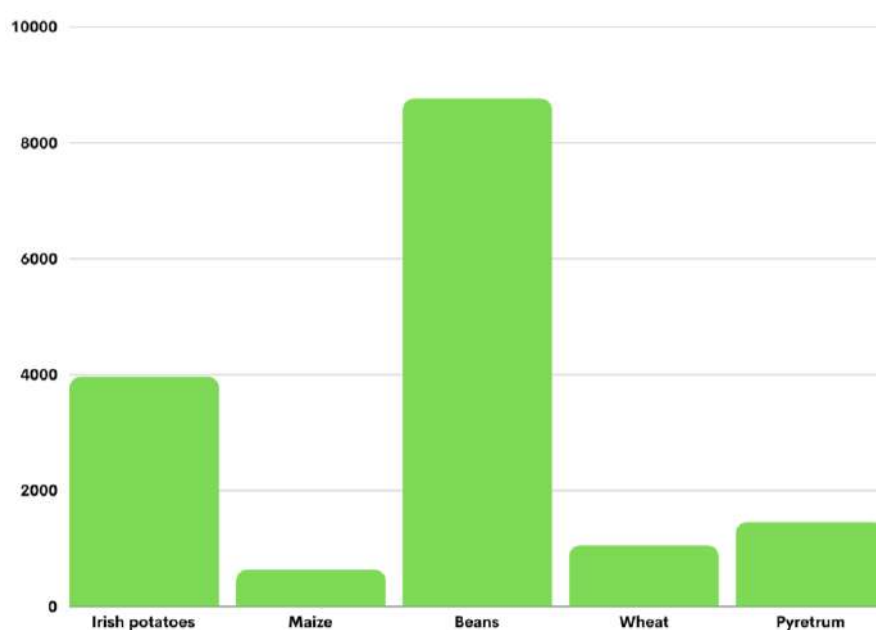


Figure 34. Showing Consolidated Land in Musanze District

4.6.1.1 Agriculture land Slope classification of in Musanze District

The hilly landscape of Musanze District offers a variety of terrains suitable for agriculture and development. With over a quarter (25.40%) of the district's agricultural land having a gentle slope (between 0% and 6%), it provides ideal conditions for farming. An even larger portion of the land (58.07%) has moderate slopes ranging from 6% to 30%, which is also well-suited for development activities. Steeper slopes, accounting for 14.31% of the district, can still be utilized for certain

purposes. However, a small area (2.21%) with slopes exceeding 55% is considered a sensitive environment and should be preserved.

Slope %	Area (Ha)	% of Land per Slope	Proposed Category
0- 6	5289	27.3	Gentle slope
6 -- 30	11256	57.9	Moderate slope
30--55	2663	13.6	Steep slope
>55	234.4	1.2	Very steep slope
Total	19442	100	

Table 24. Agriculture land Slope classification in Musanze District

4.6.2 Musanze Proposed Agricultural Land

4.6.2.1 General Description

The agricultural zone is meant to prevent farmland from being converted for non-farm uses, to prevent fragmentation of farms, to prevent land-use conflicts, as well as to protect agricultural producers from non-farm intrusion into agricultural areas. Development of rural communities is allowed in a zone only after land pooling processes are actuated to consolidate agricultural land and identify suitable locations for rural compact developments.

Regulations shall apply to all new, redeveloped, lots zoned or re-zoned agricultural uses within the Agricultural Zone (A)

4.6.2.2 Agriculture Development Factors in Musanze District

Many factors influence the development of agriculture in Musanze District. Today, in order to maximize production, most of the cultivated croplands and grasslands for commercial agriculture are in areas where local conditions for crops and livestock are determined. Some of the constraints of the factors that determine the location of agriculture can be overcome through modifications, but others cannot.

Most crops are grown on land with shallow slopes where the temperature, precipitation, and soils are favorable. Areas that are too steep, wet, or dry, landscapes should be modified to allow cultivation.

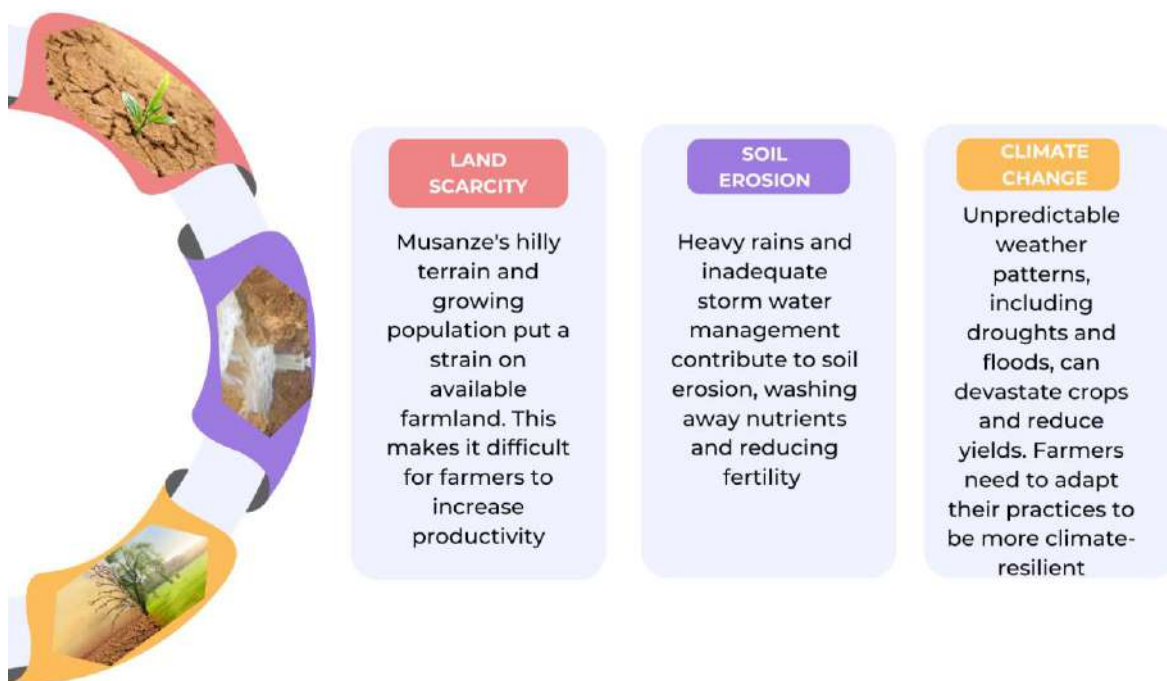


Figure 35. The major challenges in agriculture in Musanze District

4.6.2.3 The Contribution of Agriculture on Social and Economic Livelihood in Musanze District

In Rwanda, the most important activity of the population remains agriculture. Agriculture creates jobs and leads to economic growth. Farmers in Musanze, like in other Districts, practice traditional agriculture. There are different agricultural activities in Musanze District. In the Kinigi, Nyange and Musanze Sectors different crops grow in the fertile volcanic land.

Agriculture is crucial for economic development. Agriculture impacts trade in Musanze District as it is linked to other sectors of the economy, supporting job creation and encouraging economic development. Agriculture helps to reduce poverty, raise incomes, and improves food security. Healthy, sustainable and inclusive food systems are critical to achieve the district's development goals. In addition, agriculture provides raw materials for different products.

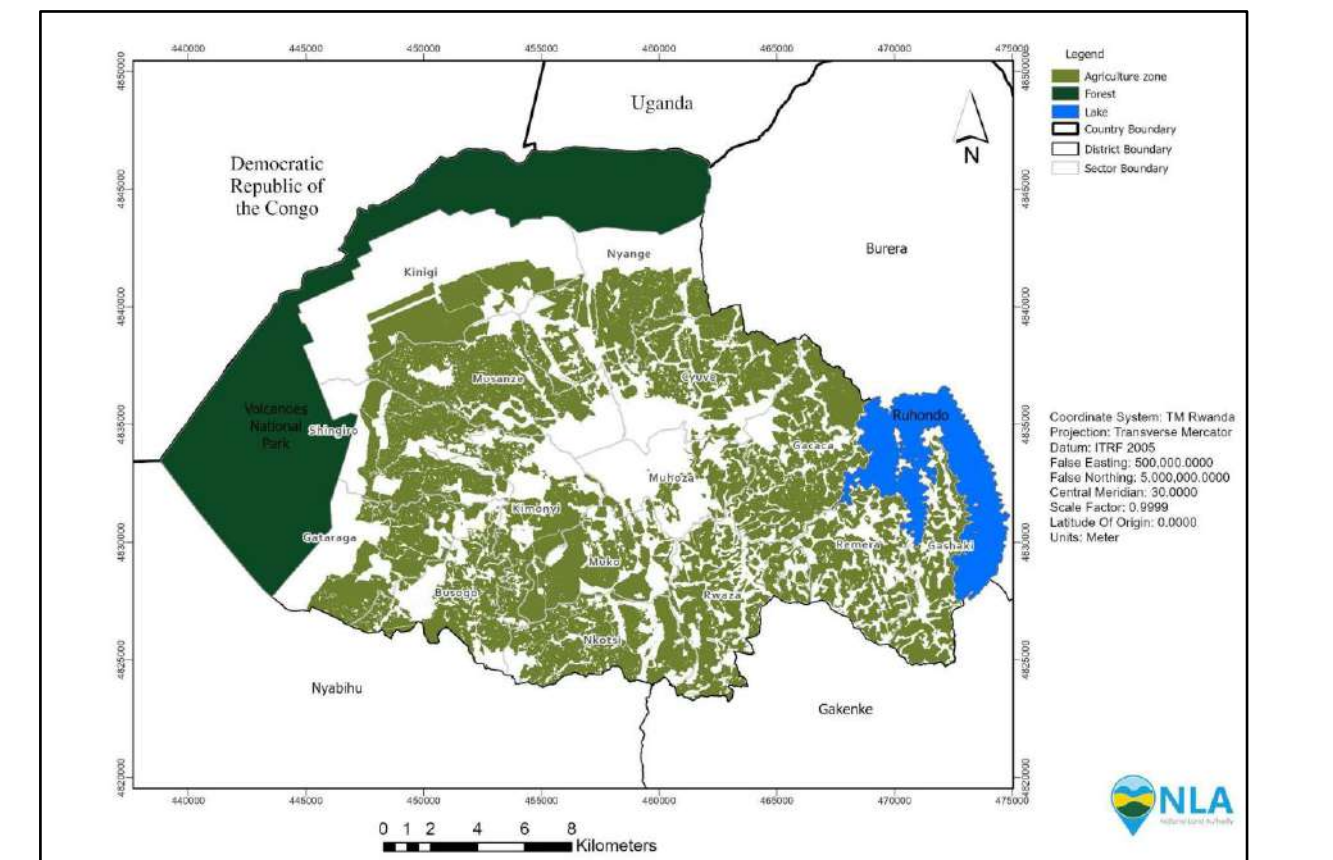
There are agro-processing industries in Musanze District that process maize, coffee, pineapples, bananas etc. But due to the increase in production, the industries are insufficient.

4.6.2.4 Planned Agriculture Development in Musanze District

The advanced food industry will be developed in the country based on strong linkages between commercial farmers and industries, urbanization, and trade. In 2050, agriculture in Rwanda will be market-led and high-tech, driven by a few professional farmers with large farms on irrigable lands. Yields will improve to the optimal international return.

The NLUDMP highlights that 30% of Rwandans will live in rural settlements by 2050, and 17.5% of employment will be engaged with agriculture, equaling 1.4 farmers per rural household.

The transformation of Musanze District will be influenced by commercial agriculture and agribusiness. Efforts for agricultural development should concentrate on the most suitable land for agriculture. The agricultural sector in Musanze District should be planned so that agricultural land is mainly used for food production for the local people, but in addition, commercial agriculture and agribusiness should be encouraged. Agro-processing industries should be developed to allow value addition to the abundant production of some crops like Irish potatoes, beans, bananas, maize, etc. During the development of Musanze DLUP, 36.3% of the entire district was designated as agricultural land. The following map shows the planned agriculture land use in Musanze District.



Map 19. showing Planned land for agriculture in 2050

4.6.3 Livestock

4.6.3.1 Existing situation of Livestock

Musanze district is home to a variety of livestock, with a significant number of cattle (34,384), sheep (35,005), and chickens (69,931). There are also a good number of goats (20,123) and pigs

(24,546) raised in the district, along with a smaller number of rabbits (4,524). This data suggests that animal farming plays an important role in Musanze's economy.

Given the substantial number of livestock in Musanze district, a significant portion of the land is dedicated to supporting them. This could involve pastures for grazing animals like cattle and sheep, as well as dedicated areas for growing crops to feed livestock that can't graze, such as pigs and rabbits. The government's focus on land consolidation for priority crops like maize and beans might indicate a delicate balance between food production for humans and animal feed. Initiatives to combat soil erosion through terracing techniques could also be crucial for maintaining healthy pastures and ensuring sustainable land use for both livestock and crops.

4.6.3.2 Challenges in livestock

- Competition for land for both residential and farming activities
- Low productivity: Due to factors like poor quality feed and traditional breeding practices
- Disease prevalence

4.6.3.3 Planning Perspectives of Agriculture and Livestock

Musanze district's agricultural and livestock sector is critical to the well-being of our communities. By prioritizing this sector, we acknowledge the essential role that farms and fresh food play in our prosperity. Local governments, regional authorities, and national leaders can all work together to establish policies that promote farm profitability and safeguard the health of our agricultural land. This might involve zoning regulations that specifically protect farmland and prevent it from being divided up for other uses.

