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ITEKA RYA MINISITIRI N° 011/25/10/TC RYO KU WA 28/07/2025 RISHYIRAHU IGISHUSHANYO MBONERA CY'IMIKORESHEREZE N'IMITUNGANYIRIZE BY'UBUTAKA CY'AKARERE KA NGOMA 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 Ngoma yateranye ku wa 28/10/2023; Inama y'Abaminisitiri yateranye ku wa 22/05/2024 imaze kubisuzuma no kubyemeza; ATEGETSE: <u>Ingingo ya mbere:</u> Ishyirwaho Hashyizweho igishushanyo mbonera cy'imikoreshereze n'imitunganyirize by'ubutaka cy'Akarere ka Ngoma.	MINISTERIAL ORDER N° 011/25/10/TC OF 28/07/2025 ESTABLISHING LAND USE AND DEVELOPMENT MASTER PLAN OF NGOMA 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 Ngoma District, in its meeting of 28/10/2023; After consideration and approval by the Cabinet, in its meeting of 22/05/2024; ORDERS: <u>Article One:</u> Establishment The land use and development master plan of Ngoma District is established.	ARRÊTÉ MINISTÉRIEL N° 011/25/10/TC DU 28/07/2025 ÉTABLISSANT LE SCHEMA DIRECTEUR D'UTILISATION ET D'AMÉNAGEMENT DES TERRES DU DISTRICT DE NGOMA 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 Ngoma, en sa réunion du 28/10/2023 ; Après examen et adoption par le Conseil des Ministres, en sa séance du 22/05/2024; ARRÊTE : <u>Article premier :</u> Établissement Il est établi le schéma directeur d'utilisation et d'aménagement des terres du District de Ngoma.
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<u>Ingingo ya 2: Ibigize igishushanyo mbonera</u> Igishushanyo mbonera cy'imikoreshereze n'imitunganyirize by'ubutaka cy'Akarere ka Ngoma, 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 Ngoma 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 Ngoma 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 Ngoma iri ku mugereka w'iri teka. (2) Amakuru ndangahantu y'igishushanyo mbonera cy'Akarere ka Ngoma n'amabwiriza agenga ishyirwa mu bikorwa ryacyo bitangazwa ku rubuga rw'ikoranabuhanga rwagenwe n'urwego rufite imicungire n'imikoreshereze by'ubutaka mu nshingano.	<u>Article 3: Publication</u> (1) The main report of the land use and development master plan of Ngoma District is annexed to this Order. (2) The zoning plan and zoning regulations of the land use and development master plan of Ngoma 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 Ngoma 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 Ngoma sont publiés sur le site web désigné par l'organe ayant l'utilisation et la gestion des terres dans ses attributions.

<u>Ingingo ya 4: Igihe igishushanyo mbonera kimara</u> Igishushanyo mbonera cy'imikoreshereze n'imitunganyirize by'ubutaka cy'Akarere ka Ngoma gikurikizwa kugeza mu 2050. <u>Ingingo ya 5: Ivugururwa</u> (1) Igishushanyo mbonera cy'imikoreshereze n'imitunganyirize by'ubutaka cy'Akarere ka Ngoma gishobora kuvugururwa cyose nyuma y'imyaka icumi cyangwa ikindi gihe bibaye ngombwa uherye ku muni gishyiriweho. (2) Ivugururwa ry'igishushanyo mbonera cy'imikoreshereze n'imitunganyirize by'ubutaka cy'Akarere ka Ngoma 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 Ngoma District is implemented until 2050. <u>Article 5: Revision</u> (1) The land use and development master plan of Ngoma 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 Ngoma 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 Ngoma 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 Ngoma 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 Ngoma 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>	<u>Article 7: Entry into force</u>	<u>Article 7 : Entrée en vigueur</u>
Iri teka ritangira gukurikizwa ku munsu ritangarijweho mu Igazeti ya Leta ya Repubulika y'u Rwanda. Agaciro karyo gahera ku wa 28/10/2023.	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 28/10/2023.	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 28/10/2023.

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° 011/25/10/TC RYO KU WA 28/07/2025 RISHYIRAHU IGISHUSHANYO MBONERA CY'IMIKORESHEREZE N'IMITUNGANYIRIZE BY'UBUTAKA CY'AKARERE KA NGOMA	ANNEX TO MINISTERIAL ORDER N° 011/25/10/TC OF 28/07/2025 ESTABLISHING LAND USE AND DEVELOPMENT MASTER PLAN OF NGOMA DISTRICT	ANNEXE À L'ARRÊTÉ MINISTÉRIEL N° 011/25/10/TC DU 28/07/2025 ÉTABLISSANT LE SCHÉMA DIRECTEUR D'UTILISATION ET D'AMÉNAGEMENT DES TERRES DU DISTRICT DE NGOMA
IGISHUSHANYO MBONERA CY'IMIKORESHEREZE N'IMITUNGANYIRIZE BY'UBUTAKA CY'AKARERE KA NGOMA	LAND USE AND DEVELOPMENT MASTER PLAN OF NGOMA DISTRICT	SCHÉMA DIRECTEUR D'UTILISATION ET D'AMÉNAGEMENT DES TERRES DU DISTRICT DE NGOMA



NGOMA

District Land Use Plan 2023-2050



“Commercial-oriented agriculture and Tourism”

2023

Report Title	Ngoma District Land Use Plan 2023 – 2050
Project title	Ngoma District Land Use Plan Report
Owner	Ngoma District
District Council Approval	28 th October, 2023
Cabinet's Approval	22 nd May, 2024

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List of Acronyms

BPMIS: Building Permitting Management Information System

BRT: Bus Rapid Transit

CCP: Continuous Compliant Planning

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

ENR: Environment and natural resources

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: Household

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

MICE: Meetings, Incentives, Conferences and Exhibitions

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

ROW: Right of Way

RWB: Rwanda Water Resources Board

RTDA: Rwanda Transport Development Agency

SDGs: Sustainable Development Goals

SME: Small and Medium Enterprise

SUDS: Sustainable Urban Drainage Systems

TREPA: Transforming eastern Province Through Adaptation

TTC: Teacher Training College

TVET: Technical and Vocational Education and Training

UMIC: Upper Middle-Income Country

UR: University of Rwanda

WASAC: Water and Sanitation Corporation

Executive Summary

Ngoma District is one of seven Districts (alongside Bugesera, Gatsibo, Kayonza, Kirehe, Rwamagana and Nyagatare) that compose the Eastern Province. It is subdivided into 14 sectors, 64 cells and 473 villages. Ngoma District borders Rwamagana District in north-west, Kayonza District in north-east, Bugesera District in the west, Kirehe District in the east and borders Burundi country in the south.

The NLUDMP 2020-2050 recommended elaborate DLUP Clusters to review those elaborated while implementing the NLUDMP 2010-2020. The updated DLUPs differ from the previous ones in terms of planning scale where the whole district land use is recommended to be planned and both urban and rural areas have been given planned land use. The aim of land use planning in Ngoma District is to guide proper land use management, for effective use of available resources, and rational land utilization at District level as well as guiding the future socio-economic development in the process of land use and master plan implementation.

In terms of population, Ngoma District was the second most densely populated District in the Eastern Province, based on the 2012 Fourth Rwanda Population and Housing Census (RPHC), with a population of 336,928. By 2022 Fifth RPHC, the population had risen to 404,048, with 9.2% of the population residing in urban areas and 90.8% in rural areas, and with a population density of 469 inhabitants/km². According to the projections, the population of Ngoma District is expected to reach 434,714 by 2035 and 473,000 by 2050 following a growth rate of 0.6%.

The rural population is estimated at 366,751 inhabitants, or 90.8% of the total population, distributed in 53 rural settlement sites covering 7,107.6 ha and in other scattered settlements. The DLUP provides sustainable solutions for both urban and rural areas.

59 rural settlement sites are planned to extend on approximately 10,074 ha to accommodate the rural population, aligning with the NLUDMP 2020-2050 goal of 70% urban and 30% rural population distribution across the country. Therefore, the percentage of those living in the rural area will be 220,000 inhabitants, or 46.5% of the total district population, with the urban population reaching 53.5%.

Ngoma DLUP was developed through a participatory approach, which started from September 2022, with NLA and Ngoma District team jointly with various stakeholders (at central and local level, e.g. public and private sector, ministries and institutions such as REG, WASAC, RTDA, RWB, RFA, RAB, from local administration from District to Village level, opinion leaders, local communities, and civil society). Ngoma DLUP was approved by the District Council on 27th October 2023 and the final validation by the Cabinet took place on 11th September 2023.

Ngoma DLUP is organized into different thematic areas describing the current situation and future trends in terms of Population, Urbanization, Settlements, and Housing (PUSH); Spatial Economy (Employment, manufacturing, industry, mining); Agriculture (agriculture farming and livestock); Environment and Natural Resources (land, forestry, water resource, mining resource, climate change and environment); Tourism and Conservation; Transportation; Public Utilities (Water, Energy, ICT); and Public Services (Health, Education, Public Administration, Religious, Recreational facilities, etc).

Ngoma District is split into urban and rural areas where especially built-up and socio-economic infrastructure have been planned separated from other larger consolidated lands uses. The urban areas include Ngoma District Town, covering mainly the three Sectors of Kazo, Kibungo and Remera with total area of 2,289.9 ha, as well as two Rurban Centers, Rukira Rurban Center in eastern Ngoma District covering 653.08 ha with a focus on economic development through banana plantations, and Sake Rurban Center in western Ngoma covering 805.5 ha where vibrate economic activities that make it a commercial hub. Sake Rurban Center also remains with a

potential to develop tourism around Lake Sake and Lake Mugesera.

Ngoma District is a rural district, with agricultural land use as a predominant economic activity of the population. Its future trends make it a *Commercial-oriented agriculture and tourism* hub. The vision of Ngoma District is to develop agriculture and make it productive as one of main economic activities of the district.

Agriculture will remain predominant land use with around 51% of the total land, built up areas including socio-economic infrastructure occupying 17%. Wetlands and water bodies with their buffer zones encompass around 20%, while forests occupy 11%.

The implementation of the Ngoma DLUP 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, commercial, industrial zones, etc. 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

Ngoma DLUP encompasses the allocation of land across the whole District to different uses around diverse thematic areas in order to manage the effective use of resources and guide future development as well as to promote more social, economic and environmental outcomes.

Ngoma District approved the first version of the DLUP in 2013, and in the same year approved the District Local Urban Development Plan (LUDP). These tools have steered land use planning across 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 been engaged in the revision and update of the NLUDMP 2010-2020, under which the evaluation and assessment on its implementation conducted in 2016-2017 indicated some bottlenecks that raised the urgent need to revise it. The newly revised and updated NLUDMP 2020-2050, which was approved by the Cabinet in July 2020, has the overall objective of finding solutions to the identified problems and generating specific guidelines for implementation and, mainly, designing a new and updated spatial structure for the country. All settlements, namely urban, rural, large or small, are part of the national spatial structure, including Kigali, the Secondary Cities and the network of Secondary Cities.

In accordance with the NLUDMP 2020-2050 directives, each sector, which has a spatial dimension and a land allocation requirement for sectoral activities, is recommended to update its master plan and strategies following the NLUDMP 2020-2050 guidelines. All land requirements are explicitly aligned with the national plan on the one hand, and based on quantitative programmes for its operations on the other.

The NLUDMP 2020-2050 still proposes the District Land Use Plans, where a new concept of District Land Use Plans Cluster is strongly recommended. This concept has the advantage of integrated compliance through the simultaneous preparation of a set of plans at District level. The DLUP includes urban and rural zoning plans. It details at the same time the district level zones by integrating urban land use zoning (Ngoma District Town, Rukira and Sake Rurban Centers) and rural zoning which includes the whole Imidugudu complex, agricultural zones, forests and infrastructure in the district. A detailed zoning map of the district with zoning regulations, useful for cadastral surveying, building permit systems and for subsequent detailed local physical planning. In addition, the DLUP is expected to be consistent with green principles and climate resilience strategies to become a Green DLUP.

It is in this perspective that the preparation and revision of Ngoma DLUP was undertaken from September 2022. The revision of the DLUP was done within the framework of alignment and compliance with the NLUDMP 2020-2050, as well as Vision 2050, NST1, Sectoral Strategic Plans and the District Development Strategy (DDS).

1.1.1 Land Use Planning Concept in Rwandan Context

The concept of “Land Use Planning” involves the allocation of land to different uses across a landscape in a way that balances economic, social and environmental values. Its purpose is to identify, in a given landscape, the combination of land uses that is best able to meet the needs of stakeholders while safeguarding resources for the future. Effective land use planning provides direction on the manner in which land use activities should take place and encourages synergies between different uses. It requires the coordination of planning and management across the (often) many sectors concerned with land use and land resources in a particular region.

Land use planning and management in pre-colonial Rwanda was characterized as led by customary law which governed almost all the rural lands and promoted the excessive parceling out of plots through the successive father-to-son inheritance system where there was collective ownership of land and complementarity between agriculture and livestock farming lands. This system promoted economic production and was a factor of stabilization and harmony in production and social relationships. Families were grouped in lineages, and these were in turn grouped in clans. Each clan had a chief. Clans were spread all over the national territory: in different proportions according to regions. Land ownership relationships were thus based on free land use and on the complementarity of the modes of production.

During the colonization period new elements in the Rwandan society were introduced which brought a lot of changes including the introduction of the economic system, which was founded on 3 pillars, namely land ownership for agricultural purposes, livestock and security in order to guarantee prosperity. For the 1st time, the Belgian colonial administration established the 1885 decree concerning land use with the two main doctrines of this decree:

A Post-Colonial Period, especially before 1994 Rwanda Genocide against Tutsi has been characterized by the implementation of the written land law which still applied to a small number of persons and religious congregations. It is applied more especially in urban areas and business communities. Thus, the first master plan was established in 1983 (Sirven, 1983) The urban master plan only concerned the old small residential area of the old City of Kigali, especially in Nyarugenge (a small place on Nyarugenge hill, currently, Nyarugenge District. (Christine Abong'o et al, 2024)

The Rwandan National Land Policy of 2004 provided a good orientation on how the land use planning and management tools play a key role in efficient land management. The policy provided the strategic options and orientation towards establishment of land use master plans starting from the National Land Use and Development Master Plan. The first National Land Use and Development master Plan 2010-2020 (NLUDMP 2010-2020) was elaborated. This later became a national priority to serve as a basic tool and springboard in the application of the national policies geared towards poverty reduction through precise and coherent distribution of lands in relation to what they are suitable for. The first NLUDMP, had a planning horizon of 10 years and was scheduled to be revised by 2015 to reflect the implementation of EDPRS II and towards achieving the vision 2020.

Its implementation has directed the sectorial, district and local land use and master plans elaboration and thus, between 2013- 2014, a lot of efforts were made to develop the District Land Use Plan (DLUPs) for all Districts. The DLUPs were approved at District level by District Councils. They played a significant role in guiding the spatial allocation of different land uses even if their quality needed further improvements.

In 2016 and 2017, the Ministry Environment, through Rwanda Land Management and Use Authority (RLMUA) later became the National Land Authority (NLA), jointly with key stakeholders, conducted an assessment and evaluation of the NLUDMP implementation of different land-use plans at District level. It was found that the NLUDMP is not in harmony with the NST1, the new Land Law, the Secondary City Approach, Green Growth Policies, and sector databases provided by national authority custodians. The assessment recommended its review through elaboration of NLUDMP 2020-2050 which started in December 2018, completed in June 2020 and was approved by the cabinet on 29th July 2020. The Presidential Order No 058/01 of 23/04/2021 has established the National Land Use and Development Master Plan (NLUDMP 2020-2050). It is being implemented through all required land use and master plans, including review of the existing District land Use Plans.

1.1.2 Impacts of Ngoma DLUP

The DLUP is a key tool to indicate catalytic projects within the district to guide investment. The DLUP aims to mitigate the negative effects of growth and development, by finding solutions to the existing problems and to manage future growth. The DLUP provides physical and social infrastructure, e.g. vehicular access to roads, electricity, water, schools, healthcare facilities, and public transport. The plan guides on the efficient and sustainable exploitation of existing natural resources such as minerals and forests.

The DLUP has the following key outputs;

- Anticipate the development needs of an area;
- Identify relevant development issues;
- Identify opportunities for and constraints to development;
- Identify areas which are suitable for different types of development;
- Make proposals for the way in which the area should be developed over time; and
- Establish standards to guide development.

The DLUP has a significant role in controlling the growth of urban and rural settlements by indicating the physical boundaries of the area, also preventing informal development and urban sprawl. The control of housing and population densities, upgrading and redevelopment of existing neighborhoods in urban areas are the principal impacts of district land use planning.

Another substantial impact of DLUP is its effect on land values. Land use planning influences land values in the sense that planning permission is an important factor in the determination of land values. It is envisaged that, as a result of the DLUP, the value of land both in urban and rural areas will increase significantly following the development of various areas.

1.2 Objective and Scope

1.2.1 Objective

The overall objective of DLUP is to ensure proper land use to guide the future development of Ngoma District.

The DLUP aims at allocating land to different uses by clustering all thematic areas, so as to manage the efficient use of resources and guide future development, thereby promoting social, economic and environmental benefits. Ngoma DLUP emerged with the 2050 target, to facilitate the implementation of the NLUDEMP 2020-2050. It gives details in terms of land allocation with specifications and potentialities of the districts, in comparison with the NLUDEMP 2020-2050 which gives general guidelines to facilitate the planning balance of land use at national level.

Furthermore, specific objectives of this DLUP are:

- To protect all parts of agricultural land by encouraging land consolidation, in urban and rural areas;

- To promote tourism as key drivers of District generating revenues by focusing on introducing new segments that attracts more tourists;
- To provide different scales and cost range of commercial and light industrial solutions, following current and expected market dynamics;
- To allow and facilitate vertical and horizontal incremental development allowing phased construction of commercial, mixed-use, mixed income and residential buildings;
- To promote the densification of dwelling;
- To provide for the preservation of desirable open space, historic related resources, water resources, wetlands, forests, and other environmentally important lands;
- To facilitate adequate provisions for community utilities and facilities such as transportation, water, sewerage, schools, parks, and other public requirements;

1.2.2 Scope

The scope of the DLUP includes the whole District, consisting of both urban and rural components. Ngoma DLUP covers all thematic areas including (i) PUSH, which stands for population, urbanization, settlements and housing; (ii) spatial economy, which stands for employment, manufacturing, mining and industry; (iii) agriculture; (iv) environment and natural resources; (v) tourism and conservation; (vi) transportation; (vii) public facilities and services. Considering all of these thematic areas, land has been allocated to different uses by land use zoning to feed each sector depending on its land demands, to achieve a balanced and effective land use balance sheet.

The DLUP describes the existing situation and planning perspectives for each land use category as well the potential catalytic projects in the district. The plan guides on how the DLUP will be implemented in four phases, and also describes the guiding tool of monitoring and evaluation (M&E) for compliance.

The DLUP integrates sectorial master plans where spatial data is available. However, some sectoral studies will continue to be undertaken by relevant central government sector ministries and authorities concerned and will be integrated into Ngoma DLUP through timely updates and proposed revisions on a 5-year basis. The following are thematic Sectoral Strategic/Master Plans so far integrated in the Ngoma DLUP:

- ^ Agricultural land suitability mapping, 2019
- ^ Rwanda Irrigation Master Plan, 2020
- ^ Forestry and Natural Parks
- ^ Water and Wetlands (+buffer zones)
- ^ Power and energy
- ^ Water and Sanitation master Plan, 2020
- ^ Mining and quarrying

- Human habitation (Urban, rural and rural settlements boundaries)
- Tourism and Conservation Plan
- Industrial master plan

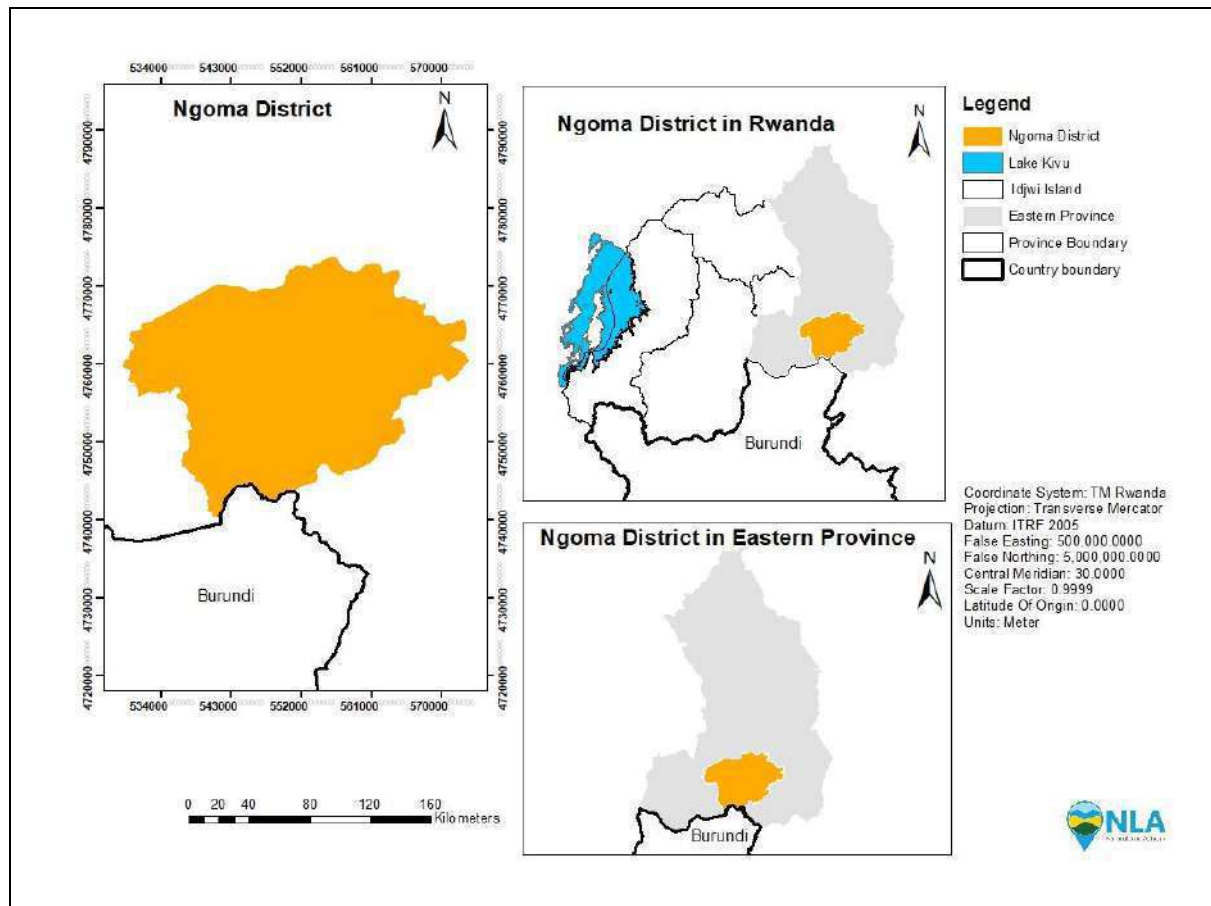
1.3 Ngoma District Description

Ngoma District is one of the seven Districts of the Eastern Province established by the organic law n° 29/2005 of 23/12/2005 on the administrative entities of the Republic of Rwanda. It is composed of 14 Sectors, 64 cells, and 473 Villages. The district covers an area of 867.7 km². Based on the 5th By 2022 Fifth Rwanda Population and Housing Census 2022, the population had risen to 404,048, with 9.2% of the population residing in urban areas while 90.8% in rural areas, and with a population density of 469 inhabitants/km². According to the projections, the population of Ngoma District is expected to reach 434,714 by 2035 and 473,000 by 2050 following a growth rate of 0.6%.

1.3.1 Geographical Location of Ngoma District

Ngoma District is located approximately at a distance of 100 km south-east of Kigali (latitude 2°8'S, longitude 30°33'E). It borders Rwamagana District to the north-west, Kayanza District to the north-east, Bugesera District to the west, Kirehe District to the east and the Republic of Burundi to the south the map below provides the location of Ngoma District:

- The map of Hydrography of Ngoma District

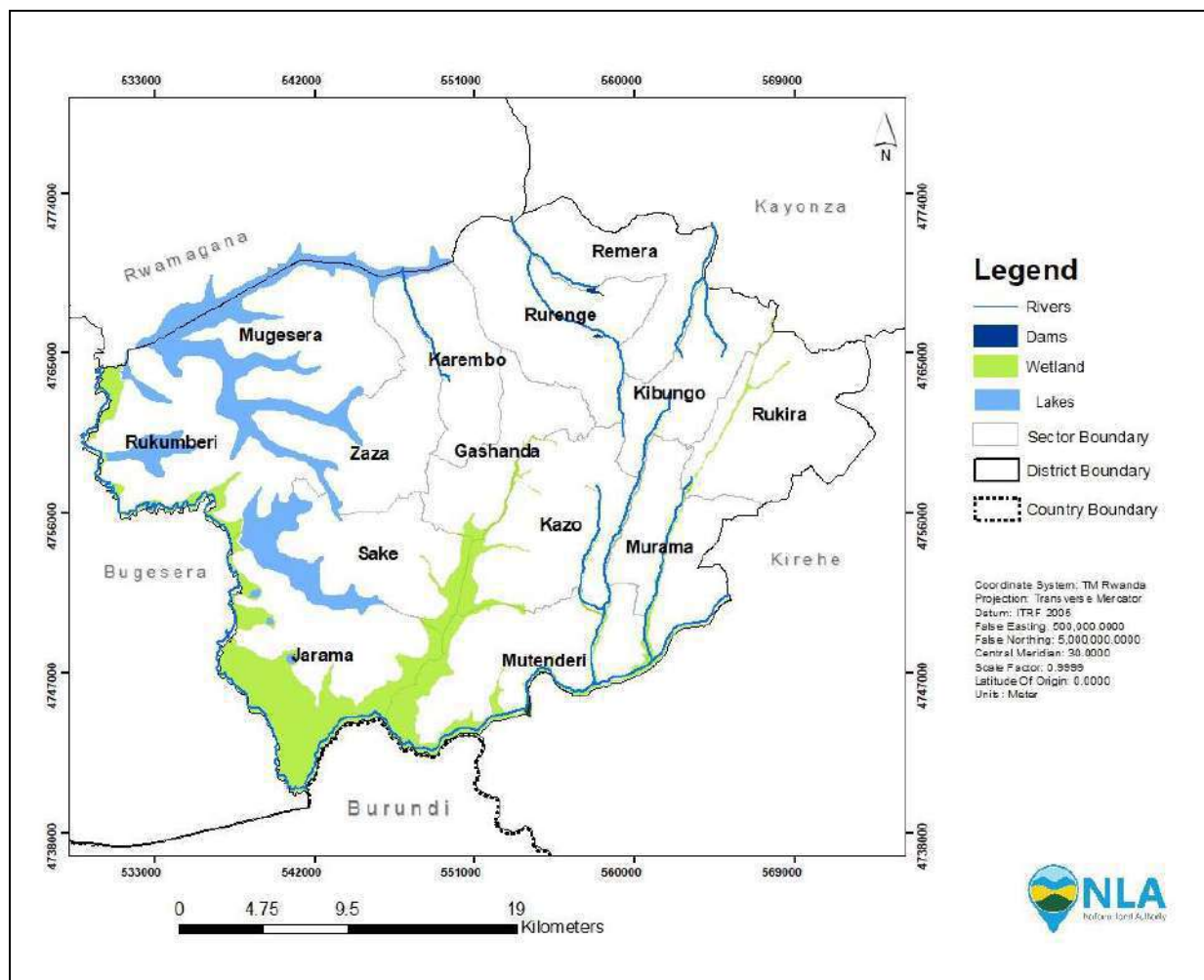


*Map 1: Administrative Map of Ngoma District (National Context)-***1.3.2 Hydrography**

Rwanda is divided into two major drainage basins: the Nile to the east, covering 67% and delivering 90% of the national water, and the Congo to the west which covers 33% and handles all national waters (Chemonics International Inc. 2003, MINITERE 2005, NBI 2005). Ngoma District has three lakes, Bilira, Mugesera and Sake, which provide the district with beautiful landscape that can attract tourists if developed and well marketed.

There are many rivers in the district among others, the main and most important rivers (type 1) of Akagera with 19.3 m of length and Nyabarongo river with 20.8 m of length. Other rivers are small and all categorized as type 4 having 336 km of length. Below is a map illustration of the water body in Ngoma District.

- The map of Hydrography of Ngoma District

*Map 2: Hydrography of Ngoma District***1.3.3 Soil and Erosion**

Soil is the loose material that lies on the top of the crustal rocks. Soil forms after weathering of the parent rock

into small particles (REB, 2023). Soil contents refer to gasses, water, mineral matter, plant residues and living organisms. Factors like vegetation type, climate, parent rock material determine the nature of soils in a given area (REB, 2023). Rwandan soil is generally affected by erosion, especially in hilly areas, and is therefore important to protect.

1.3.3.1 a) Soil in Ngoma District

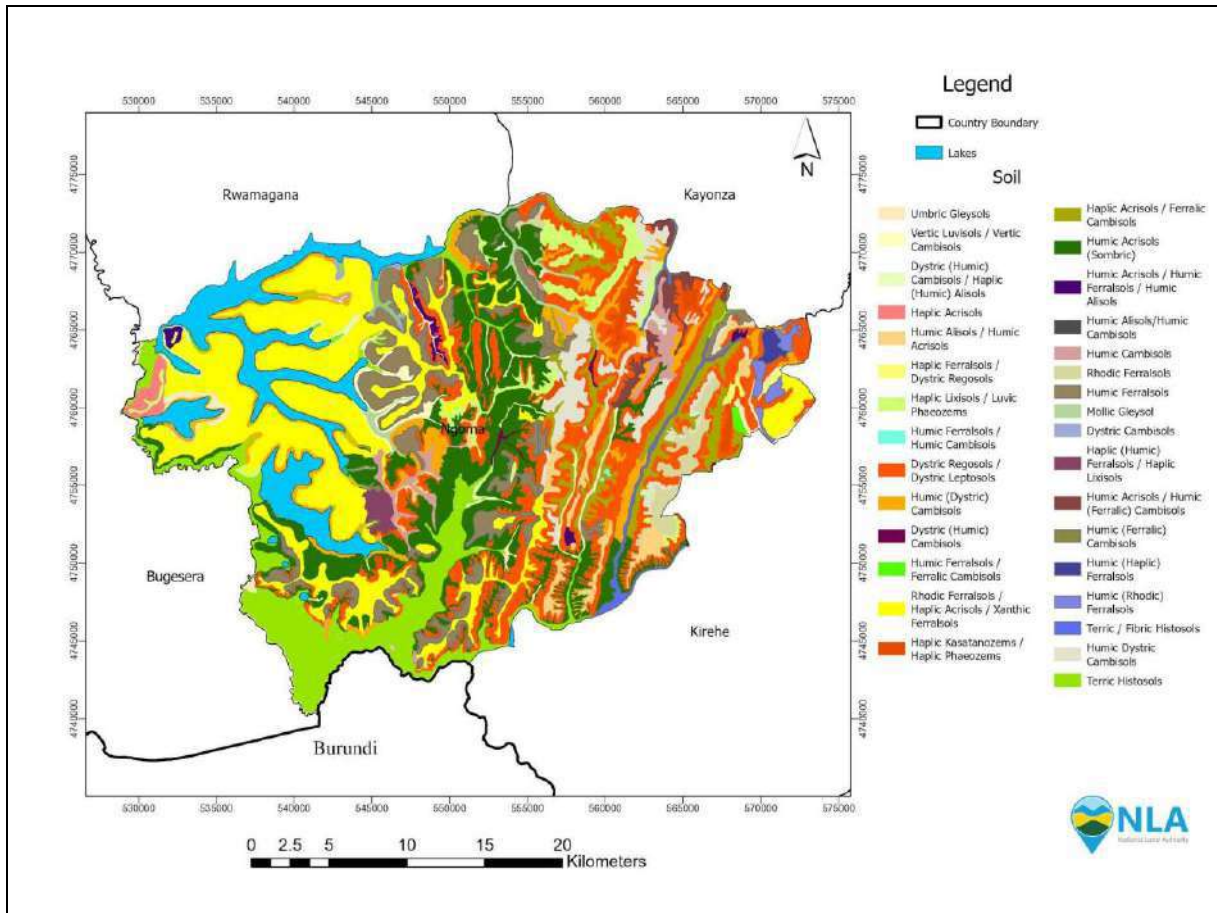
Ngoma District is located in a region characterized by three types of soil (kaolisols, xerokaolisols, and vertisols/histosols).

Humus-bearing Kaolisols are composed of aluminum and iron in smaller quantities as well as calcium, magnesium, sodium and potassium. These soils dominate the eastern part of the district, covering Kibungo, Remera, Kazo, Mutenderi, and Rukira and Rurenge Sectors.

Xerokaolisols cover an important part of the western part of the district including Mugesera, Zaza, Rukumberi, Sake, and Karemba Sectors. They are characterized by a thin layer of humus. Beneath the humus lies a layer resulting from the accumulation and cementation of iron and aluminum oxides thicker than the humus layer.

Vertisols, with a high clay content, are often subject to marked shrinking and swelling with changes in water content. They are generally low in organic content. Vertisols form under climatic conditions, they are seasonally humid or subject to periods of droughts and floods or that impeded drainage. They can range from gray or red to the more familiar deep “black cotton” soils, depending on the parent material and the climate. Domain of vertisols is found in the lower parts of Akagera river

- Soil map for Ngoma District



Map 3: Map of soil of Rwanda – Source: (REB, 2023)

1.3.3.2 b) Erosion in Ngoma District

Soil erosion is the most serious environmental problem in many catchment areas in Rwanda. The main factors affecting the amount of soil eroded include land use and vegetation cover, topography, soil and climate. As compared to other districts in Eastern Province, Ngoma District is the fourth district susceptible to erosion.

Areas in risk of erosion in Ngoma District are estimated to 25,966 ha. About 32% of the total District land are highly susceptible to erosion, of which 2,971 ha are located in Kibungo Sector (70% of Sector land), 2,831 ha are located in Remera Sector (57% of Sector land), 2,359 ha are located in Murama Sector (47% of the Sector land), and 2,713 ha are found in Rukira Sector (about 40% of the Sector land).

The Sectors least prone to erosion are Jarama with 782 hectares (9% of the Sector land), Mugesera with 952 hectares (17% of the Sector land), and Gashanda with 858 hectares (about 22% of the Sector land). Erosion risk in Ngoma District is summarized in the table below.

Table 1: Erosion risk per Sector in Ngoma District

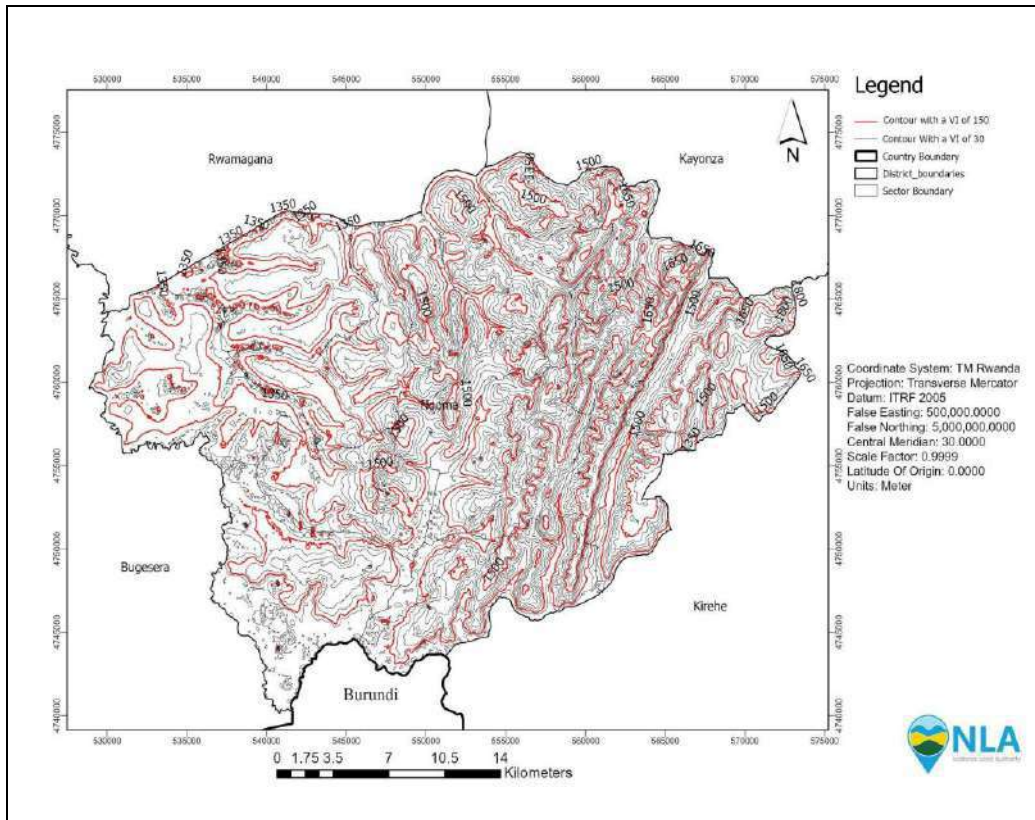
Sector name	Total area dominated by erosion risk (in ha)				Total erosion risk zone (ha)	Sector land (ha)	Percentage (%)
	Extremely high (ha)	Very high (ha)	High (ha)	Moderate (ha)			
Kibungo	25	182	873	1891	2,971	4256	70
Remera		253	923	1655	2,831	4989	57
Murama		83	528	1748	2,359	5040	47
Rukira	39	170	1061	1443	2,713	6866	40
Kazo		42	625	1840	2,507	6963	36
Karembo		26	197	1028	1,251	3641	34
Sake		78	168	1424	1,670	5035	33
Rurenge	2	44	453	1563	2,062	6513	32
Rukumberi		12	576	1395	1,983	6798	29
Mutenderi		22	224	1511	1757	7606	23
Zaza	18	20	203	1028	1,269	5530	23
Gashanda	16	25	103	713	857	3840	22
Mugesera	31	111	291	519	952	5664	17
Jarama		1	72	709	782	8706	9
Grand total	131	1069	6297	18467	25964	81447	32

Source: RWB, 2022

1.3.4 Topography

The District of Ngoma is part of the lowlands of the East, a region essentially dominated by hills with low slopes, with an average altitude between 1,400 m and 1,700 m above sea level. The original relief is a plateau strongly dissected by tectonic movements of the quaternary that were progressively gullied by the erosion creating valleys and swamps. Below is the topographic map of Ngoma District.

- The map of topography in Ngoma District



Map 4: Topographic Map of Ngoma District

1.3.5 Climate and Rainfall

The climate of Ngoma District is temperate type, especially in low altitudes. The annual average temperature is around 20°C. Ngoma, like other regions of the country, has four seasons of which two are rainy and two are dry. A short rainy season October to December, a short dry season January to February, a long rainy mid-February to mid-May, and a long dry season from mid-May to September.

Generally, the long dry season and the resulting rain deficiency adversely impacts agricultural and pastoral production. The annual precipitation in the district lies between 900 and 1,400 mm of rain.

1.3.6 Flora and Fauna

Biodiversity in the District is under threat, mainly due to the large proportion of the population working in agriculture. Agricultural activities have stripped away much of the natural vegetation to allow for growing of food crops such as potatoes, maize, beans and sorghum. In terms of flora and fauna, the natural vegetation of the district is dominated by savanna vegetation.

1.3.6.1 Fauna

Wildlife no longer exists in the region for some time, except for some birds. The presence of birds can attract tourists to the area if “Birds Viewing” is well developed as one the tourist attractions.

1.3.6.2 Flora

The vegetation is typical of the East African basin, with vast lands of grass and scattered shrubs. The natural vegetation of the district has progressively changed to cultivated land with crops and manmade (planted) forests, mainly eucalyptus and pine. The vegetation is dense in eastern Ngoma, whilst flora is rare in the western part with lakes and poor vegetation (mostly grasses and shrubs).

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.

The table below presents the spatial SWOT analysis of Ngoma District as per the NST1 sectors. Based on the findings of the spatial SWOT analysis, the district has crafted spatial priorities to maximize identified opportunities and strengths, as well as strategies and mitigation measures to address existing weaknesses and threats.

Table 2: Spatial SWOT Analysis for Ngoma District

1.3.7.1 SWOT Agriculture and Livestock

Strengths	Weaknesses
Suitable land for agriculture (banana, rice, maize, pineapple, coffee) and livestock (fish, cows, goats). Existence of swamps, lakes, rivers and dams to facilitate irrigation. Plains and low inclined hills suitable for agricultural mechanization Transportation infrastructure (maintained feeder roads, ports around Lakes Mugesera and Sake) to facilitate transportation of agricultural produce. Presence of agro-processing plants.	Low level of mechanization practices in agriculture which leads to low productivity. Low level of exploitation of wetlands for agricultural purposes. Insufficient market for agricultural produce. Limited post-harvest facilities. Limited investment in agriculture. Insufficient modern slaughter houses.
Opportunities	Threats

Potentiality in agriculture mechanization development. Spatial location of Ngoma District between Secondary and Satellite cities (Kirehe, Kayonza, Rwamagana and Bugesera) provide potential markets for agricultural produce. Potentiality for growing palm trees (palm oil production) Planned agro-processing industrial zones (Sake and Ngoma District town).	Climate change effects due to shortage of rainfall Crops and animal diseases or pests like Foot Mouth Diseases (FMD) Soil degradation
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1.3.7.2 Spatial SWOT on Society

Strengths	Weaknesses
Availability of healthcare and education facilities Administrative offices are in place to support institutional development Existence of cultural troupes and sport clubs. Existence of playgrounds and youth center Existence of historical sites (Urukiko rwa Gacinya, Kwa Nyirakabuga, etc) Predominant of young population as source labour force. Existence of Integrated Development Program (IDP model village).	Low skilled, unemployed populations are engaging in low-income activities. Poor condition of healthcare and education facilities. Limited investment in public facilities and equipment. Mismanagement of cemeteries within the district. Public administration offices in some places are not fully completed, especially Cell and Village offices Low level of dissemination of laws and policies related to land use. Insufficient playgrounds and funds to support and motivate sport teams Historical and cultural sites are not well managed.
Opportunities	Threats
Political will to improve the public facilities in the district	The district is prone to endemic diseases like malaria. Cross border crime that the district is not able to control, like illicit drinks.

Planned space for the development of sport and leisure facilities.	
Improvement of lifestyle due to neighboring Districts (including Satellite Cities Bugesera and Rwamagana, Secondary Cities Kirehe and Kayonza)	

1.3.7.3 Spatial SWOT on Economy

Strengths	Weaknesses
The District Town Master Plan has facilitated settlements especially in urban areas. Existence of markets (Kibungo, Rukira, Sake, Mutenderi, etc) and emerging trading centers (Karembo, Mutenderi, Jarama, etc) Local community participation in land use management, master plan implementation, land use compliance and environmental protection The existence of light industries (agro-processing and Agakiro) and availability of raw materials for agro based industries. Road network to facilitate economic activities. Access of internet infrastructure (fiber and towers) Existing tourism sites including lake shores and natural conservation areas. Mining and quarrying sites (Jarama, Karembo, etc)	Insufficient infrastructure to attract the population to settlement sites. Low level of master plan implementation due to lack of enforcement. Insufficient capacity of public utilities such as water, electricity and ICT. Insufficient tourism related hospitality services. Lack of modern markets Unequal distribution of financial institutions (commercial banks and micro financial institutions) Low maintenance of existing feeder road network. Unsustainable and low exploitation of mining sites. Insufficient light industries Undeveloped tourism sites.
Opportunities	Threats
Planned light industrial areas to accommodate scattered industries located in Sake and Ngoma District town. Planned tourism projects around the lakes and planned suspension bridges in Rukumberi Sector. Planned healthcare facilities including District Hospital in Sake Sector. Planned eastern railway and railway stations (Sake and Rukumberi).	The hilly topography of Remera, Rurenge, Murama and Kibungo Sectors affect establishment of various infrastructure.

Ongoing modern market project in Sake Sector. Community work activities (Umuganda) initiating, maintaining and rehabilitating roads within the Sectors. Planned water supply projects to increase water access in rural and urban areas.	
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1.3.7.4 Spatial SWOT on Environment

Strengths	Weaknesses
Natural resources including forests, water bodies and wetlands. Existence of mineral resource deposits and quarries. Existence of transfer station supporting waste management practices in the district.	Poor management of natural resources, especially forest, wetlands and waterbodies. Deforestation due to intensive use of non-renewable sources of energy (wood, charcoal). Land degradation due to poor mining practices. Poor waste management within the district. Low level of stormwater management.
Opportunities	Threats
Potential investment in sustainable exploitation of quarries and mining (coltan, cassiterite, clay, stones and sand). Planned afforestation and reforestation project. Ongoing projects of progressive and radical terraces.	Prolonged drought which affects vegetation Flooding

2. REGULATORY AND POLICY FRAMEWORK

Several policies, laws, strategies, guidelines, and directives documents prepared by the Government of Rwanda regulate land use, development, planning and management in Rwanda, as discussed in this section.

2.1 Policies

National Land Policy, established in June 2019 by the Ministry in charge of Land (Currently MoE)

The revised land policy 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.

The National Urbanization Policy, 2015 addresses all aspects of cross sectoral actions in urban development and governance for sustainable development. It aims to enhance collaboration and cooperation between all stakeholders and communities to improve service provision and support a continuously growing local economy. It sets a framework to guide urbanization through its four overarching policy pillars: Coordination, Densification, Conviviality and Economic Growth.

2.2 Laws and Regulations

Presidential Order N° 038/01 of 20/05/2022 establishing the national land use and development master plan (NLUDMP 2020-2050).

The Presidential Order establishes the NLUDMP, 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 gazetted NLUDMP, 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 Ngoma District revised its Land Use Plan, ensuring the compliance with the directives set forth in NLUDMP 2020-2050.

Law n° 27/2021 of 10/06/2021 governing land.

The law governing land in Rwanda 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. The 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.

Ngoma DLUP was revised taking into consideration additional 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 No 005/MoE/22 of 15/02/2022 determining modalities of change of land use.

Land use plans zoning regulations edition 1, November 2022.

2.3 Sectoral Plans

- 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)
- Irrigation masterplan (2020)
- Rwanda Transmission masterplan (2020-2028)
- National Feeder Roads Masterplan (2023)
- Rwanda Forest Cover Report (November,2019)

2.4 Guidelines

Numerous land use planning guidelines established in previous years remain pertinent and continue to inform current practices, e.g.: Land use guidelines established in 2017

Ministerial Instructions relating to the implementation of the National Grouped Settlement Program in Rural Areas (27 May 2009);

Rwanda Urban Planning and Building Codes (June 2019, MININFRA);

Rwanda Land Use Planning Guidelines (December 2017, NLA);

Participatory Land Readjustment guidelines (October 2021, NLA);

Ministerial Instructions no.001 of 23/04/2018 determining the management and use of the lands allocated for agriculture and livestock.

3. Methodology

3.1 Desk and literature review

Ngoma District, in collaboration with NLA, conducted the preparation of Ngoma DLUP. The two parties' staff worked together step by step, from beginning up to the end. This working environment supported the sharing of secondary data needed and used in the desktop review. Ngoma DLUP was updated in the framework of alignment with the NLUDMP 2020-2050; hence the preparation of the plan was made to also harmonize with DDS, NST1 and Vision 2050.

3.2 Kick off meetings and public awareness

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, rural, and rural settlement sites, dissemination and information sharing for public awareness.

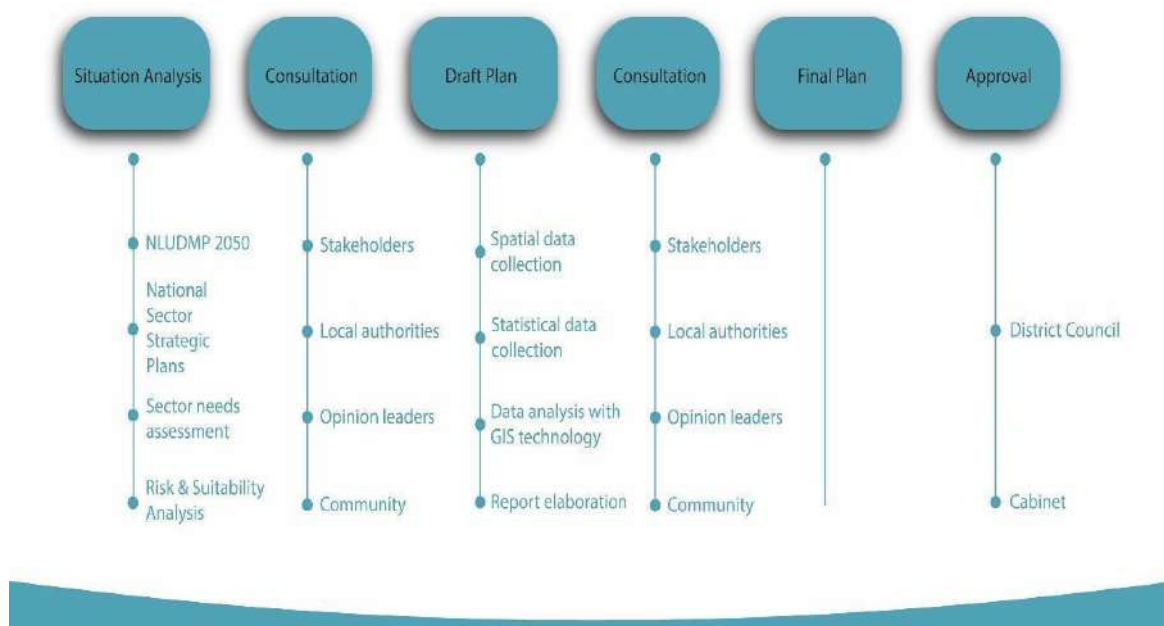


Figure 1: Planning steps used during elaboration and review of Ngoma DLUP - Source: NLA data analysis, October 2022

3.3 Consultation

Consultation emerged as one of the methodologies used in the development of the DLUP for Ngoma 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 Ngoma 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 Ngoma DLUP, consultation meetings were held among the different institutions, local authorities and the community.

3.3.1 Consultation with Local Community

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.

Community consultation meetings were conducted in each Sector to raise awareness of the project and its objective, for people to understand the purpose of the plan for their future perspectives and their contributions. These consultations helped clarify current land issues, assisted in effective data collection, and allocation of land to the most suitable areas. From the consultation meetings, the community learned about their role and responsibilities during the development of the DLUP, as well as their involvement in the implementation of the plan.

The community was given the opportunity to guide the technical team in collecting data in the field, and to integrate their insights so that no developments are left behind. Through the consultation meetings, the communities have contributed with their ideas to guide the DLUP planning process, participating in the data collection, have become aware of the structure of DLUP, and understand how it will be implemented.

Thus, Ngoma DLUP has been developed in a participatory planning process plan that encompasses all people and sectors, where local communities have an improved understanding of their role and responsibilities during implementation.



