

NYANDARUA COUNTY SPATIAL PLAN 2020-2030

COUNTY GOVERNMENT OF

NYANDARUA



DEPARTMENT OF LANDS,
HOUSING AND PHYSICAL
PLANNING



FINAL PLAN REPORT

PLAN APPROVAL

CERTIFIED

I certify that the Plan has been prepared as per section 110 of the County Governments Act 2012 and Physical Planning standards and guidelines.

Signature

Date.....

COUNTY DIRECTOR OF PHYSICAL PLANNING

RECOMMENDED

Signature

Date.....

COUNTY EXECUTIVE COMMITTEE MEMBER OF LANDS, HOUSING AND PHYSICAL
PLANNING

APPROVAL

Hansard No

Date.....

COUNTY ASSEMBLY

ENDORSED

Signature

Date.....

H. E GOVERNOR

“A competitive, prosperous, well governed and habitable county with a highly transformative economy, anchored on tourism, agro-processing, service and providing high quality infrastructure.”

FOREWORD



The Constitution of Kenya bestows the planning and development functions to the County Governments. Further, the County Governments Act, section 107 presents the various types of plans to be prepared by the county. These plans include; County Spatial Plans (CSP), Cities and Urban Areas Plans, County Integrated Development Plans (CIDP), and County Sectoral Plans. It is against this backdrop that Nyandarua County has prepared its first CSP to guide development for the next ten years (2020-2030). Nyandarua CSP is intended to provide a long-term framework showing the distribution of activities and people to promote regional balance in development, protect and conserve the environment, manage human settlements, improve connectivity, provide adequate infrastructure and ensure proper governance.

The plan has been prepared in line with aspirations of the Kenyan Constitution and Vision 2030, which is a policy document outlining the development anchored on three pillars. The plan also reflects the aspirations of the people of Nyandarua who desire to have *“A competitive, prosperous, well governed and habitable county with a highly transformative economy, anchored on tourism, agro-processing, service and providing high quality infrastructure.”* The plan focuses on strategic ways of improving food security, increase in employment opportunities through industrialization, improving the quality of infrastructure and safeguarding the natural ecosystem in the County. The plan has also phased out projects to ensure proper implementation of the projects.

The preparation of the CSP was highly participatory involving every stakeholder from the highest level to the grassroot level. Prior to the development of the CSP, public participation was undertaken in each of the twenty-five wards to detail out the issues and possible solutions.

Therefore, I wish to take this opportunity to give my commitment towards the implementation of this plan in order to realize the realization of the residents in the county and to transform the various key sectors of the economy: agriculture, industrialization, transport, tourism and environment. I also call upon every stakeholder to take up active roles in making the Nyandarua vision a reality.

H. E. MOSES KIARIE BADILISHA

GOVERNOR

NYANDARUA COUNTY

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ACKNOWLEDGEMENT



We are proud and honoured that the preparation of Nyandarua CSP has come to an end under the able leadership of his excellency Governor Moses Kiarie Badilisha and his able deputy his excellency Deputy Governor Mathara Mwangi. The preparation of this plan was assigned to the department of Lands, Housing and Physical Planning. Therefore, I wish to take this opportunity to express my special thanks of gratitude to the Governor and his deputy for the trust and belief in my department to deliver a successful plan.

Secondly, I wish to express my sincere gratitude to fellow County Executive Committee Members for their devoted support and coordination of activities in their departments to ensure the preparation and completion of the plan was successful. I thank you for the support you gave during the data collection phase, validation of the various outputs and the acceptance and approval of the final draft plan. Further I salute the members of the County Assembly and the various house committees for ensuring that adequate resources are channeled towards the project, mobilization and sensitization of stakeholders at their respective wards and for their presence at various validation workshops held in and outside the county.

Additional gratitude goes to the county directors for their participation especially in providing their technical input, availing data and validating the information. I also recognize the efforts of Sub-County, ward and village administrators for their excellent work in the mobilization of local stakeholders for sensitization, visioning and validation of the situation analysis and the draft plan report. We value the active involvement of the members of the public who gave their views on the aspirations of the county through visioning.

Finally, I thank the consultant Geodev (K) Ltd for the successful completion and submitting all the deliverables stipulated in the TOR. The department is confident that the plan prepared will assist in transforming the key economic sectors of the county in order to make the county self-sufficient, create more employment opportunity and boost the county's GCP. I also call upon all the stakeholders to play pivotal roles in making this plan a reality for the people of Nyandarua.

HON. STEPHEN KINYANJUI MBURU KK
COUNTY EXECUTIVE COMMITTEE MEMBER
DEPARTMENT OF LANDS, HOUSING AND PHYSICAL PLANNING

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EXECUTIVE SUMMARY

Nyandarua County Spatial Plan, 2020-2030, is the first GIS-based spatial Plan prepared by the County. The purpose of the County spatial Plan is to coordinate people and activities throughout the County to achieve prosperity, equity, and sustainable socioeconomic development. The Plan also provides the spatial structure, appropriate land use, and land management policies. The Plan has a strategic framework that captures the people's ambitions and how such aspirations will be achieved in the next ten years.

The Plan has been prepared to attain socio-economic transformation and land resource optimization to improve the quality of life of the Nyandarua people. It is a people-centered Plan whose axis revolves around six key areas of development, which will function as the pillars for realizing the Vision, *“A competitive, prosperous, well governed and habitable county with a highly transformative economy, anchored on tourism, agro-processing, service and providing high quality infrastructure.”*

Development constraint in Nyandarua includes: underdeveloped economy, regional imbalance, non-optimal resource utilization (land, tourism assets, rivers, waterfalls human resource, existing infrastructure-railway, airstrip), weak spatial linkages, environmental threats, and degradation, as well as governance issues. On the backdrop of the identified development constraints, the Plan is therefore anchored in the following pillars to achieve the desired end state of the County: modernizing agriculture to enhance productivity, protecting and conserving the environment, management of human settlement, promoting trade and commerce, tourism and industrialization, providing adequate and appropriate infrastructure and strengthening linkages through integrated transport systems. Each pillar of the Plan is held together by developing strategies, policies, projects, and programs to realize the Plan's objective.

The land has been zoned for optimal use, and a county structure plan showing the desired land use has been provided. Further, strategies have been formulated in the economy (including agriculture, tourism, industrialization, trade, and commerce), transportation, human settlement, infrastructure, and environmental conservation. Additionally, an implementation mechanism that breaks down the implementation into short-term, medium-term, and long-term projects with specific actors responsible for actualizing the projects identified has been prepared. The Plan contains a capital investment plan that ranks flagship projects with their respective estimated implementation cost. The Plan also includes a monitoring and evaluation framework for self-review and assessment to draw valuable lessons from the implementation process. The lessons drawn from this framework will influence the decision-making during subsequent reviews of the Plan.

RACHAEL MUGO

NYANDARUA COUNTY DIRECTOR

PHYSICAL PLANNING

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LIST OF ACRONYMS

ACE	Adult and Continuing Education
AHITI	Animal Husbandry Industry Training Institute
ATC	Agricultural Training Centres
C.S.D.B. E	County State Department of Basic Education
CBR	Crude Birth Rate
CDR	Crude Death Rate
CECM	County Executive Committee Members
CESA	Critically Ecologically Sensitive Area
CIDP	County Integrated Development Plan
CILOR	Contribution in Lieu of Rates
CIP	Capital Investment Plan
CMR	Child Mortality Rate
CSP	County Spatial Plan
DP	Development Plan
ECDE	Early Childhood and Development Education
ESA	Environmentally Sensitive Areas
F.N.S.P.	National Food and Nutrition Security Policy
FGD	Focused Group Discussions
GCP	Gross County Products
GHG	Greenhouse Gas
GIS	Geographical Information System
GSM	Global Satellite Mobile
HDI	Human Development Index
IBA	Important Bird Area
ICT	Information Communication Technology
IMR	Infant Mortality Rate
IPCC	Intergovernmental Panel on Climate Change
KAA	Kenya Airports Authority
KALRO	Kenya Agricultural and Livestock Research Organization
KDHS	Kenya Demographic and Health Survey
KeNHA	Kenya National Highway Authority
KeRRA	Kenya Rural Roads Authority
KFS	Kenya Forest Service
KNBS	Kenya National Bureau of Statistics
KNEC	Kenya National Examination Council

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KNPHC	Kenya National Population and Housing Census
KPLC	Kenya Power Limited Company
KURA	Kenya Urban Roads Authority
KUSP	Kenya Urban Support Programme
KWS	Kenya Wildlife Service
LAPSSET	Lamu Port Southern Sudan Ethiopia Transport Corridor
MCA	Member of County Assembly
MMR	Maternal Mortality Rate
NEMA	National Environment Management Authority
NIA	National Irrigation Authority
NCHASP	Nyandarua County HIV and AIDS Strategic Plan
NIST	Nyandarua Institute of Science and Technology
NMT	Non-Motorized Transport
NYANDAWAS	Nyandarua Water and Sanitation Company
NYANDAWASCO	Nyandarua Water and Sanitation Company
OLWASCO	Olkalou Water and Sewerage Company
OLWASCO	Olkalou Water and Sanitation Company
PA	Protected Areas
PDP	Physical Development Plan
RIM	Registry Index Map
RNI	Rate of Natural Increase
SDG	Sustainable Development Goals
SHG	Self Help Groups
SIVAP	Small Scale Irrigation and Value Addition Project
TARDA	Tana and Athi River Development Authority
U.A.C.A.	Urban Areas and Cities Act
VTC	Vocational Training Centres
WRA	Water Resource Authority

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PART I: INTRODUCTION

“A competitive, prosperous, well governed and habitable county with a highly transformative economy, anchored on tourism, agro-processing, service and providing high quality infrastructure.”

1 BACKGROUND

1.1 Overview

Spatial planning is crucial because it informs the future use and distribution of physical, economic, and social activities to achieve prosperity, equity, and sustainability in development. It involves coordination and integration of the spatial dimensions of sectoral activities. The Constitution of Kenya, 2010, has created two governments, national and County tiers, to undertake different planning functions. The national government is responsible for setting general land use planning principles and coordination of planning by the counties. In contrast, counties are responsible for county planning and development. According to section 104 of the County Governments Act of 2012, all counties must prepare plans for their jurisdiction areas which will form a basis for the appropriation of funds. The County Spatial Plan (CSP) is among the four types of plans counties must prepare (CGA, 2012 section 107). The law stipulates that the CSP shall be Geographic Information Systems (GIS) based and part of the County Integrated Development Plan (CIDP). The Plan also seeks to achieve the objectives of Kenya's vision 2030, which is Kenya's development blueprint for transforming Kenya into a middle-income, industrial country providing quality of life for all its citizens. The Plan will achieve this through economic growth, environmental protection and conservation, good governance and accountable leadership, and transformation of social sectors such as health, education, training, water and sanitation, environment, housing and urbanization, gender, youth, culture, and sports.

1.2 Problem Statement

Nyandarua County is located in central Kenya, bordering Kiambu, Laikipia, Nakuru, Nyeri, and Murang'a counties. It is well endowed with climatic conditions and soils that favor agriculture, a vast forest cover, and adequate land for development and transportation linkages to Nairobi, and other major towns such as Nakuru, Nyahururu, and Naivasha, among others. Despite these positive attributes, the County has not utilized its potential fully. Close to 31.5 % of the working population is unemployed, yet the national unemployment rate is 6.2% (KNBS, 2019). Moreover, absolute poverty is at 38%, meaning that this population cannot meet its basic needs.

Therefore, to reduce the poverty rate experienced in the County, there is a need to modernize agriculture, promote industrialization, increase access to rural areas through an efficient transport network and strengthen tourism in the County. More employment can be created for the youths who form the bulk of the population in the County. Also, mechanisms should be put in place to facilitate trade and commerce. The main development challenges in Nyandarua County are:

- i. Encroachment of agricultural land due to the high rate of urbanization
- ii. Uncoordinated urban development resulting in encroachment in agricultural land.
- iii. Inadequate and non-uniform distribution of infrastructure, including electricity, water supply, and ICT.

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- iv. Environmental degradation is attributed to artisanal quarrying activities and deforestation.
- v. The high rate of poverty and unemployment. Approximately 38 % of the Nyandarua population live below the poverty line, and 31.5 % are unemployed.
- vi. An underdeveloped economy that relies on agriculture as the primary economy despite massive industrialization and tourism potential.

Therefore, the County Spatial Development Plan (CSP) is prepared to provide implementable solutions to these challenges. It aims to spur economic development, provide adequate infrastructure, integrate transportation and land use, protect and conserve the environment, and manage human settlements to achieve sustainable development.

1.3 Purpose of Nyandarua County Spatial Plan

The County Spatial Plan will provide a planning framework to better balance social, economic, and physical development and population growth between areas. The specific purposes of the Plan are outlined below.

- i. Provide a framework for appropriating public funds through identification and phasing of critical projects in the County.
- ii. Provide a framework for coordinating sectoral activities to stem wastage and duplication.
- iii. Integrate economic, social, environmental, and physical planning to ensure sustainable development.
- iv. Provide policies and regulations to guide development activities in the County to ensure order and optimal resource utilization.
- v. The Plan will provide a framework for unlocking lower-level plans in the County
- vi. Provide a GIS database that includes land information, capital inventory, analysis, and proposals.

1.4 Goal, Vision, and Objectives of the CSP

1.4.1 Goal

The goal of Nyandarua CSP is to distribute activities and people within the territorial jurisdiction of Nyandarua County. Through this goal, the Plan provides a framework of sectoral coordination and unlocking lower-level planning.

1.4.2 Vision

On the 15th of February 2018, a situational analysis validation and Vision setting workshop were held at the Royal Gardens Hotel in Olkalou. The workshop involved two main activities; validation of the situational analysis findings and the formulation of a shared vision directing the County’s development for the next ten years. The stakeholders were grouped into the following themes: economy,

“A competitive, prosperous, well governed and habitable county with a highly transformative economy, anchored on tourism, agro-processing, service and providing high quality infrastructure.”

transportation, infrastructure, human settlements, environment, and governance, each with a sectoral vision.

These sectoral visions are:

- i) **Economy**-A robust /thriving economy pillared on Agro-industry, natural resources, Tourism, expert labour, and infrastructural development.
- ii) **Transportation**-To develop a good transport network that facilitates efficient movement within and beyond the County.
- iii) **Physical Infrastructure**-To provide a state-of-the-art infrastructure that will spur sustainable development and equity among the people of Nyandarua.
- iv) **Social Infrastructure**-To create a conducive and all-encompassing sound social infrastructure in Nyandarua County.
- v) **Land and Human Settlements**-Plan Nyandarua, make Nyandarua more productive and habitable
- vi) **Environment**-To achieve sustainable access to adequate water, natural resources, and an ecotourism destination with environmental safeguards.
- vii) **Governance**-Harmonized governance structure that meets the aspirations of the people of Nyandarua.

A synthesis was undertaken from the above sectoral visions, and a shared vision was arrived at, encompassing all the key sectors. The shared Vision for Nyandarua County is: *“A competitive, prosperous, well governed and habitable county with a highly transformative economy, anchored on tourism, agro-processing, service and providing high quality infrastructure.”*

1.4.3 Objectives of the CSP

Objectives of the Nyandarua County Spatial Plan are a clarification of the Vision of the Plan. Each objective has an outcome for achieving the set-out Vision. The CSP seeks to meet the following objectives:

- i. To promote balanced and equitable development of the County.
- ii. To optimize the use of land and natural resources.
- iii. To spur economic development.
- iv. To facilitate the development of a well-balanced system of human settlements and enhance their livability.
- v. To protect and conserve the environment.
- vi. To provide appropriate and adequate infrastructure.
- vii. To provide an integrated transport system and improve connectivity.

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1.5 Scope

The CSP covers the entire area of Nyandarua County, which measures 3,245.2 square kilometers. It will guide the County’s development for ten years (2020-2030) and is pegged to Vision 2030, Kenya’s premier development policy.

The technical scope involved assessing the county's existing development condition and making recommendations that translate to plan-making strategies and proposals. The assessment of the current situation involved mapping, establishing contextual subjects and themes, and assessing sectors. The assessment included natural capital assessment, infrastructural conditions, human settlement, rural and urban, regional economic analysis, governance, and institutional capacities. The plan formulation phase entailed formulation of land use proposals at the optimum and formulation of development strategies.

Other proposals include financial strategy in the form of Capital Investment Framework (CIP), and preparation of an implementation mechanism that outlines the several sectorial projects and measures, timeframe provided for implementation, and the agencies involved in implementing the proposed projects.

1.6 Organization of the Plan

The plan is structured into six sections as outlined below.

Part I: Introduction - Project background and planning context.

Part II: Situational Analysis - Land, Population and Demography, Land Availability and Potential Assessment, Environmentally Significant Areas, Human Settlements, Transportation, Infrastructure, County Economy and Governance.

Part III: Synthesis - Summary of planning issues.

Part IV: Plan Proposals - Thematic Development Strategies and Policy guidelines.

Part V: County spatial development Framework - Nyandarua County Spatial structure, Action Areas

Part VI: Implementation mechanisms.

2 PLANNING CONTEXT

2.1 Overview

This chapter presents an assessment of Nyandarua County in terms of the locational context, administrative context, historical development, legal and policy context, approaches and process of the plan formulation. These are critical determinants for the development of Nyandarua County Structure, development strategies, and policies.

2.2 Location and Size

Nyandarua County covers a total of 3,245.2 square kilometers within the central part of Kenya, between latitudes 0° 8' North and 0° 50' South and longitudes 35° 13' East and 36° 42' West. It borders Nyeri County to the East, Laikipia County to the North, Nakuru County to the West, Murang'a County to the South East, and Kiambu County to the South. Olkalou, the County headquarters, is situated about 150 kilometers North West of Nairobi.

The Olkalou-Miharati-Engineer Road, class B20, traverses the entire County, from Dundori to Njabini. It connects to the Nakuru-Nairobi (A8) Highway, thus linking the County to Nakuru (via Dundori) and Nairobi, the capital city. The County is linked to Nyahururu and Gilgil (in Nakuru County) through the A4 road, connecting to the Nyahururu-Nyeri Road (Class B21).

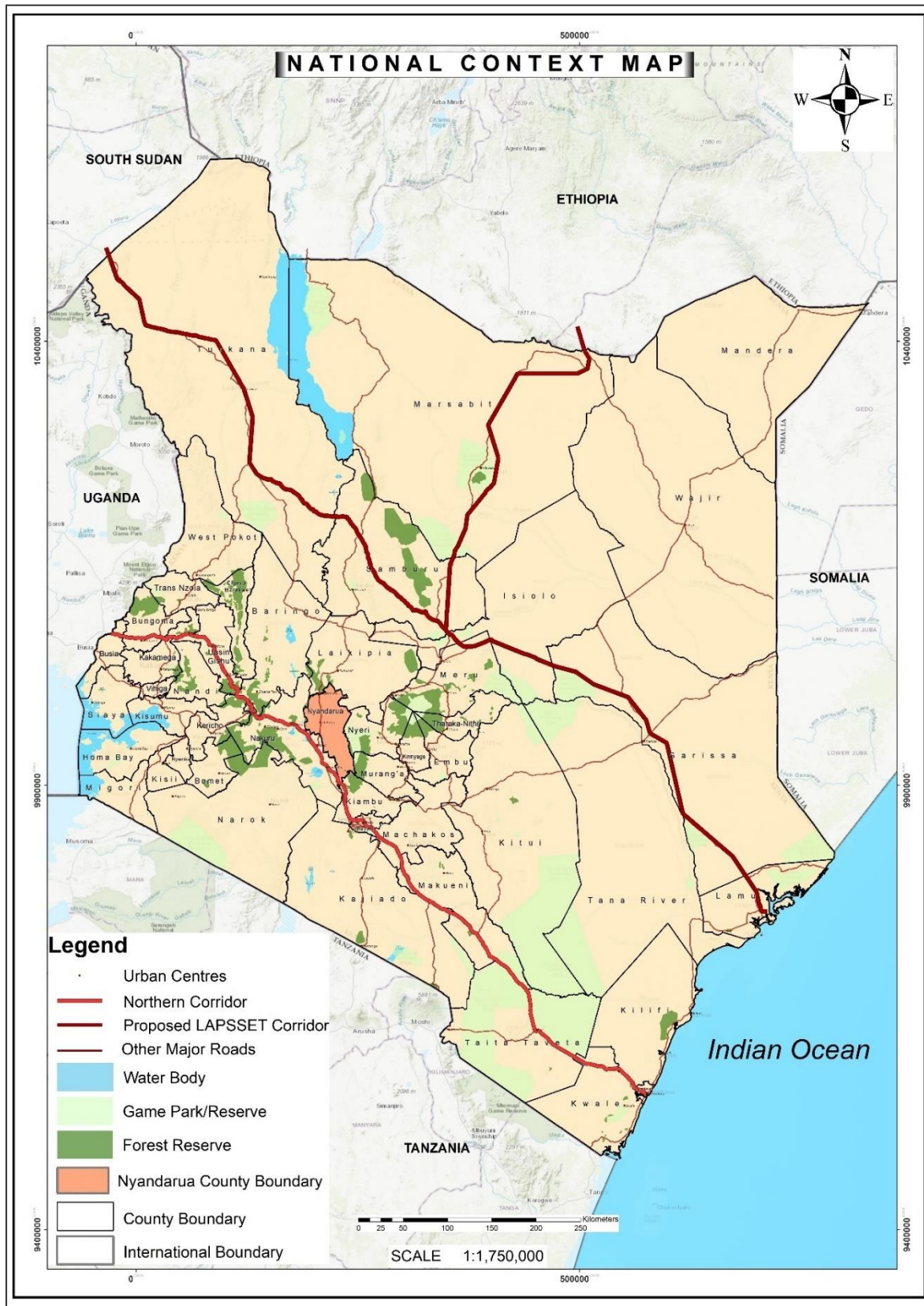
Nyandarua has the second-highest output in agriculture second to Nakuru County (Gross County Product (GCP) report, KNBS, 2019); therefore, the linkages mentioned above must be enhanced to facilitate swift mobility of the workforce, farm inputs, raw materials to industries, and finished products to their respective markets.

2.2.1 Locational Advantages

- i. The proximity to Nairobi and other major urban areas including Nakuru, Thika, and Nyeri provides a ready market for agricultural and processed goods.
- ii. The A4 road links the County to the LAPSET corridor, which further connects to Ethiopia and South Sudan. This connectivity is important as it creates external markets for agricultural and industrial products in the county.
- iii. The County is abutted by counties with more developed agricultural base such as Nakuru, Kiambu, Laikipia, and Nyeri. This proximity provide opportunity for agro-industrial development due to the availability of raw materials.
- iv. The County is traversed by eight permanent rivers, providing huge opportunity for irrigated agriculture and adequate water supply to the residents of the County.
- v. The Meter gauge railway and the airstrip at Oljoro Orok, provide an opportunity for interconnectivity to link the county to important urban areas, Internationally, nationally and regionally.

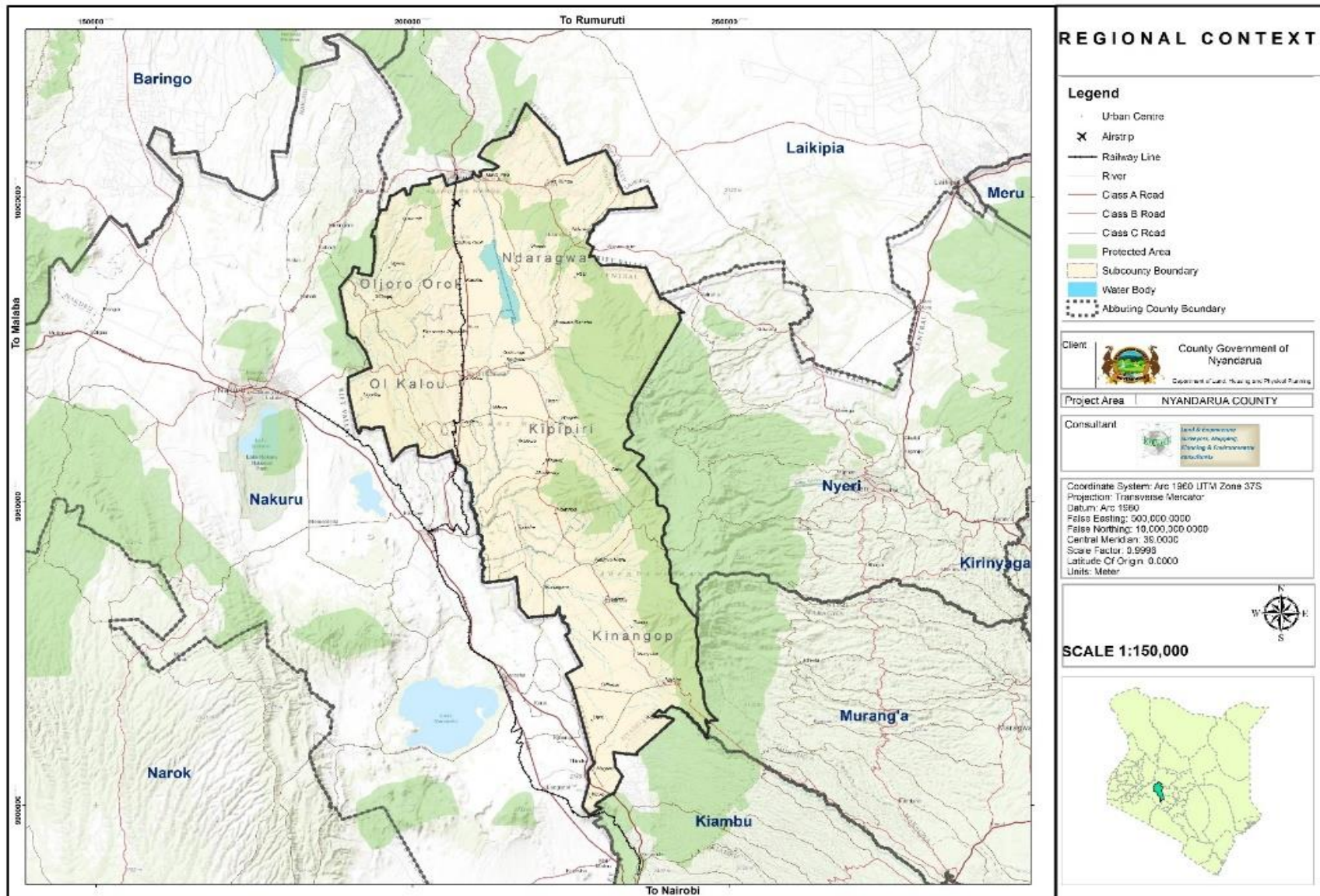
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Map 2-1: Nyandarua in the National Context



“A competitive, prosperous, well governed and habitable county with a highly transformative economy, anchored on tourism, agro-processing, service and providing high quality infrastructure.”

Map 2-2: Nyandarua County in the Regional Context



2.3 Administrative Context

The County is sub-divided into five Sub Counties, namely: Olkalou, Kinangop, Kipipiri, Ndaragwa, and Oljoro-Orok, and further into twenty-five (25) wards. Kinangop being the biggest Sub County, hosts eight wards. Kipipiri, Ndaragwa, and Oljoro-Orok each have four wards, whereas Olkalou has five wards. Major urban centers in the County are Olkalou, Njabini, Engineer, and Mairo Inya. Other vibrant centres include Oljoro-Orok, Miharati, and Ndaragwa. The administrative units are as summarized in table 2-1. The administrative context of the county provides an opportunity for ward level planning and bringing services and resources closer to the people.

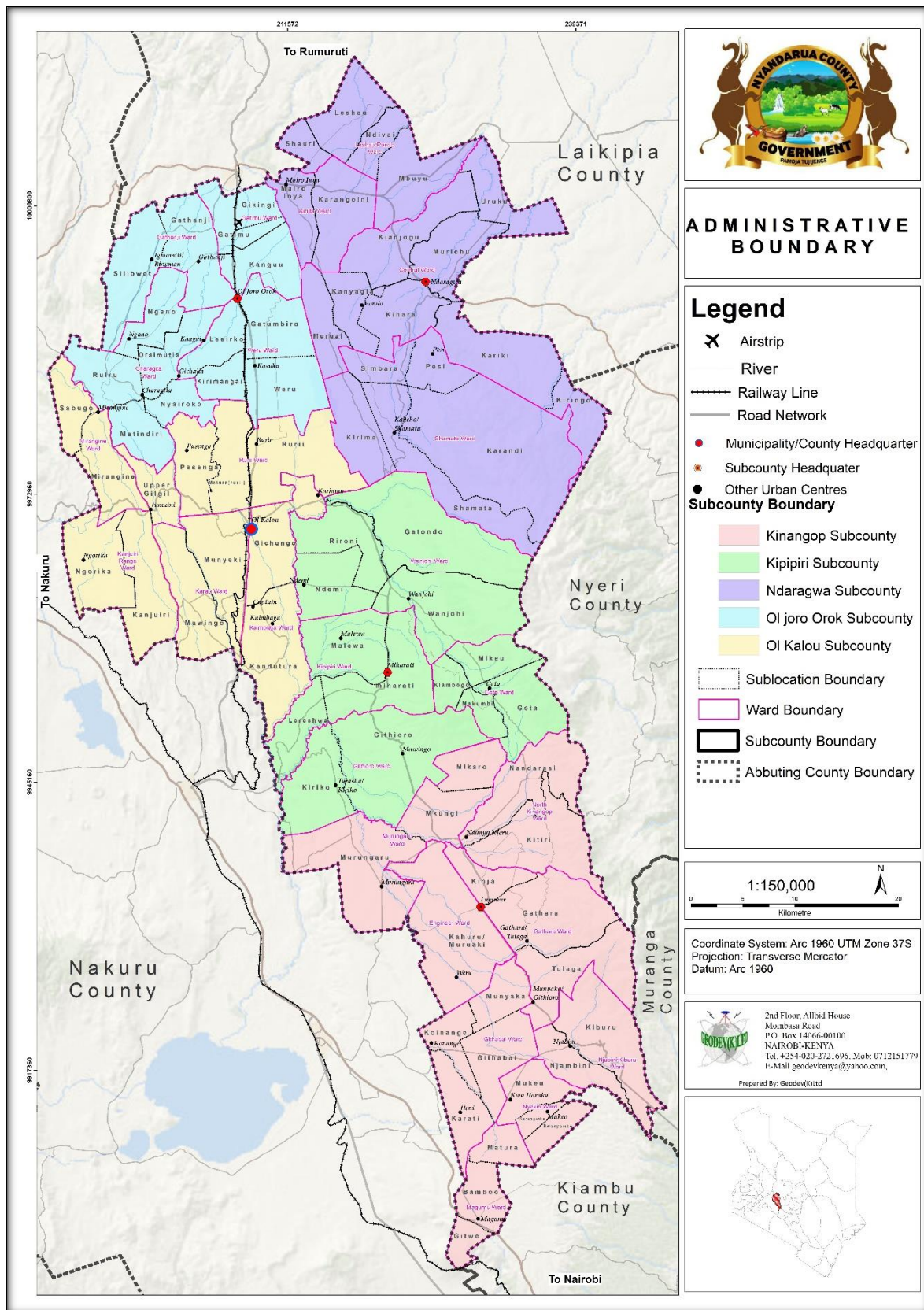
Table 2-1: Administrative areas in Nyandarua County

SUB COUNTY	WARDS
Kinangop	Engineer, Gathara, North Kinangop, Murungaru, Njabini/Kiburu, Nyakio, Githabai & Magumu
Kipipiri	Wanjohi, Kipipiri, Geta & Githioro
Olkalou	Karau, Kanjuiri Range, Mirangine, Kaimbaga & Rurii
Oljoro Orok	Gathanji, Gatimu, Weru & Charagita
Ndaragwa	Leshau/Pondo, Kiriita, Central & Shamata

Source: Nyandarua CIDP 2018-2020

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Map 2-3: Administrative Context



Source: Consultant's edit

2.4 Legal and Policy Context

The County Spatial Plan is an essential framework for realizing the County's objectives. Various legal and policy frameworks back their preparation. The legal provisions are discussed below.

2.5 Legal Context

2.5.1 Constitution of Kenya, 2010

This Plan is prepared under the principles provided in the Constitution. They include the equitable, efficient, productive, and sustainable use of land provided for by Article 60, the right of the state to regulate the use of land in the interest of land use planning (*Article 66*), and the management and protection of the environment (*Article 69*) among others.

The Constitution lays a foundation for Kenya's planning practices, all through preparation to the implementation stages. Nyandarua County Spatial Development Plan (CSP) is fully anchored within the confines of the Constitution.

2.5.2 The County Governments Act, 2012

Section 102 of the CGA describes the principles to facilitate planning and development in counties. Further, section 103 of the document outlines the general planning objectives of planning in the county. The County Governments Act provides for the obligation of the County to plan (*Section 104*), public participation in county planning (*Section 115*), content, and approval process of county spatial plans (*Section 110*). Nyandarua CSP has been prepared in line with provisions highlighted in CGA to promote equity, inclusivity, and sustainability in development.

2.5.3 Urban Areas and Cities Act (UACA), 2011 (Amended 2019)

The Urban Areas and Cities Act provides for the classification of urban areas and cities (*Part II, Section 4*), the criteria for establishing urban areas, and governance and management (*Part III, Section 11*). Additionally, the Act states that every city and municipality established under this Act shall operate within integrated development planning (*Part V*). The Act has been applied to assess the urban areas' level of service and develop a human settlement strategy for Nyandarua County.

2.5.4 The Land Act No 6 of 2012

This Act provides for sustainable administration and management of land and land-based resources. It provides regulations and standards for development control, equitable access to land, security of land rights, sustainable and productive management of the land resource, transparent and cost-effective administration of land, conservation and protection of ecologically sensitive areas, elimination of gender discrimination in law, customs and practices related to land and property inland.

The Plan also adheres to other Acts of Parliament legislating on relevant aspects. These include:

- Environmental Management and Coordination Act, 1999 (Amended in 2015).
- Physical Planning Act, 1996.

- National Land Commission Act.

2.6 Policy Context

This section outlines the policies that determine the confines under which the Nyandarua County Spatial Plan is prepared.

2.6.1 Kenya Vision 2030

Vision 2030 aims to transform Kenya into a newly industrializing, middle-income country providing a high-quality life to its citizens by 2030. It is founded on three pillars, namely economic, social, and political. The Economic Pillar aims to increase annual GDP through six key growth drivers. These drivers include promoting tourism, increasing value addition in agriculture, improving industrial production and service sector, inclusive wholesale and retail trade sector, manufacturing for the regional market, financial services, and Business Process Offshoring. The Social pillar seeks to build a just and cohesive society with social equity. It also promotes a clean and secure environment and facilitates, social infrastructure provision, including schools, health facilities, water, and sanitation. The Political pillar aims to realize a democratic political system founded on issue-based politics that respects law and transparency.

The county spatial plan outlined how the Vision's objectives can be achieved through development strategies within the County of Nyandarua.

2.6.2 National Land Policy, 2009

It was established under Sessional Paper No 3 of 2009 to guide Kenya towards efficient, equitable, and sustainable land use. Nyandarua County Spatial plan has been prepared considering the land potential to achieve optimal use of land.

2.6.3 National Land Use Policy 2017

The National Land Use Policy 2017 (NLUP) addresses the issues of optimal utilization of land and land related resources. The policy provides principles and guidelines for: Proper management of land resources to promote public good and general welfare; land use planning to enhance sustainable development; Anchoring land development initiatives; Mitigating problems associated with poor land use; Promoting environmental conservation and preservation; Preparation and review of a national spatial plan and integration of various levels of land use planning; Land and land related conflicts; Categorization of land uses in the country. Nyandarua CSP has been prepared with strict considerations on utilizing land to its best use to promote sustainability and efficiency.

2.6.4 National Food and Nutrition Security Policy (FNSP), 2012

The Government of Kenya is strongly committed to reducing hunger and malnutrition. Ways of eradicating hunger include efforts to build self-reliance to reduce chronic food insecurity and measures to assist those in need when emergencies occur. Linking relief with longer-term development efforts helps mitigate the potential impact of future crises.

The national Food and Nutrition Security Policy (FNSP) provides an overarching framework covering the multiple dimensions of food security and nutrition improvement. It has been purposefully developed to add value and create synergy to existing sectoral and other government and partner initiatives. It recognizes the need for multi-public and private sector involvement, and that hunger eradication and nutrition improvement are shared responsibilities of all Kenyans. Nyandarua County Spatial Plan development strategies and projects are framed on the policy and associated actions to improve food security and nutrition in the County and, by extension, to the Country.

2.6.5 Sustainable Development Goals

The CSP was informed by the SDGs, which were adopted in 2015. The Plan hopes to help achieve inclusive and sustainable economic growth, ending poverty in all its forms, and making cities inclusive, safe, resilient, and sustainable.

2.6.6 National Spatial Plan

The National Spatial Plan provides a framework for efficient, productive, and sustainable land use as advocated for in both the Constitution and the National Land Policy. Further, it provides strategies and policies to facilitate the sustainable exploitation of the country's massive potential in agriculture, tourism, energy, water, fishing, and forestry. It is expected to reduce regional inequalities by ensuring that these regions are no longer perceived as low potential but differently endowed.

Preparation of Nyandarua County Spatial Plan is in line with the provisions and strategies of this Plan since it serves as a guide for development planning by the counties as they discharge their responsibility of preparing County and local plans.

2.6.7 County Integrated Development Plan

The CSP for Nyandarua is a part of the CIDP, a five-year plan that addresses the County's internal transformation needs. It also identifies all known projects and programs to be implemented within the County by any state organ.

Other policies that have guided the Plan's preparation are the National Housing Policy, National Urban Development Policy, and the Integrated National Transport Policy.

2.7 Approaches in preparing the plan

The approach to this assignment was based on the following principles:

a. Participation

Participation is one of the national values and principles of governance as stated under Article 10 (2) of the Constitution of Kenya. In furtherance to this, Section 115 of the County Governments Act states that public participation in the County Planning process shall be mandatory. The preparation of the plan adhered to these legal requirements by engaging with several stakeholders relevant to the project. The levels of participation included both consultation and circulation in order to build consensus regarding any emerging issues and to achieve ownership of the plan by the people of Nyandarua.

b. Integration

The principle of integration in planning is provided for under Section 36 (1) of the Urban Areas and Cities Act; that every city and municipality established under this Act shall operate within the framework of integrated development planning. This Spatial Plan duly considered physical, economic, social and other development aspects of Nyandarua. Additionally, the various centres within the County have been recommended planning within the wider regional/county context in order to optimize the linkages there between and minimize the possible emergence of conflicts.

c. Sustainability

This Spatial Plan has considered the current as well as future population needs respecting housing, health, education, employment and transportation among others. Planning for these facilities has to be within existing natural and financial resources. These resources must unequivocally be used in such a way that the needs of the present are met without compromising the capacity of future generations to meet their own.

2.8 Process

The plan preparation process comprised ten (10) significant steps, including;

- i. Scoping of context
- ii. Mapping
- iii. Data Collection
- iv. Analysis
- v. Visioning and objective setting
- vi. Land Optimization
- vii. Formulation of a County Spatial Structure/Land Use Plan
- viii. Formulation of Sector Development Strategies and Projects
- ix. Development of an Implementation Framework and a Capital Investments Plan
- x. Approval

Each of the above steps was accomplished through a particular set of Participatory activities and had specific outputs. Table 2-2 details the steps and activities carried out in each spatial plan preparation process.

Table 2-2: The Plan Preparation Process

Steps	Activities	Outputs
1. Scoping of context	<ul style="list-style-type: none">• Definition of scope• Stakeholder analysis and Identification• Appraisal of project area/reconnaissance	<ul style="list-style-type: none">• Stakeholder identification report• Reconnaissance survey report
2. Mapping	<ul style="list-style-type: none">• Acquisition of cadastral data/Registry Index Maps (RIMs)• Acquisition of satellite imagery• Scanning and geo-referencing of RIMs• Digitization of cadastral layer• Feature extraction from satellite imagery	<ul style="list-style-type: none">• Digital topographical maps• Digital cadastral layer

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3. Data Collection	<ul style="list-style-type: none"> • Literature review • Key Informant interviews • Stakeholder consultations/FGDs • Observation and taking photographs • Administering questionnaires 	<ul style="list-style-type: none"> • Raw information in thematic lines
4. Analysis	<ul style="list-style-type: none"> • Establishing analysis criteria • Description and illustration of status, potentials, and constraints • Establishing linkages • Identifying emerging issues 	<ul style="list-style-type: none"> • Situational Analysis Report
5. Visioning and objective setting	<ul style="list-style-type: none"> • Stakeholder identification • Stakeholder engagement workshop including presentation of existing situation and feedback from stakeholders for different thematic areas • Synthesis of a shared vision for the County 	<ul style="list-style-type: none"> • Visions for different growth sectors • A shared vision for the County of Nyandarua • Visioning and Objective Setting Workshop
6. Land optimization	<ul style="list-style-type: none"> • Analysis of existing land use • Establishing land use potential • Setting sector objectives for optimization • Multi-objective optimization 	<ul style="list-style-type: none"> • Sieve maps indicating suitable land-use patterns in various thematic areas.
7. Formulation of a county spatial structure/land use plan	<ul style="list-style-type: none"> • Summarize results arising from land optimization • Review of planning objectives • Establishing the structure that best meets the objectives 	<ul style="list-style-type: none"> • County Spatial Structure/Land Use Plan • Land and land use management policies
8. Formulation of Sector Development Strategies and Projects	<ul style="list-style-type: none"> • Establishing key sectors • Review of emerging issues in each sector • Devising measures, projects, and programmes 	<ul style="list-style-type: none"> • County development strategies and projects/programmes
9. Implementation Framework	<ul style="list-style-type: none"> • Prioritization of projects and programmes • Costing • Identifying actors/implementing agencies • Setting time frames/phasing 	<ul style="list-style-type: none"> • A plan implementation plan • A Capital Investment Plan
10. Approval	<ul style="list-style-type: none"> • Submission to the office of the CECM Lands through CDPP • Invitation for comments from the public • Submission to CECM lands and approval by cabinet • Submission of Plan to H.E. the Governor • Governor tables the Plan in County Assembly • After approval by the MCAs, the speaker submits the Plan to H.E., the Governor who appends approval signature 	<ul style="list-style-type: none"> • Legally binding County Spatial Plan for Nyandarua

Source: Consultant`s edit

PART II:

SITUATION ANALYSIS

3 LAND COVER/LAND USE

3.1 Overview

Land is a factor of production and should be utilized optimally to achieve sustainability and efficiency. This section describes the land tenure in the county in terms of private and public land, existing land cover, land use change and its drivers in order to develop policies and regulations to mitigate the impacts of land cover land use change on developing of key economic sectors such as agriculture, tourism, industrialization and infrastructure provision.

3.2 Existing Land Cover/Land Use

Land cover/ land use analysis is a starting point in a planning process to establish a base upon which planning and policy decisions emanate. As planning seeks to achieve sustainability on land use, various land uses compete for limited land. Land-use allocation and policy decisions are also constrained and influenced by the existing land use patterns and activities. Based on the current land use and land cover, policy decisions are made to reform the land-use patterns to influence them otherwise.

Analysis of land cover and land use in Nyandarua County was informed by the land cover classification criteria developed by the Intergovernmental Panel on Climate Change (IPCC) with little modification to suit the realities. The criteria include cropland, open forests, closed forests, built-up area, waterbody, and bare land.

Nyandarua County has a total area of approximately 3245.2 Km² with the primary classification of agricultural land, conservation land, and built-up land. Land use and land cover change in Nyandarua are influenced by; urbanization, topographical features, and infrastructural services. The land cover and land use proportions are as follows;

3.2.1 Crop Land

The total cropland in Nyandarua measures 2113.07 km². Cropland accounts for 64.62 % of the total land area. Practice in agriculture is inherent throughout the entire County, with about half the population finding employment in the family agricultural holding. The main food crops grown are; Irish potatoes, maize, peas, vegetables, and fruits, whereas wheat, cut flowers, and snow peas are the main cash crops.

3.2.2 Forest Cover

The County has both open forests and closed forest areas, covering 24.18 % of the total land area. Much of this forest cover is distributed towards the County's eastern sections and comprises gazetted forests, including Ol'bolosat Forest, Geta Forest, North Kinangop, South Kinangop, and Ndaragwa Forests.

3.2.3 Bare land

Bare land takes up approximately 0.09% of the County's total land area and describes areas currently classified as not hosting a predominant land use activity.

3.2.4 Water Body

Water bodies in Nyandarua occupy about 0.24 % of the land in Nyandarua. Major water bodies include Lake Ol'bolossat, Sasumua dam and several major rivers such as. R. Malewa, R. Ewaso Narok, R. Pesi, and R. Turasha. Several dams and wetlands are also inherent in the County.

3.2.5 Built-up Land

Urban areas primarily constitute the built-up area. Olkalou is the largest town in the County; it serves as the county headquarters. Other major urban centers in Nyandarua include Mairo-Inya, Njabini, and Engineer, among others. The components of the built-up areas include infrastructure and building footprints. The land cover proportional distribution is summarized in table 3-1 and further illustrated in map 3-1.

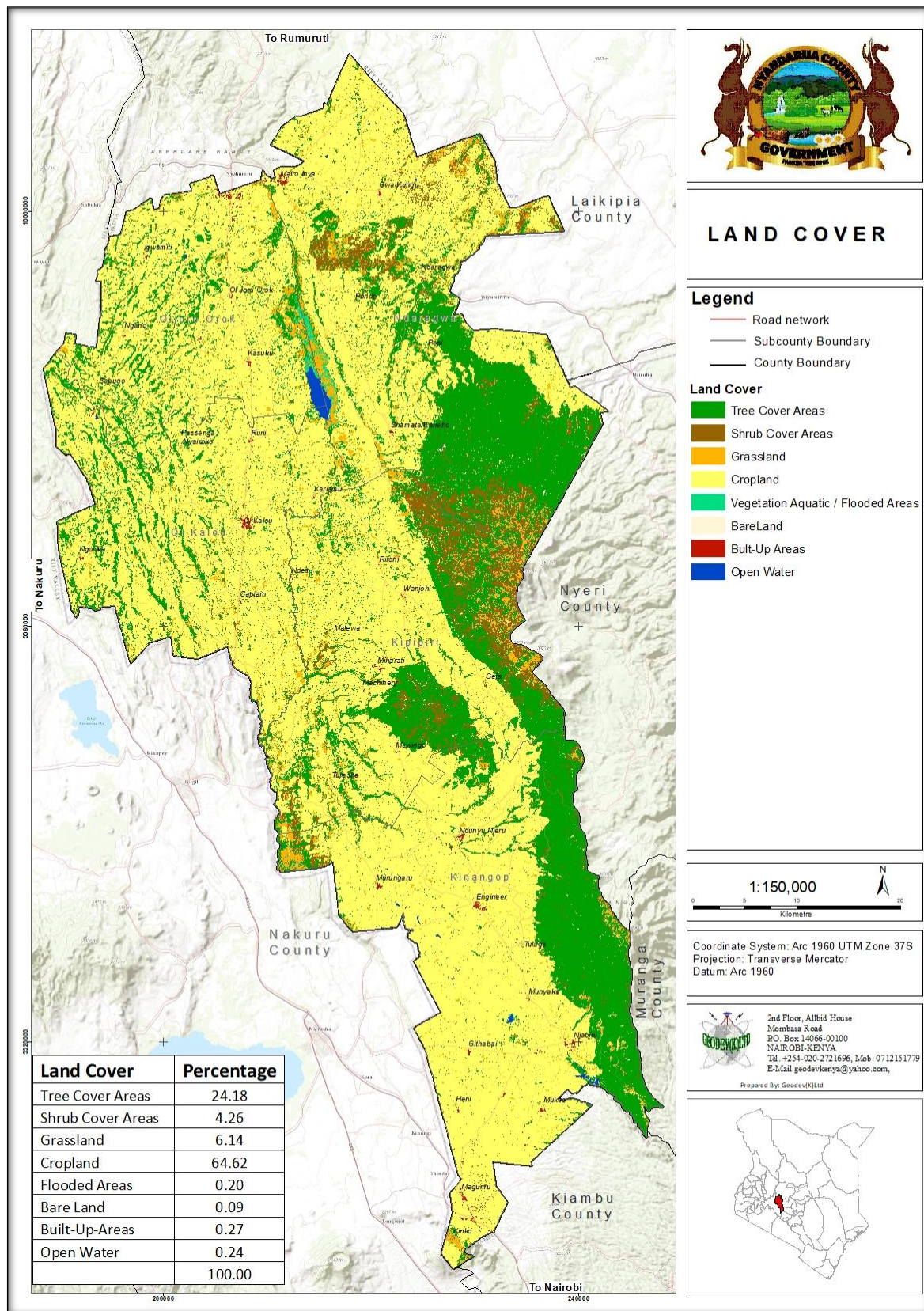
Table 3-1; Land Uses and Area Covered

<u>Land Cover</u>	<u>Size (km²)</u>	<u>Percentage (%)</u>
Tree cover areas	790.69	24.18
Shrubland	139.30	4.26
Grassland	200.78	6.14
Cropland	2113.07	64.62
Flooded areas	6.54	0.20
Bare land	2.94	0.09
Built-up areas	8.83	0.27
Open water	7.85	0.24
Total	3,270.57	100

Source: Consultant's Analysis

Table 3-1 above shows that cropland constitutes the most significant proportion of the existing land cover in Nyandarua county while the built-up area constitutes the least area.

Map 3-1: Land Cover



3.3 Land Cover/Land Use Proportion Per Ward

The distribution of land cover per ward shows that Central Ward has the most extensive land under cultivation. Wards with flooding areas include Central, Githabai, Leshau Pondo, Rurii, Shamata, and Weru Ward. Gatimu Ward has the most extensive land under built up, whereas Charagita, Shamata, Mirangine, Wanjohi, Githioro, Geta, and Gathanthi have the least areas built-up. Shamata Ward has the largest area under forest cover, while Engineer Ward has the least area under forest. Table 3-2 show the distribution of the land cover per ward. Implication of this phenomena is that, various wards have different sectors that can be promoted to develop the economy at the ward level. Agriculture needs to be promoted in wards such as Central, Charagita, Githabai, Engineer, Murungaru Rurii and Wanjohi to realize economic growth.

Table 3-2: Land Cover Distribution per Ward in KM²

S/No	Ward	Flooded Area	Bare Land	Built-Up Area	Cropland	Grassland	Open Water	Shrub-Cover Area	Tree Cover Area
1.	Central	2.4	0.3	0.2	172.0	27.1	0.1	20.8	86.1
2.	Charagita	-	0.1	0.1	100.6	7.9	-	0.4	30.7
3.	Engineer	-	-	0.4	92.9	1.0	0.1	0.1	1.0
4.	Gathanji	-	0.1	0.1	77.7	4.9	0.1	0.3	18.0
5.	Gathara	-	0.2	0.6	69.0	3.3	-	2.0	74.3
6.	Gatimu	-	0.0	1.1	57.3	6.0	-	0.2	7.8
7.	Geta	-	0.2	0.1	42.0	5.1	-	13.2	35.6
8.	Githabai	0.1	-	0.3	111.5	1.4	0.3	0.4	1.8
9.	Githioro	-	-	0.1	83.7	10.6	-	8.4	48.1
10.	Kaimbaga	-	-	0.4	99.2	7.0	0.0	0.6	7.0
11.	Kanjuri Range	-	-	0.2	92.1	7.4	0.1	0.4	25.3
12.	Karau	-	-	0.4	81.5	6.7	-	0.7	12.8
13.	Kipipiri	-	-	0.2	94.9	9.1	-	5.4	27.1
14.	Kiriita	-	-	0.7	53.0	7.4	0.1	4.2	8.7
15.	Leshau Pondo	0.1	0.1	0.2	105.0	7.2	0.2	5.7	3.9
16.	Magumu	-		0.6	49.6	2.1	0.0	1.2	1.2
17.	Mirangine	-		0.1	43.0	3.3	0.1	0.1	14.3
18.	Murungaru	-		0.4	112.9	10.3	0.1	3.9	22.5
19.	Njabini Kiburu	-	0.2	0.5	36.1	3.5	0.7	1.0	52.7
20.	North Kinangop	-	-	0.4	57.8	2.4	-	3.3	58.7
21.	Nyakio	-		0.4	47.0	0.9	0.0	0.1	1.2
22.	Rurii	0.2	0.0	0.2	115.0	6.3	1.1	0.7	13.7
23.	Shamata	1.6	0.6	0.1	94.9	20.3	1.0	24.2	160.0
24.	Wanjohi	-	0.4	0.1	137.8	23.4	-	39.5	62.1
25.	Weru	2.0	0.2	0.4	98.0	9.5	3.8	0.4	13.7

3.4 Land cover/Land-use change analysis

Land use and land cover changes emanate from both natural and human activities on land. In the process, other land uses gain, while others lose. With increased population growth and the demand for services and infrastructure, the built-up land experience an increase in its gross area at the expense of other land uses such as agriculture and ecologically sensitive areas. Table 3-3 illustrates land-use changes under different scenarios.

Table 3-3: Land use change analysis

Land use	Business as usual	Effective policy	Business Unusual
Agriculture	Decreased agricultural areas	Intact	Intact
Ecologically Sensitive Areas	Decreased ESA areas	Intact	Intact
Built-up areas	Increased Built-up areas	Controlled urban development	Controlled urban development
Physically Constrained areas	Decreased Constrained areas	Intact	Intact

3.5 Drivers of land-use change in Nyandarua County

Both anthropogenic and natural factors drive Land-use change. These factors lead to an increase or decrease in land under a specific use.

3.5.1 Population growth

Population growth increase demand for housing and infrastructure provision. All these require land for their establishment, leading to encroachment into agricultural and conservation land to accommodate the population's needs. Areas such as Gatimu and Olkalou are currently experiencing rapid land-use change due to the high population rate.

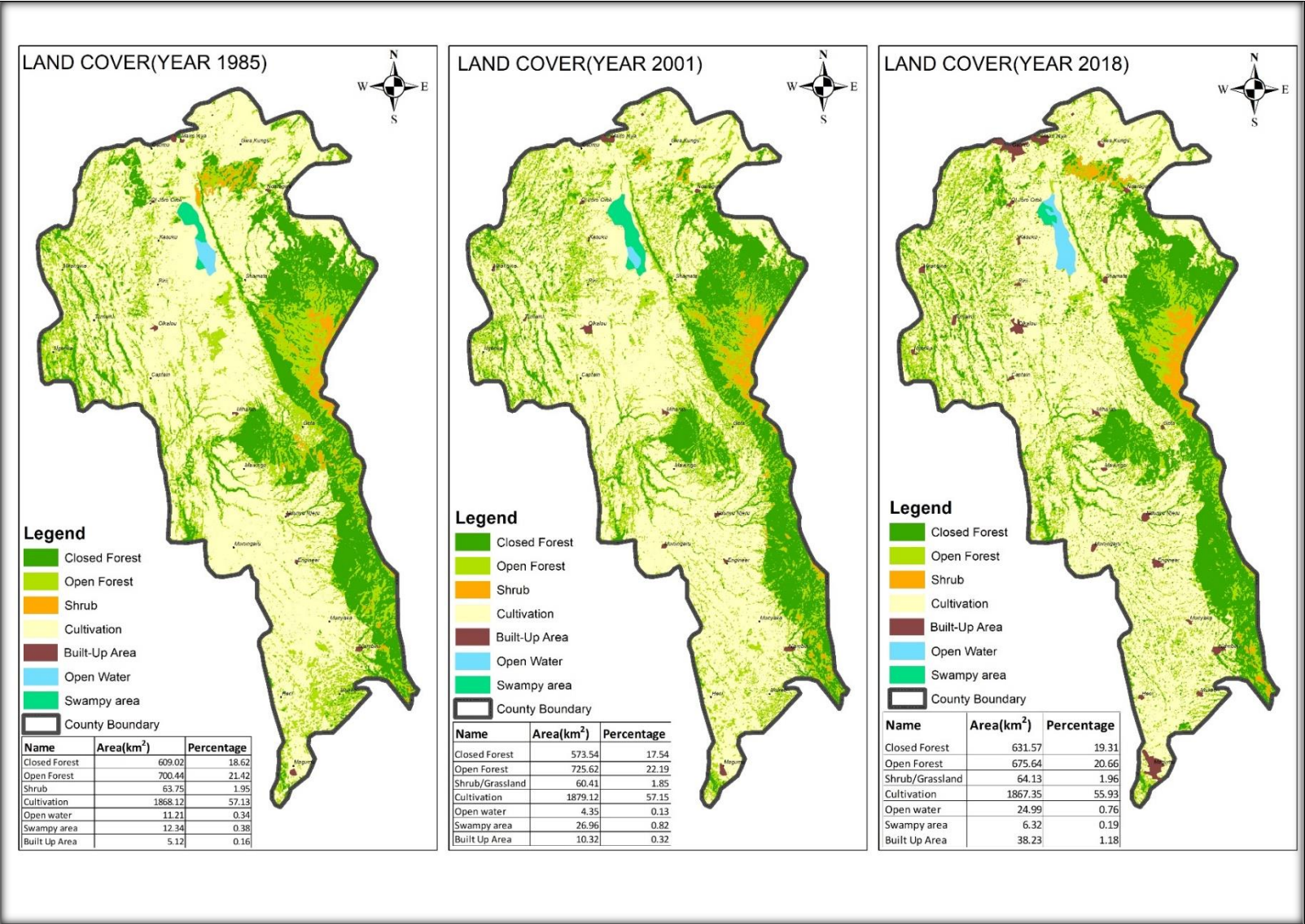
3.5.2 Urbanization

Even though the urban population in Nyandarua County is fairly low, some urban areas in the County are experiencing steady urbanization. Such urban areas include Olkalou, Gatimu, Mairo Inya, and Engineer, where subdivisions are intensively taking place thus leading to the reduction in agricultural land

3.5.3 Climate change

Climate change is the most dynamic natural factor that affects land cover. The persistence of drought conditions in some parts of the County, such as Olkalou and Ndaragwa, has led to shrinking of water bodies', loss of vegetation cover, and exposing bare soil to erosion.

Map 3-2:Land use trend (1985-2018)



4 PHYSIOGRAPHIC CHARACTERISTICS

4.1 Overview

Physiographic characteristics determine the spatial distribution of human settlement and variations in economic productivity and potential across different regions. Aspects under physiography include topography, climate, vegetation, and water resources.

4.2 Topography and Altitude

The topography of Nyandarua comprises a mixture of plateaus and hilly areas. The County was affected by faulting and volcanic activity leading to the rise of major landforms, namely the Great Rift Valley to the West and the Aberdare Ranges to the East. The highest point of the Aberdare Ranges is about 3,999 metres above sea level. The lowest parts include L. Ol'bolossat, Leshau, and the northern part of Central Ward, lower Kaimbaga, and the western parts of Kipipiri, Githioro, and Murungaru Wards. The flat areas include Kinangop and Olkalou/Ol'joro-Orok plateaus. These plateaus extend to about 80 kilometres north to south and about 40 kilometres wide north of Olkalou Town. Plate 2-1 shows the topographic characteristics in parts of Nyandarua County.

The Aberdare Ranges is one of the country's major water catchment areas. Moreover, the Aberdare ecosystem constitutes a dense forest with elephants, baboons, Columbus monkeys, tree and ground squirrels, porcupines, and many bird species. On the slopes of these ranges are also the Mau Mau caves in Geta and Kimathi. The ranges offer great potential for local and foreign tourism in the County. It borders the Aberdare National Park to the east and can be developed to be a locus for nature trails and mountain climbing in the County. Map 4-1 depicts the terrain of Nyandarua County.

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Map 4-1: Digital Elevation Model of Nyandarua

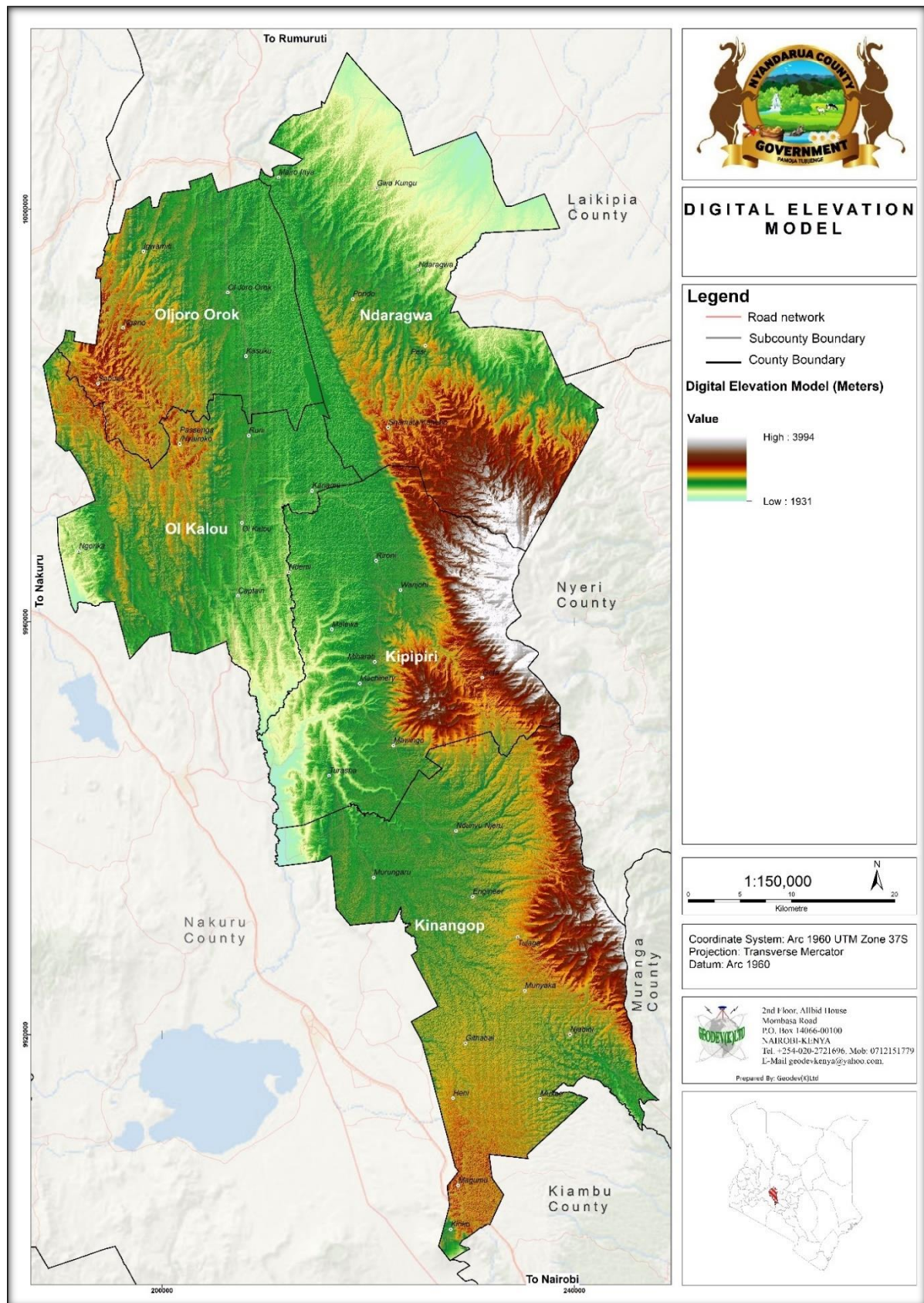
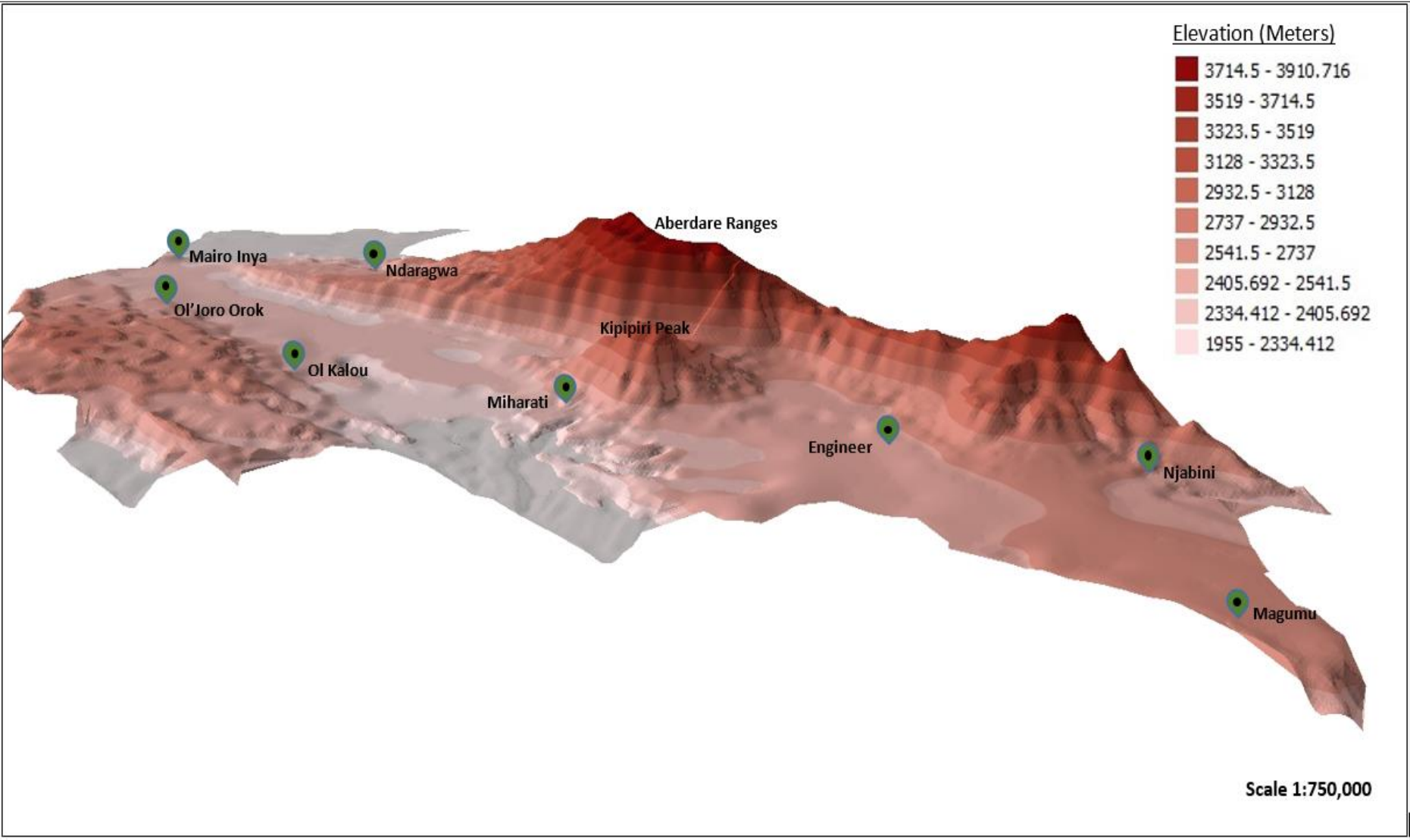


Plate 4-1: 3D Terrain Model of the County



4.3 Soil and Rock Structure

4.3.1 Soils

Soil types range from well-drained deep soils to shallow, rocky, and poorly-drained soils. Shallow soils are found in hilly areas, while the deep, well-drained soils are predominantly on the slopes and in the plateaus. Soils in the Kinangop and Olkalou plateau are poorly drained clay loams. Ndaragwa, the northern part of Oljoro-Orok and Olkalou have well-drained clay loams. These soils have different characteristics and crop production potentials, as summarized in table 4.1.