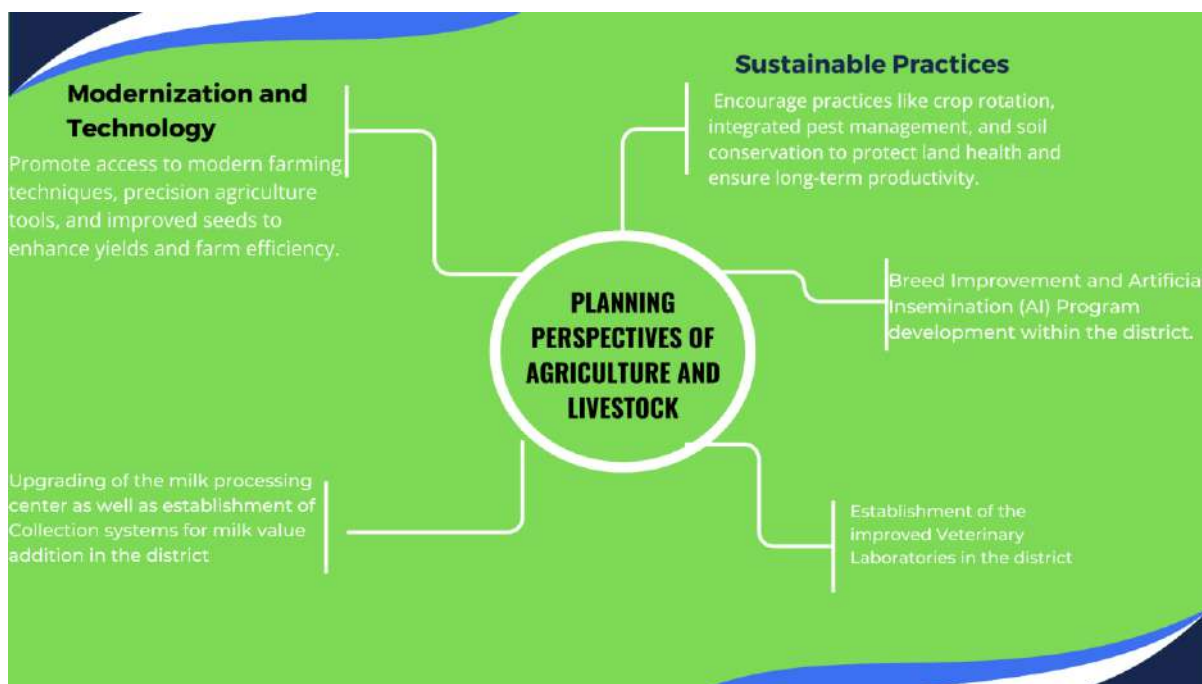


Figure 36. Planning Perspectives of Agriculture and Livestock

4.7 Environmental and Natural Resources

A healthy environment is a key prerequisite to enhancing quality of life, sustainable economic growth, and poverty reduction. Key in implementing the NLUDMP 2020-2050, is to ensure harmonization of land allocation for each sector while at the same time ensuring efforts in conservation of natural resources and their sustainable use. Increased public awareness of environmental protection and climate change resilience is key to ensure sustainable development.

4.7.1 Environmental Hazards in Musanze District

The main natural hazards in Musanze District are landslides and flooding. Around 23% of the district, especially in the northern region, is prone to high or very high risk of landslides, whereas flooding can be observed along Mukungwa River. Though a few previous epicenters of earthquakes lie in the district, the region is not prone to earthquakes. Thus, it is necessary to consider these areas wisely for resilient city planning and development.

4.7.1.1 Areas of environmental significance in Musanze District

Musanze District has rich and diverse natural resources like Ruhondo Lake, rivers, rich mineral deposits, mountains, volcanoes, forests and wetlands along with a diverse range of flora and fauna. The district is lined with 5 out of 8 volcanoes from the Volcano range and the Volcanoes National Park in the North, Lake Ruhondo in the East, Buhanga Forest, wetlands and hills in the South.

Four seasonal rivers Muhe, Susa, Mpenge and Rwebeya and one perennial river Mukungwa River flow in the district. 30% of the District is under these natural areas. Around 160 km², 19% of the land is under Volcanoes National Park, 6% under forests and 5% underwater bodies, rivers and wetlands. Rwanda's mountain gorillas (Gorilla Beringei) are found in the Volcanoes National Park, making Musanze District the most popular tourist destination in the country and in the region.

Buhanga forest has a high level of biodiversity and cultural significance. It hosts 83 bird species, three of which are endemic to the Albertine Rift. It is also a stopover for the African Pitta, a migratory bird species. The underground cave system is another geological natural wonder in Musanze. It has thus been observed that natural features of the District offer tourism opportunities.

4.7.2 Forestry

The Green Growth and Climate Resilience Strategy of Rwanda (GGCRS) states that “Rwanda does not have the land available to expand its forests and plantations, yet the majority of the population depends on wood. While proposing agroforestry that will provide wood for fuel, social protection and avoid deforestation. Agroforestry has multiple additional benefits, namely reduced soil erosion and increased resilience to heavy rains through improved slope stability; water management and nutrient recycling which improve agricultural production; and carbon sequestration.”

Sustainable forestry, agroforestry and biomass is therefore one of the Programmes of Action under the GGCRS. Controlled tree planting through afforestation, reforestation, agroforestry and urban tree planting initiatives provides wood for fuel, improves slope stability, supports food security, improves air quality, mitigates flooding and acts as a carbon sink.

There is no natural forest in Musanze urban area, as all forests are planted, most of them dominated by eucalyptus. The plantations cover a total area of 2,075 ha, equalling 28.5% of the urban area. Natural forests can be found in the rural areas of the District.

Most forest plantations within Musanze Secondary City are small and scattered. However 13 larger forest plantations have been identified:

Muhoza Sector

- ❖ Nyamagumba Forest (eucalyptus and cypress)
- ❖ Groupement forest (eucalyptus)
- ❖ Mubona forest (eucalyptus)

- ❖ Nyamuremure forest (eucalyptus and cypress)
- ❖ Mpenge forest (eucalyptus)

Cyuve Sector

- ❖ Cyuve forest (eucalyptus, arnus and greveria)
- ❖ Planted forest near landfill (eucalyptus)

Musanze Sector

- ❖ Musanze forest, (eucalyptus and greveria)
- ❖ Muhe forest (eucalyptus and greveria)

Kinigi Sector

- ❖ Forest around One & Only Hotel (eucalyptus)
- ❖ Forest (eucalyptus and bamboo)
- ❖ Forest around Rushubi School (eucalyptus)
- ❖ RAB forest (eucalyptus)

The density of forests in Musanze Secondary City is classified into four categories. Very low density (0-10%) covering 24.5 ha, low density (10-40%) which covers 36 ha, medium density (40-70%) covering 646 ha and high density (>70%) planted on 1,369 ha. High density forests are predominant in Musanze Secondary City with more than 65% of the forest plantation cover.

The urban planning for Musanze Secondary City should ensure that afforestation and agroforestry are given due consideration and provide modalities and ample space to facilitate achievement of both the GGCRS under the urban tree planting initiatives and the DDS targets. This will be achieved when urban agriculture is planned as its development is accompanied by an intensive agro forestry programme and for better results, the two should be integrated into one programme. This requires good management of the existing agro forests and continued support for people to access plant species that are of both ecological and economic value.

4.7.2.1 Proposed Forest Zones in Musanze District

The NLUDMP 2020-2050 advocates for the protection of environmentally sensitive areas. Thus, allowing Musanze District to protect certain areas as well as encourage or discourage certain types of development that may impact important natural resources dispersed across the District, especially remnants of native forest.

- Natural forest restoration should be implemented in Musanze District in line with existing regulatory framework and the strategies, guidelines and best management practices.

- Musanze One Stop Center shall ensure integration of afforestation and landscaping measures to ensure that, while allowing some degree of development, the overall design of the site respects, promotes and protects its forest component.
- Forest Zones are established to ensure sustainable use of land and resource management for sustainable economic development of the forests within the city towards health and well-being of the community. The intent is to conserve biodiversity, and to protect the ecological integrity and wildlife habitat of the areas for present and future generations, and to mitigate deforestation and encroachment.
- The Forest Zone shall be updated periodically and Forest Zone Regulations shall supersede other regulations if such regulations are in contrast with the Forest Zone prescriptions.
- Hillsides and steep slopes, above 55%, have been planned for afforestation to mitigate landslides and soil erosion. The zone is established to protect the steep slopes areas and non-developable lands for other strategic environmental purposes.

4.7.2.2 Volcanoes National Park

Volcanoes National Park (VNP) covers an area of 160 km² and is part of a unique transboundary network of protected areas in Uganda, the Democratic Republic of Congo, and Rwanda. Created in 1925 as part of the first national park in Africa, it hosts one of only two remaining populations of the endangered mountain gorilla endemic to the Virunga Massif. The Albertine Rift of East Africa, where VNP is located, is known for its high vertebrate biodiversity and endemism, the highest in continental Africa, and has been the focus of many extensive conservation efforts over recent decades. Through a concerted cross-boundary effort between Uganda, Rwanda, and the Democratic Republic of Congo, mountain gorilla conservation in this area has significantly improved.

The entire ecosystem consists of valuable flora and fauna with mammals, reptiles, amphibians, and arthropod species. In 2014, Lonely Planet lists Volcanoes National Park among the twenty best locations in all of Africa and similarly among the twenty best safari locations.

The Volcanoes chain is located in the Northern and Western Provinces of Rwanda, covering a total area of around 1,350 km². Five of the eight volcanoes of the Virunga chain are located within the District, namely Karisimbi, Bisoke, Sabyinyo, Gahinga and Muhabura.



Figure 37 .Mountain Gorillas in Volcano National Park

The Volcano National Park increased the tourism industry in Musanze District which generates income through job creation. Generally, people residing near the Volcanoes National Park, in Shingiro, Gataraga, Kinigi and Nyange Sectors, profit directly from different informal and formal activities linked to hiking or tourists visiting the national park.

Also, the tourism sector brings different business opportunities that generate income to people such as handcraft, trading, agricultural produce, investment in hotels and restaurants, and transport. During the focused group discussion, respondents identified tourism as one of the sectors which play a vital role in decreasing the unemployment rate in the district as youth are engaged in various job opportunities found in hospitality and tourism in general.

The National Parks Zone (F2) is established to protect the national parks and its biodiversity towards sustainability, health, and well-being of the community. The intent is to preserve naturally beautiful and significant areas, protect the ecological integrity of the areas for present and future generations, and to safeguard them from exploitation or encroachment.

4.7.2.3 Expansion of Volcanoes National Park

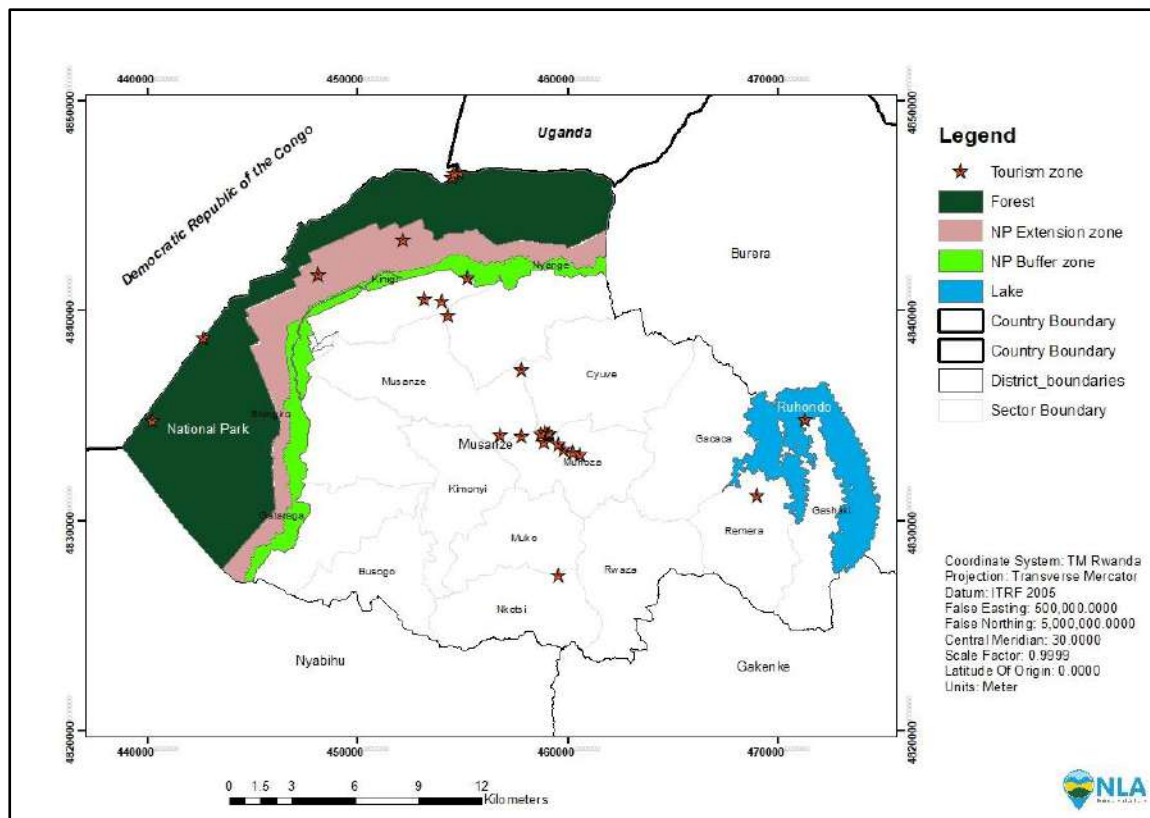
The Virunga Mountain gorilla population has grown over the past three decades, reaching approximately 1,004 individuals(gorillas) across three national parks in Rwanda, Uganda, and the Democratic Republic of Congo. This sustained growth led to their IUCN status improving from "Critically Endangered" to "Endangered." However, growth rates vary significantly among monitored groups.