Photo 1: Ngoma District, Consultation with Local Community - Source: Photo taken during our Consultation Sessions in Ngoma, September 2022

3.3.2 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 Ngoma 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 Ngoma 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.

The consultation meetings resulted in raising awareness of the project among local authorities in Ngoma District, allowing them to better understand their role and responsibility from planning to implementation, to be more conscious of the DLUP and to get involved to facilitate its implementation.



Photo 2: Ngoma District, Consultative Meetings with Local Leaders

3.3.3 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 plays 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 Ngoma DLUP, the various institutions involved in the project and consulted by NLA included RDB (field consultation on tourism zone), RHA, RTDA, NISR, LODA, REMA (field consultation on conservation), RWB (field consultation on stormwater management plan), RFA, WASAC, REG, RAB, and various ministries such as MINEDUC, MINISANTE, MINAGRI, and MINISPORT.

3.4 Data Collection

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

3.4.1 Spatial Data Collection using GIS Tools

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 Ngoma 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 Ngoma 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.



Photo 3: Use of SW maps to collected spatial data – Source: Field photo, November, 2022

3.4.2 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, rurban, and rural settlements sites. The following photos were taken during the field survey and data collection exercises.



Photo 4: Field Visits and Primary Data Collectuion in Ngoma District-source_ field photo, October, 2022

3.4.3 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 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 Ngoma DLUP.

Non-spatial data collected and used during the elaboration of Ngoma 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 Ngoma 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.

3.5 Data Analysis and Interpretation

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 were identified, to be allocated for forest plantations, 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 Ngoma 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 Ngoma District.

3.6 Ngoma 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 describes the spatial characteristics of the district, and 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 is 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.

Ngoma 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, and conclusions and recommendations, and appendices.

4. NGOMA DISTRICT LAND USE PLANNING

4.1 Visioning and Economic Specialization of Ngoma District

4.1.1 Vision of Ngoma District

The vision of Ngoma District is aligned to the country's target of being classified as an upper-middle-income country (UMIC) by 2035, and a high-income country (HIC) by 2050. Quantitatively, this means a GDP per capita of over USD 4,036 by 2035, and a GDP per capita of over USD 12,476 by 2050. The district's vision is also aligned to Vision 2050, NLUDMP 2020- 2050 and NST1. As per Ngoma DDS, the District is committed to protecting the environment and fighting against the effects of climate change (DDS, 2017-2024). The ambition of the district is to enhance agricultural practices for food security and promote a market-oriented, agriculture-based economy.

In this regard, the vision for Ngoma District has been defined as ***“Commercial-oriented agriculture and Tourism”***.

As per NLUDMP 2020-2050, Ngoma District's land use is classified as land use category (LUCA) B; characterized by suitable land, the district is expected to grow its economy through agro-industrial development, and increased agro-technology for improved agricultural production in terms of quality and quantity. In addition, social harmony, better service delivery, transparency, job creation and citizen participation will be the guiding principles of the district.

This vision will be achieved through the implementation of Government Policies, service delivery and support to sectors to deliver quality services, especially with regard to the implementation of the land use plan. With Ngoma DLUP, the formulated objectives are specific, measurable, appropriate, realistic & achievable, and time bound (SMART).

Based on the spatial SWOT, strategies and recommendations have been formulated to guide the land use planning in Ngoma District to become an area of “Commercial-oriented agriculture and tourism”.

4.1.2 Development Strategies for Ngoma District

Rwanda aspires to become a Middle-Income Country by 2035 and a high-income Country by 2050. It plans to achieve this through a series of seven-year National Strategies for Transformation (NST), underpinned by sectoral strategies focused on meeting the UN's Sustainable Development Goals (SDGs). In this framework, Ngoma District has also embarked on sustainable land use planning as a fundamental pillar for an ambitious

social-economic development. Thus, a spatial SWOT analysis led to set strategies for Ngoma District. These later will guide the district development:

4.1.2.1 To keep and develop sustainable agriculture

By this strategy, the district will improve the agricultural production system, protecting available agricultural land and enlarging its size through a conversion of some land use or land covers (grasslands, shrublands, wooded savannah, etc.) into agriculture and livestock areas; applying agricultural mechanization (machine use, irrigation practices, use of fertilizers, etc) to promote cash crops.

4.1.2.2 To attract investors in agriculture

The majority of investors do not like to undertake their projects in the agriculture sector under the pretext that the return is doubtful and that climatic conditions are very limiting factors in Rwanda. This planning will demonstrate the power of professional agriculture in economic growth and its part in the national economy. This will also enable sustainable land use consolidation both as well as quantitative and qualitative production. The availability of the market will be a key attraction of investment.

4.1.2.3 To improve agro-processing industries

This strategy will manage the agricultural production expected to increase as long as all factors of production are met.

4.1.2.4 To innovate post-harvest handling facilities

By this strategy, the Ngoma DLUP will ensure that the available post-harvest handling facilities are in good condition and serve the community. They are not even enough based on the Ngoma District's target in agriculture development. All the first four strategies support agriculture planning. They strengthen and sustain the vision of ngoma District of commercial agriculture oriented and tourism.

4.1.2.5 To develop touristic sites and hospitality services

Ngoma District is provided with an importante unexploited lake shore. The only predominant activities around Ngoma Lakes are fishing and agriculture with small scale irrigation practices. Tourism sector remains unknown and less attractive due to the lack of a lakeshore master plan, basic touristic infrastructure. This spatial planning strategy will inspire the district in which infrastructure is needed, where the tourism master plan requires which land would remain with agricultural production, what capacity building to provide to workers in the tourism sector.

4.1.2.6 To develop and conserve natural resources

The natural ecosystems in wetlands, natural forest management, monitoring of mining extraction, erosion control, waste management, stormwater management and water harvesting systems will be a key mechanism that will bring about this strategy to promote the environment protection in Ngoma District.

4.1.2.7 To develop commerce and trade connecting to neighboring Districts and Burundi

The seventh strategy is about sustaining the trans regional and border trading in Ngoma District, given its location taken as potential, between two satellite cities of Bugesera and Rwamagana; secondary cities of

Kayonza and Kirehe as well as neighboring country of Burundi.

4.1.2.8 *To develop sustainable transportation network*

Road network in Ngoma District is planned to be improved, especially construction of asphalted roads in the city center and the national road linking Ngoma to Bugesera and Kirehe Districts. The railway and its stations are planned to pass by Ngoma District and this is taken as an opportunity to develop affected areas.

4.1.2.9 *To develop and increase public facilities and utilities supporting social well being*

The existing gaps in education, health facilities, cemeteries, electrification, water supply etc will be filled while undertaking new projects to be proposed in this land use plan.

4.1.2.10 *To transform and develop settlement patterns and housing conditions*

The urbanization process in Ngoma District is very low (9.2% in 2022) so that the important number of populations is still in the rural zone. The purpose of this DLUP is to increase its percentage to at least 30.6% in 2035 and 53.5% in 2050. The rural settlement will also be upgraded and housing development outside the rural settlement sites boundaries avoided.

Development strategy map for Ngoma District

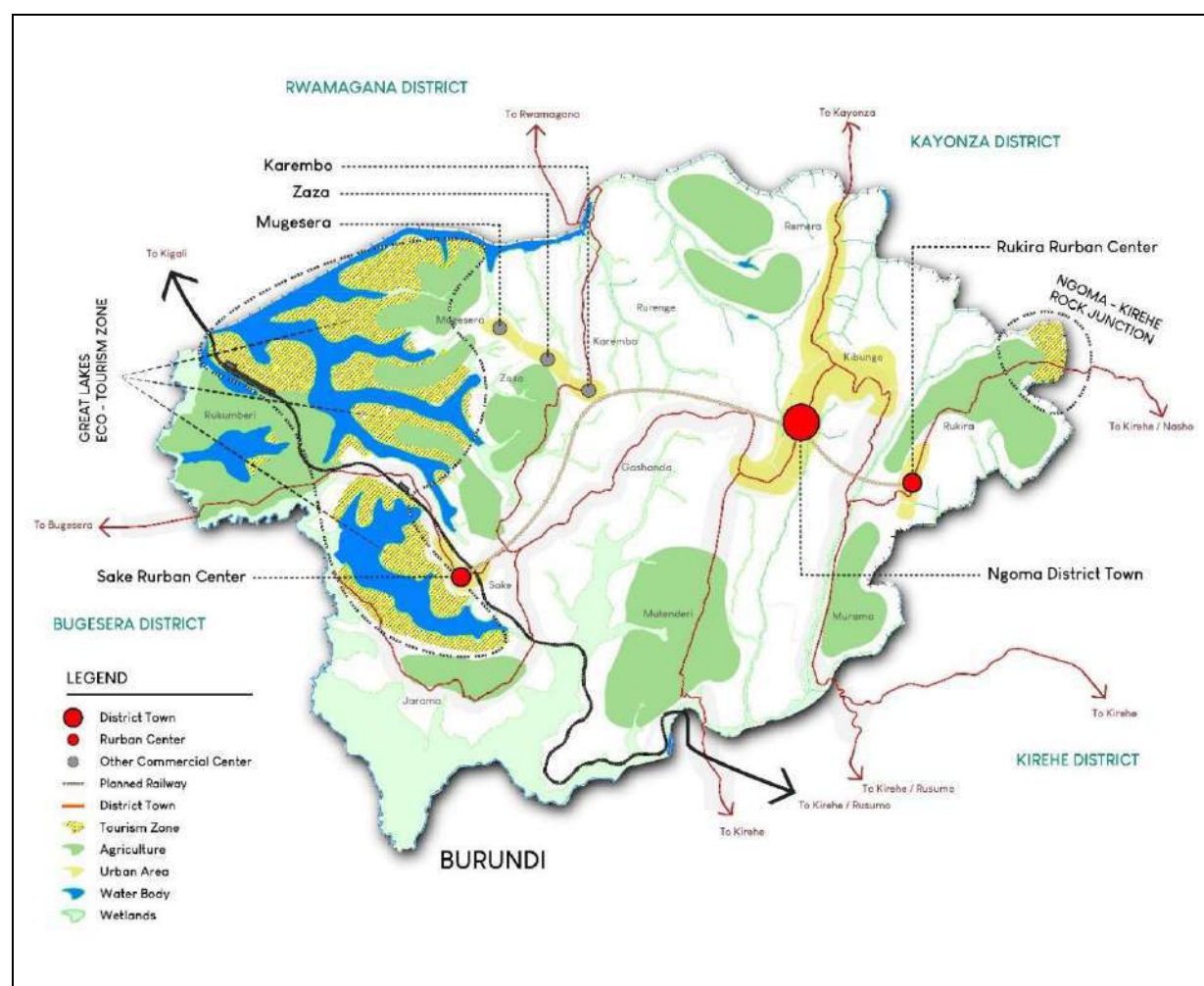


Figure 2: SWOT analysis map for Ngoma District

4.1.3 Ngoma District Economic Specialization

4.1.3.1 Ngoma District's economy

The economy of Ngoma District is divided into three sectors depending on the activities carried out: Primary, Secondary and Tertiary sectors. Based on the socio-economic context of Ngoma District, this translates to the primary agricultural sector, the industrial processing sector and the service sector.

The EICV5 provides workers per job type where wage farm represents 15%, wage non-farm 22%, independent farmers 51%, independent non-farmers 10% and unpaid family workers 2%.

The industrial sector is very small and needs a lot of support and stimulus especially in the area of agro-processing, where the district has a higher comparative advantage over the neighboring Districts. There are only three (3) small processing plants for bananas and pineapples, and nine (9) coffee washing stations, which are insufficient (DDS 2017-2024). The DDS put in place strategies for the establishment of medium agro processing industries for palm oil, pineapples, bananas, tomatoes and fertilizers to improve the current situation.

The service sector is also very small and is concentrated in commercial centers. The components of this sector

are mainly commercial and banking services. The district has nine (9) main trading centers with modern markets found in Rukumberi, Jarama, Sake, Rukira, Mutenderi, Gashanda, Karemba, Remera and Kibungo Sectors. It also has three (3) selling points located in Remera Sector, Rebezo in Kibungo Sector and Kugiturusu in Kazo Sector.

Tourism facilities are still insufficient. Accommodation facilities are very rare in the district with only a few motels. This is a serious challenge to the prospective tourism development target.

The district possesses a number of financial institutions such as "Banque Populaire" with branches in Kibungo Sector and sub-branches in Rukira, Mutenderi and Sake. There is also GT bank, Bank of Kigali and Urwego Opportunity Bank, all based in Kibungo Sector. There are micro finance institutions and 14 Umurenge SACCOs. Apart from Umurenge SACCOs, there are other credit saving cooperative societies like Umwalimu SACCO and CSS Zigama, all based in Kibungo Sector. It is hoped that as financial literacy in the district increases the number of financial institutions will increase.

According to the NST1, the agricultural sector grew at a rate of 4.1% nationally during the period 2013–2016. Of course, Ngoma District has contributed to this growth given that it is one of the districts rich in agriculture and efforts will continue to be made to increase agricultural production.

The main food crops grown in Ngoma District, in the order of importance, are: beans, banana, maize, sweet potatoes and cassava. The main cash crops are coffee, sunflower, and pepper.

The strategy in the “Agricultural Sector” shall be to continue enhancing ways to improve the yield and total production per hectare to help the country realize its target and make the citizens of Ngoma self-sufficient in food production and production for the market.

The following are major challenges in economic sector:

- Insufficient mechanization in agriculture: at present land mechanization is at 0.6% and yet by 2024 the land under mechanization is targeted at 50% nationally.
- Changing weather due to climate change and insufficient infrastructure for irrigation. At present there are only 1,722 ha under irrigation (both hillside and marshland).
- Insufficient agro-processing industries to process a number of agricultural products produced in the district.
- High unemployment level at 14.9% (disguised unemployment in agriculture and open unemployment in the nonagricultural sector).
- Low urbanization in the district (only Kibungo town and 13 other trading centers that have been upgraded).
- According to EICV4, only 89.7% of the population settled in conglomerated settlements (Imidugudu).
- The master plan is in place, but the physical plans to make it operational are yet to be developed.
- Insufficient infrastructure commensurate with real urban centers.
- Lack of greening in the few upgraded trading centers.

The figure below illustrates activities in which each sector in Ngoma District is specialized. The main activity for the majority of sectors is agriculture with an important production of mainly banana, beans, maize, pineapple and some vegetables in especially wetlands.

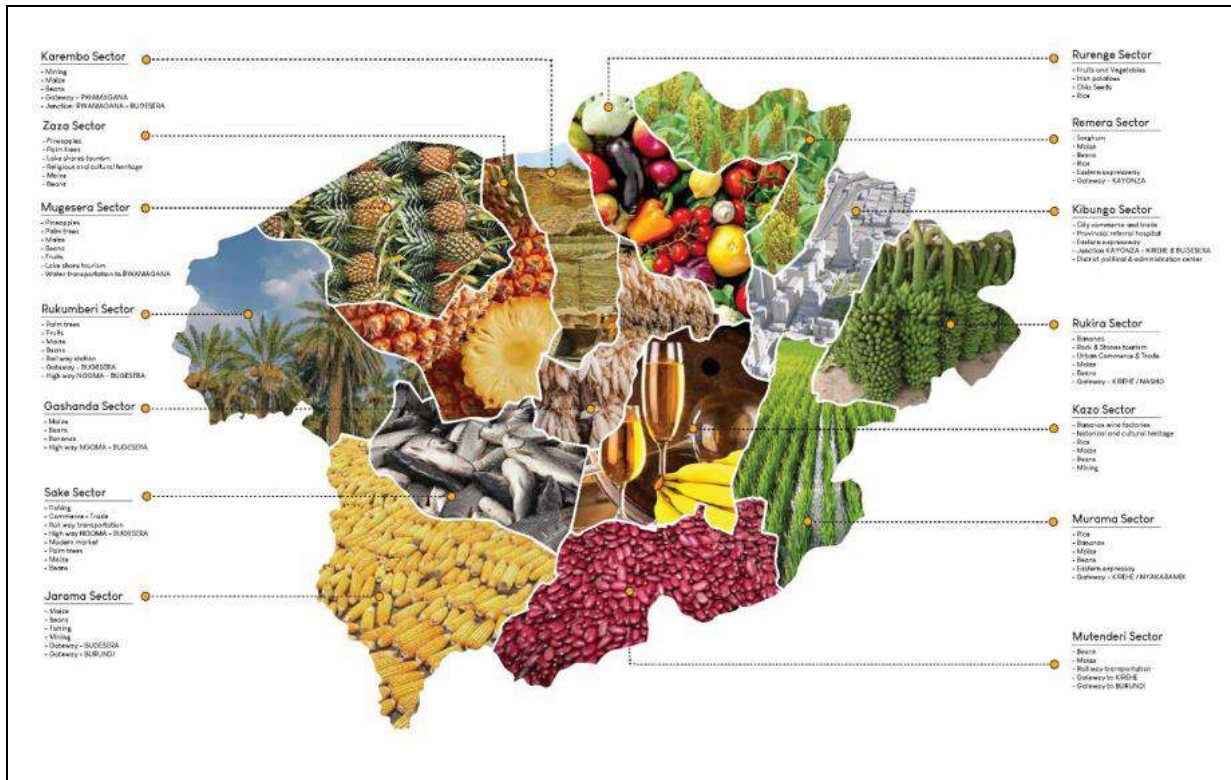


Figure 3: Specific economy of Ngoma District

4.1.3.2 Planned Economic Specialization in Ngoma District

The economic specialization for Ngoma District will concern some important sectors which are generally: agriculture and livestock; tourism, urbanization and community settlement.

a) In the Agricultural Sector:

The economy will predominantly be based on agriculture, given Ngoma District's vision of becoming a commercial-oriented agriculture hub. The most produced and developed crops are banana (in Mutenderi, Rukira, Remera, Karembo sectors), beans (in Karembo, Mutenderi, Gashanda Sectors), rice (in Mugesera, Kazo, Sake, Murama Sectors), pineapple (in generally Zaza, Sake, Jarama Sectors) and maize (in mainly Jarama, Rukumberi, Kibungo, Karembo Sectors). Agricultural production will continue to be improved and the yield will increase. Agriculture mechanization including irrigation practice notably around Sake, Mugesera and Kibilira lakes will be developed. Large scale irrigation is still unknown in Ngoma District, and will be a priority. Fishing and aquaculture will continue to be developed. The following actions will guide Ngoma District's initiative as well as private investment's interest:

- Continue to increase land for agricultural production through marshland reclamation and land consolidation.
- Promote the cultivation of new crops like palm trees and other crops that shall supply raw materials to

agro-based industries.

- Scale up terracing, especially radical terraces.
- Increase acreage under irrigation, especially hillside irrigation.
- Scale up mechanization.
- Promote cash crops like coffee and flowers to boost exports.

b) In the Private Sector and Tourism:

A vibrant tourism will also develop in Mugesera, Sake and Kibilira lake shores with construction of new infrastructure (Hotels, sport fields, roads, etc.) and creation of new attraction sites basing on existing historical and natural sites still unexploited. Below are some proposals regarding the future investment trends:

- Promote agro based industries in the district in potential identified industries (palm oil, pineapple, banana, tourism, etc.)
- Encourage and enable the private sector to invest in tourism sites e.g., along beaches of identified lakes (Bilira, Sake and Mugesera).
- Improve accessibility road standards along prioritized routes to promote tourism and trade.
- Allocate commercial plots to developers for construction in Kibungo Sector and other trading centers.

c) In Urbanization and Community settlements

The effort will be put on:

- Develop Physical Plans for different areas of the Master Plan to facilitate development of urban settlements.
- Demarcate plots and carry out road tracing in specified locations (trading centers).
- Provide 50 affordable housing (4-in-1) in different locations, e.g. Gahima settlement site.
- Construct and maintain or rehabilitate the IDP Model Villages in Musya in Rurenge Sector, Karembo and Nyagasozi in Zaza Sector and others.

4.2 Population, Urbanization, Settlement and Housing (PUSH)

4.2.1 Population

4.2.1.1 Existing population

According to the RPHC 4 & 5, the population of Ngoma District increased from 336,928 in 2012 to 404,048 in 2022. The population is predominantly rural, with 366,751 inhabitants living in rural areas (90.8%) in 2022 compared to 321,692 inhabitants (95.5%) in 2012. The female population is slightly higher than the male population, with females representing 52.3% of the total population in 2022, compared to 52% in 2012.

People aged (0-17 years) accounted for 180,051 individuals, representing 46.5% of the total population in 2022, compared to 161,601 individuals, representing 48% of the total population in 2012. This reflects a decrease in the fertility rate over a ten-year period.

Private households were estimated at 79,647 in 2012 as compared to 102,589 in 2022. The population density in Ngoma District increased from 388 inhabitants/km² in 2012 to 498 inhabitants/km² in 2022. This indicates that the district has become more densely populated over the ten-year period.

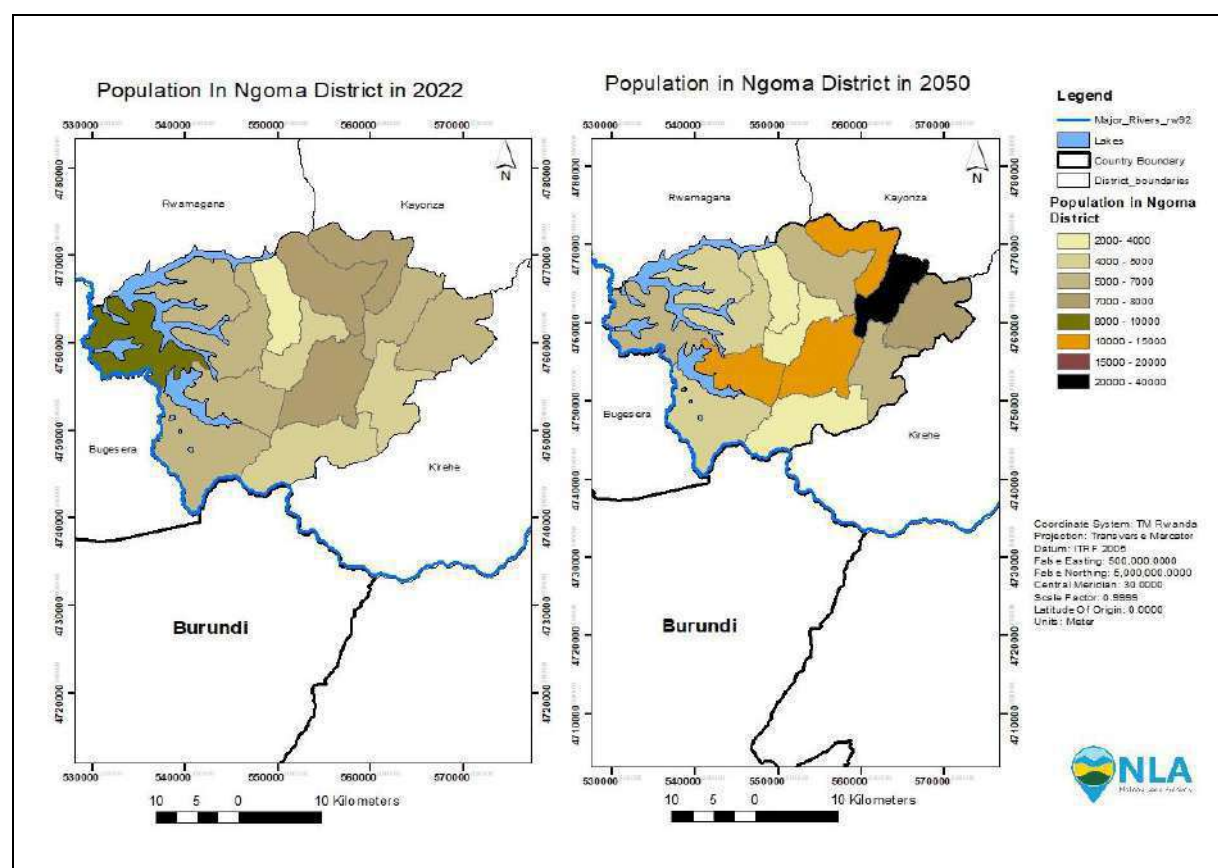
Table 3: Population of Ngoma District for the years 2012 and 2022

Sector Name	Type of Sector: Urban; Rural	2012 Census				2022 Census			
		Counts			HHs per Sector year 2012	Counts			HHs per Sector year 2022
		Total	Male	Female		Total	Male	Female	
Gashanda	Rural	16,309	7,702	8,607	4,017	19,345	9,214	10,131	5,060
Jarama	Rural	23,861	11,310	12,551	5,613	31,122	14,942	16,180	7,753
Karembo	Rural	14,902	7,088	7,814	3,596	17,726	8,445	9,281	4,481
Kazo	Rural & urban	27,318	13,207	14,111	6,407	32,450	15,597	16,853	8,271
Kibungo	Rural & urban	28,338	14,814	13,524	6,368	31,445	14,976	16,469	7,750
Mugesera	Rural	25,716	12,106	13,610	6,137	28,637	13,624	15,013	7,456
Murama	Rural & urban	22,409	10,609	11,800	5,296	26,702	12,686	14,016	6,964
Mutenderi	Rural	20,907	9,962	10,945	4,874	24,915	11,870	13,045	6,437
Remera	Rural & urban	27,622	13,288	14,334	6,538	32,344	15,422	16,922	8,265
Rukira	Rural & urban	25,250	12,065	13,185	5,815	29,893	14,301	15,592	7,489
Rukumberi	Rural	28,560	13,587	14,973	6,914	39,420	18,739	20,681	9,990
Rurenge	Rural	28,555	13,574	14,981	6,802	33,391	15,842	17,549	8,472
Sake	Rural & urban	23,703	11,199	12,504	5,624	28,822	13,762	15,060	7,180
Zaza	Rural	23,478	11,258	12,220	5,646	27,836	13,300	14,536	7,021
Total		336,928	161,769	175,159	79,647	404,048	192,720	211,328	102,589

Source: RPHC 4, 2012 & RPHC 5, 2022

According to the table, the Rukumberi Sector had the highest population count of 28,560 inhabitants in 2012,

and 39,420 in 2022. Karemba Sector is the least populated sector with 14,902 inhabitants in 2012, and 17,726 inhabitants in 2022.



Map 5: Population of Ngoma District

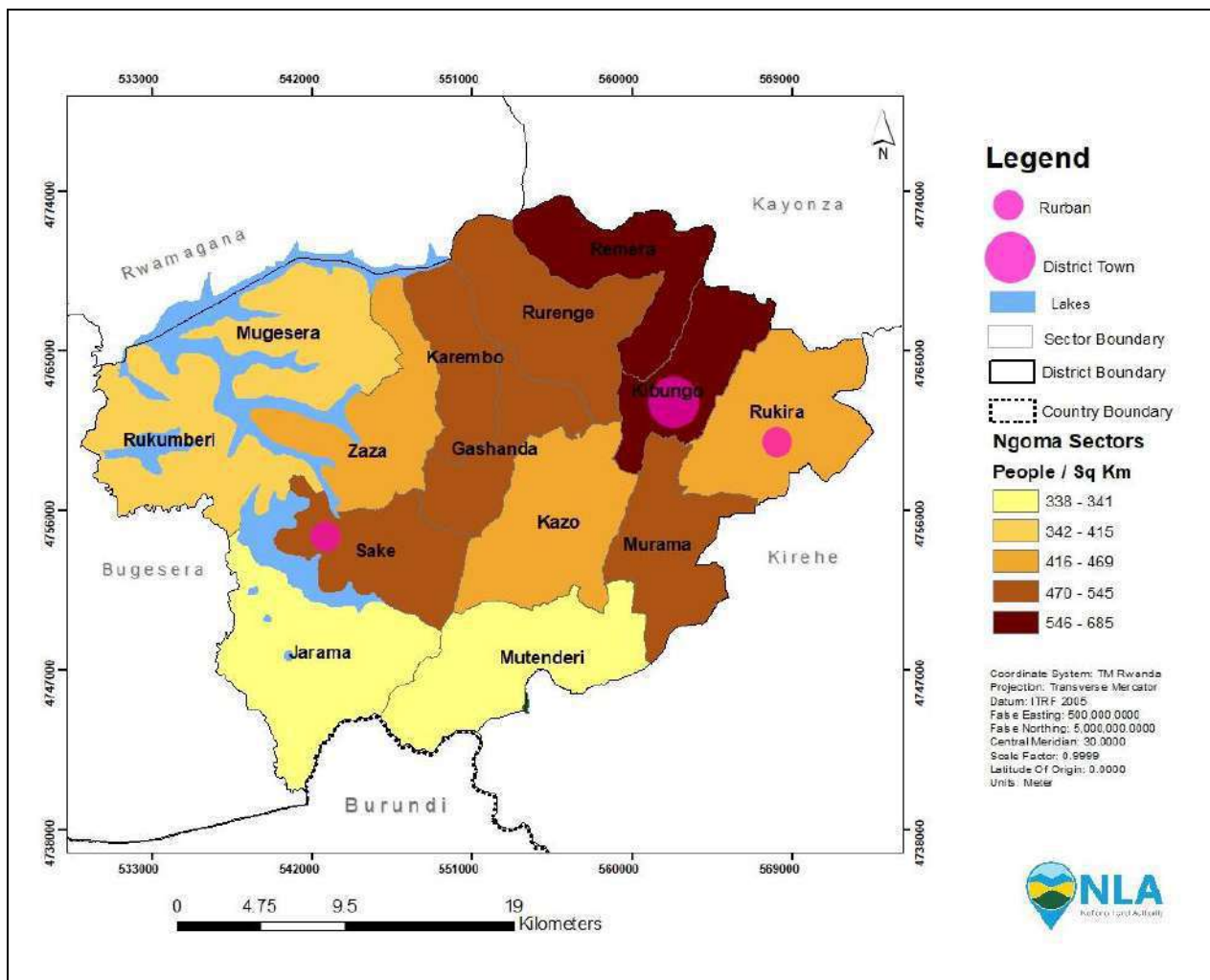
Comparing the population in Ngoma District to neighboring Districts, Ngoma District is the second most densely populated District in Eastern Province after Rwamagana District in both 2012 and 2022, with a density of 388 inhabitants/km² against 420 inhabitants/km² at provincial level and 415 inhabitants/km² at national level.

Table 4: The population of Ngoma District and neighboring Districts 2022

Districts	population		% of female		Density (inhabitants/km ²)		Residence% (rural)	
	2012	2022	2012	2022	2012	2022	2012	2022
Rwanda	10,515,973	13,246,394	51.8	51.5	415	503	83.5	72.1
Eastern Province	2,595,703	3,563,145	51.5	51.3	274	433	92.8	79.1
Ngoma	336,928	404,048	52	52.3	388	498	95.5	90.8
Kirehe	340 368	460,860	51,9	51.9	287	398	97	93.7
Rwamagana	313,461	484,953	51	49.7	460	740	91.4	62.9
Kayonza	344,157	457,156	51.6	51.6	178	338	90.1	85.8
Bugesera	361,914	551,103	51.3	50.7	280	450	92	59.9

Source : RPHC 4, 2012 & RPHC 5, 2022

The map below provides the density of Ngoma District population per sector:



Map 6: Population density in Ngoma District based on current situation

4.2.1.2 Projected Population in Ngoma District

a) Population projection according to NLUDMP 2020-2050

According to the NLUDMP 2020-2050 projection, the total population of Ngoma District is estimated to reach 434,714 inhabitants by 2035 and 473,000 by 2050. Of this, 133,034 inhabitants representing 30.6% of the total population are expected to live in urban areas by 2035 and 253,000 inhabitants, representing 53.5 % of the total population by 2050.

The population projection assumes that the population will be distributed proportionally to the future agricultural land as per the LUCA (Land Use Categories). Ngoma District is categorized as a rural district which falls under “LUCA B”. To enable the projection of population growth in each sector, the average growth percentage was calculated at 0.6%. This means that the population is projected to grow at an average rate of 0.6% per year over the projection period, more details are given in the following table:

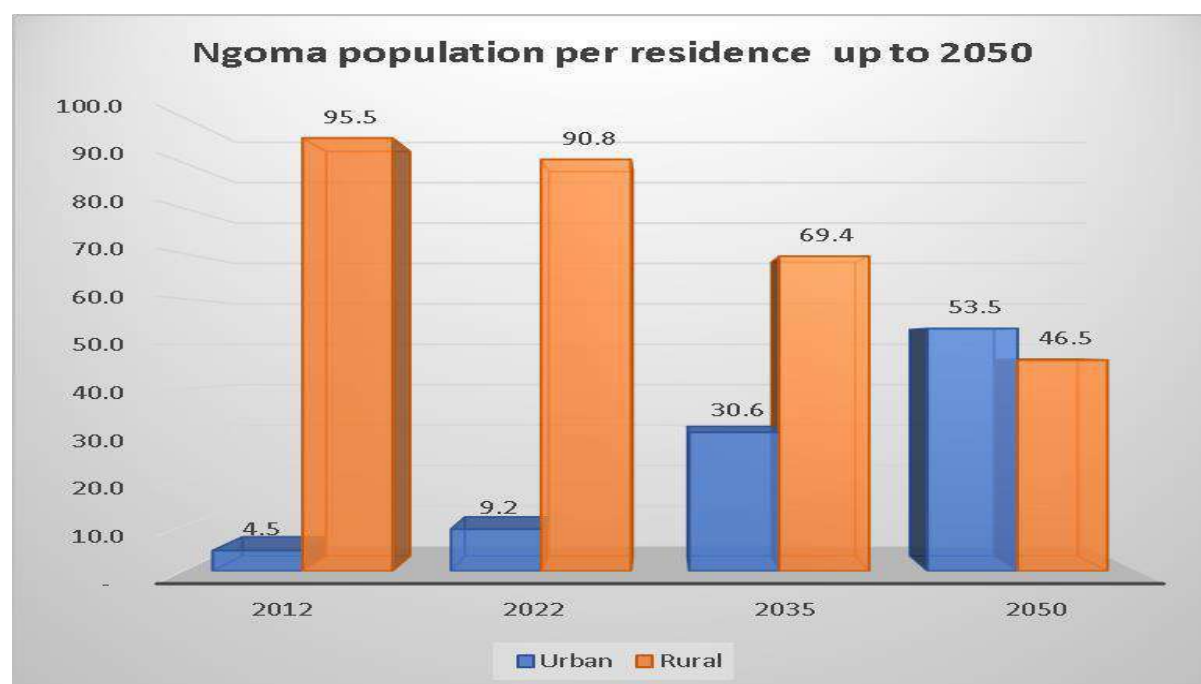
Table 5: Ngoma District population growth per administrative Sector

Sector	Type of Sector: Rural and urban	Population 2022	Number HHs 2022	Population 2035	Number HHs 2035	Population 2050	Number HHs 2050
Gashanda	Rural	19,345	5,060	15,912	3,978	11,604	2,901
Jarama	Rural	31,122	7,753	25,599	6,400	18,669	4,667
Karembo	Rural	17,726	4,481	14,580	3,645	10,633	2,658
Kazo	Rural & urban	32,450	8,271	40,783	10,196	48,951	12,238
Kibungo	Rural & urban	31,445	7,750	81,680	20,420	135,649	33,912
Mugesera	Rural	28,637	7,456	23,555	5,889	17,178	4,295
Murama	Rural & urban	26,702	6,964	24,377	6,094	23,638	5,909
Mutenderi	Rural	24,915	6,437	20,494	5,123	14,946	3,736
Remera	Rural & urban	32,344	8,265	44,570	11,143	56,993	14,248
Rukira	Rural & urban	29,893	7,489	28,848	7,212	31,383	7,846
Rukumberi	Rural	39,420	9,990	32,425	8,106	23,647	5,912
Rurenge	Rural	33,391	8,472	27,466	6,866	20,030	5,007
Sake	Rural & urban	28,822	7,180	31,527	7,882	42,981	10,745
Zaza	Rural	27,836	7,021	22,896	5,724	16,698	4,174
Total		404,048	102,589	434,712	108,678	473,000	118,248

Table 6: Summary of population projection per residence from 2012 to 2050

Population/Year	2012		2022		2035		2050	
	Population	No. of HHs	Population	No. of HHs	Population	No. of HHs	Population	No. of HHs
Total Population	336,928	79,647	404,048	102,589	434,714	108,678	473,000	118,250
Ngoma District Town	15,236	3,626	26,901	6,495	110,000	27,500	200,000	50,000
-	-	-	4,430	1,139	10,317	2,579	23,729	5,932
Sake rural center	-	-	5,966	1,486	12,726	3,182	29,271	7,318
Sub-total (rurban)	-	-	10,396	2,625	23,043	5,761	53,000	13,250
Sub-total urban (District Town+ rurban)	15,236	3,626	37,297	9,121	133,043	33,261	253,000	63,250
Rural population	321,692	76,021	366,751	93,468	301,670	75,418	220,000	55,000
Ngoma District Town (%)	4.5%	4.6%	6.7%	6.3%	25.3%		42.3%	
Rurban (%)	-	-	2.6%	2.6%	5.3%		11.2%	
Urban (District Town+ rurban) (%)	4.5%	4.6%	9.2%	8.9%	30.6%		53.5%	
Rural (%)	95.5%	95.4%	90.8%	91.1%	69.4%		46.5%	
Urban + Rural (%)	100%		100%		100%		100%	

In summarizing the table depicting the projected population in Ngoma District according to the NLUDMP 2020-2050 guidelines, the subsequent figure illustrates the anticipated population distribution based on residence. Notably, the rural population constituted 95.5% of the overall population in 2012, followed by a decline to 90.8% in 2022. Further projections indicate a gradual decrease to 69.4% by the year 2035, ultimately reaching 46.5% by 2050.

Figure 4: Ngoma Population per residence for the years up to 2050-

4.2.2 Ngoma District Urbanization and Settlement

Urbanization is a process of population concentration (Sanyaolu, 2018). Urbanization refers to the population shifting from rural to urban areas, and the corresponding decrease in the proportion of people living in rural areas. It is the process by which towns and cities grow as more people begin living and working in central areas. It is projected that by 2050, more than two-thirds of the world's population will live in urban areas (<https://ourworldindata.org>).

To address population density, and to achieve a balanced and sustainable development, the NLUDMP 2020-2050 introduces a settlement hierarchy and a spatial structure of all urban settlements in Rwanda. The hierarchy has five ranks; from the capital City of Kigali, to Satellite Cities, Secondary Cities, District Towns, and Rural Centres. The distribution of the population is based on the settlement hierarchy and economic potential of each city and District.

Population projection, urbanization structure and land requirements for Ngoma District are represented in the table below:

Ngoma District is a rural District with the majority of population living in rural areas, the main activity being agriculture. Before 2020, Ngoma District had only one city, Kibungo, which was considered as the Provincial capital.

In general, urbanization in Rwanda has been driven by internal migration from rural areas towards urban zones as well as by population growth in the peripheries of existing cities, where areas with high population have been integrated into the urban zones.

Migration is an important factor of population growth especially in the city. For the case of Ngoma District, the majority of the urban population comes from the neighboring rural sectors. Other migrants are composed of merchants who come from other Districts, for example Kayanza and Kirehe Districts.

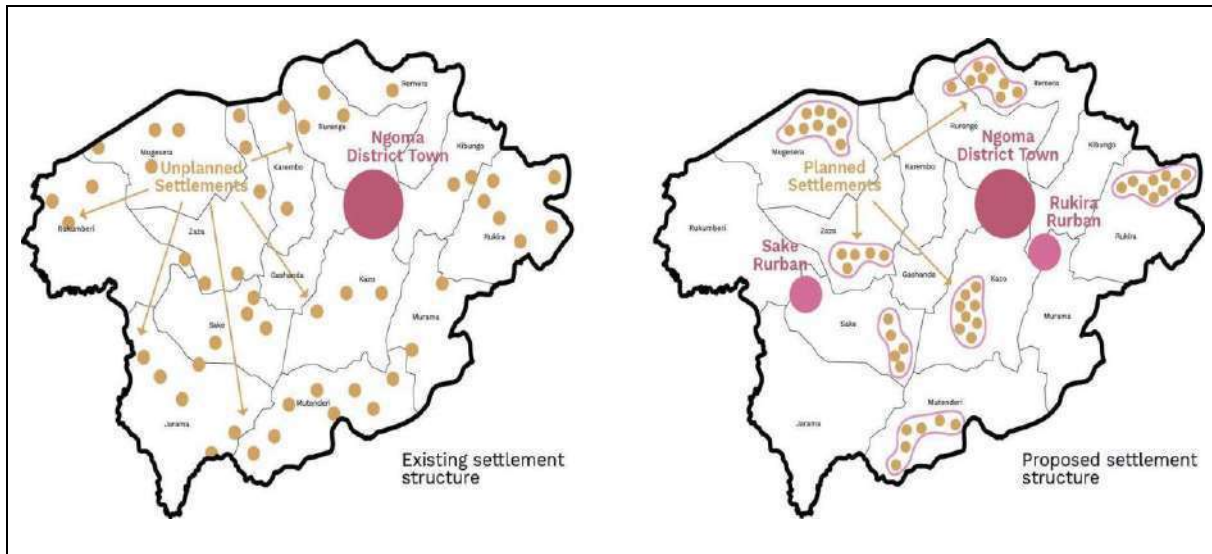
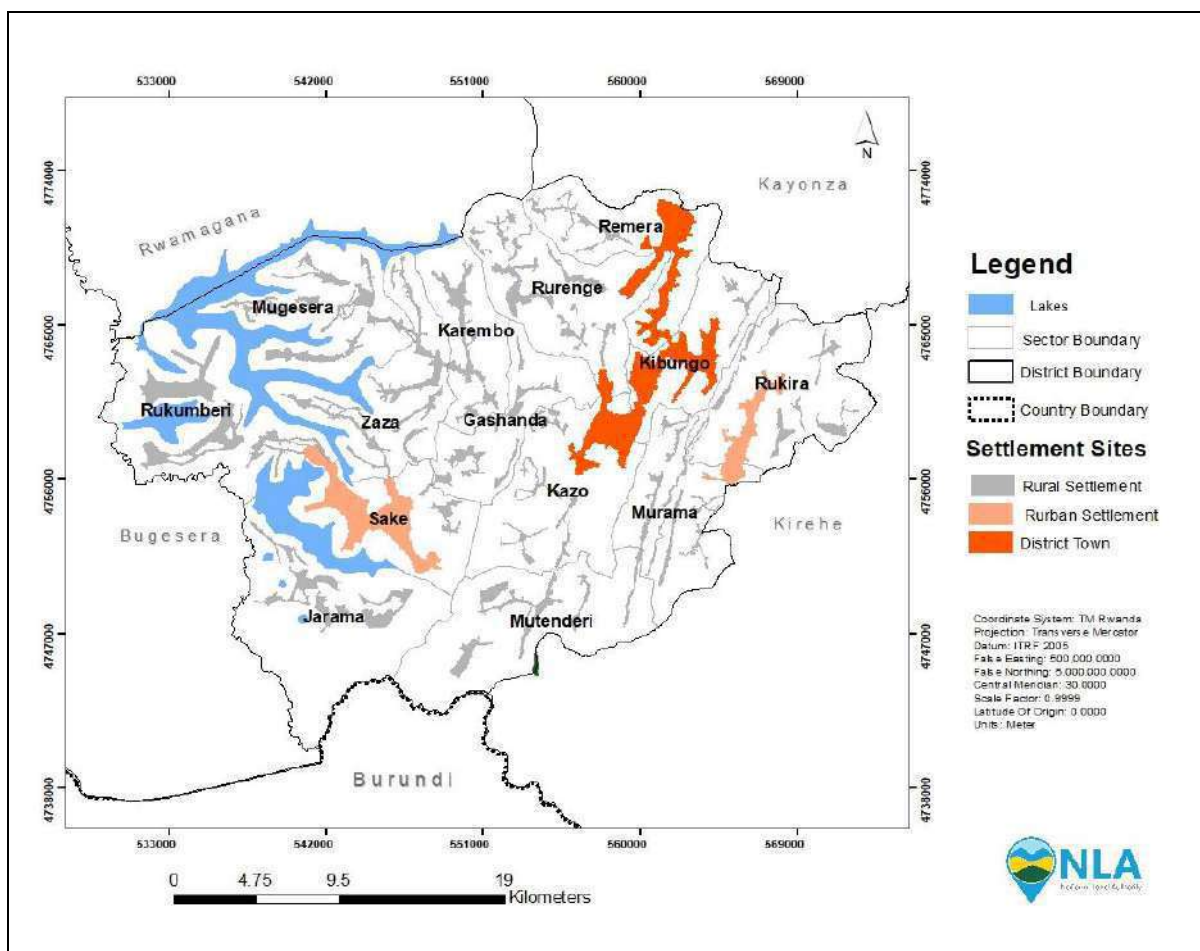


Figure 5: Ngoma urban areas and settlement zones

The settlement structure of Ngoma District is proposed to shift from only one urban node and scattered rural settlement, to a main District Town supported by two Rurban Centres. Rural settlement is to be concentrated in planned rural settlement sites.



Map 7: Settlement areas in Ngoma District

4.2.2.1 Ngoma District Town

Ngoma District Town is the main city of Ngoma District. It extends over small parts of Kibungo, Kazo and Remera Sectors, comprising the former “communes of Kigarama, Birenga, Mugesera, Sake”, and a part of “Commune Rukira” in former “Prefecture of Kibungo”.

a) Existing situation of Ngoma District Town

Ngoma District Town has an urban character compared to the rural parts of the district. There has been an increase in built-up areas resulting from rapid housing development, mainly concentrated alongside the road network, with commercial activities such as markets, restaurants, shops, handcraft, and financial institutions.

The District Town is dominated by several high slopes breaking the regular shape of the urban boundary, limiting extension of the urban development including socio-economic infrastructure. A challenge are the residential settlements located on the steep slopes. This results in environmental degradation, such as erosion due to lack of rain and wastewater management systems. The town lacks commercial and business facilities such as hotels and quality restaurants. There is only one bigger hotel and few guest houses, relatively moderate, in the whole city. There is a lack of transport infrastructure, including vehicles and bus stations, causing the residents to spend much time walking to their destinations.

The absence of tertiary education, considered as a driving motor of urban development, has also limited urban growth. The extension and development of Ngoma District Town has been limited by the absence of an implementable master plan. The former master plan was found incomplete with gaps in terms of unknown/unidentified zonings.

Photo below illustrates the current Ngoma District Town in the commercial zone where the CBD has been proposed.



Photo 5: Current land use in Ngoma District Town;

As it can be seen on the photos presented above, a part of Ngoma District Town is still located on the high slope where agriculture and forest uses are still predominant.



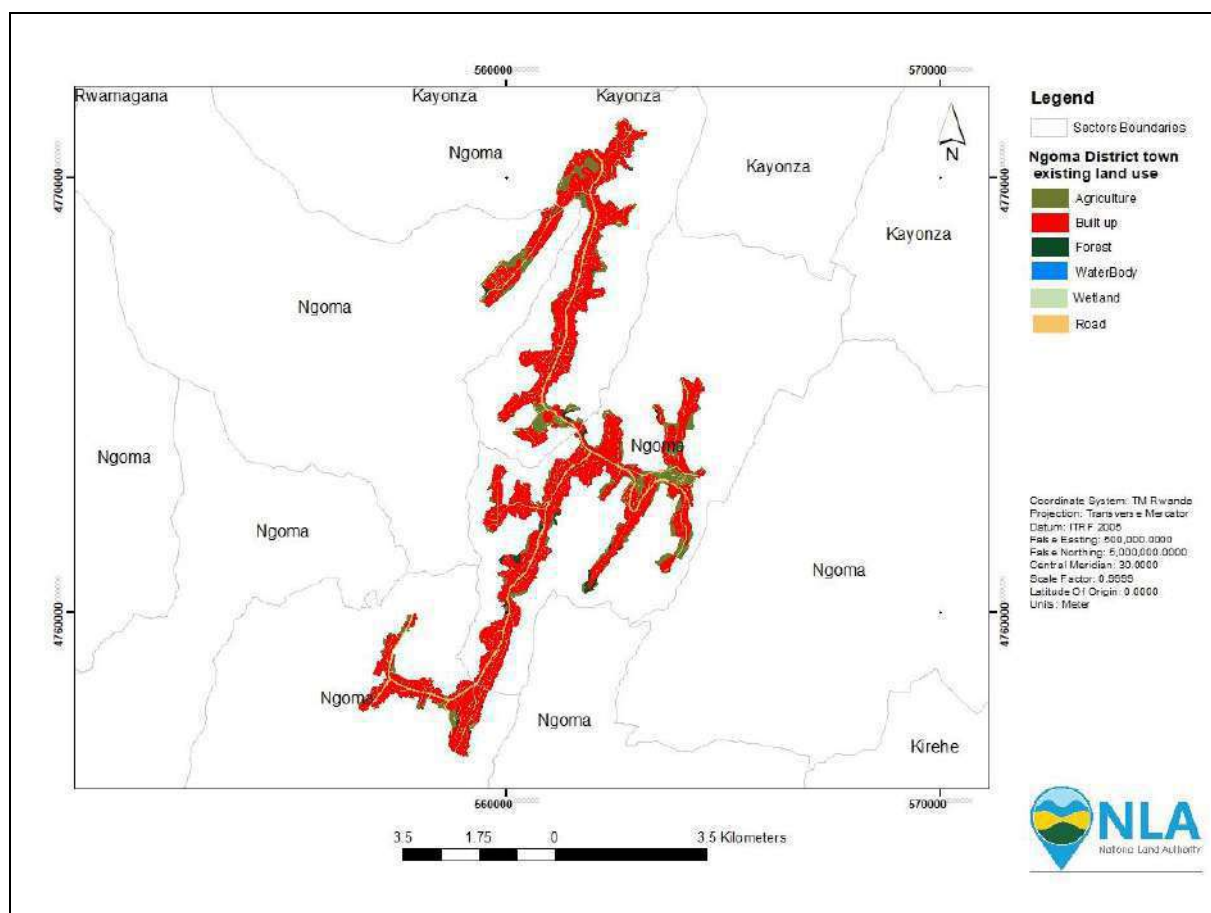
Photo 6: Main current commercial zone, in Ngoma District Town-



Photo 7: Proposed Medium density residential - Expansion zone (R3) & forest zone (on the right) proposed for open space in Ngoma District Town-

The urban area in Ngoma District is narrowed amongst the roads. The boundary includes generally built-up area which occupy more than half of the urban land size. A small part is also used for agriculture and forest. Water bodies and wetlands are also found in urban area of Ngoma district. Water body consist of a certain number of dams artificially established for generally irrigation purpose. However, some of them are also likely to serve as tourism potential.

Ngoma District Town has a well-distributed road network including asphalted roads (especially main urban roads).