Table 4-1: Major Soil Types and their Characteristics

Soils types	Characteristics
Mountain and major scarp soils	These soils are developed from significant basalt rocks and volcanic ashes. They are poorly drained, acidic and bear dark-red to dark-brown-coloured soils.
Soils on hills and minor scarps (<i>lithosols</i>)	They are well-drained and reddish-brown in colour. The soils are saline and bear ample mineral content. They are ideal for agricultural production.
Soils of plateaus/Highland plateaus(<i>plansols</i>)	They are moderately well-drained, deep, and mostly greyish in colour. The soils bear sandy, clay, and loam characteristics. They also have higher silt and alluvial material.
Soils on volcanic foot ridges (<i>nitosols</i>)	These are well-drained deep soils. They are dark-reddish in colour and have acidic top-soils, which limit sustainability to certain crop types.
Soils on foot slopes and uplands	They are well-drained, deep to very deep soils. They are acidic to humid topsoil. They are deep and well-drained and range from reddish to dark-brown.
Soils in swamps	These are poorly drained deep saline soils. They are found in different swampy locations.

Source: Nyandarua District Regional Development Plan, 2001

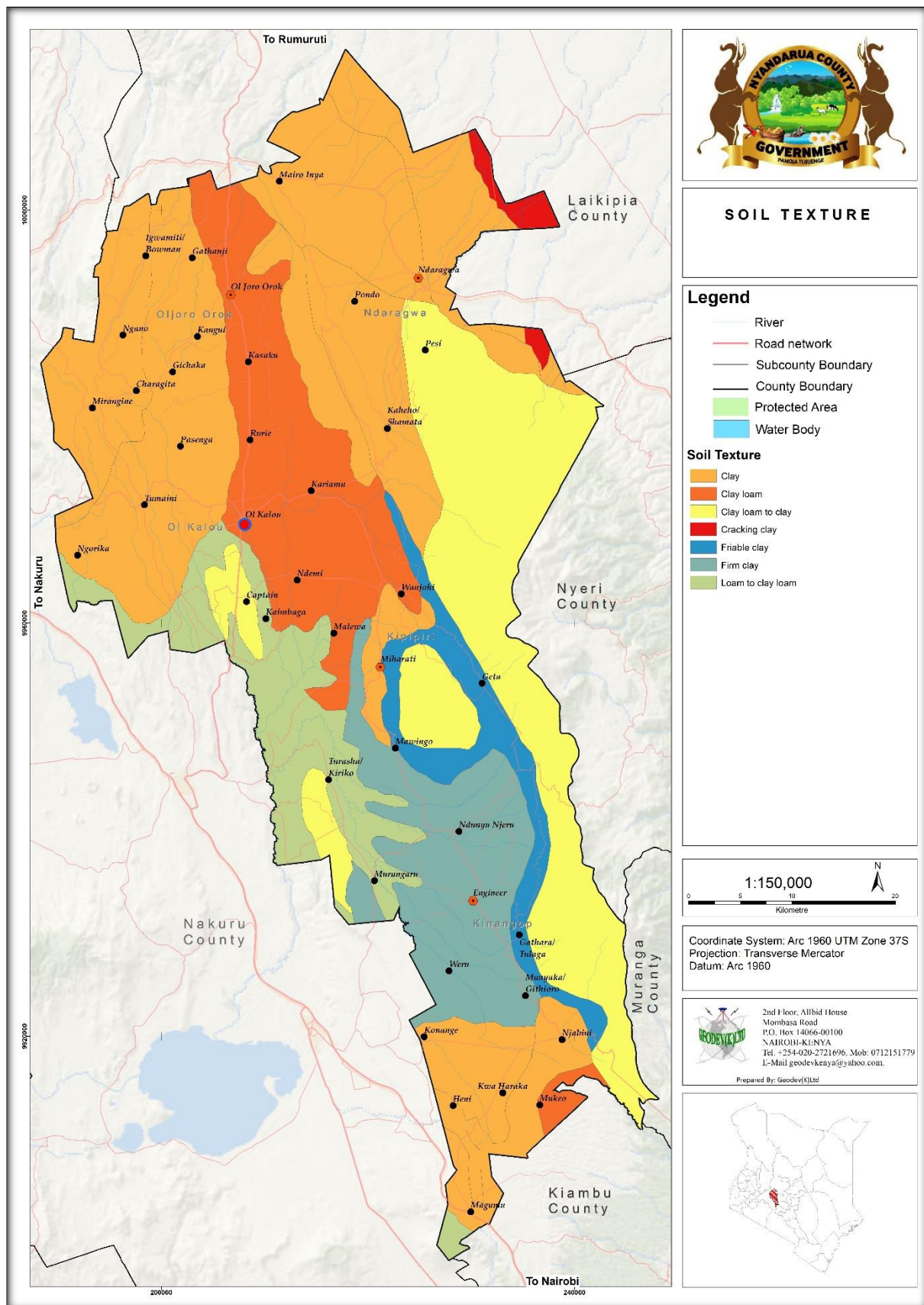
Most parts of Nyandarua have clayey soils that touch sections of all the five sub-counties. Loamy soils are found in a small part of the County covering sections of Gatimu, Weru, Rurii, Karau and Kanjuiri Range wards.

4.3.2 Rocks

The geological structure of Nyandarua is primarily volcanic due to volcanic activity and faulting with the dominant rock formation comprising volcanic rocks. Igneous, alluvium rocks and volcanic ash rocks dominate the underlying rock structure. Weathering has transformed most of the rocks into deep soils, with remnant hard rocks being found deep underground or on the Aberdare Ranges' slopes. These rocks form basement rocks that retain underground water that percolate through the soils. The alluvium and volcanic deposits are pervious and occupy the more significant part of the plateau, whereas the igneous rocks are generally impervious.

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Map 4-2: Nyandarua County soil texture



Source: Farm Management Handbook 1978

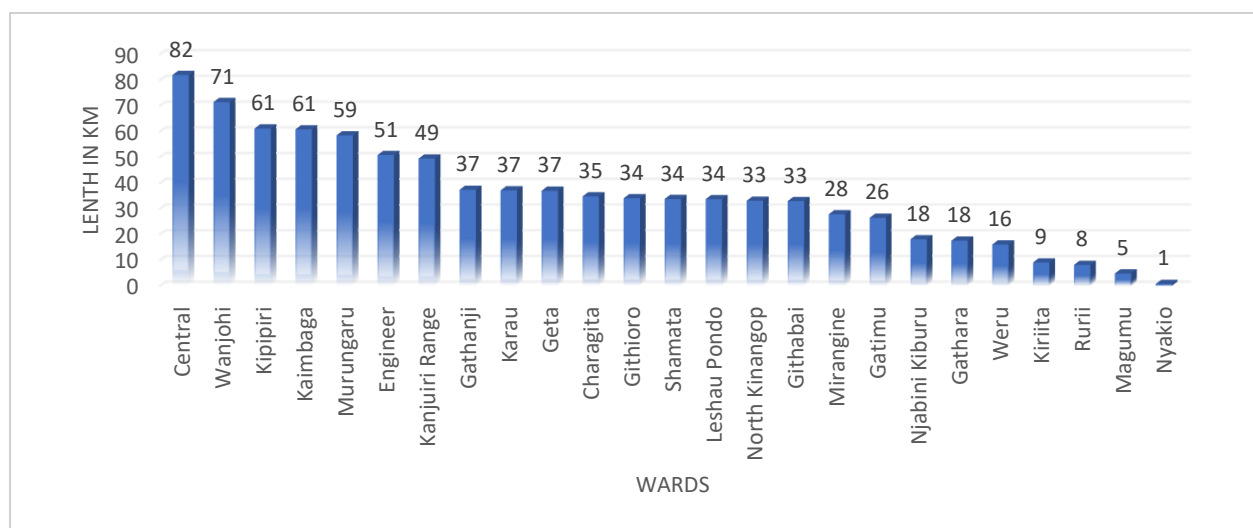
4.4 Drainage

The drainage system in Nyandarua is greatly influenced by the geological structure, topography and land use. There are 22 rivers in Nyandarua County, eight of which are permanent. They include Malewa, Ewaso Narok, Pesi, Turasha, Chania, Kiburu, Mkungi, and Kitiri. The County has one major lake, namely Lake Ol'bolossat, fed by streams and underground water from the Aberdare and Dundori Hills. It is the only lake in the central region of Kenya. However, the lake and the rivers are threatened by human activities such as clearing catchment areas for settlement purposes.

Lake Ol'bolossat is a large water mass in the County, covering about 43.3 square kilometres. It serves as a habitat for birds and hippos and a site for boating, water surfing and sport fishing. The people living close to the lake utilize it for fishing and watering of livestock. However, the lake is facing threats from encroachment by human settlements and pollution from agricultural inputs/chemicals.

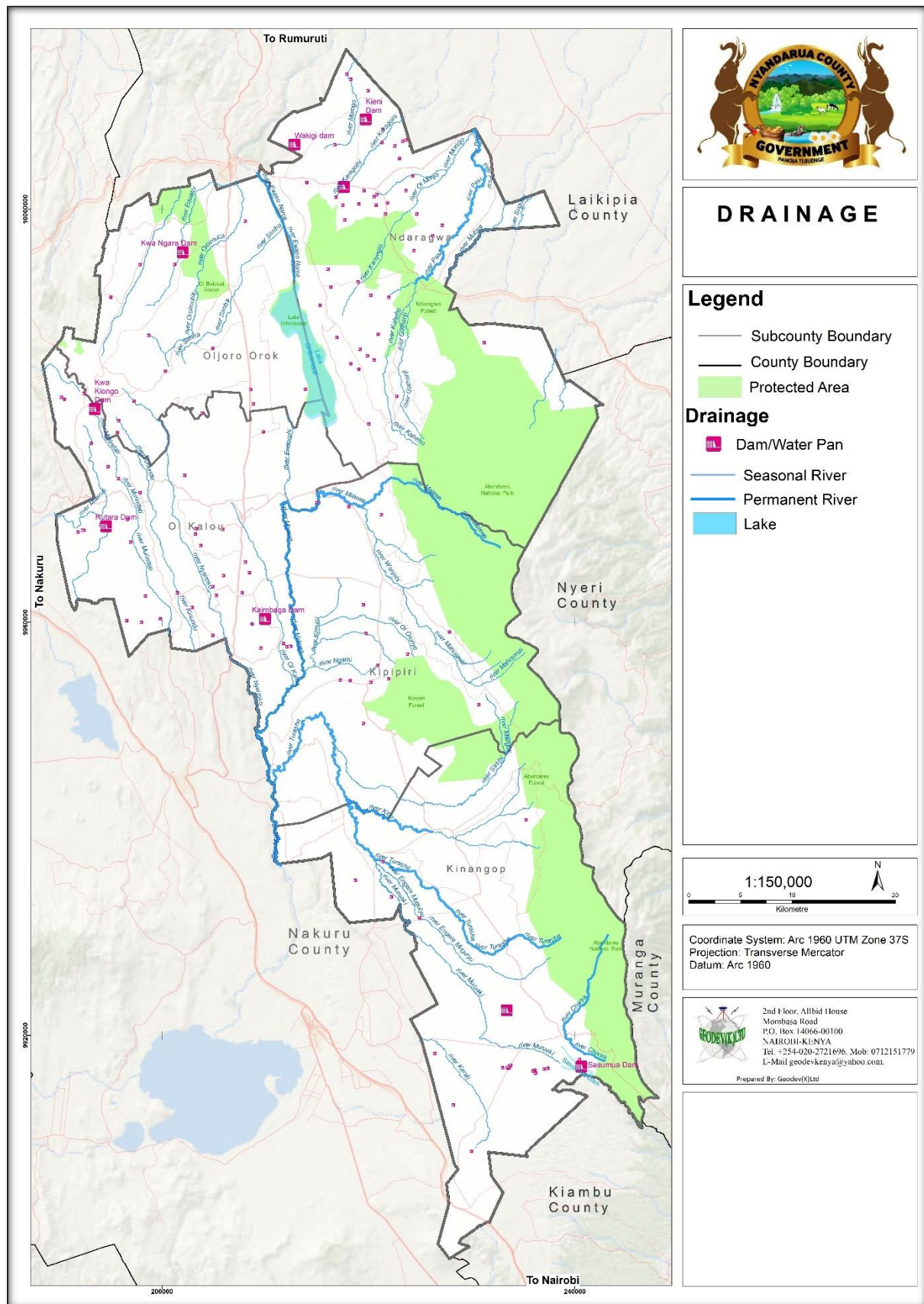
Central ward has the longest length of rivers accounting for 81.96 kilometres or 9.35 % of the total length of rivers. Nyakio ward has the shortest length of rivers traversing the entire ward. Only 16.07 kilometre or 1.83 % of the total land for Weru ward, is under rivers. Central ward is better positioned to provide adequate water supply for domestic and agricultural use. On the other hand, County should augment the water supply in the Nyakio ward by sinking boreholes, water pans and storage tanks to harvest rainwater. Chart 4-1 shows the length of rivers per ward in the County.

Chart 4-1: Length of Rivers per Ward



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Map 4-3: Nyandarua County Drainage



4.5 Climate

Nyandarua County has a cool and temperate climate with reliable rainfall, which is generally well distributed throughout the year. In a typical year, the County experiences two rainy seasons: long rains from March to May with a maximum rainfall of 1,600 mm and short rains from September to December and with a maximum rainfall of 700 mm. The average annual rainfall of the County is 1,500 mm. However, variations in altitude influence rainfall distribution, with wards in Njabini and Kinangop receiving higher amounts of rainfall while wards in Ndaragwa, Oljoro Orok, and Olkalou receiving comparatively low rainfall. Rainfall decreases drastically from the hilly slopes towards the bottom of the plateau and plains. Table 4-2 summarizes annual rainfall trends in Nyandarua from 2014 to 2019.

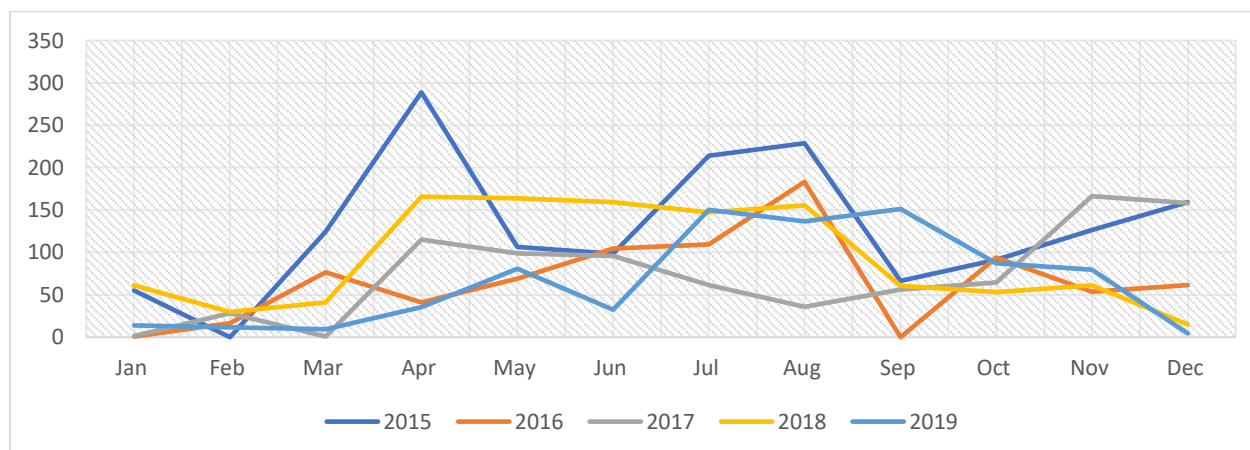
Table 4-2: Rainfall Trends in Nyandarua

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	55.3	0.0	124.6	288.9	106.5	98.5	214.1	228.9	66.3	91.3	126.6	159.5
2016	0.6	16.4	76.5	41.3	69.0	104.7	109.4	183.3	0.0	94.0	53.7	61.5
2017	1.6	28.2	0.8	115.1	98.8	96.0	61.6	35.8	56.1	64.5	166.5	158.1
2018	61.1	29.8	41.2	165.8	164.1	159.5	147.4	155.7	60.6	53.3	61.3	15.0
2019	13.8	11.7	9.4	35.3	80.8	32.3	150.5	136.8	151.3	87.3	79.8	4.4

Source: Nairobi Meteorological Department, 2020

The monthly rainfall trend is illustrated in the chart below.

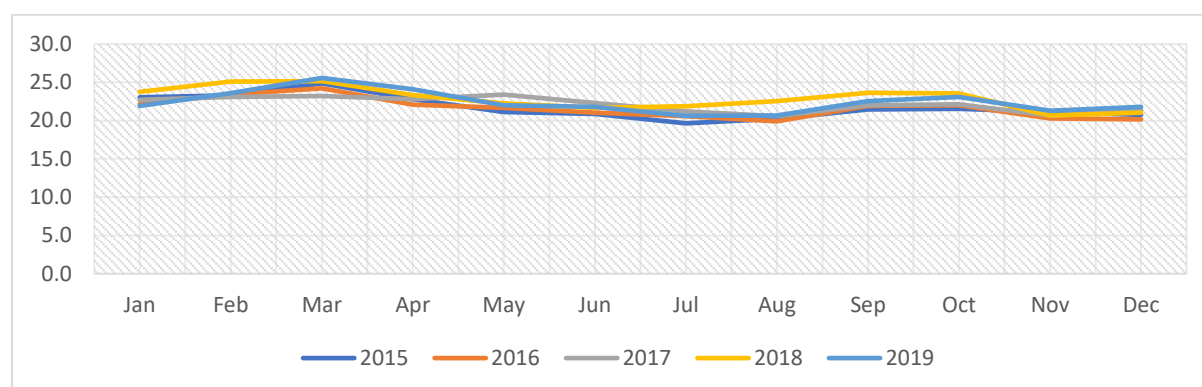
Chart 4-2: Annual Rainfall Patterns



Source: Nairobi Meteorological Department, 2020

The highest temperatures in the County are recorded in December, with a minimum average of 21.5⁰ C, while the lowest is recorded in July, with a minimum average temperature of 13⁰ C (*Nyandarua County Statistical Abstract, 2014*). Variation of the temperature has adverse effects, especially on maize production, when cold air during clear nights on the Aberdare Ranges' moorlands flows down the Kinangop and Olkalou Plateaus, causing night frost almost monthly. The temperatures range between 1⁰ C and 2⁰ C and last a few hours before sunrise (*Nyandarua District Development Plan, 2001*).

Chart 4-3: Mean Monthly Temperature Pattern



Source: Nairobi Meteorological Department, 2020

4.6 Vegetation

Vegetation ranges from open grassland with scattered acacia trees to natural forests and bushland. Most of the County is, however, covered by rain-fed herbaceous crops. Nyandarua has a total gazetted forest area of 48,588 Ha, mostly found on the Aberdares Ranges' western side. These forests include natural/indigenous and plantation forests and grassland, bushland and bamboo. Gazetted forests in the County are Ndaragwa Forest (12,588 Ha), Ol'bolossat Forest (3,326.9 Ha), Geta Forest (18,870.7 Ha), North Kinangop (6,811.8 Ha) and South Kinangop Forests (6,660.1 Ha). The table below shows the gazetted forests within Nyandarua County.

Table 4-3: Gazetted Forests in Nyandarua County

Vegetation Distribution in the Forest (Ha)						
Forest Station	Natural Forest	Forest Plantation	Bush-land	Glades	Bamboo	Total
Ol'bolossat	425.5	1843.41	426.6	631.39	0	3,326.90
Geta	12284.12	3029.88	1596.5	682.6	1277.9	18,870.70
North Kinangop	1191.52	1814.58	1748.7	0	2057	6,811.80
South Kinangop	1277.8	2170	89	0	3123.3	6,660.10
Ndaragwa	4971	1357.38	3940.42	2649.7	0	12,588.00
Total	20,149.94	10,215.25	7,801.22	3,963.99	6,457.6	48,588.00

Source: Kenya Forest Services, 2020

The photographs below show vegetation characteristics in different parts of Nyandarua.

Plate 4-2: Vegetation Characteristics in Nyandarua



There are also non-gazetted forests, namely: Muruai, Kirima, Kaimbaga Hills, Mawingu, Salient and Malewa Tree Nursery, and two presidential tree parks within Olkalou urban centre. These are shown below with their location and respective areas.

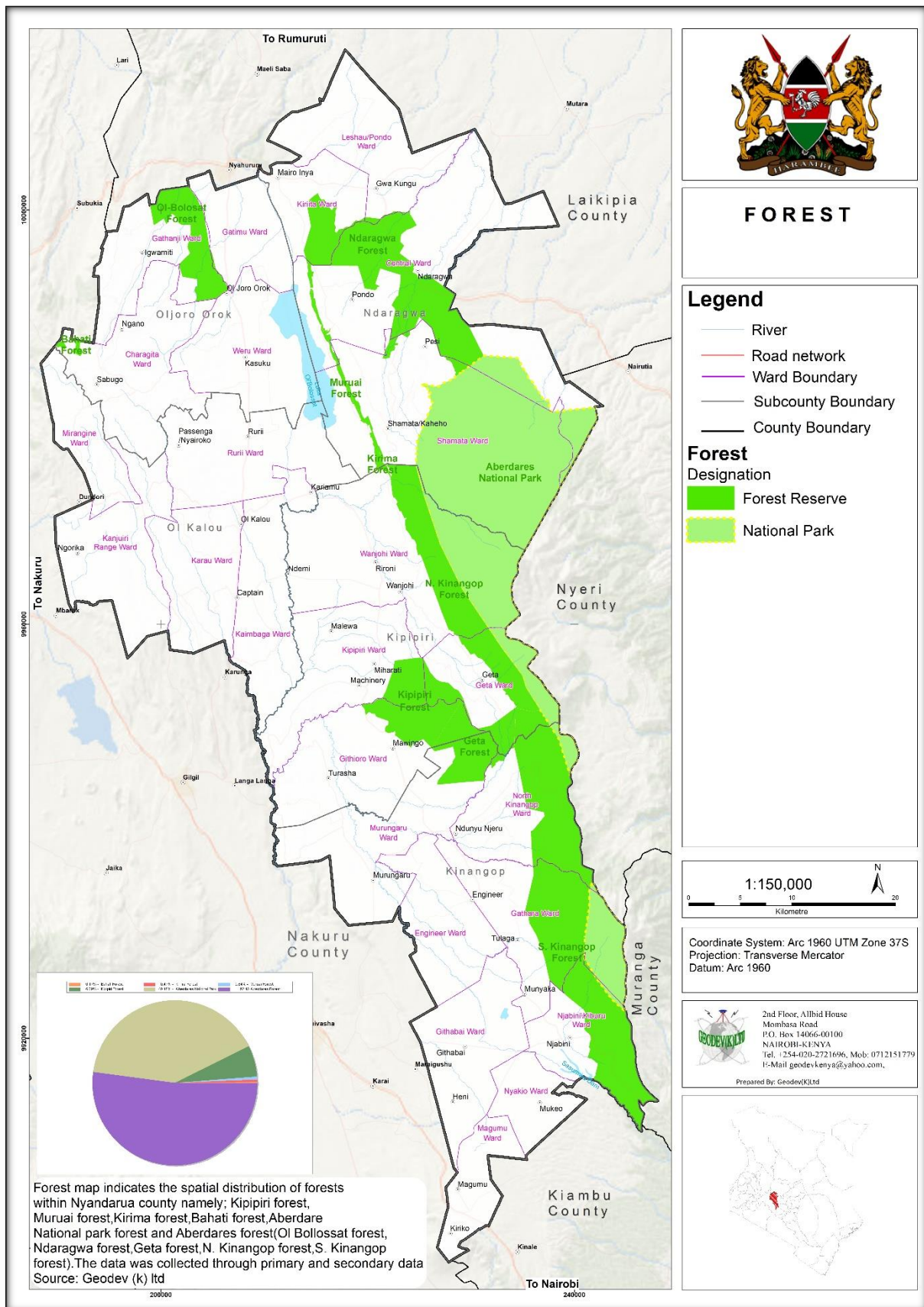
Table 4-4: Non-gazetted Forests

Name	Area situated	Approximate Area (Acres)
Presidential Tree Park	Next to Olkalou Stadium	120
Presidential Tree Planting Site	Opposite County Commissioner Offices	70
Malewa Tree Nursery	Near Kariamu Centre	10
Kaimbaga Hills	Near Captain	20
Mawingu	Near Mawingu Chief Camp	10
Tulaga Tree Nursery	Near Tulaga Secondary (Gwakinyahwe)	5
Total		235

Source: Kenya Forest Services, 2020

The county forest cover stands at 22 percent, which is impressive compared to the 10 percent requirement stipulated in Kenya's Constitution. The great biodiversity offered by these forest habitats and their importance as pristine ecosystems for Nyandarua County should not be overlooked. They offer measurable means of livelihood/sustenance, recreation and immense health benefits by ensuring a clean environment through carbon sequestration and therefore, needs to be conserved.

Map 4-4: Gazetted forests in the



4.7 Emerging Issues; Physiographical Context

The table below shows the emerging issues of the physiographical characteristics in Nyandarua County.

Table 4-5: Emerging Issues; Physiographical Context

<u>Attribute</u>	<u>Emerging Issue</u>
Climate	<ul style="list-style-type: none"> • Reliable rainfall which favour agriculture
Topography	<ul style="list-style-type: none"> • Undulating terrain favour mechanization in agriculture, road construction and utility provision • Gentle slope supports commercial and industrial development
Vegetation and Forest Cover	<ul style="list-style-type: none"> • Forests serve as water catchment areas • Encroachment into forest reserves
Drainage and Water Resources	<ul style="list-style-type: none"> • These may be exploited as water sources
Geology and Soils	<ul style="list-style-type: none"> • Potential of underground water retained by basement rocks • Rocks may be used as building materials • Soils favour agriculture

Source: Consultant's Analysis

5 POPULATION AND DEMOGRAPHY

5.1 Overview

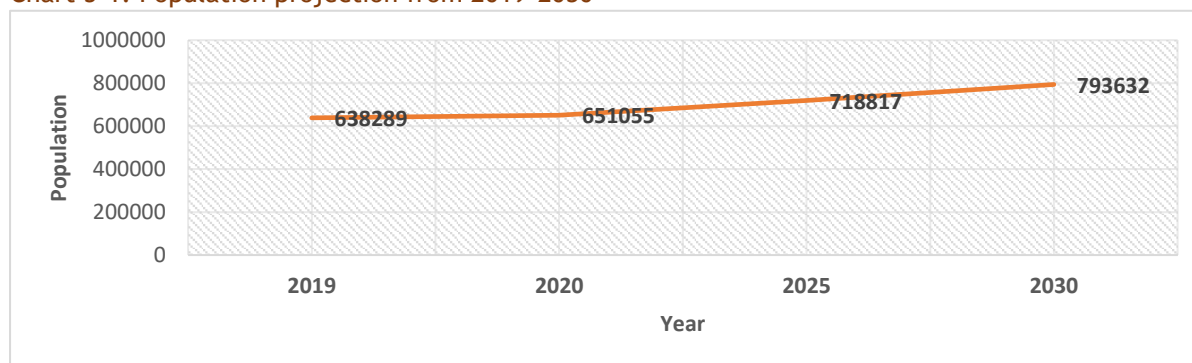
The population and demography analysis aims at determining the future land use requirements, demand for services such as water supply, infrastructural provision and allocation of resources in the County. Additionally, the forecast of population size and distribution provides a basis for estimating the potential labour force and the occupational structure in Nyandarua.

Key population attributes such as size, distribution, density, structure, and growth rates are discussed in this chapter. Further, demographic attributes such as birth and mortality rates, sex ratios and life expectancy are also studied to reveal the challenges and opportunities they present to the development of Nyandarua County.

5.2 Population size, composition, and projection

According to the Kenya National Population and Housing Census 2019, Nyandarua County had a population of 638,289. The population is composed of 315,022 (49%) males, females are 323, 247 (51%) and 20 intersexes. The County has a total of 179,686 households with an average household size of 3.5. The County's annual growth rate is 2 % (CIDP, 2018). Therefore, the population for Nyandarua County is estimated to be 651,055 in 2020 and is projected to increase to 718,817 and 793,632 in the year 2025 and 2030, respectively. Chart 5-1 illustrates the population trend for the County from 2019-2030.

Chart 5-1: Population projection from 2019-2030



5.3 Population distribution and density

The distribution of population per County put Kinangop sub-county as with the highest population of 198,835 in 2019, and 247,226 by 2030. On the other hand, Kipipiri Sub-County had the least population of 93,855 in 2019 and is projected to be 116 697 by 2030.

In terms of population per Ward, the Central ward had the highest population of 41,812 in 2019, while the Geta ward had the least population of 18,380 persons. Nyakio ward had the highest population density with 548 persons per square kilometres, while Shamata Ward had the least population density with 75 persons per square kilometres. The County's population density as of 2019 was 195 persons per square kilometer. The population and its distribution are shown in Table 5-1 and Map 4-1. Map 5-1 shows the population density per ward for the year 2020.

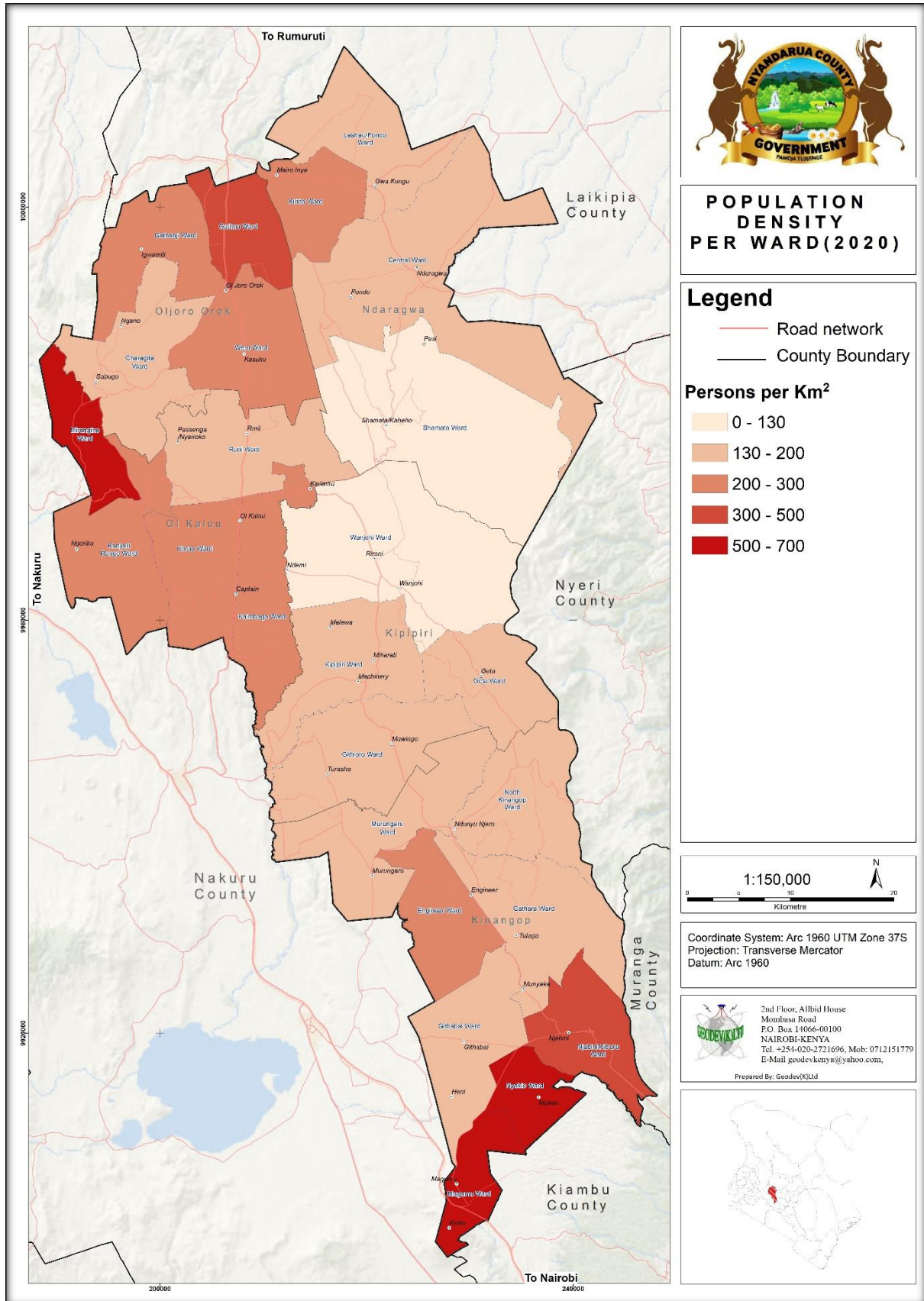
Table 5-1: Population distribution per sub-county and ward from 2019-2030.

SUB-COUNTY	WARD	WARD AREA (KM2)	2019 POPULATION	POPULATION DENSITY (2019)	2020 POPULATION	2025 POPULATION	2030 POPULATION
Kinangop	ENGINEER	95.85	19138	200	19521	21552	23796
	GATHARA	149.16	21076	141	21498	23735	26205
	NORTH KINANGOP	122.68	18957	155	19336	21349	23571
	MURUNGARU	150.07	28254	188	28819	31819	35130
	NJABINI/KIBURU	94.28	35790	380	36506	40305	44500
	NYAKIO	49.98	27404	548	27952	30861	34073
	MAGUMU	54.86	27907	509	28465	31428	34699
	GITHABAI	116.04	20309	175	20715	22871	25252
	SUB TOTAL	832.92	198835	239	202812	223921	247226
Kipipiri	WANJOHI	263.32	32053	122	32694	36097	39854
	KIPIPIRI	136.8	22906	167	23364	25796	28481
	GETA	96.26	18380	191	18748	20699	22853
	GITHIORO	150.83	20516	136	20926	23104	25509
	SUB TOTAL	647.21	93855	145	95732	105696	116697
Ol Kalou	KARAU	102.66	22068	215	22509	24852	27439
	KANJUIRI	125.53	30801	245	31417	34687	38297
	MIRANGINE	61.21	30183	493	30787	33991	37529
	KAIMBAGA	113.14	26070	230	26591	29359	32415
	RURII	138.11	25312	183	25818	28505	31472
	SUB TOTAL	540.65	134434	249	137123	151395	167152
Ol Joro Orok	GATHANJI	101.29	21695	214	22129	24432	26975
	GATIMU	72.61	33373	460	34040	37583	41495
	WERU	127.13	29785	234	30381	33543	37034
	CHARAGITA	139.97	19342	138	19729	21782	24049
	SUB TOTAL	441	104195	236	106279	117340	129553
Ndaragwa	LESHAU/PONDO	122.5	21885	179	22323	24646	27211
	KIRIITA	74.18	20611	278	21023	23211	25627
	CENTRAL	309.12	41812	135	42648	47087	51988
	SHAMATA	302.53	22662	75	23115	25521	28177
	SUB TOTAL	808.33	106970	132	109109	120466	133004
	TOTAL	3270.11	638289	195	651055	718817	793632

Source: KNPHC, 2019, County CIDP 2018-2022.

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Map 5-1: Nyandarua Population density

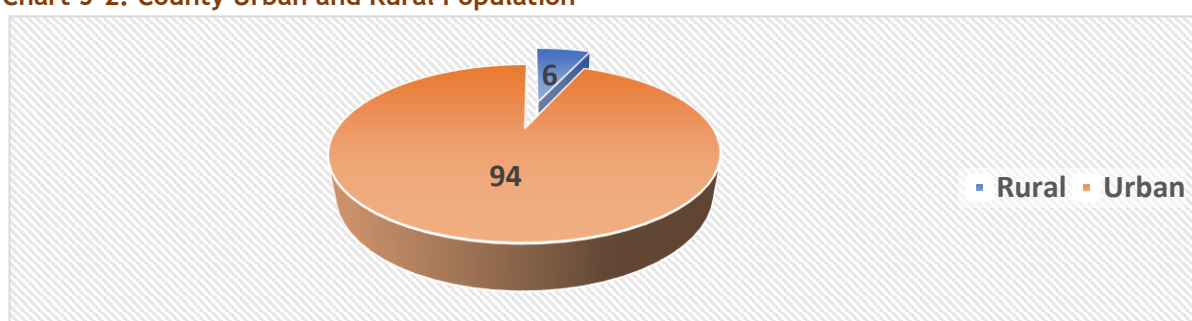


5.4 Existing and Projected Population of Major Urban Areas

Urban areas are avenues for housing, service provision, and employment opportunities. Urban areas in Nyandarua County are experiencing growth due to the availability of infrastructure and services; therefore, it is essential to determine the population of urban areas to aid in policy formulation for efficient service delivery and infrastructure provision.

Nyandarua County has a mostly rural population as compared to its urban population. Only 6 % of the population is urban. The County has ten major urban areas; Mairo Inya, Olkalou, Engineer, Ndunyu Njeru, Njabini, Kasuku, Miharati, Magumu, Oljoro Orok and Ndaragwa. According to World Bank 2018, Kenya`s annual urban growth rate stands at 4.1%; therefore, these urban areas` populations will increase.

Chart 5-2: County Urban and Rural Population



Source: KNPHC, 2019

Despite Olkalou having a small population of 13234, it plays a higher function of being the County headquarters due to its central location. Mairo Inya is the most populated of all the county's major urban areas because it is a border town, hence experiencing population influx from Nyandarua and Laikipia Counties. Table 5-2 summarizes the census year (2019), current and projected population of critical urban areas in Nyandarua. Projections were made using the World Bank, 2018 urbanization rate in Kenya (4.1% per annum).

Table 5-2: Current and Projected Population in Major Towns

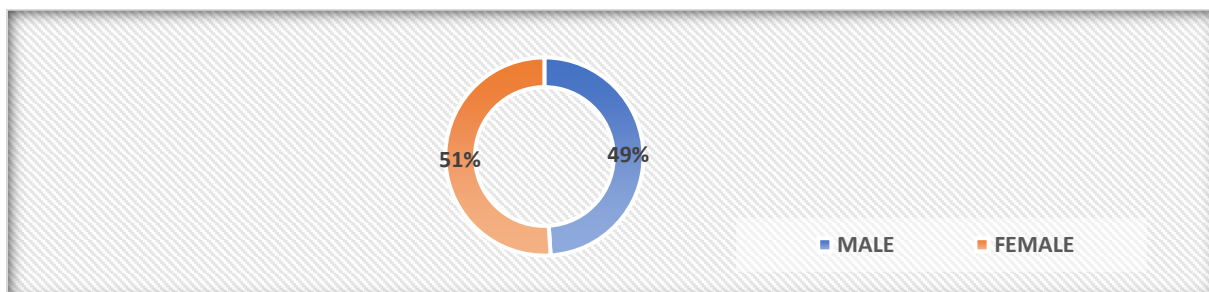
Urban area	Population of 2019	Population of 2020	Population of 2025	Population of 2030
Mairo Inya	9214	9592	11726	14923
Ol-Kalou	13234	13777	16842	21434
Engineer	5324	5542	6776	8623
Ndunyu Njeru	4354	4533	5541	7052
Njabini	3929	4090	5000	6363
Kasuku	2209	2300	2811	3578
Oljoro-Orok	2116	2203	2693	3427
Total	40380	42036	51389	65400

Source: KNPHC, 2019 and Consultant Computations

5.5 Sex ratio

According to Census 2019, Nyandarua County had an overall sex ratio of 97 males for every 100 females compared to the sex ratio of 98:100 at the national level. The female population accounts for 51 % of the total population, whereas the male population accounts for 49 %.

Chart 5-3: Population ratio



Source: KNPHC, 2019

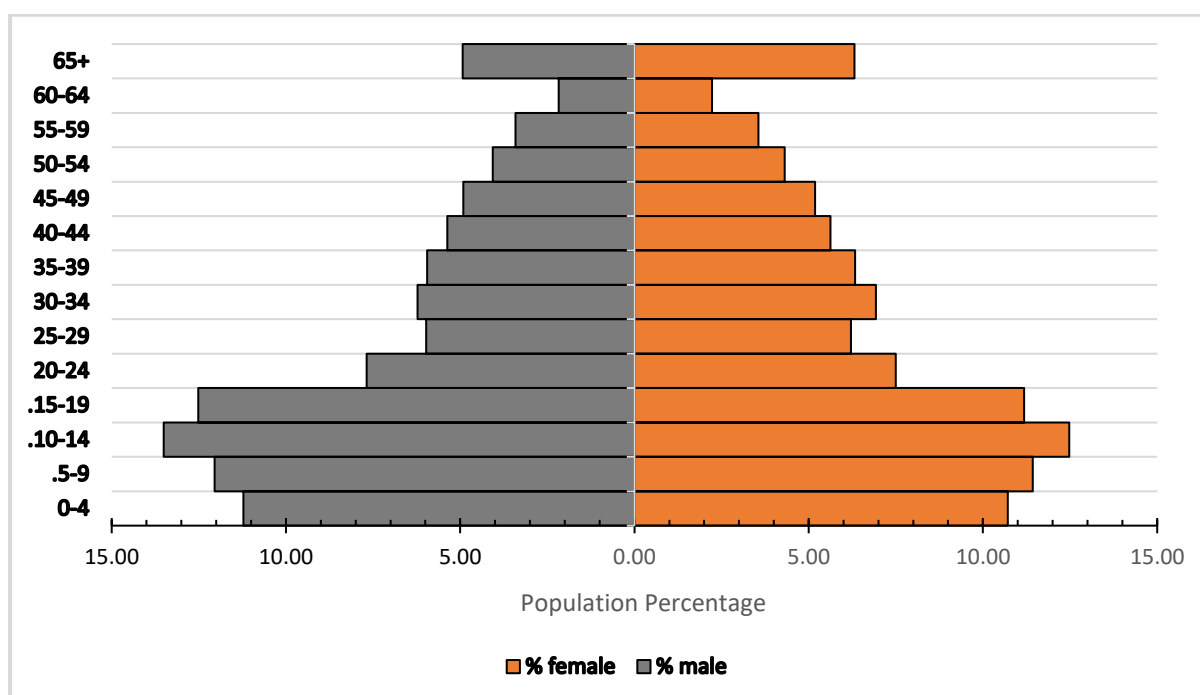
5.6 Population Structure

Nyandarua generally has a young population (youth bulge), with majority of inhabitants lying between the ages of 0 and 35. There is a steady decrease in the number of persons in each successive age group. The labour force in Nyandarua, i.e., those between the ages of 15 and 64, accounts for 59 % of the total population. The aged population (above 65 years of age) accounts for only about 5.6 %. This structure is similar to the national age-sex structure with the slight difference that the first cohort (below five years) is less than the second (aged 5-9) in Nyandarua. In contrast, at the national level, the reverse is true. The population structure for the County is presented in chart 5-3.

Table 5-3: Population projection by cohort

Base population 2019			Population 2020		Population 2025		Population of 2030	
Age	Male	Female	Male	Female	Male	Female	Male	Female
0-4	35356	34632	35603	34874	36867	36112	38176	37394
5-9	37963	36940	38229	37199	39586	38519	40991	39886
10-14	42540	40333	42838	40615	44358	42057	45933	43550
15-19	39433	36135	39709	36388	41118	37679	42578	39017
20-24	24219	24244	24389	24414	25254	25280	26151	26178
25-29	18837	20089	18969	20230	19642	20948	20339	21691
30-34	19622	22409	19759	22566	20461	23367	21187	24196
35-39	18748	20476	18879	20619	19549	21351	20243	22109
40-44	16905	18189	17023	18316	17628	18966	18253	19640
45-49	15468	16761	15576	16878	16129	17477	16702	18098
50-54	12802	13932	12892	14030	13349	14527	13823	15043
55-59	10751	11505	10826	11586	11211	11997	11608	12423
60-64	6859	7193	6907	7243	7152	7500	7406	7767
65+	15515	20408	15624	20551	16178	21280	16752	22036

Chart 5-4: Nyandarua County Population Pyramid



5.7 Age Cohort Structure

5.7.1 Under 1

In 2019, the population under 1 year of age in the County was 13,828 persons accounting for 2.17% of the total population. Nyandarua has an infant mortality rate of 50/1,000, i.e., 50 deaths for every 1,000 live births of children under one year annually. The rate is compared to a rate of 54 for every 1,000 at the national level. In as much as it has a lower Infant Mortality Rate (IMR) relative to the national IMR, there is a need to improve postnatal care. Furthermore, there is a need to increase the percentage of deliveries in health facilities since about 33.8% of deliveries in the County are home deliveries (Nyandarua CIDP, 2018).

5.7.2 Under 5

The population under 5 was 84,204 in 2019, accounting for 13.19% of the total county population. The under-5 mortality rate in Nyandarua is 51/1,000 compared to 79/1,000 countrywide; thus, the county performs better than the national level. Nevertheless, preventive approaches to health should be fortified, especially at this stage. These approaches include immunization and the use of long-lasting insecticidal nets to control malaria infections. Only 1.6% of children less than five years of age in Nyandarua sleep under treated nets (Nyandarua CIDP, 2018).

The pre-primary school age (3-5) also lies within this age group. As of 2019, the county had 789 Early Childhood and Development Education (ECDE) centers, with the teacher-pupil ratio being 1:25. This age group is projected to be 39,819 by 2025 and 41,233 by 2030, which heralds a need to expand or construct more pre-primary school facilities.

5.7.3 Primary School Age (6-13)

In 2019, this age cohort had 115,373 persons who accounted for 18.08% of the county population. As of 2019, the County has 493 primary schools with an enrolment rate of 83%. The county aimed to have attained an enrolment rate of 95% by the year 2017 (Nyandarua CIDP, 2018). There is an imminent need to recruit more qualified staff, with the current teacher-pupil ratio being 1:40, and provide more primary school facilities with the expected rise in this age group by 2030.

5.7.4 Secondary School Age (14-17)

The total number of persons aged between 14 and 17 years (secondary school age) in 2019 was 62,375 persons accounting for 9.77% of the county population. As of 2020, Nyandarua had 214 secondary schools and an enrollment rate of only 39%. Therefore, 61% of the children of secondary school age are currently not in school. There is a need to increase the enrolment rate at this level. With the expected rise in the secondary school-age population, the expansion of existing schools and the construction of new ones will be necessary. Tertiary and vocational training institutions are also needed to absorb the secondary school leavers that are not admitted to university/college programmes.

5.7.5 Youth (15-35)

This group had 187,023 persons in 2019. It accounted for 29.3% of the population in the County. This age group provides a market for finished goods and services and constitutes a significant county labour force segment. This youth bulge also underpins the need for job opportunities, adequate training facilities, and recreation and sporting facilities to cater to this cohort's needs.

5.7.6 Female Reproductive Age (15-49)

The female reproductive age, i.e., females aged 15 and 49, were 138,321 and constituted 21.67% of the county population. This group is projected to be 148,314 by 2030. With a rise in the female reproductive age group, there is a concurrent rise in the county population. There is, therefore, a need for improved maternal health care. Population control measures, e.g., family planning, is imperative to check the strain on resources, infrastructure and facilities.

5.7.7 Labour Force (15-64)

In 2019, Nyandarua had a labour force of 331,524 persons. They made up 51.9% of the total population. The labour force of Nyandarua County is expected to rise to approximately 357,964 by 2030; this implies a need to create more job opportunities, particularly by enhancing access to capital and credit facilities as well as focusing on the growth of major economic sub-sectors such as agriculture, trade, industry, and tourism. Likewise, training facilities such as polytechnics and other vocational institutions must build the human resource base. Additionally, improved healthcare services, infrastructure facilities, e.g., transportation, are also required for an effective and efficient labour force.

5.7.8 Aged Population (65+)

The people above the age of 65 were 34,509 and made up 5.4% of the county population. Life expectancy in Nyandarua is 60 years for both males and females. Hence, there is a need to augment healthcare services mainly for the elderly, to increase their life expectancy.

5.8 Population projection by selected age group

The projection of the population of the selected age group has been undertaken to gauge their future needs regarding employment, education, health, and transportation, among other needs and facilities. The projections are shown in table 5-4 for 2019 (base year) and 2030 (end of planning period).

Table 5-4: Population Projection by Selected Age Groups

Age Group	2019	2020	2025	2030	% of total
Under 1	11,886	11,969	12,394	12,834	1.86
Under 5	74,219	74,239	77,391	80,138	11.63
Primary School Going Age (6-13)	115,373	116,181	120,304	124,574	18.08
Secondary School Going Age (14-17)	62,375	62,812	65,041	67,350	9.77
Youth (15-35)	187,023	188,332	195,017	201,939	29.30
Female Reproductive Age (15-49)	138,321	139,289	144,233	149,352	21.67
Labour Force (15-64)	331,524	333,845	345,694	357,964	51.94
Aged Population	34,509	34,751	35,984	37,261	5.41

Source: KNPHC, 2019, Consultant's Calculations

The population of the primary and secondary school-age populations would continue to increase rapidly under the current fertility and mortality rates. There is a direct link between the school-age population and the educational needs like the number of teachers and the number of classrooms. Therefore, the county administration should set policies that address the expansion of the existing facilities and proper utilization of the available resources based on each sub-county's needs.

5.9 Employment Rates and Income Levels

The employment rate indicates the ratio of employed persons against the labour force (people between the ages of 15 and 65). The county labour force (people of working age) accounts for about 51.9% of the County's population (KNPHC, 2019).

A majority of the working population in Nyandarua is self-employed, specifically in Agriculture, Hotel and accommodation, transportation, and quarrying activities. They account for about 46.2% of the total labour force. Close to 13% of the labour force is formally employed, whereas about 9% is engaged in casual labour. The remaining 31.5% is unemployed, although a majority of this segment comprises students. Approximately 11.4% of the labour force is actively looking for employment (i.e., out of school) but is not actively employed. Table 5-5 shows the employment rate per Sub County.

Table 5-5: Employment Rate per Sub County

SUB-COUNTY	EMPLOYMENT RATE (%)				
	Employed formally	Self-employed	Casual labour	Student	Unemployed
Olkalou	16.0	52.7	9.5	14.2	7.7
Kipipiri	9.7	55.9	12.4	11.0	11.0
Oljoro-Orok	13.8	44.7	13.2	11.9	16.4
Kinangop	10.5	56.6	14.9	9.6	8.3
Ndaragwa	12.1	37.9	12.9	15.2	22.0

Source: Field Survey, 2020

5.9.1 Education Level and Employment

It is noted in Nyandarua County that the chances of formal employment increase in proportion to one's level of education. For instance, the majority of those formally employed, about 53.3%, have completed either university or college. These are followed by those who have completed secondary school, accounting for a stake of approximately 30%. Among those who are formally employed, only a negligible percentage lacks any formal education.

However, it is observed that a majority of the unemployed portion of the labour force, about 43.5%, have completed secondary school. An indicator of a glaring shortage of employment opportunities within Nyandarua County.

Table 5-6 shows the employment status of the working-age population against their education levels.

Table 5-6: Working Age Population Employment Status by Education Level

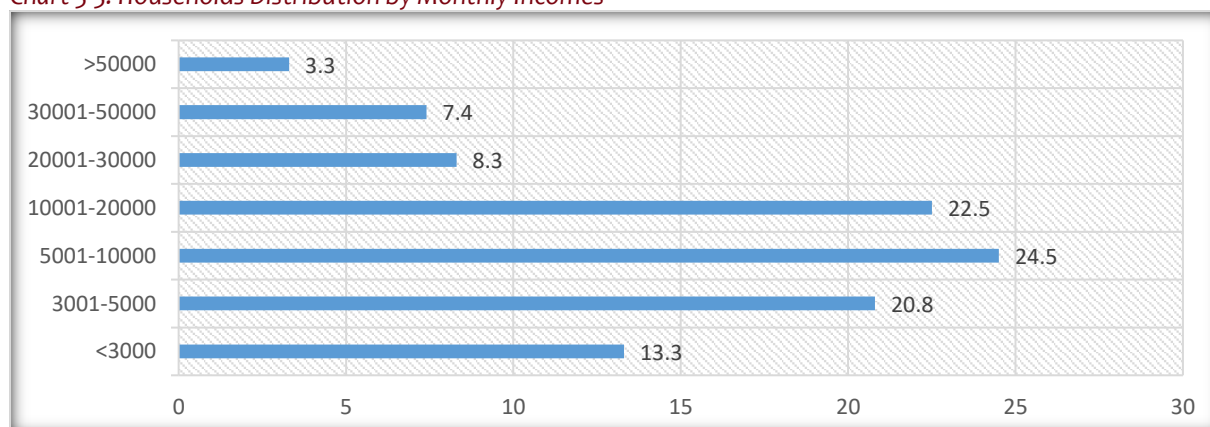
EDUCATION LEVEL	EMPLOYMENT STATUS				
	Employed formally	Self-employed	Casual labour	Student	Unemployed
Completed Pry.	8.6	27.0	38.8	0.3	17.4
Not completed, Pry.	2.4	7.2	11.2	3.1	11.4
Completed sec.	30.0	39.8	30.3	12.0	43.5
Not completed sec.	2.9	10.0	11.8	57.2	7.6
Completed Uni/college	53.3	13.8	7.2	1.2	19.0
Not completed Uni/college	2.9	1.3	0.7	26.2	0.5
No formal education	0.0	0.8	0.0	0.0	0.5

Source: Field Survey, 2017

5.9.2 Monthly Income Levels

About 25% of the household have a monthly income of between 5,000 and 10,000 shillings, whereas the second largest income group earns between ten and twenty thousand shillings monthly. Only about 3% of households in Nyandarua have a monthly income exceeding 50,000 shillings.

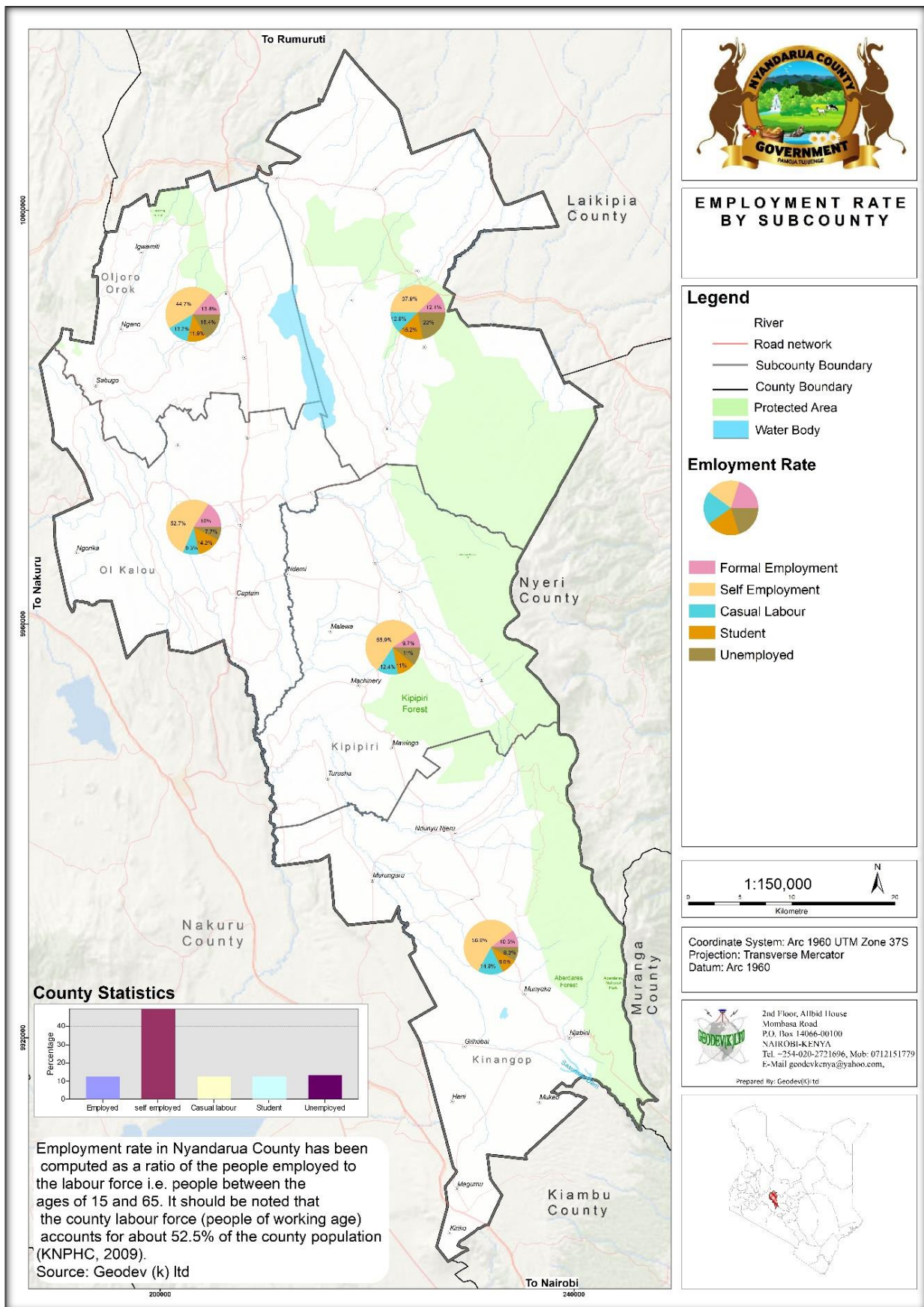
Chart 5-5: Households Distribution by Monthly Incomes



Source: Field Survey, 2020

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Map 5-2: Employment rate in Nyandarua

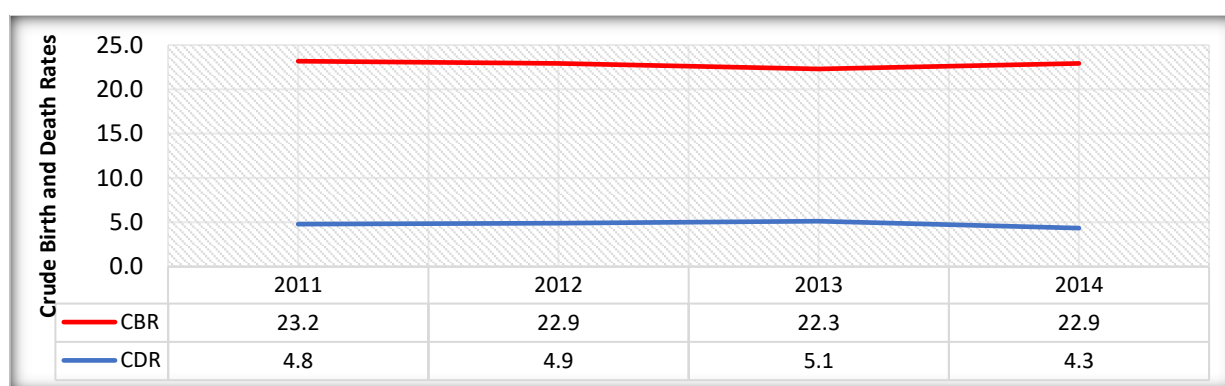


5.10 Birth and Death rate

Birth and death rates alongside migration rates are used to calculate the population growth rate of a place. In Nyandarua, the crude birth rate (CBR) lies at 41/1,000. The rate is higher than the national rate of 38.4/1,000. The crude death rate (CDR) of Nyandarua is 9.9/1,000, compared to 10.4/1,000 nationally. The difference between the CBR and CDR gives the rate of natural increase (RNI). Nyandarua has a higher RNI compared to the national rate. However, the country has a higher population growth rate (2.9%) than Nyandarua County, which lies at 2% per annum.

The graph below shows the birth and death rates in Nyandarua between the years 2011 and 2014. The CBRs and CDRs have been expressed per 1,000 persons.

Chart 5-6: Trend in Birth and Death Rates (2011 to 2014)



Source: Statistical Abstract, 2015

5.11 Infant and Child Mortality Rate

Infant mortality rate (IMR) denotes the number of deaths of children under the age of one year for every 1,000 live births. In Nyandarua, there are 50 deaths per 1,000 live births per annum, which is slightly lower than the national IMR of 54/1,000. The child mortality rate (CMR) in Nyandarua, 11/1,000, is also significantly lower than the national CMR, which stands at 24/1,000.

5.12 Maternal Mortality Ratio

Maternal Mortality Rate (MMR) in Nyandarua stands at 364 deaths (of mothers) per 100,000 live births. The county is performing relatively well measured against the national MMR, which is 495/100,000. Nevertheless, improving maternal health care and increasing the number of professionally assisted births is crucial to reducing maternal mortality in the county.

5.13 Replacement level fertility

In 2014, as per the Kenya Demographic and Health Survey (KDHS), Nyandarua County had a total fertility rate of 3.5 per woman. Thus, the number of children that would have been born to every 1,000 women in that year, assuming each woman passed through her childbearing years bearing children according to the age-specific fertility rate, would have been about 3,500 children. The rate is contrasted to a national fertility rate of 3.9 during the same year or 3,900 per 1,000 women.

5.14 Life Expectancy

Life expectancy is one of the factors used in measuring the Human Development Index (HDI) of a nation alongside adult literacy, education, and standard of living. Life expectancy in Nyandarua is 60 years for both males and females, whereas, in the whole country, it is 58 years for males and 61 for females.

5.15 Dependency Ratio

The dependency ratio in Nyandarua is 70 per 100 economically active. The ratio is quite low compared to the national dependency ratio of 92:100, which implies an imminent need to provide more employment opportunities. The aged population should also be well taken care of through the National Government 'Inua Jamii' 70 years and above cash transfer programme, among other initiatives.

5.16 Poverty Levels

Absolute poverty is defined as the absence of enough resources to secure basic life necessities, including food, safe drinking water, sanitation facilities, health, shelter, education and information. In Nyandarua, absolute poverty lies at 37.6% (Nyandarua CIDP, 2018). Nationally, the situation is worse than that in Nyandarua, with absolute poverty being 49.1%.

Poverty incidence refers to the number of people in a certain geographical area living below the poverty line and is usually expressed as a percentage of the total area population. The poverty line, in turn, refers to a threshold that separates the poor from the non-poor based on a set monetary amount. In 2015, the World Bank set the global poverty threshold at \$1.9 per day.

Nyandarua has a poverty incidence of 38.8%, 6.4 percentage points below the national figure of 45.2% (Spatial Dimensions of Well Being in Kenya, 2015). The county is ranked 14th out of the 47 counties in Kenya, with number one being the county with the least poverty incidence. The wards in the county with the highest poverty incidence include Gathanji, Wanjohi and Kipipiri (44%-57% incidence), whereas the wards with the lowest poverty incidence are Gatimu and Kiriita (16%-29% incidence).

In terms of contribution to national poverty, which is a measure of poor people in an area as a percentage of the total number of poor in the whole country, Nyandarua contributes 1.33%. It is ranked 34th out of the 47 counties, with the first being the county contributing the most to national poverty.

5.17 Migration Trends

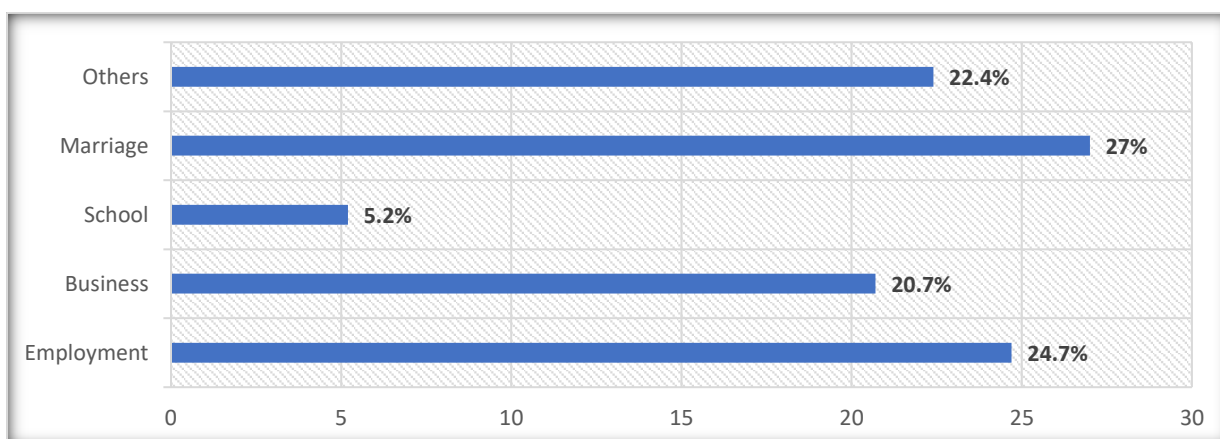
Population migration into the former Nyandarua District was associated with the then government's policy of settling people. From 1963, the district was a net reception area. Most immigrants were from neighboring Central Province districts, particularly Nyeri, Kiambu, Murang'a, with others coming from other parts of the country such as Rift Valley, Eastern, Nyanza, and Western Provinces.

5.17.1 Immigration

People move from one place to another in search of better opportunities, better living standards, growth, and development. According to a field survey, 95.4% of people who migrated to Nyandarua County came from other counties, while 4.6% came from outside the country. Among the pull factors include marriages, employment opportunities, land availability, soil fertility, education, and security. The field survey indicated that marriage was the main reason for immigration with a 27% incidence. Employment is the second most cited reason, with 24.7%. The County has many urban centres coming up, creating a need for more labour force.