In the Karisoke area of Volcanoes National Park, where research has been ongoing for over 50 years, density-dependent mortality is emerging. Growth rates declined from 4% before 2007 to 2% recently, with infant mortality doubling to 50% and adult male deaths since 2007 exceeding the total number from 1987–2006. Increased group density has driven more violent interactions, infanticide, group instability, and trauma-related deaths. It has also led to greater home-range overlap and fewer exclusive-use forest areas for each group.

The increase in numbers of mountain gorillas over the years has led to a unique challenge, the need to secure adequate habitat. The primary ecological concern is that this biodiverse park is small and isolated, with insufficient safe, suitable, interconnected habitat (space) for mountain gorillas and other wildlife species.

However, the area surrounding Volcanoes National Park is densely populated. Consequently, the viability of efforts to expand, maintain and restore habitat for gorillas' hinges on the support of surrounding communities.

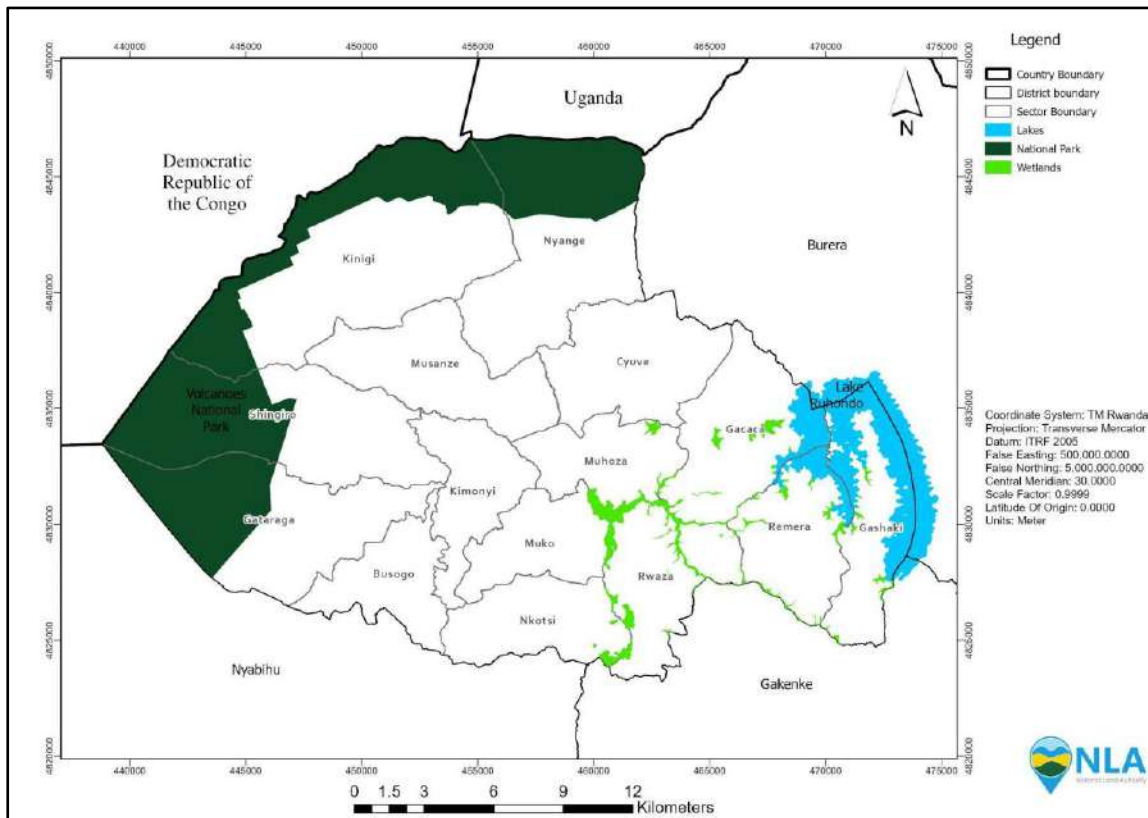
The efforts to expand the gorilla habitat need to incorporate equal investments to ensure people living around the park benefit from park expansion. This translates to involving communities in the park expansion plan process, providing housing and social benefits to communities affected by the expansion, and investing in inclusive green growth to create jobs and opportunities for people adjacent to the park. The park is planned to expand with 37.5 km².



Map 20. Volcano National Park and its expansion zone

The map (21) above shows the boundry of National Park, expansion and buffer zone collected from RDB. However, The boundary may change according to the ongoing Volcanoes National Park Expansion master plan that is elaborated by RDB. The Master Plan is aiming to detail the land uses within expansion zone. Volcanoes National Park Expansion Master plan will guide the implementation of land uses that will be planned inside the expansion zone.

4.7.3 Swamplands in Musanze District



Map 21. Existing wetlands in Musanze District

Wetlands, or swamplands, are limited in Musanze District due to its volcanic character. Mukungwa and Mpenge wetlands, with a total surface area of 34.9 ha, are located at the southern boundary of Musanze Secondary City in Muhoza Sector. They are used for fish-farming and farming of crops such as beans, sorghum, maize, sweet potatoes, etc.

A protected wetland zone is established in the plan to conserve the wetlands and protect the ecological integrity of its environmentally sensitive areas from non-sustainable exploitation, for public health safety and for general welfare. The intent is to control and sustainably guide the use of wetlands and its environs for social, economic, and cultural purposes. However, un-protected wetland will be used for agriculture under the guidance of authorities in charge of wetland management in Rwanda. The main objectives of the Wetland Zoning Plan are:

- ❖ To provide a clear direction to the enforcement agency to regulate activities within the wetland;
- ❖ To streamline regulations for all wetlands, identifying areas of importance for their potential conservation or sustainable use;

- ❖ To ensure synergism between the zoning assigned to the wetlands and designated zoning of surrounding built environment; and
- ❖ Identify strategic projects to be implemented within the wetlands and in synergy with the Implementation Plan of Musanze DLUP.

The proposed Wetland Zoning Plan adopts an ‘integrated approach’ that promotes conservation and rehabilitation of wetlands on one side and encourages wise use of wetlands in alignment with national development vision of a green growth. The Wetland Zoning Plan has classified wetlands into five zones as reflected within Musanze City Master Plan 2021.

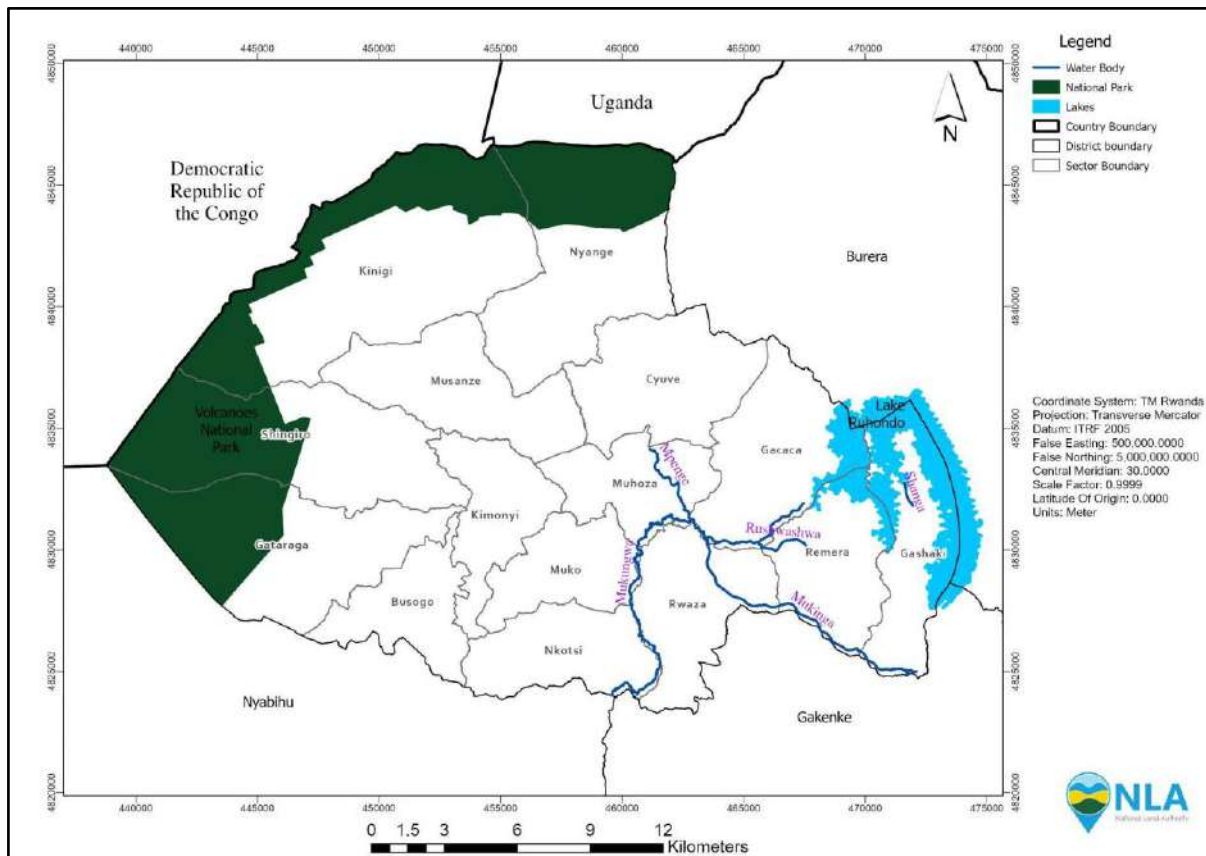
ID	Zones
W1	Buffer Zone
W2	Rehabilitation Zone
W3	Sustainable Exploitation Zone
W4	Conservation Zone
W5	Recreational Zone

Table 25. Wetland Zoning Classification

As a proposal, Wetlands and water bodies are protected as environmentally sensitive areas. For seasonal rivers and their tributaries, a 10 m buffer zone has been established. For wetlands, a buffer zone of 20 m has been established, 50m buffer zone for lakes and are proposed to be utilized as either forest, agriculture and ecotourism. These buffer zones are shown in the land use plan, as there are existing buildings within the proposed river row and buffer zones.

4.7.4 Water Bodies in Musanze District

The hydraulic network in Musanze is formed by temporary torrents and permanent watercourses. Torrents surge during strong storms, provoked by water coming downhill from the volcanoes. These torrents cause severe erosion, sedimentation and crop losses. The main torrents identified are Susa, Muhe, Rwebeya, Rungu, Cyuve, Kansoro and Mudakama.



Map 22. Existing water bodies in Musanze District

Musanze District is drained by two main permanent watercourses. There is the Mpemba River, having its source in Mpemba wetland in Muhaza Sector, and the Kigombe River having its source in Muhaza Sector in Kigombe wetland.

The District is also crossed by the Mukungwa River, which drains Ruhondo Lake located in Gashaki and Remera Sectors of Musanze District. These watercourses belong to the Nile basin, and they converge into the river Mukungwa, which, in turn, discharges into the Nyabarongo River, which is an affluent of the Akagera River.

The region is characterized by a lot of flooding resulting from high-speed runoffs due to the mountainous relief. The water mainly channels in Muhe, Susa and Rwebeya. These are found with a lot of sediments and waste, mainly resulting from soil erosion due to agriculture activities and organic debris from vegetation surrounding the rivers.

4.7.5 Mining in Musanze District

The Government of Rwanda recognizes that the mining sector has the potential to become one of the drivers of long-term sustainable growth through economic transformation, industrialization and

inclusive growth taking into account environmental and social considerations and using green mining techniques.

Rwanda is endowed with minerals such as cassiterite (SnO_2), wolframite $[(\text{Fe},\text{Mn})\text{WO}_4]$, colombo-tantalite $[(\text{Fe},\text{Mn})(\text{Nb},\text{Ta})_2\text{O}_6]$, gold, iron and gemstones such as amethyst, sapphire, and topaz. Other resources include quarry stones used in the construction industry such as amphibolite, granites and quartzite, volcanic rocks, clay, kaolin, dolomite, sand and gravel.

The exploration and extraction of coltan, cassiterite and industrial minerals and construction material will employ a large number of people, especially within communities nearby mining and quarrying concessions.

Musanze District has mineral and peat deposits. The resources majorly found are coltan, wolfram, travertine, cassiterite and volcanic stones.

Value addition and processing of mining products will be a major focus since they indicate high potentials for growth and employment. Mining can be a key sector for Musanze's development and is under development currently. It is essential to capitalize on the mineral deposits and quarries for mining development, and creation of mineral processing industries for creation of jobs and economic variation.

For now, the mining sector in Musanze District can be qualified as weak because:

- ❖ Weakness in inspection capacity to enforce good practice
- ❖ Lack of good practices
- ❖ A weak exploration licensing system
- ❖ Insufficient decentralized entities
- ❖ The mining sector is poorly developed.
- ❖ Participation of local financial institutions in direct investment in the mining sector.
- ❖ Environment destruction and degeneration

As per the zoning regulations, the following regulations apply for the mining industry development (13) in Musanze District:

- ❖ Permitted Uses: Mining, quarrying including clay extraction, brick making, operation and crashing activities, other mining related activities
- ❖ Prohibited Uses: Residential, commercial and major infrastructure installations
- ❖ Conditional Uses: Worker's accommodation, grocery shops and canteens
- ❖ Minimum Plot Size: Not Applicable

- ❖ Buffer from the nearest residential areas: mining and quarrying are required a buffer of 300m from the nearest residential areas or as may be defined by the City of Musanze One Stop Center (OSC)
- ❖ Environmental Impact Assessment: Required for all mining and quarrying activities

4.7.6 Waste Management in Musanze District

The amount of solid and liquid waste is increasing rapidly as a result of rapid growth and migration from rural to urban areas. The fast urban population increase has a significant socio-economic and environmental influence on solid waste management techniques.

The Rwandan goal is to provide 100% of the population with access to an improved type of sanitation system. Improved sanitation systems are considered to include flush toilets, Ecosan toilets and pit latrines with solid slabs.