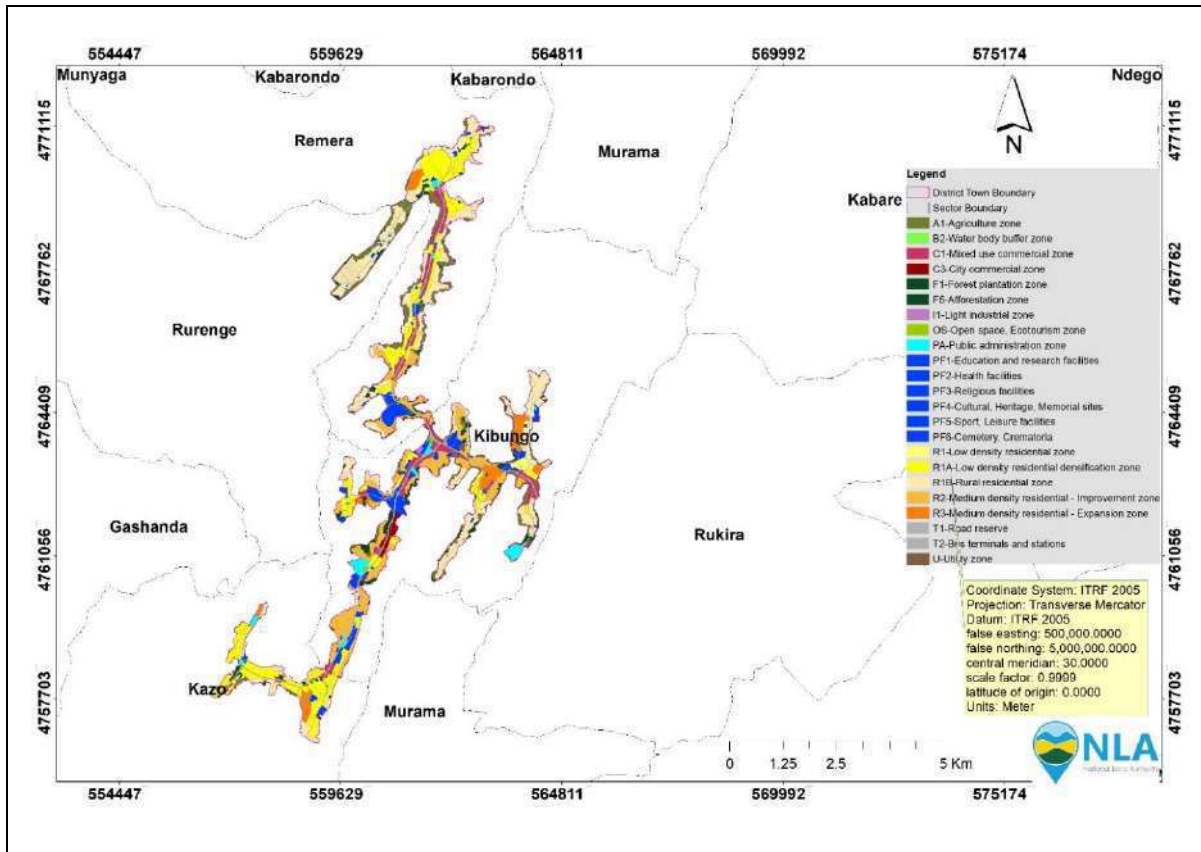


Map 8: Existing land use in Ngoma District Town

b) Planning perspectives on Ngoma District Town

According to the NLUDMP 2020-2050, the economic vision of Ngoma District is to build on “*Commercial Agriculture and Agribusiness*” for its future transformation. Tourism will also be key to opening Ngoma District to other regions of Rwanda, especially surrounding Districts and cities expected to develop such as Kayonza and Kirehe Secondary Cities, as well as Bugesera and Rwamagana Satellite Cities.

Agriculture, agribusiness and tourism will be the stimulus of economic development in Ngoma District, and especially in Ngoma District Town, developing infrastructure, accommodation, business, etc.



Map 9: Ngoma District town zoning

The urban area of Ngoma District Town has not considered the whole administrative boundaries of Kibungo, Kazo and Remera sectors. Instead, it extends to the area only recommended for urban settlement, and does not include all the Cells and Villages. The proposed boundary of Ngoma District Town covers 1,689.6 ha (26%) of the 6,500 ha of the total affected Villages area.

The main land use is Residential with 55.5%, primarily R1B-Rural residential (17%) and R1A -Low density residential (21%). The second largest land use consumer is transportation (12%) while the third one is agriculture, totaling 10.2% of the total urban land. Other land uses are Public Facility (7%), Commercial (7%), and forest (6%). Forest zones have been proposed on hilly land which remain inside the urban boundary. These forest zones are important for climate change mitigation and erosion controls and serve other benefits like providing wood for industrial activities, energy generation etc. Agriculture zones inside the urban area will contribute to urban farming for growing vegetables and fruits for the urban population. It can also contribute to developing the demonstration field. Detailed information can be seen in the table below.

Table 7: Ngoma District Town proposed land use balance sheet

N°	Land use	Area (ha)	%
1	Agriculture	173.73	10.3
2	Commercial	111.96	6.6
3	Ecotourism, parks, and open space	4.31	0.3
4	Forest	95.32	5.6
5	Industrial	1.41	0.1
6	Public Administration	34.66	2.1
7	Public Facility	126.47	7.5
8	Public Utility	4.14	0.2
9	Residential	938.2	55.5
10	Transportation	199.26	11.8
11	Water body Buffer	0.07	0.00
	Total land size	1689.6	100

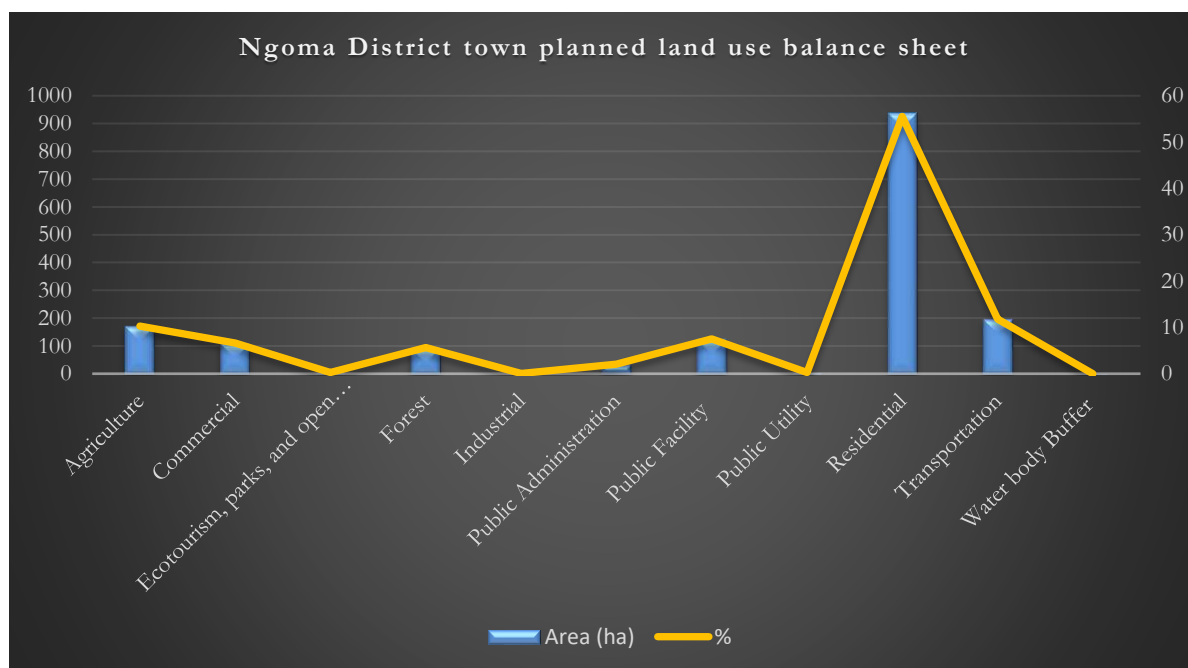


Figure 6: Land use consumption per land use zoning for District town

4.2.2.2 Rurban Centers in Ngoma District

Rurban Centers are emerging centers providing linkage between rural and urban areas. The selection of the rurban settlements has followed a number of factors, taking into consideration the District Council guidance as follows: (i) Emerging existing potential trading centers; (ii) High pressure of growing residential settlements; (iii) Geographic location; (iv) Existing and developing infrastructures such as roads, waters, electricity, healthcare facilities, employment opportunities, education facilities, etc.

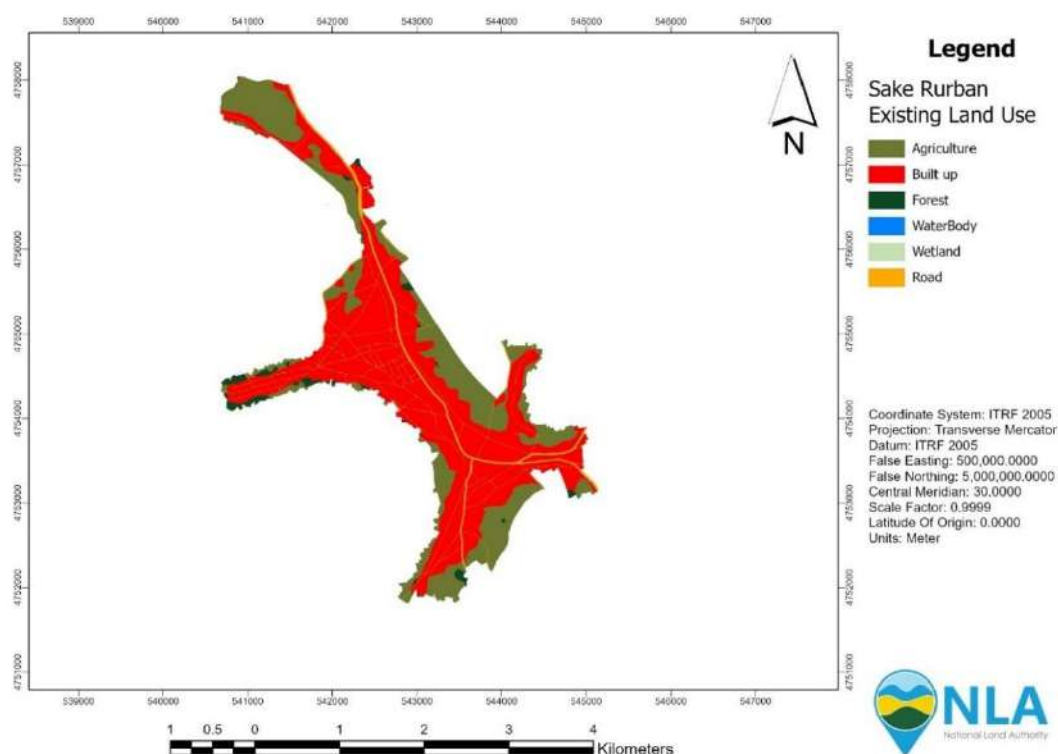
Ngoma District has never had planned Rurban Centres before. There were emerging centers, especially where commercial activities had been developed in areas close to local administration offices, religious centers and areas historically recognized as old trading locations where settlers had been residing since coming to Rwanda.

The NLUDMP 2020-2050 has proposed two Rurban Centers for Ngoma District; Rukira and Sake. The NLUDMP 2020-2050 defined the boundaries for the rurban settlements, to be verified and improved based on ground conditions and constraints when undertaking planning at local level. Rukira and Sake Rurbans Centers are planned to have an area of 8.4 km², hosting approximately 53,000 inhabitants.

a) Sake Rurban Center in Ngoma District

Existing situation of Sake Rurban Center

Sake Rurban Center extends on about 676.5 ha of land. It is characterized by a rural landscape dominated by built up area, occupying more than 50%. It is composed of residential houses in old planned settlement sites as well as few scattered residential houses. Buildings also includes public administration buildings as well as few socio-economic infrastructures and facilities. The road network totalizes alone 11%. Agriculture is the second land use consumer with 32% of the total land. There are some industrial plants such as agro-processing units scattered within agricultural zones. The map below shows the existing land use:



Map 10: Sake Rurban existing land use-Source: Primary data, author, March 2023

Table 8: The existing land use for Sake Rurban Center is composed of four main land uses

No	Land use	Area size (ha)	%
1	Agriculture	216.5	32
2	Forest	13.5	2
3	Built-Up Area	372.1	55
4	Transportation	74.4	11
	Total Land Use	676.5	100

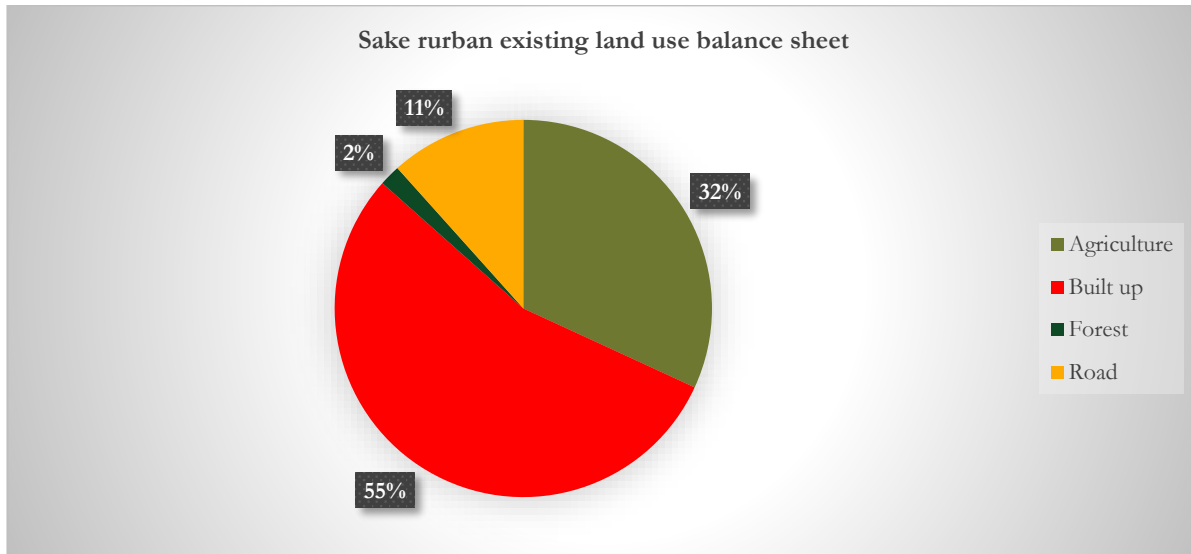


Figure 7: Existing land use balance sheet for Sake Rurban-

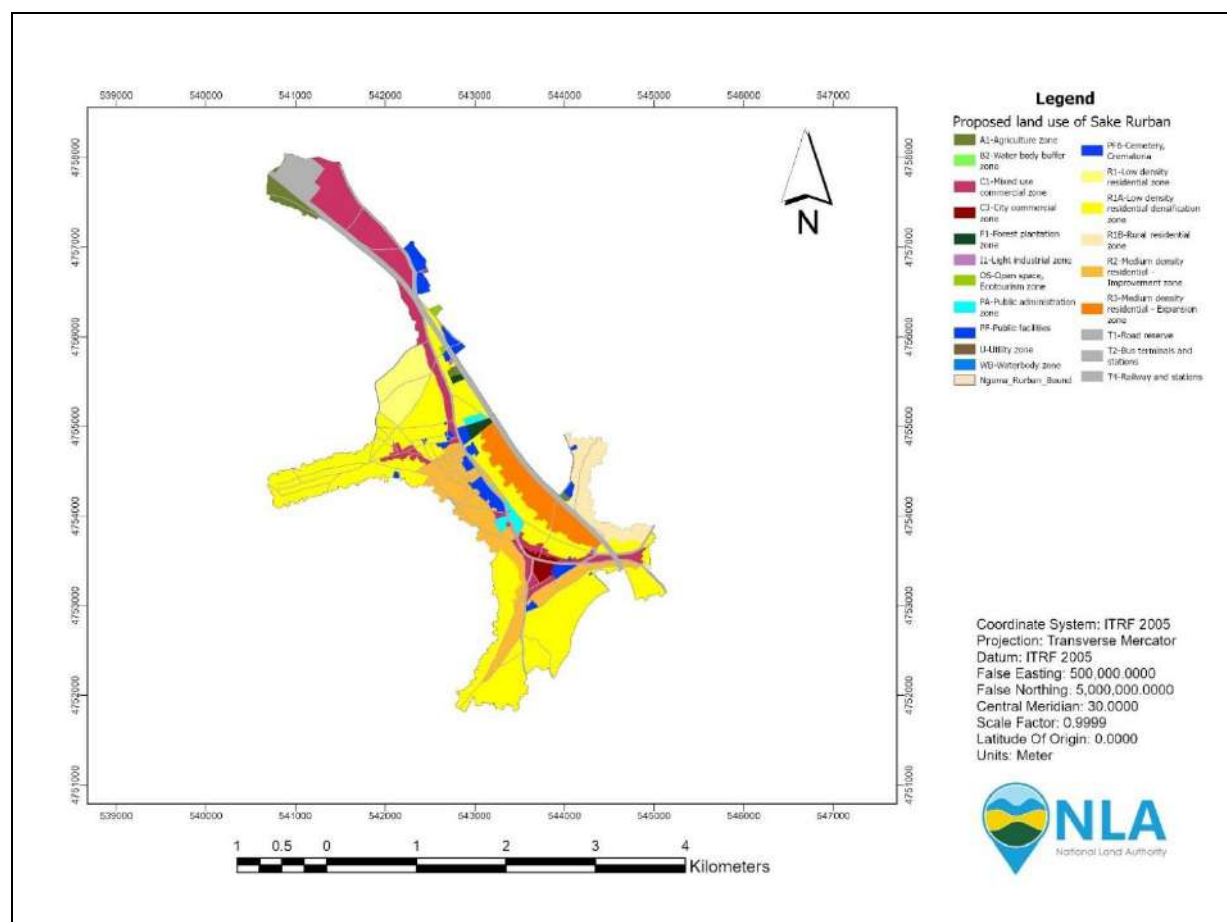
Planned perspective of Sake Rurban Center

Sake Rurban Center covers about 719 ha. It extends into Rukoma Cell, on small parts of Nyagasozi, Umukoni, Irebero and Musenyi Villages, covering important parts of Muminoga, Isangano, Nyakariba and Nyarurembo Villages. It also extends into Gafunzo Cell including small parts of Mabuga I, Isovu, Icyizanye, Rwanyabiranga and Kiriko Villages including the entire Mubuga II.

The proposed land use in Sake Rurban Center is highly dominated by residential zones (60.3% of total area). Low density residential and medium density residential improvement zones are the main residential zones that have been proposed. Agricultural land reduced a lot and remains less important activity in Sake Rurban Center, covering 1.4% of the land. Commercial use is planned on about 12% of land and the center is expected to grow. The existing important commercial center will be converted into a CBD with an open market that is regularly open twice a week (Tuesday and Friday), being especially dynamic on Fridays. Eco-tourism does not take an important area within Sake Rurban because it does not include important part of proposed tourism zone around the lakes. Instead, the tourism zones are planned around lakes.

Sake Rurban Center is expected to become an important city given its location close to the Mugesera and Sake lakes, as main tourism attractions in the area. Favorable topography (flat region), the asphalted National Road currently under construction, the upcoming railway from Tanzania to Bugesera International airport passing through Sake, as well as the District Hospital, are some of the phases one catalytic projects of Ngoma District. In addition, the transportation network will be developed, extending to about 20.46% of the total rurban area.

A zone has been allocated for a cemetery (3.2 ha), and an industrial zone is proposed covering 0.3ha.



Map 11:Sake rurban zoning plan 2035

The map aforementioned shows different zonings that have been planned for Sake Rurban land use plan.

Table 9:Sake rurban planned land use balance sheet 2035

	Land Use	Area in ha	percentage
1	Agriculture	10.6	1.40%
2	Commercial	87.6	12.18%
3	Ecotourism, parks, and open space	1.2	0.17%
4	Forest	4.4	0.61%
5	Industrial	0.3	0.04%
6	Public Administration	6.4	0.89%
7	Public Facility	27.7	3.84%
8	Residential	433.9	60.31%
9	Transportation	147.2	20.46%
	Total	719.3	100.00%

The following chart illustrates how the land size is distributed according to the planned zoning:

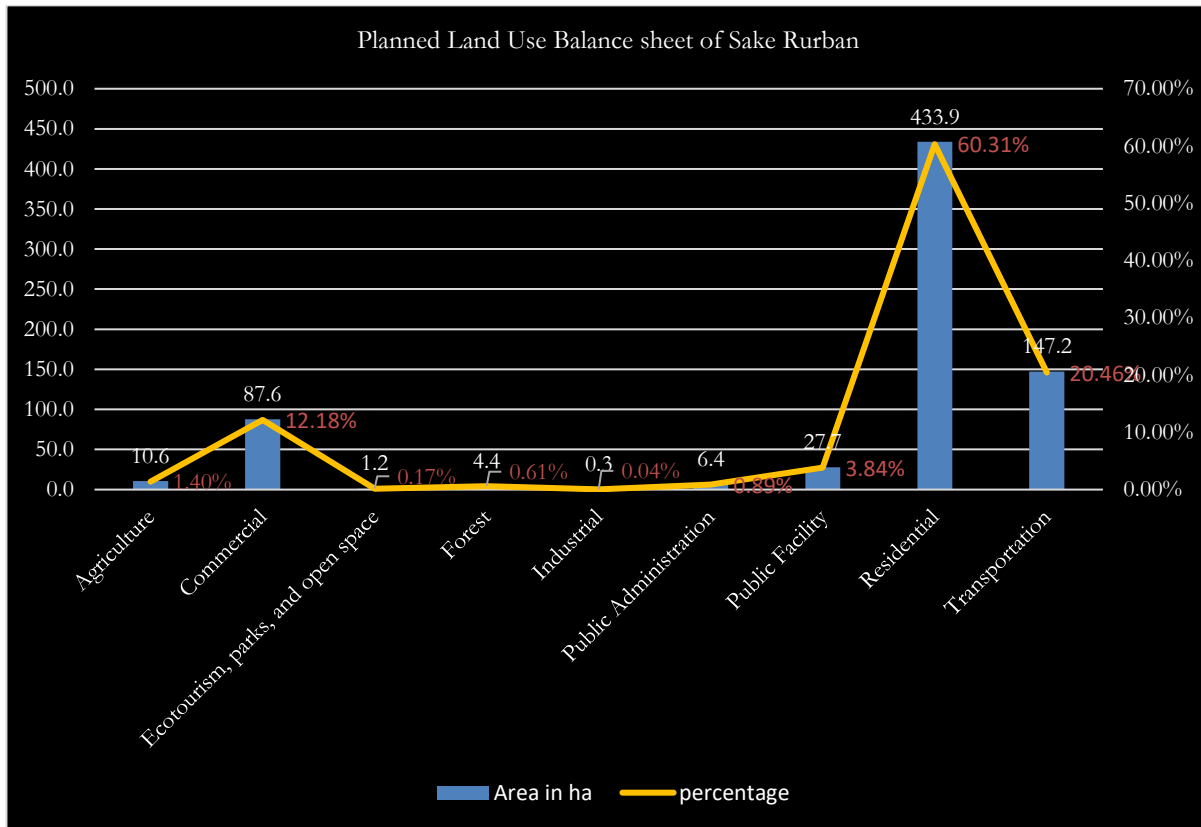


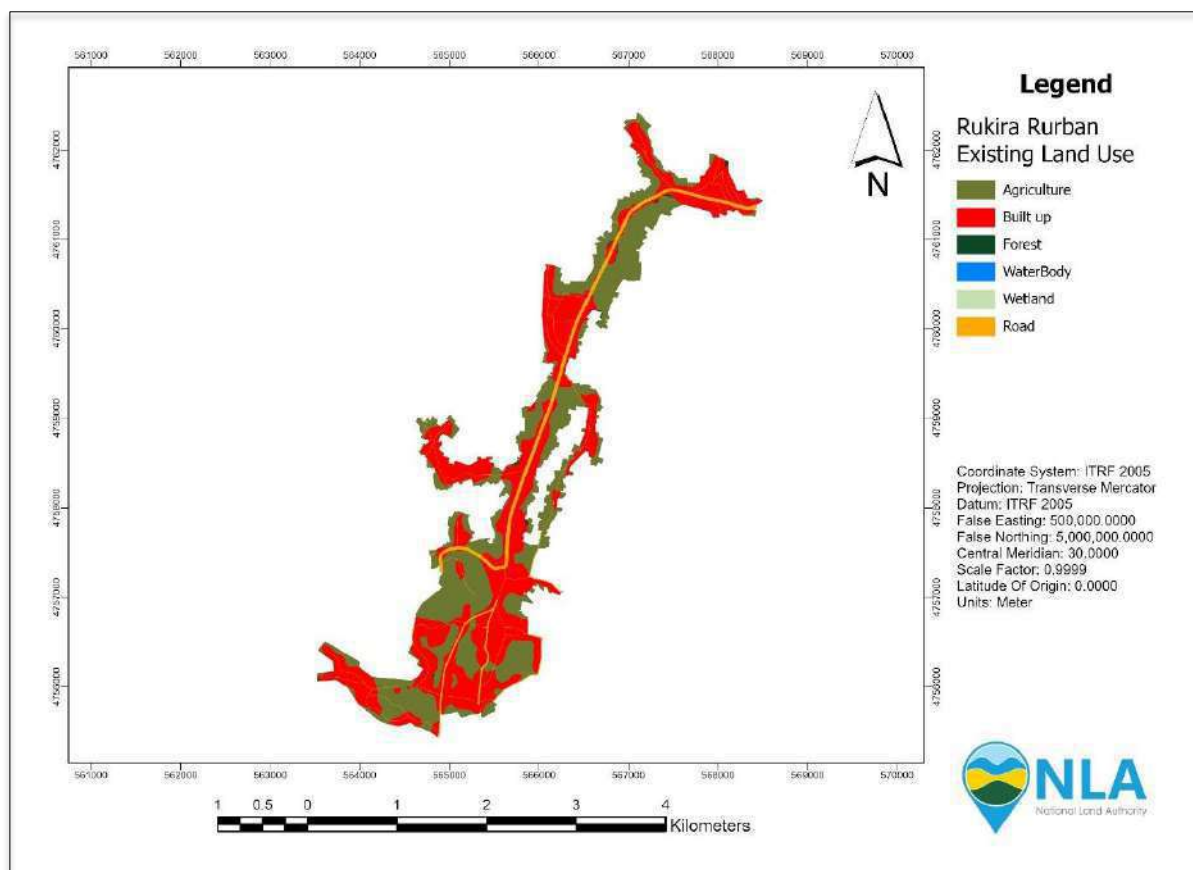
Figure 8: Existing and planned land use for Sake Rurban

b) Rukira Rurban Center in Ngoma District

Existing situation

The current land use of Rukira Rurban Center is dominated by farmlands, covering about 44% of Rukira rurban area. Rukira is one of the Sectors in Ngoma District with high production of banana. Settlement remains generally scattered within farmlands and located alongside the roads. Few houses have been developed in existing rural settlement sites. Built-up zones cover about 42% of the total area. The urban center is characterized by old commercial buildings in need of upgrading. Besides residential use, buildings are mainly used for public administration, commercial use as well as few buildings for various activities such as agro processing and handcraft, schools, and health infrastructures. Rukira has one of the most modernized open markets in Ngoma District.

Rukira Rurban Center is currently extended along the roads, especially the road connecting Ngoma to Kirehe via Rukira Center, Gituku Center toward “Mulindi wa Nasho” (Kirehe District). The forest zone occupies almost 0.2%, and the road network extends to about 15% of the land. The map below illustrates land use distribution in Rukira Rurban.



Map 12: Sake Rurban Existing land use

Table 10: Rukira Rurban existing land use balance sheet

Land Use	Area coverage	%
Agriculture	245.9	43.9
Built up	239.0	41.7
Forest	1.0	0.2
Road	87.3	15.2
Total	573.3	100.0

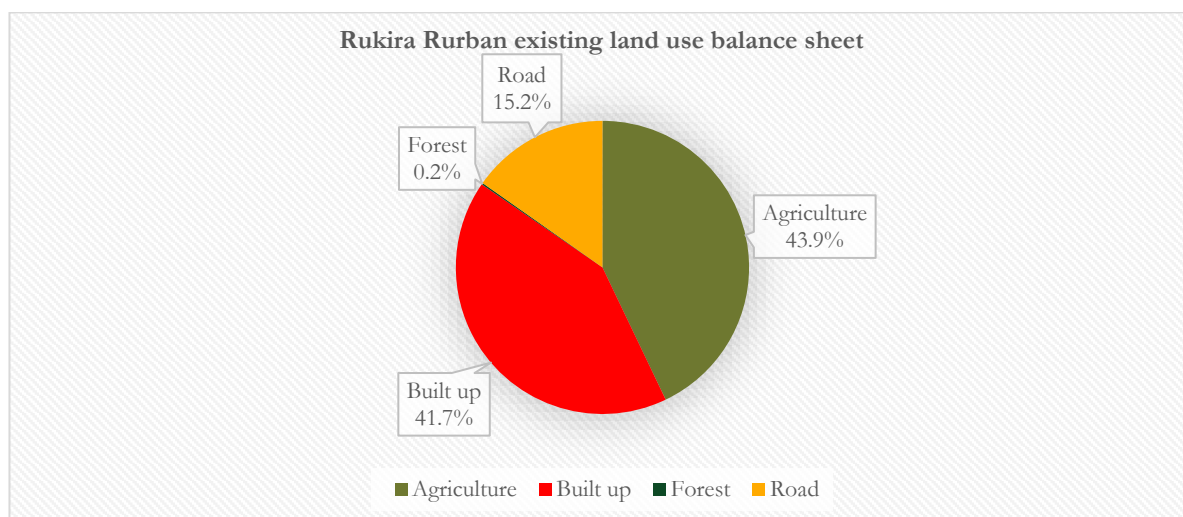


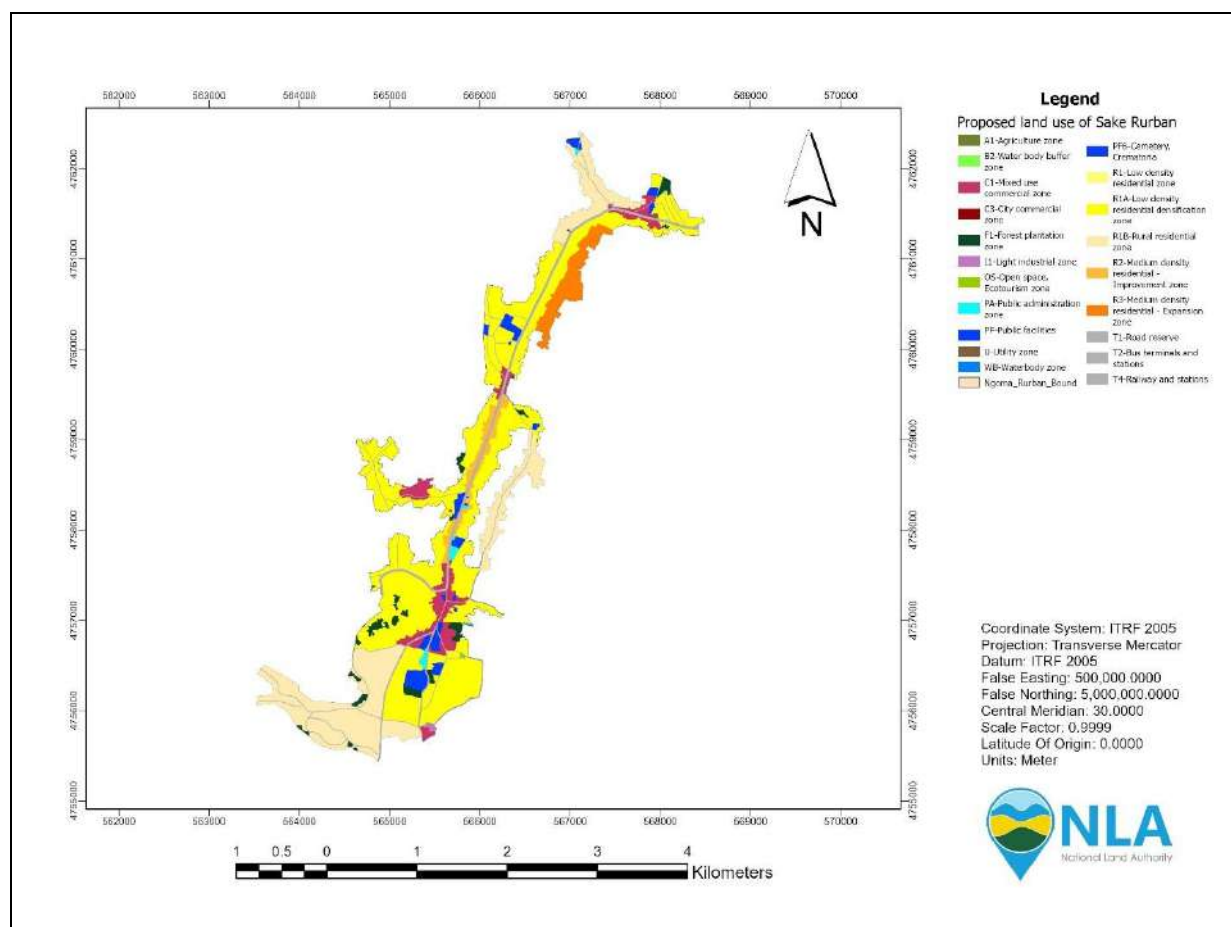
Figure 9: Existing land use balance sheet for Rukira Rurban-source:



Photo 8: Commercial zone in Rukira Rurban; photo2: Playground and where open market takes place-

Planned perspective for Rukira Rurban Center

Rukira Rurban Center, located in Nyinya Cell, covers an area of 573.3 ha. It includes parts of Kabimba, Rugarama and Rwagishanga Villages in Buliba Cell, extending into parts of Kanzenze, Kabeza, Rwavuguta, Rwakimanzi, Kibimba, Sangano, and Gatara Villages and the entire Rurama Village. It also covers part of Kigabiro Cell in Murama Sector, including parts of Cyeru, Kigabiro, Murutare and Mutara Villages.



Map 13: Rukira Rurban zoning plan 2035-Source: primary data, author, February 2023

The main proposed land use in Rukira Rurban Center is residential use counting about 454 ha, compared to the total rurban area of 573.3. ha (78.5% of total area). The residential zoning is proposed where the areas are already developed, generally within the old rural settlement sites. Low density residential and medium density residential improvement zones are the main residential land uses.

Agriculture reduced in Rukira Rurban Center, almost null. The forest cover is proposed on about 3% of the land. By 2050, the Rukira Rurban Center will not be expanded beyond its border, given that its location in the region very suitable for agriculture, especially banana plantation.

Transportation network will need about 8% of the total rurban area. Rukira Rurban Center is proposed to have a light industrial zone of about 0.10 ha. The table below provides details on different proposed land uses.

Table 11: Rukira Rurban planned land use balance sheet

No	Land Use	Area	Percentage
1	Agriculture	0.0	0.00
2	Buffer	0.1	0.0
3	Commercial	33.0	6.0
4	Ecotourism, parks, and open space	0.2	0.0

5	Forest	15.7	2.7
6	Industrial	0.7	0.1
7	Public Administration	3.0	0.5
8	Public Facility	21.3	4.0
9	Public Utility	0.4	0.0
10	Residential	453.5	78.5
11	Transportation	45.2	8.0
12	Water Body	0.1	0.0
	Total	573.3	100.00

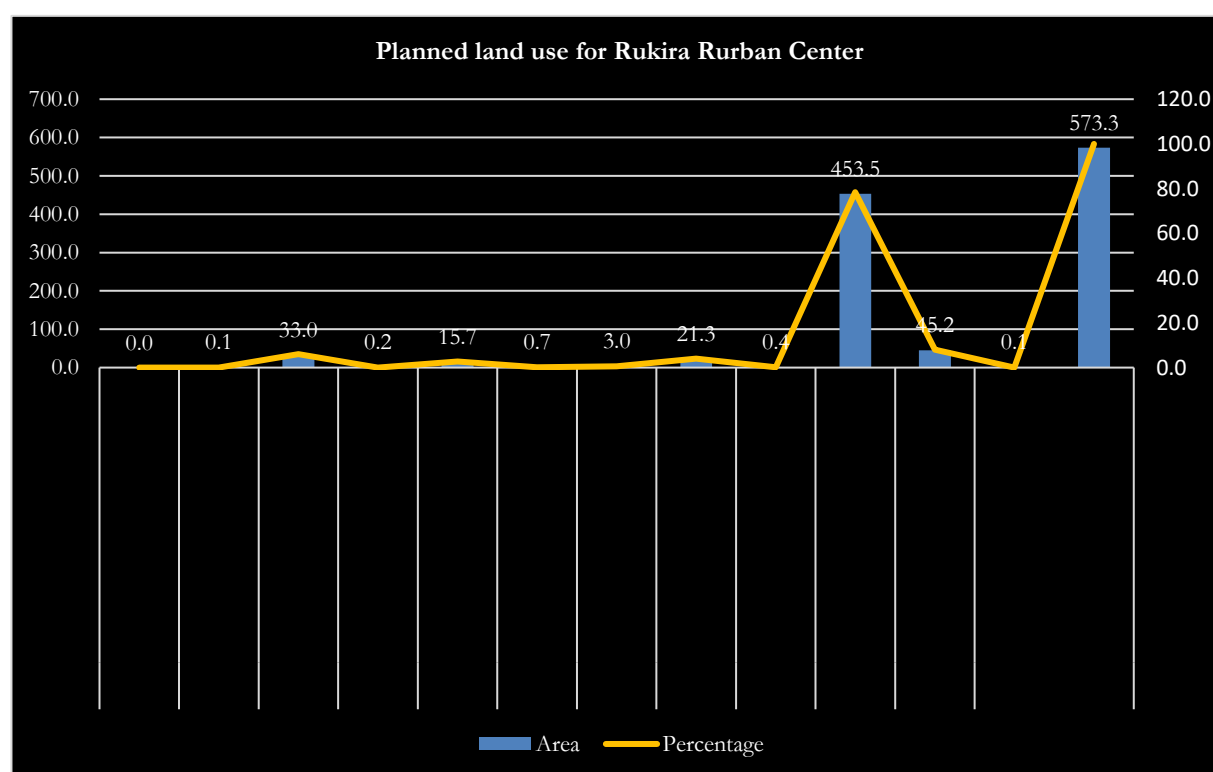


Figure 10: Rukira Rurban Center planned land use-

c) Rural Settlement Sites in Ngoma District

The rural human settlement in Rwanda is generally characterized by many rural settlement sites and scattered homesteads. The NLUDMP 2020-2050 recommends a number of rural settlement sites in each district. Thus, 100 sites are planned to cover an area of 41 km² in Ngoma District.

Existing Rural Settlement Sites in Ngoma District

Rural areas in Ngoma District are predominantly characterized by spontaneous or squattered houses, located within agricultural zones. There are 53 existing rural settlement sites covering about 71 km² (7,107.6 ha), equaling 61% of the total area allocated to settlements in the district. In total, the sites accommodate 79,002 households of 101,012 households in Ngoma District (78%).

This means that three quarters of the population in Ngoma District (366,751 out of 404,048) lived in rural areas in 2022. Ngoma District with rural population at 90.8%, a part of population lives in rural settlement sites and others in scattered settlement areas. As a consequence, agricultural arable land and other zones keep on reducing, infrastructure development remains problematic and economic growth is not well oriented. Therefore, the transformation of the rural settlement structure is urgent. By promoting densification of dwellings in rural settlements for efficient land use, as much agricultural land as possible can be protected.

IDP Model Village program

One of the major focuses of the Government of Rwanda is to advance the improved living conditions for the rural population. By putting in place the program called “an Integrated Development Approach” (IDP) with the purpose to provide basic amenities, the livelihood of people living in rural areas, especially those living in isolation or in high-risk zones, can be improved. The IDP model Village is a rural settlement model which centers on providing access to clean water, electricity, healthcare facilities, a common market place, smart classrooms, improved networks, and common cowsheds.

According to Ministry of Infrastructure, in 2019, 130 IDP Model Villages were established in the country, including four IDP Model Villages located in Ngoma District.

In 2022, Ngoma District had four IDP Model Villages, distributed in different Sectors as follows:

Table 12: Ngoma District IDP Model Villages

IDP Model Village existing in Ngoma District			
No	Sector	IDP Model Village	Number of HHs
1	Kazo	Kazo IDP Model Village	26
2	Jarama	Jarama IDP Model Village	8
3	Mutenderi	Mutenderi IDP Model Village	40
4	Rukumberi	Rukumberi IDP Model Village	57
Total HHs			131

Source: National IDP Model Village scale up concept note, 2016

Mutenderi IDP Model Village is one of Ngoma IDP Model Villages visited during the field visit. It accommodates 40 vulnerable families in multi-family (4-in-1) buildings, totaling 10 blocks. It was constructed

in 2016. However, due to poor management it has started to deteriorate and the IDP Model Village now has the following issues:

- Poor solid and liquid waste management;
- Poor housing maintenance;
- Poor drainage system and operations;
- Lack of sewage system/septic tanks, with only pit latrines with no sustainable operation and maintenance mechanisms.



Photo 9: Mutenderi IDP Model Village- Source: Field photo taken from Mutenderi IDP Model Village, October 2022

Planned perspective on rural settlement sites

The number of households per rural settlement must grow by three to four times. Consultation has led to the approval of 45 rural settlement sites covering 75.4 km² in Ngoma District. They will host about 220,000 inhabitants, equaling 46.5% of the total population in Ngoma District by 2050. This will be achieved by respecting indicators of a rural settlement site model shaped in Rwanda by 2050:

- Each rural settlement site at Cell level will have public and social amenities as per mentioned above (sports, recreational and leisure spaces, school and ECD, community health post, roads, market, cowsheds, etc.) The specific location for these social facilities will be determined by a detailed site plan;
- The arable land per rural settlement will be around 420 ha on average;
- Land consolidation in agricultural land will be emphasized;
- Five production units of 110 households and about 84 ha will be established in each settlement;

Yield improvement will be achieved due to the agglomeration of forces and economies of scale.

The population growth in rural areas will be based on Ngoma District being categorized within land use category (LUCA) B, meaning that land suitable for agriculture, with a need of land consolidation, strengthening mechanization, agro-industry and agri-business. Agriculture development will attract more people to rural areas

than urban zones, focusing on farming activities and high production, in line with Ngoma District's 2050 Vision which is to transform subsistence agriculture into commercial agriculture.

In rural settlements, the target lot size per household should follow two parameters: the preferred dwelling type "A", and a residential density of 40 dwelling units/ha is to be targeted. This equals 250 m² per household, hence this target cannot be expected to be fully applied.

Spatial compliance with the settlement standards as set by the NLUDMP 2020-2050

The NLUDMP 2020-2050 introduced a new spatial structure for Rwanda. All settlements – urban areas, rural centers, and rural settlements – are part of the national spatial structure, envisioning rapid urbanization and a remarkable transformation of the settlement structure in Rwanda by 2050. According to the NLUDMP 2020-2050, it is projected that by 2050, 70% of the population will reside in urban areas, while only 30% will live in rural areas. In 2022, 27.9% of the population was living in urban areas, with 82.1% residing in rural areas, as reported by the recent census. This data illustrates the ongoing trend of rapid urbanization, which is expected to accelerate in the coming decades. This shift, from a largely rural population to a highly urbanized society, will have to happen progressively for the coming 25 years, throughout the planning horizon of the DLUPs.

As per the NLUDMP 2020-2050, the DLUPs are based on the population projections for 2035 and 2050. In this regard, the designation of settlement boundaries is made for the period up to 2035 and 2050 (SOME DISTRICTS). Thus, in Ngoma District spatial plan is developed with the intermediate target of the year 2035 to prevent disjointed developments and settlement sprawl within large areas. In addition, a mid-term review of the district spatial plan by 2035 provides the opportunity to adjust and adapt to changes and development trends not yet known or envisioned.

According to the Census of 2022 and DLUP projections, Ngoma District will accommodate 301,670 inhabitants and 75,418 households in rural areas in 2035. However, the majority of rural residents will ultimately relocate to urban areas. Thus, 45 settlement sites (on 75.04 km²) will reduce with time, with the opportunity to convert the land that becomes vacant for other uses, e.g. agriculture. The 2035 mid-term review will assess the level and progress of urbanization and propose the necessary adjustments and revisions of the spatial plans and rural settlement boundaries to accommodate the projected population and number of households for the second planning horizon 2035-2050.

In parallel, as recommended by NLUDMP 2020-2050, Ngoma DLUP has spatially secured zoning for the projected 75,418 households for urban residents by 2035. However, within the urban boundary, land has been allocated for intermediate or transitional use to be converted once the level of urbanization requires additional land to be developed to accommodate the growing urban population. Therefore, these as-trayed transitional lands will be compensated by acquiring land from the reduced rural settlements as people move to urban areas. This will be assessed in the 2035 mid-term review, with the objective to convert land utilized for transitional use and guide the revision of the urban boundary for the next planning horizon 2035-2050.

Thus, the district spatial plans provide land resources within the urban boundary that will both be of benefit to the urban population in the intermediate time, as well as provide flexibility in the spatial planning and development of the growing cities. During the implementation of the DLUP, densification will be encouraged even in low-density areas, supported by zoning regulations that allow increased density in these zones. The ground reality in 2035 will guide adjustments to land use zoning and inform the mid-term review to meet future needs and new land use requirements. This approach aims to boost urban populations while minimizing the expansion of rural settlement areas.

Settlement Type	NLUDMP 2020-2050 directives					DLUP 2023-2050 proposals				
	Nbr	Area (2035) (Km ²)	Area (2050)	Pop	Pop density	Nbr	Area (2050) (Km ²)	Pop	Pop density Inh/km ²	Developable area (km2)
Ngoma District Town	1	16	43	200,000	4,651	1	16.8	200,000	11,905	N/A
Rurbans	2	N/A	8.4	49,314	5,871	2	12.4	53,000	4274	N/A
Total Urban			51.4				37.5			
Rural settlement sites	100	N/A	41	220,000	5,366	45	75.4	220,000	2,917	N/A

Existing land use outside the settlement boundaries

Land in Ngoma District concerns several activities such as agriculture, forest, different socio-economic

infrastructure (schools, healthcare facilities, sport grounds, religious facilities, administration buildings, cemeteries, etc), transportation infrastructure (road network, bus stops etc), and public utilities (power plants, water treatment plants, landfill, etc). In addition, waterbodies (lakes, rivers and dams) as well as wetlands and their buffers are also part of the land use or land cover (LULC).

Some of the above-mentioned activities are identified inside the urban, rural and rural settlement boundaries. They are also found outside of settlement boundaries, but with an important proportion of land, particularly agriculture, livestock and forest.

- Agriculture zones outside the settlement boundaries have been proposed for growing different crops. They cover about 43,380 ha. The rural zones are also dominated by rural scattered residential houses where people installed their families without considering housing standards as established. Instead, they considered their current standard of living, lifestyle relying on their acquired or ancestors' land properties wherever they are located and mostly in the middle of their agricultural farms. This land will be, for planning purposes, converted into other land uses in order to enforce compliance with further Ngoma DLUP.
- Forests often cover steep slopes unsuitable for residential use. Forest plantation is encouraged to achieve at least 29% of forest coverage in Rwanda (recommended by NLUDMP 2020-2050). However, forest cover in Ngoma District is at 12% with predominance of forest plantation (86%). The forest cover outside the settlement boundaries counts for about 7% of the total land.

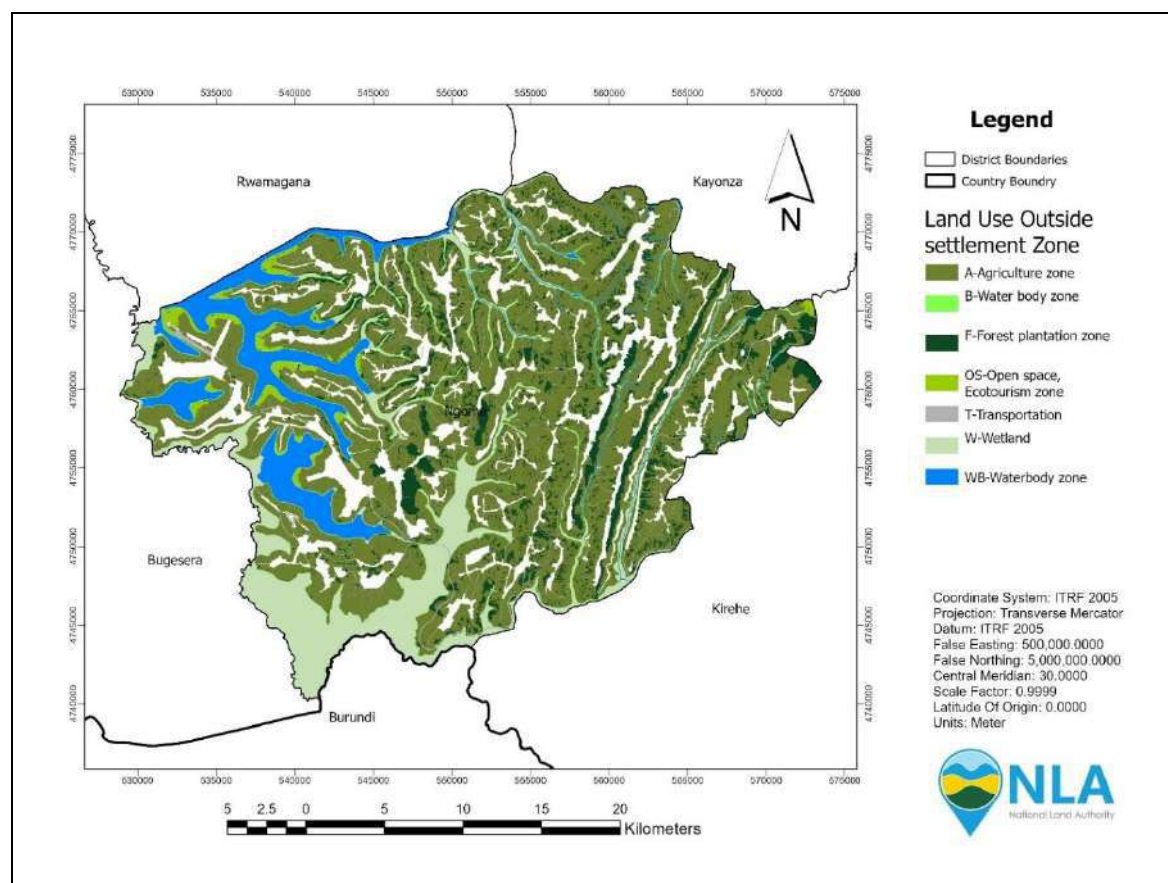
Ngoma District, still has many areas with shrubs which have been considered as forest areas according to the forest cover mapping report of 2019. However, the NLUDMP 2020-2050 had proposed those areas to be converted into agro-pastoral lands. The district has identified areas likely to be afforested such as steep slopes (more than 55%), space along roads and rivers, and buffers by water bodies. The only natural forest in Ngoma District is Mashyuza forest in Rurenge Sector.

Built-up areas and infrastructure cover about 2% of the total area outside the settlement boundaries. This includes infrastructure such as roads and different scattered residential houses which are not located within rural settlement sites or in urban or rural areas. It also includes buildings for different commercial activities, small agro-processing units, schools, and healthcare facilities as well as buildings used as public administration.

Wetlands, water bodies and their buffers cover about 23% and remain important domains of ecosystems and economic activities (agriculture, fishing, eco-tourism, etc).