Moreover, large-scale farms attract employees from other counties such as Laikipia, Nyeri, Nairobi, Bungoma, and Nakuru. Employment has also attracted people from outside the country. The third reason for immigration is grouped as others with 22.4%. These reasons include but are not limited to the following; migration in search of security due to the 2007 post-election violence while others migrated due to land availability to resettle. The remaining 5.2% migrated to the county for education purposes. Reasons for immigration is as shown in chart 5-7 below.

Chart 5-7: Percentage Distribution of Immigrants by Migration Reason



Source: Field Survey, 2017

Plate 5-1: Employees at a Flower Farm

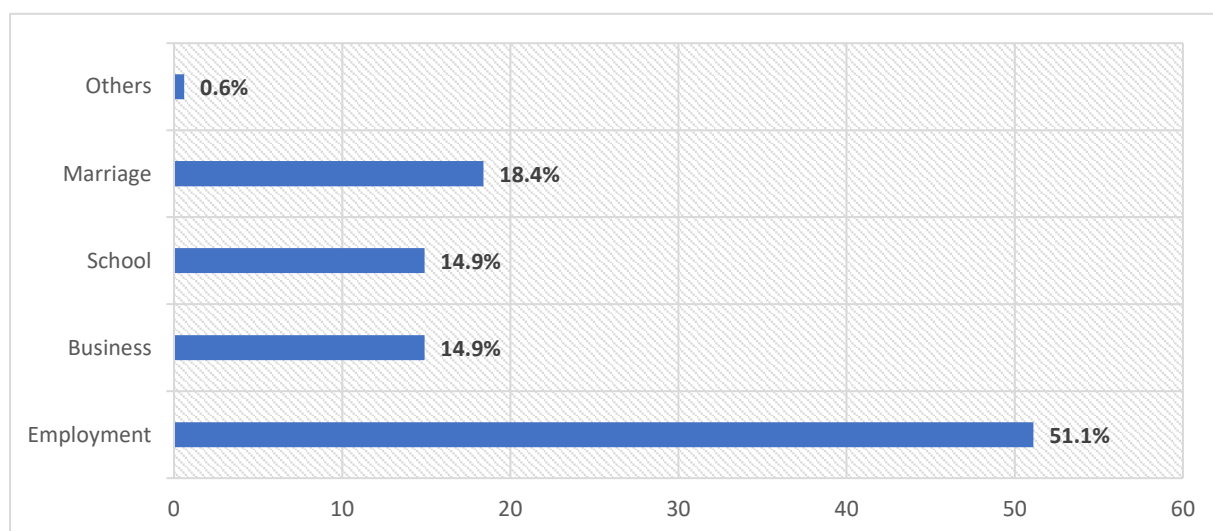


Source: Field Survey, 2017

5.17.2 Out-Migration

Approximately 93.1% of migrants moved to other counties, while nearly 6.9% migrated to destinations outside the country. Employment was the main reason for out-migration accounting for 51.1%, followed by marriage with 18.4%. 14.9% cited business or school as the reason for their out-migration, while about 0.6% cited other reasons. It is imperative to note that there is out-migration from rural areas to urban areas, thus freeing agricultural land (depopulating rural areas). However, the rural agricultural land may be freed but lacks the non-disabled people to tend it.

Chart 5-8: Percentage Distribution of Emigrants by Migration Reason



Source: Field Survey, 2017

5.18 Population needs assessment

5.18.1 Urban land requirement

Although the county's population is predominantly rural, the county's major urban areas are currently experiencing positive growth in their population, creating a need for more urban land to meet the stipulated population's needs. Using a controlled density of 50 persons per hectare, the projected gross land required for urban development is 635.2 hectares by 2030. The specific urban land demand for the respective major urban areas is presented in table 5-7.

Table 5-7: Urban land requirement for major urban areas

Urban area	Population of 2019	Population of 2020	Population of 2030	The proportion of the urban population (%)	The total land required in hectares (2030)
Mairo Inya	9214	9592	11726	19	124
Ol-Kalou	13234	13777	20590	34	217
Engineer	5324	5542	8283	14	87
Ndunyu Njeru	4354	4533	6774	11	71
Njabini	3929	4090	6113	10	64

Kasuku	2209	2300	3437	6	36
Oljoro-Orok	2116	2203	3292	5	35
Total	40380	42037	60215	100	635

5.18.2 Urban water demand

The identified urban areas in Nyandarua County need an adequate supply of water. According to WHO, the average water demand per capita is 100 litres per day. The projected urban water demand for the major urban areas is presented in table 5-8. The demand was arrived at based on the urban areas current and projected population.

Table 5-8: Urban Water Demand

Current and Projected Water Demand in Nyandarua Urban Areas				
Urban Area	Population (2020)	Water Demand (m3/day)	Population (2030)	Water Demand (m3/day)
Mairo Inya	9214	921.4	11726	1172.6
Ol-Kalou	13,777	1377.7	20,590	2059.0
Engineer	5,542	554.2	8,283	828.3
Ndunyu Njeru	4,533	453.3	6,774	677.4
Njabini	4,090	409.0	6,113	611.3
Kasuku	2,300	230.0	3,437	343.7
Oljoro- Orok	2,203	220.3	3,292	329.2

5.18.3 Household formation and housing demand

Access to decent and affordable housing in the right locations is an important spatial planning issue. Based on the current and projected population, there is a clear indication of increased housing demand in the future. Identifying future levels of housing is also essential in preparing for future infrastructural and service needs. The issue of future housing demand is, therefore, an important one for the CSP.

According to the 2019 census, Nyandarua County had a total household of 179, 686 with an average household size of 3.5 persons. The number of households is expected to increase to 183,639, 190,157, and 196,906 in 2020, 2025, and 2030 respectively, reflecting the number of housing units required.

Table 5-9: Housing Demand in Nyandarua

Nyandarua Housing Demand		
Year	Population	Demand (number of units)
2019	638,269	179,686
2020	642,736	183,639
2025	665,550	190,157
2030	689,172	196,906

5.19 Emerging issues in population

- Huge labor force (51.9 %), therefore assuring the availability of workforce
- The youthful population (29.3%) providing an opportunity for technology and innovation
- High dependency ratio for the aged (65+) and 0-4 population at 37.63%
- Low life expectancy for both male and female
- High aging population creating the need for the provision of homes for the elderly

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- vi. Increased unemployment rates leading to increased poverty rates in the county
- vii. A growing population which can be harnessed towards regional development

5.20 Recommendations

- i. Provision of home for the elderly
- ii. Creation of adequate employment opportunities to reduce the dependence ratio
- iii. Provision of adequate healthcare facilities in the County
- iv. Provision of adequate education institutions to meet the deficit
- v. Provision of adequate leisure, recreation, and community facilities

6 ENVIRONMENTALLY SIGNIFICANT AREAS.

6.1 Overview

Environmentally significant areas (ESAs) are important to the long-term maintenance of biological diversity, physical landscape features and other natural processes. They include wildlife habitat areas, steep slopes, wetlands and forests. They have several environmental qualities including home to rare plants and animal species, sources of energy and other ecological functions such as erosion regulation, water and air purification.

This chapter, therefore, takes stock of the environmental assets in Nyandarua compared against national and global goals/standards. The chapter also assesses the function and the conditions of the various environmental features in the County. In addition, the chapter discusses how human activities impact environmental features. This will aid in the establishment of good practices and shortfalls in the county's environment sector. It will also provide a firm basis for the formulation of a practicable environmental conservation strategy for Nyandarua.

6.2 Functions of ESA`s

Environmentally significant areas provide essential goods, services and life support systems that are important for the well-being of human existence and survival. The functions are classified into two broad categories; Ecosystem and supporting services. Ecosystem services offered by the features are grouped into three categories which include; Provision services which are direct Products derived from the Ecosystem, Regulation services which are benefits emanating from regulating ecosystem processes and Cultural services which are non-material benefits obtained from ecosystems including aesthetic, spiritual and psychological benefits. On the other hand, support services encompass the necessary services for the production of all other ecosystem services. Table 7-1 illustrates both the ecological and supporting services the features provide in Nyandarua County.

Table 6-1: ESA functions

Ecosystem				
Environmentally Sensitive areas	Provision services	Regulation services	Cultural services	Supporting Services
Forests	<ul style="list-style-type: none">• Timber• Wood fuel• Food supply	<ul style="list-style-type: none">• Flood control• Air purification• Erosion regulation• Water purification	<ul style="list-style-type: none">• Tourism• Recreational• Cultural heritage• Spiritual and religious• Educational	<ul style="list-style-type: none">• Nutrient cycling• Soil formation• Habitat• Oxygen production• Primary production
Rivers	<ul style="list-style-type: none">• Freshwater• Food supply	<ul style="list-style-type: none">• Flood control• Cooling		<ul style="list-style-type: none">• Irrigation• Soil formation• Habitat• Primary production
Lake Ol`bolosat	<ul style="list-style-type: none">• Freshwater• Food supply	<ul style="list-style-type: none">• Flood control• Cooling		<ul style="list-style-type: none">• Irrigation• Soil formation• Habitat• Primary production
Aberdare National Park	<ul style="list-style-type: none">• Freshwater• Food supply			<ul style="list-style-type: none">• Habitat
Wetlands	<ul style="list-style-type: none">• Timber			<ul style="list-style-type: none">• Photosynthesis

6.3 ESA features in Nyandarua County

Ecological sensitive areas in the County are in the form of forests, freshwater habitats such as lake and rivers, parks and also the support areas such as transition zones.

6.3.1 Lake Ol'bolosat

Nyandarua County boasts of the only natural lake in central Kenya, Lake Ol'bolossat. It is located between the Aberdare Ranges and Dundori Ridge. The Lake covers an area of 33.3 square kilometres. Of this, open water covers about 4 square kilometres (Nyandarua County Environmental Action Plan, 2014-2018). The lake forms the headwaters for the Ewaso Nyiro River, which is key to the support of rural livelihoods.

This drainage basin offers a variety of habitats ranging from open water through floating marshes and swamps, open grasslands and riverine forests along streams and springs that feed the lake. The Lake Ol'bolossat basin is host to several plant and bird species, and the African Marsh Harrier and mammals such as hippos. There are also a few species of fish and amphibians.

Floral species include reed and swamp grass (Themenda and Pennisetum) as well as floating aquatic macrophytes. Indigenous tree species have been cleared for wood fuel, and only exotic trees exist in the adjacent farmlands. They include Grevillea and Eucalyptus.

The lake is by itself a tourist attraction site with migratory birds and hippos in the lake. The lake is also rich in catfish which are usually in plenty during the rainy seasons. Therefore, the lake has potential for birds and hippo watching, boating, water surfing and sport fishing.

6.3.2 Aberdare National Park

The Aberdare National Park is located within Aberdare range. The Park stretches over a wide variety of terrains because it covers altitudes from about 7,000 feet (2,100 m) to 14,000 feet (4,300 m) above sea level. It covers an area of 76,700 ha (Aberdare Forest Reserve Management Plan, 2010 - 2019). The Park has a variety of wildlife which include elephants, hippopotamus, cheetahs, lions, leopards, monkeys, wild pigs, baboons, waterbucks, Thompson's gazelles, zebras and hyenas.

Moreover, it has high mountain peaks, deep ravines with icy mountain streams and many beautiful waterfalls, e.g., the Karuru Falls with a moorland plateau as well as interesting alpine vegetation in the higher regions of the peaks.

6.4 Forests

Forests play an important role in air and water purification, rainwater catchment areas, regulation of river flows and flood prevention, recharging of groundwater, improvement of soil fertility as well as reduction of soil erosion. Notably, forests also act as cultural, ceremonial, medicinal and recreational sites. Nyandarua County forest is classified into two categories, (gazetted and Non-gazetted forests)

6.4.1 Gazetted Forests

The forest cover in Nyandarua stands at 18.4%, compared to national 6.9%. The county has five gazetted forests namely: Ol'bolossat, Geta, Ndaragwa, North Kinangop and South Kinangop forests. The total area under gazetted forests is 48,588 Ha. Geta is the largest gazetted forest measuring 18,870.7 Ha while Ol'bolossat is the smallest, covering 3,326.9 Ha.

Forest cover in Nyandarua, though 11.5 percentage points higher than the national cover, has experienced a net decline of 1,330 hectares from 1999. The natural highland forest has increased by 2,907 Ha, and plantation forest by 2,323 Ha whereas bushland has reduced by 720 Ha, bamboo forest by 1,860 Ha and grassland by 3,980 Ha. Table 7-2 shows forest covers in Nyandarua County in 1999 and 2017.

Table 6-2: Forest Cover Trends (1999 to 2017)

Forest Station	Natural Forest		Forest Plantation		Bushland		Grassland		Bamboo		Total	
	1999	2017	1999	2017	1999	2017	1999	2017	1999	2017	1999	2017
Ol' bolossat	1,223	425.5	1,140	1,843.41	96	426.6	868	631.39	—	—	3,327	3,326.90
Geta	8,849	12,284.12	3,373	3,029.88	1,597	1,596.50	3,127	682.6	1,940	1,277.90	18,886	18,870.70
North Kinangop	921	1,191.52	1,793	1,814.58	2,040	1,748.70	—	—	2,057	2057	6,811	6,811.80
South Kinangop	1,278	1,277.80	972	2,170	89	89	—	—	4,321	3,123.30	6,660	6,660.10
Ndaragwa	4,972	4,971	614	1,357.38	4,699	3,940.42	3,949	2649.7	—	—	14,234	12,588.00
Total	17,243	20,149.94	7,892	10,215.25	8,521	7,801.22	7,944	3,963.99	8,318	6,457.60	49,918	48,588.00

Source: Kenya Forest Service

The maps overleaf show the trend in forest cover in Nyandarua County from 1990 to 2018. In 1990, forest cover in Nyandarua was 677 square kilometres (20.8%) but dropped to 564 Km² (17.4%). In 2018, forest cover stood at 529 Km², which accounts for 16.3% of the total county area.

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Map 6-1: Time Series of Nyandarua Forest Cover

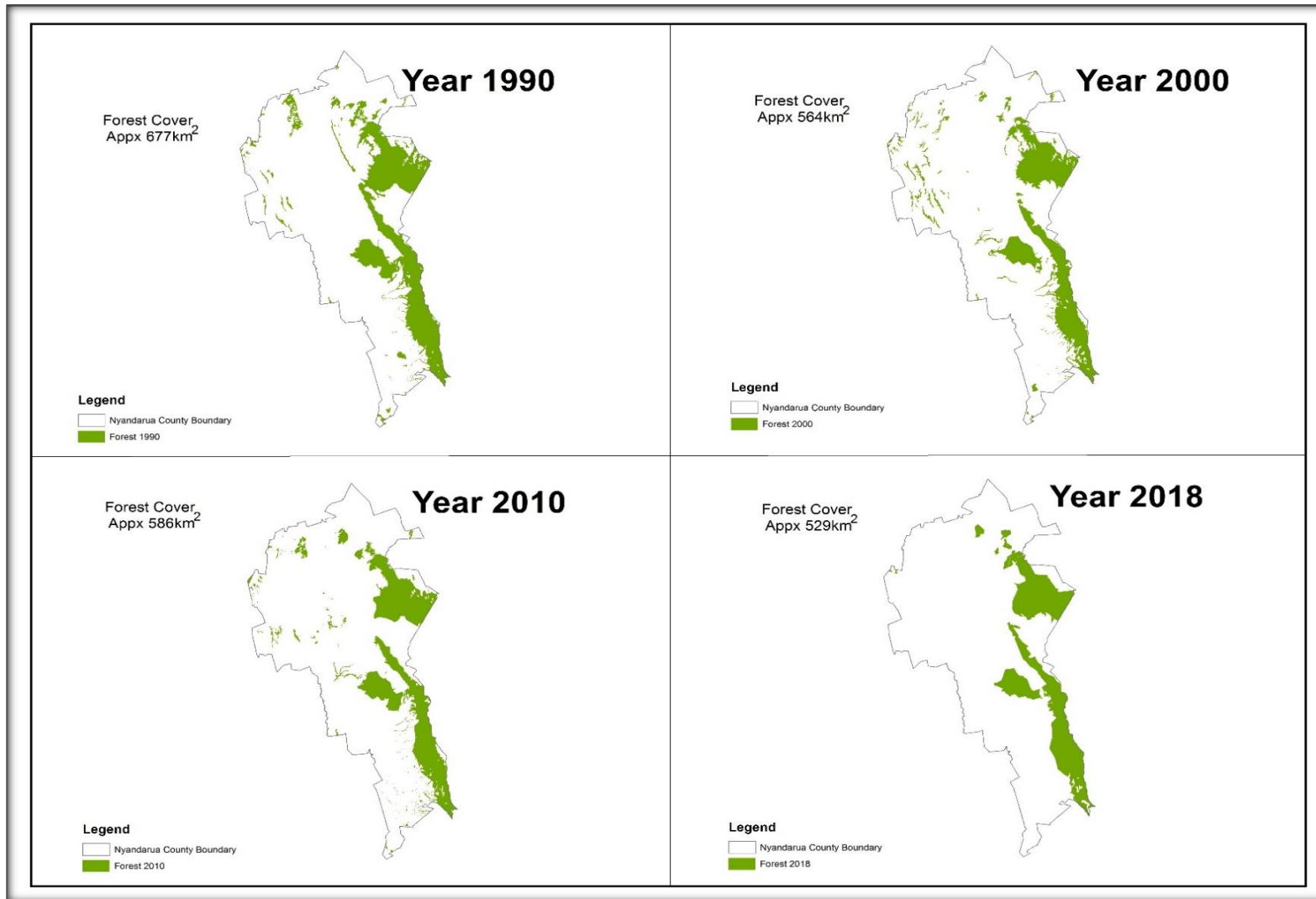


Plate 6-1: Sections of Ndaragwa and Ol'bolossat Forests



6.4.2 Non-Gazetted Forests

The county also has smaller non-gazetted forests namely: Presidential Tree Park (Olkalou), Presidential Tree Planting Site, Malewa Tree Nursery, Kaimbaga Hills, Mawingu and Tulaga Tree Nursery all of which cover an area of 235 acres.

Even though these forests are not gazetted, measures have to be put in place for their conservation. The challenges facing forest resources in Nyandarua include Overreliance on fuel-wood as the main source of energy, Climate change impacts/unpredictable weather patterns, Illegal logging. Forest destruction by fire, especially during the dry season, Damage of cypress trees by Sykes monkeys and other pests and Inadequate financial mechanisms to support financial tree growing.

6.5 Aberdare Ranges

The Aberdare ranges are on the eastern edge of the rift valley. Forest reserves for the range include the Aberdare, Kikuyu escarpment, Kijabe Hill, Kipipiri and Nyamweru, as well as some forest areas in the Aberdare National Park. Aberdare Ranges together with the Kikuyu Escarpment runs 120 kilometres northwards from Nairobi and about 40 kilometres at its widest point. The perimeter boundary of the Aberdare Ranges is about 565 kilometres long. The altitude varies from 2,000 meters on the eastern forest boundary to 4,001 meters at the peak of Ol donyo Lesatima towards the northern edge of the Range. The mean maximum temperature is 25.8 °C. The mean minimum temperature is 10.3 °C. The lowest temperatures are experienced in July and August (*Aberdare Forest Reserve Management Plan, 2010-2019*).

Receiving approximately 2,400 mm of rainfall per year, the range is an important source of water for many of Kenya's rivers and groundwater aquifers. These Rivers include Athi and Tana, which flow into the Indian Ocean, Ewaso Nyiro that drains into Lorian Swamp and River Malewa that drains into Lake Naivasha. The Aberdares are also the main catchments for Sasumua and Ndakaini dams, which provide most of the water for Nairobi, the capital city.

The range is habitat to different wildlife species including rhinos, elephants and birds as well as unique plant communities resulting from the wide range in altitude and rainfall. From the range, also, originates different waterfalls, e.g., the Karuru Falls. The range also has a rich history, freedom fighter Dedan Kimathi used as a post office, a giant tree where the Mau Mau would leave messages

for Kimathi's attention. The Queen's Caves also found here were used by the Mau Mau (freedom fighters) to preserve their meat. The Aberdares were believed by the Kikuyu to be one of the homes of God (*Ngai*) and originally known as Nyandarua "the drying hide" due to the distinctive fold of its silhouette. With such unique and magnificent features, the range is a definite tourism destination.

The range is an ecologically sensitive area considering it is a major source of water for Kenyans and supplies water to River Tana which helps in the generation of hydro-electric power.

Plate 6-2: A Natural Spring in the Aberdares



6.6 Oljoro-Orok and Olkalou Plateaus

This is a major physical feature as well as an ecologically sensitive area in the county since it's a major freshwater inlet for Lake Nakuru and its region. Human activities such as encroachment into wetlands and river regimes as well as deforestation have reduced river discharge levels that flow into Lake Nakuru. Poor agricultural practices and soil conservation measures have resulted in a high rate of soil erosion leading to siltation of the lake. This has a negative impact on aquatic life, particularly the flamingoes. This zone has also experienced encroachment into natural springs such as Nyakarianga Spring. This spring is an important water source, and urgent conservation measures should be implemented.

6.7 Kipipiri Plateau

This area is the major catchment for Lake Ol'bolossat. Human activities, e.g., deforestation and encroachment into wetlands and river regimes in the area have resulted in reduced river discharge, soil erosion and siltation of river beds, water pollution and eventually siltation of the lake.

6.8 Kinangop Plateau

Encroachments into the Aberdares within Kinangop have been pronounced. This has adversely affected rainfall formation and has led to reduced vegetation cover and river discharge. It has to be considered that this area is a major catchment for Sasumua Dam which supplies water to Nairobi County. Therefore, continued threats to this area would mean that many residents in Nairobi County

would face shortages in the water supply. As a result, measures have to be put in place to prevent unsustainable human activities in this area. Also, the high-altitude grasslands of Kinangop Plateau are recognized as an Important Bird Area (IBA) due to the presence of specialized birds and therefore of great conservation priority.

6.9 Rivers

There are eight permanent rivers in Nyandarua; Malewa, Ewaso Narok, Pesi, Turasha, Chania, Kiburu, Mkungi and Kitiri and 14 seasonal rivers. These rivers are a major water source for residents in the county. Furthermore, they integrate with the riparian area features to form an ecosystem that supports both flora and fauna, which are of great significance in an environment. Thriving ecosystems like the Malewa River ecosystem, Kinja River, Nyairoko River continue to face threats like encroachments on the riparian areas, tree species like blue gum that dry up the wetlands, sand harvesting and increasing river pollution from liquid wastes and effluents. These riverine ecosystems are of great significance considering their functions to both humans and the environment and therefore require protection.

6.10 Environmental problem areas in Nyandarua County

6.10.1 Quarrying Sites

Quarrying activities in the county are undertaken in Kibathi, Oljoro-Orok (near Kangui), Kapten, Ndemi, Mumui, Ndunyu- jeru and Tulaga though at a small scale. Resources obtained here are gravel and murram for building construction and road maintenance (*Nyandarua CIDP, 2018-2022*). Sand harvesting has mostly been noted in Miharati. Unregulated quarrying activities are known to degrade land, and therefore these activities have to be monitored and policies for extraction of these resources put in place. A practical example is a quarry near river Mkungi where the land has been degraded and its usefulness diminished.

Plate 6-3: Quarrying near R. Mkungi



6.11 Assessment of environmentally significant areas by CESA

Environmentally significant areas are ranked into three categories based on their conservation priorities, the categories range from protected Areas (PA), critically ecologically sensitive areas (CESA), and Ecological Support Areas ESA. The classification is based on the role performed and the level of threats and sensitivity that the areas are exposed to or face. The following management criteria were assigned to the different CESA ranks.

Rank 1 - Areas protected by law; therefore, no development, agriculture or logging shall be allowed except for low-impact nature tourism, research and education.

Rank 2 -No development or agriculture; Sustainable logging and low impact nature tourism may be permitted subject to local constraints.

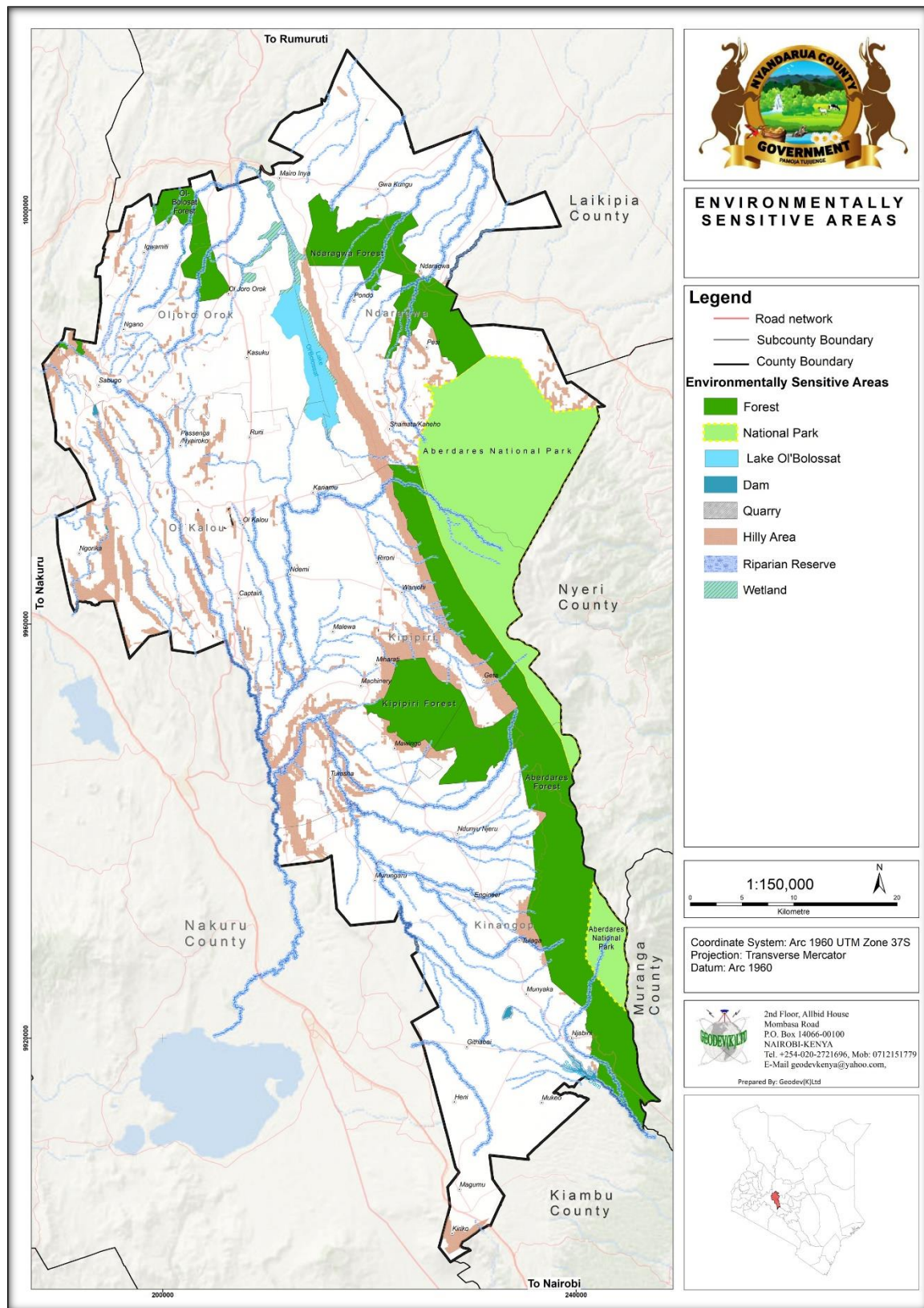
Rank 3 - Natural and semi-natural supporting areas; areas important for services or ecological infrastructure.

Table 6-3: Categories and ESA Ranks

Rank	ESA rank 1	ESA rank 2		ESA rank 3
Category	Protected Area	Critical Ecologically Significant Areas		Ecological Support Areas
Specific Category	Protected Area:	Critical Ecologically Significant Areas 1:	Critical Ecologically Significant Areas 2:	Ecological Support Area 1:
	PA	CESA 1	CESA 2	ESA
Description	Legally protected areas	Critical natural and semi-natural areas with little choice	Critical natural and semi-natural areas with some choice	Natural and semi-natural supporting areas, areas important for services or ecological infrastructure
Examples of features	National Parks, lakes and Gazetted Forests	Non-gazetted forest; Permanent rivers; community reserves and conservancies; Water catchment areas, wetlands and dams	Seasonal rivers, heritage sites	wildlife corridor and dispersal areas; intact buffers around protected areas, intact riparian buffers and ranges
Areas/Sites	Aberdare National Park, Ol'bolosat, Geta, Ndaragwa, North Kinangop and South Kinangop forests and Lake Ol'bolossat	Presidential Tree Park (Olkalou), Presidential Tree Planting Site, Malewa Tree Nursery, Kaimbaga Hills, Mawingu and Tulaga Tree Nursery, Malewa, Ewaso Narok, Pesi, Turasha, Chania, Kiburu, Mkungi and Kitiri Rivers and Sasumua Dam.	Happy valley homes,	Wildlife migratory corridors, Aberdare ranges

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Map 6-2: Environmentally Sensitive Areas in Nyandarua County



6.12 Threats of Environmentally Sensitive Areas

- i. Overreliance on fuel-wood as the primary source of energy
- ii. Climate change impacts/unpredictable weather patterns
- iii. Illegal logging and conversion to non-forest land
- iv. Forest destruction by fire, especially during the dry season
- v. Damage of cypress trees by Sykes` monkeys and other pests
- vi. Inadequate financial mechanisms to support financial tree growing
- vii. Decline water levels and quality

6.13 Recommendations

- i. Fencing of Lake Ol'bolosat to prevent encroachments on its belt and invasion of hippos into farmlands
- ii. Fencing and re-afforestation of the Aberdares
- iii. Encouraging agroforestry as a strategy to increase tree and forest cover
- iv. Community sensitization on good waste disposal methods, good farming practices, and on the long-term value of natural resources and protection of the environment
- v. Formulation of appropriate land and land resources policy
- vi. Promoting conservation, agricultural and environment-friendly policy
- vii. Gazettement of environmentally sensitive assets.

7 HUMAN SETTLEMENTS

7.1 Overview

Human settlements are areas of concentration of activities and people. They may be permanent or temporary and can range in size from a small number of dwellings to the largest cities with surrounding urbanized areas. Human settlements are defined as a city, town, village, or other agglomeration of buildings where people live and work in geospatial modeling. This plan looked at a center concentration as the critical component of human settlements in the County.

The human settlement provides an opportunity for service provision at a given threshold that is cost-effective. It is relatively cheaper to offer services where there is a population concentration than in an area with a dispersed population. Furthermore, human settlements are also areas where the conversion of raw materials into new or finished products that support economic growth occurs. At the same time, the settlements offer the market the same production outputs. Therefore, human settlements are drivers of socio-economic change, the transformation of livelihoods as well as civilization. Assessment of human settlements in terms of their nature and structure, distribution characteristics, and inter and intra-regional linkages create a foundation for a strategic policy decision on the organization of urban and rural settlement in Nyandarua County.

This thematic area's overarching objective is to facilitate the development of a well-balanced system of rural and urban settlements. Nevertheless, new approaches to planning, including environmentally sound land-use policies, responsibility, and participation, are essential to achieving healthy, productive, livable, and equitable human settlements.

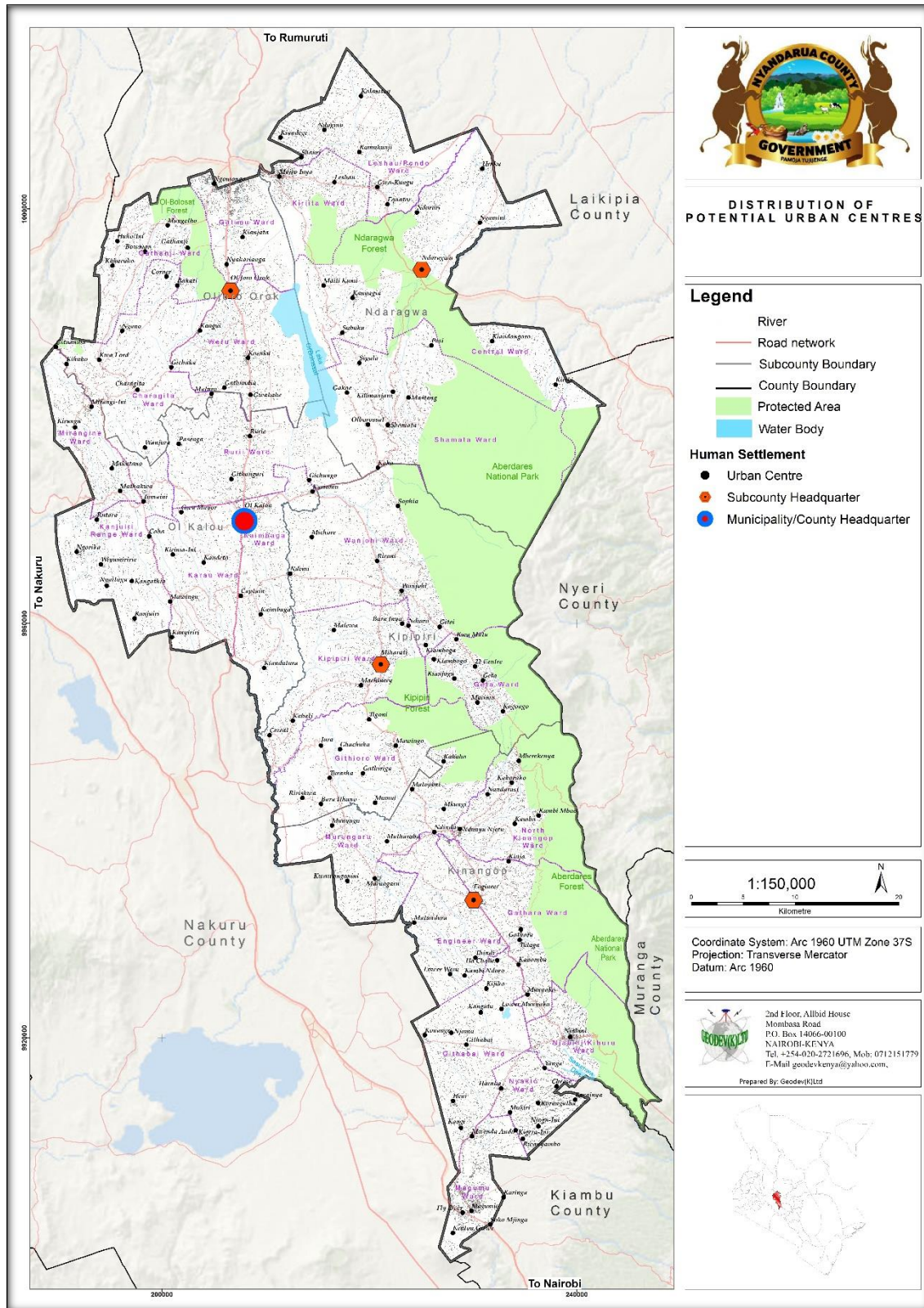
7.2 Existing Situation of Urban Settlement

Distribution of existing urban areas

Nyandarua County has a total of 125 urban settlements. These settlements have emerged from the service and the growing need of the population. The distribution of potential urban settlements is relatively even. Urban areas are unevenly distributed in the regions that are naturally or policy constrained. These areas include the Aberdares Range, Ndaragwa, Kipipiri, Ol'bolossat, Geta, Ndaragwa, North Kinangop, and South Kinangop forests. The distribution of the potential Urban Centers is as presented in Map 8-1.

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Map 7-1: Distribution of human settlement



7.3 Level of Accommodation Function of Urban Areas

The criteria for categorizing urban areas are Urban Center, Rural Center, Market Centre, and Local center for developmental planning. The level of accommodation function that leads to this classification involves attaining a population (catchment population) threshold under the general guideline of approximately 5000 population for a local centre, 15,000 for the designated market center, 40,000 for designated rural centres, and 120,000 for the designated Urban centre. In this context, only one (1) urban area meets the 120,000 thresholds, eleven (11) meeting 40,000 thresholds, thirteen (13) meeting 15,000 thresholds, and 100 centres meeting the 5000 thresholds. The list of urban areas in the various possible categories is presented in table 8-1.

Table 7-1: Possible Categories of Urban Settlements based on population and level of Service Function

Level of Centre	Name of Centre
Urban Centre	Ol Kalou
Rural Centre	Oljoro-Orok, N. Kinangop, Njabini, Mairo Inya, Engineer, Miharati, Ndaragwa, Kaheho, Rurii, Ngorika and Ngano
Market Centre	Ndunyu Njeru, Murungaru, Magumu, Mirangine, Geta, Githioro, Rironi, Karati (Koinange), Heni, Gichungo, Igwamiti, Mawingo Machinery and Sabugo
Local Centre	Wanjohi, Weru, Gathanji, Kimathi, Kiriko, Gathundia, Mukey, Munyaka, Ndemi, Kariamu, Passenga (Nyairoko), Pondo (Kanyagia), Pesi (Kambaa), Tulaga, Malewa, Tigon, Gwa Kung'u and Turasha

Source: Consultant's assessment

7.4 Level of service function for urban areas in the County

The establishment of service provision levels in Nyandarua County based on service availability in a hierarchical order ranging from the administration, education, health, transportation, community facilities, and physical infrastructure shows that only one urban area attained over 37 points is Olkalou. Out of the remaining urban areas, six (6) urban areas attained 19-39 points range, twelve (12) centres attaining 13-18 points range while one hundred and eight (108) attaining 9 points and below points range.

7.5 Basic infrastructure provision in the urban settlements

Assessment of the urban settlements' infrastructure condition revealed that only seventeen (17) urban areas have piped water supply infrastructure. The piped water connectivity in the urban areas in Nyandarua County is approximately twelve percent (12%). The level of public piped water which is a relatively lower proportion.

Urban level public liquid waste management infrastructure is lacking in the whole County. All the urban areas (100%) use pit latrines, with septic tank utilization below one percent (1%). With increasing densities in the urban areas per square unit, pit latrines' use is undesirable has its impact on environmental quality and groundwater resources are negative.

Waste management infrastructure within the urban settlements is underdeveloped with limited investment. Dumping of waste is a common phenomenon across all the assessed urban settlements. The waste management system is disconnected as attributed by a limited number of waste receptacles in terms of bins, skips, transfer stations, and sanitary landfills as the recommended conventional waste management infrastructure channel. Only Olkalou, Ndaragwa, Kinangop, and Malewa have a designated dumping site. Ineffective implementation of the waste management regulations and guidelines given by the National Environment Management Authority (NEMA) at the County level is a potential threat to Nyandarua County's environment. Improper waste management in urban areas compromises environmental quality and the livability of the urban settlements.

The electricity connection to urban settlements is 100%. However, the level of household connectivity is approximately 40% in the County. The level of household connectivity is relatively low. The explanation for the low level of connectivity in the County is described in the electricity section.

Assessment of the road conditions shows that less than 2% of the urban areas' total roads are paved. Essential roads that provide access in the urban areas and the primary roads are earthen.

The infrastructural service provision in urban areas is inadequate. Broadly, there is no specific policy framework for providing infrastructure as a guiding development at the urban settlement level in the whole County. Due to this situation, the challenges that characterize the urban areas include but are not limited to urban sprawl, unguided land use development, and limited and inadequate infrastructure and service provision, among others.

7.5.1 The extent of Selected Centres in the County

The extent/area of some centres has also been tabulated below. The areas were arrived at from the digitized cadastral data such as RIMs, DPs, and PDPs provided by the County Department of Lands, Housing, and Physical Planning.

Table 7-2: Size and Location of Selected Centres in Nyandarua

No.	Centre	Sub-County	Area in Ha	No.	Centre	Sub-County	Area in Ha
1.	Tulaga	Kinangop	12	19.	Pesi	Ndaragwa	37
2.	Engineer	Kinangop	26	20.	Kaheho	Ndaragwa	55
3.	Heni	Kinangop	28	21.	Mairo Inya	Ndaragwa	518
4.	Koinange	Kinangop	40	22.	Ndaragwa	Ndaragwa	231
5.	Magumu	Kinangop	58	23.	Pondo	Ndaragwa	54
6.	Mukeo	Kinangop	39	24.	Gathanji	Oljoro Orok	43
7.	Munyaka	Kinangop	28	25.	Igwamiti	Oljoro Orok	44
8.	Murungaru	Kinangop	8	26.	Ngano	Oljoro Orok	23
9.	Ndunyu Njeru	Kinangop	42	27.	Ol Joro Orok	Oljoro Orok	61

10.	Njabini	Kinangop	31	28.	Weru	Oljoro Orok	12
11.	Turasha	Kinangop	42	29.	Kariamu	Ol Kalou	12
12.	Geta	Kipipiri	40	30.	Ngorika	Ol Kalou	44
13.	Githioro	Kipipiri	24	31.	Mirangine	Ol Kalou	53
14.	Malewa	Kipipiri	37	32.	Ol'kalou	Ol Kalou	721
15.	Mawingo	Kipipiri	37	33.	Passenga/Nyairoko	Ol Kalou	32
16.	Miharati	Kipipiri	5	34.	Rurii	Ol Kalou	74
17.	Ndemi	Kipipiri	55	35.	Tumaini	Ol Kalou	65
18.	Wanjohi	Kipipiri	18				
Total	2,494 Ha						

Source: Department of Lands, Housing and Physical Planning, 2018

The Urban Areas and Cities Amended Amendment Act, 2019 has established new standards for the classification of cities, municipalities, and towns. An area shall be eligible for the grant of city status if it has a minimum population of 250,000 residents. For the conferment of municipal status, the threshold population is between 50,000 and 249,000 residents, whereas the conferment of town status is at least 2,000 residents. It is also important to note that Olkalou Town is a beneficiary of the Kenya Urban Support Program because it is eligible for the municipality's status by being the county headquarters (*Kenya Urban Support Programme (KUSP), POM-Vol 1, November 2017*).

7.6 Current and Projected Population in Major Towns

Instruments such as devolution, the New Urban Agenda, Kenya Urban Support Programme, among others, provide an opportunity to reform urban planning and land management institutions. Effective institutions in these areas are integral to the achievement of Kenya's and counties' economic development goals. It is envisaged that the Urban Areas and Cities Act, 2011 (revised in 2015) and National Urban Development Policy, 2016 would provide a framework for the counties to establish their urban management systems. This will help the urban centres in Nyandarua to realize sustainable urban development as articulated in the New Urban Agenda, Sustainable Development Goal 11, among other international and national agreements.

Urban area populations are growing at a rate of 4.31 percent per annum (*World Bank, 2018*). At this rate, Olkalou core urban and peri-urban populations are projected to be about 13,229 and 111,088 persons, respectively, by the end of the planning period, i.e., 2026. The table below shows the existing and projected population of the main towns and the urban area status they will qualify for by 2030.

Table 7-3: Current and Projected Population in Major Centres

Urban area	Population of 2020	Population of 2030	Envisaged Status
Ol-Kalou	13777	20590	Municipality
Mairo Inya	31779	47494	Town
Engineer	5542	8283	Town
Ndunyu Njeru	4533	6774	Town

Njabini	4090	6113	Town
Kasuku	2300	3437	Market
Oljoro-Orok	2203	3292	Market

Source: KNPHC, 2019, Consultant's Estimates

7.7 Evaluation of Human Settlement Development Potential

To critically analyze the potential for the growth and development of centres in Nyandarua, the following aspects have been examined.

- i. Anticipated population
- ii. Administrative potential
- iii. Agricultural development potential
- iv. Industrial potential
- v. Level of existing infrastructure
- vi. Accessibility

7.7.1 Anticipated Population

Dynamics that might affect the urbanization rate include; the overall growth rate of the County's economy, the disparity in rural and urban income levels, the natural increase in population, and the ability or scarcity of agricultural land in rural areas. These factors contribute to the growth of the urban population, and hence the demand for urban services. An increase in urban population also increases housing demand. Simultaneously, the determination of the correct population of a centre can be challenging because of the periodic nature of the markets in most centres. On market days, a significant proportion of economic actors (buyers and sellers) come from outside the town boundary and significantly influence the town's economic base.

Although the population size is a critical yardstick to determine the centres that qualify for growth centre status, the rapid change in these centers' population size makes it challenging to determine a static population size for qualifying centres. Since growth centres are meant to alleviate regional disparities in development, it may be appropriate to decide on different population indicators for other regions. This is important because regions differ in development, population characteristics, resource endowments, economic activities, political representation, and proximity to hubs of power.

7.7.2 Administrative Potential

Possible administrative functions of urban centers should also be put into consideration. For instance, all sub-county headquarters (Miharati, Engineer, Oljoro Orok, and Ndaragwa) are designated towns. In contrast, county headquarters is set to be a municipality at the minimum under the Urban Areas and Cities Act. This classification has its ramifications concerning the growth and development potential of these centres.

Olkalou being among the forty-seven-county headquarters, has gained new impetus for growth and investment given its role as an administrative and commercial centre. The same is implied to the Sub County administrative centres. These centres have and will experience renewed investments in real

estate developments, education, and commerce. With enhanced investments, these centres are likely to experience increased migrations as people move in search of employment and other opportunities. This category of emerging centres needs to be guided through proper and sustainable urban planning and growth limits. Their role, linkages, and specialization must, therefore, be defined.

Furthermore, once a settlement has been conferred with town status, among the facilities, it requires to include health facilities, refuse collection and solid waste management, pre-primary education, polytechnic, airstrip, cemetery, and recreational park, among others. The installation of such facilities in a settlement will, in the long run, boost its development potential.

7.7.3 Agricultural Development Potential

Predictably, the potential function of a settlement should be examined with due consideration of its hinterland. The interdependence between urban and rural areas must be considered. Urban settlements perform the function of marketing and distribution of local products and as focal points for the provision of services required by the urban population and the rural. In this regard, centres such as Njabini, Wanjohi, Ndunyu Njeru, Ndaragwa, and Engineer, which are in prime agricultural areas, have a high potential for development as agro-industrial towns.

7.7.4 Industrial Potential

Industries may be agro-based, e.g., slaughterhouses, milk processors, grain millers; urban-based, e.g., waste recycling and MSMEs, or resource-based. Centres located strategically regarding the raw materials of such industries have industrial potential. These include Njabini and Wanjohi, which have the potential for potato chips factory; Oljoro Orok for cottage industry; Mirangine for the dairy factory; and Ndaragwa for livestock feed manufacture and tanning industries, among others.

7.7.5 Level of Existing Infrastructure

Infrastructure services, including power, transportation, telecommunications, water and sanitation, and waste disposal, are central to economic production and urban growth. Adequate and quality infrastructure contributes to diversifying production, expanding trade, coping with population growth, and reducing poverty (World Bank, 2004). Thus, the towns with higher service provision levels, e.g., Olkalou, Engineer, Njabini, Miharati, Mairo-Inya, and Oljoro Orok, are more likely to grow at a faster rate than other towns. Furthermore, infrastructural improvements in towns where they are currently lacking are likely to direct development.

7.7.6 Accessibility

The mutual interdependence between urban development and transportation networks is incontestable. The transportation network acts as a structuring element, thus shaping the way an urban center grows. The movement of labour, raw materials, finished goods, and services directly impacts economic growth in any settlement. Therefore, transportation modes in a centre and their capacities are directly proportional to its development. The potential of centres such as Olkalou, Rurii, Kasuku, Oljoro Orok, and others lie along Gilgil-Olkalou-Nyahururu (Class A4) is already taking

shape. In the same vein, the centres along the Olkalou-Miharati-Engineer-Njabini Road (Class B20) are rapidly growing due to enhanced accessibility. Rapid urban development also occurs in centres along Nyahururu-Mairo Inya- Ndaragwa road (Class B21).

7.8 Urban Land Requirements Assessments for Selected Towns

The urban land requirements for selected towns to accommodate the projected population size by 2030 have been estimated and computed in the table below. Pointedly, the estimation is premised on the consultant's recommended density, which borrowed from Spatial Concept for Nairobi Metropolitan Region, 2012.

Table 7-4: Projected Urban Land Requirements for Selected Urban Centres

S/N	Urban Centre	Existing Area (Ha)	Built-up Area (Ha)	Existing Urban Population (2019 census)	Projected Population (2030)	Recommended Density (p)	Land Required (Ha)	Gap
1.	Olkalou	721	129	13234	21434	50	287.88	(158.88)
2.	Njabini	24	110	3929	6363	50	247.6	—
3.	Engineer	28	65	5324	8623	50	83.32	—
4.	Mairo-Inya	518	70	9214	14923	50	403.98	+
5.	Miharati	55	38			50		
6.	Oljoro Orok	61	29	2116	3427	50		
7.	Ndaragwa	231	32			50		

Source: Consultant's Estimates

7.9 Challenges of Urbanization

Urbanization is a population shift from rural to urban areas, the gradual increase in the proportion of people living in urban areas. It is how towns and cities are formed and become larger as more people begin living and working in central areas. The implications of rapid urban growth include but are not limited to; increasing unemployment, environmental degradation, lack of urban services, overburdening of existing infrastructure, and lack of access to land, finance, and adequate shelter.

According to the population census 2019, urbanization in Nyandarua (6%) was generally low compared to Kenya (32.3%). In respect to central Kenya, Nyandarua ranked third after Kiambu and Nyeri, which stands at 60.8% and 24.5%, respectively.

Below are some of the key challenges the towns in the County are grappling with:

7.9.1 Unplanned Urbanization

The County is experiencing higher rates of unplanned urbanization resulting in urban sprawl, which has, in turn, led to a reduction in the land available for agriculture in the hinterland. The study discovered that this scenario could be attributed to the lack of a land-use framework to guide appropriate land use and land development, both in rural and urban areas. It is also attributable to

urban land speculation, as well as population and demographic changes. Similarly, there is an emergence of undesignated service centres, e.g., Kasuku, among others.

7.9.2 Insufficient Infrastructure Development

Most of the centres in the County lack basic facilities, infrastructure, and services. Partly, this has been blamed on inadequate human and financial resources as well as institutional capacity. Notably, all lack sewerage networks, thus posing substantial health risks to residents in these urban centres. In Olkalou, the county headquarters, sewage is transported from the source by exhausters for treatment at the Decentralized Treatment Facility in Olkalou. However, there is a proposed sewerage system in Olkalou Township whose catchment will be about 30,000 households.

Olkalou Water and Sewerage Company (OLWASCO) supplies about 620 m³ of water per day against over 2,500 cubic meters' daily demand. Other urban centres such as Engineer, Miharati, Njabini, Mairo-Inya, and Oljoro Orok also lack the requisite facilities and infrastructure such as non-motorized transport systems and cemeteries.

Lack of appropriate infrastructure is more severe in the hinterlands of urban centres, and in some cases, the hinterlands are inaccessible to the designated service centres.

7.9.3 Lack of Appropriate Data on Centres and Hinterlands

Lack of explicit selection criteria makes it difficult to identify centres with the best growth potential. Other considerations, such as political expedience, may result in wrong centres and inappropriate investment packages in the absence of objective selection criteria. Further, the haphazard change of boundaries of urban centres makes it difficult to establish a stable database.

7.9.4 Rural-Urban Migration

People are moving to towns in search of employment opportunities, education, health, among others. This influx of people, coupled with the existing urban population, exerts pressure on the existing amenities such as schools, houses, water, and health facilities in these centres.

7.9.5 The emergence of Informal Settlements

Informal settlements occur due to insufficient affordable and adequate housing in towns, as provided under article 43 of the Constitution on social and economic rights. Rural-urban migration, especially by the low-income class category, has resulted in the development of informal settlements such as Huruma in Olkalou. High population densities combined with rapid, uncontrolled growth in informal settlements are likely to pose a problem for future town administrators. Their capacity to keep pace in providing infrastructure and public services to residents will be severely strained.

7.9.6 High Housing Demand that Outstrips Supply

There are 31 housing units in two estates (Bahati and Huruma Estates, both in Olkalou) managed by the county government. The units house the county public servants. With a mean household size of

4.4, the urban households in Nyandarua are expected to be close to 40,265 by 2030. The influx of people in towns and highly dilapidated public houses has culminated in higher demand for affordable housing. Housing demand outstrips the supply. Housing in urban areas is characterized by inadequate facilities, e.g., sanitation, water supply, and waste disposal.

7.10 Recommendations

Based on the presentations, findings, analysis, and evaluation of data and information on the various centres in the County, the county government should:

- Research and document the comparative advantage of major centres as the basis for their collaboration with other institutions.
- Develop centres based on their comparative advantage.
- Undertake the assessment and classification of all centres within the County.
- Provide and maintain sufficient urban infrastructure facilities such as pedestrian walkways, designated parking lots, and sewerage networks in collaboration with other development partners.
- Develop and implement a county land-use policy to check on unplanned urbanization and uncontrolled development.
- Prepare, approve, and enforce integrated urban development plans for all sub-county headquarters and other towns.
- Formulate county housing policy.
- Prepare and approve physical and land use plans for all the identified urban centres to guide land use development and infrastructure provision.
- Provide infrastructure and utility services in a prioritized manner as guided by the approved plan.
- Improve road conditions in urban settlements.

7.11 Rural Settlements

Rural areas are inseparable from urban areas. There is a constant economic relationship between urban and rural areas. The continuous interplay between urban and rural areas includes the supply of agricultural food products and raw material used directly or through conversion in the urban area and the supply of labour required in the industrial and service sectors. In reciprocation, the urban centres offer markets for products from the rural regions as well as providing the necessary inputs required for production processes in the rural areas.

Assessment of rural areas for development planning purposes is crucial in establishing constraints, opportunities, and potentials of the rural areas. Further, the assessment informs rural development strategy through settlement and improvement of the productivity of the land. In return, socio-economic transformation is realized through the effective implementation of the rural settlement strategy.

Assessment of the rural settlement in Nyandarua County took place at the sublocation level. The sublocation was defined as the rural settlement analysis unit. The objective of the analysis was to establish the population, the existing agricultural and non-farm activities, level of service provision

and the condition of the rural area in terms of water supply for domestic and agricultural use, level of rural electrification, road condition, and evaluation of the rural potential by rural economic clusters. The findings of the existing situation are presented in this subsection.

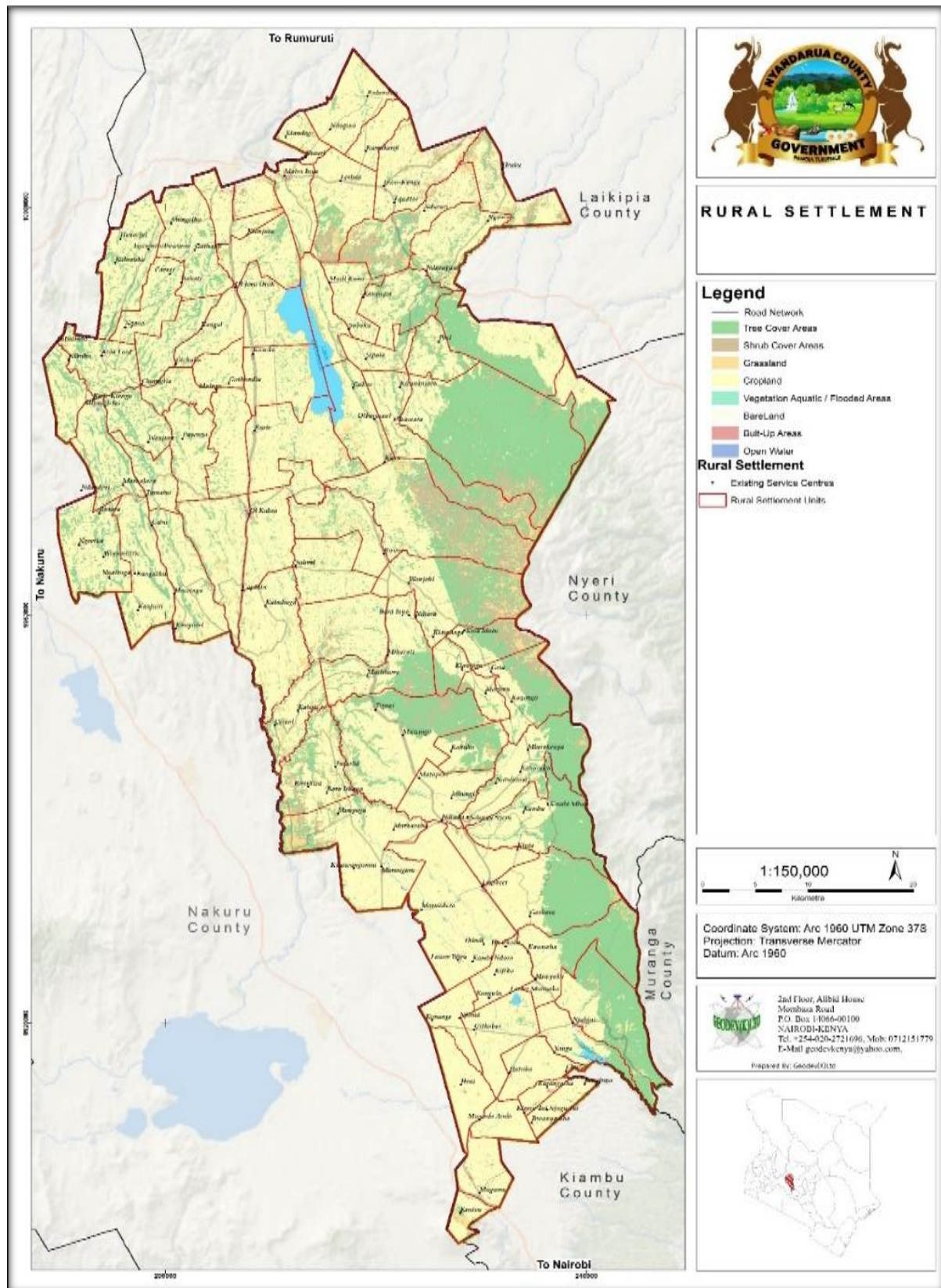
7.12 Rural Settlements in Nyandarua

Morphologically, the rural settlements in Nyandarua county depict varied patterns of concentration and dispersed characters. The areas of concentration are local centres that have emerged due to commercial and service functions, while the disperses areas have emerged due to the land tenure system.

The existing rural settlement model has impacted varied land ways, including the land fragmentation occurring from the land subdivision that has been influenced by the values systems of the residents attached to land (land inheritance).

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Map 7-2: Rural settlement units by Sub-location



7.13 Rural Economic Activities

The rural economic activities established in Nyandarua include on-farm and off-farm economic activities.

7.13.1 On-farm rural activities

Assessment of the rural agricultural activities established that in all the eighty (80) sublocations in the county, potatoes, cabbages, maize, beans, kales, carrot are the major crops and sheep keeping and dairy farming as major animal husbandry activities. It was also identified that 32 (40% of the total rural land) rural areas engage in pyrethrum production, specifically in those sublocations falling in Ndaragwa and Oljoro Orok Sub Counties. Additionally, 26% of the Sub-locations produce spinach, mainly in Kinangop Sub- County regions. These agricultural activities provide an industrial base for industrial development in the rural-urban area of Nyandarua County. This industrial opportunity is underexploited.

7.13.2 Off-farm economic activities

Off-farm activities in the county include storage, drying for value addition, transportation, and marketing. Therefore, the value chain needs to be developed to bring efficiency and facilitate easy access to agricultural products.

7.14 Potential Rural Economic Cluster

Rural economic development takes place based on the geopotential of rural areas. The criteria for assessing the rural economic clusters were horticulture (cabbage, kales, carrot, potatoes, peas, French beans), cereal (maize, oat, wheat, and barley), pasture, and forage. The clustering criteria of the rural settlements are based on the crop suitability derived from the agro-ecological zones. The county's rural economic clusters indicate that seventy out of eighty (70/80) rural units have horticulture potential, fifty-one out of eighty (51/80) rural units have the potential for cereal production. In comparison, twenty-six out of eighty (26/80) rural units have the potential for forage and pasture production.

The rural settlement in Nyandarua county has limited investment in off-farm economic activities. Over ninety-five percent (95%) of off-farm economic activities occur in the urban centres that provide services to the rural areas. Additionally, approximately 29% of the rural units have industrial activities contributing to non-farm employment in Agro-based industries, quarrying, and sand mining. The rural settlement assessment also revealed that twenty-four out of eighty sublocations have tourism potential that is presented by attraction sites and areas including tourism (24/80) facilities (see section 10.6 on tourism attraction sites and areas). More notably, the common non-farm activity that covers all the rural units is retail activities that are characterized by retail shops and open-air markets that exist in thirty-one (31) sublocations.

Other non-farm economic activities include building and construction, mobile banking services, Agrovets services, farm tools and automobile repair services. These services are dominantly provided in the local centres within the rural units. The possible rural clusters are presented in map 7-4;

7.15 Level of service provision in the rural settlement

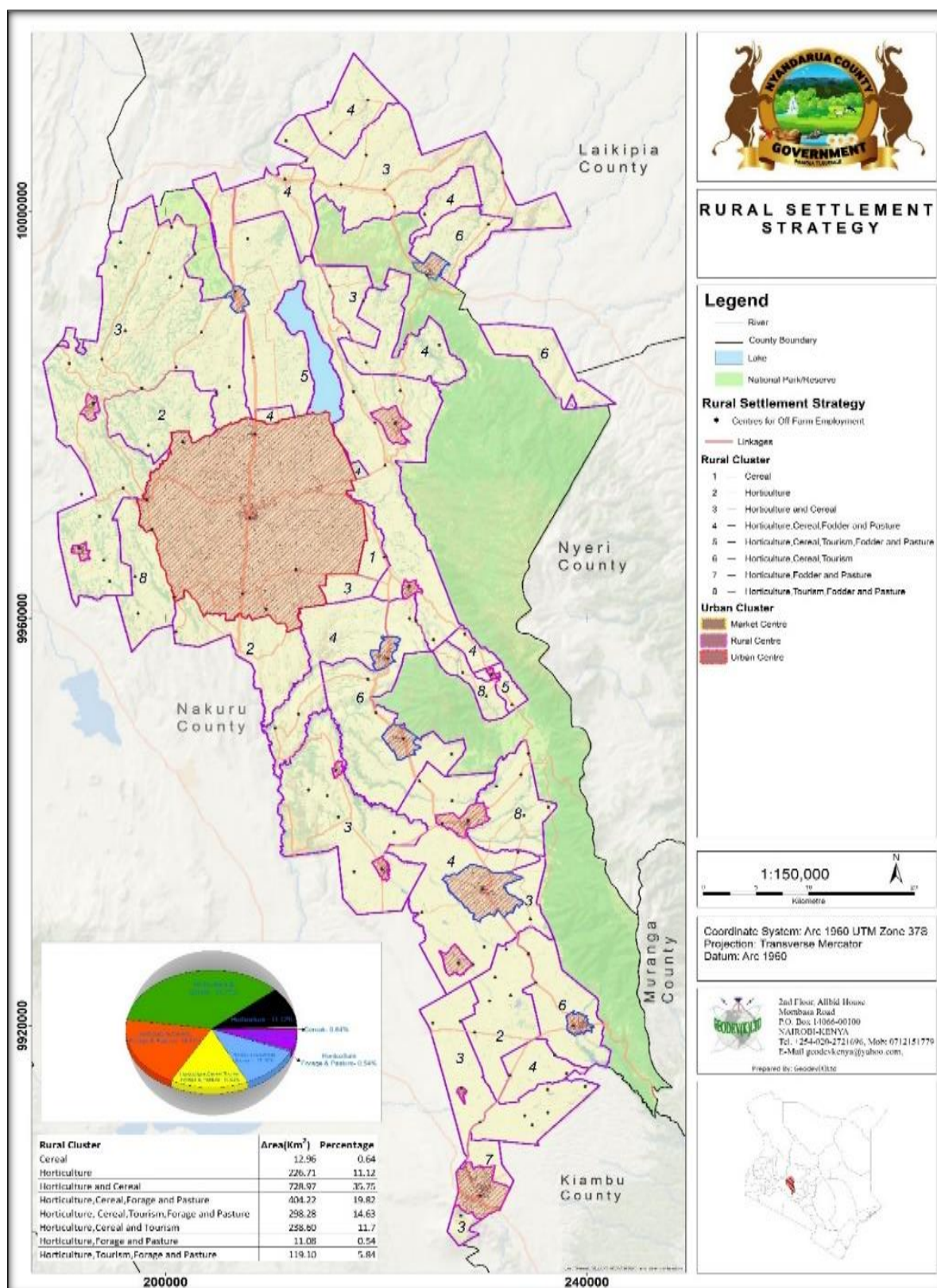
The level of service provision in the rural areas in Nyandarua County indicates that provision of education facilities is 100% at ECDE, primary, secondary school levels while the tertiary education services provision is at 36% of the total rural units. This situation means that there is limited empowerment of the rural population.

The health services that are available in the rural settlements include community units, dispensaries, health centres, and hospitals. The assessment of the facilities indicates that 89% of the rural units have access to lower-level health services (dispensary and health). For effective service provision, these services should be at 100%.

Public transport service in rural areas is limited to the transportation network where the road conditions are improved and linking only major urban centres.

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Map 7-3: Possible Rural Clusters by Farm and Non-Farm Activities



7.16 Rural basic infrastructure provision

Quality of living in rural settlement is also dependent on the level and quality of social and physical infrastructure access and provision. Infrastructural services have a central role in improving the liability index of the rural population and enhancing rural productivity and functionality.

7.16.1 Rural water supply for domestic and agricultural use

The assessment conducted in Nyandarua in the year 2018, established that only nineteen (19) out of the eighty (80) rural units have piped water supply to the rural residents. This proportion translates to approximately 24% piped water coverage. The remaining fraction use river, shallow wells, borehole or water pans and dams. The water supply situation is an indication that there are inadequate water supply and supply infrastructure for industrial, domestic, and agricultural use.

7.16.2 Rural Electrification

As of 2019, all the rural units have a connection to electricity. However, the level of the connection to households is 41.3%. Despite a 100% connection in the rural units, this proportion indicates a limited opportunity for industrialization. The connectivity to electricity is a great base for rural industrialization in the county. With a higher level of penetration, it will be easier to promote cottage industries and rural industrialization at large.

7.16.3 Road condition

The road condition in the rural settlement is poor. The assessment of the road surface condition established that earth road surface condition is: 453.52 Km in twenty-one (21) rural units in Kinangop, 352.57 Km in Thirteen (13) rural units in Kipipiri, 517.42 km in fourteen (14) rural units in Ol-joro Orok region, 474.27 Km in twenty (20) rural units in Ndaragwa and 511.28 Km in twelve rural units in Olkalou region. The earth road condition translates to approximately 48% of the road coverage in the whole county.