In Musanze District, solid waste disposal is one of the most challenging issues. Efficient collection and disposal of solid waste is critical to protect the environment as well as the health of the population. In order to address these concerns an Integrated Waste Management Plan (IWMP) is required for Musanze District in both rural and urban areas.

Musanze District does not have a collective waste water disposal system. The current methods of waste water disposal in the District include on-site containment systems such as pit latrines and septic tanks. In most cases, when the pits are full, they are abandoned and additional ones are constructed. The maintenance of these facilities on a household level lies with the owner, in both rural and urban areas. All establishments are expected to treat their own waste water, however, this is not effectively done or monitored.

The Rwandan Government is currently planning a fecal Sludge Treatment Plant with a capacity of 60 m³/day. This facility will treat and safely dispose of the sludge waste collected from septic tanks. The treatment plant will be located approximately 8 km away from Musanze Secondary City, along NR17 towards Gakoro.

A landfill exists in Muhoza Sector, but its design and poor management do not meet the standards of a modern landfill. However, biodegradable waste is separated from non-biodegradable waste and used to produce organic manure by BIDECE (Bureau des Initiatives de Développement Communautaire).

The collection and transportation of solid waste in Musanze Secondary City is handled by licensed private operators. The community leaves their waste on road sides, which is then collected by trucks and transported to the dump site. Musanze does not have a properly designed landfill or waste treatment facility, but an existing dump site is located 5 km away from the town at Base Market. This dumping site is not properly managed and poses a health risk to the community and to the environment. Waste from the GOICO market (Gorilla Investment Company) is collected and transported to the landfill by a private company.

No centralized or semi-centralized sewerage system exists. A local beer brewery (Umurage) has its own disposal and located in the communities which may negatively affect their health as its management is not up to the standards.

Liquid waste from Ruhengeri Hospital and ESSA Ruhengeri may pollute Kigombe River, thus affecting Mukungwa River. Other premises that may affect the Kigombe River if waste is not properly managed include the Rwanda Police Academy and the agro-market commonly known as Carriere Market.

The existing framework of solid and liquid waste management in Musanze District is taken care of by the Infrastructure Department but there is currently no Solid Waste Master Plan or any other tool for Waste Management System for Musanze District. This is a serious challenge associated to the following negative effects:

- Lack of waste collection system leading to sanitation challenges at household level: inadequate compost;
- Lack of segregation framework of solid waste at their sources: solid waste mixture;
- Lack of solid waste collection and transport system in general;
- Lack of modern sanitary Landfill with recycling mechanisms;
- Lack of liquid waste management system;
- Direct discharge of sewage into water bodies - This not only contaminates the water quality, but also poses a threat to public health.
- Contamination of ground water by pit latrines - As the sewage infiltrates the soil, it needs time to be treated by the organisms and cations in the ground. Most of the contamination cases occur at areas with high water tables or near water bodies when the sewage has shorter retention time in the soil. Due to the density of development, this is more of a concern in urban areas.

Based on highlighted challenges, appropriate solutions and planning proposals were formulated during the elaboration of Musanze DLUP:

- 1) Musanze District is to develop a Waste Management Plan;
- 2) A “separation-at-source” programme, including public awareness, should be developed with supporting infrastructure, with the aim to educate the population on efficient methods of recycling (segregation at source for recycling and re-use).
- 3) Household collection issues: Collection is not aligned with the rate of waste generation. Transfer stations are required to reduce the collection time and increase frequency of collection. Intermediate waste management at transfer stations is recommended.
- 4) Waste collection vehicles: The types and sizes of collection vehicles are not always appropriate for the areas in which they operate.
- 5) Assessment of waste volumes, as well as its chemical and physical content and review the proposal for collection areas and routes.
- 6) Progressive phase out septic tanks in urban and rural areas and provide adequate sewer connections and treatment plants to control the problem of sewer discharge into water sources.
- 7) Progressive phase out of the pit latrines in Musanze District to assist in significantly improving the current water quality. Careful consideration needs to be given for the placement of pit latrines in order to minimize the associated risks.
- 8) Development of a sanitary landfill: The current informal dump site is to be formally closed, and a new sanitary landfill to be constructed. A landfill has been proposed to be constructed through Rwanda’s Sustainable Water Supply and Sanitation Program. The proposed landfill is located approximately 10 km from Musanze City Center along the road to Cyanika Border. The site has been identified but the land has not yet been acquired.

4.7.6.1 Waste Management Plans

The Central Government will regularly identify priority sectors of the economy that will be required to develop waste management plans in accordance with the principles of extended producer responsibility and cleaner production. This will be done within the new regulatory framework and will set clear guidelines for planning, including financing mechanisms, phasing out of harmful substances, measures to reduce disposal to landfill, and targets and timeframes for implementation.

The following are a list of key industries identified during the strategy development, with guidance for improved waste management, that will be prioritized for mandatory industry waste management plans;

Waste type	Guidance on how to reduce waste	Timeframe
Construction and demolition waste	• Waste reduction guidelines to be led by the Rwanda Green Building Organization • Green building certification requirements introduced for public building projects • Green procurement policies	Short to medium term
Agricultural waste	• Develop educational materials and guidelines for waste prevention in the sector • Waste sources with nutrients should be reused/treated • Farmers should be supported in determining the feasibility of biogas production through anaerobic digestion for possible onsite electricity generation	Short to medium term
Mining waste	• Establish regulations that require all mines to develop waste management plans, aligned to the duty of care principle. • Develop a monitoring and compliance framework to ensure plans are implemented and social and environmental impacts are minimized	Medium term
Wastewater treatment plant sludges	• Establish regulations for the safe handling, management, and disposal of sludge • Evaluate potential to incorporate sludge with organic waste treatment processes to enhance quality of products	Medium term
Hazardous and industrial wastes (e.g. paints and	• Aligned to the new integrated regulatory system for waste management (Section 5.2.1), all wastes to be classified and managed according to risk • Phasing out of hazardous substances and chemicals	Short to medium term

solvents, automotive wastes, pesticides)	in products using direct regulation and economic instruments to incentivize cleaner production • Introduce landfill bans for waste types that could be recycled/re-used • Extended producer responsibility/compulsory take back schemes for designated waste streams (e.g. tyres, batteries, CFLs)	
Electronic wastes	• Phasing out of hazardous substances and chemicals in products by incentivizing cleaner production processes • Extended producer responsibility/compulsory take back schemes for electronic products	Short to medium term
Medical wastes	• Promote practices and develop guidelines to minimize waste generated • Develop systems in hospitals and clinics to separate waste (segregating general and hazardous wastes) and promote environmentally friendly methods of treatment and disposal	Short to medium term
Nuclear waste	• Develop a policy and regulation framework for nuclear/radioactive waste management (Ministry of Infrastructure, 2016) • Finalize radiation law currently under development	Short to medium term

Table 26. Identified sectors and guidance - Industry Waste Management Plans

4.7.7 Stormwater Management

Musanze District is climatically located in a high rainfall area, with an average rainfall of 1,000 mm to 1,200 mm per month during rainy seasons. The heaviest rain period is from March to May, and the moderate rain occurs in the months of October and November. The storm water drainage system for the District is constructed and maintained by the Infrastructure Department of the District (One Stop Center).

In order to improve the drainage system, and to ensure that the buffer zones are correctly delineated, a more detailed stormwater master plan should be developed. The stormwater master plan should follow a planning approach which aims to minimize flood risk through on-site retention, improve the quality of discharge and to integrate the storm water infrastructure into the urban setting. It should be planned based on the following criteria:

- Removal of pollutant at source;
- Slowdown of stormwater runoff;
- Storm water retention;
- Stormwater reuse
- Beautification of the existing and future waterways.

According to the NLUDMP 2020-2050, the estimated water supply demand by 2035 is expected to be 30,334 cum/day, whereas the current capacity of Mpenge River and Kigombe Water Springs together is 12,500 cum/day. The deficit of 17,834 cum/day is proposed to be managed by augmenting the existing water treatment capacity and proposing additional reservoirs.

A drainage layout has been developed for Musanze Secondary City that will help prevent flooding within the city during heavy rainfalls. Further, the carrying capacity of each produced drainage system, and flood risk maps will be developed under detailed stormwater management studies.

4.7.7.1 Criteria to set for Musanze District Drainage Layout

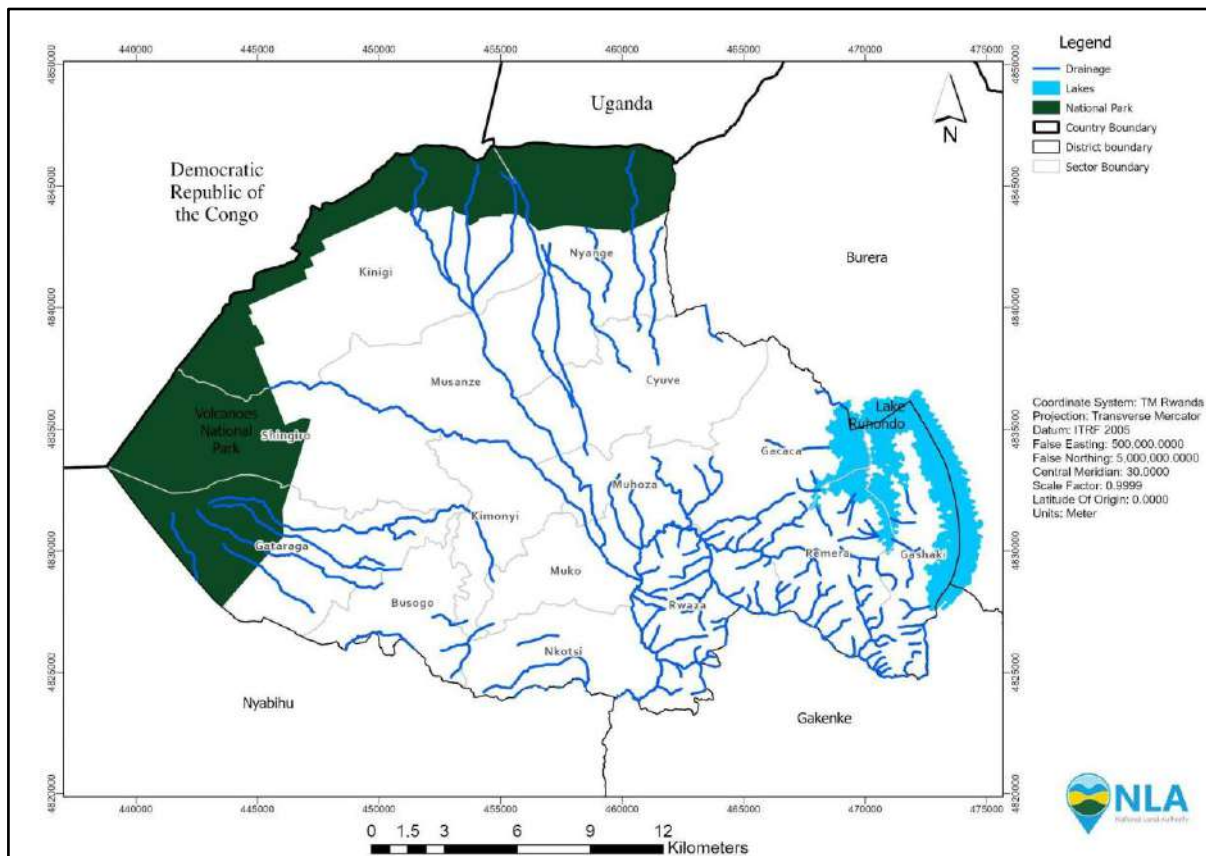
- **Topography:** based on contours lines, a drainage line was plotted. I.e., storm water in the drainage system will flow from high elevations to low elevations, thus following the topography of the land.
- **Existing road:** Drainage channels were set to the existing roads network to control water flow and flooding. This will minimize new excavations and land expropriation.
- **Natural drainage:** Water flows in natural drainage why all drainage channels were overlaid on existing flow directions and flow accumulations.
- **Land use zoning:** Residential areas were the focus when setting this drainage layout. Agriculture areas were not prioritized supposing water will naturally infiltrate cultivated areas.
- **Stream network:** All channels end at streams and rivers. This will ease discharge of stormwater without long or expensive channels.

- **Rain water harvesting:** Every house or drainage system will have a tank and pond to take its roof waters

The topography of Musanze District, with high elevation in Kinigi Sector and low elevation in Muhoza Sector, means the storm water will flow from upstream sectors to downstream sectors to join Mukungwa River.

4.7.7.2 Natural drainage analysis for Musanze District Drainage System

Natural streams were used to create channels to link to the natural rivers, thus reducing the length of drainage channels. The following map shows the natural drainage system.



Map 23. Musanze District Drainage channels

4.7.7.3 Planning proposals for storm water management in Musanze District include the following:

- During implementation of the drainage system, studies at a detailed scale are needed to add additional drainage channels in urban areas.
- It is supposed that all buildings in urban areas will have rainwater harvesting systems connected to the drainage channels to ease storm water collection.
- All drainage will follow the natural topography within the urban areas. No drainage channel should need excavation against the slope.

- Some adjustment will be needed before implementation to reduce the cost of expropriation that may be needed where drainage channels layout pass through key infrastructures.
- Detailed studies should consider and have a complete designation of inundation areas along major watercourses with regard to built-up areas, in areas suitable for building on according to the general land use planning documentation, or also in other areas for the purpose of determining the size of potential flood hazard areas.
- To delimit all areas exposed to flood hazard risk, including the regulatory provisions, using the prepared flood hazard and flood risk maps are mandatory for all development;
- A feasibility study is required to advise on stormwater management in low lying areas outside of Musanze Secondary City.