Based on the economic specialization of Ngoma District, land use outside of the settlement areas will not change drastically. Agriculture and livestock will remain a main driver of the economy of the district, strengthened by increased agro-technologies. Fishing will be developed, especially around Sake, Mugesera and Birria lakes.

Tourism will be developed around the lakes to respond to the expected demand linked to opportunities such as the international airport in Bugesera, and spurred by the general economic development of the district and of the neighboring Districts of Kayanza, Rwamagana and Kirehe. The map below illustrates all land allocated.



Map 14: Planned land uses outside the settlement boundaries

Ngoma is a rural District with agriculture as the main land use.

Table 14: Existing land use balance sheet outside settlement boundaries

No	Land use	Land use size (in ha)	%
1	Agriculture & livestock	51326.8	68.1
2	Forest	5168.6	6.9
3	Built-Up area & Infrastructures	1207	1.6
4	Wetlands and buffers	2587	3.4
5	Waterbodies and buffers	15080.5	20
Total Land Use		75369.9	100

4.2.3 Housing Typologies in Ngoma District

70% of Rwandans are projected to be living in urban areas by 2050. The housing policy and vision in Rwanda is “Everyone independent of income, base of subsistence, and location shall be able to access adequate housing in sustainably planned and developed areas reserved for habitation in Rwanda”.

Suitable shelter is a basic need. As the population in Ngoma increases, the district is confronted with a major task of accommodating them. According to recent population data, thousands of new houses will be provided, in order to accommodate the increasing population. This will be enabled by planning for affordable housing, mixed-use building, incremental housing and densification through vertical construction.

Existing buildings are primarily low-density developments of single-family houses and low multi-family social housing constructed by the government. Due to low land utilization (low density), with large plots for a single house, this leads to inefficient use of land. Therefore, a typology of multi-family housing is required. Affordability and sustainability will be addressed through construction techniques and building materials to accommodate the projected households.

Ngoma District is characterized by a high rate of low-income housing. As available land is scarce, the price for land has increased resulting in increased demand for rental housing. This has increased the gap between available housing supply and what people can afford. In addition, lack of quality control by the authorities have resulted in poor housing quality making the housing sector in Ngoma District Town less attractive.

4.2.3.1 Existing housing types in Ngoma District

As predominantly rural, Ngoma District is characterised by low rise developments, usually single-story buildings. Few taller buildings can be found in the District Town. Residential buildings are mainly standalone buildings (detached), whereas commercial buildings are usually semi-detached.



Figure 11: Photos illustrating existing Building in Ngoma District

Most building types can be found in all Sectors of Ngoma District, with different levels depending on the availability of materials, income and construction techniques. Impala and Mugongo Watemba are the most common types for residential buildings, while Konoshi is the most common topology for commercial buildings.

Building techniques include cladding (ibitebe) and Gukurungira (locally material plastering). Stone is the most

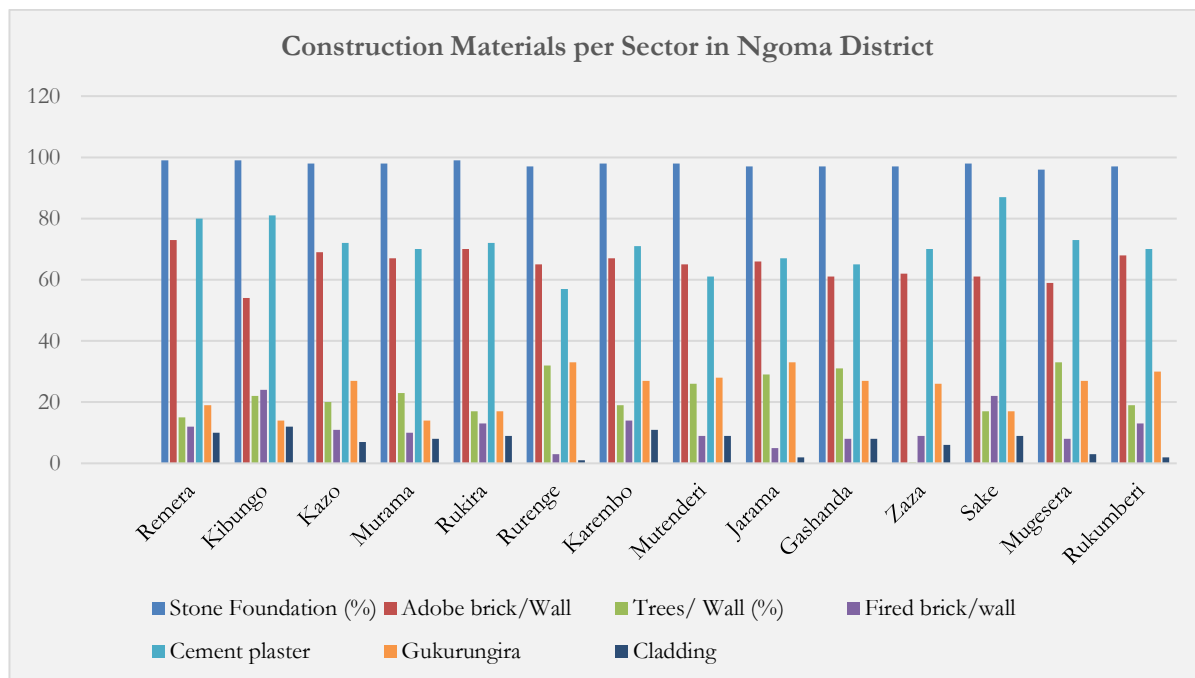


Figure 12: Construction materials use per sector in Ngoma District- Source: Oure analysis, September 2024

In addition, the community is well adapted to *Gukurungira*, an affordable technique of finishing. The technique is predominant in all Sectors (see the chart above). However, other materials like cement plaster and cladding are used especially within middle- or high-income groups. “Gukurungira” vis a vis cement use are the two techniques shown on the following photos:



Photo 10: Plastering and Stone Cladding in Ngoma District-Source: Field photos, September 2022

Due to the topography, some buildings are well located and accessible, placed linear alongside the roads and in flattened areas. Mixed-use areas are created, combining residential and commercial activities and public facilities. Other buildings have been developed scattered in the agricultural land.

4.2.3.2 *Planned perspective for housing in Ngoma District*

Housing is the largest land consumer in every settlement. Therefore, it is essential to base future demands on desired and sustainable housing types that fit the lifestyle of future Rwandans. Within this context, the size, model, and tenure of dwelling needed for 2050 are essential.

Six purposes drive this section:

- Characterization of housing types in 2050 by spatial and architectural parameters
- Match housing types with settlement categories, for maximum suitability.
- Assessment of the demands for housing types, based on population targets in each district
- Measurements of land requirements for residential areas by 2050
- Extrapolating the land requirements for residential areas to land requirements for entire cities.
- Feeding all this information into NLUDMP 2020-2050, making room for settlements of all kinds,

The target in the housing sector is a steady annual increase of building on one hand and access to housing mortgages on the other hand. A second target is to develop new local construction materials and housing typologies. The achievement of these targets will be the backbone for the roll-out of affordable and decent housing countrywide. The NLUDMP 2020-2050 recommends considering mixed-use urban development in which a real estate in a city or suburb can blend different functions such as residential, commercial, cultural, institutional, etc. into one block.

Five housing categories are proposed to be considered by local-level planning to achieve the desired consolidation and agglomeration as presented in the following figure:

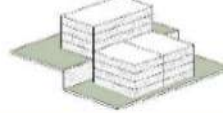
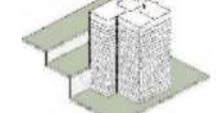
Total 2050		5,500,000 units (2.5M in 2019)
A+		1,656,000 units
1		830,000 Buildings
A		2,175,000 units
1-2		550,000 Buildings
B		1,000,000 units
3-4		11,000 Buildings
C		370,000 units
5-9		40,000 Buildings
D		245,000 units
10-22		11,000 Buildings

Figure 13: Dwelling units needed in Rwanda by 2050- Source: NLUDMP 2020-2050

a) Proposed Housing Typologies in Ngoma District

The NLUDMP proposes to develop vertical housing infrastructure in urban and rural areas in the form of multi-family apartments and socio-economic infrastructure, taking into consideration the future demographic trends and the high housing needs that require a large housing stock and space.

As presented on the figure 14 above, the NLUDMP 2020-2050 recommends A+, A, B, C, D. as housing typologies to achieve the optimal and efficient use of land in Rwanda. These typologies have been translated into more comprehensive residential and housing typologies, as established by Land use and zoning regulations to guide the development of residential areas across the country. Thus, the DLUP implemented NLUDMP proposed densification by grouping them into different residential categories as Low density (R1, R1A), Medium density (R1B, R2 & R3) and High density (R4). Below is an illustration of the linkage between the NLUDMP proposals and DLUP targets regarding the housing types to be planned.

Table 15: Housing stock per zoning plan in Ngoma District

	Housing stock per zoning plan				
Housing /NLUDMP	A+		A	B	D
DU/ha	24		40	48	90
Related Zone/DLUP	R1	R1A	R1B	R1B	R4
DU/ha (housing density)	10-15.	20-30	40-70	40-70	90+n

Lot size (m ²)	500 (G+2+P max)	300 (G+2+P max)	150 (G+2 max)	150 (G+2 max)	750
					G+n
Required area size (ha) per settlement category					
District town	10.039	295.952	291.781		0
Rurban	62.172	841.258	210.622		0
Rural	0.000	0.026	7504.01		0

b) Proposed dwelling units in Ngoma District

According to NLUDMP 2020-2050, by 2050, Ngoma District will host 118,250 dwelling units whereby 50,000 dwelling units will be hosted in Ngoma District Town, 13,250 dwelling units in Rurban Centers, and 55,000 dwelling units in rural settlement sites.

To comply with NLUDMP 2020-2050 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, dwelling units are presented as per residential category to clearly indicate the areas that will be reserved for each residential zone.

In urban areas, based on projections of Households as per NLUDM 2020-2050, Ngoma District will have 63,250 dwelling units by 2050 and as there will be a movement of people from rural areas to urban areas, DLUP planned to host 78,050 dwelling units (Minimum density) to be able to accommodate the big number of people who will continuously migrate to urban areas.

In rural settlement sites particularly, the DLUP plans to host 55,000 dwelling units by 2050. However, as proposed by the NLUDMP 2020-2050, the process of restructuring the Imidugudu system into organized clusters will need to be undertaken continuously throughout the next 30 years. Thus, people will move progressively from rural areas to urban areas looking for employment opportunities in urban areas, the total of 300,591 dwelling units (Minimum density) are reserved and will be decreased progressively up to 55,000 dwelling units by 2050 recommended by NLUDMP 2020-2050 for Ngoma District, as a result of the migration of people from rural areas to urban areas, which will be assessed during the revision of DLUP in 2035 to determine whether residential areas previously occupied by those who will move to urban areas can be dedicated to agriculture zones.

Table 16: Housing stock per settlement category and zoning plan in Ngoma District

Housing stock per settlement category and zoning plan in Ngoma District					
Settlement category	Number of DU by 2050 (NLUDMP 2020-2050)	Residential categories	Area (Ha)	Number of DU (min. density)	% of Areas
District Town	50,000	R1	10.04	100.39	0.28
		R1A	295.95	5,919	16.38
		R1B	291.78	11,671	35.52
		R2	205.04	12,302	36.30

		R3	65.10	3,906	11.53
		C1	98.70	7,600	
		C3	13.10	917	
Sub-Total			868	42,416	100.00
Rurbans	13,250	R1	62.17	621.72	1.35
		R1A	841.3	16,825	36.63
		R1B	210.6	8,425	20.17
		R2	210.5	12,629	29.33
		R3	106.2	6,373	13.87
		C1	116.6	8,980	
		C3	5.8	406	
Sub-Total			1,431	54,259	100.00
Sub-Total (Town & Rurban)	63,250		2,299	96,675	
Rural settlements	55,000	R1A	0.03	0.52	0.00
		R1B	7,504	150,080	99.86
		R2	5.4	325.4	0.10
		R3	1.7	105.0	0.03
Sub-Total			7,511	150,511	100
Total	118,250		9,810	247,187	

- Rural Residential Zone (R1B)

The Rural Residential Zone (R1B) is a residential zone offering compact developments in rural areas. The R1B Zone is intended to offer low rise housing as part of the farming community and complementary public facilities as needed. The purpose is to create a sustainable and compact residential settlement in the rural settlement sites and the rural areas of the city, limiting encroachment towards the fertile agricultural land. Within the R1B zone, all types of single-family houses and multi-family housing as per the IDP Model Villages.

Targeted density is 40-70 DU/ha for single use, and 30-50 DU/ha for mixed-use. The maximum number of stories allowed for single-family is two (2) equalling G+1, and three (3) for all other typologies (G+2). Maximum plot size for row housing or single-family units is 150m².





Figure 14: Housing Typology in R1B -2

- Low-Density Residential Densification Zone (R1A)

The Low-Density Residential Densification Zone (R1A) is a residential zone for semidetached houses, single family townhouses, multifamily houses, and low-rise developments. The R1A zone is intended to offer low and medium rise housing and complementary commercial and public facilities as needed. The lot sizes in the R1A zone are smaller than in the Low-Density Residential Zone (R1), to distinguish the R1A zone as a higher density low rise residential neighborhood. The purpose is to promote more efficient use of the lands in prime areas of the city or town by allowing for intensification and mix of uses of the existing low-density housing development.

Targeted density is 20-30 DU/ha for single use, and 15-20 DU/ha for mixed-use. The maximum number of stories allowed are three (3) plus an additional penthouse floor (G+2+P). Maximum plot size is 300m².



Figure 15: Housing Typology in R1A



Figure 16: Housing Typology in R1A

- Low-Density Residential Zone (R1)

The Low-Density Residential Zone (R1) is 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. For single family use a density of maximum 10-15 DU/Ha is allowed. For mixed-use developments a density of maximum 7-10 DU/ha is allowed. The maximum number of stories allowed are three (3) plus an additional penthouse floor (G+2+P).



Figure 17: Housing typology in R1)

- Medium Density Residential - Improvement Zone (R2)

The Medium Density Residential - Improvement Zone (R2) is intended for upgradation of unplanned settlements or redevelopment of urban renewal areas, wherever feasible in the brownfield sites. A variety in housing typologies and developments are encouraged, intended to stimulate the upgrading, redevelopment, and densification of these areas. Standalone 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 a rowhouse is 200m².

The maximum number of stories allowed are four (4) equaling (G+3). One (1) extra floor may be permitted if allowed by topographical conditions. For single family use a density 60-100 DU/Ha is allowed. For mixed-use developments a density of 40-70 DU/Ha is allowed.



Figure 18: Housing Typology in R3

- 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, in close proximity to the proposed transit corridors, hence a minimum development quantum is required. In all R3 Zones, R2 regulations are permitted.

For single use, a density of 60-90 Du/ha is required. For mixed use, a density of 40-70 Du/ha is required. The maximum plot size for single family incremental housing in new subdivision plans is 100m², and 150m² for rowhouses. The maximum number of stories allowed are four (4), equaling (G+3). One (1) extra floor may be permitted if allowed by topographical conditions.



Figure 19: Housing Typology in R3

Note: all proposed typologies in proposed residential zones will have to follow published land use zoning regulations.

4.2.3.3 Strategies to achieve sustainable housing in Ngoma District

Sustainable building in Rwanda refers to a building which uses efficient energy, water, and materials to reduce the impact on the environment through location, design, construction, operation, maintenance and demolition. This includes design measures such as orientation of the building, natural ventilation, natural daylight intake, external shading, and materials selection, and planning aspects such as mixed. use and mixed income developments.

Buildings are large consumers of energy. Proper orientation of a building provides opportunities to minimize heat gain and lowers operational costs. Natural ventilation in combination with external shading (louvers, trees and vegetation) provides a good indoor environment and reduces the need for air conditioning. Natural daylight intake reduces the energy consumption for artificial lighting. Where in Ngoma above 90% doesn't use natural lighting by getting available lighting intensity for users. Selection of materials plays a big role in energy consumption throughout the lifespan of the building. Locally produced building materials reduce the need for transportation, with impact on both climate and affordability. Local building materials and techniques can also sustain a local or regional building culture. In addition, aspects such as landscaping and permeable paving to allow for natural infiltration, rainwater harvesting, and planting of trees and other vegetation should be considered.

Mixed-use and mixed income developments and neighborhoods can contribute to reducing energy consumption through reduced need to travel for work, leisure or services.



Figure 20: Single Residential, showing density comparison between various residential zones

4.2.4. Urban Design for Ngoma District

Urban design refers to the connection between people and places, and creating sustainable solutions to meet the complex requirements of the outdoor environments in urban areas, to create more livable neighborhoods and cities. Where urban and landscape design are mostly found in developed countries, in Africa this is mainly incorporated into design of public infrastructure. Urban design is not limited to high- or medium-income areas, but should be considered within communities by challenging and expanding opportunities of implementing beautification practices and sustainable design (Arkansas, 2015).

Awareness of modern urban and landscape design was almost absent in Rwanda until the late 20th century (Seburanga, 2013). Today, houses with surrounding decorative and amenity plants have been developed, and greenery has been developed along roads and streets. In Ngoma District, urban design is primarily developing in the form of greenery and bicycle lanes along the roads, but less mixed-use development and few vertical buildings can be found in Ngoma.

Urban design contributes to the social and economic livelihood in a city, area or neighborhood. Trees and landscaping development fights pollutants, mitigates heat island effects, and allows city dwellers to comfortably spend time outside, which promotes good health amongst the community. Urban design and landscape planning can act as flood control and mitigate the risk of flooding. Well-designed streets and spaces improve legibility, wayfinding and the sense of security in the city and provides opportunities for active street frontages of commercial buildings.

Ngoma DLUP provides an opportunity to promote landscape development in zoning and regulation. By identifying and enabling the implementation of catalytic projects and other infrastructure, it guides public and private investment. The urban design for Ngoma District Town aims to promote sustainable design and environmental planning.

Urban design interventions are proposed for Ngoma District towns, Rukira and Sake Rurban Centers to provide good open spaces, and attractive streetscapes with liable signage and lighting.

The urban design area for Ngoma District includes the Central Business District (CBD), the growing urban

hillock, the market, the agri-market and the bus terminus. The site was selected after a number of interactions with the city authorities. Each development within the urban boundary provides a distinct opportunity to develop the city center's-built environment. ***The urban design area of Ngoma District Town covers about 106 ha.***

4.2.3.4 Existing Landscape Structures in Ngoma District

The landscape in Ngoma District is characterized by the topography and is composed of open spaces, streetscape, lakeshores, buildings and landmarks, and recreational areas.

- Topography: Ngoma District Town and Rukira Rurban Center are located on hills that provide an opportunity for landscaping while Sake Rurban Center is located in the plain areas.
- Open space: open spaces in Ngoma District are insufficient and not well managed and mainly found in connection to public office buildings and religious facilities.
- Streetscape: the streetscape in Ngoma District is still in poor conditions, with no well designed softscape (green space).
- Lakeshore: The place around Mugesera, Sake and Kibirira Lakes have potential landscape that could make it a sustainable town.
- Connectivity: Ngoma District has two parts: a hilly side and low land side which need to be well connected.
- Signage and Legibility: Ngoma District Town has poor signage which is visible at all.
- Buildings and Landmarks: There are many landmarks that could be included in urban design interventions, such as the District Office, the Stadium, East Gate Hotel, and the CBD in Kibungo, and Rukoma kwa Padiri, and Gafunzo (Market place) in Sake Rurban Center.

c) Landscape structures in Ngoma District Town

The landscape structures in Ngoma District Town are not well developed due to its topography with steep slopes, especially in Kibungo and Remera Sectors. There are also many wetlands inside the urban zone design. The previous land development is not well implemented because public infrastructures are not well designed and illegal buildings with no open/green space as well as poor streetscape dominating the Ngoma District Town's terrain. This general structure becomes a barrier to the landscape design for Ngoma District town.

d) Landscape Structures in Rukira Rurban Center

Existing landscape structures create an opportunity in Rukira Rurban Center. A sustainable streetscape has started to develop at a small scale. Given the fertile soil, where they cultivate bananas at large scale, there is potential for commercial areas and mixed-use development. In combination with streetscape design, open space, and street lighting, the mixed-use area can spur a sustainable community development.

Urban design in Rukira is also improved by the initiative to develop a good streetscape. The fertile soil, suitable land for banana production are important pillars which contributed a lot to the commercial activity development. which remains a motor of the economic development of Rukira Sector.

e) Landscape Structures in Sake Rurban Center

Existing landscape structures in Sake Rurban Center base on lakes, commercial areas, schools, markets and religious facilities integrated with healthcare facilities. There is no lighting, no managed public open spaces, no parking, and no integration between the commercial, residential and ecotourism areas. However, given its location by the lakes, Sake Rurban Center could have well integrated urban and landscape structures. This is illustrated in the following illustrations.



Figure 21: Landscape Structures in Sake Rurban - PA Complex /Sector office –



Figure 22: Landscape Structures in Sake Rurban Center/Parish place design



Figure 23: Landscape Structures for C3 in Sake Rurban



Figure 24: Religious Facilities: Sake Mosque and Cultural Center



Figure 25: Proposed District Hospital in Sake and Upgraded Education Facility

4.2.3.5 Proposed Urban Design and Landscape in Ngoma District

In Ngoma District, the urban planning approaches will be the promotion of affordable housing, recreational activities and sport for all, installation of public lighting, greening, and mixed-use and mixed income development to achieve sustainable community development. Recreational areas like playgrounds and open spaces for entertainment, healing and leisure are also important to incorporate. Green and vibrant cities and towns promote socio-economic development in Ngoma District. Both urban areas as well as rural settlements must have public and recreational facilities to promote social cohesion. There should be welcoming signage, and recreational open space with urban furniture to promote sustainable cities and settlements.

To achieve sustainable landscape structure in Ngoma District some measures would be recommended such as:

- To promote mixed-use and mixed income developments with a variety of typologies that allows for incremental development.
- To provide green transportation in a well-designed streetscape including street lighting, greenery, bicycle lanes, footpaths, drainage and street furniture.
- According to the topography of Ngoma District, landform conservation strategies to avoid uncontrolled site benching and leveling should be promoted and avoid new developed informal settlements, except upgrading existing ones.
- To promote social activities by providing recreational and sport facilities.

- To promote tourism areas, such as the lake shore, and introduce activities to make the public space safe, active and multifunctional at all times.
- Propose a new road network to optimizes connectivity and wayfinding, improves public transport and provides alternative parking sites.



Figure 26: Ngoma District Town Urban Design: Height, topography, softscape and hardscape.



Figure 27: Ngoma District Town Urban Design

4.3 Transportation Planning in Ngoma District

Transportation is commonly understood to be the movement of people and things from one place to another. This is made possible through various transportation modes. Besides trade, tourism activities might not be optimized without an effective transportation system. There are three main transportation modes in Rwanda, namely air, land and inland water transport. As Rwanda is landlocked, land transportation remains the predominant mode. For regional and international connectivity, Rwanda is linked by road to both Mombasa and Dar-es-Salaam ports at an estimated distance of 1,670 km and 1,430km, respectively. For Rwanda to achieve its socio-economic development objectives, it is paramount to modernize the transport infrastructure and services integrated with the development framework of other sectors. The transport development strategies should aim at reducing travel time to facilitate doing business.

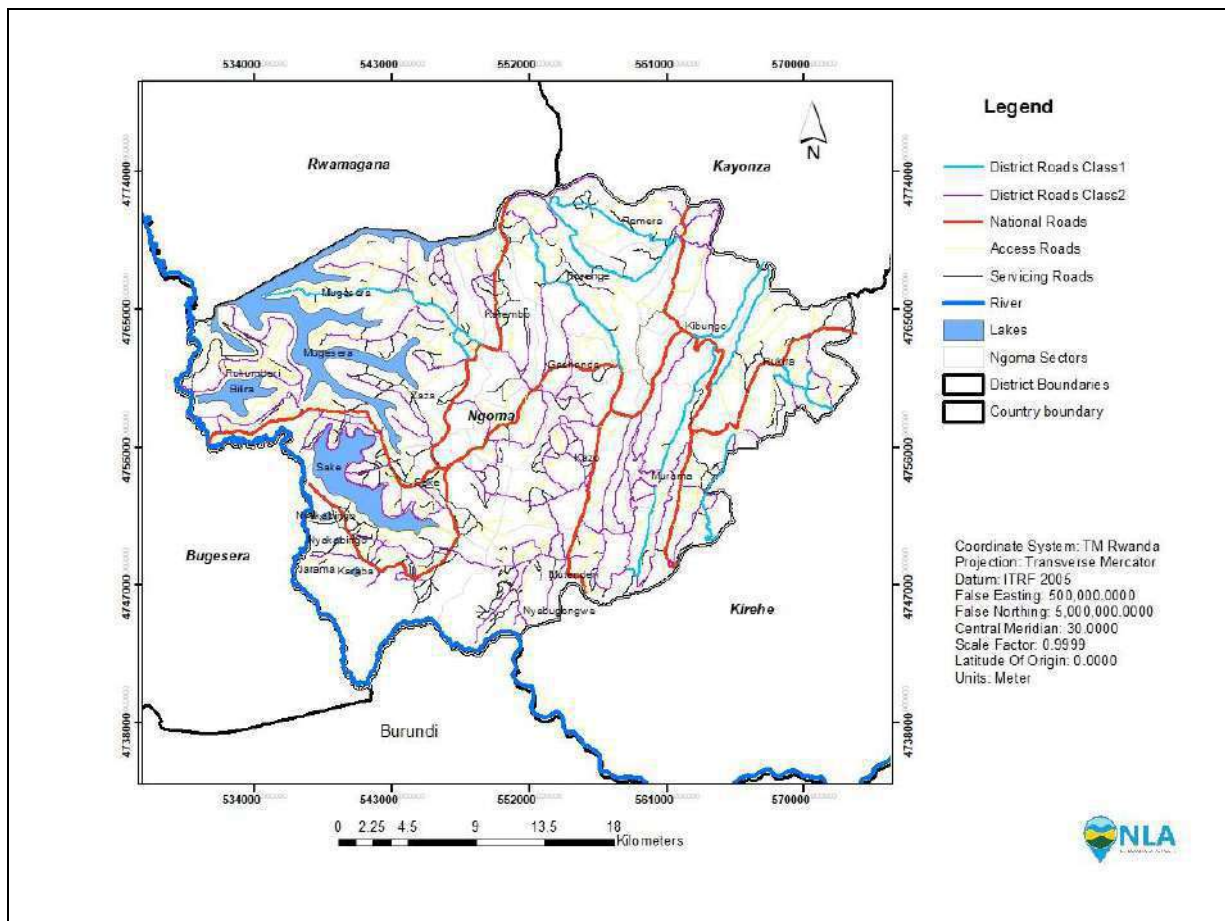
4.3.1 Existing Situation on Transportation Networks

According to EICV4, 85.3% of the population access the nearest main road in 19 minutes or less compared to

98.5% reported in EICV3. However, the District needs to improve accessibility to the nearest all weather roads. In 2010 (EICV3), the users' satisfaction rate was at 74.8% but declined to 20.7% in 2015 (EICV4). In terms of accessibility to public transport, i.e. the shortest possible distance (0-19 minutes) to get to public means of transport, 37.5% of the households had access to public transport services as per EICV4 compared to 38.3% reported by EICV3. The satisfaction level of public transport by users is low, 24.5 % in EICV4, i.e. only 24.5% of public transport users appreciate the service they get.

According to EICV4, 29.5% of the households in Ngoma District own bicycles compared to 26.1% in EICV3. 0.2% of the households' own motorcycles as per EICV4, as compared to 0.5% reported in EICV3. Ngoma District is nationally known as one of the few Districts in the country where women use bicycles as means of transport.

Ngoma District has two types of transportation, land (road) and inland water transport. Road transportation is classified into three categories - national roads, district roads and other roads which are composed of feeder roads and servicing roads. Water transport is done on three lakes which are Birira Lake, Mugesera Lake and Sake Lake.



Map 15: Existing main Roads in Ngoma District

Ngoma District is accessible with a good road network that facilitates movement of people, goods and services within. Being connected to two Secondary Cities (Kayonza and Kirehe Districts) and two Satellite Cities (Bugesera and Rwamagana Districts) it gives Ngoma District extra advantages in terms of transportation, which is essential to daily life in general.

The citizens have preferable modes of transport which includes walking, using motorcycles, and bicycles. Public transport is working insufficiently, with buses mainly in the morning and evening hours. People moving from Ngoma, for example the Rukumberi Sector passing through Kibungo Sector can use as much as 6 hours.

Despite the high level of accessibility, Ngoma District still has a room for improvement in all areas of transportation especially roads which are in bad conditions due to the type of the soil especially in the rainy season. Some of these roads don't have murram or asphalts, and lack transit amenities like public buses, parking lots, bus stations, and modern boats for water transport. There is annual rehabilitation of the roads that are in poor condition by VUP, expanded public works, and through Umuganda (community works). The following photos were taken during field visits to Ngoma District.



Photo 11: Photos illustrating existing Conditions of Roads Network in Ngoma District

Beside the road network, Ngoma District has a number of water bodies of importance to facilitate transport of people and goods to the neighboring Districts. According to the observation, water transport is done in both traditional and modern ways with citizens using traditional and modern boats.

Some of these types of boats are not durable and cannot work in all seasons, as they break easily. This affects transportation in Ngoma District, as shown in the following photos.



Photo 12: Photos illustrating Water Transport Facilities in Ngoma District

As described in the figure below, land (road) transport and inland water transport are the main modes of transportation. Land transportation has four classes: national roads, district roads class 1, district roads class 2 and other roads (access and service roads). The roads in the district have a length of about 505 km.

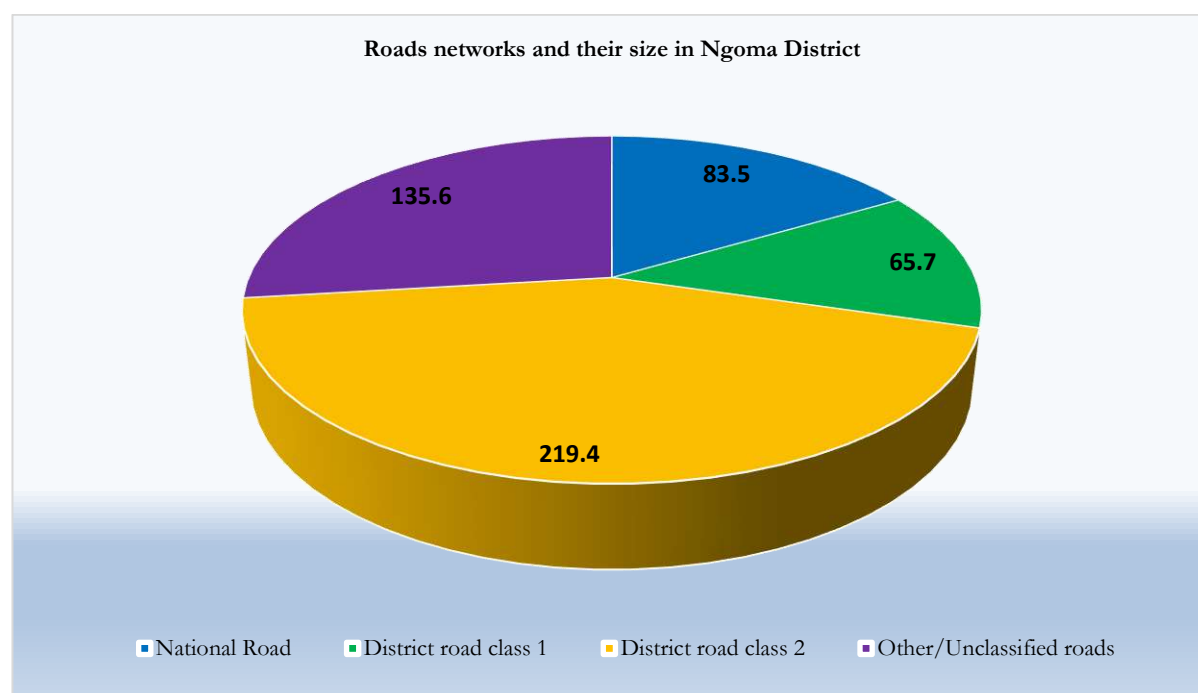


Figure 28: Roads networks in Ngoma District

There are four important roads crossing different directions of the district:

Table 17: Road's connectivity in Ngoma District

Connectivity
Kigali-Rwamagana-Kayanza-Rusumo
Kibungo-Rukumberi
Kibungo-Kazo-Mutenderi
Jarama-Sake-Zaza-Rwamagana

The DLUP allocates land for various uses including transportation, by identifying existing situations and providing solutions to problems affecting mobility in general.

4.3.2 Proposed Transportation Network in Ngoma District

Rwanda aims to develop a modern and efficient transport system where the median time taken to commute to work is 45 minutes by 2035 and 25 minutes by 2050. According to NLUDMP 2020-2050, three expressways are planned in Rwanda totaling 730 km, among others the one passing the Eastern Province, crossing Nyagatare, Gatsibo, Kayanza, Kirehe, and Ngoma Districts. The eastern express way counts for 208 km.

The percentage of the population using public transportation will be at 90% or more, and convenient public transport should be accessible within a 500 m radius or less. To achieve Vision 2050, an upgrade of as many roads as possible to an all-season network is essential. Introducing a high-speed road system connecting economic growth poles and borders is necessary as well. In addition to trade and logistic chains, railways and water transport is paramount.

Furthermore, transport services should be smart and modernized to use minimum travel time. Railways are a driving force for economic development, especially for landlocked countries such as Rwanda, where import and export use land transport to reach the seaports. At present, there are no railway lines – whether those linking different parts of Rwanda or those relating Rwanda with neighboring countries. Railways remain the key infrastructure pillar as approved by EAC Head of States in 2013. A railway connecting Dar es Salaam – Isaka - Kigali with 139 km from Rusumo to Kigali passing Kirehe, Ngoma, and Bugesera Districts with a branch line to the airport in Bugesera. The NLUDMP 2020-2060 has proposed the total national railway lines of 505 km, with 265 km in the Eastern Province.

The NLUDMP 2020-2050 recommends the following road reserves (buffers) as follows:

- ^ Railway - 60m right of way (30x2)
- ^ Expressway – 60m right of way (30x2)
- ^ National Roads - 44m right of way (22x2)
- ^ District roads class 1-44m right of way (22x2)
- ^ District roads class 2 – 24m right of way (12x2)
- ^ Other roads – 9m right of way (4.5x2)

Table 18: Road categories and widths in urban areas

Road Category	Planned Width
National Road and District Road Class 1	22 m from center line
District Roads class 2	12 m from center line
Access Road	6 m from center line
Servicing Roads	4.5 m from center line

However, according to Law n° 042/2023 of 02/08/2023 governing land and waterways transport, the dimensions

of the road reserve for the City of Kigali and other urban areas shall be determined in respect of the provisions of the master plan of the City of Kigali or other urban area irrespective of the road classification. Therefore, Ngoma DLUP determined dimensions of the road reserve for some commercial centers based upon convincing factors agreed during field consultations with local authorities.

4.3.2.1 ROW Cross-sections

The ROW widths are set but flexibility of width change is given on National Roads and District Roads Class 1 in urban areas. The ROW and cross sections of these roads are calculated and shown below for the different scenarios for areas with and without available space.

- **Dual carriage National Road/ High-Capacity urban roads of Ngoma CBD and rurban areas of 28m ROW**

Lane width: 3.5 m

Dual carriageway: $3.5 \text{ m} \times 4 = 14 \text{ m}$

Shoulder and Green space: $3 \text{ m} \times 2 = 6 \text{ m}$

Median width = 1 m

Footway in urban conditions: $2 \times 2 = 4 \text{ m}$

Road reserve: $1.5 \text{ m} \times 2 = 3 \text{ m}$

The expected ROW for a dual carriageway urban road will require 28 m, with two lanes per direction.

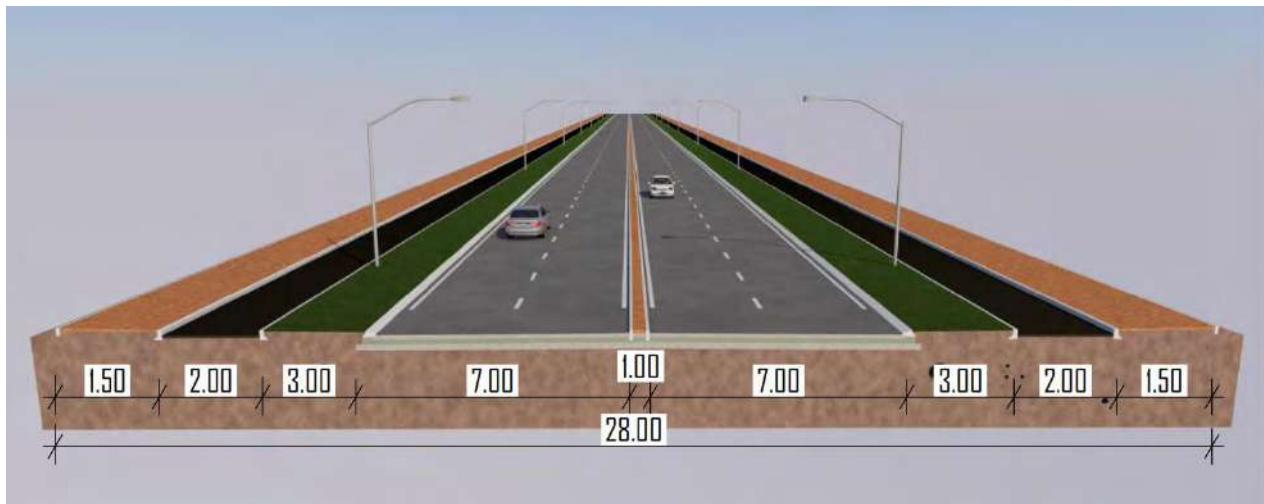


Figure 29: Dual carriage National Road/High-Capacity urban roads of Ngoma CBD and rurban areas of 28m ROW

- **Single carriage National Road/High-Capacity urban roads of Ngoma CBD and rurban areas of 23m ROW.**

Lane Width: 3.5 m

Single carriageway: $3.5 \text{ m} \times 2 = 7 \text{ m}$

Shoulder and green space: $3 \text{ m} \times 2 = 6 \text{ m}$

Median width = 1 m

Footway in urban conditions: $2 \text{ m} \times 2 = 4 \text{ m}$

Road reserve: $2.5 \text{ m} \times 2 = 5 \text{ m}$

The expected ROW for a single carriageway urban road will require 23 m , with one lane per direction.

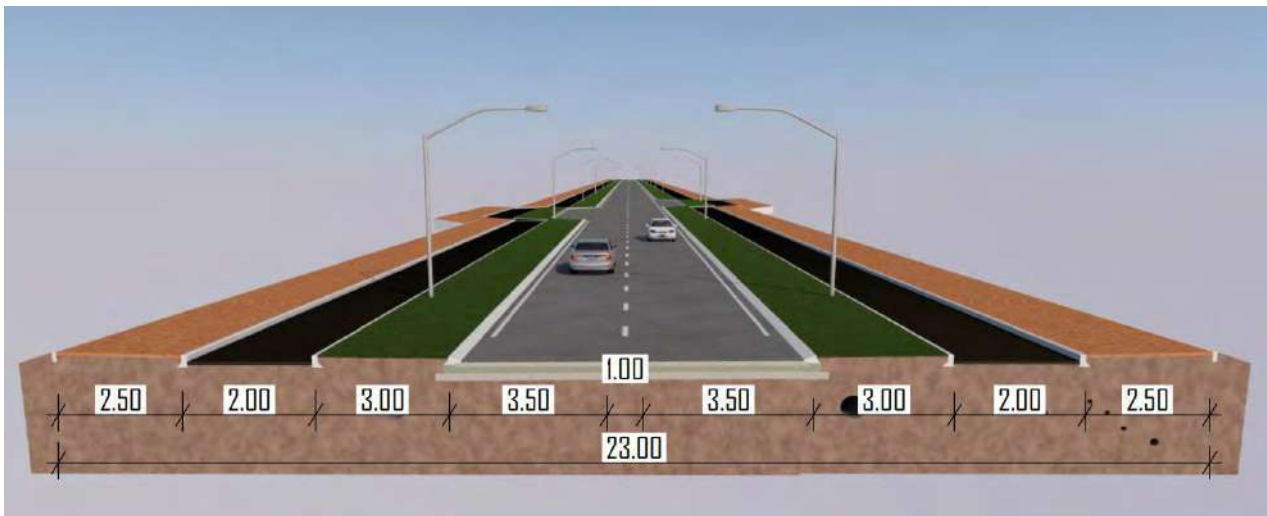


Figure 30: Single carriage National Road/ High-Capacity urban roads of Ngoma CBD and rural areas of 23m ROW

- **Primary local roads in communities – 9 to 12.5 m for brownfield areas and 12.5 m for greenfield areas.**

Lane width $3 \text{ m} \times 2 = 6 \text{ m}$

Footpath $1.5 \text{ m} \times 2 = 3 \text{ m}$

Road Reserve: $1.5 \text{ m} \times 2 = 3 \text{ m}$

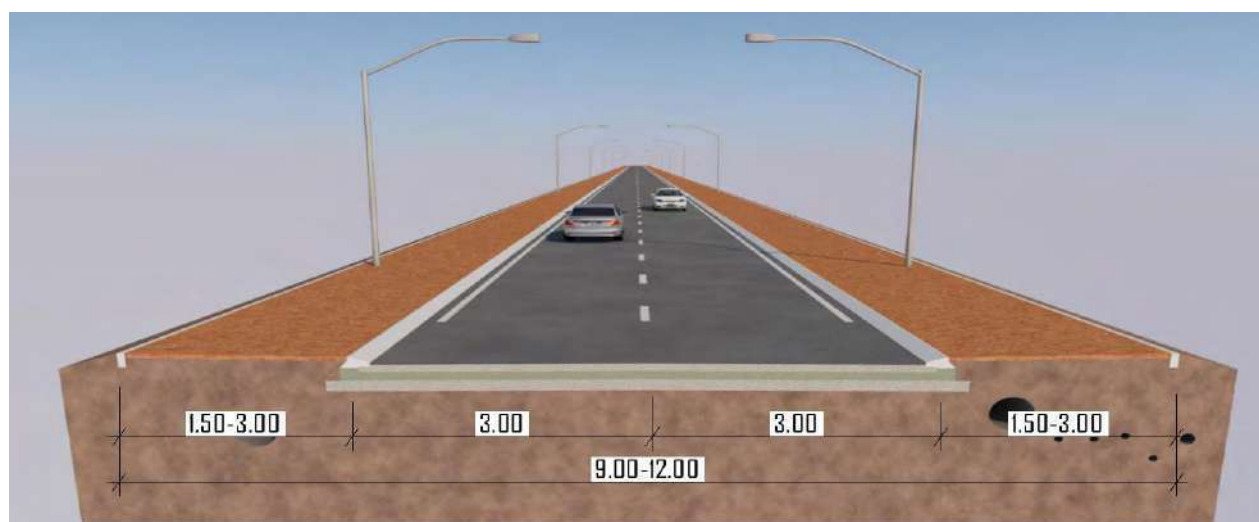


Figure 31: Primary local road in communities – 9-12.5 m for brownfield and 12.5 m for greenfield developments

- NMT – 3 m for rural settlement sites without road accessibility

Footway: 1.5 m x 2 = 3 m

4.3.2.2 Strategies for Sustainable Transportation Network in Ngoma District

In order to achieve sustainable transportation, Ngoma District, will have to adopt to the Green Transportation modes which are using electric cars, bicycles and sustainable carpooling.

As Rwanda has started adapting to using electric cars and motorcycles especially in Kigali, Ngoma should construct electric stations which will facilitate these cars and motorcycles.

So far Ngoma has started constructing new roads and rehabilitating them. As transportation entails a healthy balance between human, transportation and natural systems. This should be done by promoting inclusivity and accessibility of roads and streets.

Ngoma District should develop a framework to guide implementation and updates, this framework should concentrate on economic, social and environmental aspects. Economically, Ngoma District should make transportation costs affordable to everyone.

The following table is providing details in regard to the proposed roads construction.

Table 19: Proposed Roads Network in Ngoma District

Road Name	Length (km)	Sectors	Cells	Villages
Kabeza-Gisunzu	6.6	Remera	Bugera	Gisunzu - Kabeza - Munini I-Rwesero
Gatare-Isangano	5.18	Rukira	Buliba Nyaruvumu -	Amahoro - Gatare - Isangano-Kibimba - Nyagataba - Sangano

Gitesanyi-Nyagasozi	13.01	Murama - Mutenderi	Mvumba -Sakara - Nyagasozi	Gitesanyi - Kabahushi - Kavumu- Nyagasozi - Nyakagezi - Nyamugari
Mpandu-Rugenge	8.95	Kazo	Gahurire - Karama	Itambiro - Mpandu - Rugenge
Akarimbu- Rwanyabiranga	12.7	Mutenderi - Sake	Karwema- Kibare - Mutenderi - Gafunzo - Kibonde	Akarimbu - Cyanamo - Cyanika- Cyanyunga - Gatare - Gitesanyi - Kabare - Karengi - Kibaya - Kumurengi - Meraneza - Musenyi - Ndarage - Nkingi - Rwankamba - Rwanyabiranga - Rwumba
Isangano-Rugenda Ii	4.59	Rukumberi - Sake	Rubago - Rubona - Rukoma	Akabungo - Isangano - Kavumve- Nyakariba - Rubago - Rugenda I - Rugenda II
Gashekasheke I- Rusumbantwari	5.12	Karembo	Karaba - Nyamirambo	Gashekasheke I - Gitaraga - Kanama - Karibu - Mungoro - Rusumbantwari
Akabakanda- Rwambohero	6.53	Gashanda - Rurenge	Giseri - Rwikubo	Akabakanda - Kabashumba - Kibimba- Murambi - Nyagitabire - Rwambohero
Nyamasare- Umurambi	4.94	Gashanda - Rurenge	Mutsindo - Akagarama	Kanyinya - Nyakarambo - Nyamasare- Umurambi - Uruyenzi
Kamwiru- Rwakanuma	3.36	Rurenge	Rugese	Kamwiru - Rwakanuma
Kabuye-Nyabagaza	4.96	Remera - Rurenge	Nyamagana - Muhurire - Rujambara	Agatonero - Akarambaraye - Bukiranzuki-Kabeza - Kabuye - Nyabagaza - Rebero
Kumukiza- Nyakabingo	10.48	Remera	Bugera - Kinunga - Nyamagana	Kabeza - Kamvumba - Kigaga- Kumukiza - Murambi - Nyakabingo - Nyarugenge
Gatare-Karambi	8.44	Kibungo - Remera	Gahima - Mahango - Bugera-Kinunga	Gatare - Karengi - Kigaga-Nyamigina - Rebezo - Rutovu - Rwamihuro
Isangano- Rwasaburo_Kabuye	7.05	Kibungo - Remera - Rurenge	Karengi - Nyamagana - Musya	Amahoro - Isangano - Kabeza - Kabuye - Kinanira - Musamvu - Rebero - Rwasaburo

4.4 Public Facilities and Services in Ngoma District

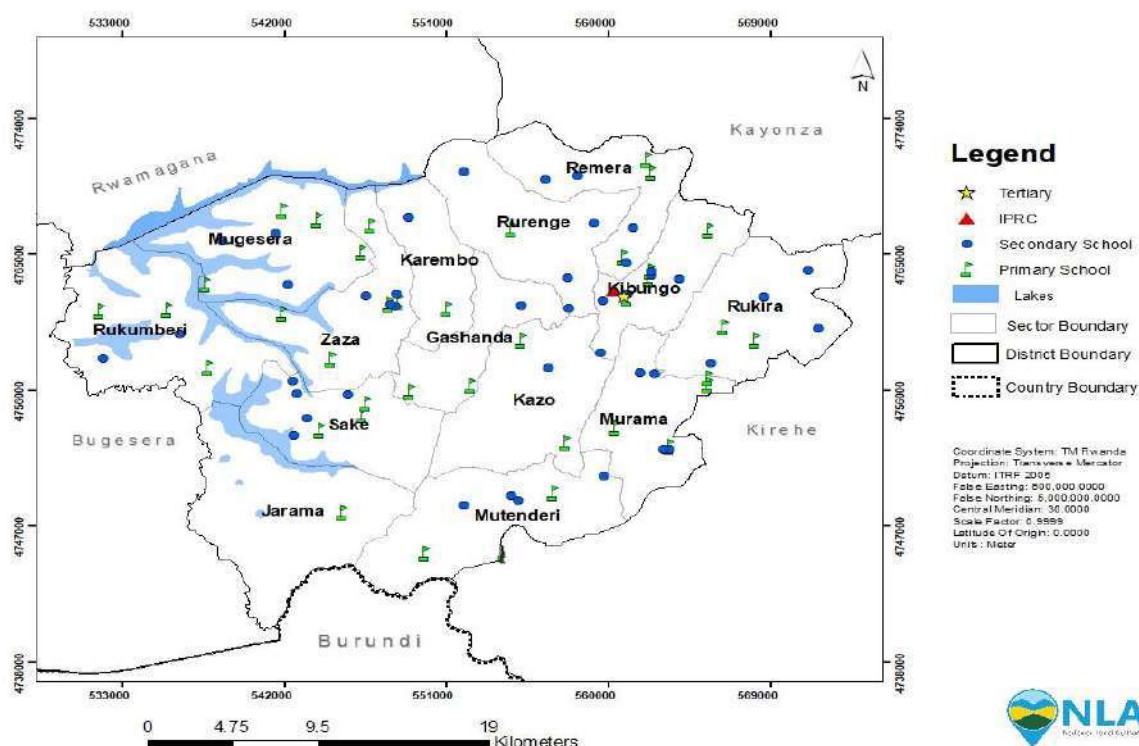
It is envisioned that with the implementation of the proposed settlement structure, access to public facilities and services will improve as these will be centralized and the services offered within consolidated settlements. The provision of facilities and servicing of sprawled settlements will be discontinued.

4.4.1 Educational Facilities

4.4.1.1 Existing situation on Education Services

In Ngoma District, the promotion rate in primary schools was 79.0%, the repetition rate in primary school was 19.5% while the net attendance rate in primary schools were 85.3%. In secondary school the promotion rate was 84.9%, the repetition rate 7.7%, and the net attendance rate was 22.8%. EICV5.

According to the 2022/2023 Education Statistical Year Book, there are 102 schools with pre-primary level, 103 schools with primary level, 62 general and professional secondary level, 18 TVET, 1 high leaning institution campuses and 122 adult literacy centers. The total number of students in the District (primary, secondary and TVETs) was 111,748, which equals almost 27.7% of the total population of the District. The number of teachers was 2,922 which means 1 teacher per 38 pupils, which is a reasonable average for the District. The number of classrooms was 2,340 equaling 48 students/ classroom, which is high compared to the NLUDMP 2020-2050 target of 35 pupils/class.