The gravel road condition in the rural area covers approximately 2205.93, which is 46% of the total road network in the county. The tarmac road in the rural units covers approximately 251 km in the rural units, which translates to 0.05% of the total road network in the county. The climatic condition of the area shows high rainfall potential at a double maxima regime. With the road conditions being largely earth and gravel surfaces, the roads quickly get eroded and become impassible, rendering them poor. The tarmac road proportion in rural is very negligible. This condition hinders the accessibility and movement of goods and services from the rural settlements.

7.17 Emerging issues

- i. Limited investment in off-farm economic activities.
- ii. Poor urban-rural linkages contributed to by poor road conditions and urban-rural interaction.
- iii. Non-optimal production in crop cultivation and animal husbandry
- iv. Limited adoption of technology in production and marketing in rural areas

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- v. Inadequate rural water supply infrastructure for domestic and agricultural use.
- vi. Inadequate infrastructure provision in the rural service centres to support the growth in the rural settlement
- vii. Underdeveloped rural off-farm income-generating activities such as industries, tourism and technological services
- viii. Potential rural economic clusters that include horticulture, cereal, forage and pasture, and tourism

7.18 Recommendation

- i. Develop the rural units in the form of rural economic clusters based on crop potentials. This intervention will promote specialization and division of labour in rural development and ensure efficiency and increased returns.
- ii. Adopt appropriate technology in dairy production, sheep keeping, and crop cultivation. The adoption of technology in crop cultivation to aligned to horticulture, cereal, and forage production
- iii. Identify a matrix of service centres to support the growth of rural settlements and use the service centres as areas of service provision and the creation of off-farm employment activities
- iv. Develop tourism sites and areas and promote tourism in rural areas.
- v. Improve the condition of the rural access roads and feeder roads to all-weather conditions, to promote urban-rural linkages and to unlock the tourism potential in the rural settlements.
- vi. Augment rural water supply by providing appropriate infrastructure to support agriculture, industrialization, and domestic needs

8 TRANSPORTATION

8.1 Overview

An efficient transport system is a requirement for local economic development and interregional competitiveness. It is achieved by easing the mobility of raw materials, labour, goods, and services. In Nyandarua County, there are three main modes of transport, namely road, railway, and air transport. Road transport is nevertheless the dominant mode. This section takes stock of all the transport infrastructure in Nyandarua County, their conditions, and their function. Also, urban and rural connectivity is accessed to determine the linkages.

8.2 Road Transport

Road is the primary transportation mode in Nyandarua. The total road length in Nyandarua is 4,787.5 kilometres (KRB, 2016). However, the total classified roads are 3,623.6 km. Roads in Kenya are classified from class A to class G. Road classes A to C, are national trunk roads, whereas classes D to G are county roads. The table below shows the criteria for road classification in Kenya.

Criteria for Road Classification in Kenya

Functional System	Level of Service Provided	Rural Road Class	Urban Road Class
Arterial	Provides the highest level of service at the greatest permissible speed for the longest uninterrupted distance, with access control	S	---
		A	H (Au)
		B	J (Bu)
Collector	Meant to collect traffic from local roads and connect it with arterials	C	K (Cu)
		D	L (Du)
Local	Consists of all roads that are not defined as arterials or collectors; primarily provides access to residential, commercial, or industrial areas with little or no movement.	E	M (Eu)
		F	N (Fu)
		G	P (Gu)

Source: Kenya Roads Board, 2020

Major roads traversing the county are Nairobi-Nakuru (A8) highway. The Gilgil-Olkalou-Nyahururu road (A4) is another major road in Nyandarua. The main class B roads are the Nyahururu-Ndaragwa-Nyeri road (B21), formerly B5, and Dundori-Olkalou-Njabini road (B20), which was previously class C69.

There are numerous class D to class G roads in Nyandarua, with class G roads covering the most length, about 2,033 kilometres. The table below shows the length of roads in Nyandarua by class.

Table 8-1: Road Length by Class

Road Class	Sum of Length (Km)
A	51.1
B	149.0
C	377.2
D	172.0

E	118.7
F	722.6
G	2,033.0
Grand Total	3,623.6

Source: Kenya Roads Board, 2020

There are 2 class A roads, 3 class B, and 13 class C roads. Also, there are 1,262 class G roads in the county whose names have not been indicated. The number of roads by class is shown in table 9-2.

Table 8-2: Number of Roads by Class

Road Class	Number of Roads
A	2
B	3
C	13
D	21
E	15
F	100
G	1,262

Source: Kenya Roads Board, 2020

8.3 Intra-connectivity

Road linkages within the county are sufficient. Major roads connect the sub-county headquarters, namely Olkalou, Oljoro-Orok, Ndaragwa, Miharati, and Engineer. The A4 road links Olkalou to Oljoro-Orok, this road intersects with the class B21 road in Nyahururu, which connects to Ndaragwa via Mairo Inya and Gwa Kung'u. Olkalou is then connected to Miharati and Engineer by the class B20 road, which further proceeds to Njabini. Class C roads interlink smaller centres such as Mawingu, Wanjohi, Charagita, and Magumu.

Poor road conditions, particularly in rural areas, have remained a persistent problem in the county. Inaccessible roads constrain the flow of commodities and mobility of travelers between urban and rural areas. A good road network is a pivotal factor in unlocking the county's potential and developing a regional economic powerhouse with more opportunities for the county. The county must therefore increase accessibility and connectivity by opening isolated areas to people and economic activity. Increased connectivity will expose relatively remote regions to the greater competition of goods and services produced within and outside. Thus, creating vibrant nodes, improve access to agricultural production areas, and intensify overall economic growth. All the existing secondary roads and minor roads must be maintained and upgraded to achieve this.

There is a need to upgrade the following linkages to create vibrant nodes and open up the county to more economic opportunities, Charagita - Boiman - Gathanji - Kwa Menja, Laikipia - Njonjo Girls - Boiman, Tumaini - Thaba - Mawingu - Kanyiriri - Gilgil, Laikipia border - Karampton - Ndogino - Mairo Inya, Ndaragwa town - Laikipia, Githioro - Turasha - Gathaithi - Gilgil, Mirangine - Subukia, Link

Nyandarua and Murang'a (Njabini - Kiburu - Kiarutara), Ndunyu Njeru - Kwa Mbekenya - Mutubio - Kiandogoro (Links Nyandarua and Nyeri at Kigogoini)

8.4 Inter-connectivity

Class A to C roads are national trunk roads. Class A and B roads serve as arterials and provide the highest service at the greatest speed possible, whereas class C roads are collector roads that connect main trading centres to arterials. The A4 highway connects Nyandarua to Laikipia County via Nyahururu and to Nakuru County via Gilgil. The A4 road is the primary transportation corridor in Nyandarua County. The B21 road connects Nyandarua to Nyeri County, whereas the B20 road connects Nyandarua to Nakuru via Dundori and to Murang'a and Kiambu Counties via Fly-Over. Notably, some class D roads also connect Nyandarua to other regional nodes outside the county. The county's current distribution of roads partially hinders accessibility, particularly on the eastern side covering Kiriita, Central, Shamata, Wanjohi, Geta, North Kinangop, Gathara, and Njabini/Kiburu wards. It points to the need for a well thought out transportation system in the county to facilitate accessibility to all areas.

Strategic transport routes must be maintained, upgraded, and developed to facilitate trade and cross-border people and goods movement. The status of roads in class informs speed limits, road dimensions, axial load, and funding from the Central Government. Strategic and regular upgrading of roads from local feeder roads to higher class roads is therefore essential.

8.5 Road Conditions

The road conditions in Nyandarua are poor. Of the total of 4,787.5 kilometres of roads in the county, only 260.5 are paved, which accounts for only 5.4% of the total road length. Gravel roads are the most common in the county, being about 54% of all county roads. The table below shows the roads in Nyandarua by condition per Sub County.

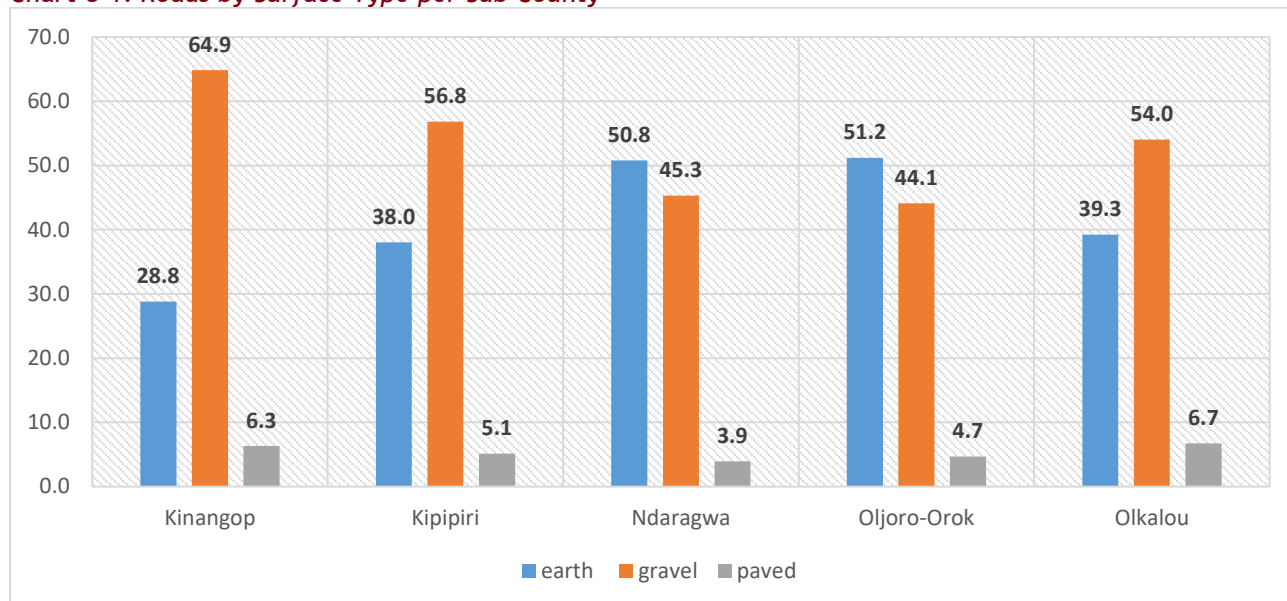
Table 8-3: Road Conditions in Nyandarua per Sub County

Sub County	Surface Type			Total Length (Km)
	Earth	Gravel	Paved	
Kinangop	340.9	767.0	74.6	1,182.5
Kipipiri	291.3	435.5	39.4	766.2
Ndaragwa	450.8	402.3	34.8	887.9
Oljoro-Orok	490.9	423.1	44.9	958.9
Olkalou	389.4	535.8	66.9	992.1
Total (Km)	1,963.3	2,563.7	260.6	4,787.6

Source: Kenya Roads Board, 2020.

The bar graph below shows the roads categorized by surface type in each Sub County. Olkalou has the highest percentage of paved roads, 6.7%, whereas Ndaragwa Sub County has the least, 3.9%.

Chart 8-1: Roads by Surface Type per Sub County



Source: Kenya Roads Board, 2020.

Wanjohi Ward has the highest percentage of road coverage, accounting for 7 % or 333 kilometres of roads. Wanjohi and Kiriita wards have most of the roads paved, accounting for 21.09 and 20.02, respectively. There are no paved roads in Shamata and Geta Wards, and most of the roads are either graveled or earthen. Central Ward has most of its roads graveled.

Table 8-4: Road Surface Condition per Ward in Km²

Ward	Surface Type			Total (Km)	Length
	Earth	Gravel	Paved		
Wanjohi	159.52	152.38	21.09	333.00	
Central	143.80	159.60	13.80	317.20	
Weru	205.10	77.33	17.95	300.38	
Rurii	140.96	107.79	13.59	262.33	
Leshau Pondo	164.54	61.21	3.68	229.44	
Charagita	90.11	117.44	13.80	221.35	
Murungaru	97.11	113.78	8.05	218.94	
Kanjuiri Range	97.34	112.65	6.82	216.81	
Gatimu	136.51	64.75	13.41	214.66	
Githabai	103.76	98.29	9.20	211.25	
shamata	91.50	113.23		204.73	
Kaimbaga	100.46	85.19	12.22	197.87	
Karau	65.46	106.90	16.72	189.08	
Kipipiri	57.96	114.15	10.54	182.65	
Gathanji	86.10	87.44	8.77	182.31	
Kiriita	111.73	42.13	20.02	173.89	
Engineer	35.45	123.32	5.79	164.56	

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Githioro	58.60	79.66	10.44	148.71
Magumu	99.30	29.61	17.07	145.98
Gathara	34.21	92.10	10.65	136.96
Mirangine	69.57	41.54	15.06	126.16
North Kinangop	36.73	77.19	10.09	124.00
Geta	76.28	28.24		104.52
Njabini Kiburu	24.36	66.42	8.42	99.20
Nyakio	22.60	53.40	5.29	81.29
Total	2309.06	2205.72	272.47	4787.25

8.6 Rail Transport

Nyandarua County has a 60 Kilometres railway stretch connecting the county to Nyahururu in Laikipia County and Gilgil in Nakuru County and two railway stations located at Olkalou and Oljoro-Orok towns. These facilities are, however, non-operational.

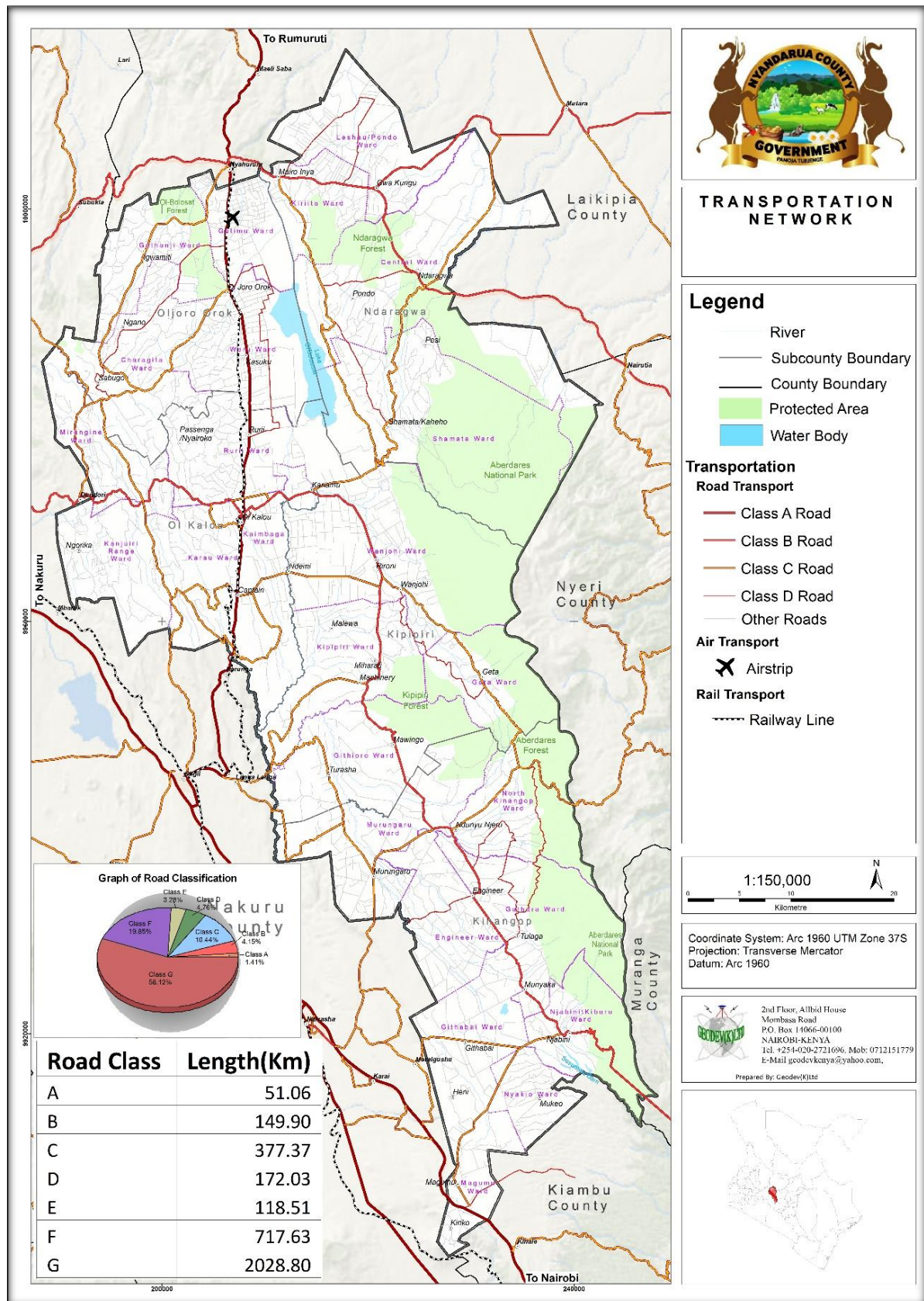
The County Government ought to liaise with the Central Government to finance and revive the railway, providing a cheap and convenient transport mode for bulky goods and agricultural produce. The subsequent extension can be done after the restoration of the old railway.

8.7 Air Transport

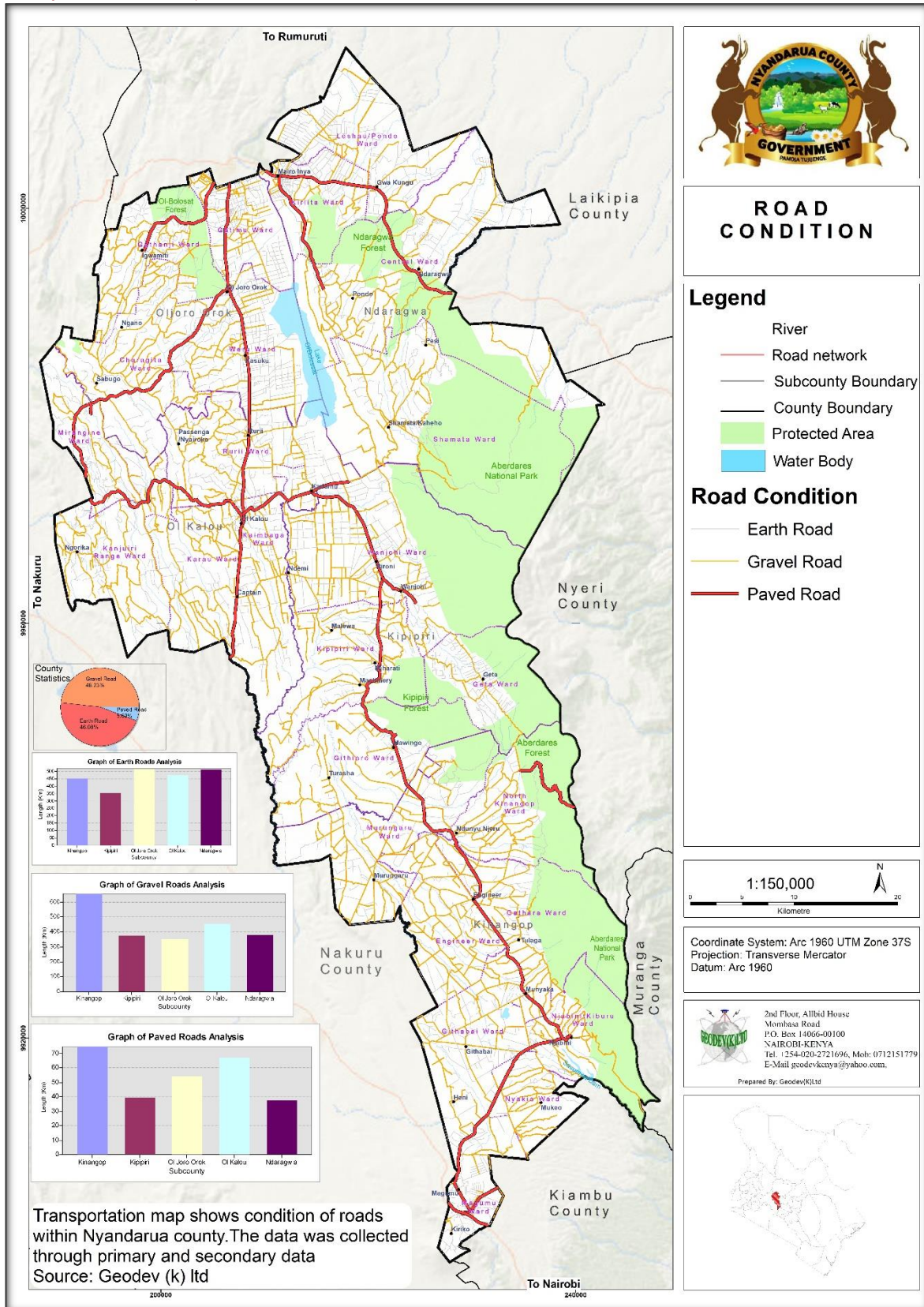
Nyandarua County only has one airstrip situated in Oljoro-Orok. The aerodrome is nonetheless inadequately serviced and has minimal operations.

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Map 8-1: Existing Transportation Network



Map 8-2: Road surface condition



8.8 Urban Transport

Transport conditions in the major urban centres in Nyandarua have been examined. These are Olkalou, Engineer, Mairo Inya, Miharati, Ndaragwa, Njabini, and Oljoro-Orok. Various attributes were studied, i.e., surface conditions, predominant means of transport, and road infrastructure availability, to establish the status of transportation in these towns.

8.8.1 Surface Conditions

The boundaries of the towns were established using satellite imagery and observing the extent of the built-up areas. The table below shows the roads by surface type in each of the towns.

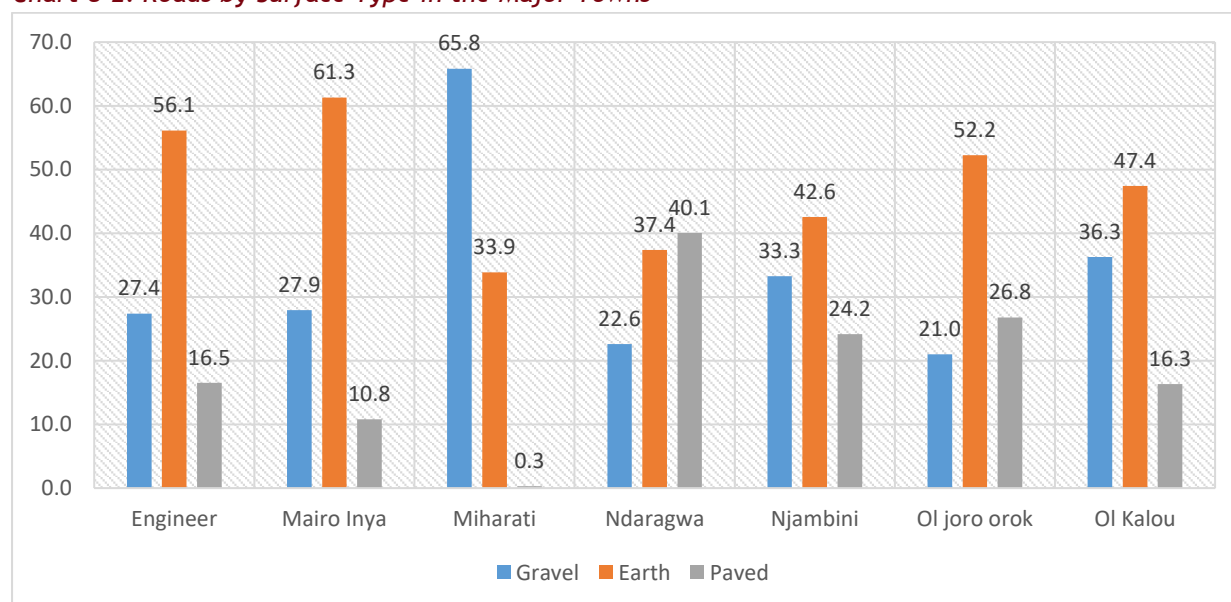
Table 8-5: Roads by Surface Type in Major Towns

Road Surface	Engineer	Mairo Inya	Miharati	Ndaragwa	Njabini	Oljoro-Orok	Ol Kalou
Gravel	1.84	10.76	4.78	1.76	2.86	0.8	17.12
Earth	3.77	23.6	2.46	2.91	3.66	1.99	22.38
Paved	1.11	4.15	0.02	3.12	2.08	1.02	7.71
Total	6.72	38.51	7.26	7.79	8.6	3.81	47.21

Source: Satellite Imagery, 2020

Olkalou is the county's largest town and consequently has the most extended road network, 47.21 kilometres. Oljoro-Orok, on the other hand, has the shortest, 3.81 kilometres. Ndaragwa town has the largest percentage of paved roads, whereas Miharati has the least. The graph below shows the roads categorized by surface type in the major towns of Nyandarua County.

Chart 8-2: Roads by Surface Type in the Major Towns



Source: Satellite Imagery, 2018

8.8.2 Means of Transport

Means of transport in Nyandarua are both motorized and non-motorized. These are further categorized into public or private means. Motor vehicles and *boda-bodas* are the dominant motorized means of transportation in Nyandarua towns. These are mostly owned privately. On the other hand, non-motorized means of transport in the county comprise hand carts, walking, and cycling. Animal transport is another non-motorized transport means. Notably, urban centres in Nyandarua lack adequate non-motorized transport (NMT) facilities such as pedestrian walkways and cycling lanes. These are needed for efficient transport through congestion reduction and the separation of road users to promote safety. Moreover, there are environmental benefits associated with NMT, such as air quality improvement, due to lower greenhouse gas (GHG) emissions.

8.8.3 Public Transport

Public transport is provided by mini-vans (*matatus*), motorcycles (*boda-bodas*), and taxis. The ‘*matatus*’ mainly ply the routes defined by the existing road network, linking the internal and external nodes. The county’s major routes link the primary nodes such as Olkalou, Oljoro-Orok, Ndaragwa, Miharati, Engineer, and Njabini. External routes link the county to Nairobi, Nakuru, Nyeri, Murang’a, Kiambu, and Nyahururu.

8.8.4 Other Road Infrastructure; Terminal and Parking Facilities

A terminal refers to any facility where freight and passengers are either assembled or dispersed. They may also be points of interchange, either from one mode of transport to another or a change of transportation means albeit without a change in transportation mode. Most of the urban centres in Nyandarua are served by terminal facilities. There are 22 terminal facilities in Nyandarua, of which 13 are murram, three are covered with cabbro blocks, whereas six are earthen. Only 9 terminal facilities are fully operational, while 2 have partial functionality. Of the four major towns understudy, all have an operational terminus except Njabini. The terminals in Nyandarua, their condition, and status are as shown in the table below.

Table 8-6: Terminal Facilities in Nyandarua

Terminus	Ward	Condition	Status
Ngorika	Kanjuiri	Murram	Partially operational
Mirangine	Mirangine	Cabro	Operational
Oljoro-Orok	Weru	Murram	Non-operational
Kasuku		Murram	Non- operational
Ndaragwa	Central	Murram	Operational
Ndemi		Murram	Operational
Captain		Murram	Operational
Geta	Geta	Murram	Operational
Mawingu	Karau	Murram	Non-operational
Mawingu	Githioro	Murram	Partially operational
Engineer	Gathara	Murram	Operational
Wanjohi	Wanjohi	Murram	Operational
Miharati	Kipipiri	Cabro blocks	Operational
Olkalou Bus Park	Karau	Cabro blocks	Operational

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Mairo Inya stage	Kiriita	Cabro blocks	Operational
Kangu		Not improved-land set aside	___
Kanjuiri	Karau	Not improved-land set aside	___
Ngano	Charagita	Murram	Non-operational
Gathanji	Gathanji	Not improved	___
Kanyagia		Not improved	___
Uruka		Not improved	___
Njabini	Njabini/Kiburu	Cabro blocks	Operational
Shamata	Shamata	Not improved	___

Source: County Department of Roads, 2017

Nyandarua County has minimal designated parking spaces in all major urban centres. On-street parking is evident in urban areas such as Engineer, Olkalou, Njabini, and Oljoro-Orok. Parking in undesignated areas is also common in smaller urban centres.

8.9 Constraints

The following challenges affect transportation in Nyandarua:

- Poor road surface conditions.
- Limited modal choice.
- Poor inter-linkage of transportation modes.
- Inadequate public transport.
- Lack of access roads in some areas, therefore impeding efficient transportation.

9 INFRASTRUCTURE

9.1 Overview

Infrastructure comprises basic structures/systems, e.g., water supply, ICT, education facilities, health facilities, and electric systems that are a prerequisite for the social and economic development of a region or nation. They facilitate the execution of different activities vital to economic growth and investment. There are two categories of infrastructure, i.e., physical and social.

9.2 WATER SUPPLY

Water availability is essential for economic growth as different economic sectors such as industries, agriculture, commerce, and households largely depend on it. The Constitution also provides for the provision of adequate, clean, and safe water for all. Moreover, the recently adopted Sustainable Development Goals (SDGs) under goal number six, aim to ensure water and sanitation access. This section looks into issues of water accessibility and supply within Nyandarua County.

9.2.1 Sources of water

Nyandarua has an enormous water resource due to its proximity to the Aberdare Water Tower (103,315 Ha). The county falls into four catchment areas: Rift Valley, Ewaso Nyiro North, Athi River, and Tana River catchment areas. It is endowed with both surface and underground water sources, which include;

- Eight permanent rivers, Malewa, Ewaso Narok, Pesi, Turasha, Chania, Kiburu, Mkungi, Kitiri, and fourteen seasonal rivers. Annual water production of the permanent rivers is estimated at 8,760,000m³ and potential production of 10,950,000M³.
- Lake Ol'bolossat has a current annual production of about 18250M3 but has an annual potential to produce 27,375M3.
- 222 dams/pans that serve about 9.8% of the county households. Some of these dams serve major urban centres in Kenya including: Sasumua Dam, which supplies water to Nairobi County; Konoike Dam, which supplies water to Nakuru; and Kitiri which supplies water to Naivasha. The dams have an annual production of 2,640,000 cubic metres but have the potential to yield 3,300,000 M3 annually.
- Rainfall, which is experienced in two seasons. Long rains start in March and end in May with a maximum rainfall of 1500 mm. The short rains are received between September and December and have a minimum rainfall of 700 mm.
- 280 boreholes with an annual production capacity of 7,752,600 M3.
- 6244 shallow wells with a total annual production yield of 456,250 M3.
- 96 springs with an annual production capacity of 7,008 M3, however, the springs have an annual production potential of 684,375M3.

Map 9-1: Water supply resources in the County

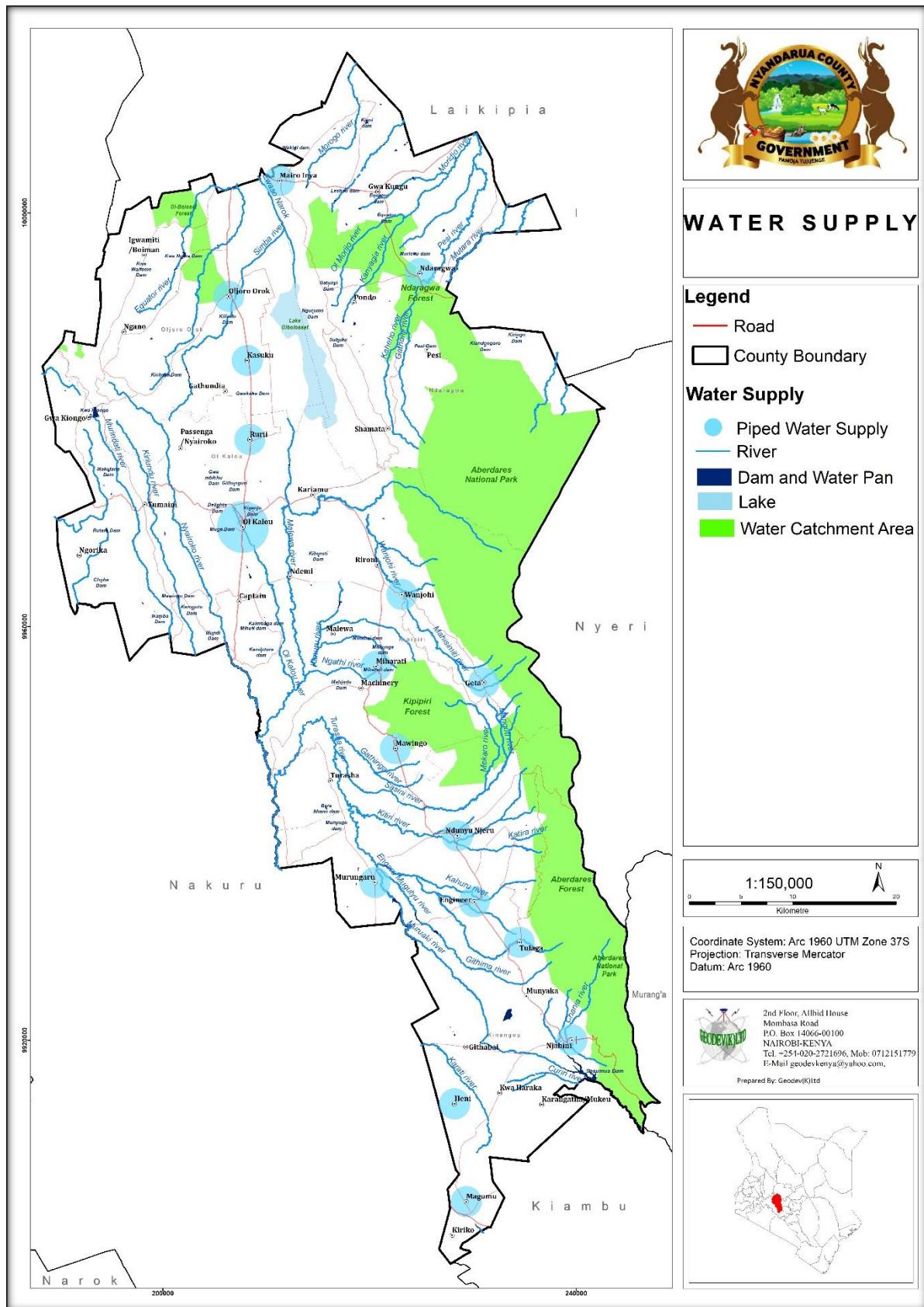


Table 9-1: Water sources in Nyandarua County

Water Sources	Number	Annual Capacity(M3)	Annual Production Potential (M3)	Level of utilization
Rivers (permanent)	8	8760000	10950000	Household, Irrigation & commercial
Springs	96	7008	684,375	Household
Lake	1	18250	27375	Household & Irrigation
Dams/Pans	222	2640000	3300000	Household & Agriculture
Boreholes	280	7752600	5168400	Household
wells	6244	456250	684375	Household
Rain	700mm - 1,500mm (Annual)	---	---	Household

9.2.2 Water Service Providers

Nyandarua Water and Sanitation Company (NYANDAWAS) and Olkalou Water and Sanitation Company (OLWASCO) are the main utility companies that supply piped water. However, there are also numerous small-scale rural water service providers' - self-help groups.

Nyandarua Water and Sanitation Company (NYANDAWAS)

The company has five schemes that serve a total of 3,000 households. The company's total distribution network is about 58 Km². The total capacity of its reservoirs is about 3025 M3 and supplies about 1550 M3/day which is low compared to the increasing demand for water within the schemes. The table below shows the schemes under NYANDAWAS.

Table 9-2: Water Supply Schemes under NYANDAWAS

Scheme	Storage M3	Supply M3/day	HH served	Coverage (Km ²)	Water Source
Kirima (Shamata) Scheme	1,000	100	150	20	Mountain Springs
Kasuku Scheme	25	50	150	2	Borehole
Ol-Olgoro/ Kangui Scheme	1,000	750	1,000	10	Oleimutia Dam
Mairo Inya Scheme	None	100	200	1	Purchase from NYAHUWASCO
Gatimu Scheme	500	300	1,000	10	1.Kamana dam 2.Purchase from NYAHUWASCO

Kibathi Scheme	500	250	500	15	A well besides lake Ol'bolosat
Gwa Kiongo Scheme					Gwa Kiongo Dam

Source: Nyandarua Water and Sanitation Company, 2017

Olkalou Water and Sewerage Company (OLWASCO)

The company sources its water from River Malewa and 5 boreholes. The company abstracts between 1,700 M3 per day during the rainy season and 800 M3 per day during the dry spell. The boreholes have a total yield of 300 M3 per day. OLWASCO supplies about 620 M3 per day against a daily demand of over 2,500M3.

Table 9-3: OLWASCO Water Supply Capacity

Storage M3	Supply M3/day	HH served	Coverage (Km2)	Water Source
3,056	620	2,718	25	River Malewa & 5 boreholes

Source: Olkalou Water and Sanitation Company, 2018

The total daily water supply from the two schemes is 2,170 cubic metres. This amount is inadequate to meet the growing demand. There is stillroom to harness emerging technologies to improve operations and service delivery across the water schemes. Notably, there is a water treatment plant being put up at Gwa Kiongo Dam to augment water supply in the county.

9.2.3 Community Based Organizations (Self-Help Groups)

The various water projects in the county; mostly in the rural areas, are championed by Self-Help Groups (SHGs). These projects mainly source water from existing dams/pans, boreholes and springs. The SGHs are managed by committees, who are members of the community elected by the members to spearhead the projects and oversee the implementation of the same. Some SHGs have employed some staff who run the day-to-day affairs of the projects in terms of management and operation. These staff facilitate the collection of water tariffs, repairs and installation and advise the community accordingly through the committee.

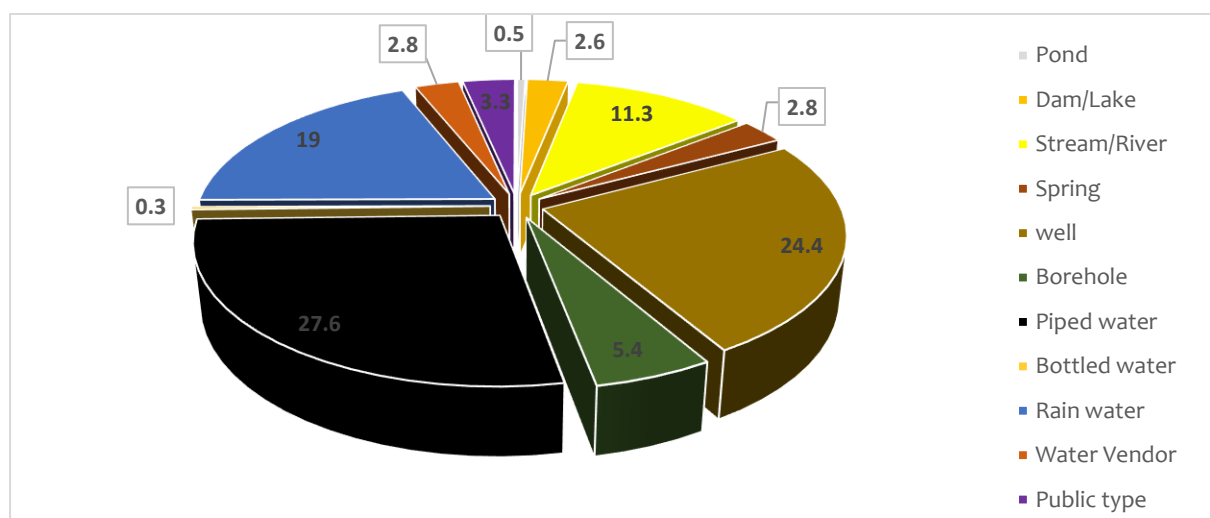
The management of these groups faces a leadership crisis. Some of these wrangles are political where individual projects are politicized. This has led to the stalling of some projects in the county. The projects also face challenges of acquiring adequate funds to regularly maintain and maximize operations. To ensure smooth operations of these water providers the county government can partner with the groups by providing funding and capacity building. The county government can also encourage self-groups to work under the management of the existing water companies to enhance efficiency of operations and management.

9.2.4 Water Accessibility

Residents of Nyandarua County have access to piped water, boreholes, shallow wells, rivers, dams and rainwater. However, access to clean and safe drinking water is a persistent problem. The problem cuts across the county, though variably. The adversely affected areas include; Ndaragwa Sub County, Turasha, Githabori, Magumu, and North of Olkalou.

Wells and rivers are the leading sources of water in rural areas, demonstrated by the fact that approximately 26.3 and 23.8 % of households rely on them respectively. Statistics indicate that only close to 20.8% of Nyandarua residents have access to piped water. The accessibility of water in the county was also established based on the average distance to the nearest water source/point. It was established that the average distance to the nearest water source in Nyandarua is approximately 646.6 metres, which compares poorly with the recommended 500 metres. The chart shows the distribution of households in Nyandarua by their main water source.

Chart 9-1: Households by Main Water Source



Source: KNBS, 2019

Rainwater harvesting remains low. This is especially due to inadequate harvesting facilities and poor structure designs that do not have provisions for rain water harvesting.

9.2.5 Accessibility of Water per Sub County

1. Olkalou Sub County

Access to water in Olkalou Sub County is uneven. The northern part of the Sub County has the least accessibility. Poor water accessibility is reflected by the long distance covered within the Sub County to the nearest water point, i.e., about 940 metres. In addition, the incidence of contaminated drinking water is pervasive across the Sub County as the residents mainly source water from shallow wells and rivers. Only about 8.8% of the Sub County households have access to piped water. OLWASCO is the main water service provider in Olkalou town. Other water schemes in the Sub County include the incomplete Maran, Kaimbaga and Wachionga Water Projects.

2. Kinangop Sub County

Kinangop is endowed with adequate water resources. However, access to piped water remains insufficient within the sub county with only about 29.0% of households having access to piped water. Muhonia Water Project serves approximately 3,000 households within Murungaru Ward, while Magumu Water Project has no distribution network. There are about 60 community water projects in the Sub County and the average distance to a water point is approximately 460 Metres.

3. Kipipiri Sub County

Accessibility to water in Kipipiri Sub County is below average with only about 44.2% of households in the Sub County having access to piped water. Githioro Ward is served by Turasha water community project, Mawingo Ward by a Canadian sponsored Water Project, Geta Ward has approximately 20 community and individual water projects, Kipipiri Ward by Manunga Mainga Water Supply Project. Githioro Ward residents depend on rain water for supply. Residents in this sub county cover a favorable distance of 409 metres, however, there is a need to increase water supply in all areas within Kipipiri.

4. Oljoro-Orok Sub County

A majority (47.8%) of Oljoro-Orok Sub County households depend on shallow wells, which are owned individually. Only about 12.6% of Sub County households have access to piped water. The average distance from a household to the nearest water point is approximately 556 metres.

5. Ndaragwa Sub County

Ndaragwa Sub County is largely water deficient with only about 19.4% of households having access to piped water. The sub county is characterized by low rainfall, and low groundwater potential. Poor water accessibility in Oljoro-Orok is reflected by the long distance, i.e., 864 metres covered from households to the nearest water point.

The table below indicates the summary of sub county water sources

Table 9-4: Households by Water Source per Sub County

Sub-County	Dam s/Pans	Lake	Rivers/Streams	Springs	Shallow wells	Water vendors	Rain water	Boreholes	Piped water
Olkalou	15.5	0.1	18.9	8.4	32.8	3.5	3.4	8.6	8.8
Kipipiri	5.6	0	32.5	2.9	5.6	0.6	5.3	3.3	44.2
Oljoro-Orok	3.4	0.1	19.3	3.4	47.8	1.9	2.3	9.2	12.6
Kinangop	7.2	0	16.1	3.1	24.9	3.5	9.5	6.7	29
Ndaragwa	19.3	0.1	22.2	6	21.6	2.5	3.1	5.8	19.4

Source: Exploring Kenya's Inequalities, 2013

Adequate investment in utility infrastructure is necessary to enhance access to safe water. Moreover, there is need to develop a strategy on rain water harvesting. Currently the county has collaborated with Tana and Athi River Development Authority (TARDA) to de-silt numerous dams to boost water supply.

1.1.1 Assessment of Accessibility Water Supply by Ward

Nyandarua County has a diverse network of rivers which supply water to every ward in the County. Analysis of the water availability revealed that the central ward had the longest network of rivers at eighty-two (82 km) while Nyakio ward has the shortest at 0.8 km.

The analysis revealed that central ward could support economic activities such as irrigated agriculture favorable than Nyakio ward. There is an implication of Nyakio ward being susceptible to water shortage relative to Central ward due to the limited water supply from rivers. The analysis of the river network per award is presented in annex 2-1 and graph 2-3;

Water supply infrastructure in the county includes dams, water pans, springs, and boreholes. Central ward and Karau wards have the highest number of dams at 20 and 14, respectively, while Magumu, Njabini, North Kinangop, and Wanjohi each have one dam. Water pans are majorly in Leshau Pondo and Nyakio, each having 14 and 12 water pans, respectively, while Magumu, Gathanji, Gatimu, Githabai, and Githioro each have one. Springs are 2 in Karau and 1 in Central ward, while Boreholes are mostly in Rurii (3) and Central (1) ward.

9.2.6 Urban Water Demand

Urban water demand estimate is established by taking into consideration the urban population, and both the commercial and institutional uses that are a key component of urban function. The urban population has been projected to grow at a rate of 4.31% per annum. Currently, with a projected population of 154,896, urban water demand in Nyandarua County is estimated to be 24,609.1 cubic metres per day. The table below shows the current and projected urban water demand in the County.

Table 9-5: Urban Water Demand

Urban Water Demand	% of Total Population	Consumption (L/Head/Day)	Demand M3/Day	
			2020	2030
High Income	5	250	1,936.2	2,830.6
Medium Income	25	150	5,808.6	8,491.9
Low Income	70	75	8,132.0	11,888.7
Total Domestic			15,876.8	23,211.2
Commercial & Institutional	30% of the Total Domestic water demand		4,763.1	6,963.4
Allowance for leakage	20% of total domestic water demand		3,175.4	4,642.2
Internal Usage	5% of total domestic water demand		793.8	1,160.6
Total Water Demand			24,609.1	35,977.4

Source: Consultant's Estimates

The two major urban water service providers i.e., NYANDAWASCO and OLWASCO supply 2,170 cubic metres per day. This implies the urban areas within the county have a current daily deficit of 22,439.1 cubic metres per day. The urban water demand is expected to rise to about 35,977.4 cubic metres per day by the year 2026. The table below shows water demand in major urban centres in Nyandarua.

Table 9-6: Current and Projected Water Demand in Major Towns

Town	Total Demand 2020 (M3/day)	Projected Demand 2030(M3/day)
Mairo Inya	1,566.2	3,209.1
Njabini	959.9	1,966.9
Engineer	323.0	661.9
Olkalou-Core	1,116.1	2,286.8
Olkalou total	14,699.6	21,490.1
Total	18,664.8	29,614.8

Source: Consultant's Estimates

9.2.7 Rural Water Demand

Meeting the growing water demand and providing maintenance on the already aging infrastructure remains a challenge to the County government. Nevertheless, the county in conjunction with the National government, is working to expand water access, particularly in rural areas where only a small percent of the population is connected to piped water.

9.2.8 Ongoing Projects.

- Malewa Dam water supply project
- Chachabole water pan
- Kwa Njora water pan
- Muti Umwe water pan
- Kinja Dam project.

9.3 Emerging issues

Opportunities	Constraints	Recommendations
<ol style="list-style-type: none"> 1. 8 permanent rivers provide opportunities for adequate supply of piped water 2. The Aberdares ranges acts as a water catchment area 3. The dams and water pans are important for storm water collection and storage 4. High ground water potential 	<ol style="list-style-type: none"> 1. Lack of an integrated water supply plan for the entire county. 2. Dilapidated and decaying infrastructure. 3. Lack of water treatment facilities in water supply systems. 4. Inadequate funding for upgrading, rehabilitation and expansion of water services. 5. Siltation in the dams. 	<ol style="list-style-type: none"> 1. Investment in the County Integrated water reticulation system 2. Repair and maintenance of dilapidated water infrastructure 3. Awareness trainings need to be carried out in the communities on the need for the water projects, community-based organizations to consider working under the management of the water companies to solve the challenge of management problems

		<p>4. Installations of water meters at strategic positions to help deal with the issue of non-revenue water.</p> <p>5. The need for water treatment plants to treat the water making it fit for the domestic use.</p> <p>6. Adoption of the various community-based water projects by the county government for funding and maintenance.</p>
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9.4 SOLID WASTE

Solid waste management remains a major challenge in all counties in Kenya, including Nyandarua. Formerly, most local authorities did not establish proper waste management systems, and county governments have inherited this state of affairs (National Solid Waste Management Strategy, 2015). The situation has been aggravated by rising population and urbanization levels. Currently, the population of Nyandarua is estimated to be 651,055 and is expected to rise to about 793,632 by 2030.

Currently, solid waste generated on a daily basis in Nyandarua is estimated to be 427 tons. Of this, 75% (320 tons) is handled in rural households, 15% (65 tons) in urban areas, while the remaining 10% is left unattended. Notably, urban areas generate close to 65 tons of waste per day, 14 of which are collected, leaving the remaining 51 uncollected.

9.4.1 Types of solid waste generated

The main types of solid waste in Nyandarua are household/domestic, commercial, agricultural, industrial (including construction waste), institutional and e-waste. There are also healthcare/clinical wastes from health facilities as well as hazardous/toxic wastes. The table below shows the various waste categories in Nyandarua County.

The main solid waste generators comprise the main markets, which are: Magumu Complex; Soko Mjinga, Fly-Over Magumu and Wakiba Junction and urban nodes such as Olkalou, Mairo-Inya, Njabini, Ndaragwa and Engineer. Other solid waste generators include the following urban centres: Wanjohi, Miharati, Oljoro-Orok, Kasuku, Kaptain, Mirangine, Ndunyu Njeru, Geta, Gwa-Kungu, Murungaru, Rurii, Mukue, Ngano, Shamata and Siribwet (County Director of Public Health, 2017).

Table 9-7: Waste Categories in Nyandarua

Waste Categories	Typical Generators	Waste	Type of Solid Waste
Household/Domestic	Single and multi-family dwellings		Food waste, paper, card boards, plastics, cans, yard wastes, textiles, leather, wood, glass etc.
Commercial	Stores, markets, office buildings, restaurants, shops, bars etc.		Packaging and container materials, used office paper, plastics, wood shavings, food waste, hazardous waste, electronic waste etc.
Industrial	Light and heavy industries		Food wastes, packaging wastes, food wastes, demolition materials, plastics, slag, mineral tailings, e-waste, batteries, pesticides, coolant, lubricants etc.

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Institutional	Police stations and posts, barracks, schools, churches, health facilities etc.	Food waste, used paper and plastics, used needles, syringes and gloves, wood, steel, concrete wastes etc.
Municipal/Street Sweepings	Residential neighborhoods	Dust, leaves, paper, plastics, human and animal excreta, sludge water, e-waste etc.
Construction	New and old buildings	Wood, brick/stones, concrete, plastics, glass, metals etc.
Agricultural	Farms	Chemical containers, manure, agricultural byproducts, carcasses etc.

Source: County Solid Waste Management Policy, 2015

9.4.2 Solid waste management facilities

The County has five waste management facilities. The facilities are located in Ol Kalou, Malewa, Kinangop and Ndaragwa.

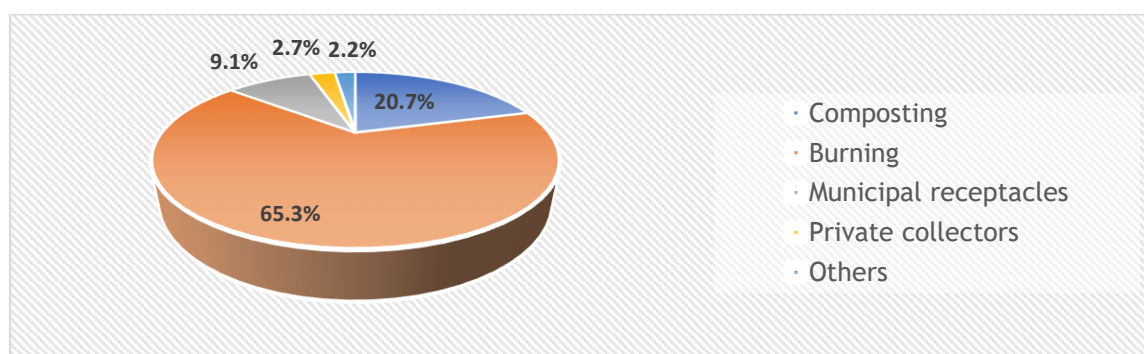
Table 9-8: Solid Management Facilities

Facility	Type	Location
Mahinga	Dumping site	Olkalou
Mahinga	Dumping site	Malewa
Kaharu	Dumping site	Kinangop
Tulaga	Dumping site	Kinangop
Mbuyu	Dumping site	Ndaragwa

9.4.3 Solid Waste Management in County Households

Most of the households, approximately 65.3%, dispose of their solid waste by burning. Municipal waste receptacles and private waste collectors collectively cater for 11.8% of the total disposed household waste in the county. These are mainly households located within urban areas. About 20.7% of households compost their waste, while the remaining 2.2% use other methods of waste disposal. The pie chart below shows the percentage distribution of households by the main method of solid waste disposal.

Chart 9-2: Households by Methods of Solid Waste Disposal



Source: Field Survey, 2017

Sorting of waste at household level is low with only about 36% of households sorting their waste (Field Survey, 2017). It should be noted that the sorting of waste is only for dry and wet waste, whereby wet waste is composted and used as farm manure. Dry waste i.e. paper, plastics, glass etc. however remain unsorted.

9.4.4 Solid Waste Disposal Sites

There are five (5) solid waste disposal sites in Nyandarua though only one is operational. They are: Mahinga (Olkalou), Mahinga (Malewa), Kaharu (Kinangop), Tulaga (Kinangop) and Mbuyu (Ndaragwa). Only the Mahinga disposal site in Olkalou is operational. All wastes are disposed at the site without segregation i.e., both biodegradable and non-biodegradable. This hinders reuse and recycling of solid waste.

Plate 9-1: Mahinga Solid Waste Disposal Site (Olkalou)



Source: Field Observation

9.4.5 Hazardous/Medical Wastes

All health facilities within the county manage their waste within their premises. This poses a high risk to public health since most facilities lack standard incinerators. However, there are plans to establish a county incinerator at JM Memorial Hospital with a capacity of managing 100 Kilograms of medical waste per day.

9.5 Electricity

Nyandarua County main source of electricity is from hydropower. The County does not have a hydropower generation plant. However, there are substations to set-up and down electricity distributed along the national grid. These Sub-Stations area situated in; Ol'kalou, Matundura, Magumu and Wanjohi. See Map 9-2

9.5.1 Electricity Access

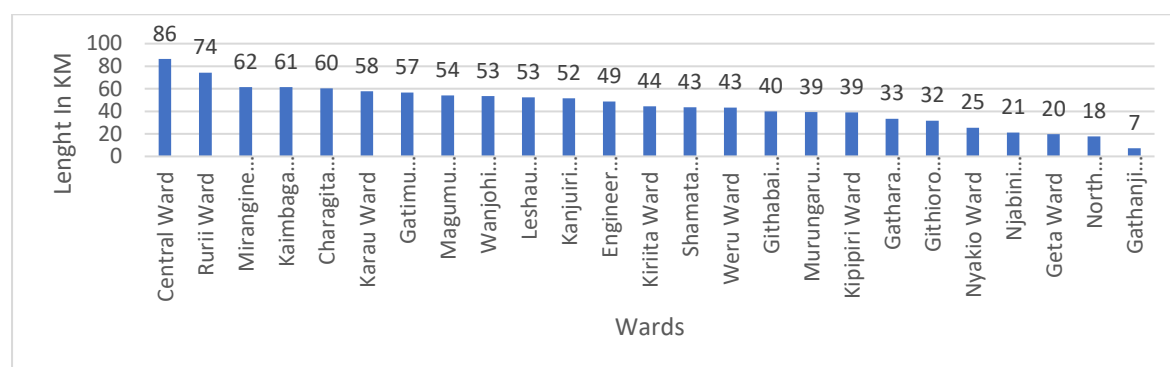
In Nyandarua County, there are a total of 65,399 (40%) households connected to the internet. Despite the moderate rate of electricity connection, power usage remains marginally low accounting for only 11% of lighting needs in the County (CIDP 2018-2022). The rate of electricity access and connection

has been on the increase supported the last mile program by the national government. Studies reveal that of 60% of households currently not connected to electricity, accessibility was the main issue preceded by affordability.

9.5.2 Electricity assessment by Ward

The electricity distribution in Nyandarua County currently stretches 1,124 Kilometer. The electricity distribution per ward favors Central ward which covers 86 km while Gathanji ward spans least at 7 km.

Chart 9-3: Distribution of Electricity Line per Ward



The distribution of sub-stations is in Kaibaga, Wanjohi, Engineer and Magumu and each have one sub-stations as presented below;

Table 9-9: Distribution Substation

Ward	Number
Kaibaga	1
Wanjohi	1
Engineer	1
Magumu	1

9.5.3 Emerging issues

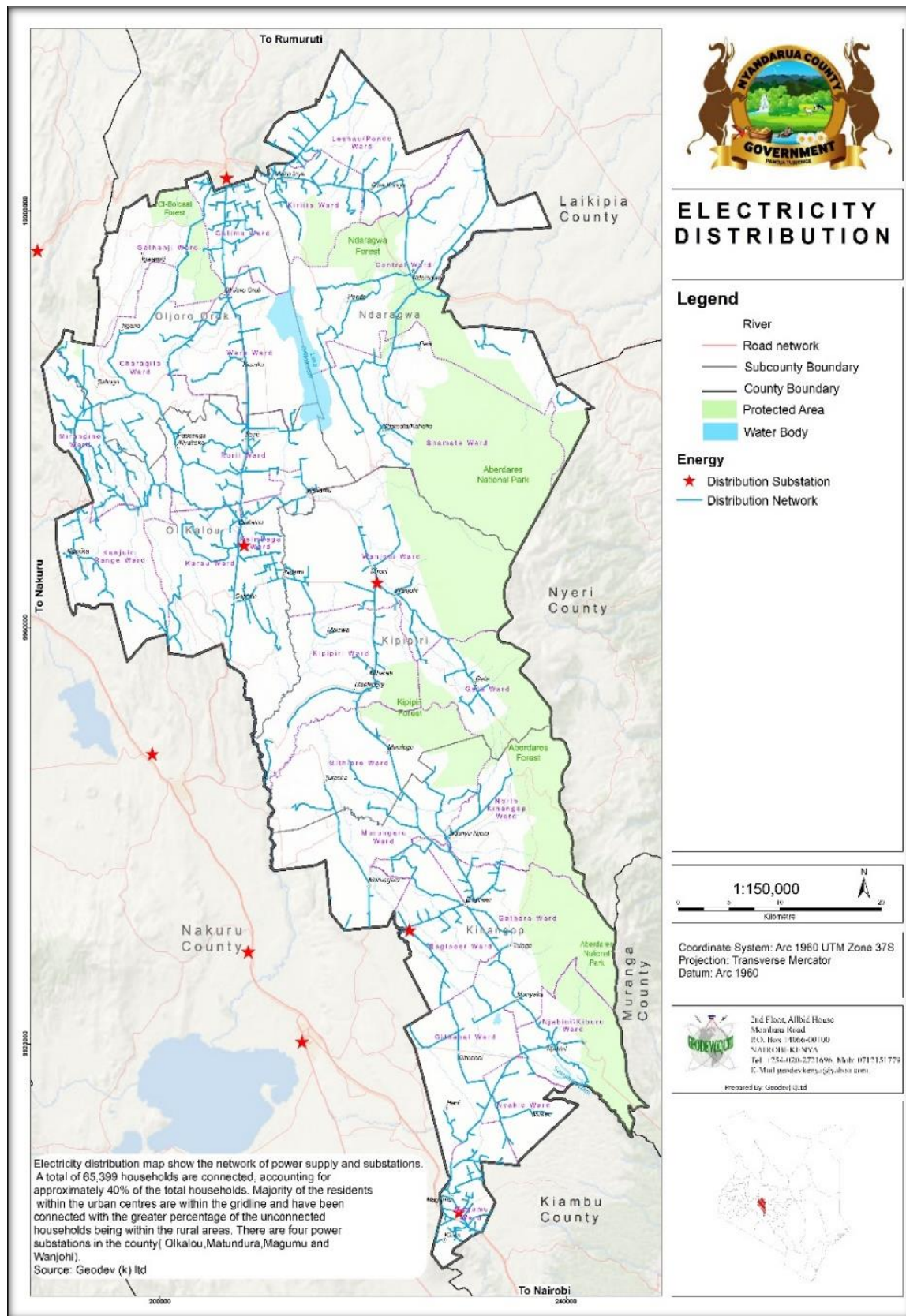
- High cost of electricity connections which limit the connection rates.
- Relatively low electricity connection currently at 40% of the total households
- Inadequate electricity distribution lines to cover the County
- Relatively low rate of electricity use, currently standing at 11% for lighting

9.5.4 Recommendations

- Provide a subsidize policy which will lower the connection cost with the intention of increasing electricity connections
- KPLC should increase electricity distribution lines to encourage electricity connection through better accessibility
- Develop a county energy policy to encourage use of alternative sources such as solar energy, wind power to make electricity affordable

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Map 9-2: Electricity Facility Distribution in Nyandarua County



9.6 Information, Communication and Technology ICT

ICT is a revolutionary and an integral facility in a growing economy. ICT plays a variety of roles within a society such as governance and developments. In Nyandarua County ICT has been embraced in a variety of areas such as public service delivery and in learning within institutions and mass education spaces. ICT and E-governance received a marginal budgetary allocation of 0.26% (20,019,170 million) (Source: Approved 2nd Supplementary Budget FY 2018/2019). ICT facilities are composed of mobile phones, post offices, fiber optic, radio and television, among others.

9.6.1 Mobile phones

Mobile phones enjoy a high degree of accessibility within Nyandarua. The base access rate stands at 88.7% as of June 2017 and is projected to have surpassed 95% as at 2020 (Source: CIDP 2018-2022). The main mobile phone and telephone service providers are Safaricom, Airtel and Telkom. The mobile service is poor and is characterized by a weak Global Satellite Mobile (GSM) signal in certain areas, and lack of a 4G network. The distribution is presented on Map 10-3.

9.6.2 Fibre Optic

Nyandarua County is served by a Fibre optic infrastructure the National Optic Fibre Backbone (NOFBI). The Fibre optic infrastructure is connected to only Olkalou. The Fibre optic infrastructure line runs through Nyahururu to Olkalou and the other from Gilgil to Olkalou as shown on Map 10-3.

9.6.3 Post office

Nyandarua County has ten (10) post offices and one sub-post office at Rurii in Olkalou Sub-County as shown in the table 10-10 and Map 10-3.

Table 9-10: Post Offices in Nyandarua

Sub-County	Name of Post Office	Sub-Post Office
Kinangop	South Kinangop (Njabini)	-
	North Kinangop (Engineer)	-
Kipiri	Miharati	-
	Wanjohi	-
Olkalou	Olkalou	-
	-	Rurii
	Mirangine	-
Oljoro Orok	Oljoro Orok	-
	Kwa-Miti (Nyandarua West)	-
Ndaragwa	Ndaragwa	-
	Kaheho/Shamata	-

Source: Olkalou Post Office, 2017

9.6.4 ICT Hub

Nyandarua County six (6) ICT hubs of which 2 ICT hubs are funded by the County Government and 4 hubs in each Sub-County funded by the National Government through the CDF. The County is developing a call centre at the County headquarters to cater for emergencies.

9.6.5 Assessment of I.C.T by Ward

9.6.5.1 Post Office

The post offices per ward are distributed within Central, Gathara Karau, Kipipiri, Mirangine, Njabini Kiburu, Shamata, Wanjohi and Weru Wards. The number of post offices is presented in table,

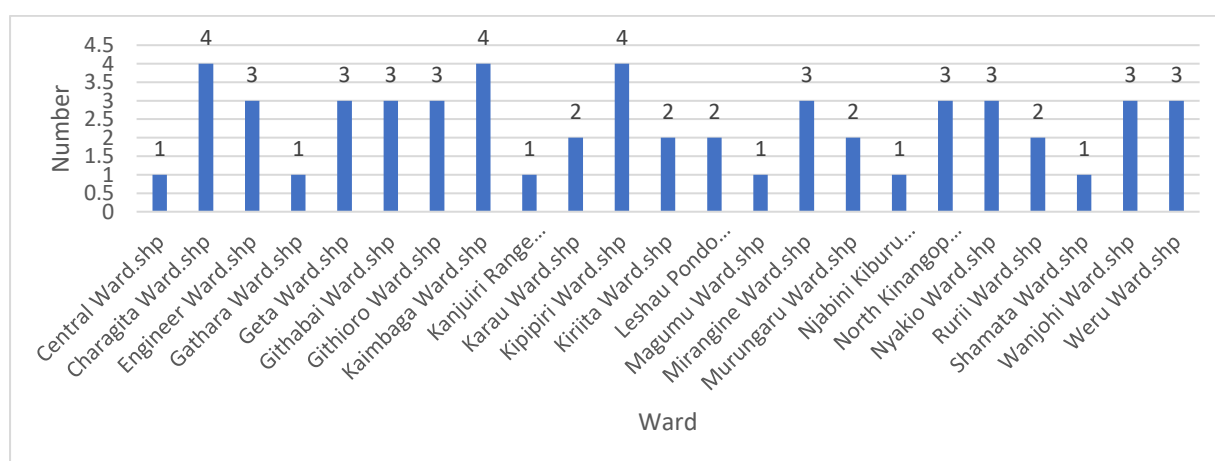
Table 9-11: Post offices per ward

Central Ward	1
Gathara Ward	1
Karau Ward	1
Kipipiri Ward	1
Mirangine Ward	1
Njabini Kiburu Ward	1
Shamata Ward	1
Wanjohi Ward	1
Weru Ward	1

9.6.5.2 Mobile Network

Telecommunication mast distribution in the county is unevenly distributed by ward. An assessment on the telecommunication distribution by ward revealed that Charagita, Kipipiri and Kiriita had the highest number (4) of telecommunication masts while Shamata, Njabini Kiburu, Magumu, Kanjuiri and Central wards had one mast each. The later have an occurrence of poor network connection based on field study and population analysis. Central ward with the highest population (41,812) has one telecommunication mast while Charagita (19,342) has four telecommunication mast. These disparities influence network shortages. A presentation of telecommunication masts per ward is presented in chart 10-4.