4.8 Tourism and Conservation

4.8.1 National Context on Tourism Industry

According to the NLUDMP 2020-2050, the tourism sector remains the top country's foreign exchange earner for more than a decade and is a major drive for Rwanda's economic growth, development and poverty alleviation. The Government of Rwanda has set tourism sector specific development strategies aimed at ensuring that it benefits local people and contributes to the national economy. This is clearly highlighted in the National Tourism Policy and the Master Plan for Sustainable Tourism Development.

The tourism industry contribution to Rwanda's economy has been increasing at a high rate due to the stability of the country and has been growing at an average rate of over 10% per year. The indirect contribution of tourism to Rwanda's GDP rose from 6.2% in 2017 to 6.8%, RWF 933.5 billion (US\$ 1,129.9 million) in 2018. The industry is projected to increase significantly to 12.5% of Rwanda's GDP in 2028 (WTTC, 2018). In total, the tourism industry's contribution to employment indirectly grew by 3.9% (346,500 jobs) in 2018 compared to 333,500 jobs in 2017. It is expected to rise significantly at 3.1% per annum, generating 469,000 jobs by 2028 (WTTC, 2018).

Tourism is recognized as an essential economic sector with huge potential to boost domestic economic growth and development, contribute to poverty reduction, job creation, export growth and prosperity through revenues generated from the tourism industry. The goal is to double tourism revenues and reach 800 million USD by 2024.

In order to achieve the above objective, there is need for proactive tourism product diversification including but not limited to key niche products with great potential for Rwanda namely adventure, birding, community-based tourism, and MICE tourism coupled with required soft skills in terms of guiding and storytelling to cater for travelers' expectations. Based on the vision 2050, the new tourism segments that will shape the future of the tourism industry shall include MICE, medical, education, water-based, adventure, and religious tourism. The projected 2050 contribution of each segment is shown in table below:

Tourism Segments	Expected GPD Contribution (%)	International	Domestic
Meetings, Incentives, Conference & Exhibition (MICE)	25%	20%	5%
Wildlife	20%	12%	8%
Cultural and Historical	15%	5%	10%
Religious	7%	3%	4%
Medical	5%	5%	-
Educational	3%	3%	-
Adventure	10%	8%	2%
Water-Bases Tourism	15%	8%	7%

Table 27. Tourism Contribution to the Local Economy, NLUDMP 2020-2050

In line with RDB's vision to diversify the tourism sector, all provinces based on their respective master plans or strategies would be required to develop tourism attractions and sites as well as encourage investments in areas beyond the current tourism hotspots.

Some areas of interest for tourism development will be subject to several factors such as environmental impact assessment, accessibility, and compatibility with other economic activities. Key tourism zones like national parks, islands and high-end zones for hotels and leisure will cover 3,500 km²(13% of the country surface).

The development strategy for Musanze District aims at ensuring the District becoming “An excellent center of tourism industry” with three goals; to improve attractive tourism sites, to promote sustainable agro processing, and promote sustainable basic infrastructure.

4.8.2 Existing Tourism Destinations in Musanze District

Musanze District serves as “*The Tourist Hub of Rwanda*”. The mountain gorillas, existence of cultural sites, natural features, flora and fauna, high-end ecolodges and hotels, and the existing aerodrome result in a flourishing tourism sector in the District. Around 41% of the tourists visiting Rwanda, visit Musanze District.

Musanze District has multiple tourist attractions that facilitate diversification of tourism opportunities. The potential to operationalize the Ruhengeri Airstrip as a tourism airport should be explored. Existing tourism opportunities and proposed tourism inserts are themed under four categories and are well distributed in the District. The themes being Nature, Urban, Agro and Cultural tourism.

A three-day circuit has been curated for Musanze District to provide varied tourism experience. The concept adopted for these circuits is to experience all the tourism. The presence of a number of bars, pubs, hotels, coffee shops and restaurants are very peculiar to Musanze District among the Secondary Cities. The bar culture and nightlife can be further strengthened in the urban design proposal.

The main tourist attractions in Musanze District include but not limited to:

- 1) **The Volcanoes National Park:** The main attraction is the habituated groups of Mountain Gorillas. The entire ecosystem consists of flora and fauna with mammals, reptiles, amphibians, and arthropod species.
- 2) **Lake Ruhondo** (one of the twin lakes): Lake Ruhondo and Lake Burera are separated by only 1 km of land and are considered as the most beautiful lakes in the Northern Province.
- 3) **Musanze Caves:** The most visited caves are the Musanze Caves with a two kilometers long section of the cave system developed for tourism with trails, walkways, stairs and other safety measures.
- 4) **Buhanga Forest and Eco-Park:** A hotspot for migratory birds with high biodiversity. This is a small forest covering about 31 ha termed as sacred, and it’s known for rituals by the Kings of Yore of Rwanda where enthrone and initiations for Kingship was done

- 5) **Red Rocks Rwanda:** Red Rocks is a social enterprise integrating tourism, conservation and sustainable community development in and around the Volcanoes National Park, campsite, and cultural center situated in a picturesque valley surrounded by rolling hills with a spectacular view of Volcanoes National Park.
- 6) **The Roots of Nyabingi:** A rural community offering activities including hiking, boat tours, a cultural center for local food, dance, bird watching and Ikirenge Cultural center, a historical site named in reference to the famous King Ruganzu II Ndori. Experiences include arts and crafts tours, performing arts and oral traditions, material culture, historical and cultural sites.

4.8.3 Proposals on Tourism Scheme in Musanze District

Existing tourism sites inspired new tourism opportunities are to be initiated and developed for further perspectives of the 2050 year. Priority actions are identified to build a professional tourism base in Musanze District including enlarge tourism baseline and set up additional leisure activities in Musanze District (golf resort, gambling resort, night clubs, water sports and entertainment, etc). The “**5-Year Product Diversification Action Plan**” has foreseen a number of product development actions needed to boost tourism in Musanze District as reflected within Musanze DDS 2018-2024:

- ❖ National Park Product Diversification, including new trails, climbs, interpretive routes, guided walks and eco-tourism attractions like Canopy Walkway;
- ❖ Community based tourism projects around the Twin Lakes area (Burera and Ruhondo Lakes), as proposed in Twin Lakes Development Strategy;
- ❖ Mt. Karisimbi Cable Car and ancillary developments;
- ❖ Enhancement of Musanze Cave, to be completed, improved and visit increased;
- ❖ Ruhengeri Convention Centre;
- ❖ Kwita Izina site development, close to the Volcanoes National Park main entrance;
- ❖ Luxury resort complex in Musanze, close to the Volcanoes National Park;
- ❖ Mountain Base development by developing a cultural Village, volcano museum, hotels, resorts, a spa, restaurants, souvenir shops and other tourist facilities at the mountain base.

4.8.4 Eco-tourism in Musanze Secondary City

This plan takes into consideration passive and active recreation zones like areas for nature-based tourism. Besides these, a variety of other open green spaces are proposed at city and neighborhood level.

4.8.4.1 Eco-Tourism site

The sports and eco-tourism sites are established to provide parks that offer active recreational uses with sporting facilities and forests with eco-tourism activities. All buildings in the zone shall adhere to the “Green Building Minimum Compliance Guidelines”. Nature areas have been capitalized upon for carving out tourism opportunities. The sports and eco-tourism zone cover 148 ha, equaling 2% of the land within the urban boundary.

Some of the proposed areas are:

- Kinigi Eco Tourism Development
- Musanze Cave Park
- Ruhengeri Theme Park integrated with Musanze Caves
- Mpenge river camping sites
- Agri Food Park
- Integrated Lake Tourism Development

4.8.4.2 Natural Conservation site

This site preserves identified undeveloped land and open space in their natural state. It can include protected cultural areas and wildlife habitat or areas for passive recreation like hiking or bird watching. The intent is to protect the ecological integrity of these nature areas from exploitation and encroachment. Natural conservation areas cover 218 ha of the land within the urban boundary (3%).

4.9 Economic Development

4.9.1 National Context on Economic Development

Rwanda aspires to achieve sustained economic growth over the long term, creating wealth for all Rwandans. The country has set a goal to become an upper-middle-income country by 2035 and a high-income country (HIC) by 2050. This means that by 2035, Rwanda aims to achieve a GDP per capita of over USD 4,036 and a GDP per capita of over USD 12,476 by 2050. Achieving these targets will require high and sustained economic growth, driven by a focus on key sectors such as agriculture, manufacturing, and services.

One of the key pillars of Rwanda's economic development strategy is the promotion of private sector-led growth. This involves measures to create an enabling environment for businesses to flourish, such as streamlining business registration procedures, improving access to finance, and

promoting investment in priority sectors. Additionally, Rwanda has sought to leverage its strategic location within East Africa to position itself as a regional hub for trade and investment.

Achieving Rwanda's economic aspirations will require sustained effort and investment over the long term. The projected demographic changes will have significant implications for policy development, particularly in areas such as education, healthcare, and employment. The growth in the working-age population presents an opportunity for the country to expand its workforce and drive economic growth, but this will require targeted investments in skills development and job creation.

4.9.2 Existing Employment Opportunities in Musanze District

Musanze District has several potentialities that contribute to its economy, particularly in terms of employment generation.

- ❖ **Suitable land for agribusiness:** Musanze District has fertile land and favorable climate conditions, making it suitable for agribusiness. The agricultural sector plays a significant role in the District's economy, with the cultivation of crops such as coffee, tea, potatoes, and other horticultural products. The sector provides employment opportunities and contributes to both local and export markets.
- ❖ **Attractions for tourism booming:** Musanze District is home to Volcanoes National Park, which is famous for its population of endangered mountain gorillas. The District's natural beauty, including stunning landscapes, volcanoes, and lakes, attracts a large number of tourists. Tourism has become a significant driver of economic growth in the area, creating employment opportunities in hospitality, tour guiding, transportation, and other related sectors.
- ❖ **High market demand for infrastructure, manufacturing, and service industry development:** With the growing population and increasing economic activities, there is a high demand for infrastructure development, including roads, housing, schools, and healthcare facilities. This demand stimulates the growth of the construction industry, creating job opportunities for engineers, architects, construction workers, and other professionals. Additionally, the expansion of the manufacturing and service sectors to meet the needs of the local population and tourists further contributes to employment generation.
- ❖ **Mineral deposits and quarries for mining development:** Musanze District is known for its mineral resources, including deposits of tin, tungsten, and tantalum. These resources have attracted mining companies to the area. The mining sector provides employment

opportunities, especially for individuals involved in extraction, processing, and trading of minerals.

- ❖ **Arts and crafts for manufacturing development:** Musanze District has a rich cultural heritage, and its residents are skilled in traditional arts and crafts. The production of crafts such as pottery, weaving, and wood carving contributes to the manufacturing sector. This industry not only generates employment but also supports cultural preservation and tourism by offering unique and locally made products.

Overall, the combination of these potentialities in Musanze District provides a diverse range of economic opportunities and contributes to employment generation, thereby supporting the local economy and livelihoods of the residents.

4.9.3 Status of employment creation in Musanze District

According to the RLFS 2022, the employment-to-population ratio stands at 49%, highlighting the percentage of the working-age population currently employed, whereas the unemployment rate is 19%. The survey identified that almost 125,300 individuals are outside the labor force, the number of employed individuals is 156,800, and 36,500 are unemployed.

The agriculture sector is the dominant contributor to the employment market in Musanze District, accounting for almost **44%** of the total jobs. Wholesale and retail trade, repair of motor vehicles and motorcycles sector accounts for **13%** and the construction sector accounts for **12%** of the employment market.

The predominance of the agriculture sector in the employment market highlights its crucial role in the economy, reflecting the sector's capacity to absorb a substantial portion of the workforce. This emphasizes the continued reliance on agriculture for livelihoods, with its inherent importance in supporting food security and sustaining rural communities.

4.9.4 Planned employment opportunities in Musanze District

Based on the RLFS 2022 and NLUDMP 2020-2050, the five main employment categories for the district are:

- ❖ Agriculture, forestry and fishing
- ❖ Mining and quarrying
- ❖ Construction

- ❖ Manufacturing
- ❖ Services

The employment projection for Musanze District considered the economic specialization of the District in alignment to NLUDMP 2020-2050, as presented in the table below:

Sector of activity	Percentage	Number of Employment to be created
Formal Employment 2050	100%	425,694
Agriculture, forestry and fishing	4.3%	18,140
Mining and quarrying	1.8%	7,852
Industrial	17.5%	74,546
Agro-processing mills and Udukiriro	11.4%	48,455
Construction	12%	51,083
Services	53%	225,618

Table 28. Employment projection in Musanze District by 2050

A total of **425,694** employment opportunities are projected to be created by the year 2050. The service sector is expected to be the dominant sector in terms of job creation (53%). This sector encompasses various activities such as financial services, trading, garages, tourism, and other.

Second to the service sector, the industrial sector is anticipated to create 123,000 employment opportunities (29%). It is important to note that Musanze District focuses on both heavy and light industries within the industrial sector.