Map 16: Education facilities Map – Source: NLA data analysis, march 2023

4.4.1.2 *Planned perspectives*

The government's aspirations to reach upper middle-income status by 2035 will require dramatic improvements in both the amount of and the quality of human capital. Economies that have grown rapidly over an extended period have made substantial investments in the health and education of their citizens (World Bank, 2020). Investments in human capital is a long-term investment, as only a small part of the population enters the labor force each year. The sooner investments in human capital are made, the sooner Rwanda will achieve increased growth.

a) **NLUDMP 2020-2050 guidelines for education facilities**

❖ **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 number of students/schools: 840 pupils
- Required plot size for a nursery school: 0.5 ha
- Required plot size for a primary school: 1 ha

❖ **Secondary, Vocational and Technical Education by 2050**

According to NLUDMP 2020-2050, the following standards and parameters have been established for secondary education.

- Enrolment rate will be 90%
- Average class size: 35 pupils/class;
- Average number of students/schools: 840 pupils
- Required plot size for a secondary school: 1,5 ha
- Required plot size for vocational and technical school: 2 ha

b) **Projected education facilities in Ngoma District**

The education level in Rwanda remains low despite the policies such as mandatory education for nursery school is organized in a single cycle of three (3) years. A pre-primary cycle (Nursery) admits children aged at least three (3) years old and completes nursery school at least 5 years, A child starts primary school at the age of at least six (6) years old and primary schools are organized in a single cycle of six (6) years. It indicated that the child completes primary school at age 11. A learner begins secondary education at the age of at least twelve (12) years old, Secondary education is provided through the two (2) cycles include the first cycle of ordinary level of education which lasts for three (3) years and the second cycle of secondary education is comprised of three (3) fields of study such as professional courses, various combination of courses like sciences, humanities, languages in addition with Technical and vocational education. Each cycle of secondary education lasts for three years and is completed by a national examination with the award of a certificate. (Law determining the organization of education,2021)

In the preparation of Ngoma DLUP for the 2050 horizon year, there will be an increase of students with direct impact on the existing schools. There is an urgent need for new classrooms for both primary and secondary schools. Jointly, both public sectors, FBO, NGOs and private sectors must respond to this demand, basing on RPHC5,2022 figures, 2022/23 Education Statistical Yearbook statistics and NLUDMP 20250 guidelines, education facilities for nursery, primary and secondary education projected as follow:

i) 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	404,048	422,653	434,714	447,118	459,877	473,000
Nursery (3-5) years old	31,404	32,850	33,787	34,752	35,743	36,763
Existing Classrooms	274	-	-	-	-	-
Classrooms to be constructed for each planning period	623	41	27	28	28	29
Total number of classrooms at the end of each planning period	897	939	965	993	1,021	1,050
Total classrooms to be constructed (Cumulatively)	623	665	691	719	747	776

Considering the trend of population growth and number of children who would be aged 3-5 years old the projected information for pre-primary level in Ngoma District will need 776 classrooms by 2050 which will be necessary to reduce the overcrowding and promote early education for the children.

ii) 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	404,048	422,653	434,714	447,118	459,877	473,000
Primary (6-11) years old	61,825	64,672	66,517	68,415	70,368	72,376
Existing Classrooms	1,632	-	-	-	-	-
Classrooms to be constructed for each planning period	134	81	53	54	56	57

Total number of classrooms at the end of each planning period	1,766	1,848	1,900	1,955	2,011	2,068
Total classrooms to be constructed (Cumulatively)	134	216	268	323	379	436

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 436 new classrooms will be needed in order to satisfy the standards of 35 children per classroom.

iii) 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	404,048	422,653	434,714	447,118	459,877	473,000
Secondary (12-17)	63,043	65,946	67,828	69,763	71,754	73,801
Existing secondary education classrooms	708	-	-	-	-	-
Classrooms to be constructed for each planning period	1,093	83	54	55	57	59
Total number of classrooms at the end of each planning period	1,801	1,884	1,938	1,993	2,050	2,109
Total classrooms to be constructed (Cumulatively)	1,093	1,176	1,230	1,285	1,342	1,401
Required TVET Classrooms (60%) (Cumulatively)	656	706	738	771	805	840
Required General secondary Classrooms (40%) (Cumulatively)	437	470	492	514	537	560

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 classrooms and extension of different schools. This will need to build an average of 840 classrooms for TVETs and 560 for General Education by 2050.

Therefore, jointly both public, churches, non-governmental organizations and private sectors have to be conscious of such a situation to directly respond to this future demand by investing in education. Vertical construction of school buildings is required to reduce high densification of pupils in schools.

4.4.2 Healthcare Facilities in Ngoma District

Ngoma District boasts a network of healthcare facilities distributed across its various sectors, offering residents access to different levels of medical care. The district is served by a single, well-equipped facility, Ngoma Referral Hospital, which provides secondary medical care for patients needing hospitalization. Most sectors in

the district have at least one healthcare center. Notably, Kibungo, Remera, and Zaza Sectors each have two health centers to serve their populations. However, Karemba and Kazo Sectors currently lack any health centers.

In addition to the Referral Hospital, Ngoma District has 16 health centers, 20 health posts, and 3 dispensaries. These facilities aim to increase access to essential primary care by reducing barriers such as cost, lack of insurance, and distance. They also promote health and well-being, preventive care, and pharmaceutical care, especially for low- or non-income residents in the community. Despite significant progress with the construction of new health centers and health posts, the district's healthcare infrastructure remains insufficient given its population growth.

The tables below offer more information on healthcare facilities in Ngoma District.

Table 23: Health Centers in Ngoma District

No	Sectors	Cell	Health Center name
1	Gashanda	Giseri	Gashanda Health Center
2	Jarama	Jarama	Jarama Health Center
3	Mugesera	Nyange	Nyange Health Center
4	Rukumberi	Rubona	Rukumberi Health Center
5	Sake	Rukoma	Rukoma Health Center
6	Zaza	Ruhinga	Sangaza health center
7	Kibungo	Gatonde	Rubona Health Centre
		Cyasamakamba	Kibungo Health Center
8	Remera	Kinunga	Remera Health Center
		Ndekwe	Gasetza Health Center
9	Rurenge	Rugese	Kirwa Health center
		Akagarama	Akagarama Health Center
10	Mutenderi	Mutenderi	Mutenderi Health center
11	Murama	Kigabiro	Rukira Health center
12	Rukira	Kikatsi	Gituku Health Center

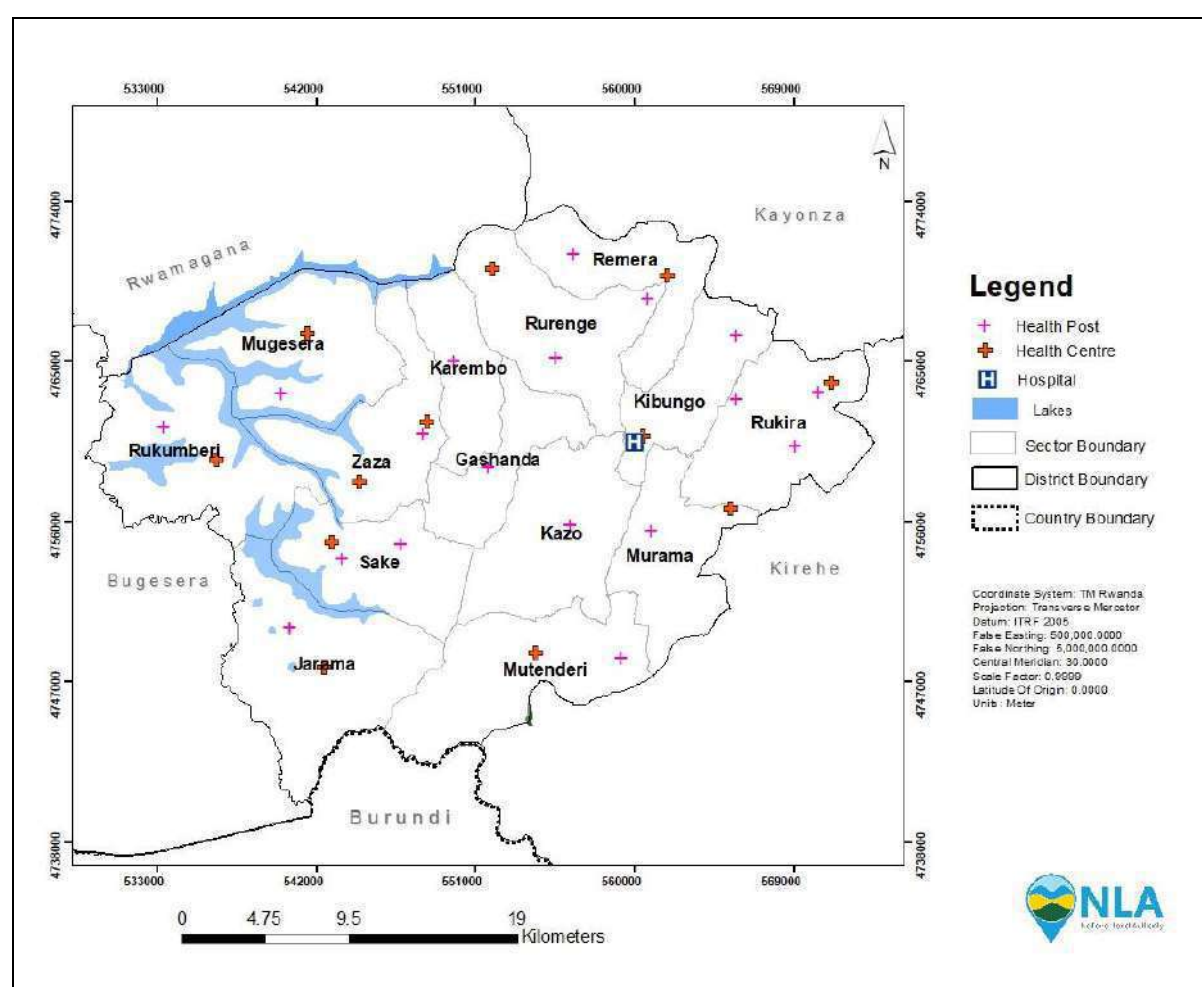
Source: Ngoma District, Edited by NLA, July2023

Table 24: Health Posts in Ngoma District

No	Sector	Cell	Name
1	Gashanda	Mutsindo	Mutsindo Health Post
2	Jarama	Kigoma	Kigoma health post
3		Ihanika	Ihanika Health Post
4	Karemba	Nyamirambo	Nyamirambo Health post

5	Mugesera	Akabungo	Akabungo Health Post
6	Sake	Gituza	Gituza health post
7		Nkanga	Nkanga Health Post
8		Nyagasozi	Nyagasozi Health Post
9	Kazo	Karama	Karama Health post
10		Gahurire	Kazo health post
11		Muhurire	Muhurire Health post
12	Mutenderi	Nyagasozi	Nyagasozi Health post
13		Kibare	Kibare Health post
14	Murama	Sakara	Sakara Health Post
15		Nyinya	Nyinya Health Post
15		Nyaruvumu	Nyaruvumu Health post

There are also few private clinics in Ngoma offering 24h a day service. However, the public sector is the most predominant, especially in rural areas. The following map is locating existing healthcare facilities in Ngoma District:



Map 17: Distribution of healthcare facilities in Ngoma District- Source: Map produced by the Author, March 2023

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

Healthcare services in Ngoma District are insufficient. One Referral Hospital is not enough for the population, and considering its location in the district, access is an issue as the transportation network is not developed.

In the Ngoma DDS, the main issues identified in the healthcare sector are insufficient infrastructure, insufficient personnel, maternal and child mortality rates, and the prevalence of diseases like stunning and malaria among children.

In Ngoma District, the percentage of households with health insurance (Mutuelle de Santé) are 93% and the number of RSSB affiliates and dependents (medical scheme) is 12,860 persons, with 4,997 affiliates and 7,863 dependents (SYB, 2021). It is of great importance to continue this achievement by assuring that every individual or household is insured.

According to NLUDMP (2020-2050) the following healthcare standards and structures are proposed:

Health Facilities by 2050

- Community health will be organized in clustered rural settlements sites.
- Health posts (0,06ha each):
- Health centers (0.2Ha each): 2 / sector
- District hospitals (2Ha each): 2 / district
- Provincial Hospital (3Ha each): 2 per province
- Referral hospitals (4Ha)
- Any new health facility to be built within urban and rural settlement boundaries and vertical construction of buildings should be mandatory.

4.4.3 Public Administration

4.4.3.1 Existing situation of Public Administration in Ngoma District

In Ngoma District, there are 14 Sectors Offices, 64 Cell Offices, and 473 Villages, but only 18 Villages have Village Offices. The District Office is old and needs to be upgraded. Some Sector Offices are too old to be upgraded, and some are too small to host all staff and the relevant documents.



Photo 13: Ngoma District Headquarters (left) and Murama Sector Office (right)

In Ngoma District, there are different categories of public administrative entities including Police, Correctional and Rehabilitation Facilities, Defense and Security, Courts and others.

Ngoma District, formerly part of Kibungo, has lagged behind neighboring districts in development, urbanization, and economic growth. Compared to Kayonza, Kirehe, Rwamagana, and Bugesera, Ngoma has fewer public infrastructure investments and urban features, with an economy historically dependent on agriculture. Consequently, its 14 sectors remain largely rural and economically underdeveloped. In recent years, however, the district has made efforts to strengthen public administration by constructing police residences, Cell and Village offices, and upgrading select Sector offices to improve governance.

4.4.3.2 Planning Perspectives on Public Administration in Ngoma District

The NLUDMP 2020-2050 promotes vertical construction of buildings and infrastructure in urban and rural settlement areas. Mixed-use developments and incremental construction are encouraged. In the preparation of Ngoma DLUP, the recommendations for decentralization of public services will be emphasized and implemented at local level for the purposes of citizen-based governance. The district has planned to support all Cell Offices to be connected to the internet.

The Potential/Catalytic Projects in relation with Public Administration include the following:

- Construction of Village Offices
- Upgrading of District Office
- Relocation of Kibungo Sector office
- Completing all the Cells' offices, including maintenance of the buildings

4.4.4 Religious Facilities

Religion is still having an impact on contemporary urban form and on society at large. Religious influences on urbanism are not only manifested through how places of worship have shaped cities across time but also encompass sociological, cultural, and political dimensions.

The DLUP will contribute in the promotion of the religious sector in different ways:

- The primary contribution will be through land allocation by planning the future locations of religious institutions.
- The DLUP confirms existing infrastructures and other accompanying public infrastructure that promote people's quality of life.
- Through land use planning, taking into account the projected population in each area, the DLUP will indicate where religious facilities have been placed in settlement areas to serve the community. It will show where religious facilities are proposed, ideally in rural communities.
- The DLUP will be clear on regulations regarding new religious facilities, where it will be restricted to establish these facilities in unplanned settlements.

4.4.4.1 The Existing Condition of Religious Facilities in Ngoma District

In Ngoma District, there are 17 churches, the main being the Catholic Church. 40% of church buildings are too old to be upgraded, especially roofing. Churches like catholic and EAR are mainly located in urban areas, while the newcomers like EECLR, EENR and EPADR are common in rural areas.

In Ngoma District, every church belongs to a LEAGUE that brings them together to better organize their efforts and take part in the district's development. The churches in the league are tasked with a variety of charitable endeavors and activities like the establishment of nursery schools for the community, Ibimina byo kubitsa no kugurizanya, gutanga umbuto yo gutera, schools' construction, training on social welfare, gutangira abatishoboye mituelle de sante, mobilization for the fight against drugs amongst young people, Pepinière z'ibiti by'imbutu ziribwa, afforestation of high-risk zones through imiganda, and social activities.

Table 25: Distribution of the Resident by Religious Affiliation in Ngoma District

Religion	Count			Percentage		
	Total	Urban	Rural	Total	Urban	Rural
RWANDA	13,246,394	3,701,245	9,545,149			
Eastern Province	3,563,145	745,935	2,817,210			
Ngoma District	404,048	37,297	366,751	100.0	100.0	100.0
Catholic	178,849	14,098	164,751	44.3	37.8	44.9
ADEPR	71,378	6,917	64,461	17.7	18.5	17.6
Protestant	58,648	4,531	54,117	14.5	12.1	14.8
Adventist	28,250	3,231	25,019	7.0	8.7	6.8
Other Christians	24,396	2,960	21,436	6.0	7.9	5.8
Muslim	11,218	1,957	9,261	2.8	5.2	2.5
Jehovah witness	3,775	423	3,352	0.9	1.1	0.9
Traditional/Animist	47	4	43	0.0	0.0	0.0
Other religion	12,862	2,038	10,824	3.2	5.5	3.0
No Religion	14,165	1,087	13,078	3.5	2.9	3.6
Not stated	460	51	409	0.1	0.1	0.1

Source: Rwandan 5th Population and Housing Census, 2022 (NISR)

Some photos were taken to demonstrate the building status of some religious facilities in Ngoma District as shown below.



Photo 14: Religious Buildings in Ngoma District - Source: Photos taken during field surveys in Ngoma District, July 2023

Due to abundance and proximity of religious facilities to Ngoma population's residences, their availability in various parts of Ngoma District has improved the quality of life for the locals. Thus, locals do not need to travel to the churches in the neighboring Districts. In order to save costly journeys, people typically go to the nearest church. As one of the earliest parishes to settle in Rwanda during the colonial era, Zaza Catholic Church is the most well-known religious tourist destination in the entire nation.

4.4.4.2 Planning Perspectives on Religious Facilities in Ngoma District

The NST1 recommends accelerating MICE (Meetings, Incentives, Conferences and Exhibition) tourism by attracting big events and conferences, and developing cultural and religious tourism working with the private sector.

The NLUDMP 2020-2050 describes the religious sector as part of public facilities considered also as public services. Given the future population trends and high housing needs that will require a large housing stock as well as space, the NLUDMP 2020-2050 recommends vertical housing infrastructure in urban and rural settlement areas in the form of multi-story buildings, including socio-economic infrastructures such as religious facilities, schools, healthcare facilities, and public administration. Incremental construction is encouraged. The building must be treated strictly as a finished product at every stage of construction.

As far as planning and land use is concerned, the DLUP recommends proper land management and use within the religious communities in Ngoma District, to comply with the planned zoning. Even if the vertical building concept is not yet recognized by the high-level religious personnel for quick changes, the construction of churches and other needed buildings should be recommended to be sustainable, complying with the building requirements to ensure human security.

4.4.5 Sport and Leisure Facilities

Ngoma DLUP identifies areas where sport services are needed and ensures that these services are provided in a way that is accessible and equitable. Through the DLUP, land use allocation ensures the future location for sport

and recreational facilities. The plan will also protect existing sport facilities including proposed improvements.

4.4.5.1 Current status of the sport in Ngoma District

Ngoma District has a modern stadium and a football team named Etoile de l'Est, playing in the second division of FERWABA. Some existing sport infrastructures, like football fields, volleyball and basketball courts are often owned by school communities and the majority of the population, especially the young generation who are not at school, have limited access to these infrastructures.



Photo 15: Ngoma District Stadium - Source: Field photo, November 2023

4.4.5.2 Planned perspective for sport and leisure in Ngoma District

Sake and Rukira Rurban Centers will have a modest stadium or upgraded sport fields to accommodate sport and recreation for the local people. Every school must have spaces dedicated for sports. It is advised that all rural settlements have a sport field that can serve multiple purposes, such as a place for recreation, a place for the community to gather for meetings, etc. This area shouldn't be located within school property in order to preserve the students' peace, security, and tranquility.

The NLUDMP 2020-2050 recommends that sport and leisure facilities must be located within the settlement boundaries so that each rural settlement site at Cell level is mandated to have public and social facilities and services such as sports, recreational and leisure playgrounds, school and ECD, community health post, roads, market, and cowsheds. The NLUDMP 2020-2050 also recommends different thematic areas like Public Services which implies recreational facilities as one of the specific land uses. All Cities and Rurban centers are mandated to have different land uses such as sports and recreational facilities.

Strengthening sport infrastructure will impact on the national, regional as well as local sport practices in terms of promoting sports, social relationship and interaction with neighboring Districts, Provinces and countries.

The urbanization in Ngoma District will influence the sports development where sport infrastructure will be needed in all three urban areas, especially in Sake and Rukira Rurban Centers. More efforts to develop sport in

all settlement areas as planned in Ngoma District are required.

The following are strategies to achieve sustainable sport and leisure in Ngoma District:

- Guide the process to put in place a long-term framework for development of modern sports and recreation facilities in the district.
- Develop a comprehensive M&E framework to track implementation of the DLUP to promote development and maintenance of sports and recreational facilities
- To ensure that all strategic plans to develop and maintain quality sports and recreation facilities for different sports domains at different levels
- Guiding and facilitating the private sector on opportunities to join a partnership with district and sports bodies to develop and lead on sport development (e.g. sport fields, stadiums, innovation in sports).

4.4.5.3 Cemeteries in Ngoma District

Cemeteries have largely been ignored by planners and are rarely considered a critical land use. Historically, environmental and health concerns sought to provide adequate buffers between the living and the dead (Bennett & Davies, 2015). There is a gathering international body of evidence that demonstrates the myriad roles of cemeteries beyond that of bodily disposal and remembrance. These include their value as recreational spaces similar to parks, and for nature conservation.

At a strategic level, cemeteries need to be planned based on demographic projections and cultural context. There is a need to safely dispose of the remains of the deceased in order to avoid public health hazards.

Cemeteries in Rwanda have played a big role in minimizing the use of land whereas previously, Rwandese used to bury their relatives in their home. However, cemeteries can also have negative impacts to socio-economic wellbeing if not properly managed.

4.4.5.4 Existing situation of cemeteries in Ngoma District

Traditionally, Ngoma District used to bury family members at home, where three or four tombs could be found at each house. But Ngoma District has provided public cemeteries where everyone is allowed to put to rest his beloved. So far, Ngoma District has 95 cemeteries covering 43.4 ha distributed in all sectors. Some are in good condition and others are in poor condition (they lack fence, some are place where domestic animals meandering around and where residents play soccer). The following figure provides a number of cemeteries per sector in Ngoma District.

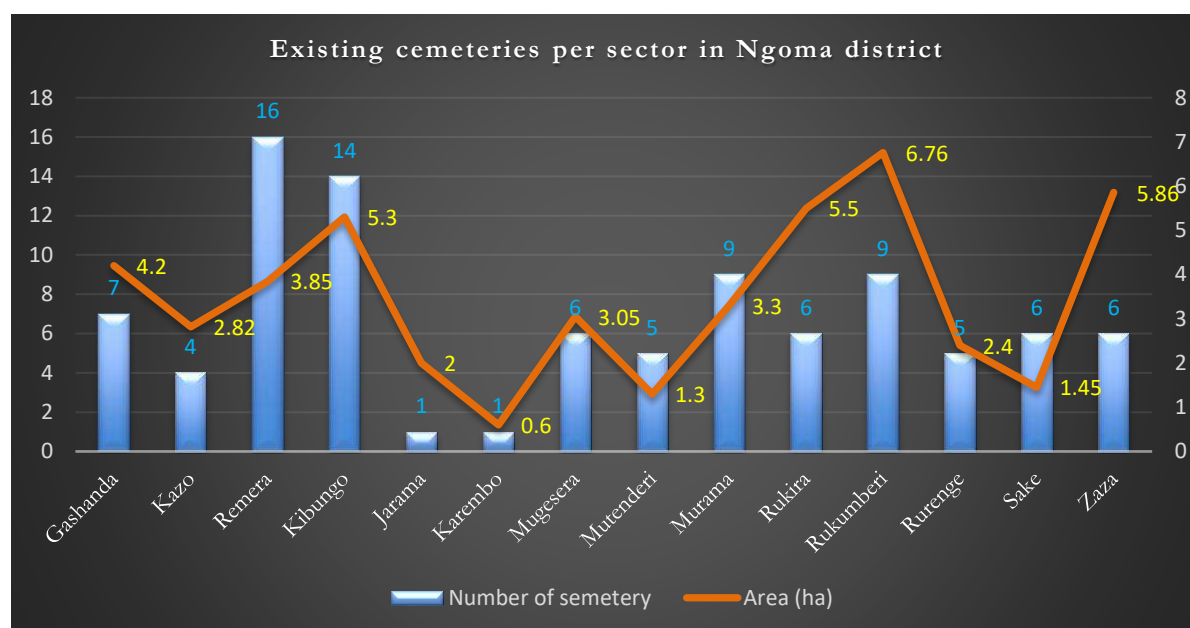


Figure 32: Existing cemeteries per sector in Ngoma District

As shown in pictures below, some of the cemeteries in Ngoma District do not have fences and residents have built the tombs in an unsustainable way.



Photo 16: Existing Cemeteries in Ngoma District

Ngoma District has two categories of cemeteries, one is private cemeteries which occupies military cemeteries, and public cemeteries where every resident is allowed to bury.

NLUDMP 2020-2050 has taken into account the existing challenges of the large allocation of land for cemeteries. Thus, the NLUDMP 2020-2050 proposes that according to the law, reuse of land from cemeteries to other economic activities be emphasized and at the same time plan to reshape the future national legal system to accommodate and enforce cremation and incineration practices. It is necessary to develop strategies and technology in funeral services to ensure efficient use of land.

The use of land for cemetery purposes has now become a publicized concern for local authorities. The district should comply with the law determining the organization and use of cemeteries.

4.4.5.5 Planning Perspectives

NLUDMP has also taken into account the existing challenges of the large land allocation by cemeteries and this remains a serious challenge even in the future. Thus, the NLUDMP proposes reuse of land used for cemeteries to other economic activities. It recommends to emphasize, at the same time, the review of existing legal tools and structuring the future national legal system to accommodate and enforce cremation and incineration practices. It is necessary to develop strategies and technology in funeral services to ensure efficient use of land.

The cemetery must be accessible by the population, it shall be located in suitable land, away from wetlands floodplains and sensitive environmental areas. There should be a minimum of 3 m from the ground surface to the water table, and not on rocky ground. If near wetland, an EIA should be conducted and should have a buffer distance of 200-300 m.

In general, cemeteries should be located outside or at the periphery of the urban area near residential areas, preferably away from busy routes where funeral processions would not disturb normal traffic. Firm and non-porous soils are recommended for graveyards.

4.5 Public Utilities

4.5.1 Energy

Energy will continue to be a requirement for households and commercial purposes in the future. Evidence shows a strong correlation between the increase in energy consumption and rise in income levels. Per capita consumption of energy will increase from 1,026 kwh in 2035 to 3,080 kwh in 2050. It is anticipated that there could be a need for about 3,788MW and 13,981 MW 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.

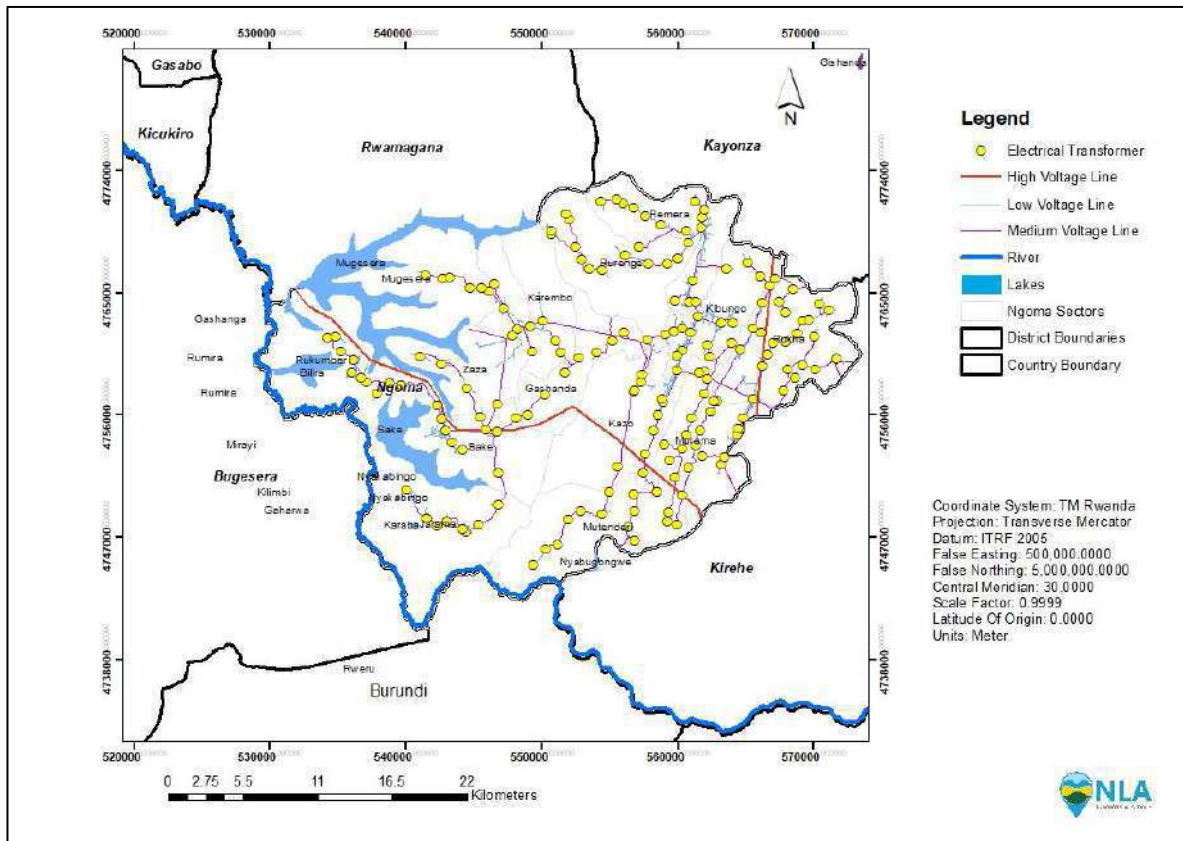
Energy is central to Rwanda's economic ambitions and development plans. The sector supports all other sectors, including housing and urbanization, manufacturing, agro-processing, mining, tourism and IT. Hence, a well-functioning, efficient energy sector is vital for achieving the country's national goals. 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.

Energy refers to power derived from the utilization of physical or chemical resources, especially to provide light and heat or to work machines. There are two types of energy resources which are renewable and non-renewable energy resources. A non-renewable resource is a natural resource that cannot be remade or re-grown at a scale comparable to its consumption. While renewable energy resources are natural resources that can be replenished in a short period of time. Examples of renewable resources are solar, wind, water, geothermal and biomass. Examples of non-renewable resources are uranium, coal, petroleum and gas.

In Rwanda, renewable resources used are solar, water, geothermal and biomass and non-renewable resources such as coal, petroleum and gas.

4.5.1.1 Existing situation of energy in Ngoma District

According to RPHC (2022), 58.3% of households in Ngoma District have access to electricity. The primary sources of energy for lighting include electricity from REG (36%), solar power (22.1%), flashlights or phone flashlights (31.1%), and firewood (1.1%). For cooking, firewood is the dominant energy source, used by 93.1% of households, followed by charcoal at 4.4%.



Map 18: Electrical Network in Ngoma District

Land use planning locates sites for energy infrastructure, based on the energy related issues in the district. The land use planning will determine the settlement zones, zones for commercial use, industries, and public facilities which will guide the distribution of energy. In addition, minimizing the use of wood for cooking and producing charcoal, promoting recycling of waste and modernizing landfills will contribute to protecting the environment.

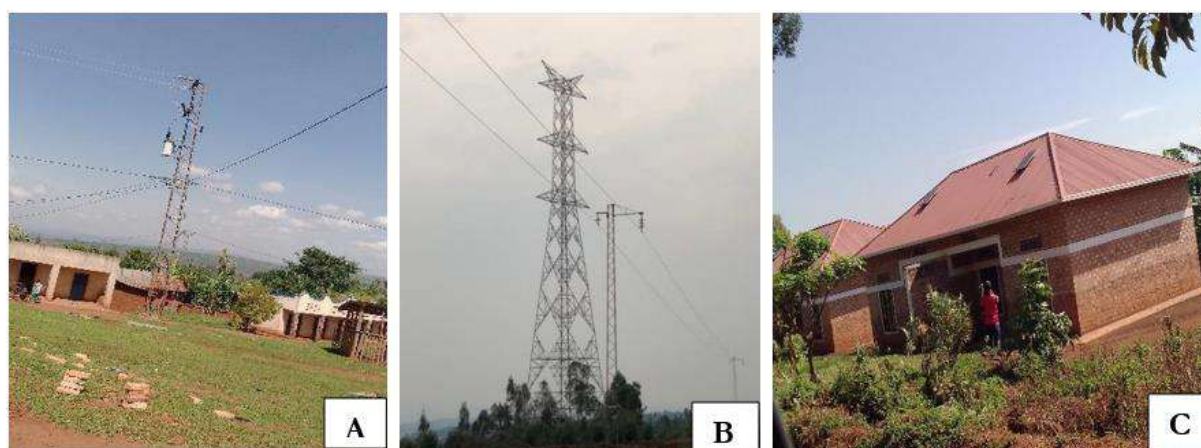


Photo 17: On-Grid and Off-Grid Electricity Networks in Ngoma District-Source: Photos taken during our field surveys, October 2022

Picture **A** is showing the electrical line of single-phase at Rurenge Sector, picture **C** is showing solar panels which are mainly used in areas where electrical lines are not yet constructed. Picture **B** shows a new electrical pillar which will pass through the Ngoma.

All administrative sectors of Ngoma District have the same sources of energy where they use hydropower, solar energy, diesel, wood and charcoal. The use of gas, briquette and biogas is low. Electricity, charcoal, and gas are sources of energy mostly used in urban zones, rather than in rural settlement zones. Rural settlement zones are likely using wood, electricity, solar, diesel, and biogas. Briquette is usually used for cooking in schools.

There are a good number of households using on-grid energy (hydropower energy) and off grid energy (solar energy) in Ngoma District as discussed in the following table.

Table 26: On-Grid and Off-Grid Source of Energy in Ngoma District

Sectors	Total of HHs	Number of HHs on grid	%	Number of HHs off grid	%	Total number of HHs on & off grid	%	Existing power plants
GASHANDA	4948	890	18	1955	39.5	2845	57.5	NONE
JARAMA	7258	2070	28.5	2686	37	4756	65.5	NONE
KAREMBO	4611	591	12.8	2006	43.5	2597	56.3	NONE
KAZO	7782	1607	20.7	2569	33	4176	53.7	NONE
KIBUNGO	7258	4404	60.7	859	11.8	5263	72.5	NONE
MUGESERA	7795	752	9.6	2765	35.5	3517	45.1	NONE
MURAMA	6440	3086	47.9	1442	22.4	4528	70.3	NONE
MUTENDERI	6177	2138	34.6	1647	26.7	3785	61.3	NONE
REMERA	7777	4035	51.9	1097	14.1	5132	66	NONE
RUKIRA	7041	4302	61.1	771	11	5073	72	NONE

RUKUMBERI	8524	2066	24.2	2735	32.1	4801	56.3	NONE
RURENGE	8313	1856	22.3	2462	29.6	4318	51.9	NONE
SAKE	7096	1101	15.5	2276	32.1	3377	47.6	NONE
ZAZA	6984	2312	33.1	2980	42.7	5292	75.8	NONE

Source: Ngoma District, February 2023

There is no power plant in Ngoma District. The existing substation is located at Kabarondo in Kayonza District serving feeders in Ngoma District. Thus, Ngoma District benefits from the electricity connection from neighboring Districts.

4.5.1.2 Planned perspectives improving energy connectivity in Ngoma District

It is expected that the population in the district will increase to 473,000 in 2050, and 200,000 inhabitants in urban zones, 53,000 inhabitants in Rurban areas and 220,000 inhabitants in rural areas.

The following are the measures to achieve NLUDMP 2020-2050 targets in energy sector:

- Increase electricity connectivity to 100% through off grid and on grid electrification;
- Construct domestic biogas stoves and other energy saving stoves to reduce the consumption of biomass;
- Sensitize the population to save on energy (electricity).
- New substations in neighboring Districts will contribute to the accessibility of energy in Ngoma District. There is another government project which will facilitate off-grid distribution for reaching 100% energy connection. Ngoma District started to use briquette for minimizing firewood quantity for cooking. This will contribute to environmental protection.

4.5.2 Water Supply in Ngoma District

According to EICV 5, almost 82.6% of the residents in Ngoma District have access to improved drinking water. The average time to access an improved water source is 11.6 minutes. A small percentage (24.7%) of households do not use their nearest water source because it is either too expensive, too far, or it does not function. In terms of access to an improved drinking water source, most of the population get their water from a public standpipe. Most households in Ngoma District are using unimproved water sources or an unprotected water spring.

Access to water and sanitation infrastructures play a critical role in ensuring targets of the Vision 2050, National Strategy for Transformation (NST2) as well as the SDGs (2030) are being achieved. Planning and investment in providing adequate clean water is the one of factors affecting the developments by promoting easy hygiene in society.

4.5.2.1 Existing Water Supply Connectivity in Ngoma District

Ngoma District has three lakes and eight dam reservoirs which cover 5,018 ha, and several rivers of different categories cover 384 ha. Other water sources are springs, boreholes and captured water sources. These water sources and water bodies play a big role by promoting local economy through irrigation, and other consumers

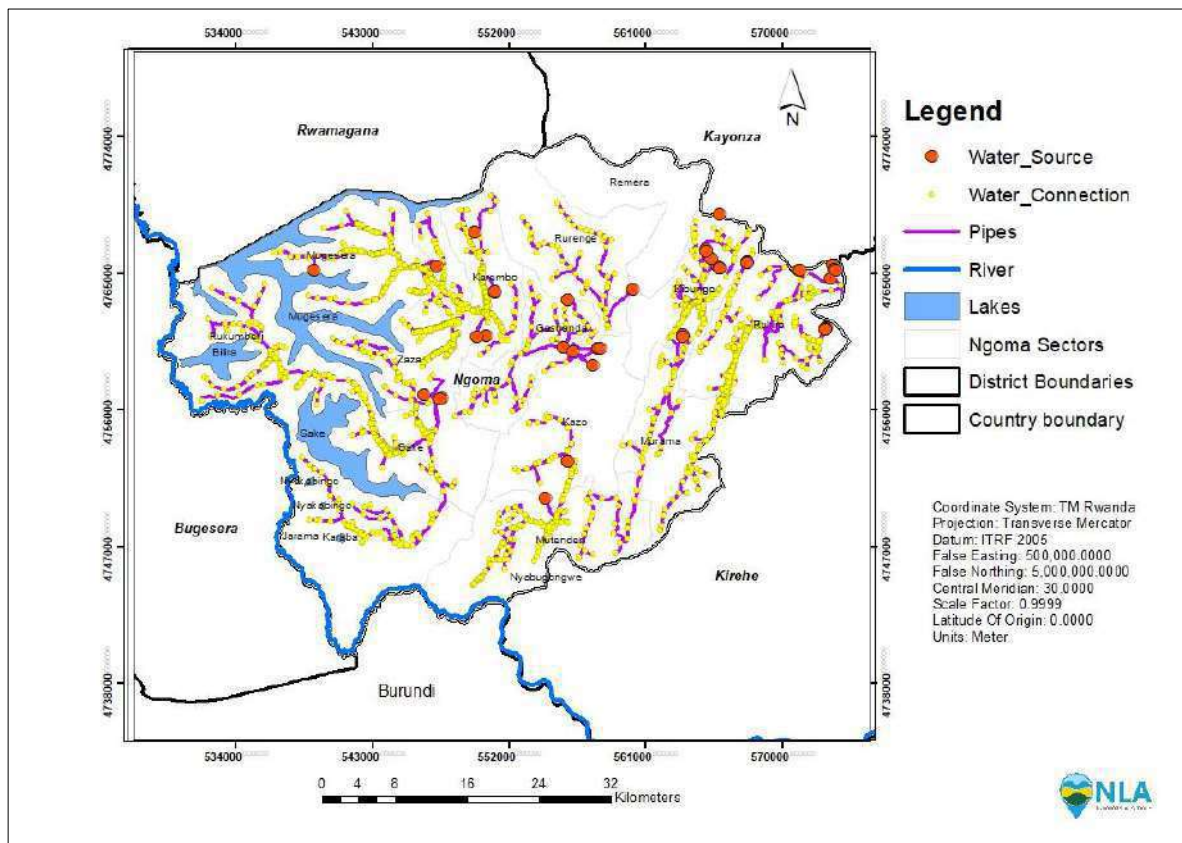
like residential, commercial, industrial and firefighting. Ngoma District has nineteen water supply systems of different types, delivering a total volume of 7,154 m³/day as shown in the following photos.



Photo 18: Existing Water Supply Connectivity in Ngoma District - Source: Photos taken during our field surveys, September 2022

Water supply systems are divided into two types: Pumping water supply systems and gravity water supply systems. A pumped water supply system is where a pump is used to fetch water from a source like a bore well, open well, sump or ground water storage and supply it to elevated storage through a rising main.

The gravity distribution is when the ground level of the water source or storage is sufficiently raised, using gravity for distribution to various areas and within settlements. Hence, no pumping is required, and such a system is highly reliable and economical. In Ngoma District there are four gravity water distribution systems and fifteen motorized water supply systems. Below is a map of water distribution in Ngoma District.



Map 19: Water Supply Networks in Ngoma District

District land use plan will help in water body conservation by creating and protecting buffers, and help districts to move from where they are today in agricultural land to site settlements where the system of sustainable water management, sufficient water infrastructures and available clean water are constructed. This will provide improved hygiene, economic development factor through job creation as clean water is available. Providing the recommendation for new water infrastructures in settlement sites having no access to clean water.

Ngoma District is one of Rwanda districts which have abundant water such as lakes, rivers, streams, springs and shallow groundwater table. These resources are useful mostly in housework, irrigation and livestock. Ngoma District had nineteen (19) operational water supply systems (WSS) which generated total volume 7154.3 m³/day to serve 408,268 inhabitants in 2021_2022. Out of 19 WSS, 18 (95%) are fully operational in the district and only the KAMFONYOGO water supply system is not fully operational.

By time family planning mobilization is being achieved, the growth rate will be two times per year as it is expressed in NLUDMP. This explains that in twenty thirty-five (2035) Ngoma District populations will reach 895,078 and they will need at least 28,563 m³/day excluding administrative infrastructures, education infrastructures and Healthcare Facilities water consumption. The current situation provides a detailed overview of Ngoma District's water supply system. The planned perspective outlines the way forward to achieve the goals for water supply and distribution.

4.5.2.2 Proposed Water Supply System in Ngoma District

Ngoma District has six water supply systems in the urban area. They cover the Sectors of Kazo, Kibungo, Murama, Remera, Rukira, Rurenge and Sake. The most important systems are RWASABURO and BUNONO,

with a capacity of 1,779 m³/day. It provides water for Kibungo, Remera and Kazo Sectors.

The rural water supply systems in Ngoma District consist of two types:

- Pumping: 15 WSS;
- Gravity: 4 WSS;

The water demand was estimated on the total population in Ngoma District, excluding public facilities, industries, slaughter houses, and agriculture uses. Water demand was estimated to 20 litres per capita per day in rural areas, and 80 liters per capita per day in urban zones. The table below provides needs in water supply from 2022 to 2050 considering 5 years interval between two periods:

Table 27: Water demand in Ngoma District

	2022	2025	2030	2035	2040	2045	2050
UNIT	m3/cap/d	m3/cap/d	m3/cap/d	m3/cap/d	m3/cap/d	m3/cap/d	m3/cap/d
Urban	6484	7067.4	8127.5	9346.6	10748.6	12360.9	14215
Rural	6544.4	7133.4	8203.4	9433.9	10849	12476.4	14347.8

Source: The author, March 2023

- Water Balance

The future water balance in Ngoma District was determined by comparing the future water supply capacity of the existing and planned water supply facilities and the projected water demand for the target year 2050 and the intermediate project horizons.

By 2050, the water deficit will be 21,408.5 m³/day (892 m³/h). The table below presents the water balance in Ngoma District:

Table 28: Water Balance in Ngoma District

Year	2022	2025	2030	2035	2040	2045	2050
Water demand (m ³ /day)	13028.2	14200.78	16330.9	18780.5	21597.6	24837.2	28562.8
Water supply capacity (m ³ /day)	7154.3	7154.3	7154.3	7154.3	7154.3	7154.31	7154.3
Water balance (m ³ /day)	-5873.9	-7046.4	-9176.5	-11626.2	-14443.3	-17682.9	-21408.5
Water balance (m ³ /h)	-244.7	-293.6	-382.3	-484.4	-601.8	-736.7	-892

Water, Sanitation and Corporation Ltd has a water supply project (phase 1) in Ngoma District which is under construction by reinforcing the water supply systems in the district. Phase one will cover Jarama, Rukumberi,

Sake, Remera, Zaza, Karemba and Mugesera Sectors. Water will be taken from Mugesera Lake, and there is an ongoing project to construct a water treatment plant on Mugesera offshore in Zaza Sector. Water supply will be scaled up to all in planned settlements zones where every household will access clean water within 500 m from the public water point/kiosk.

4.6 Agriculture and Livestock

4.6.1 Agriculture Farming Activities

Agriculture plays a significant role in Rwanda's national planning. Agriculture is one of the pillars of Vision 2050, envisioned to be nearly 15 times more productive than in 2022, of high value, and market-driven. As per NLUDMP 2020-2050, the spatial infrastructure to achieve this goal must be provided. Agriculture plays a dual role, in generating income and foreign currency through export of agricultural products (mainly coffee and tea) and in generating food for the local population.

The food required by the growing population has been analyzed based on three scenarios regarding agricultural yields', to calculate the size of the agricultural land required. In a business-as-usual situation, the farmland in Rwanda is not sufficient to feed the estimated population of 22.1 million in 2050.

4.6.1.1 Existing situation

Ngoma District has incredibly fertile soil rich in nutrients with approximately 53692.6 Ha of Agricultural land, additionally it is among the seven Districts that have been classified as land use category (LUCA) B in the country. The main crops are cash crops and food crops such as beans, bananas, maize, sweet potatoes, pepper, cassava, and coffee.

a) Factors of agricultural development

Ngoma District has a well-developed road network system and maintained feeder roads to ensure easy accessibility to input distribution and agriculture supply chain from all directions. Ngoma District has potential to grow crops not only on hillsides but also in wetlands. Plains and low inclined hills are suitable for agricultural mechanization. These areas enable crop production even in the dry season due to the existence of wetlands. Additionally, there are about 31,603 ha of agricultural land under erosion control.

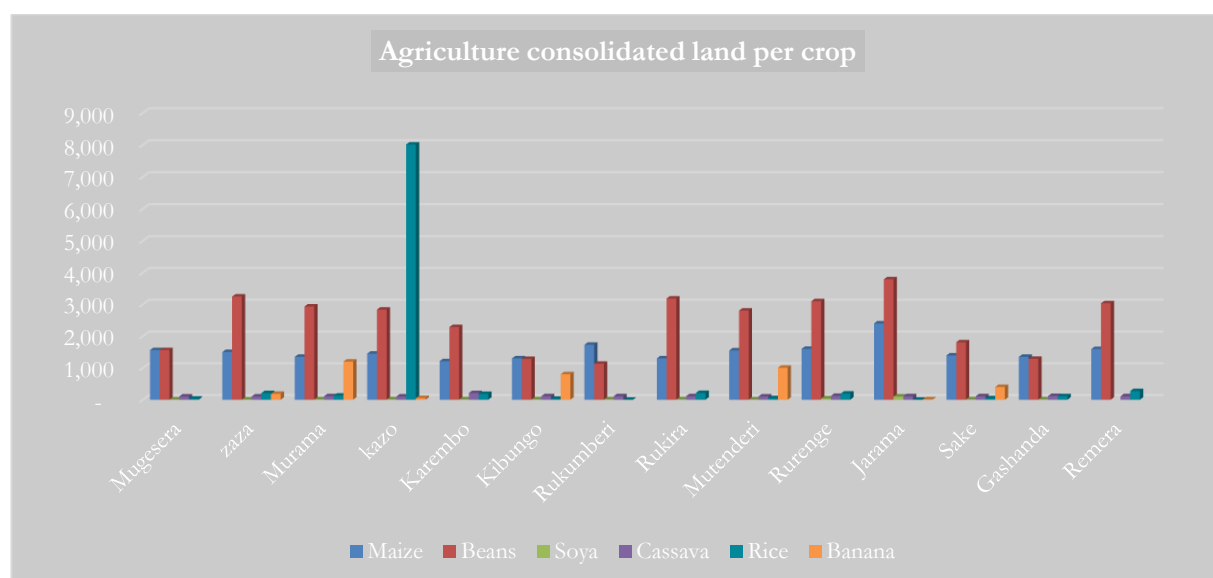


Figure 33: Crop distribution and land use consolidation by Sector in Ngoma District- Source: Ngoma District agriculture department& analyzed by NLA team

Increased traditional and non-traditional export crops has been a significant milestone in the diversification of Rwanda's agricultural exports. The chart below illustrates this.