Chart 9-4: Number of Telecommunication masts per Ward



9.6.5.3 ICT gap analysis

- The high-speed network within the County is limited to specific areas of the County
- The Fibre optic network within the county is limited to Ol' Kalou Municipality
- The County revenue collection is only 80% automated
- Inadequate numbers of specialized IT experts

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- Inadequate ICT infrastructure such as labs, and adequate qualified staff

9.6.6 Emerging issues facing ICT within Nyandarua

9.6.6.1 Challenges facing ICT

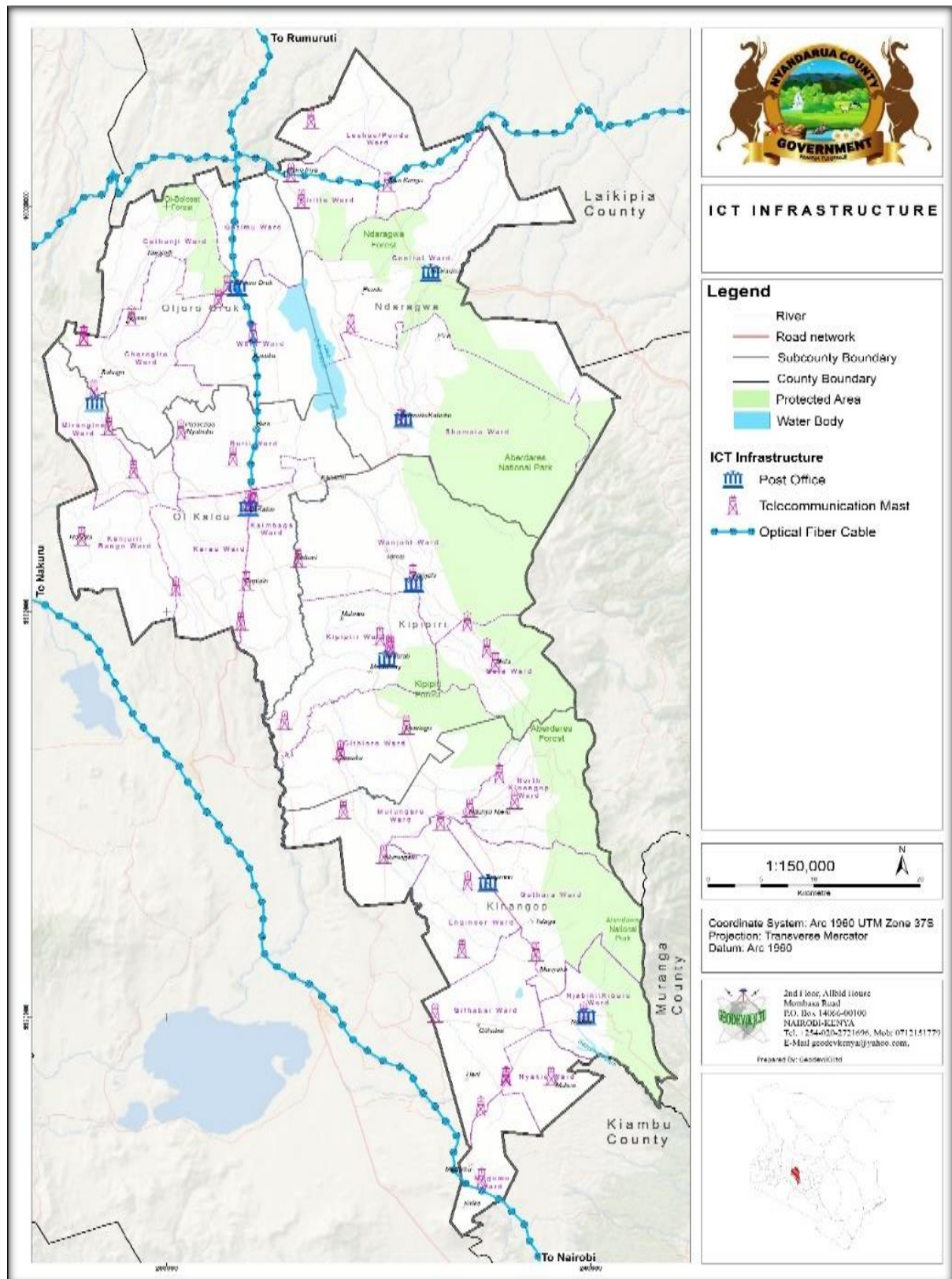
- Poor ICT infrastructure and networks demonstrated by weak Global System of Mobile in certain area and 4g network.
- Inadequate distribution to the National Fibre optic infrastructure Countywide and it is only limited to Ol'kalou headquarters.
- Low budgetary allocation of 0.26% below the 5% of declaration and commitment as per the Abuja declaration.
- Inadequate uptake of automation within the department.
- Inadequate ICT personnel where the department has only 8 staff including the director.
- Inadequate ICT skills among County staff.
- The County lacks a defined legislation and policy guideline on ICT.

9.6.6.2 Recommendation for ICT within Nyandarua

- Collaborate with service provider to ensure Countywide network coverage with
- Expand the Fibre optic backbone within the county to interlink all Sub-Counties
- Increase the budgetary allocation to 1% of the budgetary allocation
- Undertake a comprehensive automation of all departmental functions
- Hire more staff within the ICT department and embark in training of the workforce
- Formulate ICT legislation and policies to guide ICT development within the County

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Map 9-3: ICT Distribution Infrastructure



9.7 SOCIAL INFRASTRUCTURE

9.7.1 Overview

Social infrastructure is a subset of the infrastructure sector and specifically includes facilities that support social services. Types of social infrastructure include healthcare (hospitals), education (schools and universities and community facilities. This section therefore discusses the components of social infrastructure by providing the number and distribution of the facilities in the entire county.

9.8 Education

Education is recognized worldwide as an enabler of a territory's human resource. Education is credited with equipping the citizenry with knowledge and skills that are fundamental in positively impacting their social, economic and political development. Under the Social pillar of the Kenya Vision 2030, Kenya aims at achieving globally competitive quality education, training and research for sustainable development. This fact expounds on the need for education within a County and a Country at large.

An empirical study on the education sector is critical in establishing the number of educational facilities, and their levels (Pre-primary, Primary, secondary school and tertiary). The study, further, seeks to determine the distribution, normative and distributive gap, emerging issues and their recommendations.

9.8.1 Pre-primary Schools (ECDE)

In 2019, there were 789 Early Childhood Development Education (ECDE) centres within the County. The facilities are composed of both public (498) and private (291). The public ECDEs are anchored within their sponsor primary school and others are stand alone. The table below presents the distribution of ECDEs;

Table 9-12: Distribution of ECDEs per Sub County

Sub County	No. of ECD Centres		Total
	Public	Private	
Kinangop	128	76	204
Kipipiri	99	30	129
Oljoro-Orok	64	71	135
Olkalou	107	73	180
Ndaragwa	100	41	141
Total	498	291	789

Source: County Department of Education, 2020

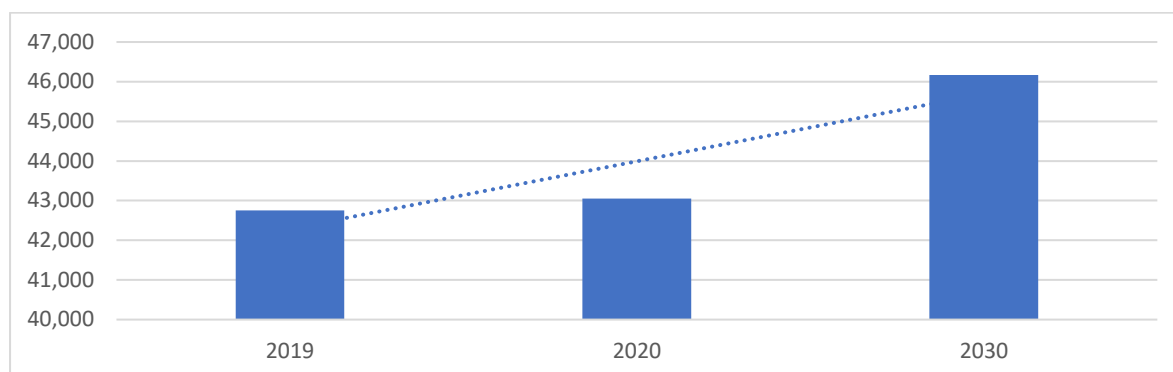
9.8.1.1 Enrollment in ECDEs

In 2019 the Enrollment in ECDEs was 22,700 pupils for public institutions, and 9308 pupils for private facilities. The total enrolment of ECD going age (3-5 years) was 32,008 (75%) pupils against a pupil population of 42,755 according to 2019 census report.

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The number is expected to increase to 43,054 pupils in 2020, and 46,165 pupils by 2030. The current and projected enrolment trend is illustrated on chart 10-5;

Chart 9-5: Current and Projected Enrolment Trends



Source: County Department of Education, 2020

There are 11,521 boys, and 11,179 girls enrolled in public facilities and 4,638 boys and 4,682 girls enrolled in private facilities. The Gross Enrolment is 75%, where boys and girls were represented by 37.8% and 37.2% respectively. The transition rate stands at 85% to primary schools according to CIDP 2018-2022.

Table 9-13: ECDE Enrolments by Sex per Sub County

Sub-County	Pupils' Enrolment						Total Enrolment.
	Public			Private			
	Boys	Girls	Total	Boys	Girls	Total	
Kinangop	3,258	3,157	6,415	1,189	1,252	2,441	8,856
Kipipiri	1,836	1,775	3,611	481	479	960	4,571
Oljoro orok	1,788	1,727	3,515	1,008	1,053	2,061	5,576
Olkalou	2,600	2,561	5,161	1,167	1,170	2,337	7,498
Ndaragwa	2,039	1,959	3,998	793	728	1,521	5,519
Total	11,521	11,179	22,700	4,638	4,682	9,320	32,020

Source: County Department of Education, 2020

Nyandarua County has a total of 789 ECDE teachers in public centres and 397 ECDE teachers in private centres, presented in table 9-12. However, the county government employs only 400 teachers of the 789 in public centres while 394 ECDE teachers are employed through parents' contributions. The average teacher-to-pupil ratio in both public and private ECDE centres stands at 1:26, which is higher than the recommended ratio of 1:25. The table below shows the County ECDE staff for the year 2019.

Table 9-14: Distribution of ECDE Teachers by Employer

Sub County	Teachers Establishment			Total
	County Govt.	Parent employed	Private	
Kinangop	125	75	86	286
Kipipiri	63	75	40	178

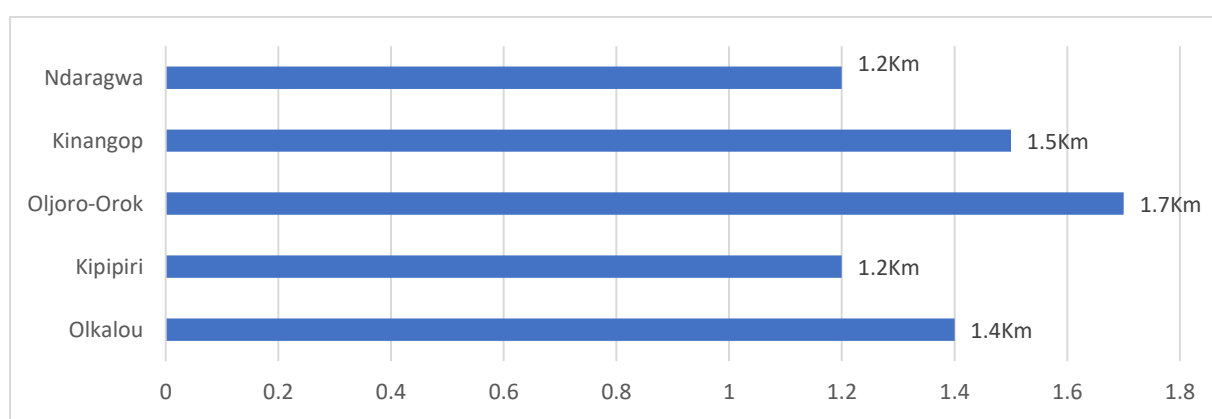
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Oljoro-Orok	64	53	81	198
Olkalou	75	102	83	260
Ndaragwa	64	97	51	212
Total	391	402	341	1134

Source: County Department of Education, 2020

The average distance to an ECDE facility within the county is 1.4 kilometres, compared to the recommended distance of 0.5 kilometres. Students from Oljoro-Orok Sub-County travel the longest distance of approximately 1.7 kilometres, while students in Ndaragwa and Kipipiri sub-counties travel the shortest distance as illustrated in chart 10-6.

Chart 9-6: Sub Counties by Average Distance to Nearest ECDE Center (Km)



Source: Field Survey, 2017

9.8.1.2 Facility Demand analysis

According to the census 2019, the total population within the age cohort of (3-5) was 42,755, projected to be 43,054 for 2020. Based on norms and standards, an ECD centre should have two classes (PP1 and PP2), each with 25 students. Therefore, an ideal ECD centre should have 50 pupils; therefore, the County requires 363 centres by 2020. The demand for the preceding years is shown in table 10-15;

Table 9-15: ECD Demand Analysis

Year	Population	Required facility	ECD Available facility	ECD Gap (ECDE facility)	Gap Teacher
2020	43,054	861	498	363	726
2025	44,582	891		393	786
2030	46,165	923		425	850

9.8.2 Challenges facing Pre-Primary Education

- Inadequate support infrastructure (sanitation facilities), inadequate classrooms and learning materials such as textbooks, sporting indoor and outdoor play equipment as well as furniture in most facilities within the County

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- Inadequate teaching personnel for ECDE facilities in all Sub-counties, especially in Ol Kalou and Ndaragwa
- Relatively low rate of pupil enrolment County wide, which currently stands at 75% of the age cohort of (3-5 years) against the targeted 100% enrolment rate
- Uneven distribution of ECDE facilities, with an average distance of 1.4 km against the recommended distance of 500 Metres.
- Inadequate funding by the County Government, leading to a shortage of ECDE facilities.

9.8.3 Primary Schools

Nyandarua County had 493 primary schools in 2019. These schools include 350 public and 143 private schools, distributed within the County, as presented in table 10-16 and Map 10-4.

Table 9-16: Primary Schools in Nyandarua 2020

Year	2019	
Area Located	Public Schools	Private Schools
Kinangop	45	34
Nyandarua South	46	33
Kipipiri	64	9
Nyandarua Central	46	10
Mirangine	35	23
Nyandarua West	25	14
Nyandarua North	34	7
Gathanji	19	5
Aberdare	36	8
	350	143

Source: County State Department of Basic Education (C.S.D.B.E, 2020)

9.8.3.1 Pupils' population Characteristics

According to the 2019 census report, 126,131 persons of primary school going age (6-13 years) accounted for 18.08% of the population. The population is projected to increase to 127,014 persons by 2020, 131,522 by 2025, and 136,190 by 2030.

9.8.3.2 Enrollment rate

In 2019, the total enrolment of primary school pupils was 137,736 with an enrollment of 114,927 pupils for public institutions and 22,809 pupils for private facilities (C.S.D.B.E, 2020),

Primary-Secondary school transition rate stands at 21% and a completion rate of approximately 87.3% (CIDP, 2018-2022). The rate implies a shortcoming in transition and completion rate from the intended 100%.

Primary schools have a Gross Enrolment Rate of 109.5% and a Net Enrolment Rate of 96.8% (CIDP 2018-2022). Most of the pupils are enrolled in public facilities accounting for 85% (126,208). The girls' enrollment rate is slightly lower than that of boys, as presented in table 10-17.

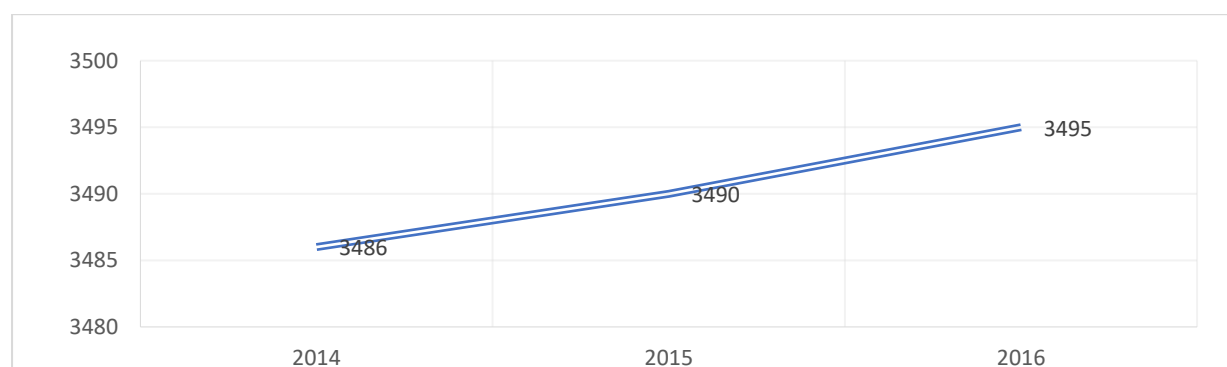
Table 9-17: Primary School Enrolments by Sex per Sub County

Area Located	Public Schools	Boys	Girls	Total	Private Schools	Boys	Girls	Total
Nyandarua Central	44	6,589	6,811	13,400	7	526	477	1,003
Nyandarua South	46	9,550	10,055	19,605	44	1,472	2,095	3,567
Nyandarua West	44	8,617	8,565	17,182	29	2,202	1,633	3,835
Nyandarua North	68	9,559	9,224	18,783	18	1,540	1,652	3,192
Kipipiri	64	11,370	11,044	22,414	14	747	713	1,460
Kinangop	45	11,449	11,119	22,568	38	2,863	2,829	5,692
Mirangine	35	6,278	5,978	12,256	28	1,776	1,728	3,504
Totals	346	63,412	62,796	126,208	178	11,126	11,127	22,253

Source: County State Department of Basic Education, 2017

The total number of TSC employed teachers was 3495 in 2016 (see chart 9-5); this places the teacher to student ratio in the county at 1:43 against the recommended 1:40.

Chart 9-7: Trend in Primary School Teaching Staff (2014 to 2016)

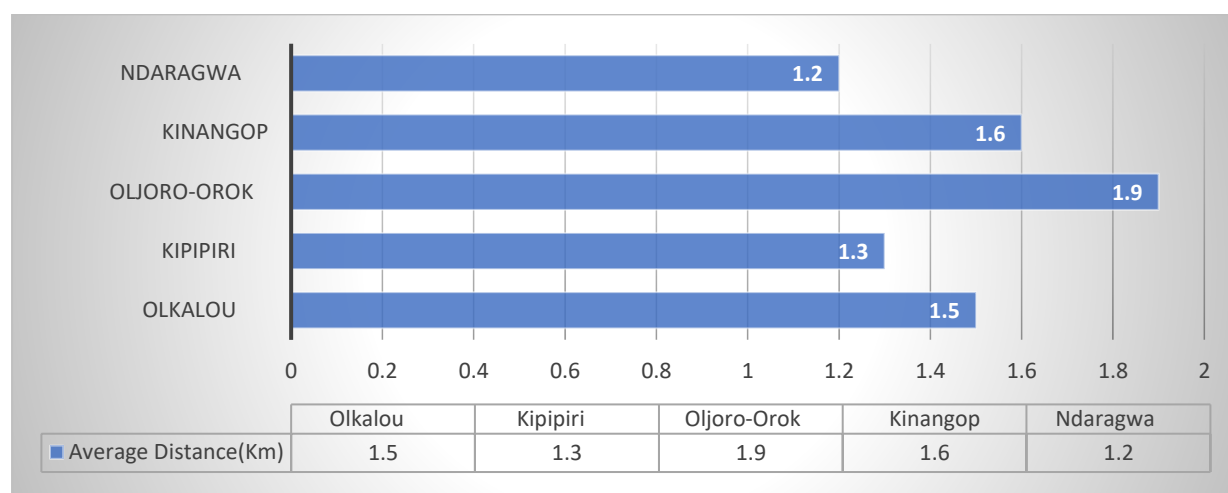


Source: Nyandarua County Department of Education, 2017

According to the field survey, the average distance traveled to access a public primary school facility within is 1.5 kilometres, 0.5 kilometres lower than the recommended maximum of 2 kilometres. Oljoro Orok sub-county has the longest distance (1.9 Km) of travel from the same study (Refer to chart 9-7). According to CIDP 2018-2022, 4% (5,567) of pupils travel more than 5 km to access primary school facilities.

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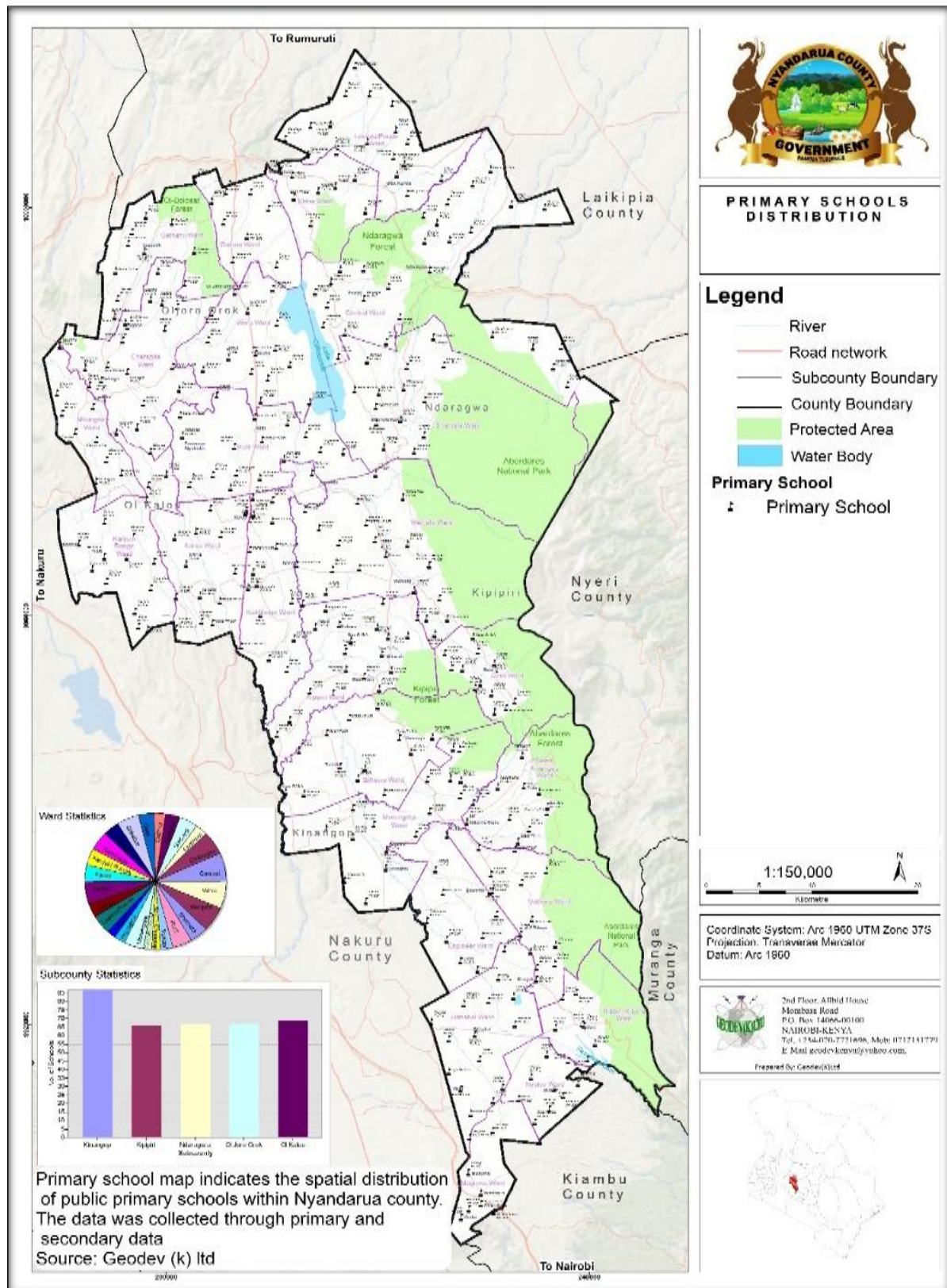
Chart 9-8: Sub Counties by Average Distance to Nearest Public Primary School (Km)



Source: Field Survey, 2017

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Map 9-4: Distribution of Primary Schools in Nyandarua County



9.8.3.3 Challenges facing Primary Schools

- Inadequate teaching personnel with a ratio of 1:43 against the recommended 1:40
- Low rate of enrolment for girls in the County
- Low transition and completion rate

9.8.4 Secondary Schools

Nyandarua County has 213 secondary schools, with 173 being public and 40 being private. The distribution of these secondary schools (public and private) within the county is presented in table 10-18 and Map 10-5.

Table 9-18: Location of Secondary Schools in Nyandarua

Year	2019	
Area Located	Public Schools	Private Schools
Kinangop	28	8
Nyandarua South	26	4
Kipipiri	31	3
Nyandarua Central	23	5
Mirangine	15	2
Nyandarua West	11	5
Nyandarua North	12	5
Gathanji	9	3
Aberdare	18	5
	173	40

Source: County State Department of Basic Education (C.S.D.B.E, 2020), 2020

9.8.4.1 Student population Characteristics

According to the 2019 National Housing and Population Census, there were 67,342 persons of secondary school-going age (14-17 years). The population currently (2020) stands at 67,813 students and is expected to increase to approximately 70,220 by 2025 and 72,712 students by 2030.

The total enrollment of students in the county stood at 65,845 (98%) as of 2019. (C.S.D.B.E, 2020)

Secondary schools' completion rate approximately 43.41% (CIDP, 2018-2022). This implies a shortfall in the completion rate from the intended 100%.

The teacher: student ratio in Nyandarua County is 1:33 against the recommended 1:40. The County has 1,656 teachers as of 2018. Further, secondary schools in Nyandarua County have a total enrolment rate of 60.66% of the population within the cohort (14-17 years). See table 10-19;

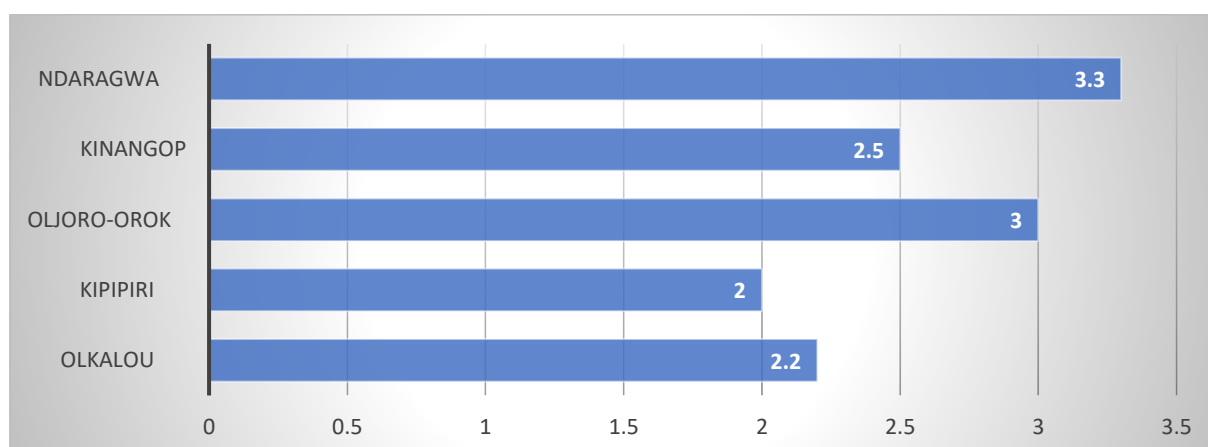
Table 9-19: Secondary School Enrolment by Sex per Sub County

Location	Public Schools	Boys	Girls	Total	Private	Boys	Girls	Total
Nyandarua Central	20	2,837	2,425	5,262	4	216	237	453
Nyandarua South	26	3,600	4,812	8,412	8	198	308	506
Nyandarua West	19	4,156	2,586	6,742	10	549	722	1,271
Nyandarua North	29	4,330	4,771	9,101	11	794	623	1,417
Kipipiri	31	3,957	4,261	8,218	3	40	300	340
Kinangop	27	4,815	4,561	9,376	12	185	1,254	1,439
Mirangine	15	1,715	2,773	4,488	6	249	372	621
Totals	167	25,410	26,189	51,599	54	2,231	3,816	6,047

Source: County State Department of Basic Education, 2017

The average distance traveled to access a public secondary school facility within the county is 2.5 kilometres against the recommended 3 kilometres. Ndaragwa students travel the longest at 3.3 km, while students from Kipipiri travel the shortest at 2 km (See Chart 10-9). However, 34% of students travel a distance of more than 5km.

Chart 9-9: Sub Counties by Average Distance to Nearest Public Secondary School (Km)



Source: Field Survey, 2017

9.8.4.2 Challenges facing Secondary Schools

- Long distances characterized by the uneven distribution of secondary school facilities
- Low enrolment rate to secondary schools
- Low completion rate, which stands at 43.41%

The map overleaf shows the distribution of secondary schools in Nyandarua County.

Map 9-5: Distribution of Secondary Schools



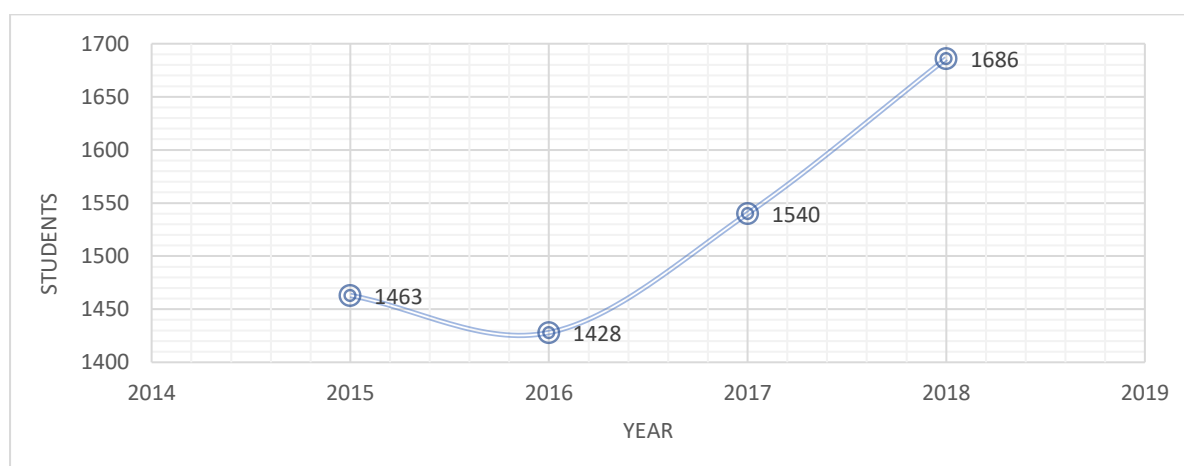
9.8.5 Tertiary Institutions

Nyandarua County currently lacks a university but has 25(15 are operational while ten are nonfunctional) Vocational Training Centres (see table 9-17). There are four (4) technical training institutes, i.e., Nyandarua Institute of Science and Technology, two (2) Technical Training Institute (TTI), i.e., Kipipiri TTI and Ndaragwa TTI, one Animal Health and Industry Training Institute (AHITI) and one Teachers Training College (TTC), i.e., Aberdare Teachers Training College. The vocational training centres have an enrollment of 1,945 students. There are 43 instructors, of which 29 are permanent and pensionable while 14 are on contract base. These centers require 142 instructors hence a gap of 99 instructors. Courses offered in these centers include fashion design, electrical and electronics, building technology, carpentry, mechanics, and ICT training. The chart below shows the trend in enrollment in polytechnics from 2012 to 2016.

Table 9-20: Vocational Training Centres in Nyandarua

NYANDARUA VOCATIONAL TRAINING CENTERS			
FUNCTIONAL VOCATIONAL CENTRES	NON- FUNCTIONAL VOCATIONAL CENTRES	VOCATIONAL EXCELLENCE (NATIONAL VOCATIONAL CERTIFICATE OF EDUCATION AND TRAINING-KNEC EXAMS)	CENTRES OF VOCATIONAL TRAINING (NITA CURRICULUM)
Rurii	Raisheri	Kanyagia	Rurii
Njabini	Mbuyu	Kangui	Ngorika,
Ol'kalou	Munyaka	Mirangine	Mukeu
Melangine	Ngano	Ol kalou	Kahoro
Ngorika,	Geta	Miharati	Leshau
Mukeu	Karangoini	Lereshwa	Shauri
Kinangop	Kanyagia	Kinangop	Shamata
Miharati	Nadarasi		Pesi
Kahoro	Ol`bolossat		Rurii
Lereshwa	Murungaru		Ngorika,
Kangui			Mukeu
Leshau			
Shauri			
Shamata			
Pesi			

Chart 9-10: Enrollment Trends in Polytechnics (2015 to 2018)



Source: County Department of Education, 2018

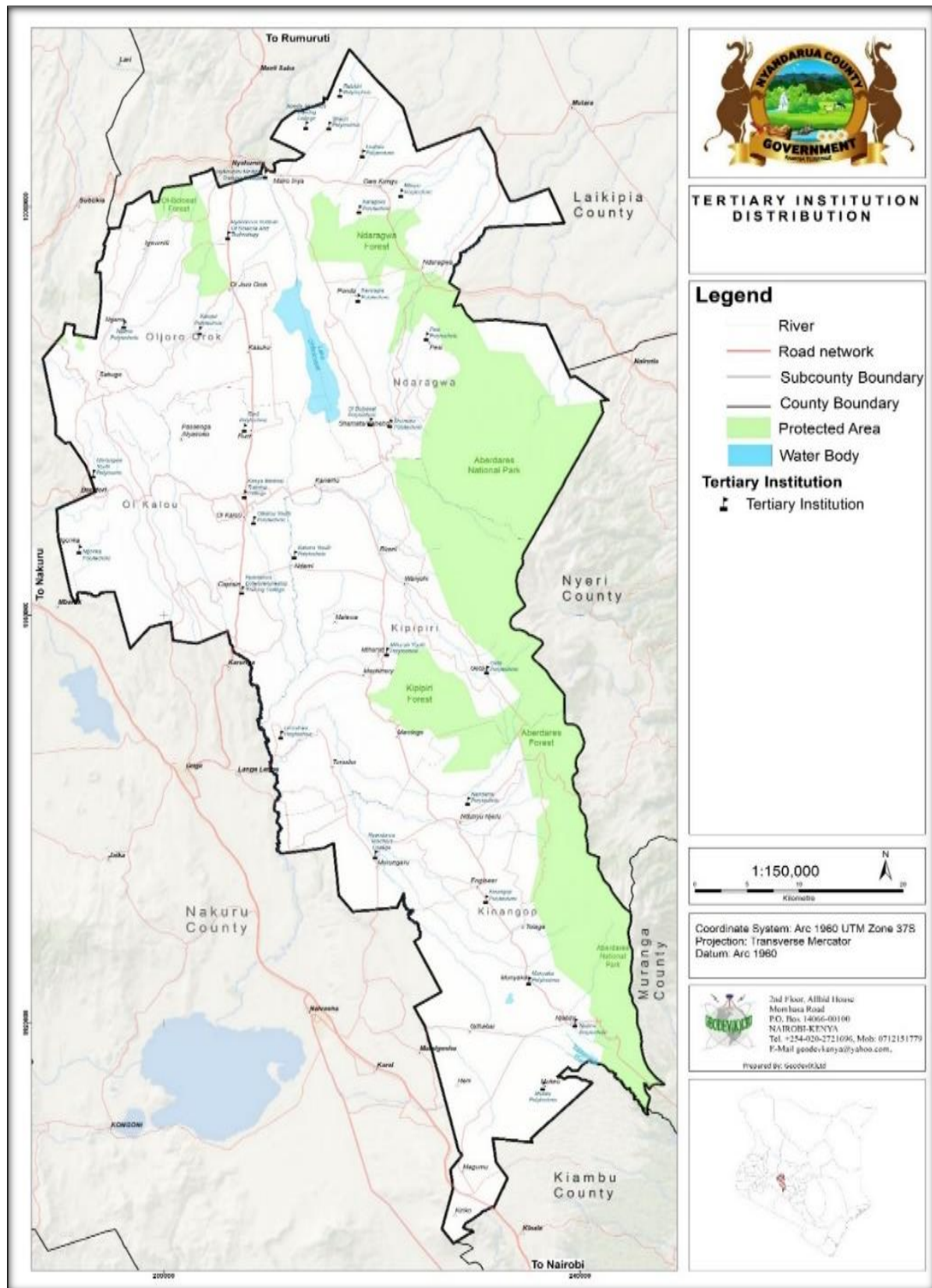
9.8.5.1 Challenges facing County Tertiary Education Facilities (Vocational Training Centres)

Following stakeholders' discussions, particularly with the County Education officers, the following challenges were cited concerning the Vocational Training Centres:

- Inadequate hostels, workshops, sanitation facilities, and administration block for all facilities
- Inadequate qualified technical instructors within all facilities currently amounting to a deficit of 99 instructors
- Low transition rate from one grade or level to the next for all VTC facilities
- The high cost of examination fees, especially for KNEC exams see table 9-18
- Low rate of enrolment for VTC facilities
- Inadequate funding from County Government characterized in a high rate of unfunctional VTC see table 9-18
- Lack of a university and constituent colleges
- Lack of an institution offering agro-based courses which would be more relevant to the economy of the County
- Low adoption of the reviewed curriculum (National Vocational Training Certificate of Education and Training) in all facilities.

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Map 9-6: Tertiary Education Facilities



9.8.6 Special Needs and Adult Education Facilities

There are 36 special needs schools distributed across the County. The Southern parts of Nyandarua have the most with nine special schools. These special needs schools have 66 teachers and a total enrollment of 1406 students as of 2016.

There are 146 Adult and Continuing Education (ACE) centers in Nyandarua County with 92 teachers, as shown in table 10-21.

Table 9-21: Adult and Continuing Education (ACE) Centres

Area	Adult Education Centres
Nyandarua North	21
Nyandarua South	27
Kinangop	12
Kipipiri	18
Nyandarua Central	20
Nyandarua West	36
Mirangine	12
Total	146

Source: Nyandarua County Department of Education, 2017

The total enrollment in 2016 was 4,287 students presented in Table 10-22 (Nyandarua County Statistical Abstract, 2015).

Table 9-22: Enrolment Trends in ACE Facilities by Sex per Constituency (2014 and 2016)

Area	ACE	2014		2016			
	Facilities						
	Number	Male	Female	Total	Male	Female	Total
Nyandarua North	21	104	285	389	51	240	291
Nyandarua West	36	564	120	684	335	834	1,169
Nyandarua Central	20	81	299	380	72	316	388
Mirangine	12	30	209	239	241	877	1,118
Kipipiri	18	354	978	1,332	102	291	393
Nyandarua South	27	179	458	637	87	447	534
Kinangop	12	171	494	665	65	329	394
Total	146	1,483	2,843	4,326	953	3,334	4,287

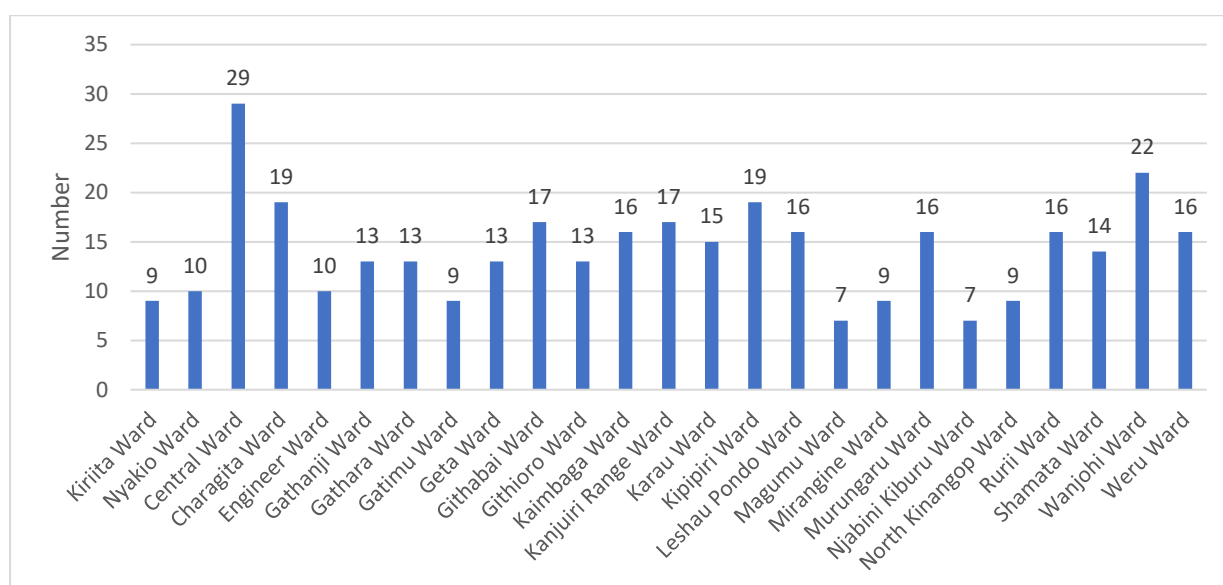
Source: Nyandarua County Statistical Abstract, 2015, County State Department of Basic Education, 2017

9.8.7 Assessment of Education Facilities per Ward

Primary Schools

Assessment of primary schools' distribution per ward revealed that Central and Wanjohi wards have the highest number of primary schools each with 29 and 22 schools respectively. Wards with fewest number of primary schools are Magumu, and Njabini Kiburu each with seven (7) schools. The distribution of Central is consistent with the high population (42,648) and area (309.12 Km²) as presented in table 4-1, however Njabini/Kiburu has significantly lower number of schools at seven relatives to the population (36,506) and area (94.28 Km²). The presentation of the number of primary schools per ward is presented in Chart 10-11

Chart 9-11: Number of Primary Schools per Ward



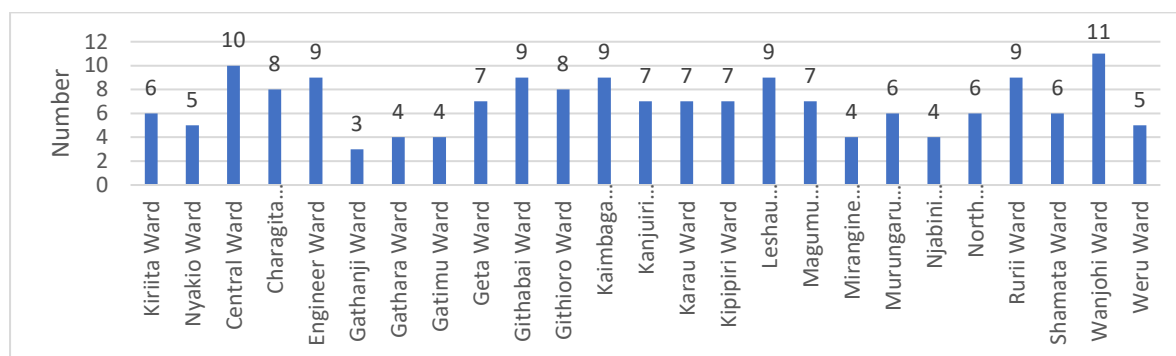
Secondary Schools

The distribution analysis of secondary schools in wards revealed Wanjohi and Central wards had most secondary schools at eleven (11) and ten (10) respectively, while Gathanji had the least at three (3).

Tertiary Institutions

Analysis of tertiary institutions in the wards revealed that Leshau Pondo, Shamata and Kipipiri had four (4), three (3) and two (2) institutions while the remaining wards each had one institution.

Chart 9-12: Number of Secondary Schools per Ward



9.8.8 Emerging Issues in Education Sector

Challenge

- Inadequate hostels, workshops, sanitation facilities and administration block for all facilities
- Inadequate qualified teaching personnel in ECDs (only 391 hired by county and 402 by management committee) and VTC with a deficit of 99 instructors
- Low transition rate (43%) from one grade or level to the next for all VTC facilities
- high dropout rate in VTC occasioned by high examination fees
- High cost of examination fees especially for KNEC exams
- Low rate of enrolment for VTC facilities
- Inadequate funding by County Government leading to shortage of ECD centres and high number of non-functional VTC
- Inadequate institutions of higher learning especially a university
- Lack of an institution offering agro-based courses which would be more relevant to the economy of the County
- Low adoption of the reviewed curriculum (National Vocational Training Certificate of Education and Training) in all facilities see table 9-18
- Uneven distribution of primary and secondary schools which leads to long distance of travel
- Inadequate teaching personnel for both primary and secondary schools represented by 1:43 and 1:44 respectively against the recommended ratios of 1:40
- Lack of a constituent university college within the County leading to low Secondary-University transition rate
- Lack of modern garage at Ol Kalou vocational Centres

Recommendation

- Establish approximately 425 ECD facilities in the county to cater for the whole planning period (2020-2030)
- Hire more skilled ECD tutors
- Operationalize the non-functional Vocational Training centers in the County see table 9-20

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- Construction of hostel facilities in all the 25 Vocational Training Centre and equipping the facilities with machinery and tools to be used in educational workshops
- Hire more personnel to Vocational Training Centre to bridge the current 99 tutor deficit
- Enhance the adoption of the reviewed curriculum (National Vocational Certificate of Education and Training) in all the Vocational Training Centres
- Increase access to the bursary program in primary, secondary, and VTC facilities to reduce school dropout rates
- Establish an institution offering agro-based courses in the County
- Subsidizing VTC examination fees in the County to curb the low transition rate
- Increase the number of teachers within educational facilities to improve the quality of education
- Establishment of a fully-fledged University in Nyandarua
- Fast-tracking the establishment of a modern garage at Ol Kalou Vocational Centres

9.9 Health

Healthcare is a critical contributor to human resource productivity. This fact, therefore, justifies the importance of health to a community or a society. The importance of health care justifies studies in the sector, which seek to investigate normative gaps such as doctor: patient ratio, nurse: patient ratio, and morbidity rate. Further, the study entails analyzing distributive gaps such as the number of health facilities and their distributions while identifying challenges arising from gaps and emerging issues critical in the synthesis of recommendations.

9.9.1 Health Care Facilities in County

Nyandarua county has a total of 350 health facilities as of 2020. These include 216 public facilities, 127 private facilities and 9 faith-based. These facilities comprise two levels four public hospitals (J.M. Memorial Hospital, Engineer hospital), two private facilities and one level four faith-based hospital (North Kinangop Mission Hospital), 27 Health Centres comprising 26 Public and one faith-based health center. There are 65 dispensaries in the county where 60 are public and 7 are Faith-based dispensaries. Also, there are 125 private clinics and 128 community units. Volunteer health workers staff the community units, and their operations are linked to the health facility.

Table 9-23: Existing County Health Facilities

Name	Level	Public	Private	Faith-Based	Total
County Referral	5	0	0	0	0
Sub-County Hospital	4	2	2	1	5
Health Centre	3	26	0	1	27
Dispensaries	2	60	0	7	67
Medical clinics	2	0	125	0	125
Community Units	1	128	-	-	128
Total	-	216	127	9	350

Source: MCUL & KHMFL, 2020

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Plate 9-2: Ndaragwa Health Centre and Chamuka Dispensary (Oljoro-Orok)



9.9.2 Health Facilities Gap Assessment

Nyandarua County has a gap of one level 5 hospital, four Level 4 hospitals, and seven dispensaries as of 2020. The gap is set to increase gradually over the years; the gaps as of 2030 are indicated in table 10-24.

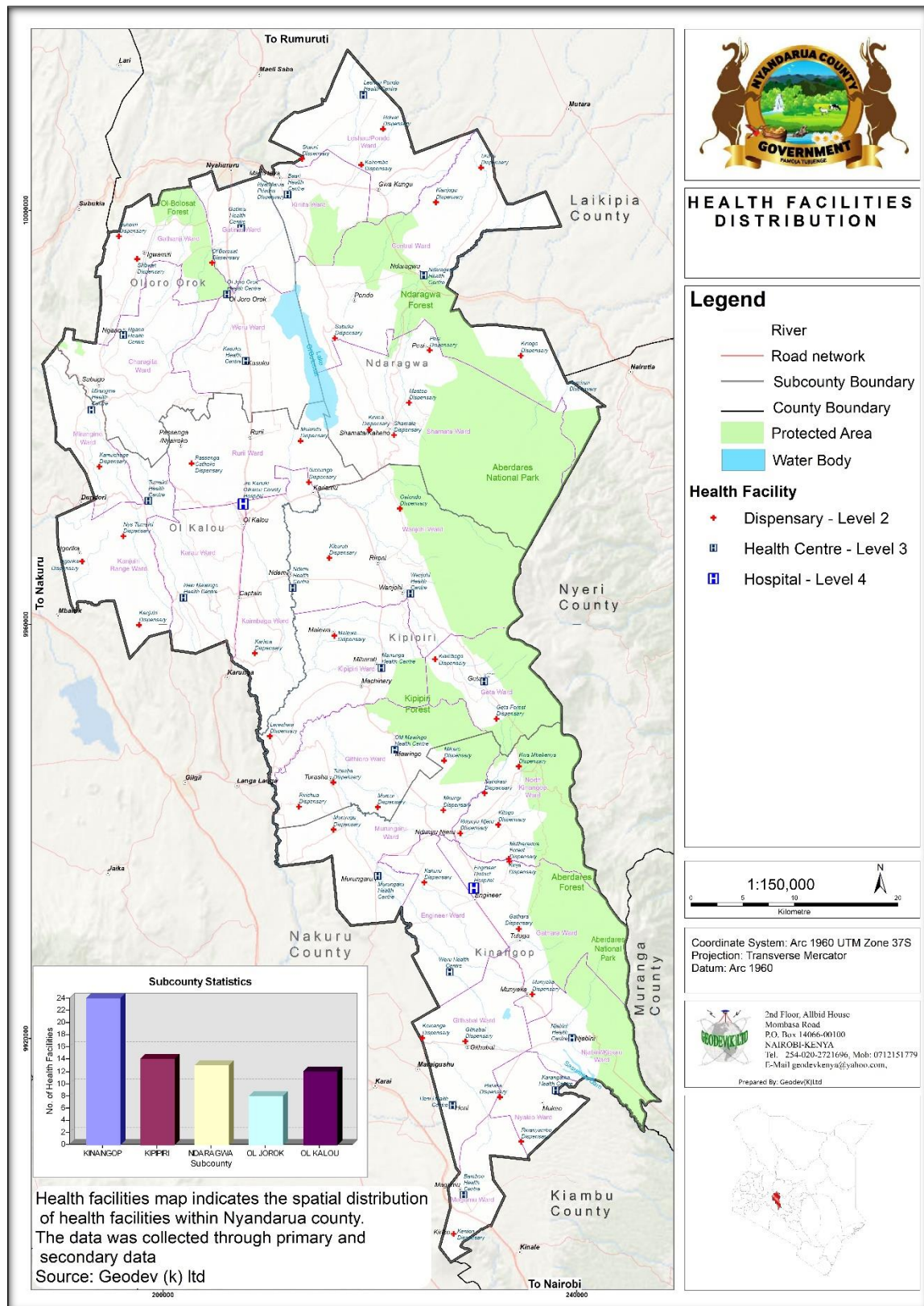
Table 9-24: Health Facilities Gap Analysis

Level	Catchment	Current population (2020)	Facilities required (2020)	Existing Facilities	Gap	Projected population (2030)	Facilities Required (2030)	Future gap
6	4,000,000	642,757	-	-	-	689,194	-	-
5	1,000,000		1	0	1		1	1
4	100,000		5	2	3		5	3
3	30,000		22	26	+4		23	+3
2	10,000		65	58	7		69	11
1	5,000		129	128	1		138	10

Source, Norms, and Standards for Health Service Delivery in Kenya, 2014

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Map 9-7: Distribution of Health Facilities in Nyandarua County



9.9.3 Normative and Distributive Gap analysis

The County has doctor: patient ratio of 1:35,750 against the recommended 1: 10,000, nurse: patient ratio of 1: 1500 against the recommended 1:1820 (NCHASP 2016 -2020), and clinical officer: patient of 1: 11,687 against the recommended 1: 4,762 according to WHO. The average distance to the nearest health center in Nyandarua is 5-5.5 km, which is not favorable compared to the 5 km recommended by WHO (NCHASP 2016 - 2020). Therefore, there is need for the provision of more health facilities to bridge the gap.

9.9.4 Health Indicators

9.9.4.1 Disease Prevalence and Morbidity

The most common disease recorded in the health facilities is respiratory system diseases, which accounted for 59.7% of ailments from July 2016 to June 2017. Other diseases are presented in table 10-25.

Table 9-25: Disease Prevalence and Morbidity July 2016 to June 2017

S/No	Type of Disease	% Of Contribution
i.	Upper respiratory tract infection	54.6
ii.	The disease of the skin	8.7
iii.	Arthritis, joint pains	6.5
iv.	Intestinal Worms	4.7
v.	Other diseases of Respiratory Systems	4.5
vi.	Diarrhea	3.3
vii.	Hypertension	3.2
viii.	Other Injuries	2.8
ix.	Urinary tract infections	2.5
x.	Pneumonia	2.3

(Source: County Health Department 2020)

9.9.5 Assessment of Health Facilities per Ward

Assessment of the distribution of health facilities in the county revealed that Gathara and Karau wards are the only administrative boundaries with level 4 hospitals, Wanjohi and Weru each had the most two (2), level 3 hospitals and Central (5), North Kinangop (5) and Shamata (4) had the highest number of level 2 hospitals.

9.9.6 Emerging issues in the health sector

Challenges

- i. High respiratory diseases prevalence (54.6%)
- ii. Uneven distribution of health facilities within the wards, e.g., Central and Olkalou Ward
- iii. Inadequate health personnel within health centers where doctor to patient ratio 1:35750, a nurse-to-patient ratio of 1: 1500 and Clinical Officer 1: 11,687
- iv. Inadequate supply of drugs to the existing health facilities
- v. Insufficient equipment within health facilities
- vi. The poor access road to health facilities, e.g., Nyairoko, Mbuyu, Divai, Shamata, Olemutia, and Kanguo
- vii. 66% of health facilities lack a reliable water supply
- viii. Lack of electricity connection at health facilities
- ix. Weak community health strategy
- x. Lack of a Level 5 Hospital

Recommendations

- i. Promote preventive healthcare to curb the high respiratory diseases
- ii. Upgrade certain level 3 facilities to perform higher order functions. These level 3 facilities include Manunga, Ndaragwa, Bamboo, Mirangine and Ngano Health centres
- iii. Set-up additional health facilities within Central, Murungaru, and Ol Kalou wards.
- iv. Hire more health personnel to meet the required ratio of 1:10,000 for doctors, 1: 1,820 for nurses, and 1: 4,762 for clinical officers
- v. Computerize the health system through the health management integrated system (HMIS) and continuously strengthen the community health systems.
- vi. Supply sufficient medical equipment (e.g., x-rays, MRI, etc.) in health facilities.
- vii. Improve infrastructure such as electricity and water supply by connecting health facilities to electricity and piped water/sinking boreholes.
- viii. Improve road access leading to health facilities

List of prioritized projects

According to Nyandarua CIDP 2 priority health Centres targeted for upgrade to level 4 are Bamboo, Manunga, Mirangine, and Ngano Ndaragwa.

9.10 Recreation and Community Facilities

Recreation is the sum total of all human socio-cultural and economic activities that enhance the therapeutic status of the mind. They are an important component in any society for they offer avenues for; relaxation/break from routine, income generation/economic activities, social interaction, preservation of socio-cultural and or religious values, environmental conservation among others. Recreational facilities could either be in form of open spaces like playing fields, stadiums, parks, community facilities and social halls among others.

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Below are discussed the various recreational facilities found in Nyandarua County.

9.10.1 Playgrounds and Stadia

There are eighteen (18) playgrounds within Nyandarua County. Some of these playgrounds such as Ndunyu Njeru and Olkalou playgrounds are in the process of being upgraded to stadium status. Most of these playgrounds are in poor condition; they lack basic support infrastructure such as perimeter fences, ablution blocks among other amenities.

Plate 9-3: Ndunyu Njeru Stadium



9.10.2 Rehabilitation and Children Rescue Centres

Nyandarua County has three rehabilitation centres. Kwa Njora and Kimaru Special which are located in Ndaragwa Sub-County and Nyandarua Vocational Rehabilitation Centre located in OlJoro-Orok. There is only one Children Rescue Center; Jesus Helper located in Tulasha.

Plate 9-4: Nyandarua Vocational Rehabilitation Centre



9.10.3 Social Halls

Social halls are among the facilities that enhance social interaction, networking and offer a break from normal day-to-day activities. They are recommended to have a catchment population of 20,000 (*Physical Planning Handbook, 2008*). The county only has four social halls. They are: Jua Kali and Gachurio halls in Kinangop, Kaimbaga social hall in Olkalou and Wanjohi social hall in Kipipiri Sub County. There are several sites designated for setting up social halls in various shopping centers but the structures have not been constructed. They are currently used as open spaces. Due to the acute shortage of these facilities in urban centres, the public is forced to hire private halls.

9.10.4 Security, Law and Order

9.10.4.1 Policing facilities

Law and order in the county are maintained by the Kenya Police and the Administration Police. The county is served by 24 Kenya Police facilities i.e., ten police stations, eight police posts and six police bases. There are a total of 460 Police officers.

Table 9-26: Police Facilities in Nyandarua

Division	Police Stations	Police Post	Patrol Base	Total
Nyandarua Central	1	1	1	3
Nyandarua South	1			1
Nyandarua West	2	2	1	5
Nyandarua North	3	3	4	10
Kipipiri	1			1
Kinangop	1	2		3
Mirangine	1			1
Total	10	8	6	24

Source: Senior Superintendent Nyandarua North, 2017

The county is also served by a total of 482 Administration Police officers in 27 Administration police camps and 59 Administration Police offices. Olkalou Sub County has the highest number of officers (203). The table below shows AP facilities and staff in Nyandarua.

Table 9-27: Administration Police Facilities and Staff

Sub-county	Facilities & Staff	AP Camps/Posts	AP Offices (at DC/DO)	Total
Ol Kalou	No.	8	10	18
	Staff	155	48	203
Oljoro-Orok	No.	3	11	14
	Staff	8	47	55
Ndaragwa	No.	4	14	18
	Staff	4	128	132
Kipipiri	No.	4	11	15
	Staff	46	46	92
Kinangop	No.	8	13	21
	Staff	67		67

Source: County AP Commander, 2017

Demand for Police Officers

The county is served by a total of 942 police officers. This indicates the current police officer to civilian ratio of the county stands at 1:765 which compares poorly with the international standard of 1:450. This analysis indicates that the county has a current gap of 660 police officers and requires a total of 1,983 police officers by 2030.

9.10.4.2 Law Courts and prisons

Law Courts

The county is served by two courts i.e., Nyahururu Chief Magistrate's Court and Engineer Law courts. There are 6 law courts in the Nyahururu Chief Magistrate's Court, 2 of these are high courts; one land court and one criminal court. The main county Law court is currently being constructed at the county headquarters in Olkalou.

Prisons

There are three prison facilities serving the county which are shown in the table below;

Table 9-28: Prison Facilities in Nyandarua County

Facilities	No.	Staff
Thompson Falls Nyahururu Women Prison	1	60
Thompson Falls Nyahururu Men Prison	1	183
Nyandarua Men Prison	1	82
Juvenile correction	0	0

Source: County AP Commander, 2017

The county lacks a juvenile correction center; however, it accesses the facilities in Kitisuru and Kakamega.

Challenges; Recreation, Community Facilities, Law and Order

The following issues emerged from the analysis and the stakeholders' discussions;

- Insufficient public parks in urban areas.
- Inadequate community facilities such as social halls, libraries and rehabilitation centres.
- The county lacks homes and hospices for the elderly.
- Inadequate staff housing for police officers i.e., number and condition. However, there is a proposal to put up 50 housing units for Kenya Police in Ndaragwa.
- Several crime hotspots: Mairo Inya, Leshau Pondo, Gwa Kung'u and Chemichemi; notably this has ceased since 2016.
- Inadequate police officers and prisons wardens within the county.
- Overcrowding, particularly at Thompson Falls Prison; Remand section due to delayed prosecution of cases; has a capacity of 200 persons but is currently holding 400 remandees.

10 COUNTY ECONOMY

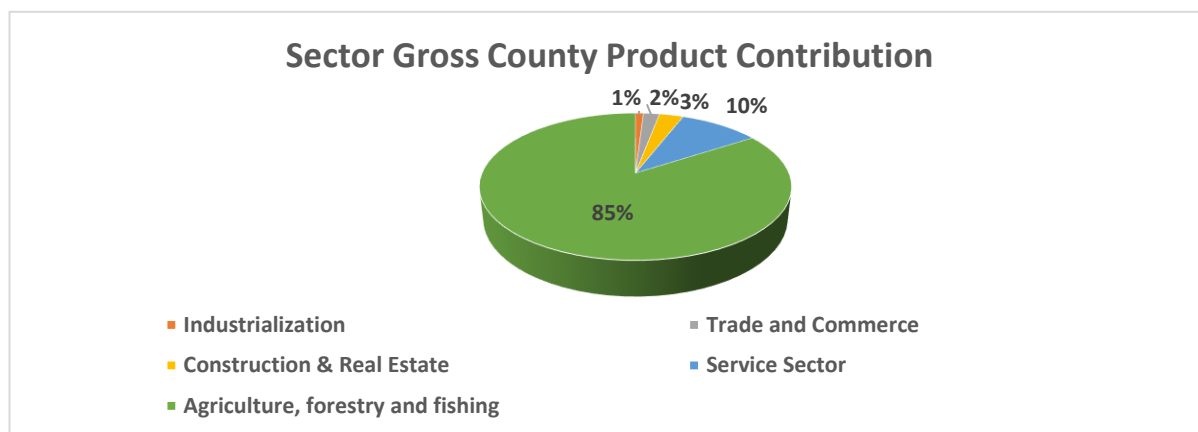
10.1 Overview

Sustainable economic performance is a key determinant of the living standards of a population. A region's development level largely depends on resource potential, exploitation, utilization, conservation, and management. Key resources in Nyandarua County, which largely determine the county's development, include land, forests, water resources, and tourist attractions.

10.2 Drivers of the County Economy

The main economic drivers in Nyandarua includes Agriculture, Trade and Commerce, Service sector (constituting: Water supply; waste collection, Electricity supply, Transport, and storage, accommodation and food service activities, Information, and communication, Financial and insurance activities, Professional, technical and support services, Public administration and defense, Education, Human health and social work activities, Other service activities,), Manufacturing, and others that include those economic activities whose contribution is very negligible. The gross county contribution is as illustrated in chart 11-1.

Chart 10-1: Sector Gross County Product Contribution



The illustration of the economic base of the county at a macro level indicates that agriculture is the leading contributor to the County's Gross Domestic Product at eighty-five percent (85%), the service sector being ten percent (10%) while, Industrialization is the least contributor at one percent (1%). The county's presented economic situation indicates that Nyandarua is still in its initial stage of economic growth. However, the indication that the service sector is the second contributor to the GCP is a growing concern since the service sector has not been anchored on industrialization, which should ideally lead the County to the takeoff stage that is service sector-led. The economic structure in this context could be as well unstable based on the current condition.

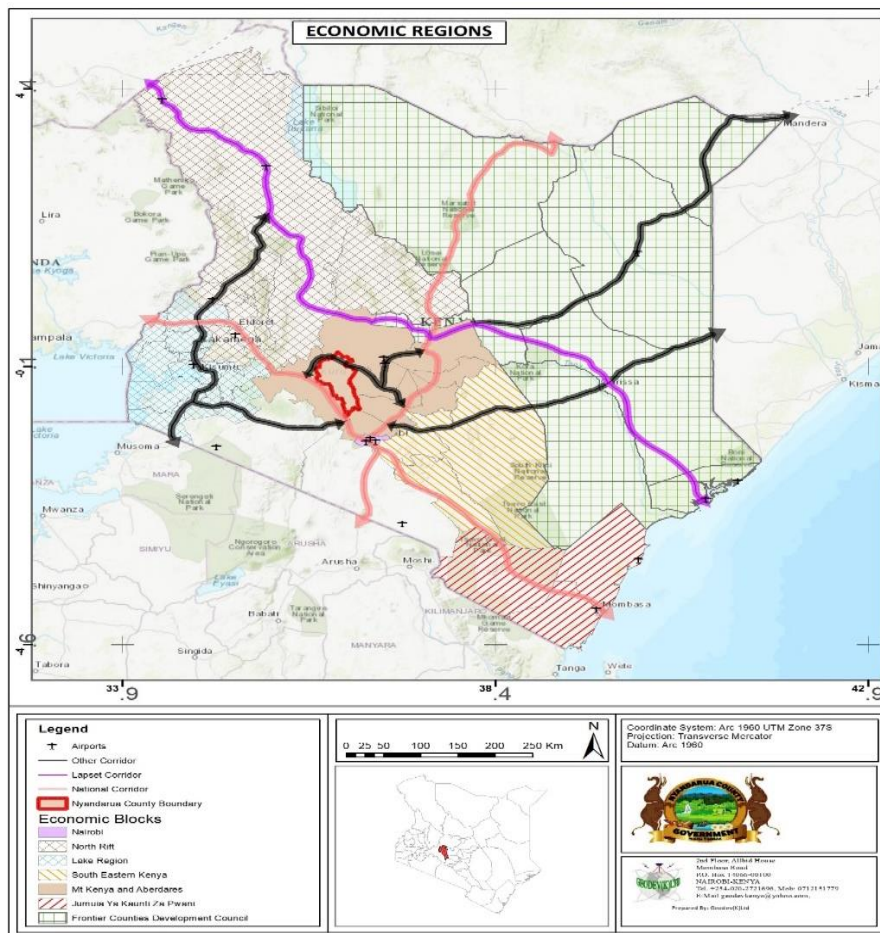
10.2.1 External and Internal Linkages

Regional development is based on complex interaction and flow of activities internally and externally. The interaction is based on production and consumption activities within the region. Nyandarua has

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contextual opportunities presented in the regional economic blocs, and the envisioned national corridors are envisaged in the National Spatial Plan 2015-2045. Nyandarua is a member of the Mt. Kenya and Aberdare Region Economic Bloc, which presents an opportunity for interregional trade. Nyandarua County is one of the leading producers of potatoes, cabbages, and milk in Kenya. With the county's established agricultural potential, Nyandarua stands in a strategic position to trade with the other economic regions. Additionally, the existing and proposed transportation and development corridors present an opportunity for regional interaction through trade and transportation functions.