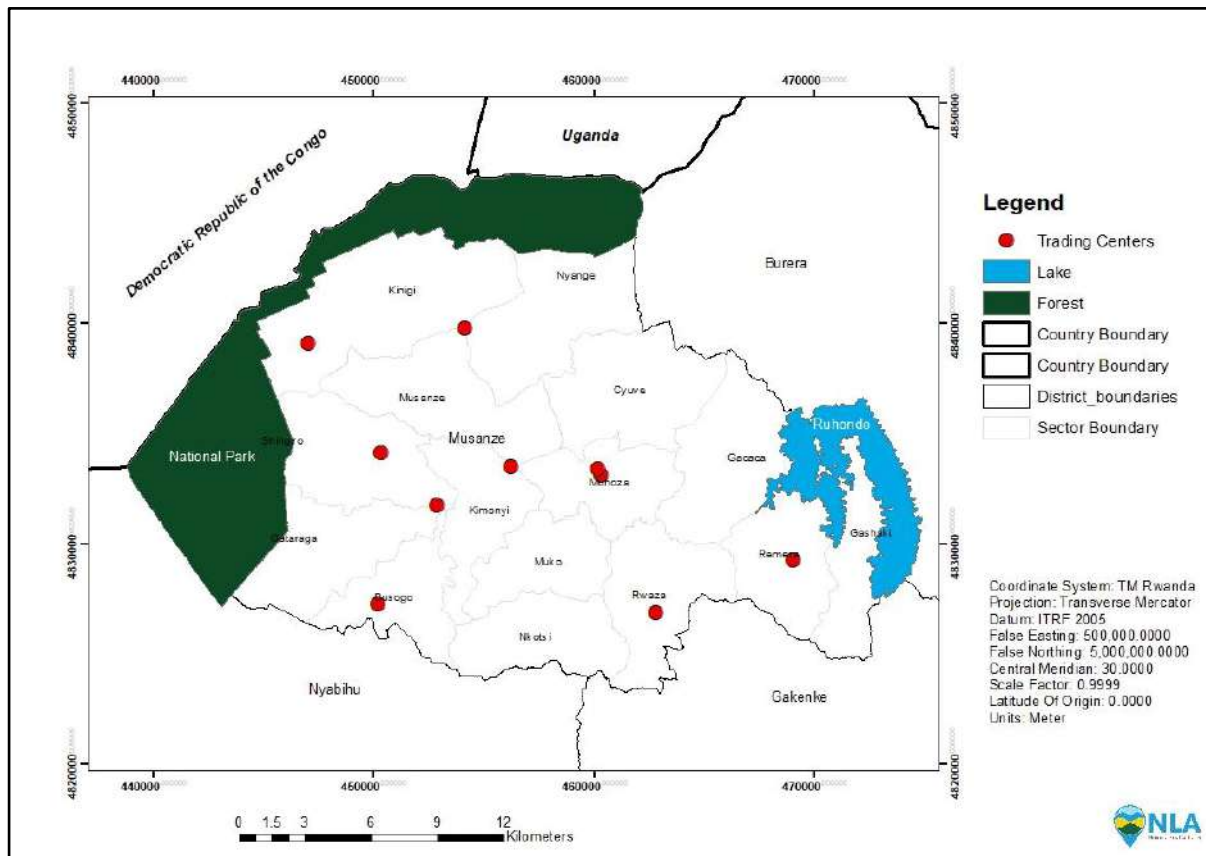
The construction sector is expected to generate around 12% of the total formal employment, whereas agriculture is predicted to account for only over 4% of employment in the District.

The mining and quarrying sector is expected to generate less than 2% of the employment opportunities in the District.

4.9.5 Commercial Business and Trade in Musanze District

Potential nodes and corridors have been identified as the epicenters for economic transformation in Musanze District, such as Kinigi (tourism), the City Centre (commerce, trade and services), Byangabo (trade), Karwasa (industry and logistics), and Nkotsi (education).

The potential freight corridor connecting Rubavu to Kisoro also connects the trade and logistics nodes in Musanze District, and the potential eco-agro corridor connects Kinigi to Kigali.



Map 24. The distribution of trading centers in Musanze District

In the formal trade sector, it is supported by the available trading infrastructures, such as the newly constructed market GOICO, the Agri-Morden Market known as Kariyeri Market, Kinkware, Byangabo, Karwasa Mini Markets, Musanze Industrial Park, Asphalt Roads, Modern Car Parking, and Agakiriro/Craft Centers. All of the trading infrastructures require maintenance, rehabilitation, refurbishment, improvement and extension as trade activities expand.

Byangabo Rural Center is located around 12 km from the City Centre of Musanze via the proposed Western Expressway (NR4). Byangabo has an existing thriving market which is in close proximity to Nyabihu and Rubavu Districts in the Western Province. This makes Byangabo a potential trade and industrial node with high employment opportunities in the industrial sector.

Musanze District consists of distinct development nodes which can be enhanced with the new master plan. Four major trading nodes have been established to foster trading and job creation. Those are:

- ❖ Existing City Centre with the potential to expand as Central Business District;
- ❖ Three developing commercial nodes or sub-regional centers: Kinigi, Kimonyi and Karwasa;

- ❖ Two major Rurban Centers: Byangabo and Kinkware-Kampala
- ❖ Three tourism nodes have been identified: the heritage tourism node at Musanze Caves entry, the urban tourism node in the CBD - agro tourism node along Musanze-Kinigi road in Village Gashangiro and the education node in Nyakinama (Nkotsi Education Node).

4.10 Musanze District Land Use Balance sheet

The land use balance sheet is the summary of all thematic sectors that need land for their projects and future prospects, where land is allocated to each sector considering the District potential and future needs. A balanced planning of land use, according to the needs and prospects of all sectors, mitigates conflicts over land, enables the effective use and management of available resources, and guides the future development in line with the NLUDMP 2020-2050.

Land use zoning represents the process of planning and regulating land for future development, in which all thematic sectors should be allocated land effectively, considering their future land demands, in accordance with the needs of the projected population, in order to manage the resources well and achieve the desired social and environmental outcomes.

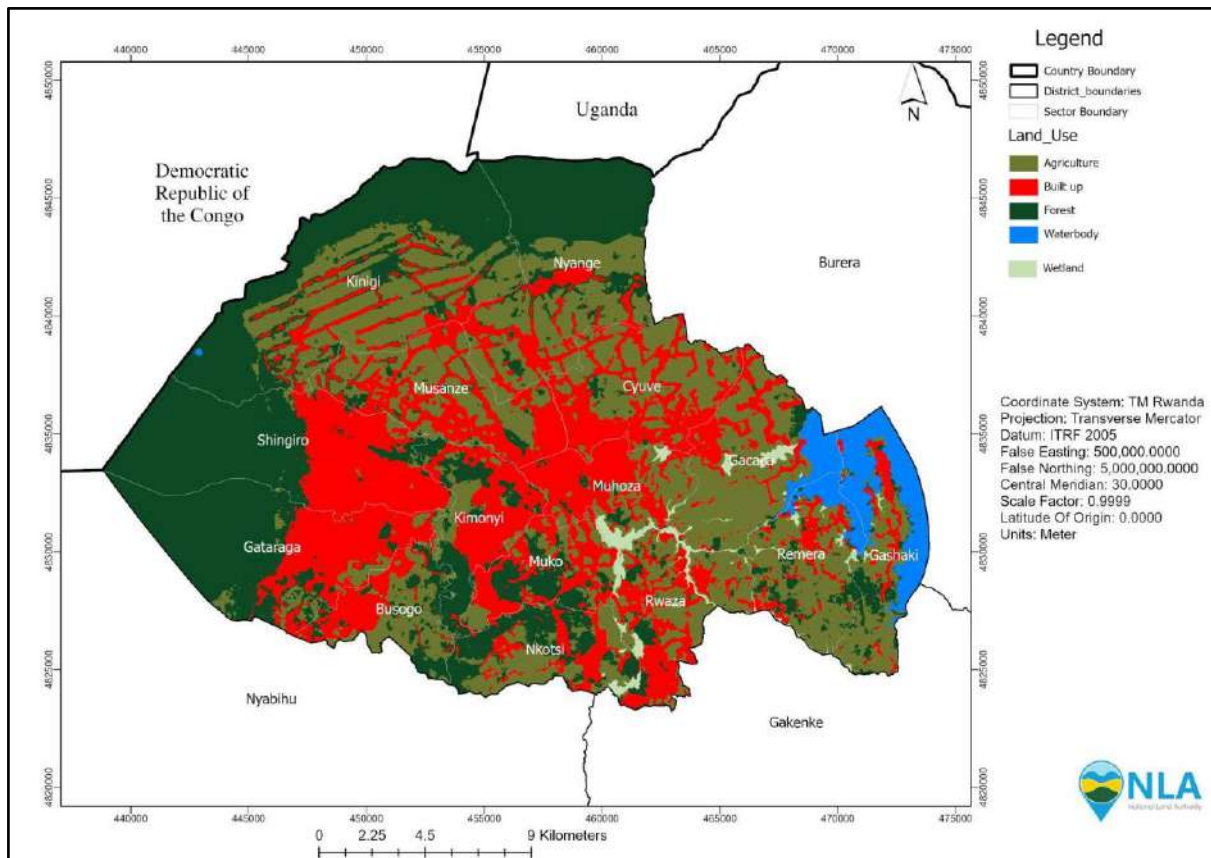
The land use zoning process is aligned with the NLUDMP 2020-2050, to facilitate local and national authorities to regulate and control land and real estate markets and ensure complementary uses as presented in the below figure.

For Musanze DLUP, Allocation of land for various uses considers various aspects and the needs of the projected population. For example, land for agriculture has been allocated to ensure food security for the future population. Other land uses, such as residential and settlement areas, are allocated based on the population projections and their future needs. The data collected from various sectoral institutions are merged into a single layer to produce the consolidated land use plan, and the balance sheet presents the area and percentage allocated for each land use. The land use balance below provides both in the existing and proposed land use balance sheet in Musanze District.

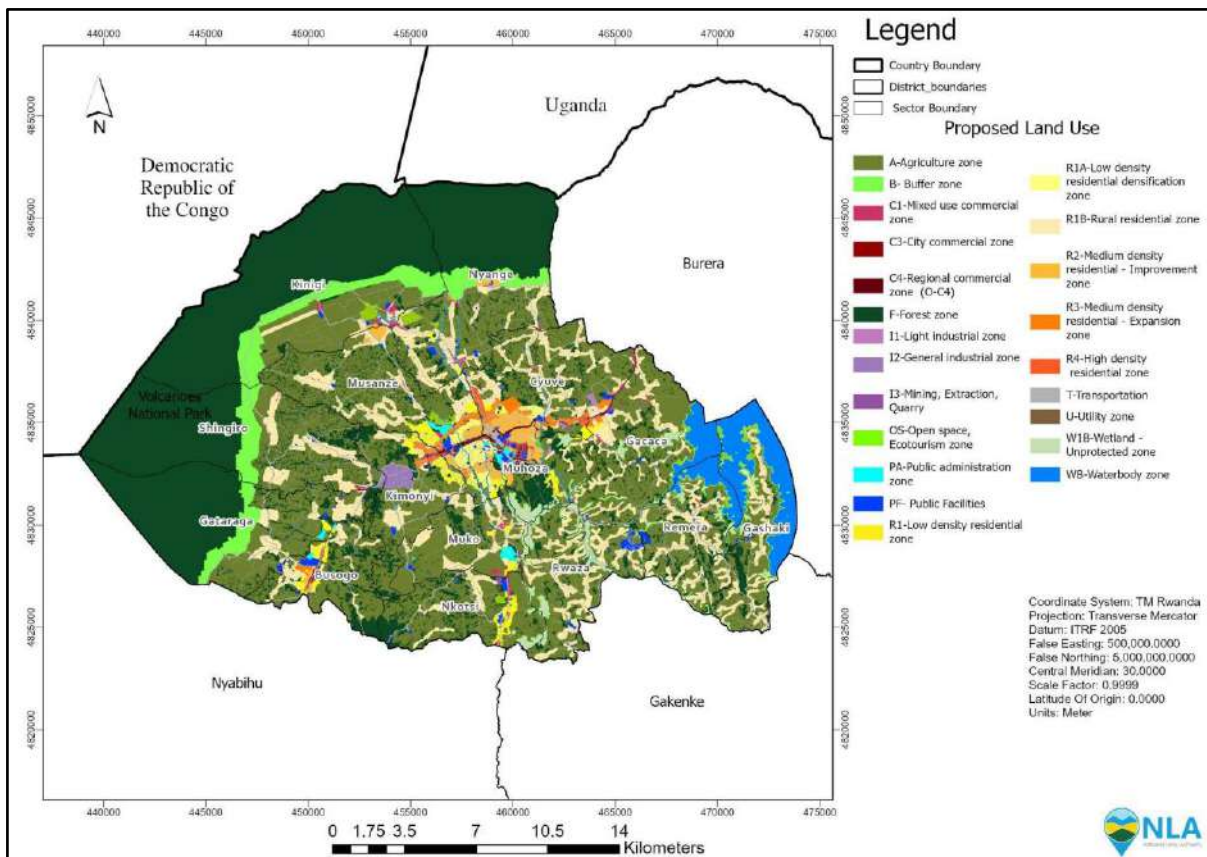
Area in ha (2023)	Percentage (2023)	Land Use	Sub zone	Area in ha (2050)	% in 2050
18189.1	34.4	Agriculture		19203	36.3
16170.06	30.6	Forest		18203.2	34.5
		Open space and Ecotourism		283.8	0.53
		Total			35.03
15608.7	29.6	Built up	Residential	6291.4	11.9
			Commercial	460	0.87
			Industry	202.8	0.38
			Public Facility	427.3	0.8
			Public Utility	42.3	0.08
			Public Administration	158.4	0.3
			Transportation	2194	4.1
			Total		14.33
777.6	1.4	Wetland		752.09	1.4
1981.3	3.7	Waterbody		1879	3.5
-	-	Buffer		2660.4	5
52,726.76	100			52,726.76	100

Table 29. Existing vs proposed land use balance sheet

In Musanze District agriculture has been maintained and increased by freezing scattered settlements. However, agriculture never increased at large scale due to expansion of National Park, wetland and water bodies buffer zones which consume land for agriculture. Therefore, Agriculture increased from 34.4% to 36.3%, built up has been reduced by proposing compact residential zones and grouped settlement sites. Built up area reduced from 29.6% to 14.33%. The following maps show the existing and proposed land use in Musanze District respectively.



Map 25. showing existing land use in Musanze District in 2023.