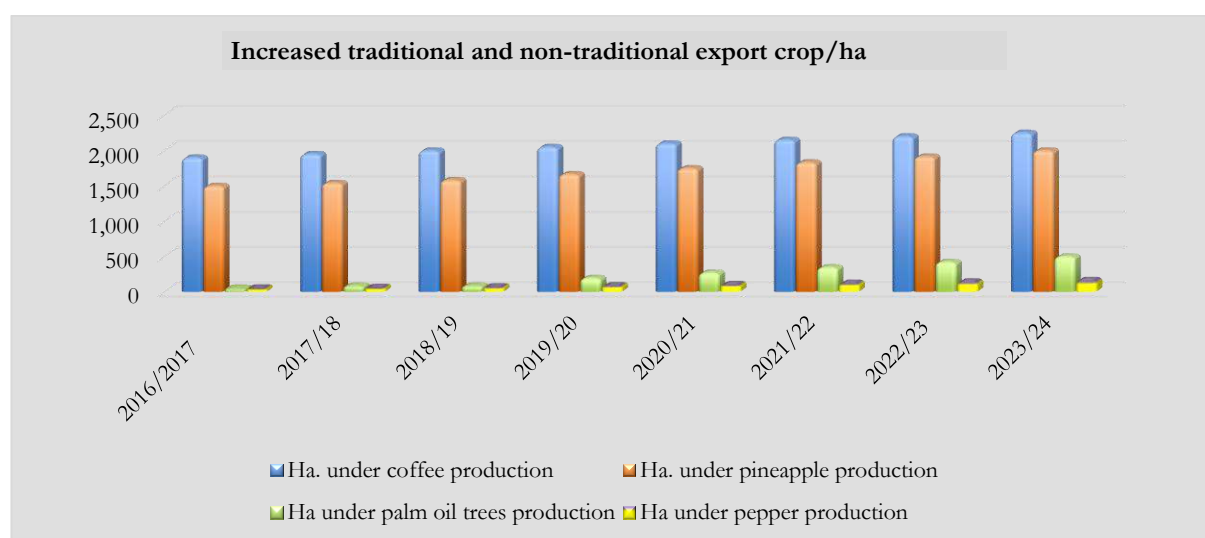


Figure 34: The traditional and non-traditional export crops/Ha

Both terracing and agroforestry are valuable practices that can be employed to enhance agricultural productivity, promote sustainability, and conserve natural resources. By integrating these techniques into farming systems, production is more resilient to environmental challenges and contributes to more sustainable land use practices. The chart below illustrates the increase of radical terraces combined with agroforestry in past 8 years in Ngoma District:

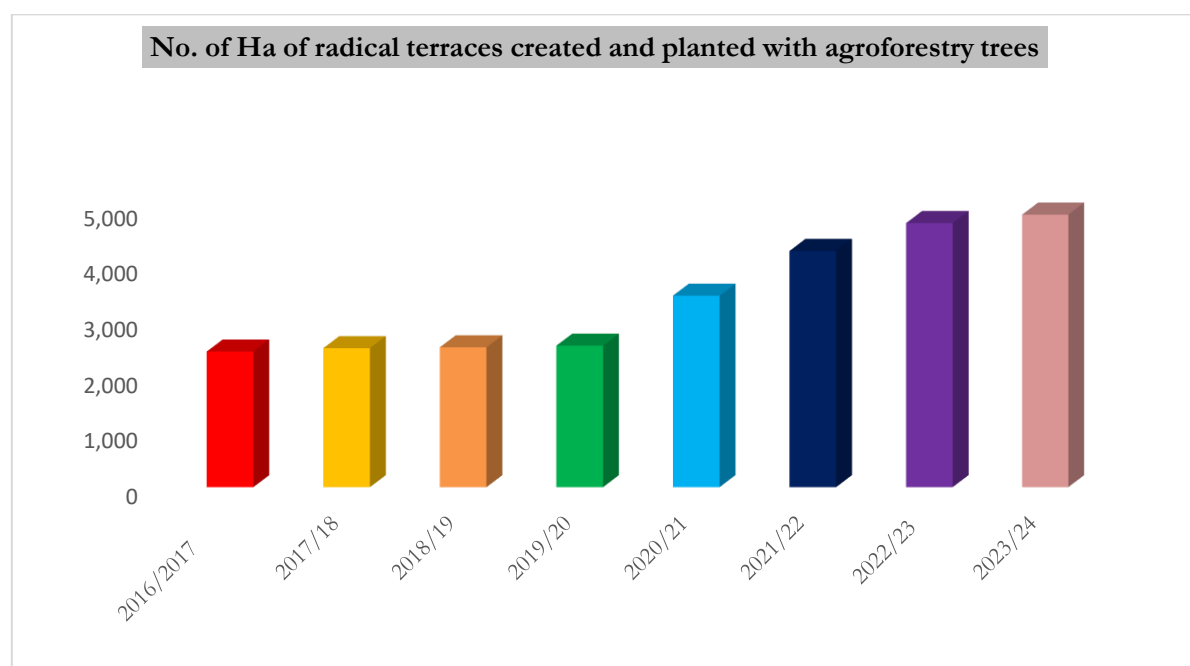


Figure 35: The increase in hectares of radical terraces created and planted with agroforestry trees in past 8 years- Source: Ngoma District agriculture department or analyzed by NLA team

Ngoma District has a total land area of 868 km². Of this, agricultural land occupies 51.5%, with 46.9 % of arable land and 47.1% of physical cultivated land. 42.7% of the area is under seasonal crops, 19% is under permanent crops, and 0.5% of the area is under permanent pasture. Modern irrigated agricultural land is 904 ha. The agricultural area under erosion control 31,603 Ha, and agricultural area under agroforestry is 24,671 Ha.

b) Types of crops and agriculture production status in Ngoma District

Ngoma District has accurate, sustainable, and cost-effective crop production statistics that promote food security monitoring, program evaluation, District accounting, and other essential purposes while ensuring high-quality standards. The table shows how crop production is distributed in different Sectors. Some crops were found highly produced in some Sectors while other Sectors have been suitable for other crops. All crops are almost cultivated in all Sectors.

Table 29: Types of Crops and agriculture production status in Ngoma District

Sector Name	Agriculture Production per sector on Annual basis (in tons per ha) in Ngoma District							
	Rice	Maize	Soybean	Cassava	Horticulture	coffee	Banana	Beans
	t/ha	t/ha	t/ha	t/ha	t/ha	t/ha	t/ha	t/ha
Gashanda	5.5	3.5	1.9	25	12	10	23	1.9
Karembo	5	4	1	26	12	4	26	15
Kazo	6.4	4.3	1.8	20	23	4.2	13	1.2
Mugesera	6.45	2.9	1.1	22	12	2	21.5	1.2
Jarama	0	4.5	1	23	23	8.6	11	1.4
Rurenge	5.5	3.5	0.9	24	12	5	22	1
Mutenderi	14	4	2	7	25	24	27	2.3
Sake	6.2	3.8	1	25	19.9	2	17	1.4

Zaza	3.5	2.5	1.2	26	24	1.9	2	1.5
Murama	6	2.5	6.6	25	31	1.1	21	1
Remera	5.4	2.7	0.8	26	12	6	26	0.8
Rukira	5.6	3.2	0.9	24	12	1.9	26	0.9
Kibungo	4.5	4	0.9	12	17	13	20	1.1
Rukumberi	0	4.5	3.2	18	12	12.3	18.5	1.4
Total	74.05	49.9	24.3	303	246.9	96	274	32.1
Average/District	5.29	3.56	1.74	21.64	17.64	6.86	19.57	2.29

Source: Field data collection, data from Ngoma District- 5th September to 2nd November 2022

There are two types of farming in Ngoma District, hillside agriculture and agricultural wetlands. The production as provided above concerns both types however, some crops are mostly cultivated and suitable in wetlands rather than on hillside. For example, in the majority of wetlands, rice is cultivated except in Jarama and Rukumberi Sectors.

Table 30: Agricultural land utilized in wetlands in Ngoma District

No	Agricultural land utilized in unprotected wetlands in Ngoma District		
	Sector Name	Favorable crops	Area size (ha)
1	Gashanda	Rice & Horticulture	137.4
2	Karembo	Rice & Horticulture	56.8
3	Kazo	Rice & Maize	49
4	Mugesera	Rice	32
5	Jarama	Beans & Maize	300
6	Rurenge	Rice	203
7	Mutenderi	Rice	62
8	Sake	N/A	N/A
9	Zaza	Rice	45
10	Murama	Rice	162
11	Remera	Rice	117
12	Rukira	Rice	82
13	Kibungo	Rice & Horticulture	31
14	Rukumberi	Horticulture	35
Total area/District			1,312

Source: Field data collection, data from Ngoma District- 5th September to 2nd November 2022

The following pictures show beans and vegetables (eggplants) grown in the lowlands around Akagera protected wetlands.



Photo 19: Agriculture production in Ngoma District-Source, Field data 5th October 2022

Pineapple is the one of main productive fruits in Ngoma District, e.g. in Mugesera, Zaza, and Jarama Sectors. The photo below shows pineapple plantation in Mugesera Sector.



Photo 20: Horticulture in Ngoma District predominated by pineapple plantations-Source: Field data 5th October 2022

c) Factors of agriculture development in Ngoma District

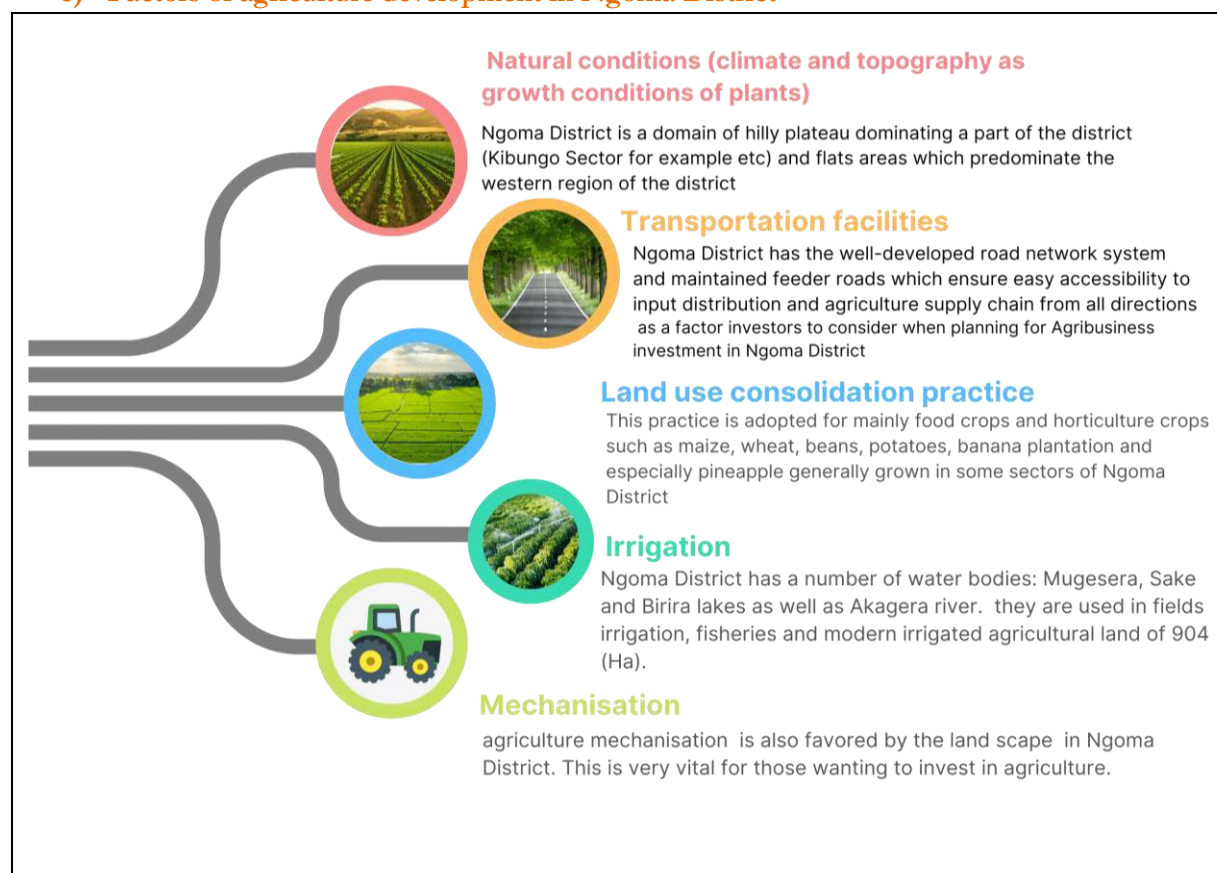


Figure 36: Different factors influencing the agriculture in Ngoma District

With many water bodies, irrigation practice is predominantly adopted in Ngoma District. Thus, about 820.11 ha have been converted into irrigated land distributed in 12 Sectors as presented in the following table:

Table 31: Irrigation Sites in Ngoma District

No	Sector	Irrigation site	Area size(ha)
1	Zaza	Akavogo & Agatinde	61.27
2	Gashanda	Bitare	24
3	Remera	Gitinga	120
4	Rurenge, Karembo, Gashanda	Gisaya	60
5	Mutenderi, Kazo	Rwakaganza	36
6	Murama	Kibaya, Cyunuzi	153.77
7	Rukira	Kibaya	90.8
8	Sake	Agatinde	42
9	Zaza	Agatinde, Akavogo	92.27
10	Mugesera	Gishandaro, Agakindo, Rwarutare	32
11	Karembo	Rwarutene, Nyimbyi	26
12	Mutenderi, Kazo, Gashanda, Rurenge	Gahondo	82

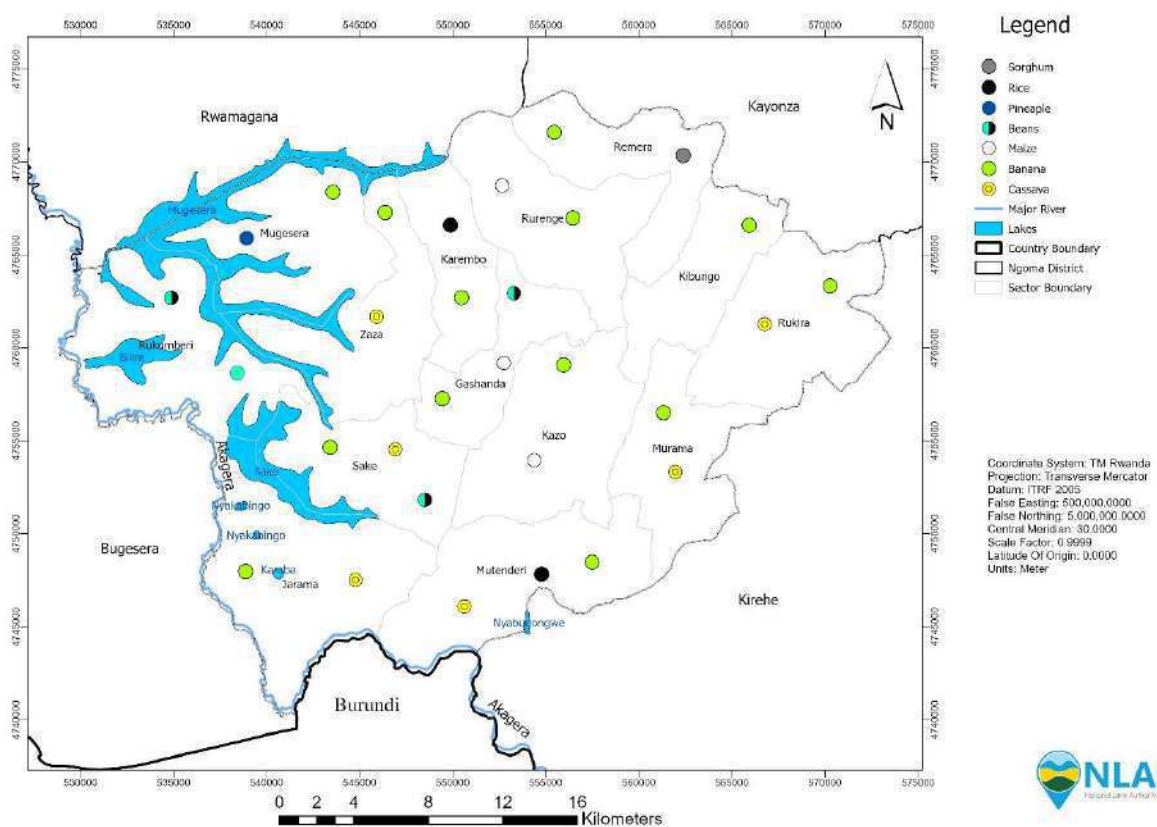
Source: Field data collection, data from Ngoma District- September/ November 2022



Photo 21: Small scale irrigation in Rukumberi/Ngoma District-Source: field data, October 2022

d) Crop suitability for Ngoma District

According to Ngoma DDS, there is suitable land available for cultivating a variety of crops. These crops include staples such as maize, beans and cassava, and fruits like pineapple. There is also a potential for production of palm oil. There are 3,450 palm trees planted on 22.5 ha of land in Rukumberi Sector. This suggests that the district has a diversified agricultural base, the below map shows priority crops that are suitable in Ngoma District.



Map 20: Map of Crop suitability in Ngoma District-Source: The author, March 2023

e) Potential Agriculture Projects in Ngoma District

There are different agricultural projects in Ngoma District. There are 38 agro-processing industries that process agricultural produce for derived products, value addition and job creation. This has also improved food habits among not only local people but also those from abroad who buy the harvest. The farmers are happy as they are assured of the market of their products.

The landscape of Ngoma District favors investments as it is not very hilly. It is made of low-lying undulating hills, which make the district ideal for investment in construction, and transportation. The raw materials and finished products can be easily accessed through the transportation network. The flat landscape favors mechanization of agriculture. This is very vital for those who intend to invest in agriculture.

Ngoma District, particularly Rukumberi Sector offers highly suitable land for palm oil production due to its favorable soil and ideal growing conditions. To capitalize for this potential, the District aim to encourage and support private investment in palm oil factory in Rukumberi Sector in the coming years.

- **Solar-powered irrigation:** With the aim of finding sustainable solutions, Ngoma District through the establishment of solar-powered irrigation systems, started in the three most affected by drought sectors of Jarama, Murama and Sake. Solar-powered irrigation systems are more sustainable, easy to use and cost-effective for rural women in the region to address the climatic conditions.
- **Other projects in Ngoma District:**

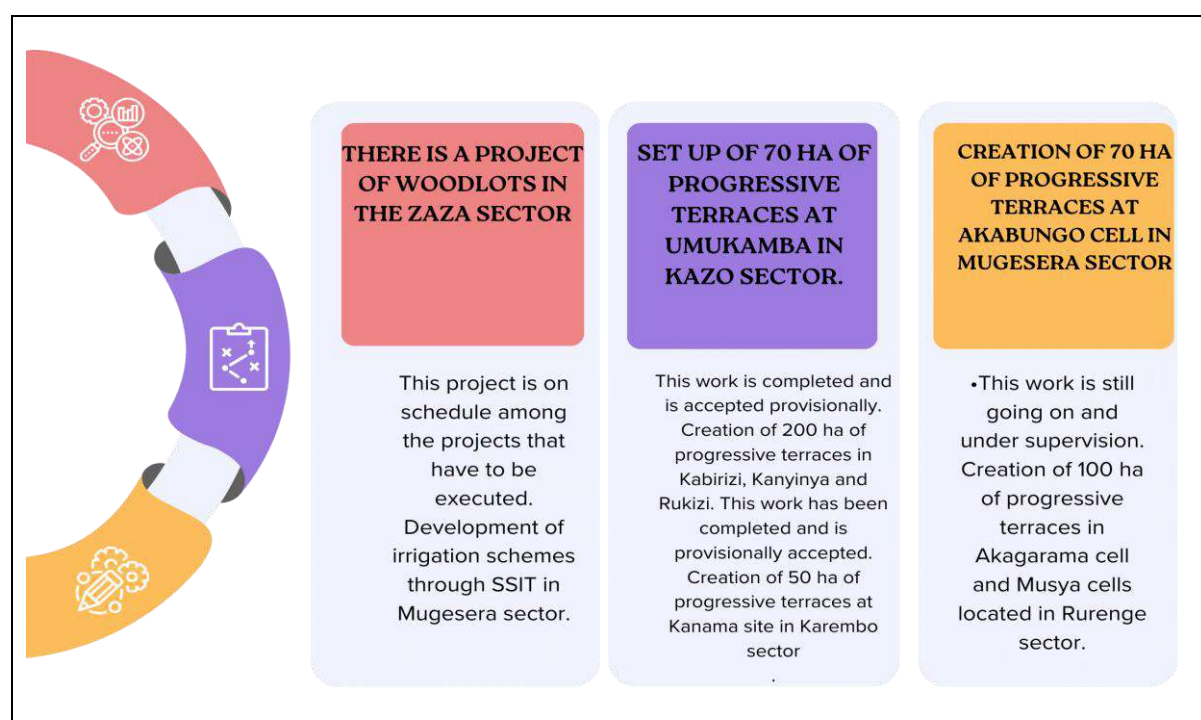


Figure 37: Other important projects in Ngoma District-Our analysis, June 2023

- **TREPA project:** TREPA is a six year project running through 2020/27, led by World Agroforestry (ICRAF) in collaboration with the International Union for Conservation of the Nature (IUCN), the Ministry of Environment (MoE), Rwanda Forestry Authority (RFA), Enabel, World Vision, and Cordaid. Funded by the Green Climate Fund (GCF), it aims to build resilient landscapes and sustain

agro-ecological systems and livelihoods in Rwanda's Eastern Province.

TREPA project has intervened in different sectors in Ngoma as indicated in the following table:

f) The Contribution of Agriculture on Social and Economic Livelihood in Ngoma District

In Rwanda, the most important activity of the population remains agriculture. Agriculture creates jobs and leads to economic growth. Ngoma farmers, like the majority of other districts' population, practice traditional agriculture.

Social livelihood is improved through giving people knowledge about agriculture. Education raises the capacity of farmers to obtain and understand agricultural information, thus enabling them to efficiently use the available information to come up with solutions to production, market and financing challenges. Farmers who possess a good education have improved decision making skills. Agriculture has also a greater impact on social livelihood through commerce. When there is an increase in agricultural production, the trading market expands. This has led to the economic development and food security in Ngoma District.

The DLUP highlights all thematic areas and their specific uses including agriculture. Ngoma DLUP will promote effective agriculture through the allocation of suitable agricultural land in order to satisfy the population of the district, will emphasize on the protection of the existing agricultural land and will highlight the available opportunities in the agriculture sector.

Agriculture impacts on trade in Ngoma as it is tied to other sectors of the economy, supports job creation and encourages economic development. Agriculture can help reduce poverty, raise incomes and improve food security. Healthy, sustainable and inclusive food systems are critical to achieve the district's development goals. Agricultural development is one of the most powerful tools to end extreme poverty and boost shared prosperity. The growth in the agricultural sector is two to four times more effective in raising incomes compared to other sectors. Agriculture also provides raw materials for food and other products.

g) Agricultural land suitability by considering slope classification in Ngoma District

The varied slopes of Ngoma District offer a range of land suitable for agriculture. Gently sloping land (0% to 6%) makes up over 12% of the district's agricultural area, providing ideal conditions for farming. An even larger portion (77%) has moderate slopes ranging from 6% to 30%, which is also well-suited for agricultural activities. Steeper slopes, accounting for 10% of the land, can still be used for some agricultural purposes. However, a small area (0.6%) with slopes exceeding 55% is considered environmentally sensitive and should be preserved.

Table 32: Agricultural land suitability by considering slope level

Slope level	Agricultural land (ha)	%
Gentle slope	6546.8	12.2
Moderate slope	41441.5	77.1
Steep slope	5391.4	10.1
Very steep slope	312.9	0.6
Total	53692.6	100

Source: Our analysis, June 2023

Following the information on the figure below, more than 89% is a suitable land for agriculture in given its

landscape. About 11% of agricultural land in Ngoma District remains steep slope where almost 1% is a land to be preserved for forest usage, afforestation or high mountainous agriculture (such as mountain tea plantations or other mountain crops)

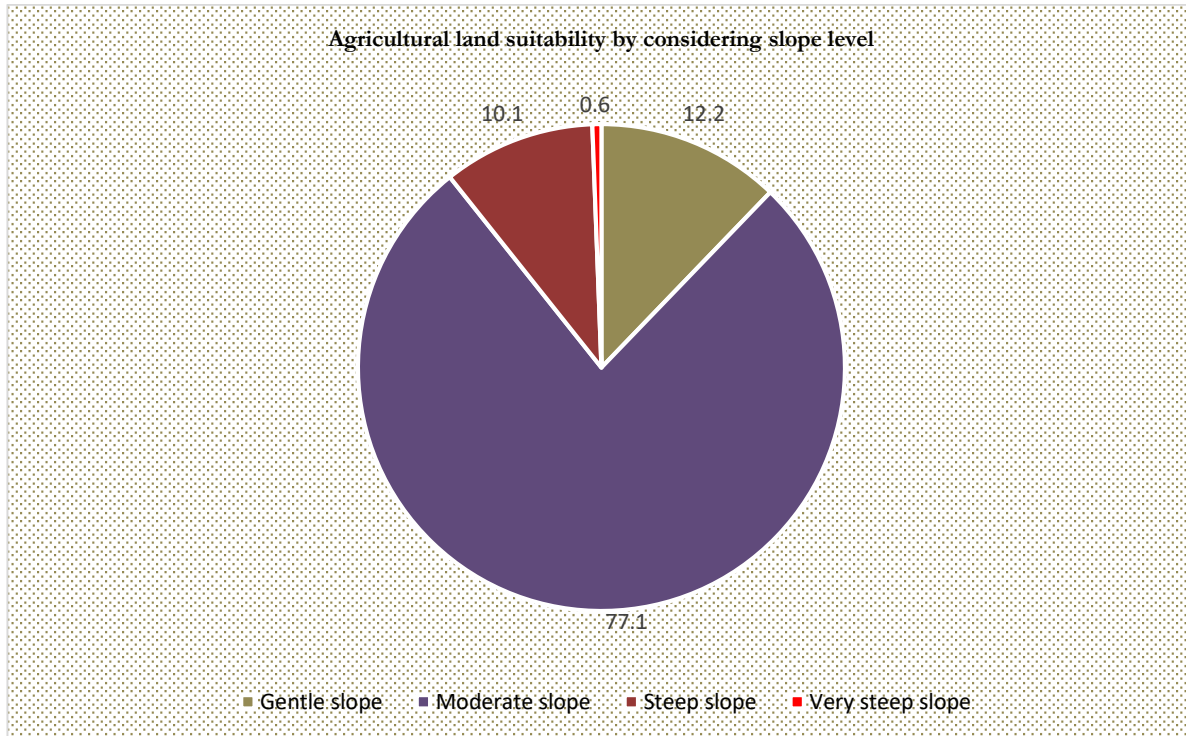


Figure 38: Agricultural land suitability per slope level-Source: Our analysis, June, 2023

4.6.1.2 Planned Agriculture in Ngoma District

It is proposed that the existing agricultural land will be preserved. The agricultural sector will have a high focus on productivity, climate resilience and standards, commercial agro-processing, and agribusinesses. The advanced food industry will be developed in the country based on strong linkages between commercial farmers and industries. 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.

According to NLUDMP 2020-2050 The recommendation is therefore to protect the current agricultural land of 10,949 km² (41.6%), and for the period of three decades, 12,433 km² (47.2%) of agricultural land will be reserved to satisfy future generations, to be protected, efficiently utilized, and enlarged as much as possible given the land demand for other uses, possibly up to 15,000 km² to ensure sustainable food security.

The vision of Ngoma District is to become an Agribusiness Hub in Rwanda for socio-economic transformation. The district has relevant objectives including the increase of agricultural production and productivity establishing agro based industries for the processing of different agricultural products.

In 2050, the agricultural land/farm (household) ration should be around 0.75 hectares per farm (household). About 8.4% of the workforce will be employed in commercial agriculture. Scattered homesteads are to be eliminated gradually, and consolidate/agglomerate in a few settlement sites to decongest the agriculture zones

and thus allow the use of technology in agriculture. The following are major challenges in agriculture:

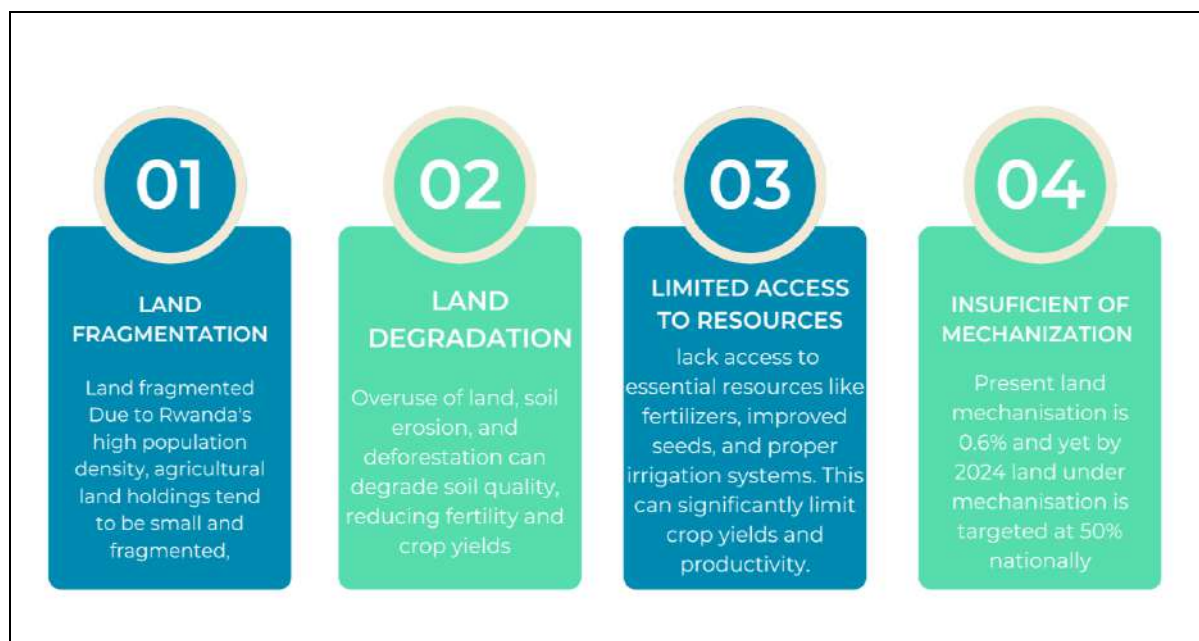


Figure 39: Major challenges in Agriculture in Ngoma District-Source

4.6.2 Strategies for the Sustainable Agriculture Development in Ngoma District

Some strategies for agriculture development in Ngoma District include the following:

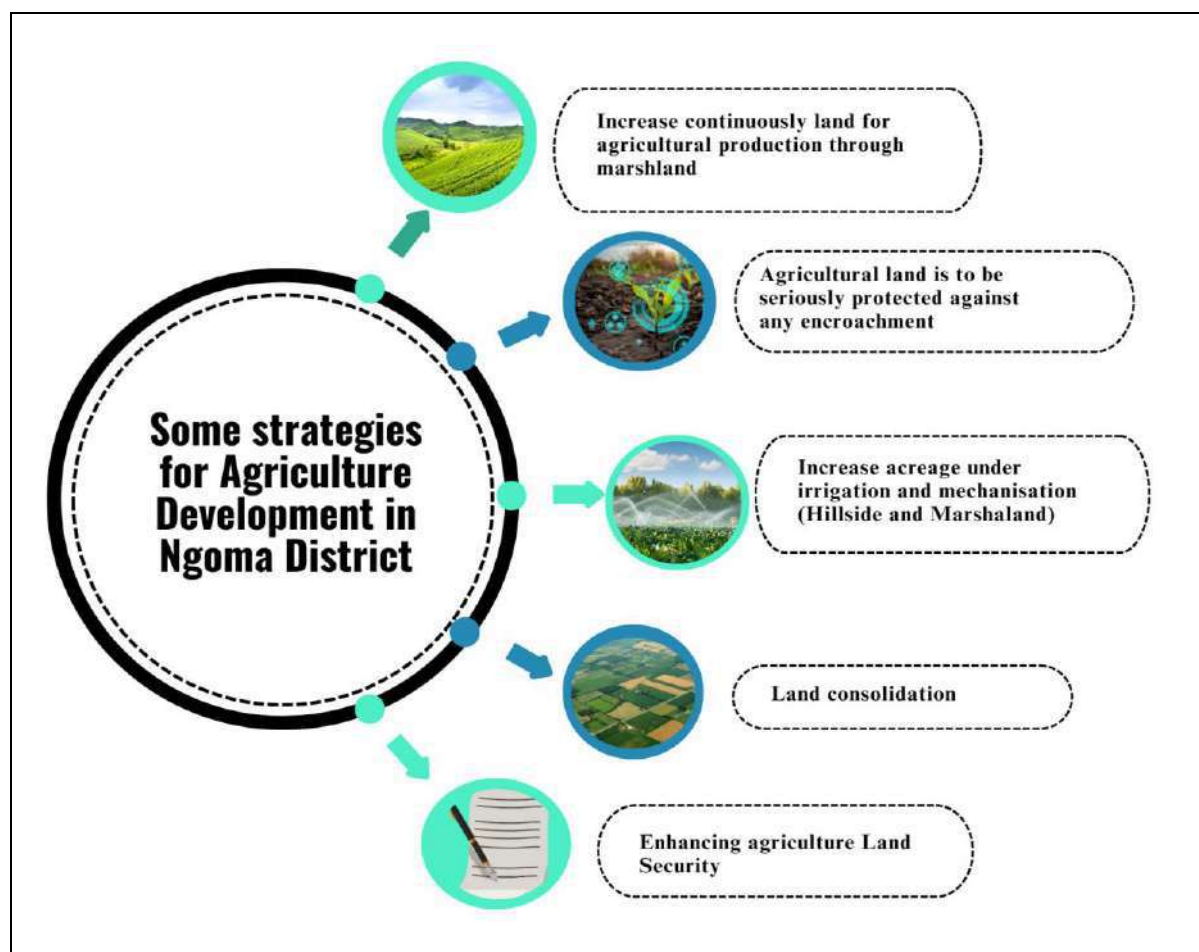


Figure 40: Strategies to achieve sustainable agriculture development in Ngoma District-

4.6.3 Livestock Farming Activities

The livestock sector is one of the fastest growing segments of the agricultural economy. Livestock are central to the livelihoods of people in Ngoma District. They form an integral part of mixed farming systems, where they help raise farm productivity and provide a steady stream of food and revenue for households.

In Ngoma District, a variety of livestock is bred including cows, goats, hens, rabbits, pigs and sheep. The production from these livestock has a great impact on social livelihood since it provides livelihood to rural and urban communities thus reducing malnutrition and poverty. Livestock provides manure that improves the soil structure and fertility as well as water retention. Additionally, livestock contributes to increasing employment rates, economic development, food security and agriculture production. Strong demands for animal-based foods and increasingly complex processing and marketing systems offers significant opportunities for growth and poverty reduction.

4.6.3.1 Existing Conditions of Livestock Development in Ngoma District

There are 32,153 cows, 64,617 goats, 154,819 hens, 34,486 rabbits, 26,755 pigs and 1,471 sheep in Ngoma District. These livestock produce meat, milk, fur, egg and compost. The production from livestock is influenced by a variety of factors including artificial insemination, proper feeding, and vaccination of domestic animals against diseases, animal husbandry, water supply and proper infrastructure for livestock. In addition, seminars play a big role in providing knowledge about livestock to citizens. This enables farmers to use the available

information so as to find solutions to issues related to the decrease of livestock production. The following table is providing more details on existing cows and their contribution to the socio-economic development of Ngoma District.

4.6.3.2 Factors Influencing the Development of Livestock in Ngoma District.

Numerous physical, biological and socio-economic factors interact to influence the nature and development of livestock. Climate, which includes both temperature and precipitation can affect any animals' ability to survive and to be productive in many ways.

4.6.3.3 Contribution of Livestock on Socio-Economic Development of Ngoma District

Livestock impacts social livelihood in Ngoma District. It is tied to other sectors of the economy, supports job creation and encourages economic development, raises income and improves food security. Livestock products are excellent for closing dietary gaps in protein consumption and producing higher value products. Ngoma District has a priority of eradicating malnutrition. Products such as milk and eggs play a big role in eradicating malnutrition.

4.6.3.4 Planning Perspectives to the Development of Livestock in Ngoma District

The DLUP will promote effective livestock through allocating the land for livestock, contributing to agriculture-led growth and the socio-economic transformation of the population. The construction of dams and boreholes for livestock in drought prone areas will be scaled up and promoted as well as the storage of animal fodder. The aim is to attract private sector and farmers to invest in flagship projects in the livestock sector including the construction and operationalization of MCCs, modern fish farming, animal feed production, and processing and value addition of leather.

Livestock production and sustainability will be increased through various mechanisms illustrated in the figure below:

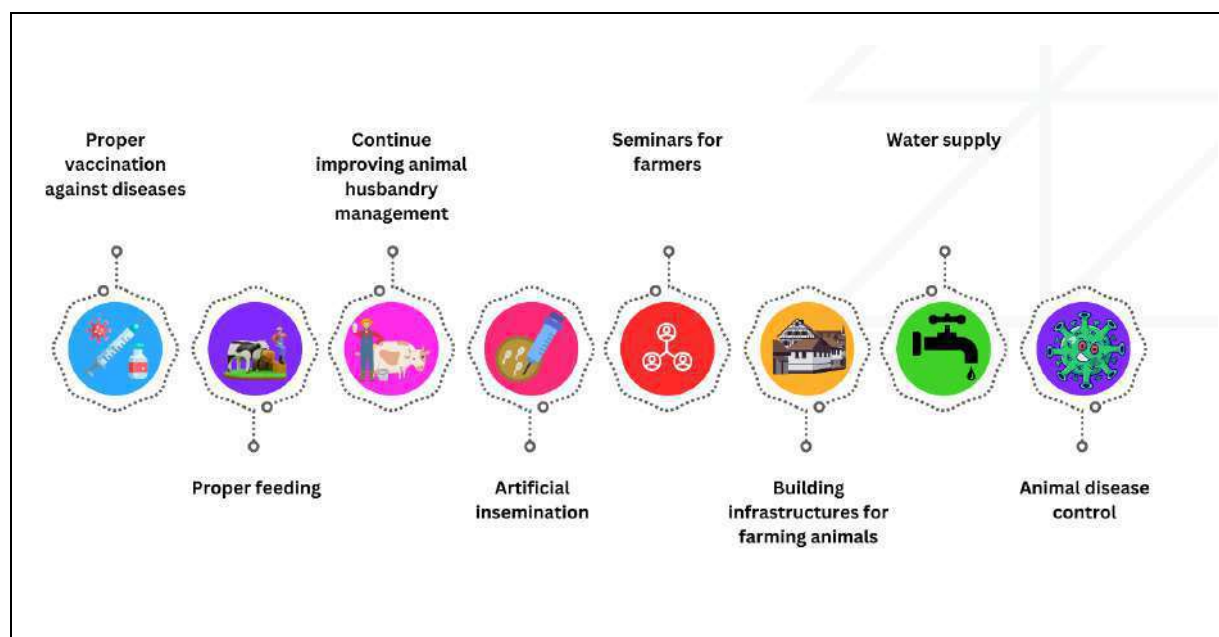


Figure 41: Strategies for sustainable livestock in Ngoma District-Source, June 2023

4.7 Environmental and Natural Resources

The environment is everything that is around us, such as soil, water, animals and plants, physical surroundings, and climatic conditions. Humans form an integral part of the environment. With time, human activities have resulted in a global environmental impact. The exploitation of natural resources has an immediate impact on the quality of the environment. The link between degradation of the environment and poverty are clearly established. In fact, the people depend directly on natural resources and services for their subsistence and they are often more affected by environmental degradation, such as deforestation, reduction of soil fertility, erosion and water pollution.

The environment comprises different components such as forests and aquatic land including lakes, dams, rivers, wetlands and streams, and natural resources such as minerals.

4.7.1 Forests

Ngoma DLUP has intensified areas for forest conservation and protection, planning for sustainable use of resources, through promoting reforestation and afforestation to support economic development and the social well-being of the community.

4.7.1.1 Status of forests in Ngoma District

In Ngoma District, there are both state- and privately-owned forests scattered in different Sectors. Existing forests have been mapped in the DLUP and additional areas have been identified for afforestation and reforestation. Afforestation is proposed in different Sectors of the District, mainly on areas identified as state land of about 203 ha. Some steep slope areas in the district are not covered by forests, which makes the areas vulnerable to climate change impacts and erosion.

4.7.1.2 Forest types in Ngoma District

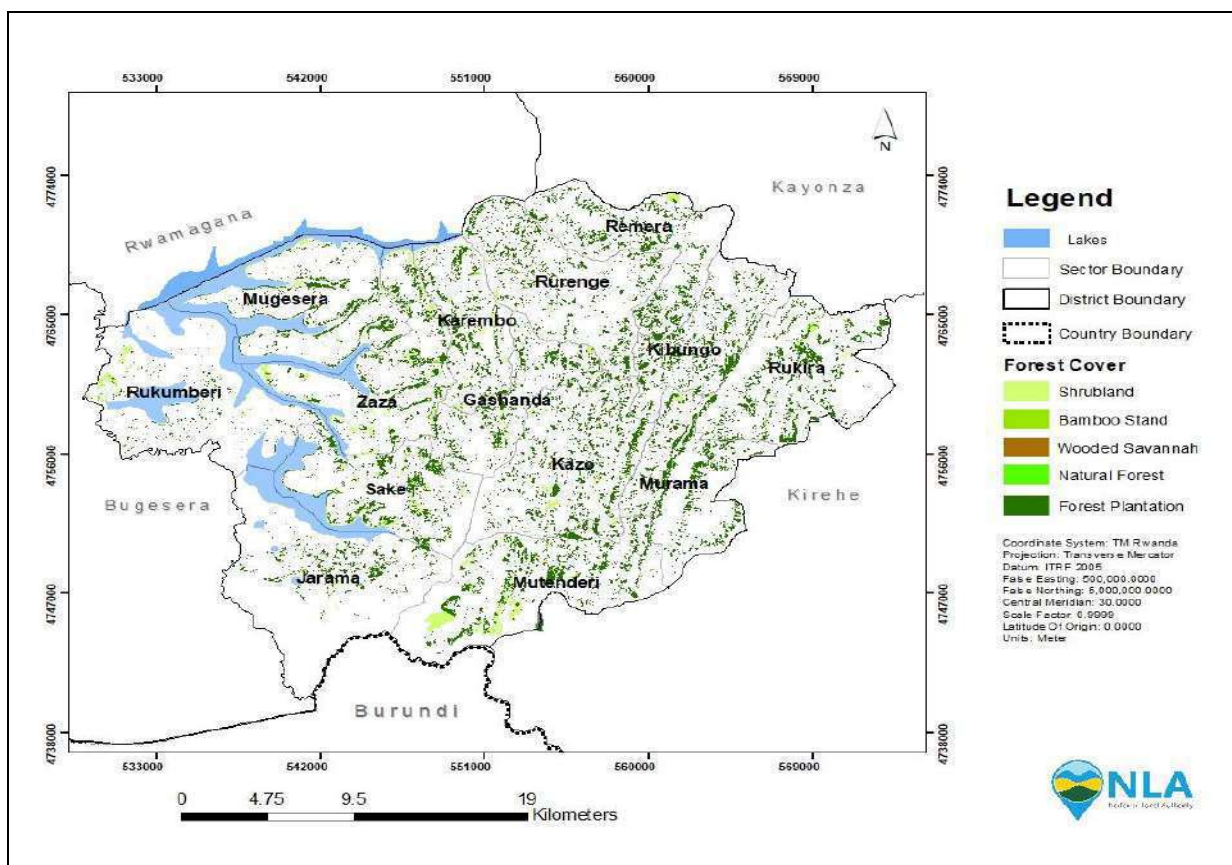
The forests in Ngoma District are classified in two categories: natural forests and planted forests. The dominating type of forest in Ngoma District are forest plantations.

Forest plantations in the district include eucalyptus and grevillea. The natural forest was also found in Ngoma District covering an area of about 18ha.

4.7.1.3 Spatial location of forests in Ngoma District

The forests in Ngoma District are unequally distributed in different Sectors. Forest plantation is predominant with 8,730 ha (10.7%). In general, forest predominates in the eastern parts of Ngoma District including Kazo, Kibungo, Rukira, Mutenderi, Remera, Rurenge, Gashanda, Karembo Sectors as well a portion of Mugesera and Zaza Sectors. Mutenderi Sector has the highest forest cover in the district with 1,267 ha. Kazo, Rukira, Zaza and Sake Sectors also have a higher forest cover than other areas. The highest density of forest cover is found in Kibungo (17%) and Zaza (16%) Sectors.

In comparison, the lowest percentage of forest cover is in Rukumberi (4%) and Jarama (5%), in the western part of Ngoma District, which is relatively flat and used for crop production. The map below serves for the illustration of current status.



Map 21: Forest cover in Ngoma District- Source: Forest cover report, MoE, 2019-Source: NLA mapping staff, November, 2023

4.7.1.4 Forest cover in Ngoma District

The forest cover in Ngoma District has changed from 2009 to 2019. The most deforested area in the district is found in Rukumberi, on an area of about 240 ha (70% of existing forest cover in 2009). Deforestation is also remarkable in Rurenge Sector, where about 51% of the forest cover in 2009 has been removed. Afforestation is most evident in Rurenge (139%), Mugesera (134%), Kazo (118%) and Jarama (100%) Sectors. In general, these Sectors have made an effort to plant trees within the past ten years from 2009 to 2019 (from 329 ha to 617 ha for Rurenge) while Mutenderi increased its forest area from 1,111 ha in 2009 to 1,198 ha in 2019.

Table 33: Forest cover status in Ngoma District

Sector name	Forest cover 2009 (ha)	Deforested areas (ha)	Afforested areas (ha)	Forest cover 2019 (ha)	Deforestation rate (%)	Afforestation rate (%)
Gashanda	398	77	228	549	19	57
Jarama	262	155	263	370	59	100
Karembo	321	116	312	518	36	97
Kazo	478	89	565	954	19	118
Kibungo	442	157	298	584	35	67
Mugesera	320	135	428	613	42	134
Murama	493	45	261	709	9	53
Mutenderi	1,111	350	437	1,198	31	39
Remera	416	133	403	687	32	97
Rukira	568	151	444	861	27	78
Rukumberi	342	240	136	237	70	40
Rurenge	329	168	457	617	51	139
Sake	416	84	370	703	20	89
Zaza	477	146	489	800	31	98
GTotal	6,376	2,046	5,071	9,401	32	80

Source: Our analysis of March 2023 based on forest cover report; MoE, 2019

4.7.1.5 Planning Perspective

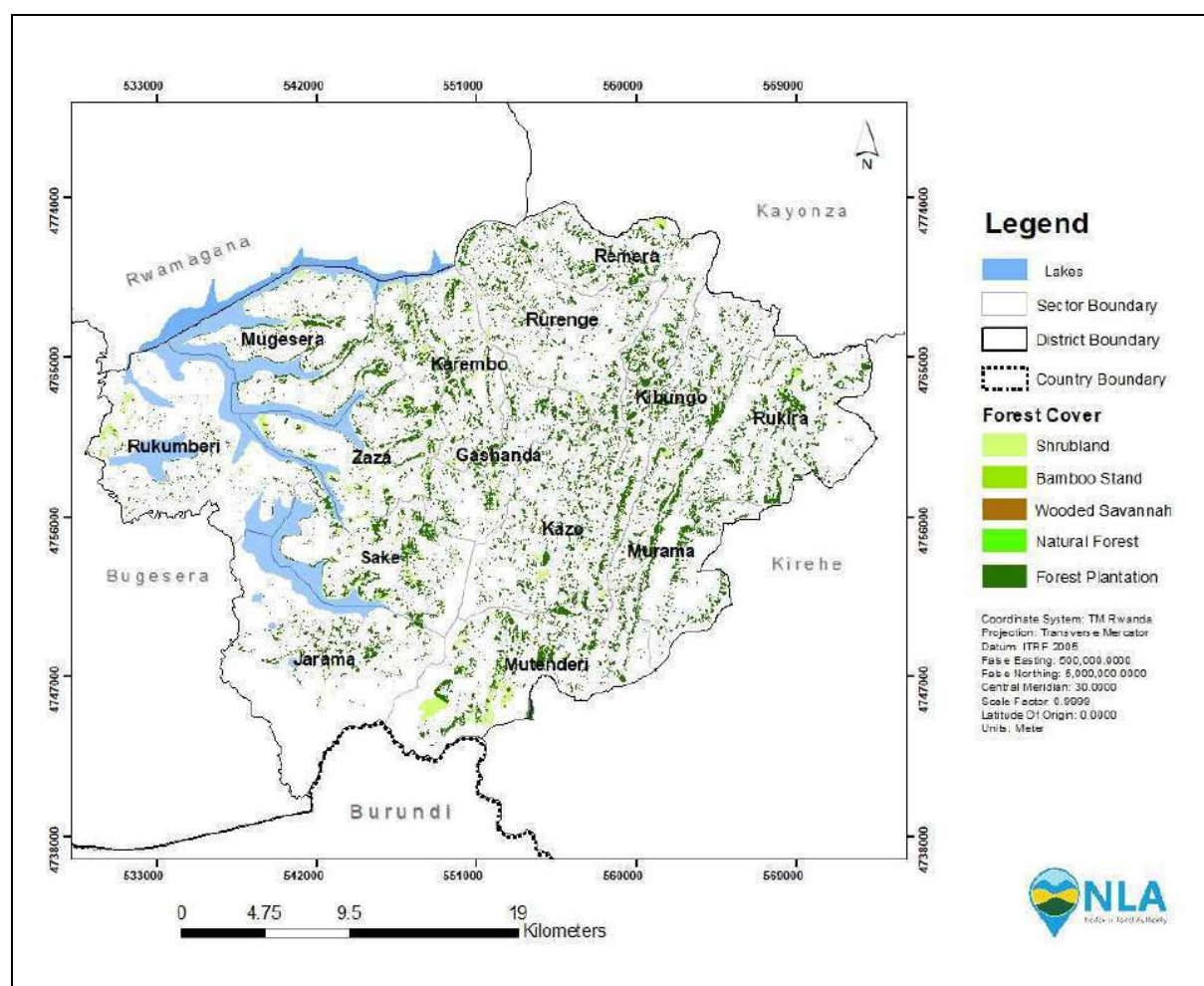
The new District environmental management plan is expected to be formulated in order to guide sustainable environment management within the whole District. This plan will ensure that green economy policies are observed and followed. This is evident that Ngoma District may continue to increase forest cover through afforestation and reforestation initiatives.

The NLUDMP 2020-2050 recommends ensuring maintenance and enhancement of the current forest cover and tree resources in Ngoma District as well as the rest of the districts in the following ways:

- Improving the forest management plan for forest plantation, and natural forests, as well as introducing reforestation and forest rehabilitation programs for degraded forests.
- Areas unsuitable for either settlement, agriculture or other activities, especially high slopes of more than 55%, have been considered under forest cover with large-scale afforestation or reforestation programs.

As a result, more than 200 ha of steep slopes are identified for afforestation within Ngoma District.

- Put forward integrated plans that include afforestation for the identified area of 1,858.5 ha, which equals 2.14% of the total District land.
- Enhance and license sustainable charcoal production techniques and promotion of improved cook stoves (ICS) for efficient and clear wood and charcoal consumption.



Map 22: Proposed Forest cover in Ngoma District, 2023

Table 34: Proposed afforestation zone in Ngoma District, 2023

SECTOR	CELL	VILLAGE	Area (ha)
MUGESERA	Mugatare	Sangano	5
		Rwamenyo	7
	Nyange	Rusave	3.5
	Ntaga	Kiyovu	5.5
GASHANDA	Rugarama	Munege	12
	Mutsindo	Nyakarambo	3
		Cyanama	5
		Gakuto	6

	Giseri	Rubambantare	74
	Cyerwa	Cyerwa	6
		Nyamugari	7
		Muyange	8
	Munege	Kanega	12
ZAZA	Nyagasozi	Gifurere	12
		Isanganira	4
	Nyagatugunda	Kizenga	8
RUKUMBERI	Rwintashya	Shyembe	4
	Gituza	Gituza	3.5
	Rugabo	Rugabo	6
	Rubona	Maswa i	4.5
REMERA	Gisunzu	Gisarara	7
Total			203

Generally, sustainable forest management is a complex and multi-faceted challenge that requires a combination of different strategies and approaches to be successful. By using a combination of these strategies, the district can ensure that forests are managed in a way that preserves their ecological, economic, and social values for present and future generations.

4.7.2 Aquatic lands

4.7.2.1 Wetlands

In Rwanda, there are 935 wetlands under the Prime Minister's Order no 001/03 of 30/01/2024 relating to swamplands, drawing up a list of swamplands, their characteristics and boundaries, and determining modalities of their use, development, and management. They have a total area of 276,477 ha (11% of all land in Rwanda), with 74% of total wetlands are under conditional exploitation, 6% are under full exploitation, and 20% of the wetlands are fully protected.

The wetlands, or swamplands, provide critical habitats for wildlife and biodiversity. They maintain important hydrologic processes which are essential in cleaning and protecting the surface and groundwater, as well as supporting local livelihoods. However, wetlands are put under stress as a result of land use conversions, and climatic change. Wetlands are the most degraded compared to any other ecosystem in the country. More than half of the wetlands in Rwanda are being used for agricultural activities and energy production.