Map 10-1: Economic Regions and External and Internal Linkages



10.3 Analysis of the Key Economic Sectors

The key economic sectors in Nyandarua are agriculture, tourism, trade, commerce, and industrialization. These have been analyzed concerning performance and contribution to the economy as well as their potential.

10.4 Agriculture

The sector currently accounts for 85% of the gross domestic product in the County. It continues to account for a proportionately larger share accounting to more than 70% of the total employment in the county.

The county's acreage under cultivation of crop and livestock fodder is 100,000 ha out of the total arable area of 185,000 ha. Nyandarua County experiences rains for most of the year, apart from Lower Ndaragwa Sub-County, which is relatively dry (Nyandarua County Department of Agriculture, 2020).

10.5 Factors affecting agricultural development in Nyandarua County

Several factors favor agricultural development in Nyandarua County. They give the County a competitive edge over the abutting Counties, therefore leading to increased crop and livestock production. The factors have been discussed below.

10.5.1 Rainfall

Nyandarua County consists of the Kinangop Plateau and Olkalou Salient. Both areas are situated in the rain shadow of the Aberdare Range (Farm Management Handbook, 1978). For this reason, rainfall decreases rapidly from East to West, with the annual average diminishing from more than 1,500 mm at the top of the Aberdares to about 700 mm in the Malewa valley. Rainfall also decreases as one moves northward, with Njabini (Sasumua Dam) areas receiving rainfall as high as 1,620 mm while areas in Ndaragwa (Leshau/Pondo and Kiriita) receiving just above 950 mm. These factors affect land potential in the county, divided into Upper Highlands and Lower Highlands based on the agro-ecological potential.

10.5.2 Temperature

Nyandarua County experiences an average temperature of 17.25°C. The temperature is suitable for both crop and livestock production.

10.5.3 Soil

Soil fertility is one of the major factors affecting crop production. Nyandarua County has different types of soils distributed in the County, as discussed in the soil section. Therefore, the soils are rich in nutrients, providing the opportunity to produce different types of crops in different zones. The types of soils have been discussed in the soil sub-chapter.

10.5.4 Agro-ecological zones

The County is divided into ten agro-ecological zones suitable for the production of a set of different crops. The soil's nature and fertility determine their suitability, rainfall amount, and slope degree. In addition to the rainfed agriculture widely practiced in the County, the County also has huge potential for irrigation, with 1755 ha of land available for irrigation.

10.6 Types of Agricultural activities

Agricultural activities in the County are grouped into two categories. These are principal activities, and secondary activities. Principal activities are the major activities undertaken in the County, and they include crop farming, livestock production, and horticulture. Secondary activities include pest and disease control, Harvesting and Storage, value addition.

10.6.1 Crop Production

The main food crops grown are Irish potatoes, Maize, cabbages and carrots, beans, vegetables, and fruits. Vegetables include kales, spinach, tomatoes, and onions, whereas fruits include plums, pears, tree tomatoes, avocados, and apples. The table below shows the crop cultivated, yield, and market value.

Table 10-1: Main Crops Cultivated in Nyandarua

Crop	Area (Ha)	Quantity (Ton)	Market Value (Ksh)
Irish potato	37,860	413,160	8.3 B
Garden peas	14,650	36,625	1.5 B
Cabbages	9300	325,500	1.3 B
Maize	16,906	37,184	1.1 B
Other vegetables (Kales, spinach, Tomatoes, Shallots, Onions)	1670	33,400	501 M
Cut flowers	240	1600	400 M
Carrots	1150	17,250	345 M
Wheat	3572	6430	193 M
Snow peas	536	1608	112.6 M
Beans	3800	1026	71.8 M
Temperate fruits (Plums, pears, Tree-tomatoes, & apples)	196	980	19.6 M
Pyrethrum	68	27.2	4.9 M

Source: County Department of Agriculture 2020

The main cash crops include wheat, pyrethrum, cut flowers, and snow peas. Crops such as Irish potatoes, garden peas, cabbages, and carrots are grown both as food and cash crops. There are other crops grown, e.g., avocados and oranges in Ndaragwa Sub County.

Potatoes, carrots, cabbages are grown in all sub-counties in Nyandarua. However, some crops are only grown in particular parts of the county, such as spring onions in Githabai Ward (Kinangop) and Geta (Kipipiri), Soya beans Oljoro-Orok, and French beans in Njabini. Pyrethrum is also grown in parts of Ndaragwa and Oljoro-Orok Sub Counties. The table below shows crop production per Sub County.

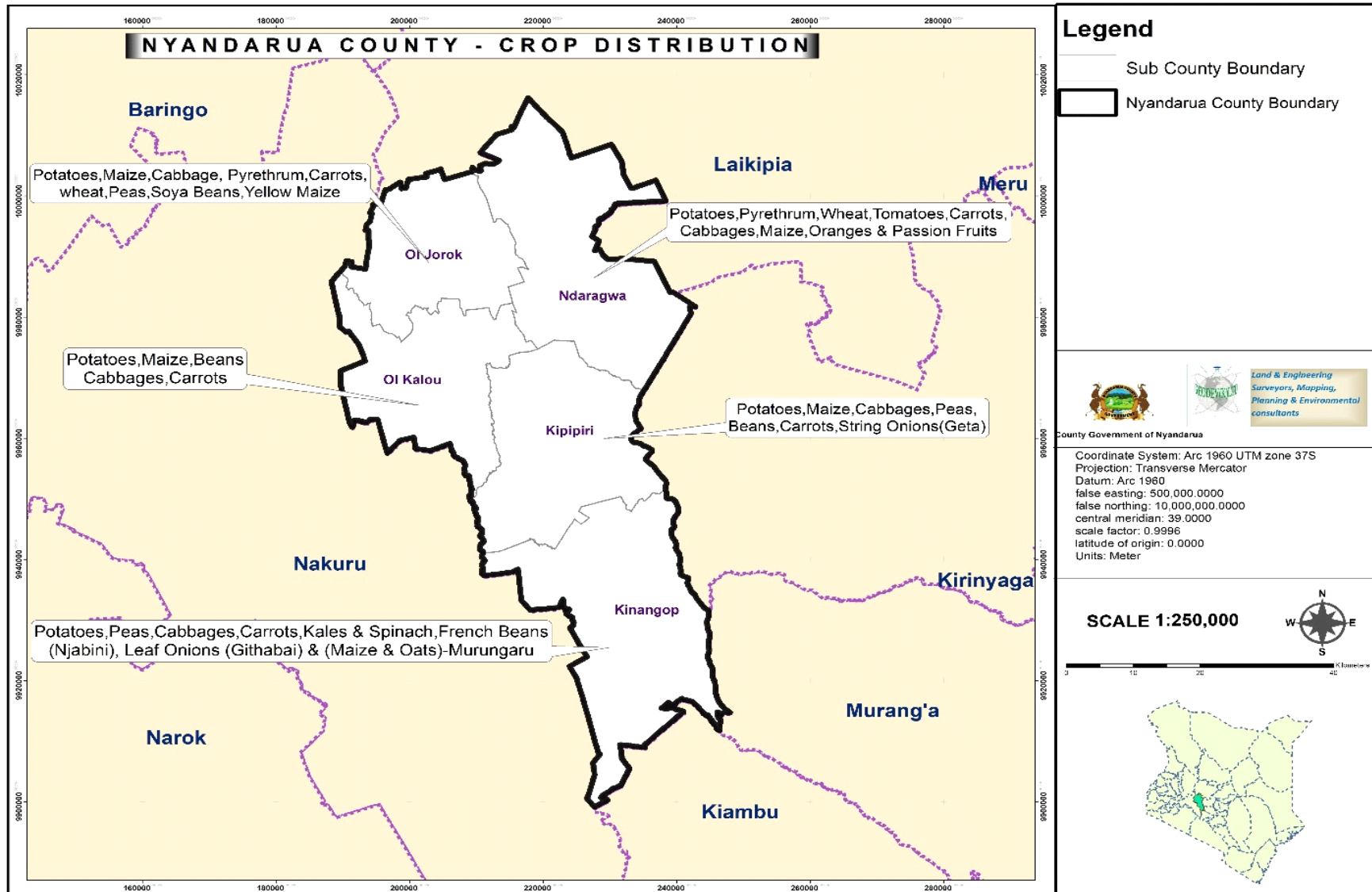
Table 10-2: Crop Production per Sub County

Sub-County	Crops Grown
Ol 'Kalou	Potatoes, maize, beans, cabbages, carrots
Kinangop	Potatoes, peas, cabbages, carrots, kales, spinach, French beans, spring onions, maize, and oats
Ndaragwa	Potatoes, pyrethrum, wheat, tomatoes, carrots, cabbages, maize, oranges, and passion fruits
Kipipiri	Potatoes, maize, cabbages, peas, beans, carrots, and spring onions
Oljoro-Orok	Potatoes, maize, cabbages, pyrethrum, carrots, wheat, peas, soya beans, and yellow beans

Source: Field Survey, 2020

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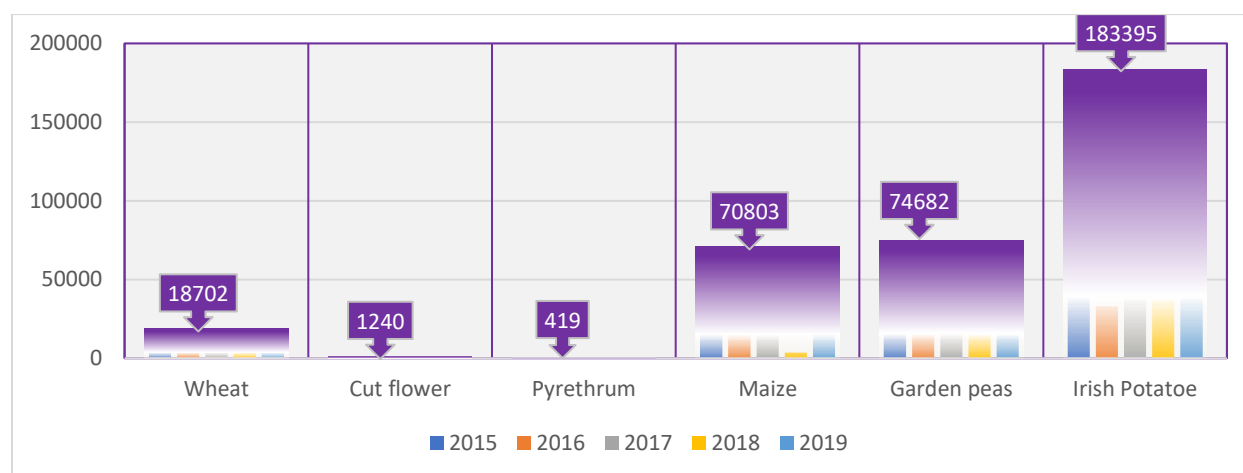
Map 10-2: Distribution of Crop Production



Sources: Farm Management Handbook.

In 2016, the total area under crop production in Nyandarua County was 89,948 Ha (County Department of Agriculture, 2020). This accounted for only 48.65% of the entire arable land in Nyandarua. This implies that there is much room for expansion of land under agriculture. As of 2019, the area under Irish Potatoes in Nyandarua was 37,860 Ha, followed by maize and garden peas with 16,906 Ha and 14,650 Ha, respectively. It is observed that the area under cash crops is significantly smaller than that under food crops. For instance, the area under wheat, cut flowers, and pyrethrum in 2019 was 3,572 Ha, 240 Ha, and 68 Ha, respectively. The bar graph below shows the trends in crop area coverage (in hectares) from 2015 to 2019.

Chart 10-2: Trend Assessment for Area Occupied by Various Crops in Ha (2015-2019)



Source: County Department of Agriculture, 2020

The table below is a trend analysis of the area covered by other crops grown in Nyandarua.

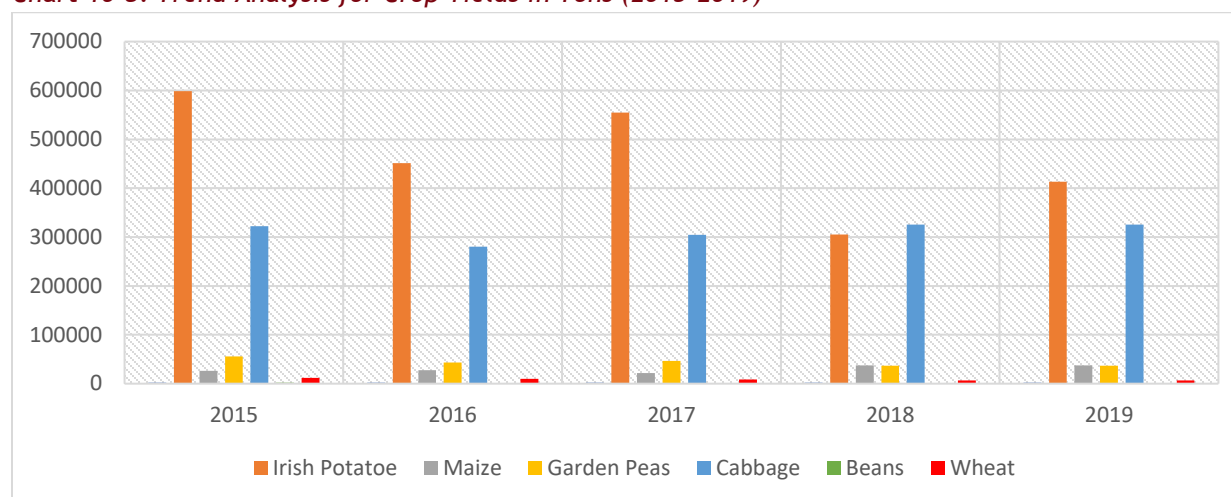
Table 10-3: Trend Analysis for Area Occupied by Other Crops (2015-2019)

Crop	Area in Hectares				
	2015	2016	2017	2018	2019
Carrots	1100	1150	23600	1720	1150
Other vegetables (Kales, spinach, Tomatoes, Shallots, Onions)	1426	1300	1340	1500	1670
Fruits (Plums, pears, Tree-tomatoes, avocados & apples)	194.5	204	200	196	196
Snow peas	456	380	512	240	536
Beans	5870	4152	4520	4130	3800
Cabbages	9210	9200	8700	6760	9300

Source: County Department of Agriculture, 2020

Chart 11-3 shows the trend analysis of crop yields in Nyandarua from 2015 to 2019. Potatoes have had the highest total yield throughout the period.

Chart 10-3: Trend Analysis for Crop Yields in Tons (2015-2019)



Source: County Department of Agriculture, 2020

The table below shows the trend in yields for other crops in Nyandarua over the same period.

Table 10-4: Trends Assessment of other Crop Yields (2015-2019)

Crop	Yield (Production) in Tons				
	2015	2016	2017	2018	2019
Carrots	22000	22500	23600	25800	17250
Other vegetables (Kales, spinach, Tomatoes, Shallots, Onions)	20665	26000	33500	37500	33400
Temperate fruits (Plums, pears, Tree-Tomatoes & apples)	447	1020	1000	980	980
Cut flowers	1260	2000	2000	1900	1600
Snow peas	2280	1900	1920	1320	1608
Pyrethrum	23	18.5	15	14	27.2

Source: County Department of Agriculture, 2020

The yield (in tons per hectare) from 2015 to 2019 is shown in the line graph below. Cabbages have maintained the highest yield per hectare relative to other crops throughout the period. Carrots and vegetables also have a relatively high yield per hectare, with an average yield of 20.9 and 15.1 tons per hectare, respectively. The yield for potatoes, the leading food crop, remained relatively constant, close to 15 tons per hectare, between 2015 and 2019, then declined to 13.7 tons per hectare in 2020. Vegetables include Kales, spinach, Tomatoes, Shallots, and Onions.

The table below is a trend assessment of yield for other crops grown in the county.

Table 10-5: Trend Assessment of other Crop Yields in Tons per Hectare (2015-2019)

Crop	2015	2016	2017	2018	2019
Beans	2255	988	204	929	1026
Other vegetables (Kales, spinach, Tomatoes, Shallots, Onions)	20665	26000	33500	37500	33400
Fruits (Plums, pears, Tree-tomatoes, avocados & apples)	514.5	1020	1000	980	980
Wheat	11813.04	9729	8550	9612	6430
Cut flowers	2400	2000	2000	1900	1600
Snow peas	2280	1900	1920	1320	1608
Pyrethrum	19.6	18.5	15	14	27.2

Source: County Department of Agriculture, 2020

Yield Potential

The table overleaf compares the current prevailing yields and the potential yield for various crop enterprises. It is noted that most crops exempting carrots and pyrethrum fall far short of their yield potential.

Table 10-6: Prevailing and Potential Yields for Various Crops

Crop	Prevailing Yields (Tons/ Ha)	Potential (Tons/Ha)
Irish Potatoes	8 - 25	25 - 40
Maize	1.8 - 3.2	2.5 - 3.6
Cabbages	25 - 50	40 - 50
Garden peas (flesh pods)	2 - 3.75	3.75 - 5
Wheat	1.8 - 3.0	3.6 - 4.5
Beans	0.225 - 0.9	1.0 - 1.25
Carrots	15-25	20 - 30
Snow peas	3 - 6	5-7
Other vegetables	10 - 20	25 - 30
Pyrethrum	0.75 - 1.25	1 - 1.5

Source: County Department of Agriculture, 2020

Initiatives to Improve Crop Production

The following projects have been initiated to improve crop production in Nyandarua;

- National Irrigation Authority (NIA)

The National Irrigation Authority has initiated the following projects in Nyandarua County;

Table 10-7: Irrigation Initiatives by NIA in Nyandarua

Project Location	Area (Acres)	Status
Kinungu Irrigation Project	350	Complete/Under production
Haki Irrigation Project	350	Complete/Under production
Canaan Irrigation Project	100	Complete/Under production
Marangachi Water Pan	10	complete
Muti Umwe Water Pan	10	complete
Kwa Njora Water Pan Phase I and II	10	complete
Gathanji Irrigation Project	200	Contractor mobilizing

Source: <https://www.delivery.go.ke/countyprojects/18>

b) Small Scale Irrigation and Value Addition Project (SIVAP)

The national government has partnered with county governments to provide a lasting solution to the chronic food insecurity experienced in Kenya. The SIVAP project targets 10,400 households from eleven counties, among which Nyandarua is one. The county will benefit from one irrigation scheme under the project.

c) Greenhouse Installation

The national government has rolled out the installation of greenhouses in Nyandarua as shown in table 11-8.

Table 10-8 Greenhouse Installations

Name of Project	Capacity (Cubic Metres)	Status
Chachabole Water Pan	65,000	Complete/under production
Kwa Njora Water Pan	30,000	complete
Muti Umwe Water Pan	40,000	complete

Source: <https://www.delivery.go.ke/countyprojects/18>

d) Protection of Watersheds

Listed below are the projects for the protection of watersheds in Nyandarua undertaken by the national government:

- Conservation of Kibuyu watershed
- Rehabilitation of Upper Chania River catchment
- Conservation of Njoguini watershed & spillway
- Conservation of Kiaruhiu riverbank & watershed
- Rehabilitation of Sasumua Dam watershed (5 Acres) at Solio
- Conservation of Gitwe Escarpment
- Conservation of Ruiru Swamp catchment
- Protection of 25 ha of Yaang' a Dam catchment
- Kariamburi catchment and spring protection
- Kagai spring protection
- Rehabilitation of Kwa Kihara gully
- Conservation of Gichere Dam catchment
- Protection of Rugu Spring
- Conservation of Kwa Musa Dam

10.6.1.1 Major Storage Facilities

There are four storage facilities in Nyandarua County. Two are owned by the government through the National Cereals and Produce Board in Lereshwa - Kipipiri, and Ol'kalou. Ndeavai which is owned by cooperative societies. There is a potato storage facility under construction in Olkalou Sub-County. The total holding capacity of these facilities is 235,000 bags (Department of Agriculture, 2020).

10.6.1.2 Agricultural Extension, Training, Research and Information Services

There are four agricultural training institutions in the County. Two are Agricultural Training Centres (ATC) in Njabini and Ol'joro Orok involved in training farmers on farming techniques both in crop and livestock farming. Others are the Animal Husbandry Industry Training Institute (AHITI) located in Gatimu offers courses on animal health and husbandry, and the Kenya Agricultural and Livestock Research Organization (KALRO) is located in Ol'joro Orok, conducts research and provides advisory services. There is also Nyandarua Institute of Science and Technology (NIST) in Ol'joro Orok which offers agricultural courses (Nyandarua CIDP: 2018-2022).

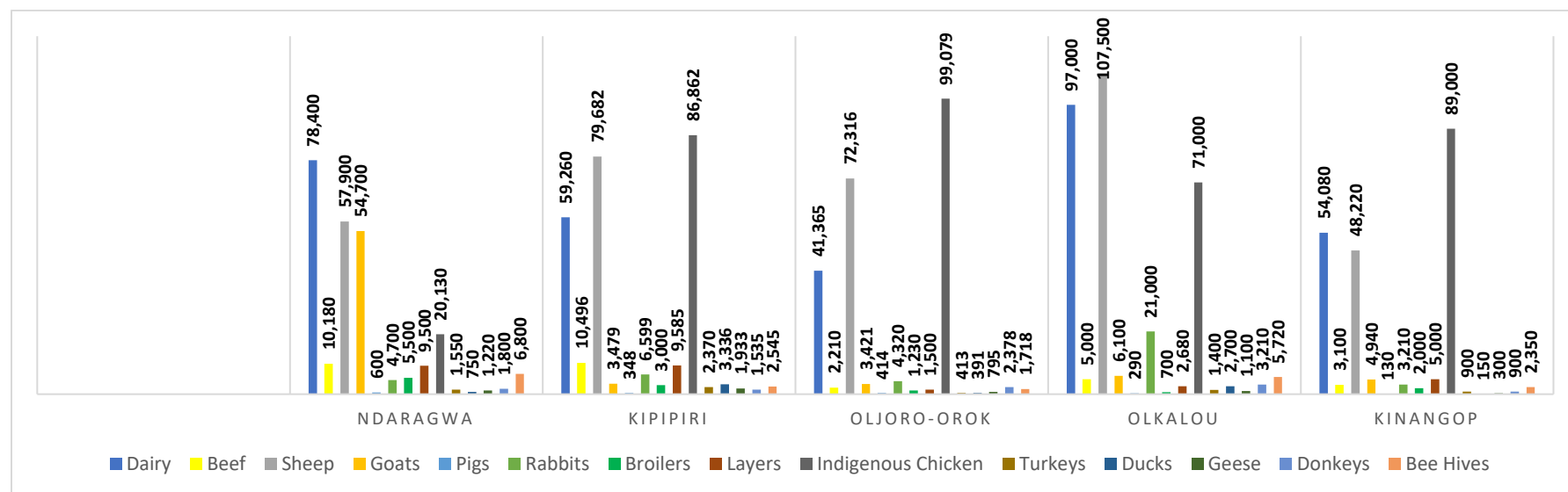
10.6.2 Livestock Production

The main livestock kept in Nyandarua includes cattle, sheep, goats, poultry, rabbits, and pigs. Others include apiculture (beekeeping) and donkeys. Most of the cattle in the county are dairy cattle, amounting to 349,000 at 2019. The county is a high potential area for livestock production, especially in Shamata's upper parts in Ndaragwa, Kangui, and Charagita in Oljoro-Orok. Relatively low potential areas include Turasha in Kipipiri, Murungaru, and Kenton in Kinangop. The main dairy cattle breeds are Friesian, Ayrshire, Guernsey, and their crossbreeds. Poultry reared in Nyandarua includes chicken (local, layers, and broilers), turkey, geese, and ducks. The tables overleaf show livestock population trends per Sub County for 2017, 2018, and 2019. Kinangop Sub County leads in cattle and sheep rearing, whereas Ndaragwa leads in poultry and goat keeping. Livestock kept in Nyandarua comprise of both indigenous and exotic breeds. The table overleaf shows production trends and value of various livestock products in the County within three years;

Table 10-9: Livestock Population Trend Analysis in 2017

Sub-County	Cattle		Sheep	Goats	Pigs	Rabbits	Poultry						Donkeys	Bee Hives
	Dairy	Beef					Broilers	Layers	Indigenous Chicken	Turkeys	Ducks	Geese		
Ndaragwa	78,400	10,180	57,900	54,700	600	4,700	5,500	9,500	20,130	1,550	750	1,220	1,800	6,800
Kipipiri	59,260	10,496	79,682	3,479	348	6,599	3,000	9,585	86,862	2,370	3,336	1,933	1,535	2,545
Oljoro-Orok	41,365	2,210	72,316	3,421	414	4,320	1,230	1,500	99,079	413	391	795	2,378	1,718
Olkalou	97,000	5,000	107,500	6,100	290	21,000	700	2,680	71,000	1,400	2,700	1,100	3,210	5,720
Kinangop	54,080	3,100	48,220	4,940	130	3,210	2,000	5,000	89,000	900	150	300	900	2,350
Total	330,105	30,986	365,618	72,640	1782	39,829	12,430	28,265	366,071	6,633	7,327	5,348	9,823	19,133

Chart 10-4: Livestock production trend in 2017

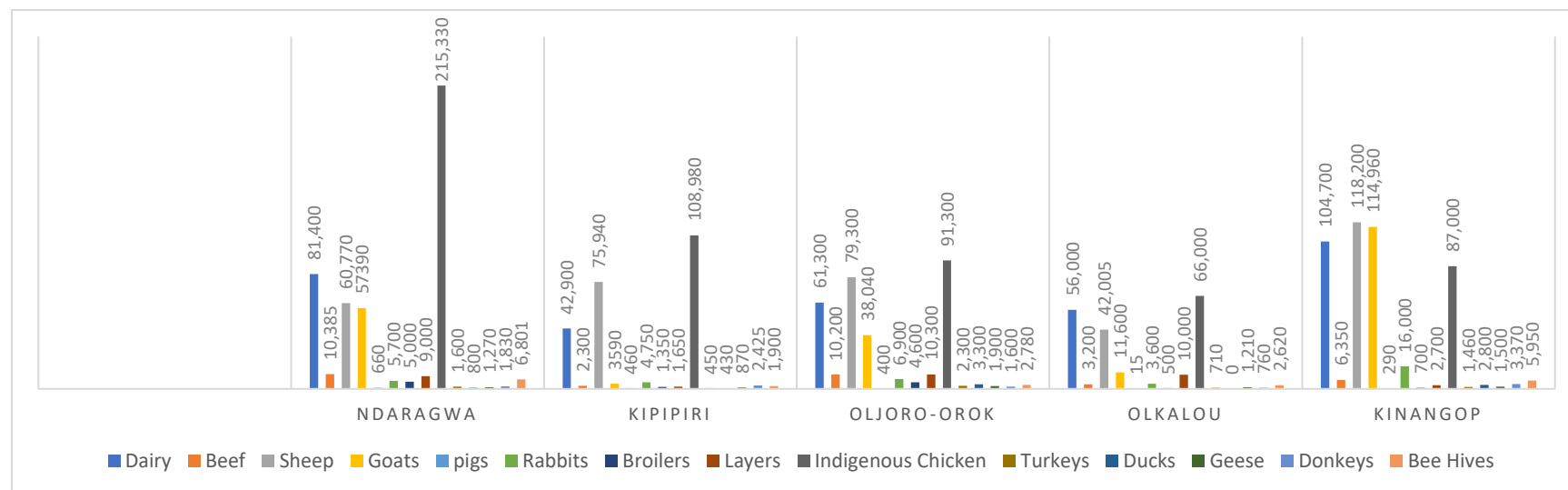


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Table 10-10: Livestock Population Trend Analysis in 2018

Sub-County	Cattle		Sheep	Goats	pigs	Rabbits	Poultry						Donkeys	Bee Hives
	Dairy	Beef					Broilers	Layers	Indigenous Chicken	Turkeys	Ducks	Geese		
Ndaragwa	81,400	10,385	60,770	57,390	660	5,700	5,000	9,000	215,330	1,600	800	1,270	1,830	6,801
Kipipiri	42,900	2,300	75,940	3,590	460	4,750	1,350	1,650	108,980	450	430	870	2,425	1,900
Oljoro-Orok	61,300	10,200	79,300	38,040	400	6,900	4,600	10,300	91,300	2,300	3,300	1,900	1,600	2,780
Olkalou	56,000	3,200	42,005	11,600	15	3,600	500	10,000	66,000	710	-	1,210	760	2,620
Kinangop	104,700	6,350	118,200	114,960	290	16,000	700	2,700	87,000	1,460	2,800	1,500	3,370	5,950
Total	346,300	32,435	376,215	225,580	1825	36,950	12,150	33,650	568,610	6,520	2,800	6,750	9,985	20,051

Chart 10-5: Livestock production trend in 2018



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Table 10-11: Livestock Population Trend Analysis in 2019 Respectively

Sub-County	Cattle		Sheep	Goats	pigs	Rabbits	Poultry						Donkeys	Bee Hives
	Dairy	Beef					Broilers	Layers	Indigenous Chicken	Turkeys	Ducks	Geese		
Ndaragwa	83,830	10,690	61,400	55,500	720	6,100	5,150	9,450	217,490	1,550	850	1,200	1,880	6,800
Kipipiri	58,080	3,270	43,200	4,860	581	3,750	500	1,000	66,000	710	-	1210	758	2,625
Oljoro-Orok	43,758	2,346	79,738	3,769	506	5,236	1,350	1,733	113,400	459	443	896	2,500	2,067
Olkalou	61,300	11,000	79,300	3,750	500	6,000	4,600	10,000	92,000	2,500	3,300	2,000	1,500	2,820
Kinangop	102,313	6,477	121,746	11,800	1,035	16,000	735	2,835	91,350	1,490	2,884	3,245	3,370	6,060
Total	349,281	33,783	385,384	79,679	3,342	37,086	12,335	25,018	580,240	6,709	6,627	8,551	10,008	20,372

Chart 10-6: Livestock production trend in 2019

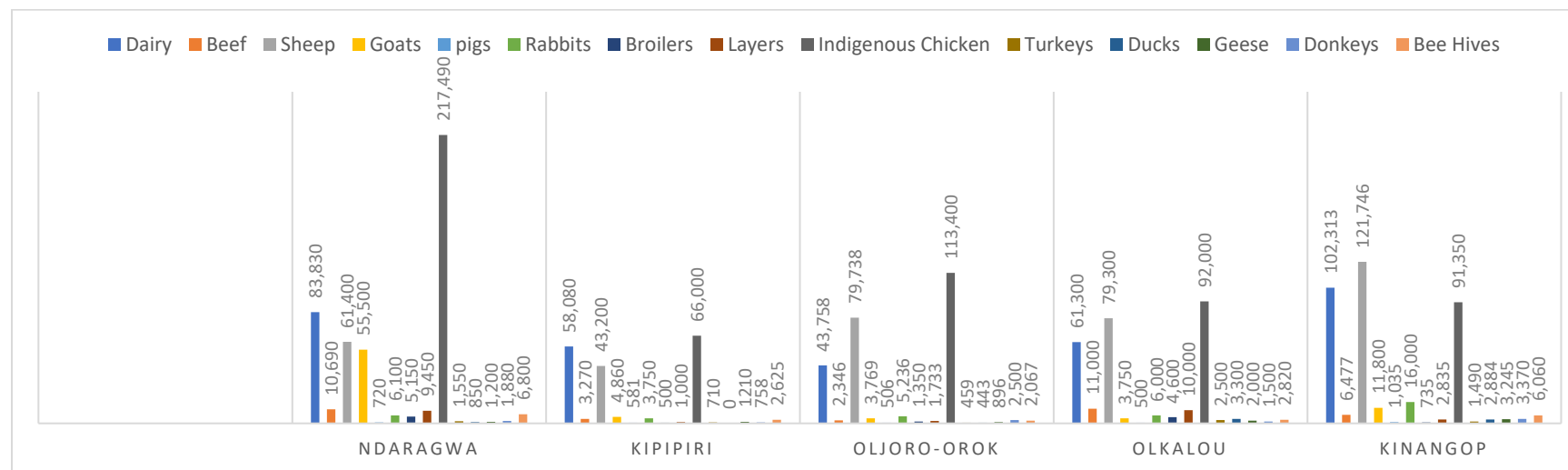


Table 10-12: Trend in Livestock Production 2017

Product	Unit Price	Total Yield	value of Production
Beef (Tons)	360,000	2,900.3	1,044,108,000
Chevon (goat meat) (Tons)	400,000	139.5	55,800,000
Mutton (Tons)	400,000	315.2	126,080,000
Poultry Meat (Tons)	400,000	253.9	101,560,000
Pork (Tons)	400,000	91.1	36,440,000
Rabbit Meat (Tons)	-	11.9	-
Milk (Litres)	32,000	238155.2	7,620,966,400
Honey (Tons)	500,000	136.1	68,050,000
Wax (Tons)	-	-	-
Wool (Tons)	80,000	102.3	8,184,000
Eggs	310	457,980 (Trays)	-

Product	Unit Price	Total Yield	value of Production
Beef (Tons)	350,000	3,026.8	1,059,380,000
Chevon (goat meat) (Tons)	400,000	853.3	341,320,000
Mutton (Tons)	400,000	691.8	276,720,000
Poultry Meat (Tons)	300,000	615.7	184,710,000
Pork (Tons)	350,000	207.3	72,555,000
Rabbit Meat (Tons)	400,000	31.2	12,480,000
Milk (Tons)	25,000	296,580.8	7,414,520,000
Honey (Tons)	800,000	187.1	149,680,000
Wax (Tons)	-	-	-
Wool (Tons)	20,000	246.2	4,924,000
Eggs	450	443,478(Trays)	-

Table 10-13: Trend in Livestock Production 2018

Product	Unit Price	Total Yield	value of Production
Beef (Tons)	350,000	2,576.3	901,705,000
Chevon (goat meat) (Tons)	400,000	184.2	73,680,000
Mutton (Tons)	400,000	678.3	271,320,000
Poultry Meat (Tons)	300,000	308.9	92,670,000
Pork (Tons)	350,000	36.7	12,845,000
Rabbit Meat (Tons)	400,000	26.9	10,760,000
Milk (Litres)	31,000	292,282.1	
Honey (Tons)	600,000	187.2	112,320,000
Wax (Tons)	-	-	
Wool (Tons)	30,000	157.4	4,722,000
Eggs	450	384,567(Trays)	

Table 10-14: Trend in Livestock Production 2019

10.6.2.1 Ranching

Ranching in Nyandarua County is practiced only in Kipipiri Sub-County- Ol Magogo and is run by KALRO. The ranch occupies an area of 300 hectares, and sheep are the main animals reared. (CIDP, 2018-2022).

10.6.2.2 Fish production

Nyandarua County has three major freshwater fisheries, i.e., riverine, aquaculture (fish farming), dam, and lake. The water potential is enormous for fish production with 22 permanent and seasonal rivers, 527 wells, nine protected streams, 250 water dams and pans, and Lake Ol' Bollosat, the only large water mass in the County.

There are about 1200 fish ponds in the county. Only 273 are operational, accounting for the minimal production from aquaculture as they are not exploited maximally due to gaps in technology and management practices.

Table 10-15: Number of fish ponds per sub-county

Sub County	Number of Ponds		Active ponds
	2015	2016	2017
Ndaragwa	300	300	80
Oljoro-Orok	210	210	83
Ol Kalou	325	325	80
Kipipiri	325	325	24
Kinangop	326	326	30

Source: Fisheries Department, 2020

The County Government is operating two trout farms in Ndaragwa and Geta for fish and fingerlings production. The following are the specific objectives for the farms (Government trout farms) establishment:

- To produce 700 000 trout fingerlings (according to demand) for about 700 out-grower trout farmers per year.
- Develop and disseminate modern trout fish farming technology through capacity building to farmers, extensions officers, and students.
- To enhance production efficiency through the development and formulation of high quality and cheap trout fish feed.
- To restock trout gazetted rivers and restore degraded forest sites through a collaborative effort with Forest Department.

There are other private fish hatcheries in the County for trout, catfish, and tilapia. Several fish producers in the County operate on a small scale. There are main processors involved in fish filleting, sausage making, and feeds formulation. These include Avil fish farm in Kiriita ward, Kentalo Fish farm in Gatimu ward, and Malewa Gorge in Wanjohi ward.

Table 10-16: Production trend for various fish species

Year	Tilapia nilotica- (<i>Oreochromis niloticus</i>)		Catfish- (<i>Clarias gariepinus</i>)		Rainbow Trout (<i>Onchorynchus mykiss</i>)		Common carps (<i>Cyprinus carpio</i>)	
	Quantity (Kgs)	Value (Ksh)	Quantity (Kgs)	Value (Ksh)	Quantity (Kgs)	Value (Ksh)	Quantity (Kgs)	Value (Ksh)
2012	5,180	1,554,000	6,741	2,022,300	1,500	1,800,000	58	17,400
2013	4,680	1,404,000	7,064	2,119,200	1,515	1,818,000	39	11,700
2014	5,919	1,775,700	7,168	2,150,400	1,800	2,160,000	153	45,900
2015	6,578	1,973,400	8,685	2,605,500	2,246	2,695,200	179	53,700
2016	4,619	1,385,700	5,090	1,527,000	2,300	2,760,000	-	-
2017	5,470	1,641,000	16,200	4,860,000	2,023	606,900	8,540	12,810,000
2018	21,214	6,364,200	25,748	7,724,400	1,361	1,361,000	924	277,200
2019	7,181	2,154,300	7,181	2,154,300	1,911	1,911,00	15,176	4,552,800
Total	60,841	18,252,300	83,877	25,163,100	14,656	13,203,011	24,640	17,363,077.2

Source: Fisheries Department, 2020

The directorate is improving fish production and productivity of smallholder farmers through improvements of their means of production. Support is provided to smallholders active in aquaculture fish production and uses their farms to demonstrate and train other farmers. Thus, together with the two Agricultural training centers in the County, the directorate is establishing demo fish farms in every sub-County, eventually escalating to the ward level.

Capture Fishery

The Lake Ol'bollosat fishery has come under increasing pressure in the last decades. Fish production peaked in the early 2000s, and currently, catches of dominant species are showing downward trends. Despite this, there is greater demand for fish of Lake Ol'bolosat, chiefly Catfish (*Clarias gariepinus*), in the local market and domestic consumption. The present situation is the consequence of the over-exploitation that the fishery of Lake Ol'bolosat has undergone in those 20 years.

Lake Ol'bolosat is the dominant fish source, contributing over 60 percent of all the fish landed annually in Nyandarua in the last decade. Besides Lake Ol'bolosat, the other sources of capture fish in the county are the fresh rivers and dams located in various parts of the county.

10.6.2.3 Apiculture (beekeeping)

Nyandarua has a relative potential for honey production, the main source being Aberdare Forest with bee farming practiced in Ndaragwa Sub-County. Ndaragwa is favorable due to weather and climatic condition. Other areas where apiculture is practiced are Geta, Kipipiri, and Kinangop Sub-Counties (Nyandarua CIDP: 2018-2022).

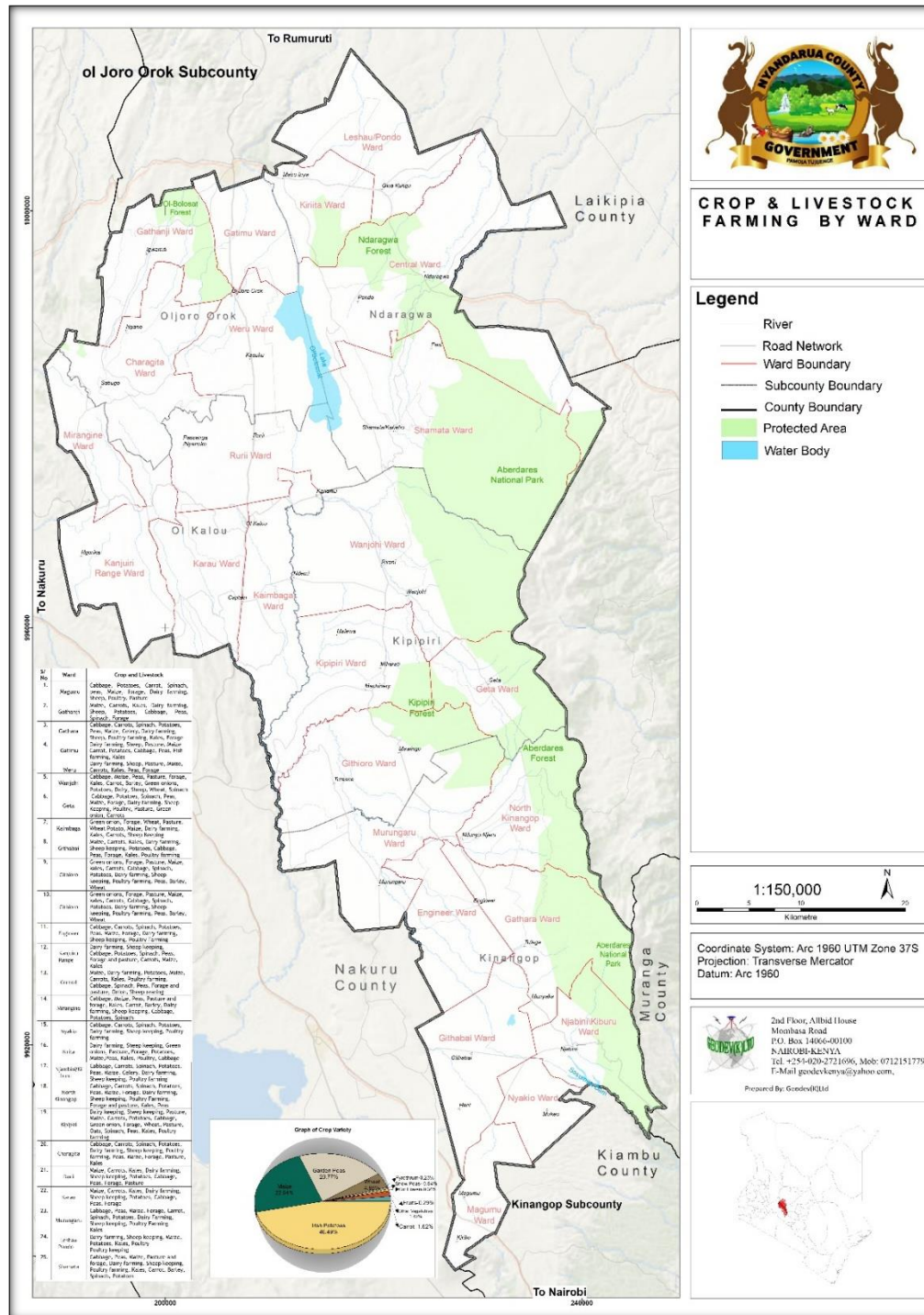
10.6.3 Assessment of crop and livestock production by ward

Assessment of crop distribution per ward revealed that crops and livestock majorly grown are maize, potatoes, poultry, vegetable - spinach, dairy farming and sheep rearing. However, the existing situation

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does not fully commensurate to the agro-ecological potential based on the farm management handbook presented on table 5-3. Crop production is not guided by economic principles of relative advantage since all wards grow crops such as maize despite not favorable to the area. A presentation of crop distribution per ward is illustrated in Map 11.3;

Map 10-3: Crop and Livestock Farming by Ward



10.6.4 Emerging Issues

Sector	Potential	Opportunity	Challenge	Recommendations
Crop Production	<ul style="list-style-type: none"> Potential to be mass fresh produce distributor due to link with regional counties such as Nairobi, Nakuru, Nanyuki, Nyeri Potential to produce high value agricultural produces from horticulture Potential to maintain irrigated agriculture due to availability of rivers 	<ul style="list-style-type: none"> Opportunity to host and fully supply agro-processing industries with raw materials Opportunity to gain high monetary value due to trade and commerce from Fresh produce Large scale horticultural and floriculture production Availability of conducive climate to sustain crop production 	<ul style="list-style-type: none"> Underutilization of agricultural land. Over-reliance on rain-fed agriculture coupled with erratic rainfall patterns. Fluctuating market prices of farm produce. Crop pests and diseases affecting the quality of yields. Land sub-division into smaller portions affecting the total production per unit area. Low levels of adoption of modern farming techniques. Absence of an organized marketing system leading to the exploitation of farmers by brokers and market cartels. Lack of clear production and marketing policies. Low yields and poor-quality produce. Low soil fertility resulting in low yields per unit area. Frequent frost damage of crops. High costs of labour and agricultural inputs (seedlings, fertilizer, etc.). Waterlogging during rainy seasons leading to the rotting of crops. Inadequate storage facilities. Inadequate extension services. Tedious procedures in accessing government fertilizer. Limited agro-processing and value addition along the value chain. Unstandardized packaging units. Weak cooperative movement. Decline acreage of cash crops such as pyrethrum 	<ul style="list-style-type: none"> Adoption of good and sustainable agricultural practices. Construction of storage facilities, particularly in northern parts of Nyandarua. Introduce an irrigation system by drilling more boreholes and harnessing water from existing dams. Revival and strengthening of cooperatives. Introduction of new cash crops, e.g., pyrethrum and sugar beets, to augment farmer profits. Increase value addition. Diversification, e.g., production of fruits such as pears, plums, avocados, and apples. Venturing more into export markets. Improve accessibility of fertilizers. Promotion of irrigation agriculture by utilizing the county's water resources. Standardize packaging of potatoes. The county should distribute seedling and provide incentives to encourage pyrethrum farming Construction of a pyrethrum processing plant to provide a market for the harvest

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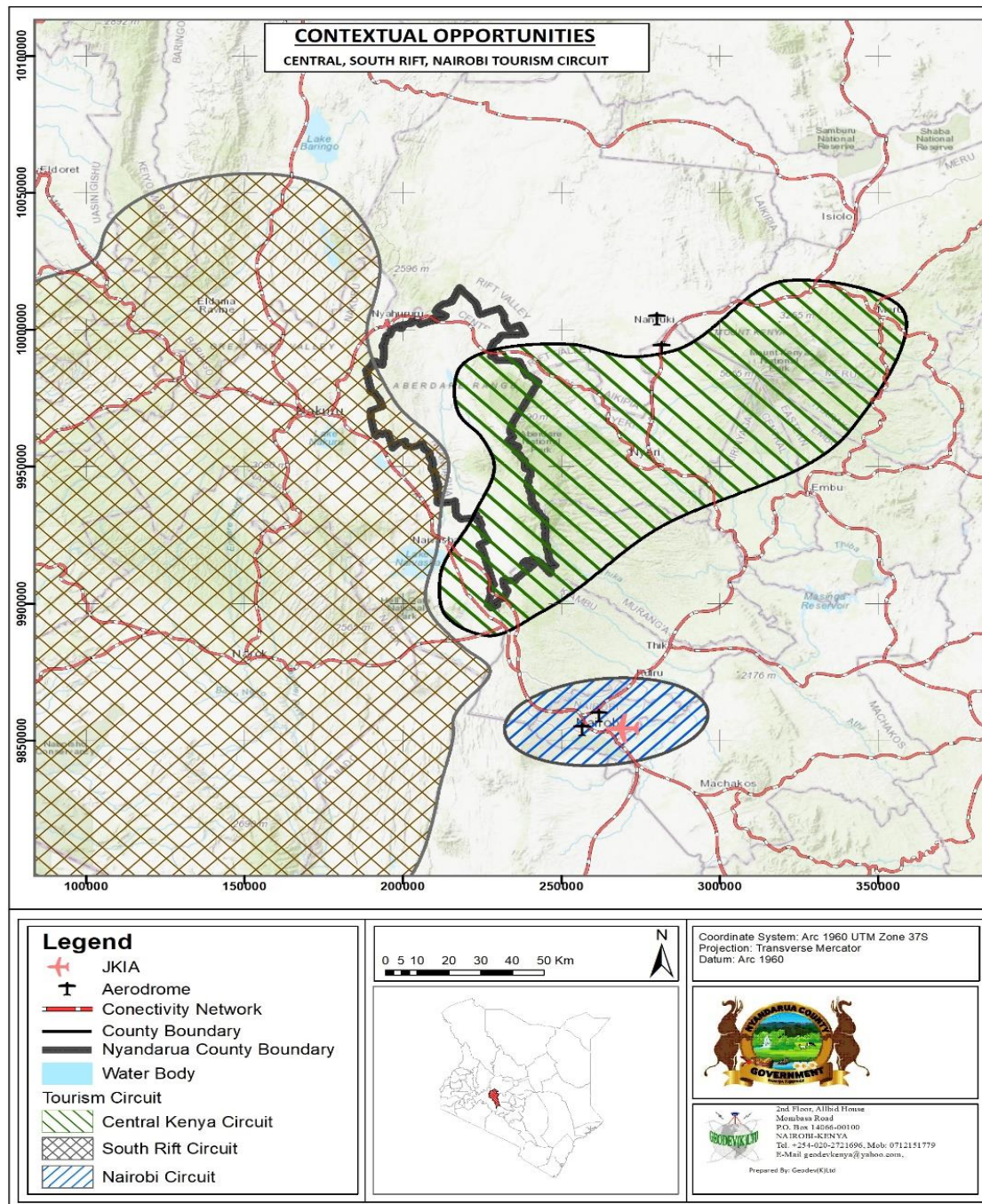
Livestock Production	<ul style="list-style-type: none"> • Potential to be a mass producer of animals and animal product due to a conducive environment • The availability of a variety of animals demonstrates a potential for diversification of agricultural activities 	<ul style="list-style-type: none"> • Milk production, beef, and mutton demonstrates the potential for the establishments of an agro-processing 	<ul style="list-style-type: none"> • High prices of animal feed. • Low milk prices. • Poor livestock breeds. • Low levels of value addition. • Poor access to information. 	<ul style="list-style-type: none"> • Provision of quality and affordable livestock feeds. • Livestock marketing and value addition. • Promotion of wool sheep. • Support for extension and advisory services. • Support youth in agribusiness. • Control of livestock pests and diseases. • Improve livestock breeding and AI services. • Hides and skins/leather development.
Aquaculture	<ul style="list-style-type: none"> • Availability of a freshwater Lake Ol'bolossat for cage fish farming • Existence of an established fish farming sector • Availability of fish market 	<ul style="list-style-type: none"> • The availability of a lake provides an opportunity for investment in fish production • The presence of an established fish farming sub-sector provides an opportunity for reinvestment to increase production 	<ul style="list-style-type: none"> • Inadequate knowhow on fish farming such as cage fishing • Inadequate fish ponds within wards • Lack of appropriate trout fish variety and fingerlings • Poor infrastructure hindering the marketing and transportation of fish produce 	<ul style="list-style-type: none"> • Initiate fish farming programs to train fish farmers and fishers • Construction of at least 300 fish ponds per constituency and on farmers' demand • Trout development to produce 5000 kgs of trout (table-size) and 100,000 fingerlings • Establishment of fish cooling facilities • Farmer sensitization on off-farm handling methods
Apiculture	<ul style="list-style-type: none"> • Potential for high-value production of honey 	<ul style="list-style-type: none"> • The availability of an established apiculture sub-sector provides an opportunity for investment 	<ul style="list-style-type: none"> • Inadequate knowhow on apiculture farming • Low numbers of bee farming in Nyandarua • Inadequate beehives farming inputs 	<ul style="list-style-type: none"> • Initiate apiculture training programs to boost the sub-sector • Increase the number of beekeepers through the provision of beehives • Purchase of beekeeper's starter kit • Promote beekeeping groups with modern hives and honey processing equipment

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10.7 Tourism

Tourism is a major regional economy in Kenya's regions. Nyandarua County's tourism potential is presented in contextual tourism opportunities that include the South Rift and Central and Nairobi tourism circuits. The external options that can be integrated to develop Nyandarua as shown in map below;

Map 10-4: Contextual Opportunities along Central, South Rift, Nairobi Circuit



Environmental assets form the main basis for a tourist activity in Nyandarua. They include national parks, forests, lakes, rivers, waterfalls, ranges, and hilltops. However, other non-environmental attractions such as the Happy Valley Homes and Mau Mau caves have a large cultural significance in the county. The tourist attractions in Nyandarua are:

- i. Aberdare National Park,
- ii. Lake Ol'bolossat,
- iii. Forests (gazetted and non-gazetted)
- iv. Karuru Falls,
- v. Aberdare Ranges and hilltops,
- vi. Rivers.
- vii. Mau Mau caves,
- viii. Sasumua Dam
- ix. Happy Valley Homes.

10.7.1 Conservation Areas

Aberdare National Park (ANP)

The Aberdare National Park measures 767 square kilometres and is a major destination for recreational tourism. It offers two main attractions types, namely wildlife conservation and forest reserve. There are three gates into the park within Nyandarua, namely Queensway, Shamata, and Mairo Inya. The main entrance, however, is located in the abutting Nyeri County. Visitor statistics for the park are indicated in the table below.

Table 10-17: Aberdare National Park Visitor Statistics

Year	Citizen		Resident		Non-Resident		Total Visitors	Total Revenue Kshs.
	Adult	Child	Adult	Child	Adult	Child		
2017	17,727	8,726	3,044	1,728	8,123	2,528	41,876	139,958,460
2016	23,438	4,103	1,915	1,401	9,412	1,853	42,122	122,624,825
2015	16,101	5,162	2,123	1,369	7,631	2,614	35,000	97,541,910
2014	21,713	6,205	3,392	1,100	9,821	1,531	43,762	124,616,568
2013	27,128	5,214	4,703	1,177	9,472	2,139	49,833	120,206,361

Source: Kenya Wildlife Services, 2018

Though the National Park revenue accrues to the national government, the county government of Nyandarua could take advantage of the traffic of tourists by providing hospitality facilities and restaurants. The three gates that are located within Nyandarua should also be well constructed and commercialized.

Lake Ol'bolossat

This is the only lake in central Kenya. It is a destination for eco-tourism. It is located in the northern part of Nyandarua, with a large proportion falling within Oljoro-Orok Sub County (Weru Ward). However, the southern part of the lake touches Rurii Ward (Olkalou) and Shamata Ward (Ndaragwa). It measures 33 square kilometres (UNEP, 2012). L. Ol'bolossat is a habitat for different plants and animals, being home to over 400 giant hippos and bird species such as ducks, herons, grebe, and the African Marsh Harrier. It is recognized as the 61st most Important Bird Area (IBA) in Kenya since 2007. Moreover, it is home to globally threatened bird species such as the Sharpe's Long Claw and the Grey Crowned Crane.

The County has not fully utilized the lake's potential; Lake Ol'bolossat has huge potential for sports tourism, e.g., boating, water surfing/skiing, sport fishing, and ecotourism, e.g., bird watching. Access to the site, however, needs to be improved.

Also, activities such as farming, overgrazing, and encroachment upon the lake by human settlement threaten it. The county government is seeking comprehensive rehabilitation, conservation, and dredging of the lake. Effective 24th January 2018, L. Ol'bolossat was gazetted as a Wetlands Protected Area.

Forests

Gazetted Forests

There are five gazetted forests in Nyandarua covering about 486 square kilometres. These are Ol'bolossat, Geta, Ndaragwa, North Kinangop, and South Kinangop forests. Currently, these forests are minimally used for tourism purposes. Nevertheless, they have the potential for ecotourism and recreation tourism, whereby people experience nature or camp.

Non-gazetted Forests

There are also five non-gazetted forests, which amount to 235 acres. They include the presidential Tree Park in Olkalou, Presidential Tree Planting site (opposite the county commissioner's office) and Olkalou, Malewa tree nursery, Kaimbaga, Mawingu, and Tulaga tree nursery. These are potential attractions which may be used for recreational tourism and ecotourism. The Presidential Tree Park is proposed for development into an arboretum.

The Karuru Falls

This is the highest waterfall in Kenya, a breathtaking sight that plunges 273 metres below the viewpoint. It is located within the Aberdare National Park, Nyandarua, in the central moorlands. It is surrounded by tall indigenous trees, which are home to unique wildlife and vegetation. With the Aberdare Mountain Range being home to 52 of Kenya's 67 highland bird species, some may be found at the Karuru Falls. They include Sharpe's Long Claw, Aberdare Cisticola, Abbott's Starling, Jackson's Widowbird, the African Green Ibis, and Ayres' Hawk-Eagle, among others.

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Other than bird watching, the falls may offer a treat for mountain climbers since several peaks surround it. The most popular are Ol Donyo Lesatima (4,001m), Kinangop (3,906m), Chebuswa Hill (3,364m), and Twin Hills (3,300m).

Plate 10-1: The Karuru Falls



Aberdare Ranges

The ranges are 160 kilometres long and are located on the eastern edge of the rift valley. The range is heavily forested and is a habitat for different wildlife species, including rhinos, elephants, and birds. Notably, Mt. Kipipiri, a Table Mountain, falls within the ranges and may be viewed from Nyandarua.

Plate 10-2: The Aberdare Ranges



Rivers

Nyandarua County has 22 rivers, eight permanent rivers, which include Malewa, Ewaso Narok, Pesi, Turasha, Chania, Kiburu, Mkungi, and Kitiri. The river reserves in the county demonstrate a potential for ecotourism and recreational activities.

10.7.2 Cultural Heritage Sites

Mau-Mau Caves

These are found in Mawingo, Wanjohi, and Mikeu. They are potential sites for cultural tourism since they are associated with Kenya's struggle for independence.

Happy Valley Homes

There are 26 Happy Valley Homes in Nyandarua. The homes were previously owned by white settlers/aristocrats and are located in the Wanjohi Valley near the Aberdare Mountain Range. They are currently privately owned though the owners have limited rights regarding the houses since a court injunction filed by the Museums of Kenya prohibits the demolition of these houses. The houses' condition differs, with some being in excellent condition e.g., Kanyotu's home, whereas others are dilapidated and uninhabitable, e.g., the Alice De Janze home. They are major attractions for cultural tourism in the county.

Plate 10-3: Hetherington's and Kruggler House Respectively



The table below shows the names, location, and condition of some of the happy valley homes:

Table 10-18: Name and Status of Happy Valley Homes

Name	Location	Rooms	Current Owner	Condition
Kruggler House	3 Km from Olkalou	—	—	Maintained in its original state
General China Home	Off Olkalou-Kariamu Rd	8	Waruhiu Itote's wife	In good condition
Gibbs Home	Rironi-Kirima Rd	—	Kirima Secondary (Headquarters)	Part of the roof is ruined
Job Robertson's House	Rironi-Kirima Rd	—	Gatondo Primary (Admin Block)	Renovated by the school
Alice De Janze Home	Wanjohi-Satima road	—	Satima Primary	Neglected and dilapidated
Kiberenge's Home	Off Wanjohi-Geta Rd	—	Samuel Karanja	The roof is worn out

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Kanyotu's Home	—	—	Kanyotu Family	Excellent condition
Clouds Home (Lady Idina)	In Mawingo	20	Nuthu's Family	The roof is worn out
Ex Button Button's Home	5 Km off Ndunyu-Njeru-Kahuruko-Geta Rd	10	Philip Maina	Most rooms are intact
Humphrey Slade Home	7 Km off Ndunyu Njeru-Kahuruko-Geta Rd	10	Church	Neglected
Kimble's Home	10 Km off Ndunyu Njeru-Kahuruko-Geta Rd	20	Joseph Mukuna	In good condition but needs maintenance
B L's House	15 Km through Ndunyu Njeru-Mutubio gate junction	—	Stephen Waithaka	In good condition but needs maintenance
Kanyaweh's House	3 Km off Engineer-Njabini Rd	—	Chief Anne	Neglected and vandalized
Schumacher's Home	3 Km off Njabini-Kinamba-Nairobi route	17	Vincent Nderitu	Well maintained
Hetherington's House	5 Km off Njabini-Kinamba-Nairobi routes	25	Karangatha Health Centre	Well maintained
Kanyugi's House	Engineer	8	Mr. and Mrs. Gichuki	—
Major Gorr Carl's House	Engineer-Njabini Rd	37	—	Maintained in its original state
York Davis Home	—	—	Mrs. Kimathi	Poor

Source: County Department of Tourism and Natural Resources

The exploitation of Tourist Attractions

Potential attractions have not been developed, and existing attractions whose potential has not yet been optimized. The table below shows the level of exploitation of tourism sites in Nyandarua.

Table 10-19: Status of Exploitation of Tourist Attractions

Tourism Products	Sub County	Exploitation Status
Game drives to the ANP, Tafari Castle Lodge, bird watching,	Ndaragwa (Central)	Game drives-operational, Tafari Castle-operational
Possible site for eco-lodge development, develop Manguo Hippo Point for game viewing	Ndaragwa (Kiriita)	Uncontrolled game viewing (Manguo Hippo Point)
Eco-lodges for accommodation, sport fishing (trout), sports tourism (high altitude training camp at Kaheho), mountain climbing at twin	Ndaragwa (Shamata)	Game drives/safaris through Shamata gate-operational

peaks, hiking at Satima Peak (accessible through Shamata gate)		
L. Ol'bolossat, wildlife safaris, accommodation lodges, water sports,	Oljoro-Orok (Weru)	Occasional bird watching and hunting, Tabor Hill Lodge-operational
Happy Valley Homes (National Heritage Sites), Wanjohi caves, sport fishing, hiking, and trekking	Kipipiri (Wanjohi)	Uncontrolled fishing at R. Njangiri and R. Gitei
Nature trails (Kipipiri Peak), eco-homes, game viewing	Kipipiri (Kipipiri)	Uncontrolled hiking to Table Mountain
Nature trail and mountaineering (Satima Peak, Twin Peaks), sport fishing (R. Wanjohi, R. Gitei, R. Njangiri), Wang'ae caves, Philo Grande Camp, Gatuku waterfalls	Kipipiri (Geta)	Uncontrolled hiking to Table Mountain, Philo Grande Camp is unregistered, an uncontrolled visit to Wang'ae caves
Wildlife sanctuary (Aberdares estate),	Kipipiri (Githioro)	Nature trails, cultural/religious tourism (Kipipiri peak)
Mau Mau caves, hiking, bird watching	Kinangop (Murungaru)	
Mountain biking (Mutubio gate road), sport fishing, eco-lodges, game viewing (ANP through Mutubio gate), water sports (John Nimu and Karemeri dams), hiking, Happy Valley Homes,	Kinangop (North Kinangop)	
Mountain biking, nature trail (to Feys and Kinangop peak), guest house (Mutarakwa Forest Station), sport fishing (R. Kinja and R. Turasha), guesthouses (Engineer Town), water sports (Semini Dam)	Kinangop (Gathara)	Inadequate and substandard accommodation facilities
Mountain biking, water sports (Sasumua Dam), hiking to Elephant and Kinangop peaks, sport fishing, guesthouses (formerly owned by white settlers),	Kinangop (Njabini Kiburu)	
Agro-tourism	Kinangop (Nyakio)	
Scenic view of rift valley escarpment	Kinangop (Magumu)	The viewpoint is not fully developed

Source: *Status of Tourism in Nyandarua, 2014*

Currently (2020), tourism numbers are projected to be 9,000 visitors, up from 6,000 in 2018. The number of visitors is expected to increase gradually at 1,500 annually to reach 24,000 by 2030. The total revenue derived from tourism was Ksh. 100,000,000 as of 2018 and will rise to Ksh. 240,000,000 million, assuming that every visitor spends 20,000 Ksh. per day per visit annually (CIDP 2018-2022).

10.7.2.1 Challenges Facing Tourism

The following challenges were identified from the analysis;

- Under-exploited tourism potential, e.g., Happy Valley Homes, L. Ol'bolossat, and Mau Mau caves.
- Deforestation.

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- Siltation of tourism sites such as L. Ol'bolossat.
- Poor marketing of tourist attractions.
- Encroachment on L. Ol'bolossat and the Aberdare Ranges.
- Inadequate investment in the hospitality sector.
- Informal tourism activities, such as fishing, game viewing, and hiking.
- Negligence of some attractions, such as Happy Valley Homes.
- Inaccessibility of tourism sites and areas, e.g., L. Ol'bolossat.

10.7.2.2 Recommendations

The following initiatives are proposed to solve the problems which currently face tourism in Nyandarua County by the tourism department and from preceding analyses:

- Gazettement of all tourist attractions.
- The exploitation of existing attractions, e.g., L. Ol'bolossat, the Aberdare National Park gates located within Nyandarua, Mau Mau caves, Happy Valley Homes, etc.
- Intensify marketing of tourist sites and attractions through Meetings, Incentives, Conferences, and Exhibitions (MICE).
- Strategic establishment of hospitality facilities and lodges in specific areas in the county.
- Tap into the market of surrounding counties such as Nakuru and Laikipia.
- Enforcement of policies and legal statutes concerning management, conservation, and marketing of tourist attractions.
- Holding cultural tourism and talent events such as beauty pageants.

Initiatives to Improve Tourism

The following initiatives have been proposed by the county department of water, environment, tourism, and natural resources to promote tourism in Nyandarua:

- Construction of monuments to honour the Mau Mau freedom fighters: Monuments in commemoration of Dedan Kimathi and Kung'u Karumba are proposed for construction in Njabini and Gwa Kung'u, respectively.
- Equator View Points: These may be established in Gwa Kung'u, Kia Njata, and Gwa Kiongo.
- Dams: Development of Gwa Kiongo and Passenga Dams into tourist attractions.
- Development of the Presidential Tree Park in Olkalou into an Arboretum.
- Medical Tourism: Improving infrastructure within Nyandarua could attract the best doctors and hospitals to the county.
- Aggressive advertisement programmes to create awareness

Plate 10-4: Gwa Kiongo Dam; a Potential Tourist Destination



10.8 Trade and Commerce

10.8.1 Wholesale and Retail

Trading establishments in Nyandarua include retail and wholesale outlets that range from small-scale to large-scale. According to the CIDP, 2018-2022, the County has 12,900 registered retail outlets and 537 registered wholesale traders. Other dominant businesses operating in the County are hotels, petrol stations, and liquor stores. The major trading centres in the County are Olkalou, Engineer, Njabini, Mairo Inya, Ndaragwa, Miharati, and Ol'joro-Orok. These centres currently offer the highest order of goods and services. Nevertheless, other centres spread out in the County which provide commodities easily accessible to smaller catchments.

10.8.2 Markets

Nyandarua has a total of 54 markets; 26 formal and 28 informal markets. The majority of formal markets have scheduled market days. Major goods traded in these markets include potatoes, cabbages, and tomatoes, among other agricultural produce, second-hand clothes, and household items.

The distribution of markets in Nyandarua County is shown in the table below.