Map 26. showing Musanze District Proposed land use

The proposed land use plan for Musanze District provides the development plan till the year 2050 with the mid-term planning target of 2035. The proposed plan also takes into consideration the approved projects and the development trends within the district in its rural and urban areas as discussed in the section of implementation framework in “Capital and catalytically Improvement Projects (CIP)” subsection. The proposed zoning plan and zoning regulations guide the development direction for the district. This DLUP caters for the projected population in the district to be accommodated in Musanze District by 2050.

5. IMPLEMENTATION STRATEGIES

5.1 Institutional Framework

One of the fundamental aspects of achieving the goals as set out in a Musanze DLUP for a specific spatial space is the implementation of such a plan by the established implementation Agency.

The implementation of a Musanze DLUP, which is the official document (that contains public policy, programs and projects for Musanze District), is a major determinant of urban and rural development and the Musanze District has a major role to play. Stakeholders are the key players in the implementation of DLUPs. The table below shows the targeted stakeholders and the associated roles and responsibilities.

Table 30. Musanze District Implementation key actors and their responsibilities (DDS 2018-2024)

N°	Actors & Stakeholders	Intervention sector	Responsibilities
1.	Musanze District	All interventions sectors	- Develop working mechanism that brings all actors on board - Strengthen capacity building of staff, hold workshops and regular meetings with all District partners to share best practices - Facilitate the provision of extension services - Mobilize necessary resources for the implementation of the District priorities. - Initiate, Coordinate, Monitor and Evaluate the Implementation Phases
2.	MINALOC	All interventions sectors	- Ensure that all the guidelines and directives from the central government are fully disseminated to the District - Proper use of the public resources - Supporting stakeholder coordination in their activities at District level
3.	MINECOFIN	Public Financial Management	- Leads the resource mobilization, allocation process and approve new innovative financing mechanisms

			- Will assist to link the District strategic outcomes with the NST1 and higher-level plans. - Coordinate the transfer of earmarked funds
4.	MININFRA	- Transport - Urbanization - Energy - Water and Sanitation	- Ensure the sustainable development of infrastructure - Overseeing maintenance and development of infrastructure
5.	MINEDUC	- Education	- Developing and managing Education Monitoring and Evaluation systems - Promoting information and technologies in the area of education - Promoting information a Conservation Zone and communication technology as a tool for learning and teaching; - Overseeing the programs of school construction and equipment - Overseeing formal education and continuing training of teaching staff
6.	MINISANTE	- Health	- Financial accessibility of health services - Strengthening national referral hospitals, treatment & research centers - Institutional capacity building - Human Resources Development
7.	MINAGRI	- Agriculture	- Organization, mobilization and capacity-building for producers and their organizations - Promoting the gender approach and reducing vulnerability among disadvantaged groups - Diversification and intensification of plant, animal and fish production
8.	MoE/ REMA	- Environment and Natural resources	- Strengthening climate resilience of communities - Water Resources Management - Monitor and assess development programs to ensure compliance with the laws on environment during their preparation and implementation; - Advice and technical support to individuals or entities engaged in natural resources management and environmental conservation - Monitor and supervise impact assessment

9	MINICOM	- Private sector development and employment	- Support private sector growth and job creation with a focus on SMEs - Build an effective human resource base and institutional capacity for delivery.
10	MOYA / MINUBUMWE / MINISPORTS	Sports and Culture	- Ensure that sports and culture policies and strategies are disseminated and appropriately implemented to attain the intended results - Supervise the functioning and management of affiliated institutions and agencies of the ministry for efficiency and effectiveness. - Promote research and development of cultural and sport activities
11	National Land Authority (NLA)	All Sectors	- Overall Monitoring and Evaluation of Musanze DLUP Implementation Phases - Capacity Building of all implementation Actors at all levels of Governance - Involve public and private investors and developers for Musanze DLUP Implementation
12	LODA	- Private Sector Development & Youth Employment - Social protection - Urbanization and rural settlements - Transport	- Local Economic & Community Development - Capacity building of local administrative entities - Monitoring and evaluating the implementation process of development programs
13	RHA	-Housing - Public Building	- Monitoring and Inspection of Housing Permitting - Effective Management of Public Buildings (Construction, Repair and Maintenance)
14	RAB	- Agriculture	- Practice modern methods in crop and animal production, research, agricultural extension, education and training of farmers in new technologies.
15.	NAEB	Agriculture	- Facilitate the growth of business to diversify agriculture and livestock commodity export revenues.

16.	Rwanda Cooperative Agency (RCA)	- Agriculture - Financial Sector Development -Empowerment of Youth, Women and People with Disabilities	- Promoting the cooperative organizations sector - Promoting business entrepreneurship in the cooperative organizations sector - Assisting cooperative organizations in their capacity building through training and seminars of its members and managers - Supervising implementation of laws and instructions governing cooperatives
17.	BDF / BRD	Financial sector Development	- Promoting SME development through the provision of financial services - Accelerate export development, Catalyse agricultural financing; - Promote affordable housing, Manage and facilitate financing for education loans; and - Increase investments in energy development
18.	REG	Energy	- Responsible for maintaining and improving power plants, transmission and distribution networks, as well as delivery of electrical energy to consumers at a sustainable fee - Community companies support in small micro hydro power plants
19.	WASAC & RWB	Water and Sanitation	To increase the water production, distribution, and performance improvement aimed at provision of quality water and sanitation services and RWB for water resources management & regulation, flood management, landslide & erosion control, etc
20.	Development Partners (World Bank, Un-Habitat, AFD, etc.)	- Urbanization and Rural settlement - Upgrading of Informal Settlement - Resettlement of People living in High Risk Zones	- Provision of basic infrastructure - Technical assistance to support sustainable urban management and capacities at Secondary Cities District level and facilitation of Local Economic Development - Financing of Projects for improvement of Living Conditions of Musanze Population

5.2 Musanze Capital & Catalytic Improvement Projects (CIP)

These Capital Improvement Projects (CIP) are an integral part of Musanze DLUP to be implemented in four distinct phases: Phase one (2023-2029), Phase two (2030-2035), Phase three (2036-2040) and Phase four (2041-2050). The Implementation of Musanze DLUP will involve all partners and stakeholders through an appropriate coordination and participation approach. Priority Projects for capital investment plan (CIP) include the following:

1. Volcano Adventure and Innovation Gateway

Positioned as a flagship gateway experience to Volcanoes National Park into a cutting-edge tourism and conservation research center, this project transforms the Volcano Expansion Zone, Kwita Izina Inauguration Center, green village resettling people from park expansion, etc.

2. Twin lake tourism development

The Twin Lakes are renowned for their scenic landscapes, featuring terraced hillsides, lush vegetation, and panoramic views of the surrounding volcanoes. Visitors can engage in various activities:

- Natural Attractions and Activities
- Accommodation and Hospitality
- Twin Lakes Recreational Island
- Hiking and Biking
- Bird Watching
- Boating and Kayaking
- Infrastructure and Investment

3. Development of Integrated Eco- Tourism Hub

This project will serve as a centralized tourism attraction, merging ecological preservation, cultural heritage, and recreational tourism. It integrates the Nyamuremure Wetland Eco Park, introduction of Nyamuremure artificial lake, and Development of Tourism city monuments into a single, well-branded eco-cultural destination.

4. Developing Creative Industrial & Tourism Park

The project is a flagship destination that combines craft production, light industry, and tourism by transforming part of the Udukiri (Craft Centers) and Industrial Zone into an interactive cultural

experience zone. It leverages nearby infrastructure investments (e.g., roads, public lights, car parking, and the substation) to attract tourists seeking authentic, locally-made products and immersive cultural engagement.

5. Development of commercial agricultural and processing

The main objective this project is to transform the agriculture sector in Musanze from subsistence to commercial and value-added production through investment in large-scale cultivation, modern farming practices, and agro-processing industries for:

- Irish potatoes
- Vegetables
- Medicinal cannabis (under regulated frameworks)
- Pyrethrum (a botanical pesticide crop)

6. Creation of Sports and Cultural Tourism Festival Hub

This project is envisioned as a dynamic, annual attraction and infrastructure-integrated initiative that merges sports tourism, cultural exhibitions, and youth talent. It leverages new facilities like Ubworoherane Stadium, Kinigi Arena, Musanze Cultural Center, and Youth Empowerment Center, cycling, etc to host regional and international events that attract both domestic and foreign tourists.

7. Improve Tourism and Governance Welcome Center

The project is a visionary initiative that integrates the new Northern Province & Musanze District Headquarters complex into a tourism-supportive civic and information hub. It reimagines administrative infrastructure as a gateway for tourism orientation, visitor services, and cultural diplomacy, offering tourists a starting point to explore Musanze while showcasing the district's governance, heritage, and development journey.

8. Construction of Faecal Sludge Treatment Plant and Landfill for Musanze Secondary City

The project aims to address the growing challenges of waste and sanitation management in one of Rwanda's rapidly urbanizing secondary cities. It involves establishing a dedicated facility to treat faecal sludge from non-sewered sanitation systems and constructing an engineered sanitary landfill

for safe solid waste disposal. The project is designed to improve public health, reduce environmental pollution, and support Musanze's transition into a clean, resilient, and sustainable urban centre.

9. Enhancing urban mobility through expressway and underground tunnels

This project aims to improve urban mobility and reduce congestion in Musanze Secondary City by developing modern transport infrastructure, including expressways and underground tunnels. As Musanze continues to grow as a tourism and economic hub, its road network faces increasing pressure from traffic, particularly in the city centre. The proposed infrastructure will create efficient traffic flow, reduce travel time, and improve access to key urban areas while preserving surface land for pedestrians, green spaces, and economic activities. The project aligns with Rwanda's Smart City vision and sustainable urban development goals by promoting inclusive, safe, and resilient transportation systems.

10. Resettlement people from high-risk zone

This project focuses on the planned and human resettlement of communities living in high-risk zones in Musanze and surrounding areas, such as steep slopes, flood-prone zones, and areas vulnerable to landslides or other natural hazards. The objective is to ensure the safety, dignity, and long-term wellbeing of affected populations by relocating them to safer, planned settlements with access to basic services and infrastructure. The project includes risk assessment, stakeholder engagement, provision of housing, and livelihood restoration support. It contributes to disaster risk reduction, climate resilience, and aligns with Rwanda's national housing policy and urban development strategies.

11. Sustainable urban and settlement neighborhood development

This project aims to promote inclusive, well-planned, and environmentally sustainable neighborhoods in Musanze and other urbanizing areas. It focuses on developing mixed-use, climate-resilient, and affordable settlements that integrate housing, green spaces, infrastructure, public services, and mobility networks.

12. Increasing adaptation to climate resilient project

This project aims to enhance the capacity of urban and rural communities in Musanze and surrounding regions to adapt to the impacts of climate change through the design and implementation of climate-resilient infrastructure and development initiatives. It focuses on integrating climate risk assessments into urban planning, promoting nature-based solutions (such

as green infrastructure and reforestation), improving water and energy management, and building resilient housing and public services.

Table 31. Priority Musanze Capital & Catalytic Improvement Projects (CIP)

Thematic areas	Projects	Phase 1 (2023-2029)	Phase 2 (2030-2035)	Phase 3 (2036-2040)	Phase 4 (2041-2050)	Responsible Institution
Tourism & Economic development	Volcano Adventure and Innovation Gateway					RDB, District
	Twin lake tourism development					District, RDB
	Development of Integrated Eco-Tourism Hub					RDB, District
	Improve Tourism and Governance Welcome Center					RDB, PSF, District, MINALOC
	Creation of Sports and Cultural Tourism Festival Hub					RDB, District, PSF, MINISPORT
	Developing Creative Industrial & Tourism Park					District, MINICOM
	Development of commercial agricultural and processing					MINAGRI, RAB, District
Urbanization, Infrastructure and environment	Sustainable urban and settlement neighborhood development					District, RHA, NLA, MININFRA, RTDA, District
	Resettlement people from high-risk zone.					District, RHA, NLA, MININFRA, RTDA, District

Enhancing urban mobility through expressway and underground tunnels					District, MININFRA, RTDA
Construction of Faecal Sludge Treatment Plant and Landfill for Musanze Secondary City					District, WASAC

5.3 Participatory Land Readjustment Approach and Detailed Physical Plans Initiatives in Musanze District

The readjustment of existing plots and Detailed Physical Plans are recommended during implementation of Musanze DLUP to assure rational development and effective land uses. Where the plots are of different shape or value, size or value adjustments are made.

The readjustment of land transforms irregularly shaped plots into regular and standard shape land with access to infrastructure such as roads, electricity, water, schools, hospitals and other services, which contributes to the value of the land in any specific area. Statutory phasing in each land-use plan will be compulsory.

The communities, who are landowners, are encouraged to participate in all phases including elaboration of site physical plans, data collection, mapping and site demarcations exercises until the process is completed and approved, being provided with in-depth advice of planners and appraisal experts. A land readjustment map and appraisal documents must be approved together with the concerned detailed local plan as one unit. Alternatively, simplified voluntary land exchange processes shall be introduced.

A readjustment is an essential tool for land consolidation and orderly development. Musanze District communities should have ownership in all phases to ensure compliance during development. A practical guide for participatory land readjustment was established by the National Land Authority in 2021, for local physical plan development procedures and implementation, roles and responsibilities for local communities, the site committee, local authorities and the consultants

or experts developing the neighborhood-planning site. Therefore, a community approach is part of Musanze DLUP for its successful implementation.

Detailed physical plans were initiated according to the District Council decision of 10/09/2021.