Wetlands' species vary widely depending on climate, soil, vegetation, hydrology, chemistry, and human disturbance. The prolonged presence of water creates conditions that favor the growth of specially adapted plants (hydrophytes) and promote the development of characteristic wetland (hydric) soils.

a) Existing Situation

There are mainly two types of wetlands in Ngoma District: fully protected wetlands with 870 ha, or 8.6% of all wetlands in the district for conservation, and non-protected wetlands estimated at 9,152 ha mainly used for agriculture and other purposes. This means that over 91% of wetlands in Ngoma District are exploited, mainly for farming.

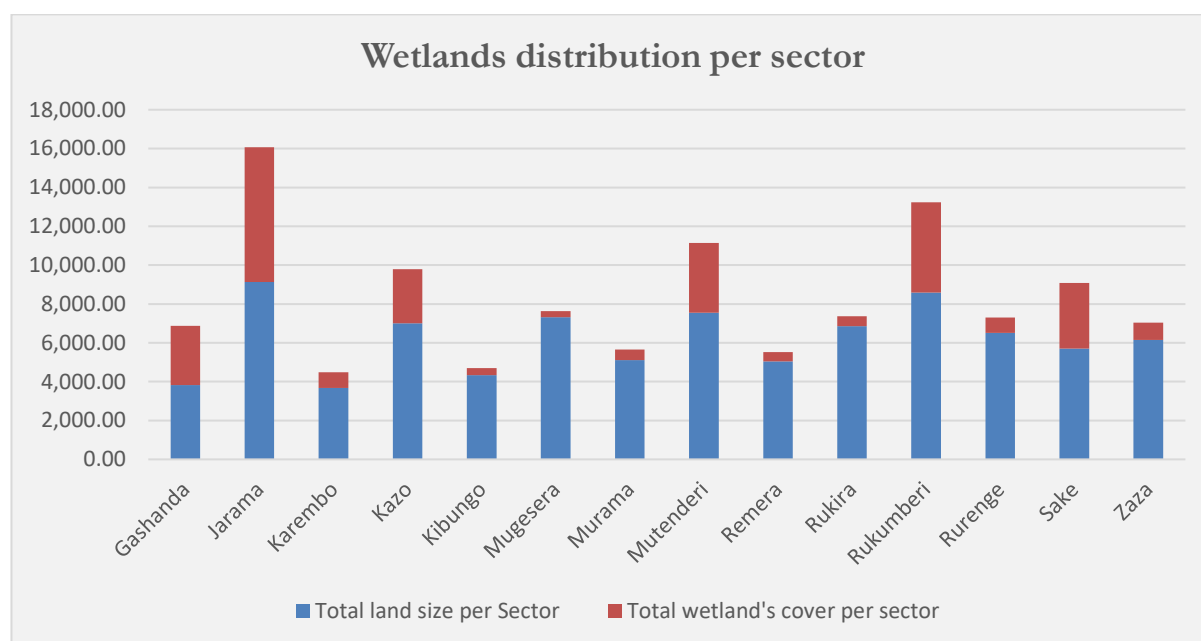


Figure 42: Wetland distribution in Ngoma District- Source: our analysis based on Ngoma District data, November 2022

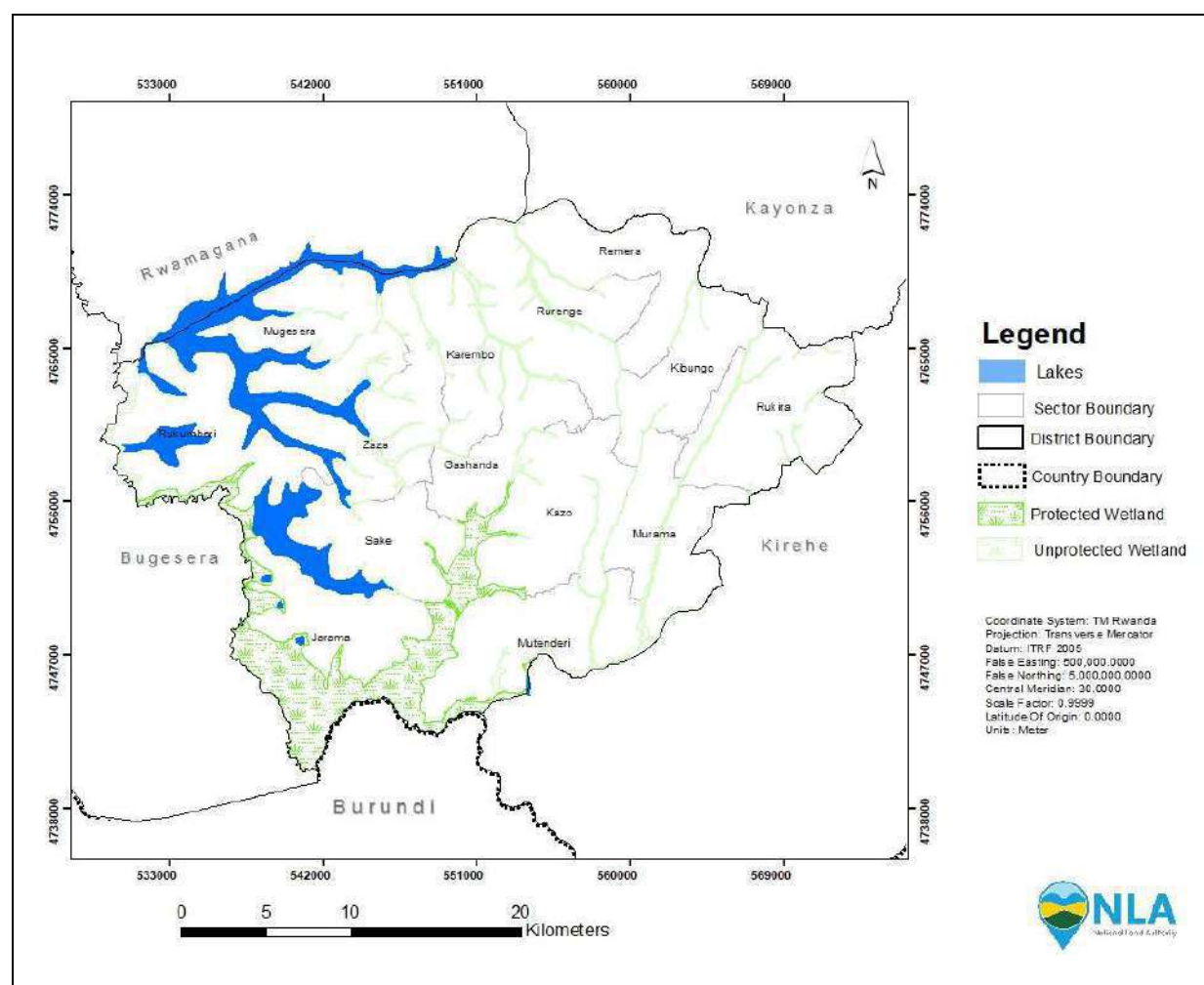
The important parts of wetlands in Ngoma District are located in Jarama, Rukumberi, Mutenderi, Sake, and Gashanda Sectors.

Table 35: Wetland's distribution per sector in Ngoma District

	Sector	Total size per Sector (ha)	Total wetland covers per Sector (ha)	%
1	Gashanda	3,829.05	3,044.40	79.51
2	Jarama	9,125.00	6,936.90	76.02
3	Karembo	3,685.19	797.6	21.64
4	Kazo	7,007.55	2,785	39.74
5	Kibungo	4,336.62	366.3	8.45
6	Mugesera	7,326.01	305.5	4.17
7	Murama	5,117.57	535.9	10.47
8	Mutenderi	7,555.60	3,580.20	47.38
9	Remera	5,041.50	483.3	9.59
10	Rukira	6,854.14	522	7.62
11	Rukumberi	8,595.68	4,633.30	53.90
12	Rurenge	6,515.62	779.4	11.96
13	Sake	5,701.50	3,386.60	59.40
14	Zaza	6,154.20	879.3	14.29
	Total	86,845.23	29,035.70	33.43

Source: Data from Ngoma District, November, 2022

In Ngoma District, wetlands and buffers constitute 10.8% of the district area, and about 106 km² are water bodies and their buffers occupying 16.3%. Wetlands, water bodies and their buffers have a total area of 159 km².



Map 23: Existing wetlands in Ngoma District - Source: Data analysis by NLA

b) Planning Perspectives

The NLUDMP 2020-2050 recommends protected wetlands and their buffer zones are fully protected from settlements within 20m for wetland boundaries. Wetlands' buffer zones are recommended for forest, tourism and conservation efforts. Zoning enforcement should limit acquisition of wetlands for other functions. Thus, the following are the recommended measures for ensuring protection and preservation of wetlands in the district:

- To conduct a feasibility study on preservation and protection of Nyabarongo wetland.
- To conduct a feasibility study on wetlands for conditional use, e.g. recreation, research, tourism.
- Conservation of all wetland buffers zones as per the zoning regulations.
- To conduct an in-depth study on the systematic restoration of degraded wetlands.
- The district, together with stakeholders, are to ensure development and enforcement of Environmental Impact Assessments (EIA) to ensure sustainable utilization of wetlands.

4.7.2.2 Water bodies

A water body is a certain clearly distinguishable part of surface water, such as a lake, a stream or a river. Rwanda's water bodies' surface is estimated at 6.2 % of the total area, accounting for about 1,537 km². Most of the lakes and rivers are fed by marshes, which in turn are fed by shallow groundwater and seasonal floods.

The DLUP plays a crucial role in promoting effective management and utilization of water bodies. The plan involves the mapping and zoning of land and water bodies, with the goal of identifying the most appropriate and sustainable uses for different areas. One of the key ways in which DLUP contributes to water body management is by identifying areas that are suitable for development, and mitigate negative impacts on water bodies from settlements, agriculture and other land uses. This to prevent pollution and other negative impacts on water quality, and to protect these vital resources for future generations.

The DLUP will contribute to efficient planning of water bodies not only for protection and conservation purposes but also how they can economically contribute to the development of the district through promoting tourism, irrigation, fishing, agriculture, and transport purposes.

a) Existing Situation in Ngoma

Ngoma District's water bodies cover a surface area of 6,262 ha (4% of the total national land). Among the key waterbodies in the district are three lakes totaling over 5,866 ha, three dams totaling 39.8 ha and some rivers including the Akagera river, which is the biggest river in the district. Water bodies are an essential component of the district's economy through connecting the district to other regions without land routes, facilitating irrigation, and fish farming activities.

b) Types of water bodies found in Ngoma District

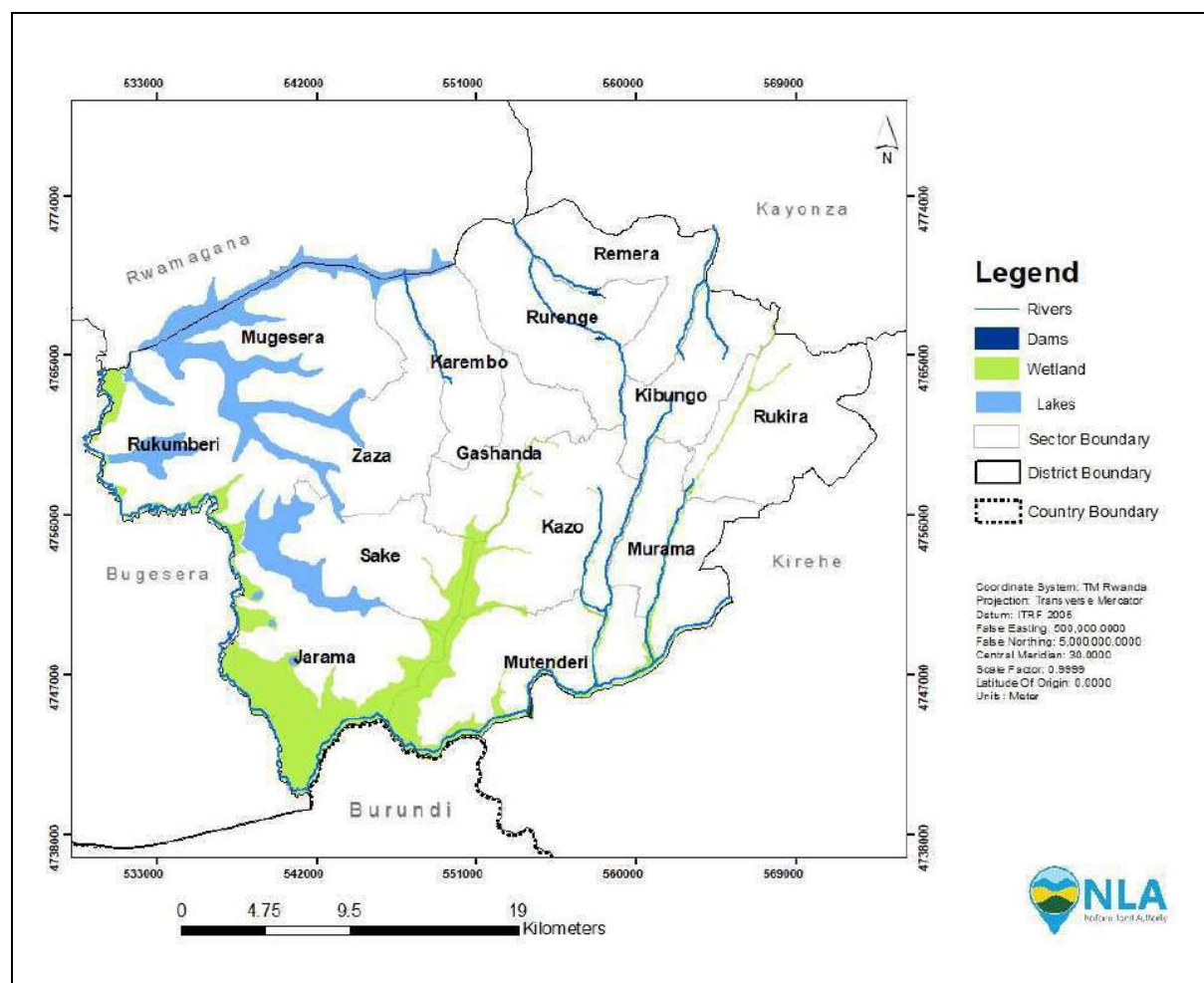
The important part of Ngoma District's waterbodies is located in its western part, dominated by lakes and Akagera River. The almost all other rivers existing in Ngoma District are less important, ranging in class 4 of minor rivers. Existing dams have been created with purpose to serve in irrigation practice. They are generally located in the area of lakes even if some can be seen in other sectors (Remera, Kazo Sectors for example).

The table below indicates various types of water bodies existing in Ngoma District. Their location can be seen on the map 24 with their illustration

Table 36: The table below indicates various types of water bodies existing in Ngoma District.

Type of water body	Name	Location area
Lakes	Mugesera	Ntove Cell
	Birira	Rwintashya Cell
		Rubona Cell
		Gituza Cell
	Sake	Rubago Cell
Rivers	Akagera	Gituza Cell
Dams	Gituza	Gituza Cell
	Ntove	Ntove Cell

Source: Data from Ngoma District and our analysis, November, 2022



Map 24: Water bodies in Ngoma District-Source: NLA mapping staff, November 2022

c) Planning perspective

Water resources are under increasing pressure due to their utilization for essential household needs and socio-economic development, particularly in agriculture.

To ensure sustainable management and utilization of water bodies in Ngoma District, the following recommendations are proposed:

1. Protection of Water Bodies

- ❖ Enforce strict regulations to protect all water bodies and buffer zones from encroachment and settlements.
- ❖ Maintain a minimum buffer zone of:
 - 50 meters from lakeshores
 - 10 meters from riverbanks

2. Sustainable Land Use within Buffer Zones

- ❖ Where appropriate, utilize buffer zones for forestry development.
- ❖ Encourage the adoption of **agroforestry species** to enhance food security while preserving the ecological integrity of these areas.

3. Tourism Development around Water Bodies

- ❖ Promote **sustainable tourism** by ensuring designated areas for tourism and recreational activities are properly managed.
- ❖ Develop essential infrastructure to support tourism while minimizing environmental impacts.

By implementing these strategies, Ngoma District can balance environmental conservation with economic growth, ensuring water resources remain available for future generations.

4.7.3 Mining industry

Mining is a non-renewable resource activity with great potential to become one of the drivers of long-term sustainable growth in Rwanda through economic transformation, industrialization and inclusive growth taking into account environmental and social considerations and using green mining techniques.

However, although mining generally utilizes a small area of land, it can have significant and often irreversible environmental impacts such as pollution (e.g. sterile mines transported by rain water erosion to the valleys is harmful to vegetation), soil degradation associated with operating and abandoned mining sites and the multiple trenches found across the hillsides. This can impact residents by reducing land available for farming, while the open and unfenced shafts and pits scattered across the area pose a risk to livestock and humans. The Rwanda Environment Policy provides strategic actions to ensure the rehabilitation of sites after mining and quarrying activities.

4.7.3.1 Existing situation of mining in Ngoma District

During data collection in the elaboration process of the DLUP, several mining sites were visited in order to identify their status, contribution to local communities' livelihood and impacts on the physical environment in order to plan future sustainable solutions.

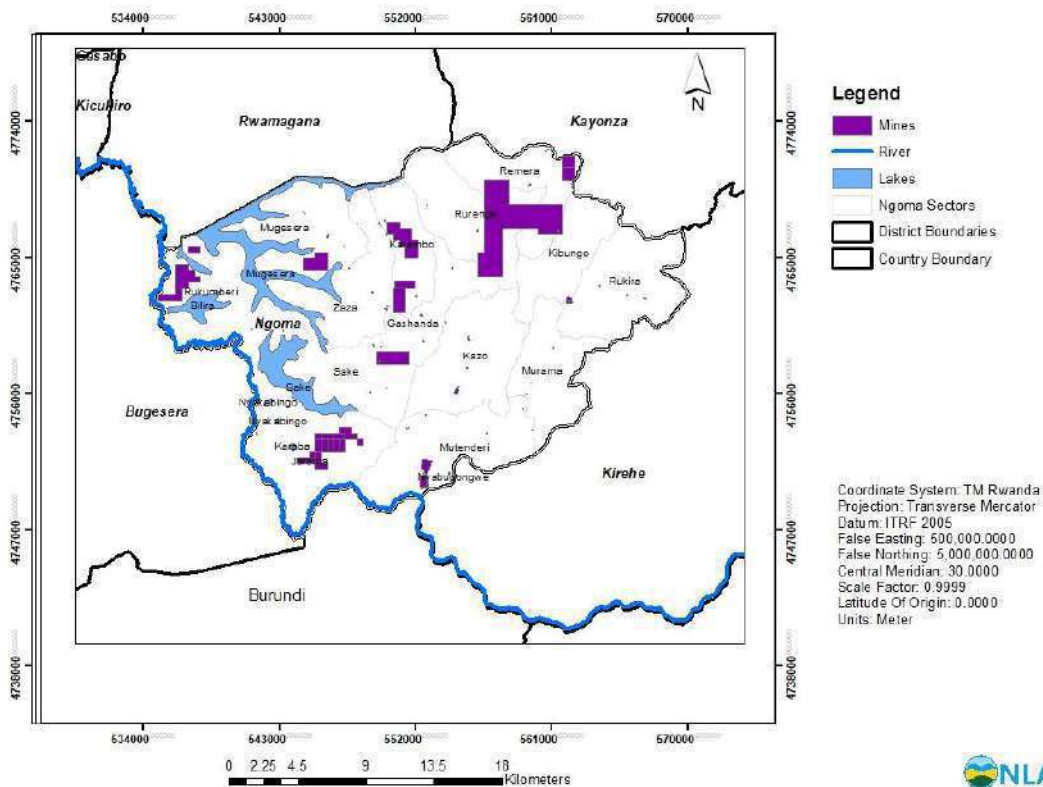
The mining sector in Ngoma District, like in other parts of Rwanda, has been undergoing significant developments in recent years as the country seeks to leverage its mineral resources for economic growth and development while ensuring sustainable practices. Ngoma District is not among the districts with important mining concessions, but there are some active mining sites while the significant part of identified concessions is not yet exploited or under research. The challenges encountered is that the concession is often conflicting with other uses, especially residential and agricultural use. Ngoma District is known to have deposits of various minerals and gold. The most common minerals are coltan, cassiterite, wolfram, kaolin, stones, sands and clay.

Within Zaza Sector, the tin mining site in Bare Village, Rwintashya Cell, is fully operational and offers employment to the surrounding communities.

Sand extraction is taking place in Nyinya Cell, Rukira Sector, as well as at three sites in Nyamabuye Village, Nyamugari Cell, Mugesera Sector.



Photo 22 Photos showing Mibirizi mining site in Gashanda-Mutenderi sectors for coltan extraction - Source: Field data, October 2022



Map 25: Mining sites located in Ngoma District - elaborated during DLUP elaboration, March 2023

4.7.3.2 Planned perspective

To achieve the goals outlined in the NLUDMP 2020-2050 and NSTI, the mining sector must implement several measures. These include expanding mineral extraction and processing capabilities. Capacity development of miners shall aim to acquire knowledge and skills and access appropriate technology to ensure that the mining strategy incorporates a pro-poor component.

It is recommended that the district enforces compliance with environment conservation standards to mitigate negative environmental impacts. Additionally, before commencing any mining activity, it is recommended to conduct a thorough cost-benefit analysis and an Environmental Impact Assessment of the mining sites. This will help mitigate conflicts between land use and environmental impacts.

The following are additional recommendations should be considered mining sector development in Ngoma District:

- ^ Invest in essential infrastructure such as roads, electricity, and water supply to support mining activities. Adequate infrastructure enhances accessibility, reduces operational costs and attracts investment.
- ^ Integrate modern mining technologies and practices to improve efficiency and reduce environmental impact. This could include the use of automation, remote sensing and sustainable mining techniques.
- ^ Allocate a portion of mining revenues for local infrastructure projects and environmental protection activities.
- ^ Establish a landscape restoration program for rehabilitating the environmental state of the abandoned quarries in the district.

4.7.4 Green urbanization in Ngoma District

Rwanda has decided to fundamentally change the way cities are built that follows a holistic and integrated approach to green urban planning. This builds on innovation in future-oriented technologies as well as a reliance on home grown solutions and local construction materials.

4.7.4.1 Current Status of the green urbanization in Ngoma District

In general, green urbanization in Ngoma District is still low, and effort needs to be employed in order to achieve the required principal components that are essential for green urbanization, such as zero-waste, strengthen urban biodiversity, and green buildings with passive design principles.

Green urbanization provides benefits that are visible to all. The majority of communities in Ngoma District have acknowledged the importance of using energy sources and materials with little or no impact on climate change. However, they are constrained by limited capacities and lack of affordable green materials accessible on market. The common use of wood or charcoal for cooking leads to air pollution and deforestation. However, the District has a strategy to sensitize people to use biogas and solar energy. The existing culture of walking and cycling should be embraced and promoted by providing the necessary infrastructure such as walkways and bicycle lanes that are attractive, safe and convenient to use.

4.7.4.2 Planning perspective

The NLUDMP recommends the following on green urbanization in the Ngoma District:

- All population, urbanization, settlements, and housing (push) programs should be streamlined and include components such as green buildings, use of sustainable materials, energy efficiency and green mobility.
- Urbanization approach where a city's development takes into account environmental aspects, especially

through land use and spatial development planning to achieve low carbon growth overall and build resilience to climate change, i.e. ensuring that all urban development processes incorporate climate risk and low emission strategies into all the proposed activities.

- All urban development should promote climate-resilient human settlements as this will lead to halting the proliferation of informal settlements in urban areas.
- All the proposed investment in the proposed urban areas should have integrated resilient, reliable and sustainable infrastructure which will enable the cities to adapt to climate change and function efficiently at the local level.
- There should be mapping, delimiting, and greening of the transport system.
- Ensure that Strategic Environmental Assessment (SEA) is undertaken for all land-use master plans to ensure their sustainability.
- All green infrastructure projects should be designed to complement gray infrastructure systems performing a combination of volume management, water quality improvement, and flood control.

Sustainable green urbanization is achievable through the implementation of a comprehensive set of policies and strategies that prioritize clean and renewable energy, energy efficiency, green spaces, waste reduction, and sustainable transportation. By implementing these strategies, cities can not only improve the environment but also contribute to a more livable, equitable, and resilient urban future.

In addition, sustainable green urban areas in Ngoma District should prioritize, protect and enhance green spaces through the creation of green belts, parks, and other open spaces, as well as through the promotion of urban agriculture and green roofs practices. All urban and rural settlement areas should prioritize public transport, walking and cycling. This will be achieved through the creation of pedestrian-friendly streets and sidewalks

- All urban and settlement areas should prioritize the use of clean and renewable energy sources. This will be achieved through the implementation of policies and regulations that promote the use of solar, wind, and other renewable energy sources, as well as through the development of infrastructure to support their use.
- The urban areas should focus on improving energy efficiency in buildings and transportation. This will be achieved through the use of energy-efficient building design, the promotion of public transportation, and the development of smart city technology to optimize energy use.
- Prioritizing the reduction of waste and pollution in Ngoma District will be achieved through the implementation of policies and regulations to reduce waste and pollution, as well as through the promotion of recycling and composting programs.
- Urban and settlement areas should prioritize the promotion of sustainable transportation. This will be achieved through the development of bike-sharing and car-sharing programs, the promotion of electric and hybrid vehicles, and the creation of pedestrian-friendly streets and sidewalks.

4.7.5 Waste management

The country has made remarkable strides in recent years to improve waste management practices and reduce the

negative impact of waste on the environment. However, waste management in Ngoma District is generally poor. There are two types of waste, solid waste and liquid waste.

Solid waste is commonly dumped within farm lands. Organic waste is often used as compost to be used for farming. The non-degradable waste remains where dumped. Only Kibungo Sector has a designated dumping area where after sorting, the organic matter is treated to produce charcoal.

4.7.5.1 Liquid waste management in Ngoma District

Sustainable liquid waste management requires developing an appropriate infrastructure such as wastewater treatment plants, septic systems or biodigesters. It also requires enforcing and adhering to local, national and international regulations and policies in accordance with liquid waste management.

Liquid waste management involves the proper collection, treatment and disposal of liquid waste to prevent environmental contamination and risk public health. The equipment for liquid waste collection involves a systematic collection system designing and implementing a network of drains, sewer systems or septic tanks to capture and channel liquid waste away from populated areas. The waste treatment depends on the nature of liquid waste and the treatment process and it can include physical, chemical or biological methods.

However, liquid waste in Ngoma District has been found in a critical situation which requires an urgent intervention and remedy taking into consideration both the current residents as well as the projected population of the district.

a) Existing situation of liquid waste

According to Ngoma city master plan, a high percentage of Rwanda's population lives in unplanned settlements which are characterized by limited sanitation. Sewage service coverage is limited, and is based on on-site septic tanks.

Ngoma District is challenged by a lack of developed sanitation infrastructures. Some households lack toilets and others have substandard toilets. Mostly, wastewater is disposed of using on-site containment systems such as pit latrines (at household level), which does not sustainable use land as when the pits are full, they are abandoned and replaced with new ones.

At institutional level (hospitals, schools, commercial buildings and few households with high living standards), septic tanks are used to store liquid waste and sludge is removed once the tank is full.

According to the data retrieved from Ngoma District, out of 93,393 total households, 57 households don't have toilets and 228 households have toilets but are substandard. Wastewater is discharged untreated into stormwater channels; this contaminates the streams and leads to sedimentation and debris disposal downstream. Besides being an environmental hazard, this puts additional strain on the limited stormwater management infrastructure in the district.

b) Planning perspectives on liquid waste

On-site sanitation with improved pit latrines, and where possible semi centralized systems, remain the most viable options for the disposal of wastewater in rural areas. A piped sewer network is recommended only within

urban areas where the population densities are high, through centralized sewer networks. Careful monitoring of wastewater is required at industrial sites to ensure that industries are applying to the regulations.

A waste management plan needs to be established and aligned with the existing and future urban development, population density, and projected growth. It is recommended that the waste management plan would recognize suitable areas for sanitation interventions, decentralized wastewater treatment systems, and other appropriate technologies. Therefore, it recommended for the centralized sewage system for both urban and rural areas.

Phasing out of pit latrines in urban areas will assist in significantly improving the current water quality. In rural areas careful consideration needs to be given for the placement of pit latrines in order to minimize the associated risks.

4.7.5.2 Solid waste management in Ngoma District

The main objective of solid waste management is to collect, treat and dispose of waste in an environmentally and socially satisfactory manner using the most economical means available. As cities grow both spatially and economically, business activity and consumption patterns drive up solid waste quantities.

a) Existing Situation of solid waste

Ngoma District has only one landfill that needs to be renovated to improve in size and capacity to be able to handle the projected waste generation in the district. It is located in Kibungo Sector, Mahango Cell at Ruhinga Village. Other sites of waste disposal are at markets, and household waste composts.

Ngoma District Town generates a high amount of solid waste followed by Sake Rural Center and Rukira Rural Center. Below is a photo of an existing transfer station of solid waste in Kibungo Sector:



Photo 23: Solid waste dumping site in Kibungo Sector, Ngoma District-

b) Types of solid waste generated in Ngoma District

Different types of waste are generated in Ngoma District and are classified into 3 main categories:

Organic waste: Biodegradable waste is the main type of solid waste generated. Examples of organic waste are food, biomass and garden waste. It is usually disposed of directly into open land or used as compost. Recycling and re-use of organic waste have been initiated by the district but still at a very low level.

Non-organic waste: Electronic, plastic, glass, metal, and combustibles are common examples of non-biodegradable waste. Recycling of non-organic waste is not common in the district. However, there is a national ban on the use of plastic bags which has helped to reduce the volume of non-organic waste.

Hazardous waste: Any solid waste that poses a threat to human health or to the environment is classified as hazardous waste. They are mainly generated by hospitals, industries and other facilities. Hazardous waste is disposed of at incinerators and is not taken to a dump site.

c) Planning perspectives of solid waste

A transfer station, in the context of waste management, is a facility where solid waste is temporarily stored before it is transported to a landfill. Based on the location of the existing solid waste landfill, Ngoma District would require at least two landfills sites, one in Sake Sector as proposed and another one in Kibungo Sector by improving existing one. However, in order to prevent waste from being dumped, an efficient waste collection system must be in place, along with a public awareness campaign in urban areas and the main emerging centers.

In addition, recycling practices must be introduced in all settlements for the aim of resource sustainability as well as land use efficiency. Waste collection should comply with waste categories generated such as organic, recyclable, and hazardous waste to facilitate more efficient collection and disposal processes. It should emphasize the need for coordination and collaboration between relevant government agencies, stakeholders, and communities to ensure a comprehensive and sustainable approach to waste management.

The district and relevant stakeholders should strongly support in prioritizing public awareness campaigns, education, and community engagement initiatives to promote waste reduction, proper waste disposal, and recycling practices to reach the “zero waste” goal. Encouraging behavior change and fostering a sense of ownership among citizens can significantly contribute to the success of waste management efforts.

The waste management plan should recognize the economic aspects of solid waste management. It requires deep research on the cost-effectiveness of different waste management options, considering factors such as investment requirements, operation and maintenance costs, and potential revenue streams from waste recovery or recycling. Economic incentives and mechanisms, such as extended producer responsibility or waste-to-energy incentives, can be explored to encourage sustainable waste management practices.



Figure 43: Waste management practice.

4.7.6 Stormwater Management

Stormwater management is a crucial aspect of urban and environmental planning to prevent flooding, erosion and water pollution. The country has developed a key drainage system to manage stormwater effectively which includes a network of channels, pipes and culverts designed to direct excess rainwater away from developed areas to prevent flooding.

Some wetlands and settlements are affected by stormwater due to lack of rainwater harvesting systems, drainage systems and other stormwater management measures.

4.7.6.1 Existing Situation of the storm water in Ngoma District

Water-related Road drainage channels are under construction in urban areas, as gullies along roads are lacking. Other issues related to drainage include culverts being fully or partially clogged, lack of drainage along roads, or side drains not connected to culverts or other forms of runoff discharge. However, the stormwater-related impacts in Ngoma District are not as alarming as those in the northern and western parts of the country. This is because Ngoma is situated in a region with gentle slopes, which mitigates the severity of such issues.

4.7.6.2 Planning Perspectives

Flooding, erosion, and landslide records in Ngoma District will continuously be managed through establishing stormwater management plans with emphasis on mitigation measures including producing well designed and suitable drainage network for the urban and rural areas to prevent flooding during heavy rainfall. In addition, the carrying capacity of each produced drainage system and flood risk maps will be developed under detailed stormwater management studies, modern terraces, water harvesting, construction of gullies, application of nature-based solutions and protection of marslands and buffer zones.

As it is shown on the map below, the drainage system follows many parameters including the road networks, slopes, streams respecting the rules of flowing order. It is recommended that these networks are taken into consideration while developing any roads, settlements or infrastructures because it has a high influence on the natural flow of water which causes damages to the landscape if not respected.

Some measures for the key issues to be addressed by the district include:

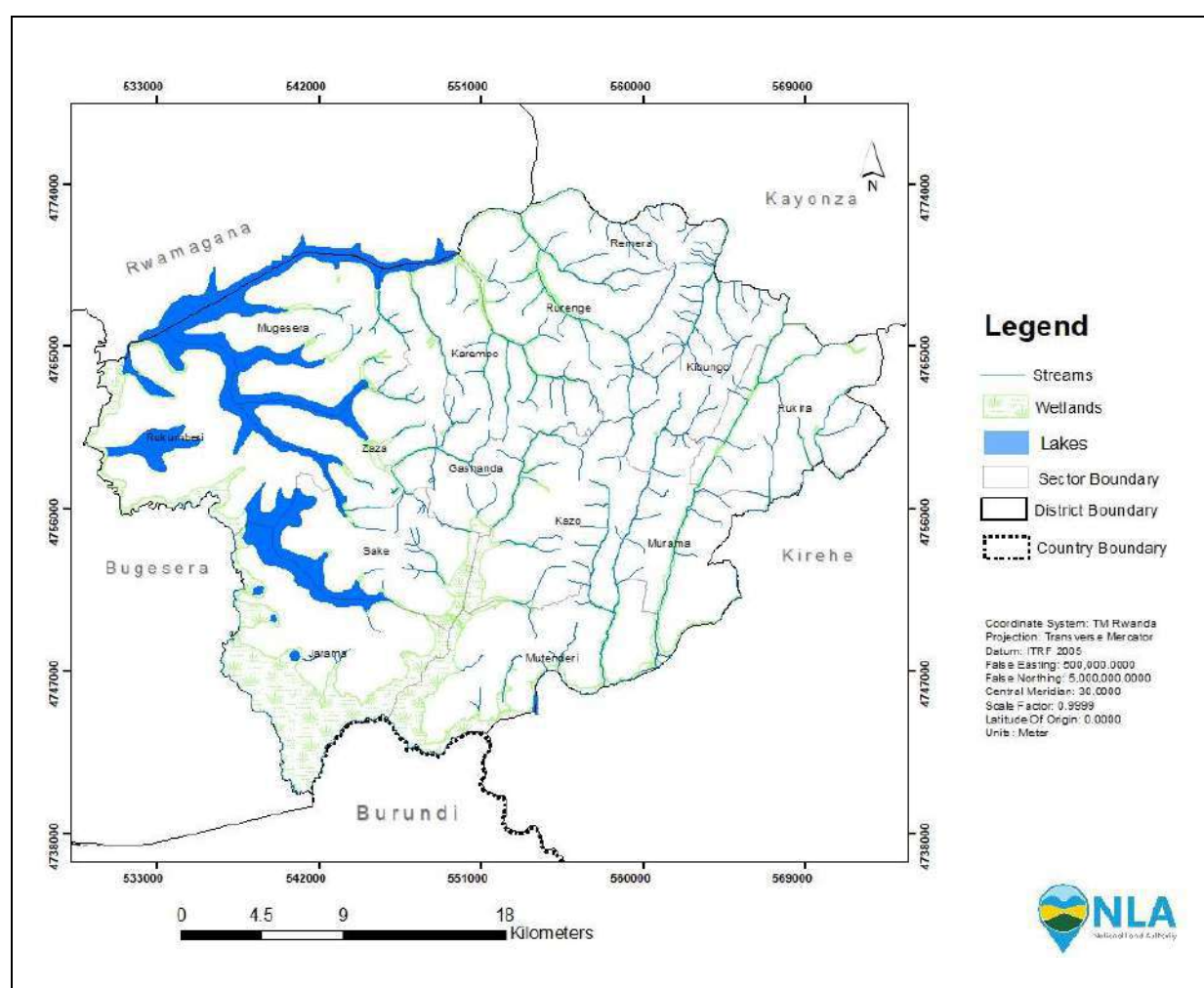
The existing open storm water channels and collector, require to be addressed for a safety hazard for both pedestrians and vehicles;

Improving the maintenance of channels to reduce the siltation and impact drainage capacity;

Provision of storm water management skills which requires to district technicians on sustainable storm water management measures.

To avoid any development within the designated area for main drainages, which would be for collecting water from various catchment areas.

The map of Ngoma District streams is provided below:



Map 26 : Ngoma stream map-Source: NLA mapping staff, November 2023

Further planning proposals for stormwater management include:

- Conducting a study at small scale to add more drainage channels in urban areas, during construction of the drainage system,

- It is supposed that every building in urban areas will have a rain water harvesting system connected to drainage channels to ease storm water collection and conveyance.
- It is supposed that every drainage will be constructed following the topography of 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 passes through key infrastructures.
- The plan and implementation programs for terraces, afforestation, and restoring forest cover scheme will aim at stormwater issues.
- Detailed studies on future climate scenarios in relation to implementation of the land use should guide when determining the size of potential flood hazard areas.

In addition, a stormwater network plan should be developed and include the following:

- Schematic design of major drainage basins, their catchment areas and runoff computation.
- Schematic storm water drainage network plan showing the principal drain reserves and existing natural drain as well as built drains with suitable re-alignments
- Generic design for flood control elements such as stormwater detention ponds and locating in plan using generic size worked out based on estimation.

4.8 Tourism and Conservation

4.8.1 Tourism

Tourism is a multifaceted industry that involves various sectors including transportation, accommodation, and hospitality. It provides employment opportunities for a large number of people, both directly and indirectly. Tourism is a major driving force for the development of infrastructure, including hotels, restaurants, conference facilities and entertainment venues, and for the enhancement of tourism-related services. This contributes to both urban and rural development through improving services and facilities within settlements.

4.8.1.1 Existing status of Tourism in Ngoma District

Ngoma District benefit from its strategic location, close to the emerging Satellite Cities (Bugesera and Rwamagana) and Secondary Cities (Kayonza and Kirehe), to become a hub and contribute to tourism by integrating Community Based Tourism components to the overall Eastern Province tourism packages.

The three lakes, Birira, Mugesera and Sake, are potentially vital for tourism development. The area is continuously attracting several investors who have purchased land around the lake shores, although no tourism development or infrastructure in place.

With regard of fauna, wildlife no longer exists in the Ngoma District except for some birds, small mammals and reptiles encountered in the less frequented places. However, the District is endowed with many cultural and historical sites and attractions that can be added to tourism catalogs and circuits.

Ngoma District offers middle range accommodation facilities in six operating hotels and guest houses. There are two construction projects for tourism complexes on Sake, Mugesera and Birira Lakes.

Cultural heritage-based tourism is a significant aspect of the district's attraction. Notable sites include the historic Igisaka and Ibigabiro by'Umwami in Murama Sector, which can be preserved and promoted for tourism purposes. There are a several memorial sites from the Genocide against the Tutsi in 1994 in different parts of the district. Zaza Genocide Memorial site is one of the sites highly visited, where in the past two years about 8,000-10,000 people visited the site.

In Karemba Sector in Karaba Cell, Ingoro y'Umwami and iperu historical site that should be maintained and developed to attract more visitors to the place.



Photo 24: Rukumberi Genocide Memorial Site and Cultural Heritage .

Other potential tourism attractions are found in Akagarama Cell, Ivumwe Village. The place preserves the history of Queen Nyirakabuga to the Yuhi V Musinga of Rwanda, including remnants of her estate, and the historic house built in 1930, which requires preservation.



Photo 25: Queen Nyirakabuga Historical Buildings .

In Sake Sector, the main tourism areas are Sake and Mugesera lakeshores which are currently used for fishing and transport. The infrastructures in place are not in good condition. However, there is a big opportunity for a new road under construction from Ngoma to Southern Province. Other essential tourism areas include Amazi y'amakera y'inka za Ruganzu, the natural salty water which served King Ruganzu Ndori's cows. This water is located in Rukoma Cell, Mukoni Village, also known as Iriba rya gakondo.



Photo 26: The salty water used to serve King Ruganzu's cows -Source: Photos taken during our field surveys, July 2022

One of the key potential tourism areas identified in Kazo Sector is "Urukiko rwa Gacinya". It was the first court in the area formerly known as Guhunya, constructed in 1935. In addition, Gacinya is remembered for having been an educated and baptized catholic believer. This building used to be the office of Kazo Cell but is vacant. The local people advise this building should be protected, rehabilitated and remain as a cultural symbol to preserve the history of the judicial system before colonization.



Photo 27: Urukiko rwa Gacinya House-Source: Field photo, Ngoma District, November 2022

"Ibigabiro by'Umwami Rwabugiri" in Murama Sector are trees which fenced the house of King Rwabugiri, remembered as the bravest king who annexed several parts of the neighboring countries during his reign between June 1853 and November 1895.

Murama Sector also preserves the area famously known as Urukira rw’Abazungu found in Kigabiro Cell, Mutara Village. This place adopted the name Rukira rw’Abazungu from 1916 up to 1931, when the territory office of Rukira was established by white colonialists, which later became Kibungo Territory and its capital city shifted to Birenga.



Photo 28: Ibigabiro by’Umwami Rwabugiri.

The main part of Kibungo Sector is within the urban area of the District. Like others, it holds tourism potential that should be preserved. Notably, Belgian colonial-era houses built between 1930 and 1935 still stand in Karengé Cell, Amahoro Village. Preserving these structures in their original form will enhance tourism in Ngoma District Town.

The houses below were constructed by Belgians and were used for various purposes; starting from the left was a Belgian hostel, later changed into the school known as “Foyer”. The house is vacant. In the center was a prosecution office during colonization, later changed into a canteen and currently used as a research office by IRS (Indoor Residual Spraying) campaign. The photo on the right-hand side was a residential house for Belgians.



Photo 29: Historical houses constructed in Ngoma/Kibungo Sector by Belgians

Akagera River and surrounding papyrus has interesting historical meaning as the place from where King

Ruganzu Ndori of Rwanda with his team used to hunt as the place accommodated a lot of wild animals. This site has beautiful grasses growing on a big rock, where King Ruganzu and his army used to relax after hunting or after battles in Burundi.



Photo 30: Akagera River and surrounding papyrus-Source: Photos taken during our field surveys, October 2022

a) Religious sites

The religious related history of Zaza Catholic church is widely known as being the second catholic church built after Save in Huye District, and it is believed that several priests graduated from Zaza seminary. Zaza Sector covers the catholic religious-based facilities frequently visited. Zaza Saint Kizito Seminary is where the first Archbishop in Rwanda Aloys Bigirumwami graduated in 1917, together with the two other priests Father Baritazari Gafuku and Donati Reberaho.

b) Natural based tourism sites

Remera and Mutenderi Sectors share an artificial lake with potential for recreation due to its geographical location with easy accessibility. Therefore, the area is proposed to be developed as a tourism zone. The following photos were taken to show the artificial, natural lakes and other touristic sites in Ngoma District.

Photo 23: Touristic Sites in Ngoma District



Photo 31: Photo showing touristic Sites in Ngoma District

Lake Sake, located in Jarama Sector, Ihanika Cell, Kivugiza Village, has potential for tourism development as proposed in the DLUP. Lake Mugesera is the main tourism destination. In Mutenderi Sector, two existing areas are proposed to be redeveloped for further improvement and tourism attraction. These are “IVURIRO RYA GIHANGA” established by Musenyeri KAYINAMURA Thelesphore found in Mutenderi Cell Akarimbu Village. Another potential tourism zone at Rukira Sector are unusual rocks with a fantastic view.

Rukumberi is one of the Sectors surrounded by Lake Sake, Lake Birira and Lake Mugesera with potential for tourism. The Sector is being prioritized as a potential tourism center in Ngoma District.

In Rurenge Sector, there are potential tourism areas but not yet developed. At Rujambara Cell there is a natural forest with small animals like monkeys, snakes, and birds that can attract visitors, with good views.

All Cells in Zaza Sector connect to Lake Mugesera, which gives advantages to the Sector to profit from tourism linked to the lakes, including transport and fishing.

4.8.1.2 The Planning Perspectives on Tourism in Ngoma District

Around 1058 ha have been identified as main tourism zones in Ngoma District, especially in the Sectors of Zaza, Sake and Rukumberi, and a small part in the eastern zone, in Rukira Sector, where some extraordinary rocky landscapes provide an attractive view and where visitors should be able to enjoy the view of Nasho and Akagera Lakes, Akagera Park, as well as parts of Tanzania.

In addition, cultural heritage sites and natural attractions have been identified for inclusion in the tourism development plan. For areas identified as having both high tourism potential and valuable agricultural land, an overlay approach is proposed. This strategy aims to develop tourism without disrupting the existing agricultural use.

There is ongoing work at the Recreational Park Hotel in Zaza Sector, Nyagatugunda Cell, Cyirira Village. The project is in its initial phase of construction and is expected, once completed, to accommodate tourists coming to Zaza Sector and Ngoma District in general.

The NLUDMP 2020-2050 proposes other eco-tourism sites to be taken into consideration, including lakes and their surrounds as well as islands. These are identified as the Investment Area, as indicated in the map below.

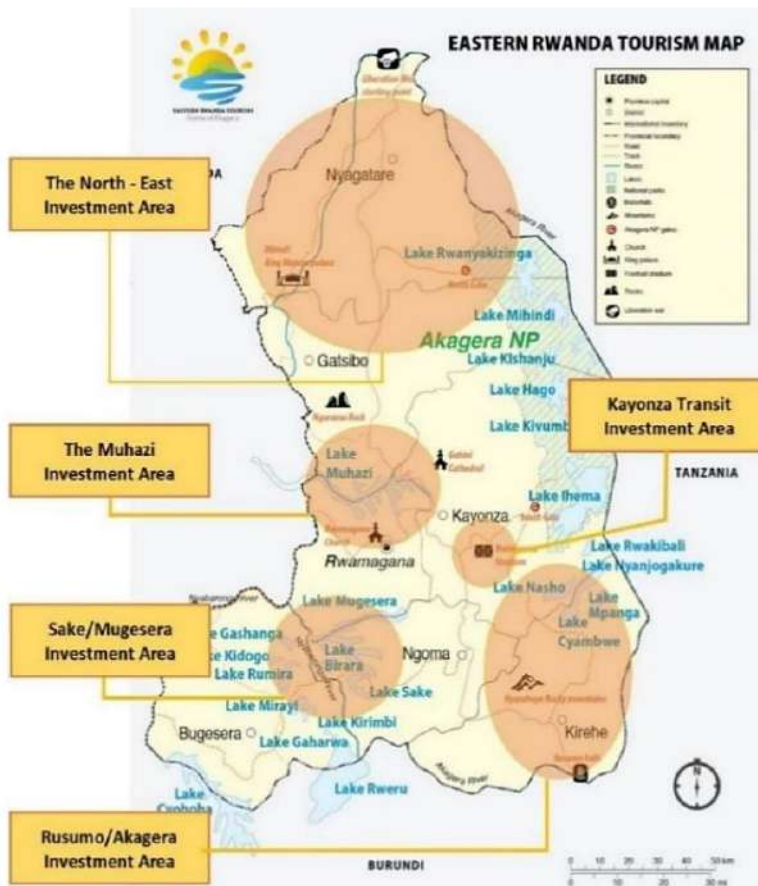


Figure 44: Eastern Province Tourism Investment Areas - Source: NLUDMP 2050

Under economic transformation pillar priority 1.4 of Ngoma DDS, the following key activities are proposed to promote sustainable tourism in the district:



Figure 45: Key proposed activities to promote sustainable tourism in Ngoma District.

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.

4.8.2 Conservation in Ngoma District

The natural assets in the form of bio-diversified ecosystems provide water and energy security to millions of people in Rwanda. Conservation aims to protect and preserve the natural environment and its resources for future generations. One key aspect of conservation is the protection of natural habitats and ecosystems, such as forests,

grasslands, and wetlands. These habitats provide homes for a diverse array of plants and animals, and are essential for maintaining the delicate balance of the ecosystem.

The DLUP is a key tool in conservation by mapping and indicating where areas to be conserved are located, as well as guiding on sustainable utilization.

4.8.2.1 The current conservation areas in Ngoma District

According to Ngoma DDS 2018-2024, Ngoma District established a Forest Management Plan. The plan describes all types of forests, private and public, and explains how conservation plays a significant role in protection of natural resources. The main objective of the plan is to guide on sustainable management of the forest resources within the district, combining economic profitability and preservation of the environment.

According to Law n° 046/2024 of 04/06/2024 governing forests and trees, there is only one protected forest in Ngoma District, Mashoza Forest. The state-owned forest is located in Rurenge Sector, Rujambara Cell, along the Mwambu marshland, Rusasa and Mwambu streams, and measures 18 Ha.



Figure 46: Mashoza Forest in Ngoma District- Source: Ngoma DFMP, 2016

The Mashoza protected forest is one of the potential areas for tourism development. It contains a variety of animals, including different types of birds. To make it more productive for tourism development, some infrastructure like roads needs to be put in place and it should continuously be conserved to avoid the conflict of other land uses like agriculture and settlement activities.

Within the District, the lakes are potential areas to be conserved. As provided by organic law conserving lakes, rivers and other natural resources, these lakes will continue to be conserved and protected. As the lakes and rivers are shared with neighboring Districts, plans for regional conservation must be aligned on District level.

4.8.2.2 *Planned Perspectives for Conservation in Ngoma District*

As per NLUDMP 2020-2050, conservation in Ngoma District is focused on Lake Sake and Lake Mugesera as key areas to be conserved, and at the same time being future potential investment areas. In addition, there are a number of potential areas to be conserved including rivers such as River Akagera, wetlands and protected forests.



Figure 47: Ngoma potential area for future conservation- Source: NLUDMP 2050

Conservation efforts in Ngoma District increased since 2013. The district established a District Forest Management Plan (2016-2026). Mashoza Forest in Rurenge Sector is a protected forest, and all lake buffer zones have been planted by trees while as per the 50 m buffer specified by the environmental law.

4.9 Economic Development

4.9.1 National Context on Economic Development

One of the key pillars of Rwanda's economic development strategy is the promotion of private sector-led growth. This has involved a range of 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 country has made significant progress in recent years, with improvements in key sectors such as agriculture and manufacturing. However, challenges remain, particularly in areas such as infrastructure development and access to finance.