Table 10-20: Markets in Nyandarua

Sub County	Markets		Total
	Formal	Informal	
Ol Kalou	5	6	11
Oljoro-Orok	5	2	7
Kipipiri	5	6	11
Kinangop	6	11	17
Ndaragwa	5	3	8
Total	25	28	54

Source: County Department of Industrialization, Trade, and Cooperatives, 2020

Several products are exported to various destinations. These include milk, potatoes, cabbages, carrots, fruits, and cut flowers. Most of the agricultural produce except cut flowers are exported to Nairobi and the neighbouring counties. Cut flowers are exported to the Middle East, Europe, and Australia.

10.8.3 Financial Institutions

10.8.3.1 Banks

Banks in Nyandarua are found in major urban centres such as Olkalou, Njabini, and Engineer, which generally have higher population densities than other towns and higher income levels. Some of the banks in Nyandarua include Kenya Commercial Bank (KCB), Equity Bank, Cooperative Bank, Family Bank, and the Kenya Women Finance Trust (KWFT). Also, SACCOs are working as banks. They include Viktas, Nyala Vision Tower, and Muki Sacco.

10.8.3.2 Cooperatives

There are 152 registered cooperatives in Nyandarua. They deal in different areas, such as farming, savings, credit, housing, and investments. Notably, savings and credit cooperatives (SACCOs) are the majority amounting to 90, whereas investment societies are the least. The table below shows the cooperatives in Nyandarua per Sub County.

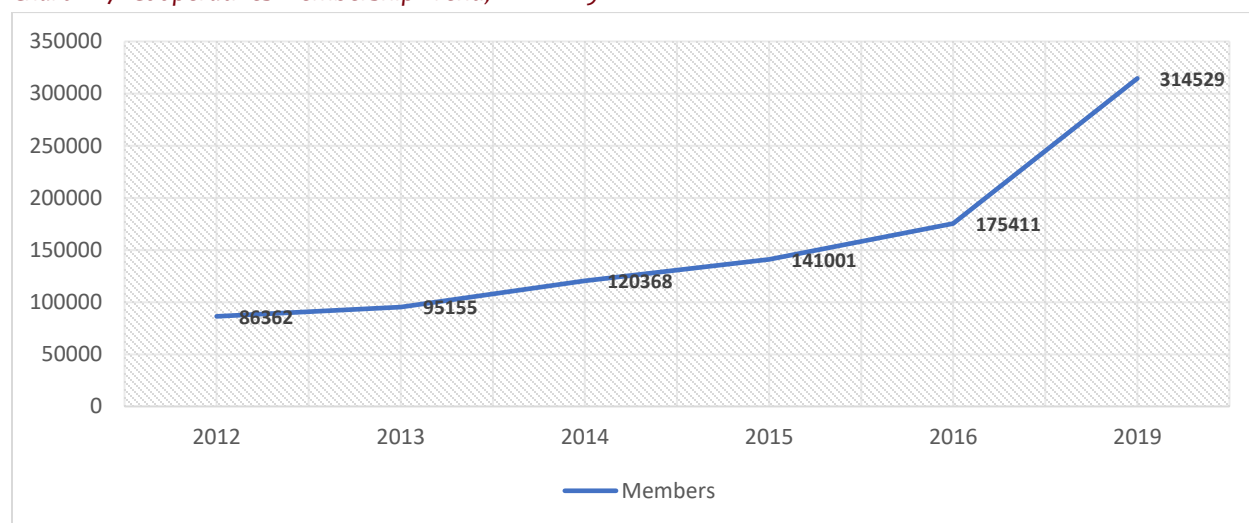
Table 10-21: Registered Cooperatives in Nyandarua

Sub County	Dairy	Sacco	Housing	Investment	Horticulture	Total
N. Central	14	26	2	0	0	42
N. North	4	26	5	0	0	35
N. West	8	12	1	0	-	21
Kipipiri	6	4	0	1	1	14
Kinangop & Nyandarua South	10	22	6	1	1	40
Total	42	90	14	2	0	152

Source: County Department of Trade, Cooperatives and Industrialization, 2020

Membership in cooperatives has been on a steady rise since 2012. Currently, all cooperative members in Nyandarua amount to 314,529. The line graph below shows the trend in cooperative membership from 2012 to 2019.

Chart 10-7: Cooperatives Membership Trend, 2012-2019



Source: County Department of Trade, Cooperatives and Industrialization, 2020

Only five of the SACCOs have either met or are in the process of obtaining licenses from SACCO Societies Regulating Authority (SASRA) to take deposits from members. Members can access various financial products such as school fees loans, asset financing loans, farming loans, and emergency loans. Notably, urban SACCOs are mostly employed in the formal sector, whereas those in rural SACCOs are largely involved in farming and informal employment activities.

The dairy cooperatives have over 2,050 permanent employees and over 2,500 casual workers. On average, dairy cooperatives in Nyandarua handle close to 1,500 litres of milk per day.

Nyandarua County has potential for youth and women and *bodaboda* SACCOs. Additionally, there's potential for value addition in dairy cooperatives, pyrethrum marketing, and low-cost housing projects by housing cooperatives.

10.8.4 Challenges Facing Cooperatives

The following are challenges that were reported concerning cooperatives in Nyandarua;

- The default of loan repayment by members.
- Inadequate working capital.
- Low budgetary allocation for the trade and cooperatives department.
- Inadequate staff.
- Low-capacity building of staff.
- Fluctuating milk prices.
- Low ICT uptake in cooperatives.
- Low-value addition.

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- Poor road network.
- Poor management of cooperatives.
- Political interference.

10.8.5 Challenges; Trade and Commerce

Trade and commerce in Nyandarua have several challenges, as indicated below:

- Inadequate capital and credit facilities, especially for startup entrepreneurs.
- Limited accessibility to markets in some areas.
- Lack of a coordinated development strategy in Nyandarua.
- Low levels of investment.
- Lack of an organized business community.
- Low savings and investment opportunities.

10.8.6 Recommendations

Stakeholders made the following recommendations to bolster trade and commerce in Nyandarua:

- Strengthening the cooperative movement.
- Tapping into the surrounding county markets and the proximate capital of Nairobi.
- Ease of access to capital and credit facilities.
- Improve accessibility in the county.

10.8.7 Initiatives to Improve Trade

The following rapid result initiatives have been launched to bolster trade in Nyandarua:

- Holding a leaders' conference to come up with a county development strategy.
- Holding an investor conference to strategize on how to attract investors to the county.
- To organize and register all businesses into distinct groups.
- Providing affordable credit to spur business growth and create employment.
- Surveying the Jua Kali sector.
- Delivery of ten milk coolers to reduce losses as a result of inadequate storage facilities.
- To facilitate training and formation of SACCOs by *Boda Boda* operators.
- To facilitate a collective voice (cooperative movement) in the marketing and pricing of agricultural produce.

10.9 Industrialization

The main type of industries in Nyandarua are agro-based processing industries. Major processing industries in the County include;

- Ziara dairies in Kipipiri

- **Kinangop Dairy processing plant** owned by MUKI farmers cooperatives and specializes in producing fresh milk, long life milk, and yoghurt. Currently, it produces 90,000 litres.
- **Midlands Limited in Njabini** that currently focuses on potato processing, producing potato chips. The plant is, however, embattled in a court case over land ownership.
- **Countryside Dairy Limited** is a milk processing industry in Ndaragwa with a capacity of 100,000 litres per day.
- **Kenya Cooperative Creameries (KCC)** in Murungaru that specializes in milk processing.
- **Aberdares Farmers' Cooperative** in Geta that undertakes large scale honey processing.
- **Potato processing** in Ol Kaluo, which covers 8.2 ha and is located opposite J.M. Kariuki Hospital, undertakes large scale potato processing
- A vegetable processing plant in Engineer

Apart from the agro-based processing industries, there are several cottage industrial activities in Nyandarua County. Industrial activities differ from urban areas to rural areas. Industrial clustering revealed that most urban areas were characterized by agro-processing, metal, wood fabrication, automotive works, cottage industry, and technology innovation. While rural areas were characterized by industrial activities such as agro-processing, metal and wood fabrication, and engineering works (farm tool repairs). The industrial analysis per industrial activity, centre, and distribution by ward is annexed.

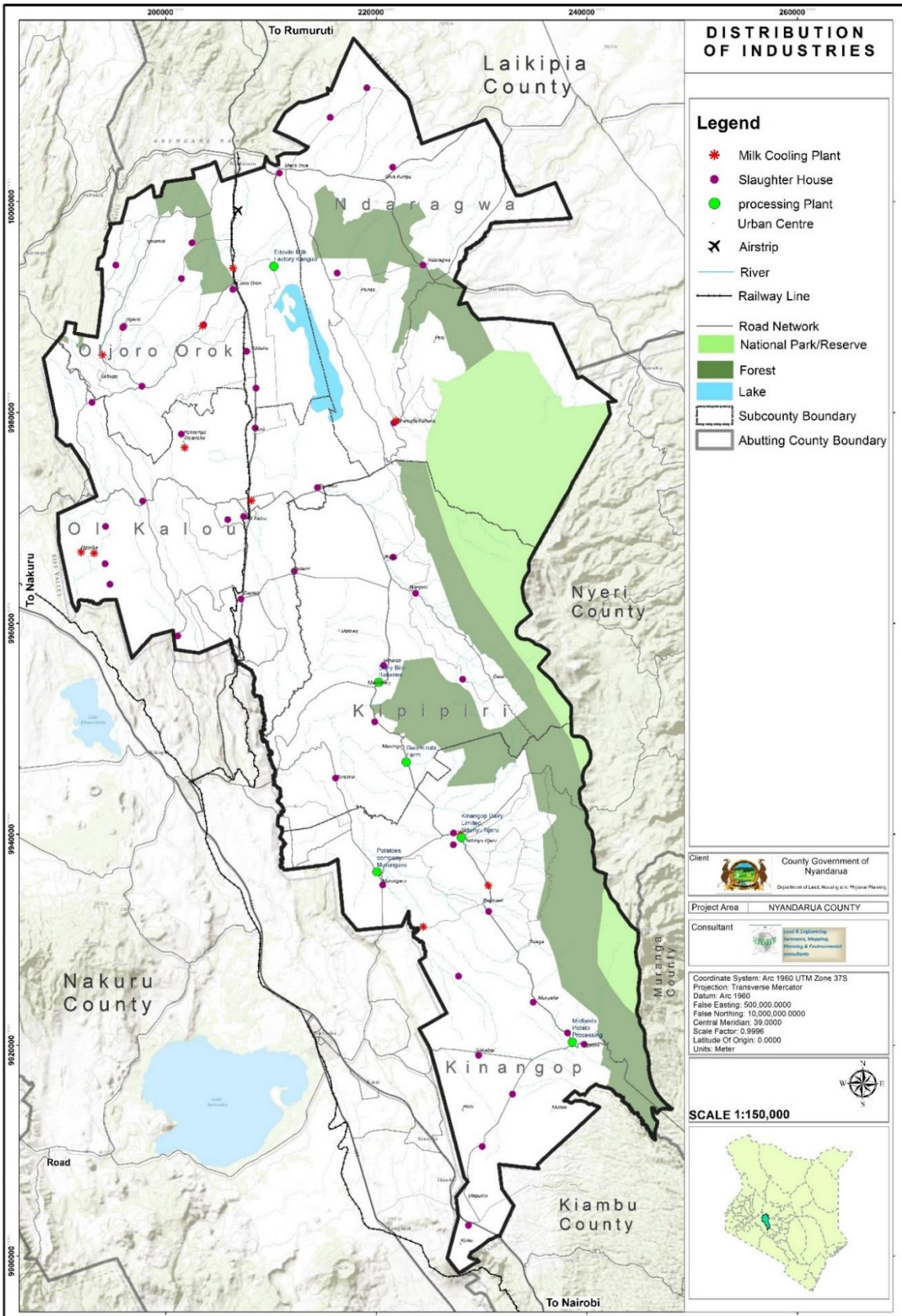
10.9.1 Formal industries and Jua Kali

Nyandarua has four established Constituency Industrial Development Centres in Geta (Kipipiri), Ndunyu Njeru (Kinangop), Ol'kalou, and Ndaragwa. These sites are currently operating below the optimal capacity due to the inadequacy of equipment.

Jua Kali shed is the most prominent industrial activity due to the lack of a strong formal industrial base. Jua Kali activities include basketry in Oljoro-Orok, wool carpets and mats in Njabini tailoring, carpentry and joinery, blacksmith, welding/ fabrication, and motor vehicle repairs. Nyandarua has a total of eighteen registered Jua Kali associations with a combined membership of 2500 people (County department of trade, 2020). The Jua kali sector employs over 10000 Nyandarua residents.

Jua Kali activities are mostly situated in urban centres. Towns with designated Jua Kali operation areas are Olkalou, Mirangine, Magumu, Ndunyu Njeru, and Ndaragwa.

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Map 10-5: Distribution of Industries in Nyandarua

10.9.2 Industrialization Potential

There is great potential for agro-based industries in the county, given the readily available agricultural products ranging from food and cash crops to various animal products. There is also a potential for livestock and poultry feeds manufacture, leather tanning (Ndaragwa), textile manufacture (wool), vegetable/fruit processing, sugar production (sugar beets), milk processing (cheese and yoghurt) as well as water purification and bottling.

10.9.3 Challenges facing Industrialization

The following are the challenges facing industrial development in the county.

- Inadequate infrastructure.
- Inadequate capital and credit facilities.
- Lack of designated land for industrial activity.
- Inadequate technical know-how/skilled labour.
- Low support for cottage (Jua Kali) industry.

10.10 Mining

Quarrying and sand harvesting are the only mining activities in Nyandarua County. Areas, where quarrying is practiced include Olkalou, Kaimbaga, Kibathi, Mkungi, Karati Ridge, Oljoro-Orok/Kangui, Kapten, Ndemi, Mumui, Ndunyu Njeru, and Tulaga. Sand harvesting is practiced in Miharati and Kinangop. Distribution of mining activities by site and wards is presented in table 11-23.

Table 10-22: Mining activities by site and wards

Mining Activities	Site/Urban area	Distribution by ward
Stone quarrying	Kibathi	Kipipiri
Stone quarrying	Ol'Joro Orok (near Kangui)	Charagati
Stone quarrying	Kapten	North Kinangop
Stone quarrying	Mumui	Githioro
Stone quarrying	Ndunyu- Njeru	North Kinangop
Stone quarrying	Ndemi	Wanjohi
Stone quarrying	Ol Kalau	Ol kalou
Stone quarrying	Kaimbaga	Wanjohi
Stone quarrying	Karati	Murungaru
Stone quarrying	Mkungi	Murungaru
Stone quarrying	Tulaga	Gathara
Sand harvesting	Miharati	Miharati
Sand harvesting	Kinangop	North Kinangop

II INSTITUTION AND GOVERNANCE

11.1 Overview

Institutional and institutional capacity analysis is essential since institutional issues are cross-cutting. The Constitution of Kenya 2010 guides the two levels of government to relate based on consultation and cooperation. Article 189 of the Constitution requires the two groups of government to perform their functions while respecting government's functional and institutional integrity at the other level and in liaison to exchange information, coordinate policies, and enhance capacity. Further, it requires the two government levels to assist, support, and consult and, as appropriate, implement legislations of the other level of government.

The institutional analysis for this planning context is focused on the institutions that have a major role in realizing this plan.

11.2 County Organizational Structure

Article 176 (1) of the Constitution establishes a county government for each County, consisting of a county assembly and a county executive. Further, Article 176 (2) stipulates that every county government shall decentralize its functions and provide its services to the extent that it is efficient and practicable to do so.

The county government is responsible for service provision, policy formulation, implementation, and enforcement of rules and regulations. Instructively, implementation of this plan depends on the existence of functional and robust institutions, which depend on the adequate staff, resources, structures, and equipment.

The County Government consists of two distinct but complementary structures; the Executive, which implements the county development agenda, and the Legislature, which is vested with the mandate to legislate, represent the electorate, and oversee the County Executive and its organs.

The executive's role in this plan is to implement this plan through its appendages structured as departments. The realization of projects in the County is realized in the departmental lines of the executive in the County. The structure of the executive further informs the implementation framework for this plan.

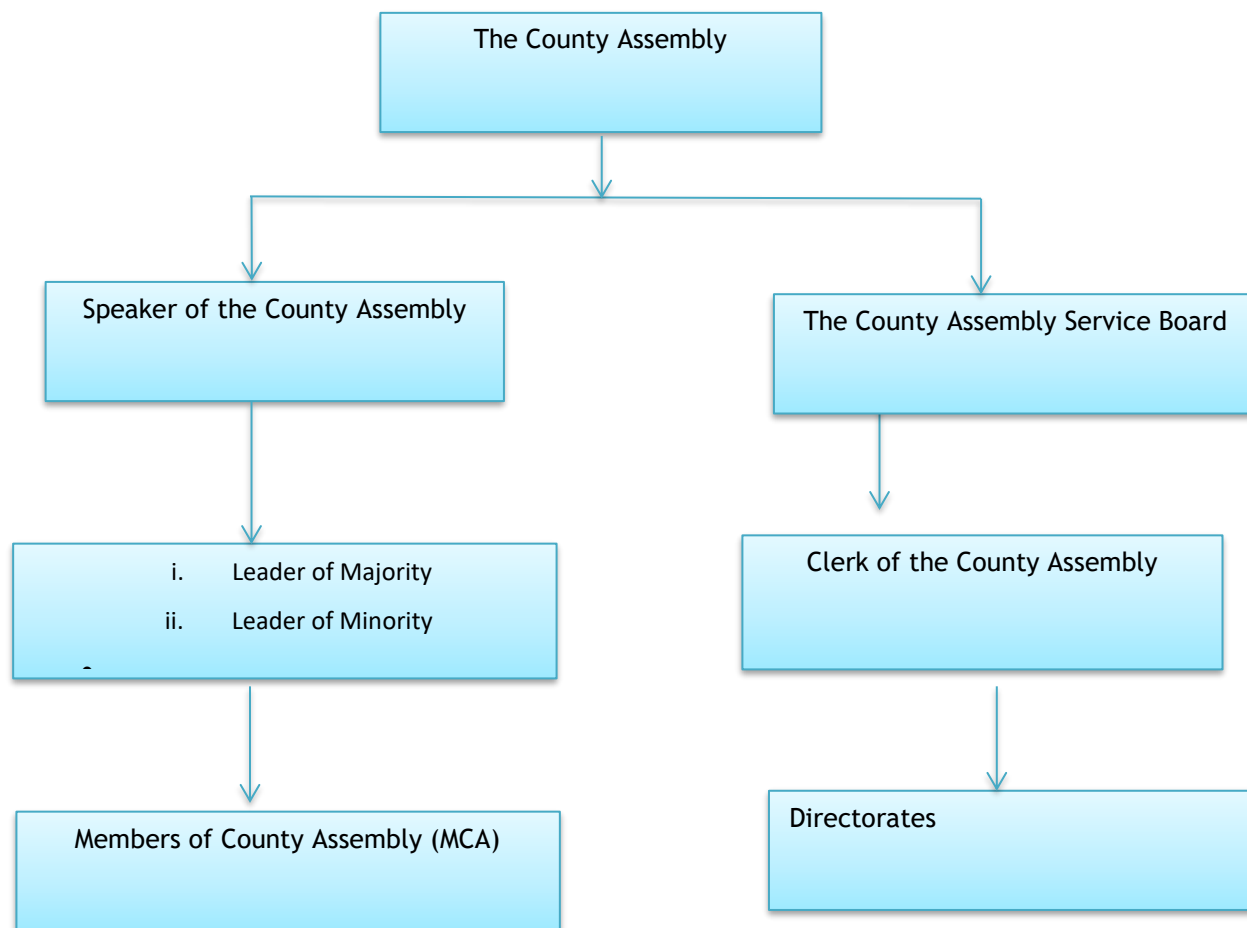
County Assembly operates on the principles of separation of powers and sharing of power within and between the County and the citizens. This implies that County Assembly members have oversight, policy formulation, and representation role perform executive functions.

In this plan, the county assembly has a crucial role in approval in two facets. Firstly, the county Assembly has the responsibility to approve this plan to make it a legally binding policy framework that shall guide the county's spatial planning. Secondly, the County Assembly is responsible for approving the budgetary

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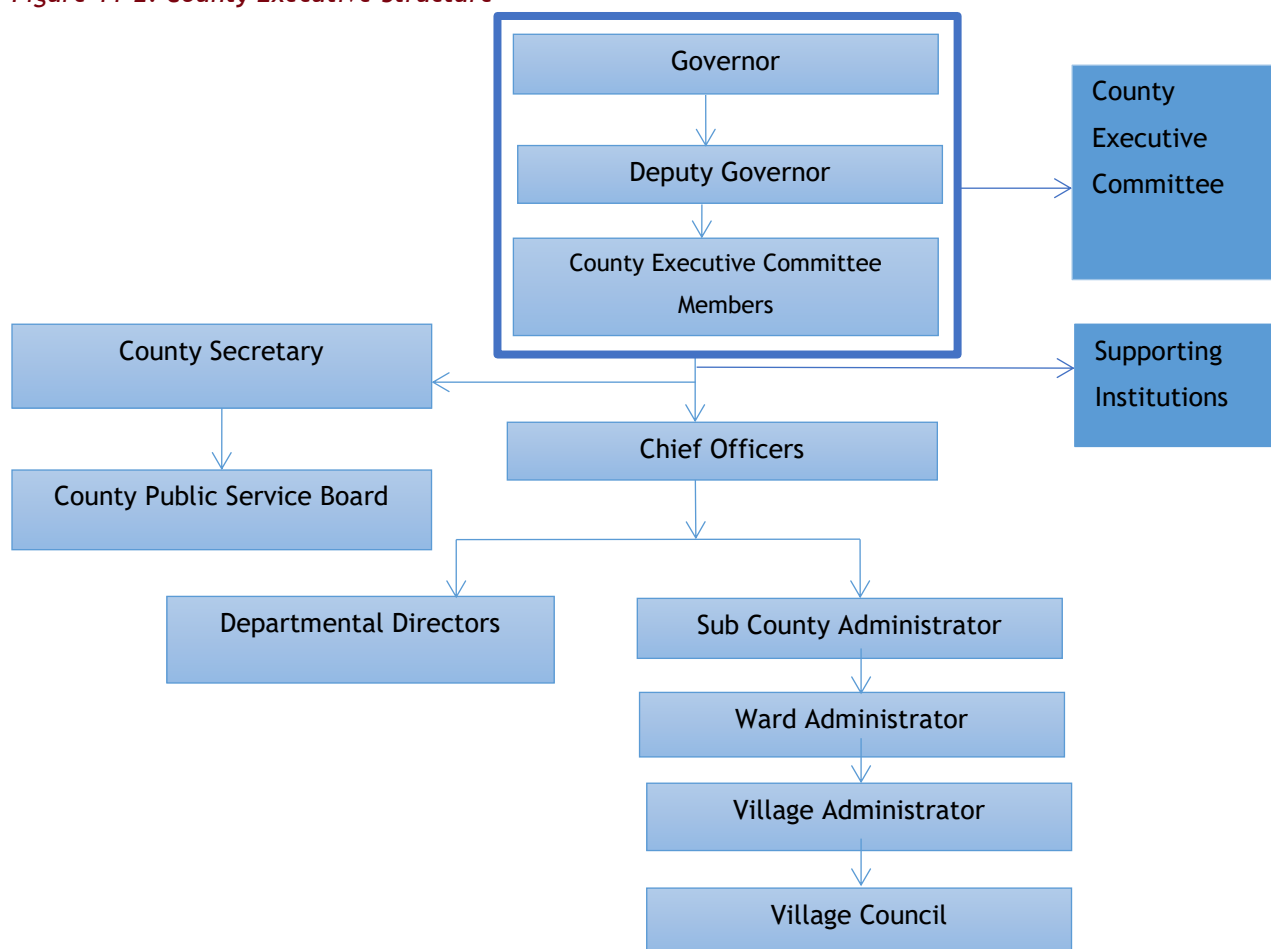
allocation for the projects envisaged to contribute to this plan's socio-economic transformation. The figure 12-1 and 12-2 represents the organizational structure of the county executive committee and county assembly, respectively.

Figure 11-1: County Legislature Structure



Source: County Governments Act, 2012

Figure 11-2: County Executive Structure



Source: County Governments Act, 2012

It is imperative to note that, according to section 30(1) (f) of the County Governments Act, 2012, it is the responsibility of the Governor to submit county plans and policies to the county assembly for approval. Consequently, the county assembly is mandated to approve county development planning, i.e., county spatial plan.

After the assembly's approval, the plan is submitted to the Governor to append his or her signature. Once it is signed, it becomes county legislation to be implemented by the County Executive Committee.

11.3 Functions of the National and County Governments

The fourth Schedule of the Constitution of Kenya specifies the functions and powers to be performed by each government level. National Government has a total of thirty-five (35) functions and powers. On the other page, County Governments have a total of 14 functions and powers to operationalize. Table 13-1 shows some of these functions and powers.

Table 11-1: National and County Government Functions

National Government Functions	County Governments Functions
<ul style="list-style-type: none"> Foreign affairs, foreign policy, and international trade The use of international waters and water resources Police services National defense, Police service, and Courts National economic policy and planning National statistics and data on population Education policy, standards, curricula, examinations Universities, tertiary educational institutions and other institutions of higher learning and primary schools, secondary schools and special education institutions Transport and communications; construction and operation of national roads. General principles of land planning and the coordination of planning by the counties Protection of the environment and natural resources National referral health facilities Capacity building and technical assistance to the counties 	<ul style="list-style-type: none"> Agriculture-crop and animal husbandry; livestock sale yards; county abattoirs; plant and animal disease control; and fisheries County health services; county health facilities and pharmacies; Control of air pollution, noise pollution, other public nuisances, and outdoor advertising Cultural activities, public entertainment, and public amenities County transport, including—county roads, street lighting, traffic and parking, public road transport, etc. Animal control and welfare Trade development and regulation-markets; trade licenses; local tourism, etc. County planning and development-statistics; land surveying and mapping; boundaries and fencing; housing; and electricity and gas reticulation and energy regulation Pre-primary education, village polytechnics, home craft centers, and childcare facilities Implementation of specific national government policies on natural resources and environmental Conservation County public works and services-storm water management systems; water and sanitation services Firefighting services and disaster management Ensuring and coordinating the participation of communities in governance

Source: Constitution of Kenya, 2012

11.4 Devolved Units in Nyandarua County

Nyandarua County is subdivided into five (5) Sub Counties, namely Olkalou, Kipipiri, Kinangop, Oljoro-Orok, and Ndaragwa. The Sub-Counties are further subdivided into twenty-five (25) Wards, with Kinangop Sub-County having the highest number of wards at eight (8), as shown in table 12-2. All the devolved units are functional with relevant administrative head.

Table 11-2: Nyandarua County Devolved Units

Sub-County	Kinangop	Kipipiri	Ol'kalou	Ol'joro Orok	Ndaragwa
Electoral Wards	1. Engineer 2. Gathara 3. North Kinangop 4. Murungaru 5. Njabini/Kibiru	1. Wanjohi 2. Kipipiri 3. Geta 4. Githioro	1.Karau 2.Kanjuiri Range 3.Mirangine 4.Kaimbaga 5.Rurii	1.Gathanji 2.Gatimu 3.Weru 4.Charagita	1.Leshau/Pondo 2.Kiriita 3.Central 4.Shamata

	6. Nyakio				
	7. Magumu				
	8. Githabai				

The map below shows the administrative/devolved units of Nyandarua County.

NYANDARUA COUNTY ADMINISTRATIVE UNITS

Legend

- Sub County Boundary
- Nyandarua County Boundary
- Kenya Counties

Coordinate System: Arc 1960 UTM zone 37S
 Projection: Transverse Mercator
 Datum: Arc 1960
 false easting: 500,000.0000
 false northing: 10,000,000.0000
 central meridian: 39.0000
 scale factor: 0.9996
 latitude of origin: 0.0000
 Units: Meter

SCALE 1:250,000

North Arrow

Inset Map of Kenya

11.5 County Government Agencies

The counties are legally given the opportunities to create institutions that ensure the objects of devolution. The County Governments Act 2012 allows the establishment of a County Planning Unit whose roles include: coordinating integrated development planning within the County; ensuring integrated planning within the County; ensuring linkages between county plans and the national planning framework; and ensuring the meaningful engagement of citizens in the planning process; ensuring the collection, collation, storage and updating of data and information suitable for the planning process; and ensuring the establishment of a GIS-based database system. Also, the counties are allowed to establish municipal boards and town committees responsible for the urban areas' management and governance.

The institutions mentioned above are essential in planning project implementation in the County. During the period of formulating this plan, the Municipal Board for Olkalou urban area was established. However, the board's technical wing was not fully constituted. On the other hand, the county does not have a fully functional county planning unit.

11.6 National Government Agencies

The national government agencies play a crucial role in development not only to issues affiliated to the national government but also the county government. These institutions perform a special task that is related to the welfare of the citizens. Some sectors in the County are solely the mandate of the national government agencies. These agencies are developmental and are key in supporting the realization of this plan through project implementation. These institutions and their role in this plan are as follows;

Kenya National Highway Authority (KeNHA)

KeNHA is a National Government agency entrusted with the mandate of planning, managing, constructing, upgrading, rehabilitating, and maintaining national trunk roads. The role of KeNHA in this plan is to implement the plan proposals on National Trunk Roads and ensuring adherence to transportation policies that shall be recommended in the plan as well as giving advice on the recommendations on road improvement and upgrading. However, there is a weak link in consultation and coordination in project conception and implementation due to protracted processes.

Kenya Urban Roads Authority (KURA)

KURA is responsible for the management, development, rehabilitation, and maintenance of all public roads in cities and municipalities except where this road is categorized as national roads. Based on its role as an agency, KURA has a crucial role in implementing this plan since there are urban areas within Nyandarua that fall within its jurisdiction. However, this institution also lacks care linked to the county planning and project conceptualization since its decision-making structure, and the County are interlinked.

Kenya Rural Roads Authority (KeRRA)

KeRRA is mandated with the development, rehabilitation, maintenance, and management of rural roads in the country and ensuring that the quality of road works is following established standards. This agency's role in this plan is the implementation of rural road projects that are identified and proposed. However, the institution faces inadequate funding and an ineffective coordination framework with the county to prioritize conceptualization and implementation.

Kenya Power Limited Company (KPLC)

Kenya Power owns, operates most of the country's electricity transmission and distribution systems, and sells electricity. This institution is responsible for increasing the distribution of power to the various areas identified and proposed in this plan. However, according to the assessment conducted in Nyandarua County regional Office, the institution is undermined by the inadequacy of funds to extend the infrastructure to all residents.

Kenya Airports Authority (KAA)

Kenya Airports Authority is charged with the provision and management of all airports in Kenya. At the period of the preparation of this plan, Nyandarua county has air transport potential that this plan has to seek to optimize. Airport improvement and development projects are within the jurisdiction of KAA. However, the institution is undermined by the limited finances to develop the ground support infrastructure facilities in the County.

Kenya Forest Service (KFS)

KFS's role is to conserve, protect, and manage all public forests following the Forest Act's provisions. In this plan, KFS is responsible for the conservation of the public forests in the County, assist the County in increasing the forest cover and collaborate with the County to develop eco-tourism activities within the forested areas. This institution also presents the opportunity to collaborate and develop the tourism industry in Nyandarua County.

However, KFS faces the challenge of the nonexistence of a forest information storage and retrieval center (database), which would enhance the effective management of forest resources in the County.

Kenya Wildlife Service (KWS)

The main role of the KWS is to conserve and manage national parks, wildlife conservation areas, and sanctuaries under its jurisdiction. The institution does other activities that relate to the security of the wildlife and visitors in the park and other developmental and managerial activities, including planning for park management plans. KWS has a role to play in this plan. The role includes coordinating the implementation of ecosystem proposals relating to this plan and ensuring benefit-sharing for benefit sharing with communities living in wildlife areas. These roles the institution would not perform if there is no institutional link and framework for coordination and cooperation with the county government of

Nyandarua. Furthermore, there is an opportunity for committee formulation to conserve wildlife at the county level.

Water Resource Authority (WRA)

Water Resource Authority is responsible for safeguarding the right to clean water by ensuring that there is proper regulation of the management and use of water resources in Kenya. The role of WRA in this plan is no exception from the broadly outlined roles. However, the inadequacies established in public water supply and the potential solution through abstraction of water from their natural source are subject to this authority's regulations and approval.

This institution's effectiveness is undermined by the Limited staff capacity to oversee the activities related to water resource utilization, inadequate data management resources to facilitate decisions, and planning on water resources—insufficient funding to enable research and development in the institution.

Nyandarua Water and Sanitation Company (NYANDAWASCO)

Nyandarua Water and Sanitation Company are charged with providing water and sanitation services to the whole of Nyandarua County. However, the institution has a limited financial capacity to augment water supply in the entire County and inadequate staffing. Due to this limitation in institutional capacity, the institution shall not be able to implement water supply issues established in this plan.

National Environment Management Authority (NEMA)

The mandate of NEMA includes coordinating the various environmental management activities being undertaken by the lead agencies. The agency also promotes ecological considerations into development policies, plans, programmes, and projects. To ensure the proper management and rational utilization of environmental resources, on a sustainable yield basis, to improve Kenya's quality of human life. The roles are both managerial and conservation-related. The roles also include examining land use patterns to determine their impact on natural resources' quality and quantity. NEMA is responsible for implementing waste management policies and conservation policies in the county as aligned with this plan. However, this institution is undermined by inadequate staffing at the County level, inadequate finance to run its programmes.

The institution also provides an opportunity for proper waste management and environmental conservation in the county.

Non-State Actors

Over three thousand self-help and community groups exist in the county. According to Nyandarua CIDP (2018-2020), some renowned community-based groups are the Friends of Kinangop Plateau and the Friends of Lake Ol'bolosat. These institutions source their funds from the community members. They are efficient in resource mobilization to achieve their social development agenda. However, not all these

institutions are active. The active groups in the county receive funds from the devolved funds, namely Youth Fund, Women Enterprise Fund, National AIDS Control Council (NACC), and the National Campaign against Drug Abuse (NACADA). The groups engage in farming enterprises (crop and livestock), poultry, environmental conservation, weaving, beads making, creating HIV and AIDS awareness, and prevention of drug and alcohol abuse. Political Parties Several political parties have membership and offices in the County.

These institutions are vital in developing the county as they empower the community members through funding and social support. These institutions, however, face the challenge of limited engagement in county government development initiatives.

11.7 Governance issues

Governance issues are cross-cutting and impact development across the board. The issues discussed herein include Public Participation, Poverty and Marginalization, Gender Issues, Youth issues, Safety and Security, county financing, and Climate Change. A detailed description is discussed below.

11.8 County Revenue

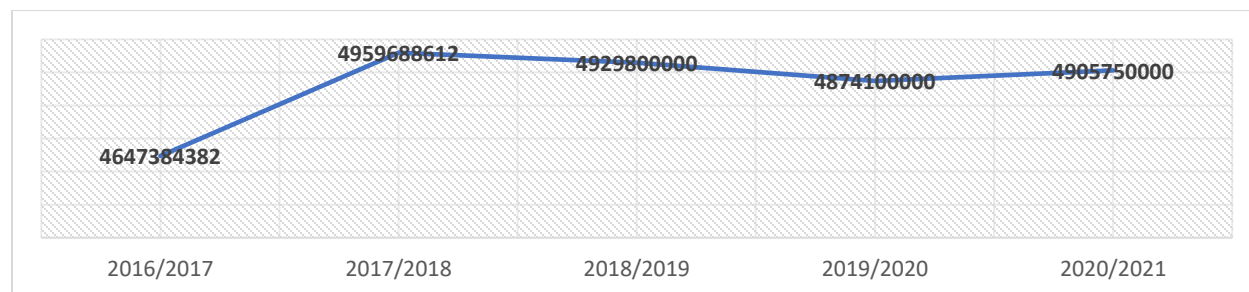
County revenue sources are either internal or external. There are various external sources of revenue. These are conditional grants, equitable share, donor funding, and loans. Internal revenue sources include property taxes, land rates, parking fees, licensing fees, etc.

11.8.1 External Sources of Revenue

Equitable share

In the Financial Year 2016/17, Nyandarua County received Ksh.4,647,384,382 as a basic equal share from the National revenue. In the Financial Year 2017/18, the County was allocated Ksh.4,959,688,612. This was an increase of 6.72 percent from Financial Year 2016/17. In the Financial Year 2018/19, the County was allocated Ksh.4,929,800,000. The equitable share allocation for the financial year 2019/2020 was 4,874,100,000. According to Nyandarua County Budget estimates (2020), the County was projected to receive Ksh. 4,905,750,000 in the Financial Year 2020/21 from the national revenue. The chart below shows the equitable share allocation trend from the Financial Year 2016/17 to the Financial Year 2020/21.

Chart 11-1: Equitable Share Trend from FY 2016/17 to FY 2020/21

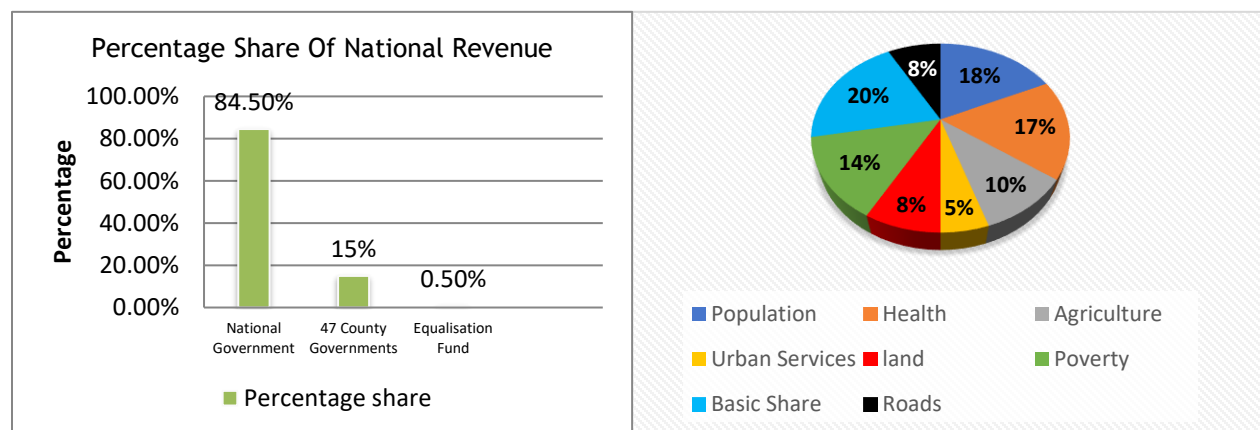


Source: Nyandarua County Fiscal Strategy Paper, 2016/2017, 2017/2018, 2018/2019.

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The Commission for Revenue Allocation (CRA) has a formula for revenue sharing whose criteria is determined by factors such as population (18%), Agriculture (10%) Health (17%), Basic minimum share (20%), land area (8%), Roads (4%) poverty index (14%), and urban services (%). The chart below shows how revenue is shared between the national and 47 county governments and the criteria used.

Chart 11-2: Percentage Share of National Revenue and the Criteria for Sharing among the 47 Counties



Source: Devolution Handbook, 2020

Contribution in Lieu of Rates (CILOR)

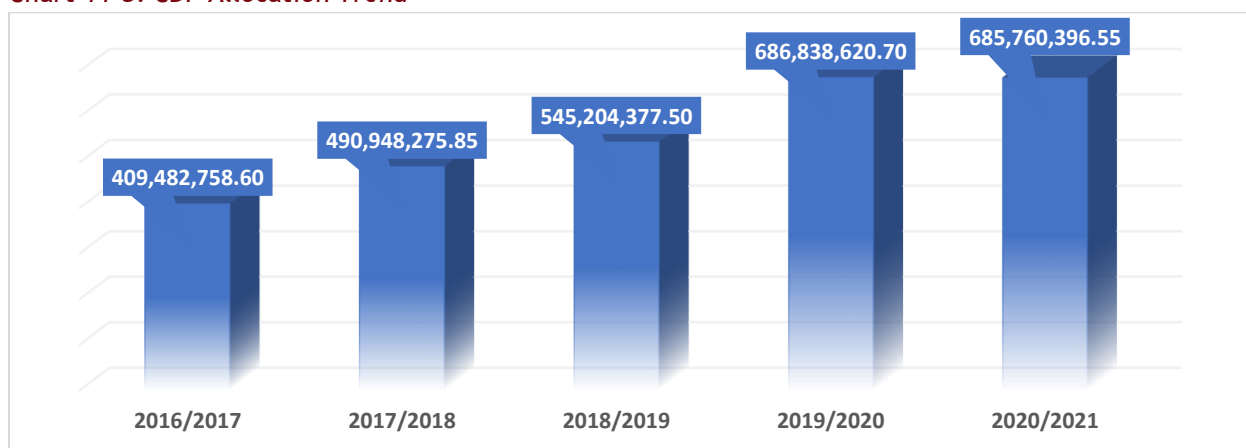
Property owned by the national government, such as land and real estate, are not subject to taxation by the county government. The national government reimburses the county governments for part of the tax revenue that it would otherwise have collected. In the Financial Year 2019/20, Nyandarua County received 6,521,891,236 as conditional grants paid as Contribution in Lieu of Rates.

National Government Constituency Development Fund

Nyandarua County uses its CDF funds for community-level development projects. These projects include buying ambulances for health centers in the constituencies, improving facilities in public schools, building classrooms, and providing buses. The table below shows the trend of CDF allocations to the County for the last five financial years (2016/2017-2020/2021). Over the years, the allocations to the County have increased, as shown in chart 11-3.

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Chart 11-3: CDF Allocation Trend



Source: ngcdf.go.ke, 2020.

11.8.2 Internal Sources of Revenue (Local Revenue)

The table below shows county revenue from the 2018/19 financial year to 2020/21.

Table 11-3: County Revenue Sources

Revenue Source	Amount		
	2018/2019	2019/2020	2020/2021
National Transfer Equitable Share	4,929,800,000	4,867,000,000	4,905,750,000
National Transfers Conditional Grants	421,933,263	452,069,843	461,276,710
Own Source Revenue (Local Collection)	440,000,000	630,000,000	830,000,000
Donor Funds	567,610,216	572,821,393	669,662,340
Total	6,359,343,479	6,521,891,236	6,866,689,050

Source: County Budget Review and Outlook Papers 2018/2019-2020/2021

The County fiscal projections are as presented in table 11-4

Table 11-4: County Revenue Projections

REVENUE	AMOUNT PER FINANCIAL YEAR			
	2020/2021 (Actual)	2021/22 (Projected)	2022/23 (Projected)	2023/2024 (Projected)
National Transfers	4,905,750,000	5,702,094,000	5,930,177,760	6,167,384,870
Local Collections	800,000,000	850,000,000	884,000,000	919,360,000
Linda Mama	30,000,000	30,000,000	30,000,000	30,000,000
Fuel Levy Fund	146,215,617	146,215,617	146,215,617	146,215,617
Covid 19 grant for the	89,354,000	0	0	0

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national Government				
User Fees Foregone	12,735,922	12,735,922	12,735,922	12,735,922
Leasing of Medical Equipment	132,021,277	132,021,277	132,021,277	132,021,277
Rehabilitation of Village Polytechnics	30,949,894	30,949,894	30,949,894	30,949,894
Supplement for construction of County Headquarters	50,000,000	0	0	0
DANIDA (Donor Grant)	13,860,000	0	0	0
World Bank Grant for KDSP (Level 1)	45,000,000	0	0	0
World Bank Grant for KDSP (Level II)	184,795,683	0	0	0
EU Grant For Potato Tissue Culture Lab	11,000,000	0	0	0
World Bank Loan for Transforming Health Systems	163,357,834	32,000,000	32,000,000	32,000,000
World Bank Grant for Kenya Urban Support Programme (KUSP Level II)	0	135,543,000	135,543,000	135,543,000
World Bank Grant for Climate Smart Agriculture Programme (KCSAP)	239,157,250	117,000,000	117,000,000	117,000,000
Sweden-Agricultural Sector Development	12,491,573	12,491,573	12,491,573	12,491,573

Support Programme (ASDP) Level II				
European Union (Donor Grant)				
TOTAL	6,866,689,050	7,201,051,283	7,463,135,043	7,735,702,153

Source: CBROP, 2020

11.9 County Expenditure

Expenditure is split into recurrent and development expenditure. Recurrent expenditure consists of payment for goods and services, wages and salaries, employer contributions, interest payments, subsidies, and transfers. Development expenditure involves fixed capital assets, stock, and land, among others.

The County total outlay for the Financial Year 2015/16 was expected to be Ksh.5, 577,056,815. Out of this, Ksh.3, 356,064,730 (60%) was meant for recurrent expenditure and Ksh.2, 220,992,085 (40%) was meant for development expenditure.

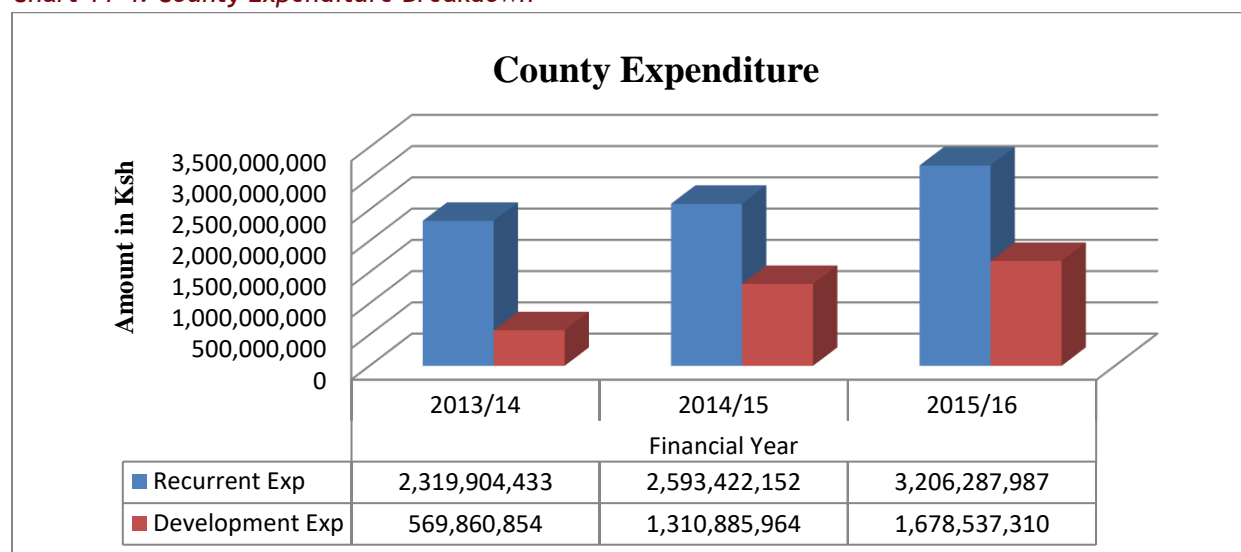
In July to December 2015, the County had spent a total of Ksh.1, 710,995,501 comprising of Ksh.1, 343,541,880 (47.9%) on recurrent and Ksh.367, 453,621 (24.9%) on development expenditure. This was an improvement from Ksh.1, 052,701,698, spent during the same period in the year 2014/15. Budgetary allocations to various county departments are shown in the table below.

Table 11-5: Departmental Budgetary Allocation

Department	Budgetary Allocation		
	2018/2019	2019/2020	2020/2021
County Executive	291,209,987	293,848,869	312,901,879
County Assembly	591,860,002	599,517,261	720,868,212
Education, Youth Affairs and Culture	227,511,193	211,441,932	281,624,584
County Health Services	774,481,802	1,090,386,234	1,339,456,708
Lands, Housing, Physical Planning & Development	37,409,989	132,666,000	164,069,557
Roads, Transport and Public Works	600,219,826	743,606,689	1,159,117,291
Agriculture, Livestock & Fisheries	356,334,633	454,715,115	362,481,787
Trade & Industrialization	60,919,063	116,691,696	130,963,200
Water, Environment and Natural Resources	64,788,611	196,471,399	397,159,868
Tourism, Wildlife and Sports	0	45,477,750	76,894,072
Legal and ICT	38,759,874	64,523,223	89,281,782
Finance and Economic Planning	343,454,004	505,384,270	562,237,874
Total	3,386,948,984	4,454,730,438	5,597,056,814

Source: County Department of Finance and Economic Planning, 2020

Chart 11-4: County Expenditure Breakdown



Source: County Department of Finance and Economic Planning, 2020

11.9.1 Recurrent Expenditure

Maintaining a sustainable recurrent expenditure is a prerequisite for having higher development funds. Recurrent expenditures are expected to remain relatively stable between 60 and 70 percent of total spending in the medium term (Nyandarua CBROP, 2015/2016). This allows additional allocations to development and capital investment by the County government.

11.9.2 Development Expenditure

Development expenditure is expected to increase to above 30 percent of total spending (Nyandarua CBROP, 2015/2016).

The aim is to allocate adequate resources towards development outlays and ensure the completion of critical infrastructure.

Due to limited funds from the National transfers and low revenue base coupled with the need to improve infrastructural facilities, the County will need to explore Public-Private Partnerships (PPPs) to fund infrastructure projects. This, therefore, calls for conducive investment policies and incentives to the investors.

Challenges facing Revenue Collection

The following constraints were identified concerning revenue collection in Nyandarua.

- Lack of political goodwill.
- Weak internet services and also the connectivity is limited to Olkalou town impeding automation of revenue collection in other major towns.
- Structured services are not fully implemented (Automated).

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- Potential revenue sources that are not exploited, e.g., non-food business premises, health inspection fees, and tourism-related activities.

Initiatives in place to Improve Revenue Levels

- Automation of revenue collection.
- Continuous enforcement of revenue collection laws and regulations.

Public Participation

Nyandarua County has an existing law on public participation and civic education (Nyandarua County Public Participation and Civic Education Act, 2016). The Act outlines the forums of participation that include citizen forums, notices, provision of information, venues, management of proceedings, method of input by the facilitators, and public and state officers, including suctions and participation procedures. However, public participation's effectiveness is still undermined by challenges that include selecting participants and a significant participation threshold. Also, the budgetary allocation is a constraint to effective civic engagement.

Poverty and Marginalization

The County has a poverty incidence rate of 38.8%. this figure is 6.4% below the national growth rate of 45.2%. This is according to the Spatial Dimension of the report on Well-being in Kenya, 2015. However, the county has put in place measures to address poverty that are social and economic related.

Gender Issues

The county has strived to attain gender parity. Currently, there are women empowerment programs that the county is implementing. Some of these programs include Gender mainstreaming opportunities and Women Enterprise Fund. Equal opportunities for empowerment also in education and employment in the county.

Youth Issues

The main issue that is inherent among the youths in Nyandarua County is the limited empowerment of the youths. Currently, the County Government of Nyandarua is putting measures in place that include the development of youth Polytechnique, creation of ICT hubs, *jua Kali* sectors, subsidized *Boda Boda* charges, organization of youth groups, the promotion of fish farming and poultry farming, and the development of a youth empowerment center. These initiatives are important in the development and empowerment of the youths in the county.

Climate Change

Nyandarua county currently realizes temporal variability in rainfall patterns. This condition has resulted in Changes in rainfall patterns and changes in disease prevalence. As a result, the situation is impacting

crop and livestock farming. Activities such as the reduction in the forest cover and increasing carbon emission are contributors to this phenomenon.

Emerging Issues on Institution and Governance

The following issues emerge from the assessment of governance and institutional capacities in Nyandarua County.

- i. Implementation of this is a shared responsibility between the National and County governments based on the institutional roles identified.
- ii. There are institutional opportunities in law to foster development in Nyandarua County
- iii. Limited financial and staffing capacity of the institutions in the County undermines the efficiency and effectiveness of the institutions in realizing their developmental roles
- iv. There is bureaucracy in the coordination and engagement in the joint project conceptualization and implementation.
- v. The threshold of effective participation in the county is not met yet.
- vi. Weak link between the national government agencies and the county government departments.
- vii. There are initiatives and efforts to address marginalization in the county.
- viii. The county is gradually rolling out programs to empower the youths.
- ix. There are constraints in revenue collection, and utilization in the county due to political interference, collation methods

Recommendations

- i. Establish the recommended agencies that ensure coordinated development and implementation of projects in the County.
- ii. Explore and establish more opportunities for revenue sources for the County.
- iii. Capacitate the agencies and institutions recommended within the county governance structure through staffing, financing, and equipment. i.e., County Planning Unit, Town Committees.
- iv. Fully equip the technical wing of the municipal boards.
- v. Reduce the coordination and consultations' bureaucracy to achieve a quicker consensus building, project conceptualization, and implementation.
- vi. Establish a link that would act as an implementation unit that shall be liaising and coordinating road project development between the county and the institution
- vii. Develop a technology-based forest information storage and retrieval center managed at the County level and integrated with the national database.
- viii. Prepare a detailed ecosystem plan for the park integration to promote conservation and tourism in collaboration with the KWS.
- ix. Equip the institution adequately with support facilities and appropriate staff.
- x. Incorporate the non-state actors in development needs identification and project implementation

PART III:

SYNTHESIS

12 SUMMARY OF PLANNING ISSUES

12.1 Overview

The growth of a region largely depends on a fully functional system. The analysis of the existing situation in Nyandarua county has identified several areas that should be improved to fast track economic and social development and environmental sustainability. This section summarizes the challenges and opportunities that are cutting across the various thematic areas. These issues have been grouped into social, economic, political, and environmental issues that are likely to impact the quality of lives of the Nyandarua populace. The analysis of the problems is detailed below.

12.2 Economic Issues

12.2.1 Regional imbalance

Some parts of Nyandarua County, particularly areas of Ndaragwa, have little to minimal development as the areas are physically constrained. Therefore, development should be channeled to the areas to unlock the potential in these areas. Some areas of the county have poor access due to the poor state of roads, which is a limiting factor since it inhibits access to raw materials and physical markets for agricultural products. There are also areas with huge potential for tourism development because of the presence of various tourism resources such as Aberdares National Park.

12.2.2 Underdeveloped economy

Approximately 65 % of the population directly depend on agriculture as a source of livelihood. The Country has huge potential for industrial development due to the availability of agricultural raw materials. Also, the county has a wider array of tourism resources that the County can promote. The County should, therefore, leverage on these abundant resources to promote industrialization and tourism development to increase employment opportunities and diversification.

12.2.3 Under exploitation of the natural resource

The county has numerous resources that are underexploited. The eight permanent rivers, Sasumua Dam and lake Ol'bolosat, will augment the supply of potable water to the urban areas and rural areas. The forested areas, Karuru falls, and the Aberdares national park are potential resources for recreational and tourism development. Karuru falls also provide huge potential for hydroelectricity production.

12.2.4 Poor transport conditions

The general state of transportation in the county is poor. Most of the roads are dilapidated, and some become impassable during rainy seasons. Other areas, particularly in the rural areas, lack roads impeding access to market, employment areas and public institutions such as education and health facilities. Other modes of transport such as air and rail are also not fully utilized despite their potential and their projected contribution to the economic growth of the county. There it imperative

to note that the rehabilitation of the airstrip and the meter gauge railway will promote socioeconomic growth and overall improvement of the quality of life.

12.3 Environmental issues

Environmental degradation and climate change are seen as one of the key issues impacting agriculture development in the County. Eroding natural resources such as Lake Ol'bolosat impacts the livelihood of people by depriving them the opportunity to benefit from its ecological functions.

12.4 Political issues

12.4.1 Institutional capacity

Majority of the departments in the county recorded a shortage of workforce as a major bottleneck facing their various departments, which creates a barrier in projects implementation. In addition, the county lacks a planning unit with defined planning functions. To properly implement the strategies and measures proposed by the plan, adequate staffing is imperative. This will create more employment opportunities and generally improve the quality of life for the majority of the populace.

12.4.2 Youth and gender issues

The county has a very youthful population, creating a demand for certain specific services. There are also limited employment opportunities exacerbated by the narrow economic base. construction of industries and development of tourism will increase options for employment in the County.

12.5 Opportunities

12.5.1 Strategic location of the county

The strategic location of the county along the central region presents an opportunity that when fully utilized will promote socioeconomic development. The major roads in the county links it to other significant counties such as Nakuru, Nyeri, Kiambu and Laikipia therefore creating a huge opportunity for regional integration and growth. The tourist resources distributed in the county, are a key to economic growth which will translate to increase in the Gross Domestic Product.

12.5.2 Huge labour force

The huge labour force in the county calls for investment in various key economic areas such as tourism, industrialization and transportation in order to increase potential employment areas

12.6 Potential

12.6.1 Sustainable food supply

The population in the county is growing, increasing the demand for adequate supply of food. The county has huge potential for sustainable production food supply as majority of the land is arable accounting for 60 % of the total land. The county has several areas that are suitable for the cultivation of different crops and rearing of livestock. Areas of Oljoro Orok, Kinangop and Ndaragwa are suitable

for irrigation farming which can be tapped to supplement on-farming. The favorable climate and fertile soil also contribute to the county having huge potential for food production

12.6.2 Industrial development through agro-processing

The numerous agricultural activities ranging from crop farming and livestock keeping both provide opportunities for industrial development particularly agro-processing industries. In addition, the huge population are key for the provision of labour the industries. It therefore imperative to invest more in industrial development in order to create more areas of employment in the county.

12.6.3 Tourism development

The county has numerous resources that can be utilized for tourism development. The Aberdares National Park, Karuru falls and lake Ol'bolosat provide opportunity for nature tourism development. Other key tourism resources are the happy valley homes that provide opportunity for development of heritage tourism. The County's close proximity to other well-known tourism sites such as Thompson falls, Lake Nakuru and Naivasha provide an opportunity for development of hotels, resort and accommodation facilities that will contribute to development of the tourism sector in the central circuit

12.7 Recommendations

From the above issues the following key recommendations are necessary in order to propel the county towards achieving its vision and objectives and transform the quality of lives in Nyandarua County. The recommendations will form the pillars on which other strategies will be anchored in.

12.7.1 Modernizing agriculture

In order to increase agricultural productivity, there is need to transform agriculture from traditional labour-based agriculture to technology-based agriculture. It will not only increase food production but also increase the household incomes for the majority of the population who directly depend on farming as the main source of livelihood.

12.7.2 Protecting and conserving the environment

There is need to protect and conserve the natural asset in the county as these resources are a basis for employment, recreation and tourism development.

12.7.3 Managing human settlement

In order to achieve the vision of the plan and the overarching objective in respect to human settlements, that is, to facilitate the development of a well-balanced system of human settlements, it is desirous that they be sustainably managed so as to optimize their potential. Management of settlements consists in establishing the priority centres where growth should be directed, and coming up with ways to exploit them as instruments of development in Nyandarua. Also, it means setting up a hierarchy of service centres, such that facilities and services which the populace is in need of are proximate and easily accessible.

12.7.4 Providing adequate and appropriate infrastructure

The provision of appropriate infrastructure in the county particularly in urban areas is important to improve the well-being of the urban population. Essential infrastructure such as potable water reticulation system, sewer reticulation system, constant electricity, adequate education and health facilities are key to improving the quality life in Nyandarua County.

12.7.5 Integrating transport

Proper transportation network linking rural and urban areas will open more areas for investment as well as create more employment opportunities. The upgrading of roads linking the county to other abutting counties will also promote regional integration. The rehabilitation of the meter gauge railway and the Oljoro Orok airstrip will also open up the county to not only the counties in the central region but also important to Nairobi which is the capital city of Nairobi.

13 SCENARIO BUILDING

13.1 Overview

Availability of land in the County is an important factor to consider in formulating plan proposals and recommendations. The assessment was undertaken to determine land that is available, achievable and suitable for housing and economic development.

13.2 Land Availability and Potential Assessment

The land available for economic development and housing provision was obtained through a multivariable analysis on which, land for other land uses such as prime agricultural land, environmentally sensitive areas, existing built-up areas, Physical constraint areas and were determined. The land available was obtained from the deduction of the above land uses from the total land for the County. The results of the assessment are presented in table 6-1.

Table 13-1: Land availability criteria assessment

Criteria	Size (km ²)	Percentage	Existing use	Anticipated use/Economic activities
Agricultural land	1462.86	44.73	Cropland, shrubland, grassland.	Irrigation, horticulture, apiculture, aquaculture
Built-up areas	38.23	1.17	Urban areas, Rural buildings	Urban settlement, rural settlement
Environmentally sensitive areas	764.88	23.39	Forests, Lake, Dam, Rivers, Aberdares Range	Tourism, Recreation. Research
Lake	31.47	0.96	Fishing, Water Source	Tourism, Recreation
Physical constraint areas (Hilly Areas)	279.54	8.55	Degraded land through Quarrying, Rocky areas	Recreation, Mining
Available Land	693.42	21.20	Agricultural land	Housing, Industrial development, Infrastructural development

Source: Satellite Imagery, 2020

13.2.1 Agricultural area

Total land under agriculture in the county accounts for 1462.86 km² of the total land. This figure translates to 44.73% of the total land. The county being a food basket, there is need to safeguard the land and ensure there is continuity in food production.

13.2.2 Environmentally sensitive area

Environmentally sensitive areas are important sources of food, energy, services, and they also offer life support systems such as water and air purification, soil erosion regulation and pest control. In addition, they also serve as habitats for the County's flora and Fauna, offers scenic features for tourism and recreational areas.

Therefore, this feature should be protected and conserved as much as possible depending on the type, characteristics and level of importance. Examples of environmentally features in the County

include forests (both gazetted and non-gazetted), swamps, parks, lakes, rivers and quarrying sites. This feature accounts for 764.88 km² or 23.39 % of the total land area in Nyandarua County.

13.2.3 Built-up area

These are the areas that are under predominantly urban use, including land uses such as residential, commercial, industrial and institutional uses together with supporting facilities such as parks and open spaces.

Areas under existing built-up areas account for 38.23 km² or 1.17 % of the total land area. Out of these, most of the built-up areas are located within the major urban areas. The urban areas are essentially activity areas and population concentration. Olkalou, Engineer, Ndunyu Njeru, Njabini, Kasuku, Oljoro Orok and Mairo Inya are the most built-up areas accounting for a larger percentage of the total land under the built-up area.

13.2.4 Physically constrained areas

Areas that are physically constrained in Nyandarua include area the degraded quarrying sites and the rocky areas with a slope of above fifteen degrees. These areas cover a total of 279.54 km² or 8.55 % of the total land area.

13.2.5 Available Land

The established land that is available for future housing and economic development in the County is 693.42 km² accounting for 21.20% of the total land. This land has been determined for the establishment of industries, infrastructure and other institutional facilities that are going to promote economic development.

13.3 Assessment of Land Availability Per Ward

Kanjuri Range Ward has the largest land available for housing and economic development, Whereas Wards such as Gathara, Gatimu and Geta are predominantly rural wards with prime agricultural lands. These agricultural lands should be protected to ensure agricultural productivity thus no urban development activities should be promoted. The assessment reveals that Central Ward is both suitable for agriculture and tourism development because of the vast land available for both agriculture and tourism activities. Investment in agriculture and tourism will also promote the economy of wards such as Charagita, Gathanji and Shamata wards. On the other hand, Gatimu ward is suitable for urban development due to its proximity to Nyahururu town and also the rate of urban development the ward is currently experiencing. Gatimu ward should therefore be serviced with adequate infrastructure in anticipation of the prospected urban population.

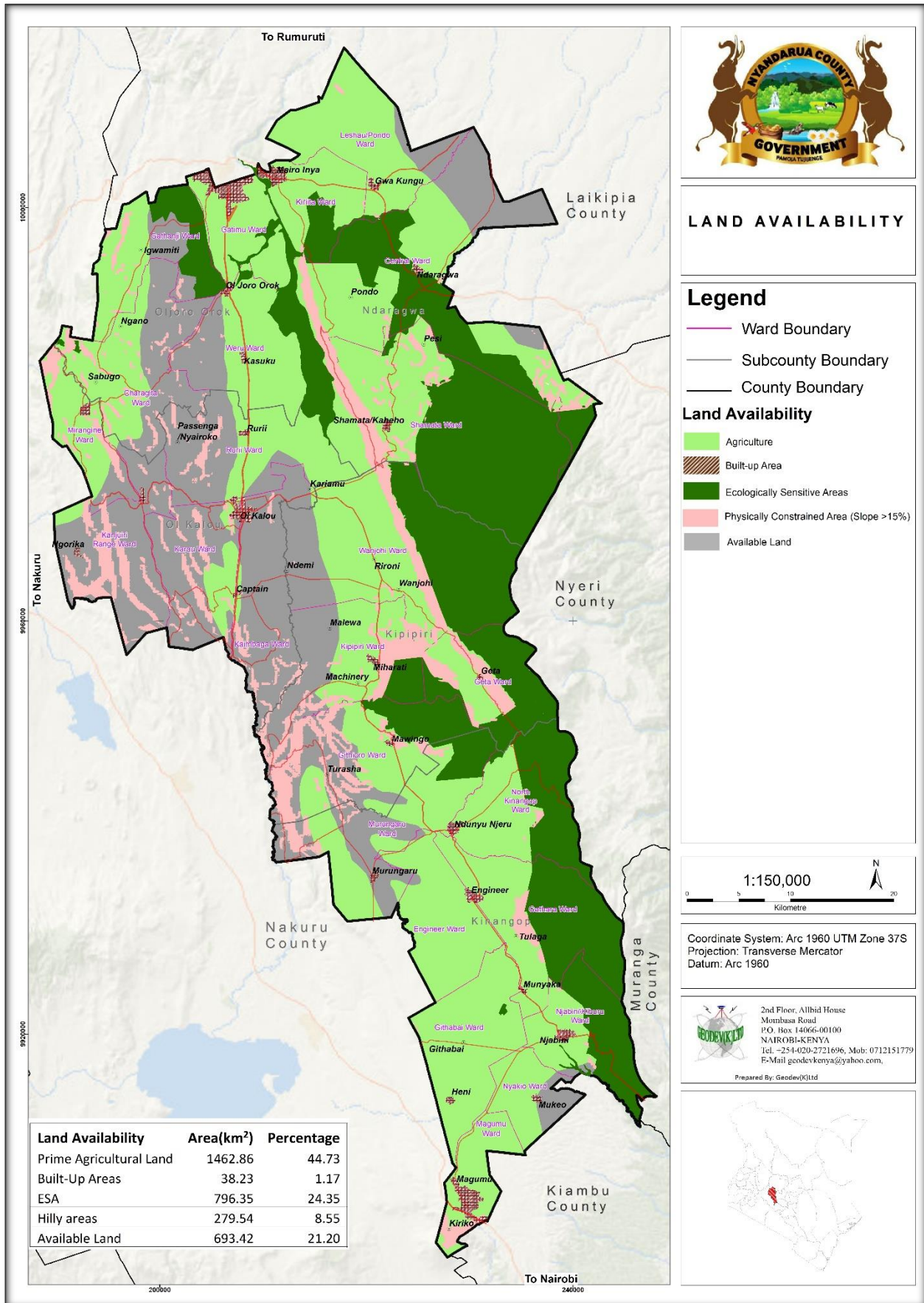
Table 13-2: Proportion of land availability per ward in km²

Ward	Prime Agricultural Land	Built-Up Areas	ESA	Lake	Hilly areas	Available Land
Central	122.60	0.71	102.64	5.41	19.69	58.03
Charagita	59.92		0.95		13.67	65.35
Engineer	92.74	0.69				2.20

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Gathanji	44.15	0.00	32.18		5.28	19.52
Gathara	61.22	1.26	79.90		6.97	
Gatimu	56.59	9.05	0.32	0.12	6.29	
Geta	21.14	0.35	58.74		16.03	
Githabai	115.01	0.61			0.18	
Githioro	52.25	0.39	32.34		34.27	31.57
Kaimbaga	3.60	2.15			9.33	99.21
Kanjuri Range	4.97	1.21			31.05	88.31
Karau	19.83	1.72			15.25	65.38
Kipipiri	46.89	0.81	15.46		28.05	45.59
Kiriita	50.72	3.53	17.33		2.60	
Leshau Pondo	103.74	0.87	0.93		0.55	16.41
Magumu	42.89	6.62			5.35	
Mirangine	37.71	1.10			11.98	10.17
Murungaru	75.73	0.96	18.84		9.33	45.21
Njabini Kiburu	34.47	1.75	55.17		0.62	2.75
North Kinangop	55.39	1.09	65.54		0.66	
Nyakio	35.77	0.57			0.00	13.39
Rurii	60.32	0.67		3.37	8.36	64.45
Shamata	87.23	0.78	178.78	6.47	29.43	
Wanjohi	100.26		105.74		21.84	35.43
Weru	77.71	1.33	0.00	16.10	2.32	30.43

Map 13-1: Land availability Assessment



13.4 Land potential and capability assessment

Land potential assessment is used to identify the suitability for agricultural and non-agricultural use. It deals with the land performance for the specific use such as crop and livestock production, irrigation, industrialization, human settlement and tourism. Nyandarua county has huge potential for various land activities ranging from rainfed agriculture, irrigation, solar and wind energy, mining and industrialization as well as human settlement potential. All these potential presents opportunities for socio-economic development.