The following sites were selected for physical plans by community arrangement:

Site Name	Cell	Sector	Observations
GATURO	CYABAGARURA	MUSANZE	A draft of the layout plan has been presented to the District technical team. The next step is about an implementation step.
GAKORO	RWAMBOGO	MUSANZE	Mapping of the existing situation (socio-economic analysis) of the site is ongoing.
BUHUNGE	RWAMBOGO	MUSANZE	Mapping of the existing situation (socio-economic analysis) of the site is ongoing.
RUGEYO	CYABAGARURA	MUSANZE	Planning to be initiated. (Planning status)
GIKERI	CYABAGARURA	MUSANZE	The approved physical plan of site is implemented from 2023
KARUNYURA	KABEZA	CYUVE	Mapping of the existing situation (socio-economic analysis) of the site is ongoing.
KARINZI	KABEZA	CYUVE	The physical plan of site will be implemented by V.CO Ltd Company sponsored by Enabel / RHA
KUNGO (MU MUHOZA)	KABEZA	CYUVE	The approved physical plan of site is implemented from 2023

RUHINDINKA	BURUBA	CYUVE	The physical plan of site will be implemented by V.CO Ltd Company sponsored by Enabel / RHA
BUBANDU	BUKINANYANA	CYUVE	The mapping of the existing situation (socio-economic analysis) of the site is ongoing.
MWIDAGAD URO	BUKINANYANA	CYUVE	The approved physical plan of site is implemented from 2023
MURAMBI	BUKINANYANA	CYUVE	Mapping of the existing situation (socio-economic analysis) of the site is ongoing.
Nyarubuye (SAG)	SAHARA	BUSOGO	The approved physical plan of site is implemented from 2017
KAVUMU	KARWASA	GACACA	Mapping of the existing situation (socio-economic analysis) of the site is ongoing.

Table 32. Initiatives for Physical Plans and Land Readjustment in Musanze District

5.4 Musanze DLUP Spatial Phasing Plan by Horizon Year 2035

Implementation Phasing of Musanze DLUP is part of all local and land use plan provisions and elaborated based on the local context. The leading spatial principle in phasing is Tiling, which simply prevents random and remote locations of development. The phasing plan for Musanze DLUP intends to provide flexibility to implementation agents and stakeholders to prioritize investment projects for local economic development in Musanze District for efficient and adequate use of implementation resources and funds to finance the selected priority projects.

This Phasing Plan provides the District, communities, and donors/financiers with rationale to prioritize infrastructure and associated urban and rural services to incrementally develop in a phased manner. Phasing plans have been elaborated in Musanze Secondary City and the Rurbans of Byangabo and Kinkware-Kampara where the Four phases have been proposed to implement the Musanze DLUP:

A) Phase One: 2023 – 2029

The first phase (2023–2029) involves the built-up areas having Physical Plans and Land Readjustment Plans serviced with basic facilities and infrastructure such as roads, water, electricity, drainages, etc. in urban and rural settlement areas. The areas of Musanze Secondary City and Byangabo, Kinkware-Kampara Rural Centers are already settled and contain all major basic infrastructures. The District will continue the issuance of building construction permits and rehabilitation permits in order to achieve required proposed densities. These areas will be priority during additional District infrastructures development and relevant stakeholders' investments. Physical Plans are available and published for Residential and Mixed Use in line with Musanze DLUP for these areas.

This Phase will also consider the residential expansion zones concerned by settlement upgrading projects in city and towns and rural settlement sites today not having access to basic services and infrastructures. The District will be putting in place in distributing basic infrastructures where they are lacking to achieve the country target of 100% electricity and water infrastructure supply and accessibility to all rural settlements.

However, from Phase One, the DLUP Phasing Plan allows the Implementation Flexibility on phases which provides that the district can allow developments for immediate implementation of any of any phase by issuing of new building construction permits, when the neighborhood is well serviced with roads and other basic public amenities, or when investors commit to distribute all basic infrastructures (Roads, water, electricity, etc.) without a government or public investments.

B) Phase Two: 2030 – 2035

The second phase (2030–2035) involves the selected sites for residential zoning in urban areas and in rural settlement sites where the servicing activities are initiated, for example areas of urban expansion and urban peripherals for areas suitable for urban development and rural areas currently used for agriculture and livestock. These areas lack basic services and infrastructures. Issuance of new building construction permits is prohibited in phase two, except large scale investment where the investors will distribute all basic infrastructure (roads, water, electricity, etc.) without government or public investments. The District will provide construction permits in phase two after elaboration of detailed physical plans and distribution of all basic infrastructure (roads, water, electricity, IT, etc.).

C) Phase Three: 2036 – 2040

The third phase (2036-2040) will involve the following:

- Zones for agriculture and forest;
- Zones without basic services, facilities and infrastructure;
- Zones without Physical Plans;
- High slop zones (steep slopes above 55%);
- Informal Settlement Zones; and
- Neighboring Zones of protected areas such as flooding areas, water bodies, marshlands, ravines, etc.

D) Phase Four: 2041 – 2050

Phase Four covers urban expansion zones and peripherals, suitable for urban development and rural areas today used for agriculture and livestock. Urban and Rural Expansion Areas will be considered during the implementation of this DLUP in this second medium-term phase. These areas don't have basic services and infrastructures today. Issuance of new building construction permits is prohibited in phase three, except big investment cases, where the investors will comfortably distribute all basic infrastructure (roads, water, electricity, etc.) without a government or public investments. The district will provide construction permits in phase 4, after elaboration of detailed physical plans and distribution of all basic infrastructures (roads, water, electricity, IT, drainage channels, etc.).

Phases Three and Four will be aligned with a mid-term review 2035 corresponding eventually to the revision of land use plans at National and District levels. These phases should consider needs of urban expansion for areas that today are used for agriculture and livestock. These areas will be protected allowing transitional land uses like agriculture or forestry/agroforestry plantations.

5.5 Principles Guiding the Zoning Requirements in cities / urban areas

• Integrated Development and Urban Resilience

The integrated approach to urban development promotes appropriate growth of Cities, ensures sustainable mobility, more cohesive communities, and a better environment. By looking at the City in a holistic fashion, it strengthens the urban resilience, known as “the capacity of urban systems, communities, individuals, organizations, and businesses to recover, maintain their function and thrive in the aftermath of a shock or a stress, regardless of its impact, frequency or magnitude”.

These Zoning Regulations enhance this approach and help to build the resilience, providing adequate tools and measures to guide the growth of the City as an urban system, where all components - infrastructural, institutional, economic, and social are taken into consideration.

- **Inclusivity and Community Involvement in the Planning**

Inclusivity and equity in the planning and development process help create more sustainable cities with people getting the right to fully participate in every aspect of social, economic, political, and cultural life and voice their concerns and aspirations to create thriving neighborhoods and communities.

All developments shall consider the needs and aspirations of all groups, including vulnerable groups and people of all abilities, in the design and implementation process. A participatory and bottom-up approach shall be followed involving and engaging the community in the design, development, and monitoring process.

- **Incrementality and Flexibility**

The principle of incrementality is adopted in these Zoning Regulations to allow communities, investors, and developers to develop according to their current financial capacities. The objective is to create a flexible environment where all developments happen in an organic manner, without creating financial overexposure and hence hindering the affordability of the development. At the same time, the incremental approach is designed in such a way that future addition to the development would help achieve the desired density for the specific zone in future years.

Incremental development also allows developers to better adapt to current and future market conditions, thus reducing investment risk and facilitating access to the market to a larger segment of the population. Incremental development shall be an opportunity to limit ongoing informal development processes and ensure efficient provision of infrastructure and service delivery and rational land use.

- **Mixed Land Use**

The zoning regulations allow and encourage Integrated and mixed-use development within all zones to create higher density, compact and vibrant places for people from all groups and neighborhoods. Neighborhoods shall showcase a blend of residential, commercial, cultural, public facilities, and micro-enterprises that are accessible and well connected to the transit system. This will enhance inclusivity, bring work closer to homes and reduce disparity and social segregation between different groups.

- **Pedestrian First**

“Cities around the world are recognizing how essential walkability is for the access and health of their citizens, and the economic growth of their cities. All planners, designers and developers shall ensure walkable and integrated neighborhoods that link residences to the public facilities, commercial and recreational areas. The DLUP provides for the City to expand its Non-Motorized Transport (NMT) network to cover the entire City for complete, continuous, and safe walkway and cycleway networks that provide clear protection from motor vehicles and are accessible to people of all groups. Universal designs shall be adopted by removing all physical barriers and providing a safe route for smooth mobility and easy access.

- **Transit Oriented Development (TOD)**

Transit-oriented development (TOD) presents as the best approach for Cities of Rwanda to continue keeping the private vehicle ownership on the low, and to avoid unsustainable, car-dependent, and sprawling settlement. TOD is necessary for inclusivity, equity, and long-term sustainability of the cities. The integrated and transit-oriented development brings people closer to activities, work, home, and public space, providing inclusive access for all, to Citywide opportunities and resources at the lowest financial and environmental cost, and with the highest resilience to climate change and other disasters.

The City provide high-quality, safe, and reliable mass transit system for a sustainable, and equitable development. Mixed-use, integrated, and higher density developments that are well connected with easy walking and cycling connection, and in proximity to reliable transit service to the rest of the City are at the base of this master planning effort.

- **Sustainable Design**

All developments shall be designed and developed with due regards for the environment, by incorporating environmentally friendly and sustainable design practices in both design and construction of the buildings. It shall be of paramount importance to encourage environmentally responsible buildings that are appropriate for the existing urban fabric.

Subject to review and evaluation of developments in certain zones, and in line with GBMC, the District One Stop Center may, at its discretion, grant increases in additional floor area, building height or building coverage for developments that adopt sustainable design technologies or

techniques or provide additional benefit to the neighboring communities such as public spaces or recreational areas.

5.6 Musanze DLUP Monitoring and Evaluation

Proper monitoring and implementation of Musanze DLUP will be continuously conducted. However, the revision may also be done on the specific sector when considered necessary without compromising the development with other sectors. The proposed compliance between the different planning levels is a must in order to avoid any mistakes made in the many plans, policies and projects before caused by lack of compliance. The purpose of this part is to set up administrative and planning tools, in which planning instructions transfer from central level to local level.

A Continuous Compliance Planning (CCP) principle was adopted to ensure the fulfillment of the chain of planning. Before completion and approval of this plan, no construction permits will be issued until further approval by the District Council. Under the principle of CCP, the following measures and procedures are essential in order to achieve the desired compliance in the planning process:

- ❖ Providing a non-objection to any change of land use and project by National Land Authority (NLA) in charge of Land Use Management through the back up coordination force from the Ministry in charge of Lands which will be instrumental in resolving coordination and compliance issues.
- ❖ NLUDMP 2020-2050 ensures that projects and activities of all Ministries and Authorities comply with this plan. The national development planning and budgeting process (MINECOFIN) should ensure that sector priorities and investments comply with the NLUDMP 2020-2050. In other words, there must be a balance between economic planning and spatial planning.
- ❖ Delineate and enforce settlement boundaries. It is recommended that new boundaries will gain legal status only to supply developing needs for a period of the coming 13 years (2022-2035). All master plans shall show implementation phases for midterm review without overpassing this boundary. The areas of the development phases will be adjacent to each other to create a paving system for the efficient use of lands.
- ❖ Consolidation principles in land use planning will be directed towards and applied to all levels and all sectors of land-use planning.
- ❖ Regular updating of spatial data and base maps through large-scale mapping will greatly support the development of master plans and monitoring of land use.

- ❖ To improve the adequate performance of Building Permitting Management Information System (BPMIS) and its dissemination in all sectors to serve the urban and rural construction and development permitting in Musanze District. A strong community outreach program and mind-set change on land use planning in the entire District of Musanze will be organized continuously in order for community public awareness and ownership.

REFERENCES

1. The United Nations Sustainable Development Goals are (SDGs).
2. Rwanda's Vision 2050.
3. National Strategy for Transformation (NST1): 2017-2024
4. National Housing Policy, 2015.
5. National Land Policy, 2019.
6. National Urbanization Policy, 2015.
7. National Investment Policy.
8. National Human Settlement Policy.
9. National Land Use Development Master Plan (NLUDMP) 2020-2050
10. Green Growth and Climate Resilient Strategy, 2011.
11. Rwanda National Land Use Planning Guidelines (NLUPG).
12. Rwanda Urban Planning Code (UPC), 2015.
13. Urbanization and Rural Settlements Sector Strategic Plan 2018-2024.
14. Environmental Impact Assessment Guidelines, 2007.
15. Law N°48/2018 of 13/08/2018 on Environment.
16. General Census and National Population Projection, 2012 National Institute of Statistics of Rwanda (NISR).
17. General Census and National Population Projection, 2022 National Institute of Statistics of Rwanda (NISR).
18. Integrated Household Living Conditions Survey, EICV 5, Thematic Report, Environmental and natural resources, March, 2020, NISR
19. Rwanda Building Code, 2015, RHA.
20. The National Environmental Policy of the Republic of Rwanda.
21. Law N° 27/2021 of 10/06/2021 governing land.
22. Law N°10/2012 of 02/05/2012 governing urban planning and building in Rwanda.
23. Law N°20/2011 of 21/06/2011 governing human habitation.
24. Musanze District Development Plan (DDS), 2018-2024
25. Musanze District Potentialities Report, 2017
26. Musanze District, Master Plan for Urban Development, 2020
27. Musanze District, Local Economic Development (LED) Strategy 2017-2024

Bibonywe kugira ngo bishyirwe ku mugereka w'Iteka rya Minisitiri n° 006/25/10/TC ryo ku wa 28/07/2025 rishyiraho igishushanyo mbonera cy'imikoreshereze n'imitunganyirize by'ubutaka cy'Akarere ka Musanze	Seen to be annexed to Ministerial Order n° 006/25/10/TC of 28/07/2025 establishing land use and development master plan of Musanze District	Vu pour être annexé à l'Arrêté Ministériel n° 006/25/10/TC du 28/07/2025 établissant le schéma directeur d'utilisation et d'aménagement des terres du District de Musanze
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Kigali, 28/07/2025

(sé)

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Ministre des Finances et de la Planification Économique

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Vu et scellé du Sceau de la République :

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