Furthermore, 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

Ngoma DDS (2018-2024) highlighted various potentialities and economic opportunities, as discussed below:

- **Agriculture:** The fertile land in Ngoma District provides opportunities for agriculture, which can lead to increased productivity. Agro-mechanization can further boost productivity, and the establishment of agro-processing industries can create job opportunities in the processing and marketing of local produce.
- **Investment Opportunities:** The favorable landscape of Ngoma District can attract investors, leading to the establishment of various businesses and industries, thereby generating employment opportunities for the local population.
- **Papyrus Handicraft Industry:** The use of papyrus in the handicraft industry can provide employment opportunities, especially for women, who can engage in making various handicraft products for the local and potential tourist markets.
- **Construction:** There is a need for new infrastructure and upgrading of existing facilities in Ngoma District. Construction projects offer job opportunities for construction workers, engineers, architects, and other related professionals.
- **Tourism Sector:** Ngoma District has existing tourism, cultural, and recreational spaces that, after being upgraded as recommended by the DLUP, can serve as a resource for employment in the tourism industry. This includes jobs in hospitality, travel services, tour guiding, and other related areas.
- **Mining Sites:** Existing mining activities in the district provide employment opportunities for the local population involved in mining operations. Additionally, mining activities can contribute to government revenue through taxes and royalties.

These employment opportunities can contribute to the economic growth of Ngoma District, provide livelihoods for the local population, and contribute to the overall development of the region. It's important for local authorities, businesses, and community organizations to work together to harness these opportunities for the benefit of the residents and the district as a whole.

4.9.3 Employment status in Ngoma District

According to the thematic report for economic activity (EICV 5), Ngoma District has a working-age population of 292,000 individuals, with a workforce to population ratio of 88.8 %. In terms of job status, 17.5 % are engaged in wage farming, 13% in wage non-farming activities, 64.1% are independent farmers and 5.3% are independent non-farmers. Furthermore, when considering the distribution of these individuals across broad economic sectors, 71.8% are employed in agriculture, 6.1% in industry, and 16% in services.

According to the Labor Force Survey of 2022, the employment-to-population ratio stands at 49.9 %, highlighting the proportion of the working-age population currently employed. In contrast, the unemployment rate is reported as 15.6%. The survey also identified that 87,737 individuals are outside the labor force, while the number of employed individuals is 104,590, with 19,372 falling into the category of the unemployed.

Employment creation in addressing the country's rapid population growth, poverty reduction, and overall economic growth is a priority. Ngoma DDS (2018-2024) outlined the aim to create 60,708 decent and productive jobs by 2024, with a particular emphasis on empowering youth and women.

To better illustrate the current status of employment creation in Ngoma District, a graphic representation is provided below:

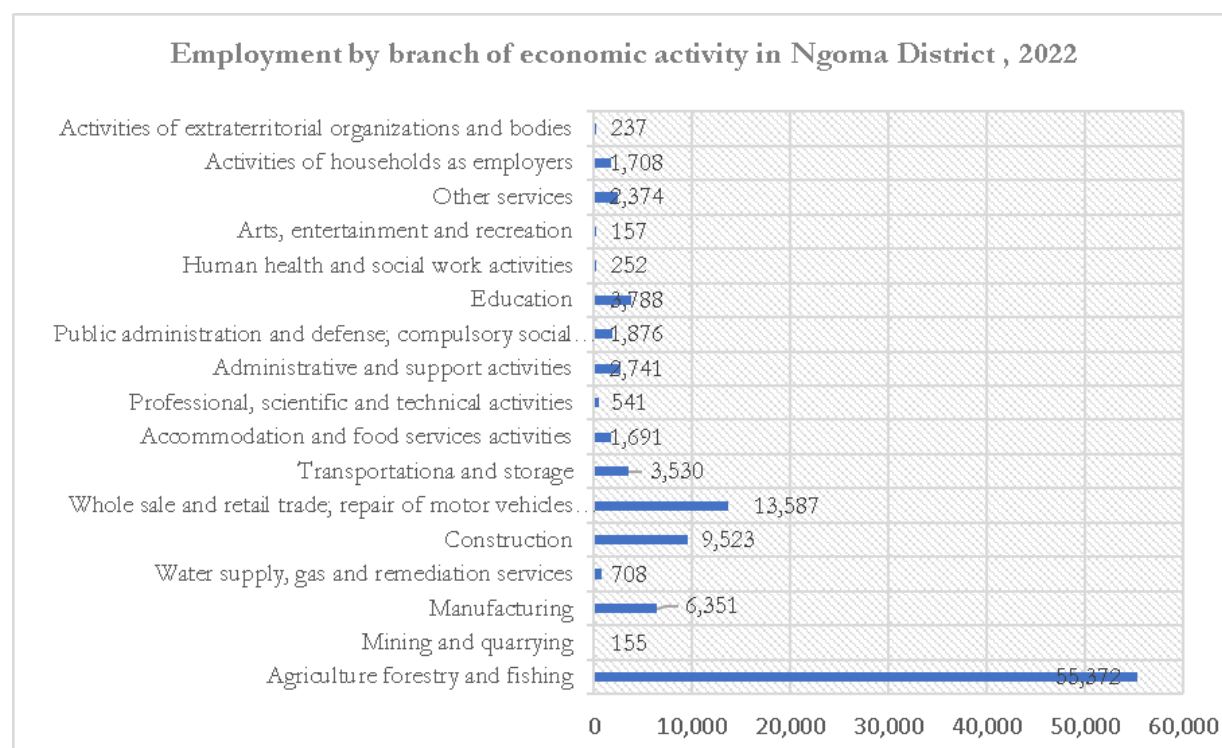


Figure 48: Employment by area and branch of economic activity, RLFS 2022

Based on the provided graph, the agriculture sector is the dominant contributor to the employment market, accounting for 61.2% of the total jobs, followed by wholesale and retail trade, repair of motor vehicles and motorcycles, generating 15% of the total employment opportunities. The construction sector provides 10.5% of the jobs in the employment market.

The predominance of the agriculture sector in job creation during the specified period underscores its crucial role in the economy, reflecting the sector's capacity to absorb a substantial portion of the workforce. It also highlights the continued reliance on agriculture for livelihoods, with its inherent importance in supporting food security and sustaining rural communities.

4.9.4 Proposal on employment opportunities

Based on the Labor Force Survey done by NISR for 2022, plus the percentage estimates as presented in the NLUDMP 2020-2050, the employment sectors have been divided into five main categories:

- Agriculture, Forestry and Fishing
- Mining and Quarrying Construction
- Manufacturing
- Services

The methodology for employment projection in Ngoma District involves cascading the assumptions outlined in NLUDEMP 2020-2050 down to District level, taking into consideration the economic specialization of the district, allowing for accurate and consistent estimation as presented in the graph below:

Table 37: Projection of employment per category

Sector of activity	Number of employments to be created
Formal employment 2050	249,755
Agriculture, forestry and fishing	26,915
Mining and quarrying	12,044
Agro-processing mills and Udukiri	48,455
Construction	37,463
Services	124,877

Based on the table and figure presented above, a total of **249,755** employment opportunities are projected to be created by the year 2050. Among these sectors, the service sector is expected to be the dominant sector in terms of job creation, accounting for **50%** of the total formal employment. This sector encompasses various activities such as financial services, trading, garages, tourism, and others. Following the service sector are agro-processing mills and udukiri, anticipated to create **19.4%** of the total formal employment. It is important to note that Ngoma District focuses primarily on agro-processing mills and udukiri activities within the industrial sector. At third place is the construction sector, which is expected to generate **15%** of the total formal employment.

The agriculture sector, despite occupying a significant portion of employment in the district, is projected to account for only **10.8%** of the total formal employment. The adoption of advanced technology necessitates extensive agriculture practices in order to increase productivity and efficiency. Lastly the mining sector is expected to contribute 4.8%.

4.9.5 Industries and trade in Ngoma District

4.9.5.1 Existing situation of industries

Ngoma District is characterized by a predominantly agro-processing light industrial landscape, with a particular focus on tea washing stations. These facilities are often situated within compact premises due to the nature of their machinery and operational requirements. Most of these facilities are situated outside the proposed industrial zones. Besides tea washing stations, the district hosts various other light industries, including small-scale enterprises that process agricultural products like maize and bananas. These activities fall under the commercial sector, mainly because they can be effectively housed in designated areas due to their space requirements. Proximity to the source of raw materials is of paramount importance for their operational success. Across all sectors of the district, approximately 25 small-scale light industries are dispersed.

Table 38: Ngoma existing light industries- Source: NLUDMP 2020-2050

No	Name of the Industry	Specialization	Location: Sector / Cell
1	MUZINGIRA Banana Wine Processing Unit.	UMUVUNO banana wine	Kazo Sector/Kinyonzo Cell
2	PANOVITA CO.LTD	Porridge flour and maize flour	Kazo Sector/Karama Cell
3	GUBUCO Ltd.	Isano banana-based wine and Mereraneza Inkangaza.	Kazo Sector /Kinyonzo Cell
4	Nsabimana Banana Wine Ltd.	Banana wine based alcoholic beverage	Kazo Sector/Kinyonzi Sector
5	COPROBIBA Ltd.	Umuyange banana-based wine	Mutenderi Sector /Muzingira Cell
6	One Love Company Ltd	Ihigiro banana based alcoholic beverage	Sake Sector/Gafunzo Cell
7	Bona Natural Fruits Transformation Company Ltd (BNFTC)	Juice processing plant	Karembo Sector/Karaba Cell
8	Abasenga Company Ltd	Umuzeti pineapple wine	Mugesera Sector/Nyange Cell
9	COPROVIBA	Ibanga-based alcoholic beverage	Mutenderi Sector/Mutenderi Cell
10	CATAM (Cooperative des agriculteurs et de transformateurs d'ananas de Mutenderi)	Pineapple wine processing plant	Mutenderi Sector/Mutenderi Cell
11	Hangumurimo	Maize flour	Kazo Sector/Karama Cell
12	Ruhamu Best Bakery	Bread	Remera Sector/Nyamagana Cell
13	CORIMI	Ubwiza rice grains	Sake Sector/Nkanga Cell
14	COVAPROBA	Garuka usubire banana based alcoholic beverage	Rurenge Sector/Musya Cell
15	KAKA Flour Business Ltd	Maize flour processing plant	Kibungo Sector/Mahango Cell
16	Bread plant	Bread plant	Kibungo Sector/Mahango Cell
16	AKG	Coffee washing station	Gashanda Sector
17	Sake Plantation	Coffee washing station	Sake Sector
18	IAKB	Coffee washing station	Murama Sector
19	ENAS	Coffee washing station	Murama Sector
20	IMPEXCOL	Coffee washing station	Murama Sector/Sakara Cell
21	RWACOFF	Coffee washing station	Murama Sector/Kigabiro Cell
20	Ishema coffee	Coffee washing station	Rurenge Sector
21	IMPEXOR	Coffee washing station	Mutenderi Sector
22	CYIZA COFFEE	Coffee washing station	Kibungo Sector
23	RWACOF/KAZO	Coffee washing station	Kazo Sector
24	TWESE TURYOHERWE LTD	Maize processing plant	Remera Sector/Nyamagana Cell
25	ABAKANGUKIYE KAWA	Coffee processing plant	Gashanda Sector/Mutsindo Cell

Source: Data collected from Ngoma District, November, 2022

Small agro-processing plants for banana, pineapple and maize are growing. Coffee washing stations are located

in different Sectors where the land is suitable for coffee plantation. However, the private sector is taking the role in developing the industry in Ngoma District.

4.9.5.2 Existing commercial facilities

There are 80 trading centers scattered in different Sectors, generally small in size. These centers differ in terms of size, services and infrastructure. The district has nine (9) upgraded trading centers with modern markets found in Rukumberi, Jarama, Sake, Rukira, Mutenderi, Gashanda, Karembo, Remera and Kibungo Sectors.

The following are trading centers identified Sector by Sector;

- Rukumberi Sector: Gashenyi, Kwakidima, Gituza, Rwintashya, Rubona, Rubonde, Kavumve, Kwibuye, Gihandagaza, Nyakibande, Giturusu, Shori, Mugwato, Rugenda and Kajevuba trading centers. All these trading centers are in poor physical condition. The following have access to both electricity and water: Gashenyi, Kwakidima, Gituza, Kajevuba and Kwibuye trading centers. Others have only electricity but no water, no solid waste disposal or access to parking facilities.
- Kazo Sector: Mugiturusu, Kazo, Tambiro, Tunduti, Koperative and Mulinja trading centers. Out of these, Mugiturusu, Kazo, Tambiro and Tunduti trading center) have access to water and electricity. Others lack facilities.
- Gashanda Sector: Rushinya, Kibimba, Agatare I, Agatare II, Munyungwe and Kidugu trading centers. Only Rushinya, Kibimba, Agatare I, and Agatare II trading centers have access to water and electricity, the rest of trading centers lack access to water, electricity, solid waste disposal and parking facilities.
- Murama Sector: Muri, Mvumba, Nyagataba, Rubare and Kugasoko trading centers. Only Muri, Mvumba, Nyagataba, Rubare centers have access to both water and electricity but lack solid waste disposal and access to parking facilities. Kugasoko trading center lacks access to electricity, water and solid waste disposal as well as car parking facilities.
- Zaza Sector: Njyambere, Rwimbirwa, Kanyinya, Kugasoko, Mpambwe, Nyagahandakazi and Sangaza trading centers. Only Kanyinya, Kugasoko, Mpambwe, Nyagahandakazi, Sangaza trading centers have access to water and electricity but lack solid disposal as well as car parking facilities. The rest are not connected.
- Rurenge Sector: Kajevuba, Akagarama, Rwikubo and Mwuhurire trading centers which are all connected to water and electricity.
- Karembo Sector: Nyamirambo, Cyakabiri and Akaziba trading centers. Two have access to water and electricity. Nyamirambo center is not connected to electricity but has water connection. The three trading centers lack solid waste disposal and parking facilities.
- Mugesera Sector: Karisizo, Icyovu, Kampala, Kajevuba and Rugaju trading centers, all these trading centers lack access to electricity, water, solid waste disposal and parking facilities. Karisizo center has access only to water.
- Remera Sector: Muhurire, Kukibuye, Nyarugenge, Kugiturusu, Kamvumba, Remera, Gisunzu, Nkenke, Kiyovu, Munini, Kamboji, Mucyakabiri, Toneru and Mwindika trading centers. All are in poor conditions; only Toneru and Mwindika have access to both water and electricity, the rest have only

access to electricity but not water. All trading centers in Remera Sector lack solid waste disposal and access to parking facilities and other infrastructures.

- Rukira Sector: Rubona, Nyinya-Cyayabagara and Gituku trading centers which have access to electricity and water, however the centers are in poor physical condition due to lack of access to other facilities such as parking, solid waste disposal, sanitation and waste water management.
- Mutenderi Sector: Kibuye, Kaguruka, Agatonde, Ihoza, Musenyi, Meraneza, Gitesanyi 1, Gitesanyi 2, Mumbogo, Kamombo, Rwakaza and Mutukura trading centers. The trading centers have access to electricity and water but lack other facilities like parking, waste management, sanitation facilities etc. Musenyi trading center lacks all-above-mentioned utilities and services.
- Sake Sector: Ku Matara, Madeliye, Tega, Mu Gatere and Agasima trading centers. All are in poor physical conditions, having access to electricity and water but lacking other facilities.
- Jarama Sector: Vunga, Cyahafi, Kamapfizi, Irebezo and Mukaje trading centers. All centers are in poor condition but have access to electricity and water but lack other facilities like waste management and parking etc.
- Kibungo Sector: Rebezo trading center has access to water and electricity but lacks other facilities.

The following photos were taken from these trading centers in the same regard.



Photo illustrating the trading Centers in Ngoma District - Source: Photos taken during our field investigations, November 2022

Trade in Ngoma District contributes to the development of the district, however there are existing challenges such as insufficient road infrastructure, especially in rural areas, which hinders local communities to transport their agricultural produce to the market. The condition of market facilities in rural areas needs also to be improved to support trade.

4.9.6 The Service and Trade Sector

The service sector is small in Ngoma District, and is concentrated in commercial trading centers. Generally, local traders face the challenges based on lack of basic infrastructural facilities like electricity and water both in urban and rural areas. There are 14 markets located in these small centers, some in good conditions and others lacking access to electricity, water, roads, solid and liquid waste management, lack of parking facilities etc. There are also informal markets in the small centers that mainly occur in the evening time.

The strategic location of Ngoma District favors direct links in terms of trade and services with the neighboring Districts Bugesera, Rwamagana, and Kayonza. Products from the District are easily transported and exported to Tanzania via Kirehe District and Rusumo border. Lake Sake and Lake Mugesera act as the potential bridge to facilitate the transportation of people and goods to markets in the neighboring Districts.

Trade and services are important factors in improving social livelihood. It has allowed for increased access to resources and services, as well as increased economic development. Trade has allowed for increased access to markets for goods and services, as well as increased access to new technologies. Trade also leads to increased employment opportunities, improved infrastructure, and increased access to capital and credit. As trade increases and the economy grows, resources may become available to invest in infrastructure projects, such as the construction of roads, schools, and hospitals. This improves access to essential services and enhances the overall quality of life in the district. Currently, the construction of Ngoma District Road, connecting Ngoma District to the Southern Province and the western part of the country, will not only increase trade with neighboring regions but also tourism development.

In addition, trade helps to promote social and cultural exchange between different communities and regions. This can lead to the sharing of ideas, customs, and traditions, which enriches the cultural fabric of a District.

4.9.7 Planning Perspectives for industries and trade

4.9.7.1 Exports and Trade

The strategic location of Ngoma District will support trade with the neighboring Districts and neighboring countries. Bugesera International Airport will serve as the primary hub for people and goods, connecting Rwanda to the rest of Africa, Europe, Asia, and the USA. The proposed railway connecting Rwanda and Tanzania will pass through the district and will have direct impact in terms of trade and commercial development.

The following markets are proposed to be upgraded to spur trade in Ngoma District:

- Rukira Sector: As the main market in Rukira Rurban Center, Murama market will be extended to enable various commodities and other opportunities. The market is planned to have access to roads and bus stops, and modern shopping malls. The market will have access to recycling facilities.
- Rukumberi Sector: The trading center will be redeveloped with basic infrastructures such as roads and electricity.
- Rurenge Sector: Rugese market will be extended to enable various commodities and other opportunities.
- Zaza Sector: Ruhembe market is proposed to be extended and upgraded to a modern market to enable various commodities and other opportunities. The market is planned to have access to roads and bus

stops, and modern shopping malls.

- **Murama Sector:** The place commonly known as Kugasoko used to be a small market operating once weekly. The market is no longer operating. It is proposed that the place is developed into an improved market serving various local communities.

Table 39: Proposed Selling Points in Ngoma District

No	Sector	Cell	Selling Point
1	Kibungo	Mahango	Rebezo
2	Rukira	Kibatsi	Gituku
3	Murama	Gitaraga	Societe
4	Kazo	Karama	Kigusa
5	Jarama	Kibimba	Mubaha
6	Rukumberi	Mfunne	Mfunne
		Gituza	Kwisi yacyenda
7	Zaza	Nyagatugunda	Njyambere
		Nyagasozi	Agatare
8	Sake	Rukoma	Tega
9	Rurenge	Rugese	Kirwa
10	Gashanda	Giseri	Nyamugari
11	Mugesera	Ntaga	Ikiyovu
Total			13

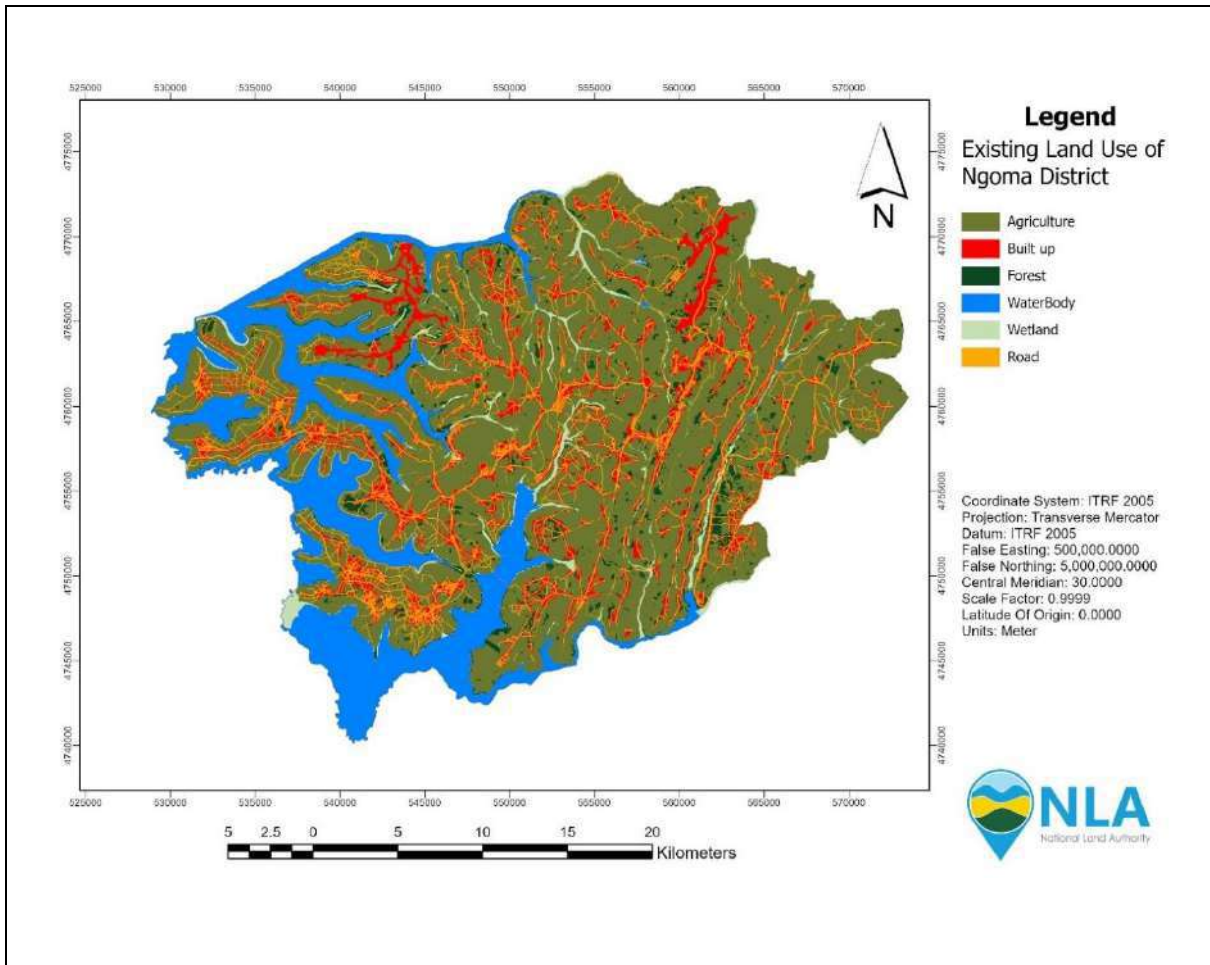
The above selling points are proposed in different Sectors and Cells to support trade in different areas of the district, where local communities usually travel long distances to access markets. The development of these proposed selling points in improved ways, such as providing shading, access to water and electricity, waste management and parking facilities, will stimulate trade and ease business especially in remote areas of Ngoma District.

4.10 Ngoma District Land Use Balance Sheet

The land use balance sheet represents the allocation of land for various sectors or land uses. The existing land use balance sheet represents the current situation. The proposed land use balance sheet represents the proposed land use, based on the integrated planning of Ngoma District.

4.10.1 Ngoma District existing land use

The current land use in Ngoma District is generally dominated by agriculture. The Ngoma District is known as one of the districts in eastern Rwanda with important farming activities. It results in the predominance of agriculture practices in the existing land use. In addition, residential developments are still characterized by linear settlements alongside the roads. The map below illustrates the current land use in Ngoma District.



Map 27: Map of existing land use in Ngoma District- Source: NLA data analysis, July, 2023

The figure below shows the provides different proportions of land use: Agriculture utilizes 61% of all lands. The second land consumer is waterbody (16%), followed by the built-up area (14%). This land use includes public facilities public utilities as well as transportation areas

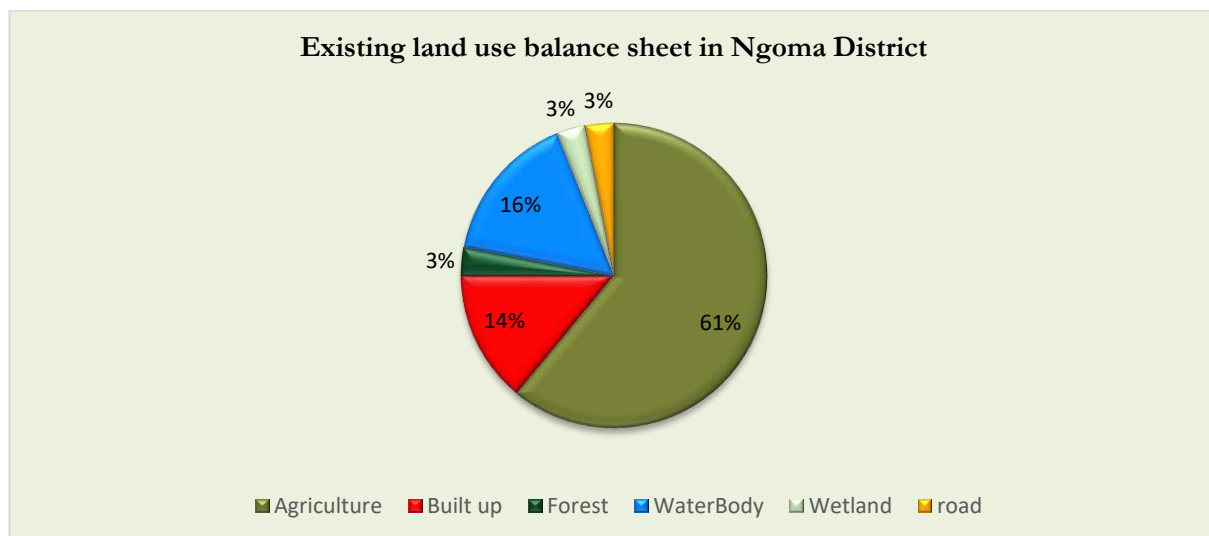


Figure 49: Ngoma District existing land use

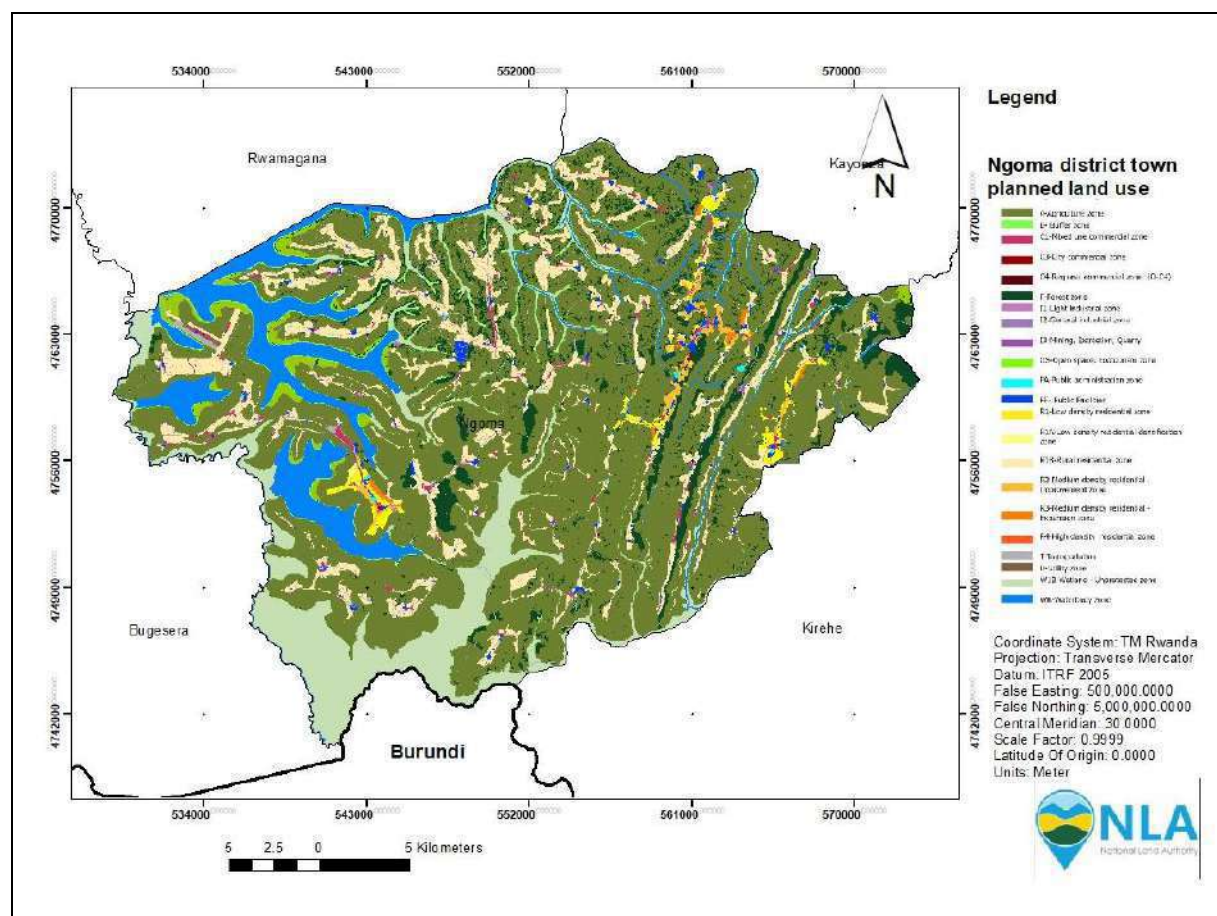
4.10.2 Ngoma District planned land use

The agricultural land was reduced to 50.55% Another small part of agricultural land was converted into tourism zones.

Ngoma District land use plan divides land into different categories, with agriculture being the main use. This supports the district's goal of developing agriculture. About 51% of the district's land is allocated for agriculture, including 2.3% for livestock and 283.5 hectares (0.64%) occupied by scattered settlements. These scattered settlements will not be turned into agricultural land right away, and no new buildings are allowed. Over time, residents will move to planned settlement areas, and the land will be used for farming as originally planned.

Ngoma District, and the majority of Districts in the Eastern Province, have many areas with shrubs which have been considered as forest areas according to the forest cover mapping report of 2019. According to the NLUDMP 2020-2050, these areas will be converted into agro-pastoral lands. Unprotected swamplands are also mainly used for agriculture. Thus, agricultural land will increase and the swamplands' use will be specifically reserved for vegetables and some crops like rice.

Forests are proposed to occupy 11% of Ngoma District, responding to the national policy on forest management. Areas likely to be afforested, such as steep slopes (more than 55%), space along roads and rivers, and water bodies buffers have been identified to increase forest cover. All land uses are presented in the table below. Lakeshores will mainly be used for tourism, Ngoma DLUP provides 1068 ha reserved for tourism development. This sector is planned to become one of important economic sector of Ngoma District, based on district's vision.



Map 28: Ngoma District proposed land use – Source: Our analysis, July 2023

Table 40: Ngoma District existing and proposed land use balance sheet

Land use	Existing land use		Planned land use	
	area size (ha)	%	area size (ha)	%
Agriculture	50,390.6	61	43,838.5	50.5
A1-Agriculture zone	52,647.2	60.4	43,963	48.2
A2-Livestock zone	2,019.4	2.3	1,996.6	2.3
Ecotourism, parks, and open space	2,991.3	3	1,068	1.2
Forest			9,535	11
Commercial	12,050.8	14	1,349	1.6
Industrial			59	0.07
Public Administration			79	0.09
Public Facility			571	0.7
Public Utility			7	0.008
Residential			9,288	10.7
Transportation	3021.4	3	3268	3.8
Buffers	N/A	N/A	1835	2.1
Wetlands	2170.4	3	9,530	11

Water bodies	13907.8	16	6,311	7.3
Total			86,863	100.035

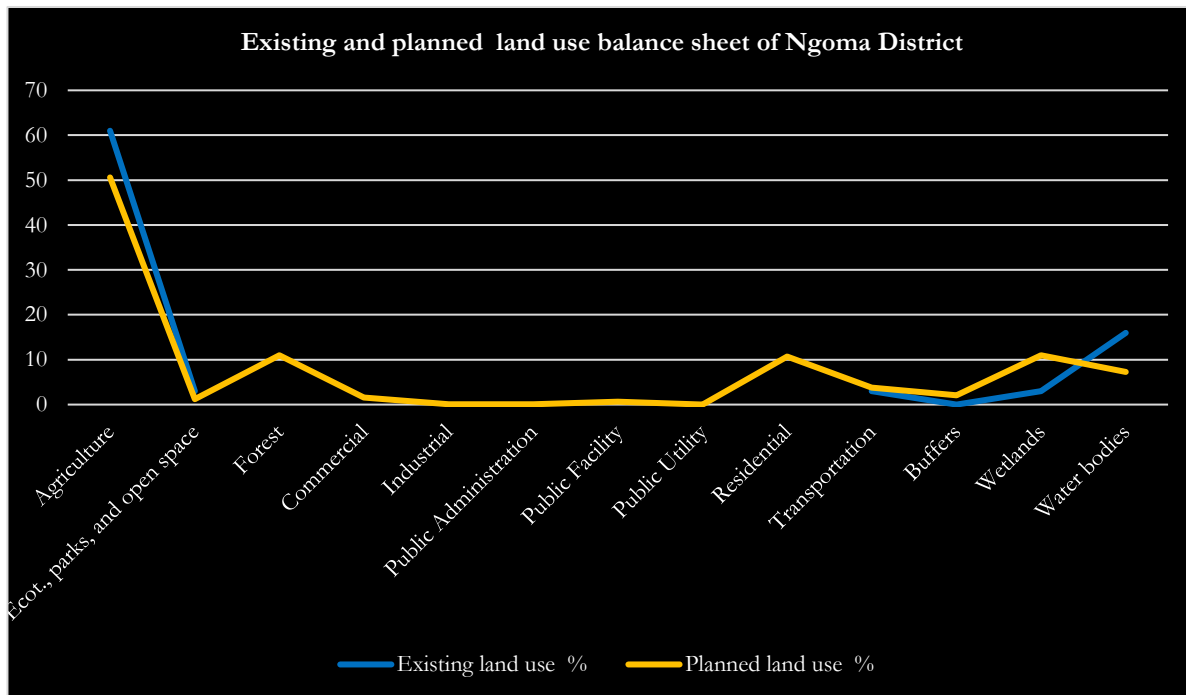


Figure 50: Existing/planned land use balance sheet of Ngoma District-Source: Our analysis, July, 2023

5. IMPLEMENTATION STRATEGIES

5.1 Legal and Institutional Framework

One of the fundamental aspects of achieving the goals as set out in a Ngoma District Land Use Plan for a specific spatial space is the implementation of such a plan by the established implementation Agency.

The implementation of a Ngoma DLUP, which is the official document (that contains public policy, programs and projects for Ngoma District), is a major determinant of urban and rural development and the Ngoma 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 41: Ngoma District Implementation key actors and their responsibilities

N°	Actors & Stakeholders	Intervention sector	Responsibilities
1.	Ngoma District	All 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 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/REG	- Education	- Developing and managing Education Monitoring and Evaluation systems - Promoting information and technologies in the area of education - Promoting information 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 centres - 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 Ngoma DLUP Implementation Phases - Capacity Building of all implementation Actors at all levels of Governance - Involve public and private investors and developers for Ngoma DLUP Implementation
12	LODA	- Private Sector Development & Youth Employment	- Local Economic & Community Development - Capacity building of local administrative entities

		- Social protection - Urbanization and rural settlements - Transport	- 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 Maintainance)
14	RAB	- Agriculture	- Practise 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	Water and Sanitation	To increase the water production, distribution, and performance improvement aimed at provision of quality water and sanitation services
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 Ngoma Population

5.2 Ngoma DLUP Implementation Framework

The implementation of Ngoma DLUP is organized in phases. The aim is to avoid urban and rural sprawl, promote integrated and coordinated development of different land uses. In this context, Ngoma DLUP will emphasize the tiling principle to prevent random and remote locations of development. Every detailed development affecting the land use plan will clarify where implementation will be focused at least every 5 years after which evaluation would be conducted before allowing the next phase (mid-term evaluation).

The phasing strategy for Ngoma DLUP is organized in detailed physical plans and land re-adjustment plans. Any development of housing and infrastructure in the district should be regulated and authorized through the building permitting management information system (BPMIS) to ensure compliance. Regular monthly and annual land use implementation monitoring will be applied to ensure consistency and compliance.

5.2.1 Ngoma DLUP Spatial Phasing Plan: Horizon of the Year 2050

Implementation Phasing of Ngoma DLUP is part of all local master plan 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 Ngoma District Land Use Plan intends to provide flexibility to the implementing agents and Stakeholders to prioritize investment projects for local economic development in Ngoma 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 or 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 Ngoma City and Rukira and Sake Rurban where the 4 phases have been proposed to implement Ngoma District Land Use Master Plan.

5.2.1.1 Phase One: 2023 – 2030

Phase one considers the areas, which already contain existing built up and basic infrastructures, inside the areas of Ngoma District Town as well as Rukira and Sake Rurban Centers, already occupied and containing all major basic infrastructures. The district continues the issuance of building construction permits and rehabilitation permits in order to achieve required proposed densities. These areas are priority during additional district infrastructures development and relevant stakeholders' investments. Physical Plans elaboration and their publication will be priority for Residential and Mixed Uses in line with Ngoma DLUP implementation.

This Phase will also consider the residential expansion zones concerning settlement upgrading projects in towns and rural settlement sites today not having access to basic services and infrastructures. The district will put in place basic infrastructures to achieve the District's target of 100% for example, of electricity and water infrastructure supply as well as increasing accessibility in all planned settlements areas.

However, from Phase One, the DLUP phasing plan allows the Implementation flexibility while implementing new land developments by issuing new building construction permits, as long as 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 any government or public intervention.

The physical plan elaboration for key site development is required to allow all land development and implementation of DLUP.

5.2.1.2 Phase two: 2030 – 2035

Phase two considers areas of urban residential zones with high densities (R3) CBD development and strengthening existing rural settlement by putting in place basic infrastructure and improving trade centers within the rural settlement sites as well as electrification at 100% for the whole District.

Those areas are not yet serviced and it is a one of priority actions. Issuance of new building construction permits is prohibited in phase two, except big investment cases, where the investors will comfortably distribute all basic infrastructures (Roads, water, electricity, etc.), without a government or public intervention. District will issue construction permits after elaboration of detailed physical plans and distribution of all basic infrastructures (Roads, Water, Electricity, IT, etc.).

5.2.1.3 Phase three: 2035 – 2050

This Phase corresponds eventually to the revision of land use plans at national and District levels. This phase considers the areas of urban expansion and development and urban peripherals that today are used for agriculture and livestock. These areas will be protected for allowing transitional land uses like agriculture or forestry/agroforestry plantations.

New building construction permits will be issued, and big investment cases will be continuously permitted, where the developers will comfortably distribute all basic infrastructures (Roads, water, electricity, etc.), without any government or public intervention. District will issue construction permits in phase 3, after elaboration of detailed physical plans and distribution of all basic infrastructures (Roads, Water, Electricity, IT, etc.).

During this phase, the following essential projects will be given particular attention:

- ^ Continuous implementation of the planned projects, especially with focus on tourism, infrastructure, and urban development.
- ^ Agricultural mechanization development empowering large scale irrigation program and agro-processing industries.
- ^ CBD developments.

5.2.2 Land Readjustment & Detailed Physical Plans

Land Readjustment programs have been introduced with the purpose to facilitate plot servicing mainly in the urban areas without physical plans to facilitate the land uses and master plans implementation. By this practice, the plot servicing was found less expensive and more participatory while involving the local community in the whole process. The local community becomes owner of the program through elected committees which take responsibilities of supervising the plot servicing projects, management of produced plots, facilitation negotiation and understanding between the previous landowners and newcomers for land acquisition and all activities are controlled and coordinated by the local administration.

Readjustment of existing plots, known also as “Replotting” through elaboration of Detailed Physical Plans are also recommended while implementing the Ngoma District Land Use Plan to assure rational development and effective land uses. Where the plots are of different quality or value, where area or value adjustments are made.

The underlying principle is that every owner must be compensated for their land with the land of equivalent

value. The readjustment of the land transforms the irregularly shaped plots into regular and standard shape land with access to infrastructures 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. Community approach

The communities who are the landowners must be willing to participate in all phases from beginning to end including elaboration of site physical plans, data collection and all mapping and site demarcations exercises until the assignment is completed and approved, being provided by 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.

Land readjustment is an essential tool for land consolidation and orderly development. The Ngoma District communities should have ownership in all phases and must contribute as well as ensuring compliance during development. Any conflicts and disputes that may occur in the process should be resolved between land owners, the site committee established, local Village Chiefs and Cell Leaders. A practical guide for participatory land readjustment was established by the National Land Authority 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 or planning site. Therefore, community approach is part of Ngoma District Land Use Plan for its successful implementation.

5.2.3 Ngoma Capital Improvement Projects

Ngoma District capital projects discussed between the NLA team and the Ngoma District during the participatory planning are the following:

Ngoma District is undergoing significant socio-economic transformation. The district has outlined several major projects across various sectors in its development strategy, aiming to enhance infrastructure, agriculture, education, healthcare, and governance up to 2050. Below is an overview of these initiatives:

1. Strengthen Urban & rural settlement Development and Land Use Planning

- Develop a green and growing and well equipped cities
 - Construction of CBD in city center of Ngoma District Town
 - Greening 50 ha of land in urban centers and rural settlement sites (tree & flower planting)
 - Construction of domestic wastewater treatment and disposal in District Town
 - Development of IDP model villages to enhance rural housing.
- Plot demarcation and physical plan elaboration
 - Elaboration of Mahango site of 54 ha (in Kibungo Sector)
 - Elaboration of 25 ha on site physical plan in Sake rurban and 25 ha in Rukira Rurban.
- Enhance rain water harvesting and domestic wastewater management system
 - Construction of domestic wastewater treatment and disposal in Ngoma District Town
 - Constriction of rain water channels in Ngoma District Town

2. Boost Local Trade and Economic Infrastructure

- Development of trade infrastructures (new open markets, rehabilitation of the existing ones and celling points).
 - Construction of Sake open market (in Sake Sector);
 - Construction of open markets in poor conditions
 - Construction of selling points at Kumatara (Sake) and Gahushyi (Rukira)

- **Enhancing light industrial activities** by developing small industries
- **Creating artisanal product hubs**, strengthening cluster-based production of pottery, weaving, mat crafting and basketry linked to export value chains.

3. Improve Transport Connectivity and Mobility

- Initiate a modern transport interchange, strengthening urban mobility and improving rural-urban linkages.
 - Construction of national asphalted road linking Ngoma to Bugesera District
 - Construction of bridge on national road linking to Bugesera District
 - Construction of urban service roads, enabling CBD and city access, crossing urban parts of Kibungo, Remera and Karemba Sectors
 - Maintenance of existing roads connecting urban to the rural zones
- Construction of car parks and bus stations
 - Construction of Kibungo car park
 - Construction of Sake car park
 - Construction of bus stations
- Construction of Railway axe transiting from Rusumo via Kirehe-Ngoma and Rwamagana to City of Kigali through Gasabo District (long-term economic connection).

4. Improve utilities' conditions to foster economic growth

- Enhance Access to Clean Water and Sanitation
 - Construction of Sake water supply system (11,000 m³/day) – Phase I
 - Construction of New water pipelines: Nyagasozi-Muzingira, Gatonde-Gahima, Nyagashandi-Gituku
 - Extension of existing water pipelines (urban water network & Sakara/Kayanja)
 - Rehabilitation of Kamfonyogo-Gashanda water supply system.
- Expand Energy Access and Promote Clean Cooking Solutions
 - Connecting Munege, Cyerwa, Mutsindo, Giseri, Karengi, and Munege Primary School to electricity
 - Installation of new voltage lines
 - Construction of domestic biogas and other energy-saving stoves (300 households)

5. Modernize Agriculture to promote Sustainable Land Use

- Establish local agro-processing hubs especially for banana, pineapple, maize, beans, etc
- Creation of 525 ha progressive terraces:
 - 100 ha (Karengi-Rwumba, Sake)
 - 125 ha (Gituza & Rubona – Rukumberi)
 - 100 ha (Rurengi – Akagarama & Musya)
 - 70 ha (Akabungo – Mugesera)
 - 50 ha (Kanama – Karemba)
 - 80 ha (Zaza)
- Development of hillside and marshlands both small and large scale irrigation schemes
 - Large-scale irrigation scheme in **“Murwuri”** (Rukumberi Sector)
- Improving productivity through land husbandry technologies, mechanization and value chain development.
- Support farmer cooperatives with logistics, storage, and market access.

6. Environmental & Natural Resources management

- Restoration of degraded wetlands **watershed restoration**: Protect Lake Mugesera and Akagera River systems.
- Promotion of land consolidation aligned with agro-climatic zones

7. Enhance social infrastructures and Skills Training

- Building of 436 classrooms for primary schools considering the population of 35 pupils per classroom
- Construction of 840 TVET schools
- Development of 18 Early Childhood Development Centers (ECDs)

8. Enhance Healthcare Services and Social Facilities

- Construction of 2 Health Centers (Kazo and Karemba)
- Development of 15 health posts
- Construction of a District Hospital (Sake Sector)
- Construction of a rehabilitation center (Sake Sector)

9. Develop Eco-Tourism and Recreational Opportunities

- Eco-tourism development across Ngoma District
- Greening programs including pedestrian, motorcycle/bike infrastructure around lakes
- Development of recreational areas on lakeshores (ring roads, walking/cycling, water activities – especially in Mugesera, Rukumberi and Sake Sectors)

Table 42 Catalytic projects for Ngoma District

			Phase I	Phase II	Phase III
THEMATIC AREA	KEY ACTIONS	RESPONSIBLE INSTITUTIONS	2023-2030	2030-2035	2035-2050
Strengthen Urban Development and Land Use Planning	Develop a green, growing and well equipped cities	MINICOM, DISTRICT, PSF			
	Plot demarcation and physical plan elaboration in Ngoma District Town and suburbs	DISTRICT, MININFRA, RHA RTDA, PSF			
	Enhance rain water harvesting and domestic wastewater management system	DISTRICT, MININFRA, PSF			
	Development of IDP model villages to enhance rural housing.	DISTRICT, MININFRA, RHA PSF			
Boost Local Trade and Economic Infrastructure	Development of trade infrastructures (new open markets, rehabilitation of the existing ones and selling points).	MINICOM, DISTRICT, PSF			
	Enhancing light industrial activities by developing small industries	MINICOM, DISTRICT, PSF			
	Creating artisanal product hubs, strengthening cluster-based production of pottery, weaving, mat crafting and basketry linked to export value chains	MINICOM, DISTRICT, PSF			

Improve Transport Connectivity and Mobility	<i>Initiate a modern transport interchange, strengthening urban mobility and improving rural-urban linkages.</i>	DISTRICT, MININFRA, RTDA, PSF			
	Construction of car parks and bus stations	DISTRICT, MININFRA, RTDA			
	Construction of Railway axe transiting from Rusumo via Kirehe-Ngoma and Rwamagana to City of Kigali through Gasabo District (long-term economic connection).	DISTRICT, MININFRA, RTDA			
Improve utilities' conditions to foster economic growth	Enhance Access to Clean Water and Sanitation	DISTRICT, MININFRA, WASAC			
	Expand Energy Access and Promote Clean Cooking Solutions	DISTRICT, MININFRA, REG			
Modernize Agriculture to promote Sustainable Land Use	Establish local agro-processing hubs especially for banana, pineapple, maize, beans, etc	MINICOM, MINAGRI, DISTRICT, PSF			
	Creation of 525 ha progressive terraces	MINAGRI, DISTRICT, PSF			
	Development of hillside and marshlands both small and large scale irrigation schemes	MINAGRI, DISTRICT, PSF			
	Improving productivity through land husbandry technologies, mechanization and value chain development.	MINAGRI, DISTRICT, PSF			
	Support farmer cooperatives with logistics, storage, and market access.	MINICOM, MINAGRI, DISTRICT			
Environmental & Natural Resources management	Restoration of degraded wetlands watershed restoration: Protect Lake Mugesera and Akagera River systems.	MoE, REMA DISTRICT			
	Promotion of land consolidation aligned with agro-climatic zones.	MINAGRI, DISTRICT, PSF			
Enhance social infrastructures and Skills Training	Building of 436 classrooms for primary schools considering the population of 35 pupils per classroom	MINEDUC, DISTRICT, PSF and community			
	Construction of 840 TVE'T schools	MINEDUC, DISTRICT, PSF			
	Development of 18 Early Childhood Development Centers (ECDs)				
Enhance Healthcare Services and Social Facilities	Construction of 2 Health Centers (Kazo and Karemba), development of 15 health posts, construction of a District Hospital and rehabilitation center (Sake Sector).	MoH, DISTRICT, PSF			
Develop Eco-Tourism and Recreational Opportunities	Eco-tourism development across Ngoma District	RDB, DISTRICT, PSF			
	Greening programs including pedestrian, motorcycle/bike infrastructure around lakes.	RDB, DISTRICT, PSF			
	Development of recreational areas on lakeshores (ring roads, walking/cycling, water activities – especially in Mugesera, Rukumberi and Sake Sectors)	RDB, DISTRICT, PSF			

Source: Our proposal-Ngoma DLUP, November, 2023

5.3 Ngoma DLUP Monitoring and Evaluation

Every 3 years the existing situation should be updated and Ngoma DLUP updated to ensure proper monitoring and implementation mechanisms. 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 this principle of CCP, the following measures and procedures are essential in order to achieve the desired compliance in planning process;

- Providing a non-objection to any land use plan and project by National Land Authority (NLA) in charge of Land Use Management through the back up coordination force from MINECOFIN will be instrumental in resolving coordination and compliance issues.
- NLUDMP dominance, ensuring that the projects and activities of all Ministries & Authorities comply with this plan. The national development planning and budgeting process (MINECOFIN) should ensure that sector priorities and investments comply with the NLUDMP. 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 15 years (2020-2035). All master plans shall show implementation phases for midterm (2035) 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. The long-term boundary for 2050 will be protected for the next 15 years.
- 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 districts to serve the urban and rural construction and development permitting countrywide. Strong community outreach program and mind-set change on land use planning in Rwanda will be organized continuously in Ngoma District in order for community public awareness and ownership.

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Bibonywe kugira ngo bishyirwe ku mugereka w'Iteka rya Minisitiri n° 011/25/10/TC ryo ku wa 28/07/2025 rishyiraho igishushanyo mbonera cy'imikoreshereze n'imitunganyirize by'ubutaka cy'Akarere ka Ngoma	Seen to be annexed to Ministerial Order n° 011/25/10/TC of 28/07/2025 establishing land use and development master plan of Ngoma District	Vu pour être annexé à l'Arrêté Ministériel n° 011/25/10/TC du 28/07/2025 établissant le schéma directeur d'utilisation et d'aménagement des terres du District de Ngoma
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Kigali, 28/07/2025

(sé)

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