13.4.1 Tourism potential

The county is endowed with various tourist assets which include; protected areas such as the Aberdares National Park, Lake Ol'bolosat and gazetted forests; critical environmental sensitive areas such as the Karuru Falls and non-gazetted forests; and environmentally sensitive areas such as Aberdares Ranges, hilltops and rivers. In addition, heritage sites such as happy valley homes also offer great opportunities for tourism development.

Careful examination of these assets reveals that tourism potential in the county has not been fully harnessed. Predictably, the county has a huge potential for sports tourism, e.g., boating, water surfing/skiing; sport fishing; ecotourism, e.g., bird watching; recreation tourism, among others.

13.4.2 Agricultural potential (Agroecological and irrigation potential)

Nyandarua County has both agroecological and irrigation potential. The County is an agriculturally oriented County, crop and livestock activities take place in different zones. This is influenced by soil fertility, climate and topography. On the other hand, lower areas in the County provide suitable areas for irrigation farming.

13.4.2.1 Agro-ecological potential

Nyandarua is divided into two main agro-ecological zones in which different agricultural enterprises are practiced. These are the lower highlands and upper highlands. The agro-ecological zones of the County and their respective agricultural enterprises are shown in table 6-3;

Table 13-3: County Agro-Ecological Zones

Zone	Ward	Area (Km2)	High yield potential crop	Medium yield potential
TA-I, II (National Park) Limited grazing potential	Shamata, Wanjohi, Geta, Gathara	388.68	-	
UH-0 (Forest Zone)	Njabini Kiburu, Gathara	61.01	-	
UH-1 Sheep and dairy	Kanjuiri Range, Mirangine, Charagita, Gathanji, Shamata, Wanjohi, Geta, Githioro, Kipipiri, Njabini Kiburu, Nyakio, Magumu	365.81	Peas, Potatoes, Rapeseed, Cabbages, Carrot, Kohlrabi, rampion, leek, spinach, dairy cows, Trout fish	Wheat, Pears and plums,
UH-2 Pyrethrum and Wheat	Gathanji, Charagita, Mirangine, Kanjuiri Range, Shamata, Wanjohi, Kipipiri, Githioro, Geta, Murungaru, North Kinangop, Gathara, Engineer, Githabai, Njabini Kiburu, Nyakio, Magumu	768.48	Wheat, Barley, Peas, horse beans, rapeseed, carrots, cabbages, Kohlrabi, Kales, Spinach, Rampion, Leek, dairy cows, Merino sheep, catfish, Common carp	Peas, cabbages, rapeseed, Kohlrabi, Plums, Apples, Maize
UH-3 Wheat and barley	Githabai, Engineer, Githioro, Murungaru, Wanjohi, central, Kiriita, Gatimu, Weru.	42.91	Wheat, Barley, Potatoes, green onions, cabbages, cauliflower, garden peas, kohlrabi, Raddish, Pyrethrum, dairy cows, Merino sheep, catfish, Common carp	Maize, carrot, sunflower, kales, celery, beef cattle, white clover
UH-4 Ranching	Gatimu, Weru, Central, Rurii, Wanjohi, Shamata		Forage and Grassland	
LH-3 Wheat, Maize, Barley	Githioro, Murungaru, Central, Kiriita, Leshau Pondo	80.13	Wheat, Barley, Potatoes	Maize, peas, rapeseed, sunflower, cabbage, carrot, beetroot, Black Wattle, Beef Cattle, Merino Sheep
LH-4 Cattle, sheep, Barley	Leshau Pondo. Kiriita Ward, Central, Murungaru, Githioro	166.75		Wheat, Barley, Potatoes, Sunflower, Tomatoes, Green Onions, pyrethrum, cattle, sheep, Tilapia, catfish, ornamental fish
LH-5 Ranching	Leshau Pondo, Central, Kipipiri, Kaimbaga	383.64	Pasture and Forage Irrigation Large-scale livestock keeping	

Source: Farm Management Handbook, 1978, Nyandarua County Statistical Abstract, 2015

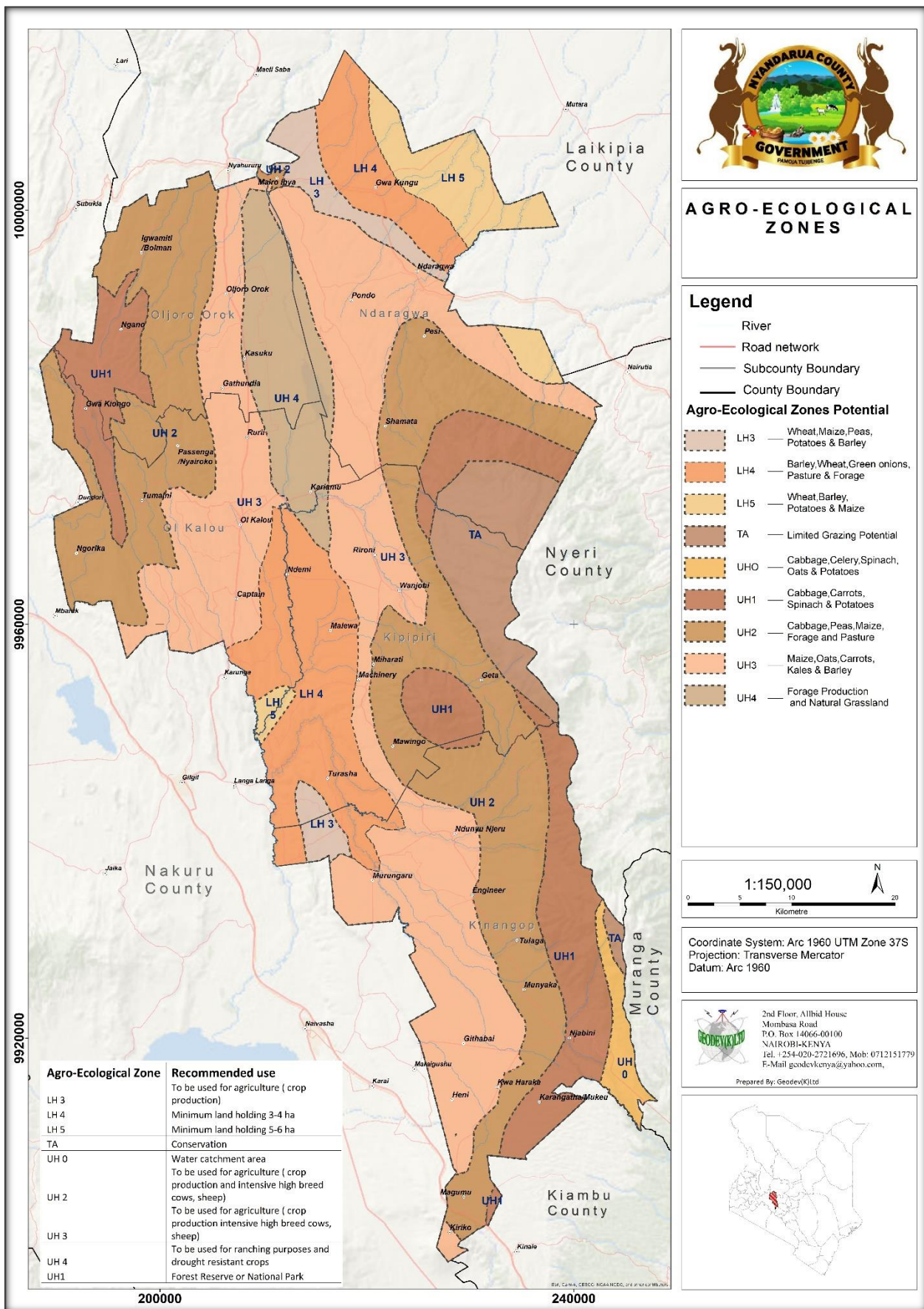
The upper highlands and lower highlands each account for almost half the area of Nyandarua, with the upper highlands covering about 1,421.5 square kilometres and lower highlands covering about 1,399.1 square kilometres. The forest zone (UH-0) accounts for 61 square kilometres, whereas the National Park (TA-I, II) covers 388.7 square kilometres. Map 6-2 shows the Agro-Ecological Zones in Nyandarua County;

13.4.2.2 Irrigation Potential

There is an overreliance on rainfed agriculture in the County, though, it has huge irrigation potential in areas of Oljoro Orok, Kinangop and Ndaragwa. The permanent rivers, Sasumua Dam, Lake Ol'bolosat and the low areas in some parts of the County such as Ndaragwa and Oljoro Orok both make the areas suitable for irrigation activities.

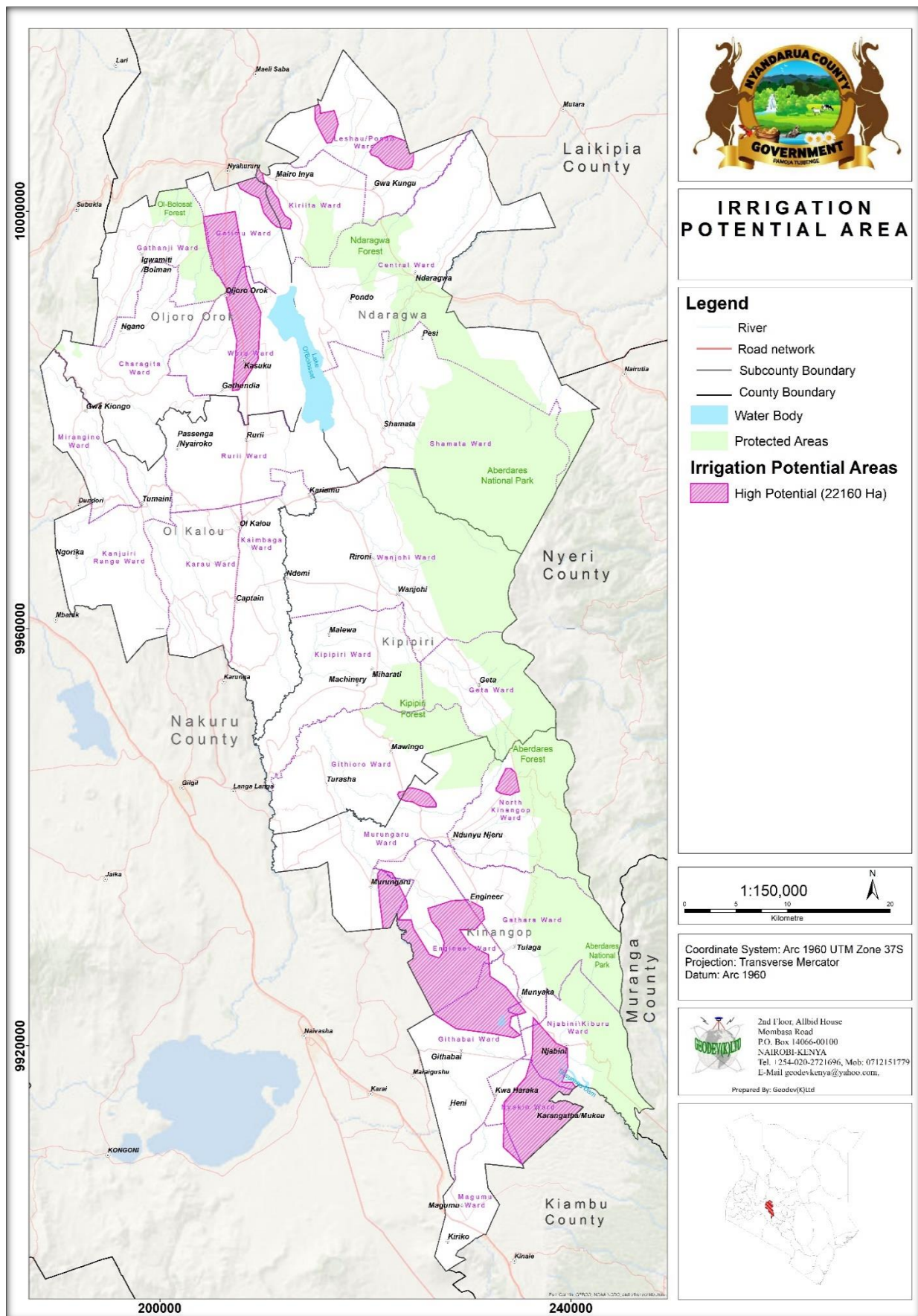
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Map 13-2: Agro-potential areas in Nyandarua County



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Map 13-3: Irrigation potential areas in Nyandarua County



13.4.3 Agriculture Land

Agriculture is the main economic activity in Nyandarua County, particularly in the rural areas. Unregulated land subdivision in Nyandarua County is threatening the agricultural land, especially those lands surrounding the major urban areas. With the county experiencing an increase in population and economic growth, agricultural land is continuously shrinking as most of it is being converted to meet the additional housing, commercial and infrastructural land demands. Therefore, the identification of Prime Agricultural areas is important to facilitate their protection and conservation. This will ensure that the County's competitive advantage in agricultural food production is maintained. A total of 1462.86 km² or 44.73% of the County's land is under Prime agricultural use. The prime agricultural areas are inclusive of areas favorable for both rainfed and irrigated agriculture

13.4.4 Industrial Potential

The County has huge industrial potential due to the availability of agricultural raw materials. Various areas in the County have huge potential for the establishment of different types of industries based on the availability of raw products and climatic conditions.

Areas of Njabini and Wanjohi have huge potential for potato processing and milk processing for value addition due to availability of potatoes; Oljoro Orok for cottage industry; and Ndaragwa for livestock and feeds manufacture industries among other urban centres.

13.4.5 Human settlement potential

Efficient urban areas are key as they offer residential and administrative services. With the County experiencing continuous growth, particularly in urban areas, proper human settlement strategy is required. Urban areas such as Mairo Inya, Olkalou, Engineer, Ndunyu Njeru, Njabini, Kasuku, Magumu, Miharati and Oljoro-Orok have the potential of performing higher-order function due to their high population, availability of services and infrastructure. These urban areas are capable of accommodating the anticipated population for Nyandarua County.

13.4.6 Mineral Resource Potential

Small scale quarrying is the only significant extraction activity within the county. The most notable quarry sites are in Kibathi, Ol'joro Orok (near Kangui), Captain, Ndemi, Mumui, Ndunyu- Njeru and Tulaga. These quarrying sites provide materials for building construction and road maintenance such as gravel and murrum within the county and outside (Samburu, Laikipia, and Nakuru, among others).

Pumice for use in building (used to make lightweight concrete or insulative low-density cinder blocks and as an additive for cement) is mined near Kinungi in small quantities although there are ample reserves.

13.4.7 Energy Resource Potential

Key sources of energy in the county include both renewable and non-renewable. Renewable sources include solar, wood fuel (firewood and charcoal), hydropower (electricity) and biogas. The County

has huge potential for the generation of electricity by use of wind in Mirangine, Kanjuiri, Shamata, Central, Wanjohi, Kinangop and Kipipiri areas.

Other potential sources of energy that can be harnessed include waterfalls, e.g., Karuru and solar, in Ndogino and Mbuyu areas of Ndaragwa.

13.4.8 Water Resource Potential

The County has 8 permanent rivers which include Malewa, Ewaso Narok, Pesi, Turasha, Chania, Kiburu, Mkungi and Kitiri. All the rivers have the potential for abstraction, however, during the dry seasons (Jan-March) the seasonal rivers dry up, and the permanent rivers lower their capacities. Annual water production of the permanent rivers is estimated at 8,760,000m³ against the potential production of 10,950,000M³

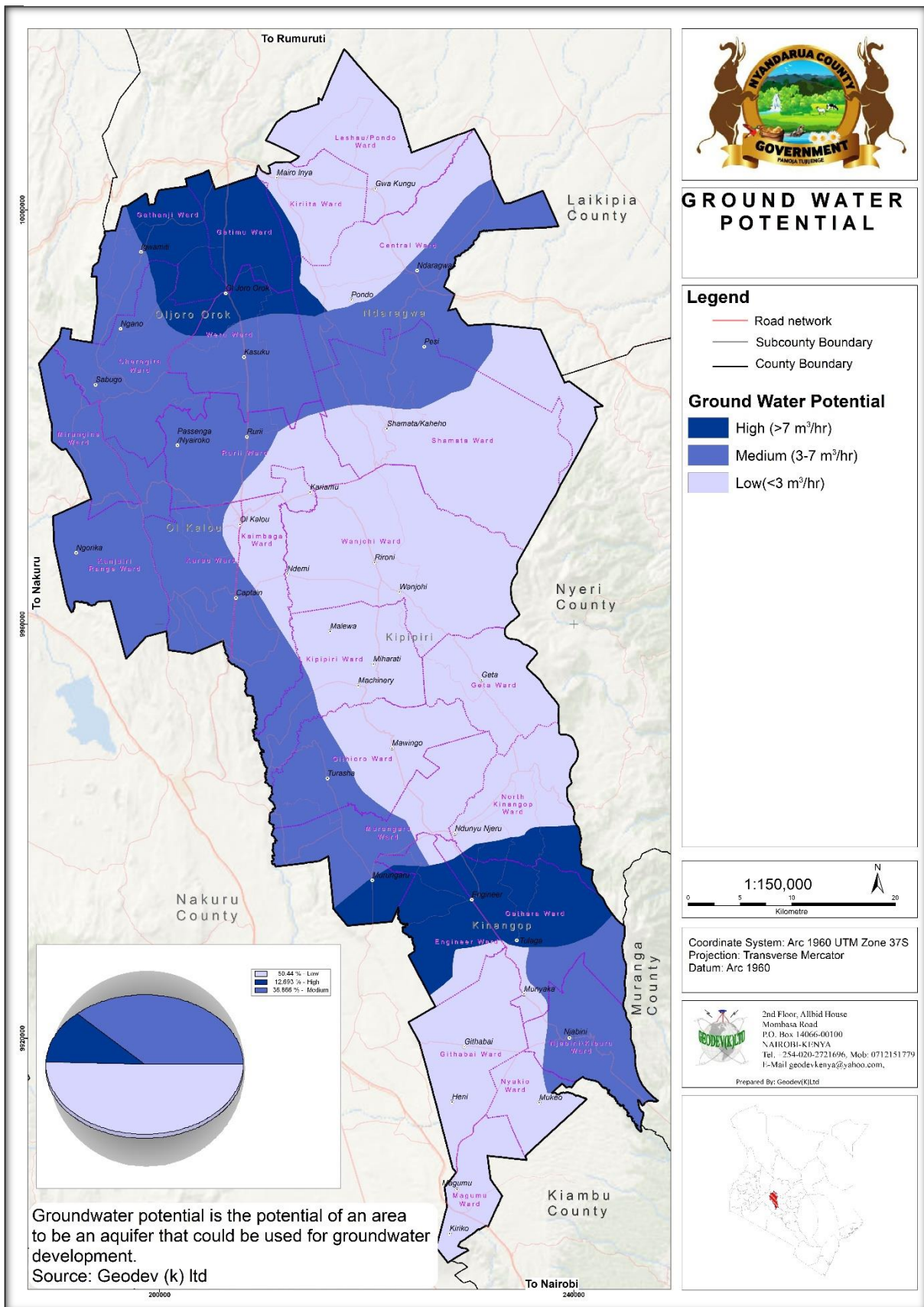
Additionally, there are 14 seasonal rivers, 222 water pans and dams, which are the main abstraction points and are replenished during the rainy seasons from various tributaries. The dams have an annual production of 2,640,000 m³ but have a potential yield of 3,300,000 m³ annually. It is also imperative to note that there is one freshwater lake in the county; Lake Ol'bolosat. Outstandingly, it is the only lake in the Central Kenya Region. The Lake covers an area of 33.3 square kilometres. Of this, open water covers about 4 square kilometres (*Nyandarua County Environmental Action Plan, 2014-2018*). The Lake has a current annual production of about 18,250 m³ but has an annual potential to produce 27,375 m³.

The county has 280 boreholes, 6,244 shallow wells and 96 water springs with an annual production of 7,752,600m³, 456,250m³ and 7,008m³ respectively. However, the water springs have an annual production potential of 684,375m³ (Department of Water, 2020).

13.4.8.1 Ground Water Potential

A simplified groundwater potential and groundwater availability map for the county has been prepared in order to give a picture of the groundwater conditions in the county in terms of borehole yields. Three classes of groundwater potential zones have been identified, i.e., high, medium and low groundwater potential zones as displayed in map 6-4.

Map 13-4: Ground Water Potential



13.5 Average Land Size per Sub-County and Ward

According to CIDP, 2018, most of the land in the County has already been subdivided, allocated and settled with the mean holding size per household being 3.5 Ha. This, however, has remarkably reduced due to the emergence of unplanned urbanization (urban sprawl). The hinterland has continued to be subdivided further to satisfy the current demand for land. Agricultural land is gradually being consumed by the expansion of towns. Most of the existing farmers practice small scale farming on land where they reside. Large scale farms are spread out across the County.

The table below shows the average land size per sub-county and ward. The consultant's calculation was premised on cadastral data (PDPs and DPs) provided by the County Department of Lands, Housing, and Physical Planning.

Table 13-4: Average Land Sizes in Nyandarua per Ward

Sub County	Area in Sq. Km.	Average (Acre)	Ward	Average (Acre)
Kinangop	939	3.78	Magumu	2.85
			Njabini/Kibiru	3.20
			Gathara	3.39
			Nyakio	3.44
			North Kinangop	3.58
			Githabai	4.40
			Engineer	4.47
			Murungaru	4.91
Kipipiri	544	5.75	Geta	3.71
			Wanjohi	5.86
			Kipipiri	6.49
			Githioro	6.93
Ndaragwa	654	3.62	Kiriita	1.86
			Leshau/Pondo	3.10
			Central	4.26
			Shamata	5.27
Oljoro-Orok	439.4	4.03	Gatimu	2.21
			Weru	3.84
			Gathanji	4.86
			Charagita	5.21
Ol'kalou	669.6	4.19	Mirangine	2.87
			Rurii	4.06
			Karau	4.62
			Kaimbaga	4.68
			Kanjuiri Range	4.71

Source: Analysis of the Cadastral layer

Kipipiri Sub-County has the largest average landholding size. Arguably, this can be attributed to the nature and type of landforms in the area. The sub-county mainly comprises protected areas (mountains and forests) hence discouraging subdivisions. Ndaragwa Sub-County has the smallest average landholding size. This suggests that there is a high rate of land subdivision in the sub-county.

Furthermore, field survey revealed that agricultural landholding in Nyandarua currently lies at about 1.67 acres. The average agricultural landholding is largest in Olkalou where it is about 1.8 acres and the smallest in Kipipiri Sub County, where it lies at approximately 1.47 acres. Table 6-5 shows the average agricultural landholding sizes per Sub County.

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Table 13-5: Mean Agricultural Land Holding per Sub County

Sub County	Average (Acres)
Olkalou	1.80
Kipipiri	1.47
Oljoro-Orok	1.69
Kinangop	1.73
Ndaragwa	1.69

Source: Field Survey, 2017

13.6 Overview

This section analyses various aspects that would lead to the optimal utilization of land in Nyandarua County. Various issues have been analyzed in detail including land availability assessment, and land potential for different uses. The key results of the assessment are to understand the possible development trends that can transform the County to achieve its full potential.

PART IV:

PLAN PROPOSALS

14 DEVELOPMENT STRATEGIES FOR REVITALIZING THE ECONOMY

14.1 Overview

The strategies to revitalize the economy of Nyandarua County are anchored on the main economic sectors namely agriculture, tourism, industrialization and trade. The actualization of this strategy is then driven by four core sub-strategies along these sectoral lines:

- a) To modernize agriculture,
- b) To strengthen tourism,
- c) To promote industrialization, and
- d) To facilitate trade and commerce.

Notably, the above sub-strategies are in line with the sectoral vision of ‘a robust/thriving economy founded on agro-industry, natural resources, expert labour and infrastructural development’.

14.2 Modernizing Agriculture

It has been observed that modernizing agriculture in various parts of the world has increased agricultural productivity. Modernization of agriculture comprises irrigation, the use of improved and high yielding seed varieties, modern machinery and the optimal use of agro-chemicals such as inorganic fertilizer and pesticides. However, the need to secure ready market for agricultural produce and streamlining marketing channels cannot be over-emphasized if returns from agricultural enterprises in Nyandarua are to increase.

14.2.1 Re-statement of Issues

From the synthesis of issues in the agriculture sector, the outstanding challenges are low levels of productivity and low farmer returns. These constraints cut across crop and livestock production as well as fish farming.

In respect to crop farming, the issue of low productivity has diverse underlying causes. Notably, only close to 42% of the total arable land in Nyandarua is currently committed to crop production. Over-reliance on rain fed agriculture, land subdivision, low levels of mechanization and adoption of modern technology as well as inaccessibility of information are other major challenges. Low returns in turn are due to low levels of value addition, hence produce is sold unprocessed and inadequate storage facilities which results in premature sales at throw-away prices.

Under livestock production, low production was due to high price of animal feeds, poor livestock breeds, inaccessibility of information and drought in some parts of the county e.g. Ndaragwa. In turn, low returns were ascribed to low milk prices, inadequate market/low demand for some products such as goat milk, low value addition and weak cooperatives.

Inadequate quality feeds, low temperatures and pervious soils caused low productivity in fish farming. The sub-sector also faces inadequacy of storage facilities and low value addition, which lead to low returns.

The strategies proposed are therefore geared towards the alleviation of the above identified constraints.

14.2.2 Strategies

i. Expansion of Land Under Agriculture

The amount of crop yield is directly proportional to the size of land under cultivation all other factors held constant. In Nyandarua, the total arable land is approximately 2147 square kilometres whereas the total land under crop production in 2016 was only about 899.48 square kilometres; 42% of total arable land. Therefore, if more of the arable land is put under cultivation, crop yields are expected to rise significantly.

ii. Use of High Yielding Seed Varieties

Agriculture is the mainstay of Nyandarua County. Close to 77% of the households in the county practice crop farming with some of the agricultural produce being used for subsistence whereas the surplus is sold. Hence, in order to increase production levels, which translates to increased sales, there is need to promote the use of improved seeds, which have high yield potential. This is mostly because they are adaptable to local climatic conditions and resistant to pests and diseases.

iii. Use of Modern Farming Technology and Farm Machinery

Modern farming should be promoted at the farm level to increase land productivity, increase efficiency and improve livelihoods. The use of machinery in various farm operations such as tilling, milking, harvesting and threshing saves time and enhances efficiency in production. This in turn leads to an increase in output. Moreover, large-scale mechanization has been found to reduce the cost of production which results in higher profit margins. In addition, farm mechanization over time causes a shift from subsistence agriculture to commercialization. In order to achieve this, the Plan proposes the establishment of an additional Agricultural Mechanization Station in Kinangop in order to supplement the already existing facility located in Nyahururu.

Plate 14-1: Modern Farming Technology, Galana Kulalu, Tana River County



Source: <https://irrigation.amiad.com/project/galana-kulalu-food-security-project-kenya/>

iv. Promoting Irrigated Agriculture

With the population of Nyandarua rising steadily at a rate of 2 % per annum, there is a commensurate demand for agricultural products for food, fuel and fiber. It is therefore imperative to increase productivity in order to meet these requirements. This can be achieved by the use of efficient irrigation technologies especially in areas that are water stressed in the County such as Ndaragwa Sub-County. Moreover, irrigation promotes resilience in agriculture and renders it less vulnerable to changes in weather patterns.

v. Improved Farming Education, Skills and Research

Most farmers in Nyandarua lack current information on efficient and economical agricultural practices. Particularly, farmers need more information on good breeding practices, pest and disease control, soil pH levels, produce marketing etc. The county government must therefore take initiative to improve extension services in the county. Other techniques which may be applied to train farmers include regular trade fairs/exhibitions, model farmers as well as media campaigns and shows among others. Moreover, there is need to revamp agricultural research and specialized training in the county.

vi. Diversification into High Value Crops

In Nyandarua, farming is a source of food, nutrition, income and employment. In order to enhance these functions, there is need to shift from traditional crops to new crops which have higher yields and are more remunerative. The agro-ecological zones in the county support a wide array of agricultural commodities which have not been fully exploited. Analysis indicates that crops such as cabbages, carrots, and vegetables such as kales, spinach and onions have higher yield per hectare compared to traditional crops such as potatoes and maize. Farmers should therefore commit portions of their land to these crops.

Other recommended ones include fruits e.g., plums, pears and avocados. Additionally, pyrethrum, which was largely grown in Nyandarua in the '90s, should be re-introduced into the county farms. A key benefit of diversification is reduction of the risk of crop failure to the farmer as well as preservation of soil fertility.

vii. Control of Pests and Diseases

In both crop and livestock production, pests and diseases are a significant cause of low production as well as compromised quality of produce. In order to mitigate this, it is imperative that pest and disease control initiatives are taken. It should however be noted that awareness of farmers on sustainable pest/disease control measures is crucial as well as the accessibility of inputs such as pesticides. The use of innovative ideas such as using drones in spraying is highly recommended.

viii. Regulation of Packaging and Pricing

The irregular packaging of potatoes is a major cause of low returns to farmers in the county. The county government should intervene by regularizing the packaging of potatoes to avoid the exploitation of farmers. Furthermore, there is need for price support policies whereby the government sets a minimum legal price that the seller of a particular commodity may charge. This controls the consumer's perception of value and cushions the farmer from market uncertainties.

ix. Provision of Farmer Incentives

a. Enhance access to quality agricultural inputs/Subsidization of Farm Inputs

Provision of farm inputs such as seeds, animal feeds, fingerlings, fertilizer and pesticides to local farmers in the entire County will lead to increased productivity. Besides, with a reduction in the cost of inputs, there is a corresponding increase in the profit margin for farmers with the assumption that selling prices remain constant.

b. Availing Credit Facilities

The accessibility of farming loans is aimed at increasing returns by commercializing agriculture, through loans, farmers can procure inputs and new technologies they might otherwise be unable to access. Moreover, this will facilitate a greater inclusion of youth and women in the agricultural sector, hence increasing the employment rate. The Plan therefore proposes for the allocation of agricultural development funds in the County budget to augment agricultural production.

c. Strengthening extension services through integrated extension approaches

The accessibility of extension services at the farm level is aimed at promoting sustainable land use, improving land productivity and enhancing farmers with proper and adequate knowledge regarding crop and livestock farming through integrated extension approaches

x. Increased Value Addition/Agro Processing

Value addition consists of the transformation of primary agricultural goods into secondary or tertiary (processed) commodities which can be sold for a higher price. This then leads to higher farmer profits. Additionally, processing leads to an increase in shelf life of products which reduces wastage and creates more employment opportunities. In Nyandarua, there is potential for agro processing both in crop and livestock production. Potential processed goods include potato chips, yoghurt, cheese, leather etc.

xi. Provision of Fresh Produce Cold Storage Facilities and Improved Post-Harvest Handling

Storage is an important marketing function, which involves the preservation of goods from the time they are produced to the time they are consumed. A major reason why the farmers in Nyandarua do not get optimal returns is the fact that they have to sell their produce soon after harvesting due to lack of storage facilities. Among other advantages, storage prevents the deterioration of perishable and semi-perishable goods, protects farmers whose products have a seasonal demand and helps in price stabilization by regulating supply and demand. The Plan proposes for the construction of a cold storage facility in every ward to help in storage of perishable products.

xii. Revival of Cooperatives

Through collective action, farmers are able to achieve goals that they may not otherwise be able to achieve independently. For instance, farmers can obtain inputs at cheaper rates, access finance and credit facilities, get information and market their produce. Through economies of scale, hiring services such as storage and transport is also cheaper.

xiii. Construction of modern markets

The construction of wholesale and retail modern markets in Oleriondo, Miharati, Soko Mpya and Ndaragwa markets in Olkalou, Kipipiri, Kinangop and Ndaragwa sub counties respectively will provide a ready market and increase direct access for agricultural products. The trickle-down effects of these market facilities will be, increased employment opportunities for local residents and increased income for local farmers due to elimination of middlemen. Additionally, more investment opportunities will be created in other key areas such as hotels and restaurants and transportation. Payment of market fees and licensing of resultant businesses will also generate additional revenue for the county.

xiv. Strengthen Youth Participation Programmes in Agribusiness

The development of more competitive, inclusive, and resilient market systems that can sustain demand, support more actors (i.e., ‘absorb the youth bulge’), and catalyze economic activity in a variety of interconnected systems offers a range of opportunities for young people. The Common challenges they face include: limited access to productive resources e.g. land, water, inputs, technology and

information, limited access to extension services and credit facilities, low participation in rural institutions and decision making (lack of ‘voice’), and poor access to decent rural employment opportunities.

For women in rural areas, the challenges faced include: triple work burden in the productive, reproductive and social spheres as well as low recognition, whereas youth-specific challenges include: lack of incentives and interest in agriculture, limited skills and education to meet demand, and social pressure to migrate in order to contribute to the household income. These constraints can be mitigated through:

- a. Forging links between stakeholders in the agricultural system and other partners to provide short technical training and demonstrations serving rural learners, which are appropriate for the youth.
- b. Facilitating market linkages with the private sector that result in employment opportunities for youth in form of farming contracts, and ability to effectively employ market assessments including identification of mid-chain/off-farm opportunities for youth.
- c. Creating real pathways to profitable livelihoods that can change youth mindsets about agriculture.
- d. Promotion of youth groups to facilitate economies of scale.
- e. Research in Climate-Smart Agriculture (CSA): This is an approach to develop climate-resilient crops and livestock, scaling proven technologies and practices in CSA to the farm, and helping farmers to adopt them. Given the orientation of youth to new technologies and the methods used by implementers to promote uptake of these technologies, youth are well situated to fuel demand for CSA products and deliver CSA services. Many youths are very aware of climatic change and do mention a need for techniques and advanced technologies to address immediate concerns.

The overall effectiveness of a youth-focused agriculture sector intervention is dependent upon the ability of beneficiaries to attain, maintain, and profit from a higher level of income generation. Consequently, monitoring and disaggregating development outcomes by age cohort, and within each youth cohort, gender, over time where relevant, is critical as a means to determine what benefits youth most, if at all. Particularly for interventions with a narrow focus, such as productivity improvement in the maize value chain or the provision of specific farm services such as spraying, there is an opportunity to internally develop specific methods to look at “value for money.” In this way, it is possible to determine cost and implementation effectiveness by disaggregated youth age and gender segment, looking specifically at changes in use of time, income, and financial control.

xv. Reinforcing an Enabling Environment and Channeling Youth Voice

Youth benefit is strong where goals and strategies specific to youth in agriculture converge at all levels including youth networks. When young women and men have a seat at the table and are enabled to participate actively, creative solutions can emerge. Priority areas to be considered are:

- a. Work with governments on policies and strategies related to youth in agriculture and support their efforts.
- b. Recognize and incentivize youth champions.
- c. Participate in, or support the creation of County Youth in Agriculture forums with youth participation.
- d. Develop proposals that should include both a ranking of activities based on their potential to benefit youth; this should be guided by evidence or through pilot projects, and the solid identification of youth vulnerabilities and barriers, complemented with mitigation measures.
- e. Encourage Youth expertise either in the form of consortia with youth-serving partners or advisory groups, or by hiring qualified youth specialists when programs are to include social and human dimensions of youth development.

14.2.3 Proposed Projects and Programmes; Agriculture

The following projects and programmes are proposed to actualize the modernization of agriculture in Nyandarua:

- Completion of potato processing industry at Olkalou, opposite J.M Kariuki hospital with requisite facilities
- Provision of subsidized inputs including fertilizers and high-yielding seeds.
- Promotion of irrigation agriculture in Kinungi, Haki, Canaan, Marangachi, Muti Umwe, Kwa Njora, Gathanji, through the sinking of more boreholes, and construction of water pans, abstraction of water from existing rivers within the first 3 years of the plan implementation period. Promotion of irrigation agriculture shall also be achieved through damming of existing rivers
- Construction of Modern Agricultural wholesale market at Oleriondo, Miharati, Soko Mpya and Ndaragwa
- Adopt a county agricultural policy advising on minimum plot sizes in agricultural land.
- Construction of an Agriculture Mechanization Station in Kinangop
- Create a pool of integrated extension services and quality control, research, demonstration and advisory services
- Increase crop and livestock pests and diseases surveillance and control through recruitment and facilitation of extension officers for crop and livestock.
- Enhanced coordination and monitoring of crops development programmes and projects
- Establish Seed multiplication centres at Ol'joro Orok, and Njabini ATCs to promote pyrethrum, sugar beets, giant bamboo, avocado and sunflower growing.
- Establish benchmarked quality control, weights and measures to standardize packaging of local crop produce.
- Establishment of livestock sale yards in Ndaragwa and Geta.
- Establish Improved fodder and pastures bulking sites at the ward level

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- Construction of fresh produce cold storage facilities, warehouses, and drying silos in Olkalou and in every ward to improve postharvest handling and commodity marketing.
- Fisheries development: incentivize fish farming (construct ponds and provide fingerlings, seeds, feeds and cottage industries on fisheries) and establish a fish mini-processing industry and cold storage facilities in Ndaragwa.
- Introduce contracted farming with guaranteed markets e.g., Potatoes, vegetables, sugar beet, sunflower, fruits and farmers growing raw materials for feeds processing
- Promote horticultural export through infrastructure development, value addition, marketing, contracted farming, mechanization, tax cuts etc.
- Establish Nyandarua County Investment Promotion Corporation
- Establish trading partnerships at regional, national and international levels.
- Improvement of access and feeder roads to promote marketing of agricultural products (refer to transportation projects)
- Involve youth and women groups in agriculture through technical training and demonstration programs, involvement in value addition and incentivization such as establishing green houses and agri-business incubation centres for them.
- Encourage formation of farmers groups and engage them in technical training and demonstration programs, value addition programs, mechanization services and agribusiness incubation programs at the ward level
- Establish intensive Value addition programs at the ward level (refer to the strategy for promoting industrialization).
- Diversification into high-value crops as follows

Table 14-1: Areas Recommended for High Value Crops

Crop	Recommended Areas
Sugar Beets	Parts of Gatimu, Gathanji, Charagita, Mirangine, Kanjuiri, Karau, Rurii, Kaimbaga and Weru wards
Strawberries	Around Oljoro-Orok and Njabini towns
Sunflower	Parts of Olkalou, Oljoro-Orok and Kipipiri and Kinangop Sub Counties (Murungaru area)
Fruits	Oranges, Avocadoes, Tree Tomatoes, Purple Passion Fruits (Ndaragwa Sub County), Plums and Pears (Oljoro-Orok and Olkalou Sub Counties)
Bamboo	All riparian zones in the county
Horticultural Produce	Ngorika (irrigation), Nyakio and Magumu

Source: Consultant's Analysis

- Development of climate resilient crops and livestock in northern parts of Ndaragwa.
- Undertake frequent soil testing to continuously determine the best crops for each region and maintain improved soil management for better crop yields
- Undertake study on Bio-fertilizer potential in Lake Ol'bolossat
- Diversify farming through collaboration with research institutions e.g. KALRO, KEPHIS

14.3 Strengthening Tourism

In order to strengthen tourism in Nyandarua, there should be an increase in visitors, both domestic and foreign, to the tourist attractions in the county. In addition, the county government should take measures to broaden the range of tourism products, which are available to the visitors. It is also imperative that there is a strong integration of tourism and transportation infrastructure in order to ensure ease of accessibility of all tourist attractions.

14.3.1 Restatement of Issues

The main constraints affecting tourism in Nyandarua are untapped tourism potential and encroachment onto touristic assets. Untapped potential is mostly due to poor marketing of existing attractions. Nevertheless, some of the tourist attractions are hardly accessible due to poor road conditions whereas others including some of the Happy Valley Homes are ill maintained and dilapidated. Encroachment on the other hand is especially due to weak enforcement of regulations regarding environmental assets with touristic value e.g., L. Ol'bolossat and the gazetted forests.

14.3.2 Strategies

i. Legal Protection of Tourist Attractions

Nyandarua has a wide variety of tourist attractions including forests, the Aberdare National Park, Lake Ol'bolossat, rivers, Mau-mau caves and Happy Valley Homes among others. This notwithstanding, human activities have put some of these attractions under jeopardy and if the status quo remains as such, these assets may not be able to serve their functions in the future. It is therefore vital that the touristic assets in the county be gazetted in order to preserve them in their natural condition.

ii. Formalization of Tourist Activities

There are several tourism activities in Nyandarua which are currently unregulated and as a consequence, the monetary charges due to such activities are foregone. Examples include uncontrolled game viewing at Manguo Hippo Point, fishing at River Njangiri and Gitei and hiking to Mt. Kipipiri, a Table Mountain. Also, the gates into the Aberdare National Park (ANP) namely Queensway, Shamata and Mairo Inya gates should be opened up. These activities should be formalized as commercial tourist attractions in order to reap the potential benefits associated with them.

iii. Intensive Marketing of all Tourist Attractions

All tourist attractions and products offered in Nyandarua County should be identified and vigorously marketed in a bid to create awareness to potential visitors. Widespread advertising should be undertaken via media, the internet, billboards and other platforms. Notably, social media is indispensable as a cost-effective digital marketing platform with the capacity of reaching millions of people worldwide. It will not only increase brand visibility but also provide an opportunity to engage with potential tourists.

iv. Broadening the Range of Tourism Products

Nyandarua County has the potential for a wide array of tourism products such as boating, water sports, hiking, game viewing, birds watching and sport fishing. Based on an analysis of current and future market trends and undertaking visitor surveys, whereby visitor characteristics and their tourism-related activities can be identified, the county government can convert its assets into quality tourism products. This will in turn increase the competitiveness of Nyandarua County in the larger region and the country at large.

Plate 14-2: Kayaking at Tudor Greek



Integrating Tourism with Transportation

In order to ensure a rise in the number of visitors including repeat visits as well as the length of stay of those visitors, there must be adequate and affordable transportation to all tourist destinations. Moreover, the county government should liaise with commercial transport providers in order to ensure that there are convenient means of moving about locally and that the needs of the visitors are well understood and acted upon.

v. Renewal of Degraded Attractions

Some of the tourist attractions in Nyandarua have been degraded due to human activities. For instance, Lake Ol'bolossat has experienced siltation and pollution due to the encroachment of human settlements.

Also, some of the Happy Valley Homes are worn out and dilapidated due to negligence and poor maintenance over time. The county government should therefore undertake desiltation of the lake and refurbishing of the worn Happy Valley Homes in order to restore them to their former state.

vi. Strategic Establishment of Hospitality Facilities

Hospitality facilities comprise the complementary services that accompany tourism such as hotel and accommodation facilities, restaurants, transportation and leisure/fun activities. The hospitality industry therefore supplies the services needed by tourists during travel. There is need for strategic investment in hospitality facilities in Nyandarua, proximal to the existing and proposed tourist attractions. These should also be sufficiently marketed within and outside the country so as to attract visitors.

vii. Strengthening Enforcement

It was observed that despite clear provisions made under the Environmental Management and Coordination Act (EMCA) on the conservation of resources such as forests, lakes and rivers, encroachment still remains a challenge in Nyandarua. Therefore, there is need to revamp the enforcement of regulations in respect to environmental resources/assets.

viii. Networks and Partnerships

There are various stakeholders involved in promoting tourism in Nyandarua such as the county government, Tourism Regulatory Authority, NEMA, KWS, KFS and local residents among others. In order to maintain constancy in innovation and knowledge development, continuous collaboration amongst all stakeholders is necessary.

14.3.3 Proposed Projects and Programmes; Tourism

The following proposals have been made in order to strengthen tourism in Nyandarua:

- Develop a tourism master plan for the County
- Enforcement of environmental laws and regulations to protect and conserve tourism sites and areas.
- Rehabilitation, conservation and dredging of Lake Ol'bolossat.
- Renovation of dilapidated Happy Valley Homes.
- Development of three equator viewpoints in Gwa Kung'u, Kia Njata and Gwa Kiongo.
- Construction of monuments to honor the Mau Mau freedom fighters i.e., Dedan Kimathi and Kung'u Karumba in Njabini and Gwa Kung'u respectively.
- Formalize and regulate tourist activities as indicated in the table 14-2

Table 14-2: Proposed Tourism Attractions

Sub County	Tourism Products
Ndaragwa (Central)	Tafaria Castle Lodge, bird watching,
Ndaragwa (Kiriita)	Develop Manguo Hippo Point for game viewing
Ndaragwa (Shamata)	Eco-lodges for accommodation, sport fishing (trout), sport tourism (high altitude training camp at Kaheho), mountain climbing at twin peaks, hiking from Kaheho to Satima Peak (accessible through Shamata gate)
Oljoro-Orok (Weru)	Bird watching in L. Ol'bolossat, accommodation lodges, water sports (canoeing), Tabor Hill Lodge
Kipipiri (Wanjohi)	Happy Valley Homes (National Heritage Sites), Wanjohi caves, sport fishing, hiking and trekking
Kipipiri (Kipipiri)	Nature trails (Kipipiri Peak), eco-homes,
Kipipiri (Geta)	Develop Geta as an eco-tourism town, cable cars between Kipipiri peak and twin peaks (Aberdares), Nature trail and mountaineering (Satima Peak, Twin Peaks), sport fishing (R. Wanjohi, R. Gitei, R. Njangiri), Wang'ae caves, Philo Grande Camp, Gatuku waterfalls, 20 Km Marathon & Biking Circuit from Geta Forest through Marimu to Kagongo and back,
Kinangop (Murungaru)	Mau Mau caves, hiking, bird watching
Kinangop (North Kinangop)	Mountain biking (Mutubio gate road), sport fishing, eco-lodges, game viewing (ANP through Mutubio gate), water sports (John Nimu and Karemeri dams), hiking, Happy Valley Homes,
Kinangop (Gathara)	Mountain biking in Pesi town,
Kinangop (Njabini Kiburu)	Mountain biking, water sports/canoeing at Sasumua Dam, hiking to Elephant and Kinangop peaks (religious pilgrimage),
Kinangop (Nyakio)	Agro-tourism
Kinangop (Magumu)	Scenic view of rift valley escarpment

- Liaise with National Museums of Kenya, Ministry of Tourism, NEMA, KWS, and KFS among other stakeholders to gazette and protect archeological and cultural heritage sites e.g., Mau Mau caves and Happy Valley Homes.
- Marketing of touristic sites and attractions; county website, mainstream media, social media, billboards and other platforms.
- Establish an integrated tourism circuit covering; water sports, boating, hiking, game viewing, bird watching, sport fishing, agricultural and medical tourism.
- Integrate sports and tourism by constructing sports facilities and tourism facilities in Lake Ol'bolossat, Geta and Karuru high grand-water fall of the Aberdares
- Establish Nyandarua County Investment Promotion Corporation
- Incentivize investors to put up star-rated hotels and restaurants in major urban centres and strategically located centres/areas e.g., Lake Ol'bolossat Aberdare, slopes of Aberdares ranges.

14.4 Promoting Industrialization

An industrialized economy is one which is based on manufacturing rather than primary agricultural goods as is the current case in Nyandarua County. Notably, industrialization is characterized by mass production through mechanization as opposed to manual labour. Industrialization should thus be promoted because it provides market to other sectors, produces consumer goods, creates employment for both skilled and non-skilled labour, contributes to foreign exchange earnings and leads to a rise in income levels through value addition.

It is worthy to note that manufacturing is among the ‘Big 4’ agenda for the Country, and it primarily aims at increasing the percentage contribution of manufacturing to the country’s GDP, increasing the value, volume and variety of export products and raising consumer benefits. The strategy to promote industrialization in Nyandarua is therefore informed by the policies entrenched in the national government’s industrial development agenda.

14.4.1 Restatement of Issues

The low level of industrialization in Nyandarua is attributed to inadequate infrastructure, inadequate capital and credit facilities, and lack of designated land for industrial activity as well as inadequate skills/technical knowhow.

14.4.2 Strategies

- Provision of Adequate and Appropriate Infrastructure

Basic infrastructure such as water supply, transport, energy and ICT are crucial to economic development. In the industrial context, poor infrastructure reduces the profitability of manufacturing due to high operation costs which in turn inhibits industrialization. The county government of Nyandarua must therefore provide easily accessible infrastructure facilities so as to drive industrialization in the county.

- Improve Access to Reliable Electricity

Electricity is a pivotal input in the manufacturing process. Fluctuation in power supply and power outages lower productivity since machines must be restarted; their lifetime is also reduced. Currently, only about 40% of households in Nyandarua have access to electricity. A majority of the 60% who lack power supply cited the main reasons as absence of proximal transmission lines to their homes as well as unaffordable charges. In order to increase electricity access in Nyandarua, there is need to extend transmission to areas that lack power and more importantly, to look into alternative power sources such as wind and solar energy.

- Enhance Transportation Efficiency

An efficient transport system is essential for the movement of raw materials for processing and the delivery of products to the final consumers. In order to improve transportation so as to favour industrialization, roads should be upgraded to all weather conditions. Additionally, it is imperative to integrate the existing transport modes such as rail and the road network.

- Improve Access to Capital and Credit

This is a challenge especially for Small and Medium Enterprises (SMEs). This is usually because they lack creditworthiness and managerial capacity. They also lack the required collateral which renders their endeavors to secure funds difficult. As a result, the ability of the SMEs to procure raw materials and equipment is limited. If industrialization in Nyandarua is to grow, there is need for emerging industries to access more finances at a lower cost.

- Formalization of Small and Medium Enterprises (SMEs)

Many SMEs largely operate in the informal sector. Nationally, there are about 1.56 million registered SMEs whereas unlicensed businesses are close to 5.85 million (KAM, 2018). This is mostly due to tedious registration and licensing procedures, competition from uncontrolled imports, unclear government policies and regulations etc. in order to encourage formalization of SMEs, the county government should facilitate the compliance of businesses with existing regulations.

- Allocation of Adequate Land for Industrial Use

Land for industrial use i.e. industrial zones should be allocated in the towns with industrial potential. Industrial potential is dependent on availability of raw materials such as minerals and rich agricultural hinterlands among others. Notably, land availed should include designated space for incubation centres for SMEs.

- Review of Curriculum in TVETs

Technical and Vocational Education and Training (TVET) is the most practical avenue for acquiring readily employable skills in the work environment. Nyandarua needs highly skilled technical personnel to drive the agenda of transforming the economy through value addition to primary commodities and natural resources. There is need for review of curricula in line with manufacturing as well as increased focus and budgetary allocation to this sub-sector in order to train learners to the required level of competence.

14.4.3 Proposed Projects and Programmes; Industrialization

The following projects have been proposed to promote manufacturing and industrialization in Nyandarua:

- Put up manufacturing, agro-processing and value addition industries as follows:

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- i. Fruit processing- Wanjohi
 - ii. Wool processing and textile manufacturing- Engineer
 - iii. Leather tanning- Ndaragwa
 - iv. Animal feeds processing- Miharati
 - v. Dairy meal processing in Mirangine and Miharati (small scale)
 - vi. Livestock feeds manufacturing plant- Ndunyu Njeru
 - vii. Poultry feeds manufacturing plant- Olkalou
- Establish cottage industries: thread milling in Njabini, leather tannery in Ndaragwa and basket weaving in Oljoro-Orok.
 - Road improvement to support industrialization (refer to transportation projects).
 - Supply reliable power supply to existing and proposed rural-based industries e.g., identify alternative energy sources to augment the current supply and connectivity, develop strategy to reactivate the Green Wind Power energy in Kinangop.
 - Establish Special Economic Zones/Industrial Parks in partnership with KENINVEST, KAM, ICDC and KIE in the following towns; Olkalou, Mirangine, Ndunyu Njeru, Njabini and Ndaragwa
 - Establish fruit and vegetables processing and Cold storage facilities in Ol Kalou, Murungaru, Shamata, Geta, Tumaini and Oljoro-Orok
 - Identify and develop a database (land information system) for all illegally acquired land in the county and commence the repossession process
 - Providing innovation and incubation services to nurture SMEs in the county.
 - Nurturing of youth talent through development of ‘Jua Kali’ associations in all Sub-Counties and adequately fund their operations.
 - Building artisan (Jua Kali) sheds in all sub-county headquarters (Ol Kalou, Miharati, Engineer, Oljoro Orok and Ndaragwa) to promote SMEs development and empowerment in the County
 - Establish Nyandarua County Investment Promotion Corporation to identify, evaluate and market investment opportunities in the County
 - Provide incentives to prospective industrial investors through provision of land for investment, tax rebates, and tax holidays.
 - Formalizing MSMEs through streamlining licensing procedures and formulating suitable policies.
 - Review of curriculum in polytechnics to include manufacturing activities and processes.

14.5 Facilitating Trade and Commerce

Trade is a key driver of growth and development and no country in the last 50 years has sustained high levels of growth and significant increase in per capita incomes without greatly expanding trade (World Bank, 2011). Trade should therefore be enhanced as it promotes economic development in the following ways.

Firstly, trade generates economic growth through increased commercial opportunities and investment. Secondly, it facilitates export diversification by enabling access to new markets. Moreover, trade expands choice and lowers prices for consumers by broadening supply sources and finally, it creates employment by boosting other economic sectors. These are but some of the benefits associated with trade in an economy and particularly in developing countries.

14.5.1 Restatement of Issues

The overarching challenge to trade and investment in Nyandarua is that it lacks a conducive environment. This has been ascribed to several causes such as inadequate capital and credit, limited market access, lack of an organized business community and low disposable income and savings.

14.5.2 Strategies

- Trade Competitiveness through Diversification

This is closely related to the industrialization strategy. It aims at expanding trade opportunities by increasing the number and value of exports. It therefore reiterates the need for value addition, through processing, in order to widen the customer base.

- Broadening Trade Finance Options

Access to trade credit is an important determinant of the ability of firms to engage in trade. Businesses in Nyandarua, especially startups, have difficulties obtaining credit due to their inability to meet collateral requirements or low creditworthiness. Availing affordable finance alternatives especially to Micro, Small and Medium Enterprises (MSMEs) will improve trade in Nyandarua.

- Regional Trade Cooperation for Improved Market Access

It is crucial for the county government to establish trading partnerships/blocs in order to explore a larger market base for goods produced within the county. This calls for integration of markets at the regional/supra-county level. In the formulation of regional trade agreements, policies must be evidence-based and especially geared to effective means of poverty reduction.

- Transportation Efficiency and Integration

Economic activities cannot take place without an infrastructure base particularly transport which facilitates the mobility of people, goods and information. High density transport infrastructure and highly connected networks are commonly associated with high levels of development. This is because efficient transport systems provide economic opportunities, which create positive multiplier effects such as market accessibility, employment and additional investments. Hence the need to upgrade roads in Nyandarua and integrate all modes of transport to foster trade and economic growth.

14.5.3 Proposed Projects and Programmes; Trade and Commerce

In order to facilitate trade and commerce in Nyandarua County, the following proposals have been made:

- Create awareness for existing credit facilities.
- Increase uptake of government funded credit facilities
- Provide Financial literacy and entrepreneurship programmes to traders and start ups
- Construct business incubation in all major urban centres
- Establish county enterprise fund
- Establish Nyandarua County Investment Promotion Corporation
- Branding and marketing of Nyandarua products
- Road improvement to improve local and regional trade (refer to transportation projects).
- Regional trade cooperation to establish trading blocs/partnerships.
- Establishment of modern agricultural wholesale market at Magumu.

15 PROVIDING ADEQUATE AND APPROPRIATE INFRASTRUCTURE

15.1 Overview

The strategies outlined in this chapter are aimed at providing infrastructure that meets the current and future needs of the population in Nyandarua. Moreover, the strategy promotes suitability and convenience in the design and location of infrastructure facilities focusing on accessibility, land use compatibility and ability to support development.

The strategy will endeavor to improve and enhance adequacy of the following aspects of physical and social infrastructure;

- e) Water Supply,
- f) Wastewater Disposal,
- g) Solid Waste Management,
- h) Electricity and ICT,
- i) Education,
- j) Healthcare,
- k) Recreation and Community Facilities.

The strategy is also in line with the county stakeholders' vision of providing 'state of the art infrastructure that will spur sustainable development and equity among the people of Nyandarua'.

15.2 Water Supply

15.2.1 Restatement of Issues

Inadequate water supply was identified as the main challenge in Nyandarua. This is so particularly in the urban areas. The inadequacy of water supply is attributed to the lack of an integrated water supply plan. Nyandarua has diverse water sources with a total production capacity of 19.6 million cubic metres annually yet there are only 2 water service providers which supply only about 0.8 million cubic metres per year. Other major causes of inadequacy in water supply include degradation of water towers, Aberdares in particular, and dilapidated infrastructure. Compromised water quality was also a constraint and was ascribed to the lack of treatment facilities in supply schemes and pollution of groundwater especially because of over-reliance on pit latrines.

The following strategies are proposed to counteract the constraints identified.

15.2.2 Strategies

- i. Extend Reticulation and Establish New Water Supply Schemes

Water demand in Olkalou is currently 1,116 cubic metres daily whereas OLWASCO only supplies 620 cubic metres per day, leaving a supply deficit of 496 m³. Furthermore, this deficit is expected to rise to 1,667

m³ by 2030. This indicates the need to extend the reticulation network to subserved areas in Olkalou in the first 5 years of plan implementation. NYANDAWASCO on the other hand only services areas of Kirima, Kasuku, Oljoro/Kangui, Mairo Inya, Gatimu and Kibathi. Notably, major towns such as Engineer, Njabini, Ndaragwa and Miharati currently lack piped water supply hence the need for new supply schemes in this town. Therefore, the plan proposes that within the first 5 years of plan implementation, Engineer, Miharati and Njabini towns should be connected to piped water and within 10 years of the plan implementation, Ndaragwa and Magumu towns should be connected to piped water.

ii. Increased Abstraction from Existing Water Sources

The difference between the production capacity of water resources in Nyandarua and the water supplied by the utility companies has already been remarked. This notwithstanding, Mairo Inya and Gatimu schemes purchase water from Nyahururu Water and Sanitation Company (NYAHUWASCO) in Laikipia County. With the evident abundance of water resources in the county, abstraction from the 8 permanent rivers that were identified during analysis should be optimized in order to feed existing and proposed supply schemes.

iii. Protection of Water Towers

The Environmental Management and Coordination Act (EMCA), 1999 under sections 42, 44, and 48 provides for the protection of rivers, lakes, wetlands and forests. It further proceeds to provide regulations against encroachment and other activities that cause soil erosion, siltation or water pollution. Enforcement of this law is crucial in order to deter activities that have adverse effects on the environment, and water catchment areas in particular.

iv. Adopt Inter-Agency Coordination

The various issues which affect water supply fall under the jurisdiction of various departments and agencies e.g. supply companies, county departments, Kenya Forest Services, development authorities, WRA and NEMA among others. There is therefore need for coordination between these agencies not only to avoid duplication of roles and responsibilities but also to promote complementary operations.

v. Attract Private Sector Participation in the Sector (PPPs)

Implementing adequate water supply could be rather costly for the county government. Public Private Partnerships are thus encouraged to reduce costs on the government's side, while simultaneously increasing water supply connections. This may be achieved by incentivizing the water supply sector to attract private investors. Notably, private supply schemes mostly involve trucked water, but piped infrastructure should be encouraged where feasible. In the scenario where the public sector fully controls/operates the supply system, private entities may be sub-contracted for specific tasks such as billing, metering, maintenance and monitoring losses.

vi. Increase Rainwater Harvesting

The annual rainfall in Nyandarua ranges from 700 mm to 1,600 mm. Nevertheless, only an average of about 5.4% of county households harvest rainwater. This is especially due to inadequate water harvesting facilities and poor structural designs. Rainwater harvesting as a supplementary water source must needs be encouraged more so in the rural areas.

Plate 15-1: A Rainwater Barrel



Source: <https://www.google.com>

vii. Strengthen Community Involvement in Operation and Maintenance

Involvement of the community in water supply promotes access to project benefits. It also fosters a sense of ownership and enables the protection of public interest. This approach aims to decentralize decision making by empowering local communities. This is done by involving the beneficiaries in planning and implementation of water supply schemes as well as delegating their operation and maintenance to water supply groups. Important to note is that communities should be mobilized early in the project for effective participation. Also, the use of accessible technology is recommended since smaller water supply schemes are easily maintained by communities with limited technical skills, hence more sustainable.

viii. Desiltation of Rivers and Dams

Siltation in the county water resources has mostly occurred due to encroachment and poor agricultural practices. This has in turn caused a decline in water levels and compromised water quality. Desiltation of Sasumua dam, Lake Ol'bolosat, Rivers such as Malewa, Ewaso Narok, Pesi, Turasha, Chania, Kiburu, Mkungi and Kitiri should therefore be undertaken to restore these water resources so that they may be used for comprehensive water supply in Nyandarua.

ix. Enforcing Conformity to Water Quality Standards

Other than unreliable water supply, most of the county households cited poor quality as the main challenge in respect to accessing water. This accounted for about 19% of the households. Notably, both water supply schemes i.e. NYANDAWASCO and OLWASCO lack water treatment plants at the intake. The supply of untreated water to households poses a great health risk to the county residents. Moreover, other resources which are either polluted or used for watering livestock still serve as sources of water for people in Nyandarua. The county government should therefore enforce regulations on water quality standards to be observed by the existing and proposed water supply schemes as well as all other sources that provide water for human use.

In addition, the county government must strictly regulate the location of pit latrines in order to protect both surface and groundwater sources.

15.2.3 Proposed Projects and Programmes; Water Supply

The following projects and programmes have been proposed to provide adequate water in the county:

- Construction of 6 mega dams i.e. Pesi, Kinja, Malewa, Shamata/Kirima, Kiburu and Geta.
- Develop a county water and sewerage master plan
- Extension of existing water supply schemes i.e. OLWASCO to cover all households within the municipality.
- Establishment of water supply schemes in Engineer, Njabini, Ndaragwa and Miharati.
- Enforcement of environmental laws and regulations to protect water towers.
- Desiltation of rivers, dams and water pans.
- Rehabilitation and repair of dams/pans boreholes and sink new boreholes.
- Sensitization campaigns to promote rain water harvesting.
- County Government to forge inter-agency partnerships with water service providers, Water Resource Authority (WRA), Ministry of Water, regional development authorities, KFS, Kenya Water Towers Agency (KWTa) among others in water supply and management.
- Sensitization of the community in the management of dams and water pans.
- Construction of designated water points for livestock.
- Repossess all illegally acquired land previously occupied by dams and water pans.

15.3 Wastewater Disposal

15.3.1 Restatement of Issues

The poor condition of wastewater management and disposal in Nyandarua is as a result of two main causes; inadequate infrastructure and poor access to improved sanitation. Notably, only about 5.6% of

Nyandarua County households use flush toilets but over 90% use pit latrines, most of which are unimproved. Also, none of the towns in the county have a sewerage network. Olkalou, the county headquarters, uses a decentralized wastewater treatment plant.

15.3.2 Strategies

a) Establishment of Sewerage Networks in Major Towns

The physical planning handbook recommends the consideration of a sewage collection and treatment plant in any urban settlement with a population exceeding 3,000 persons. The population in each of the major towns in Nyandarua namely Olkalou, Mairo Inya, Njabini, Ndunyu Njeru and Engineer is expected to exceed this threshold by the year 2030. Sewerage networks and treatment plants are, therefore, proposed in these towns. Notably, there is a proposed project for installing a sewerage system in Olkalou serving about 30,000 households.

b) Promote use of Decentralized Treatment Plants in Rural Centres

Decentralized wastewater treatment systems are recommended in low density development areas. They rely on simple biological treatment systems and discharge to a land disposal system. Moreover, treated wastewater could be re-used through subsurface drip irrigation. This system is viable in the smaller urban centres in Nyandarua such as Oljoro-Orok, Miharati and Ndaragwa.

c) Encourage Individual on-site Treatment in Rural Areas

In the rural areas of the county where housing density is sparse, decentralized/communal treatment systems might not be cost effective. Individual treatment systems such as septic tanks are recommended in these areas. Where installation of such might not be possible for the property owner, improved sanitation systems such as pour-flush latrines and VIP latrines may be considered.

d) Public Private Partnerships (PPPs) in Wastewater Management

These are encouraged since they allow for risk transfer and sharing between the public and private sectors in that risk is apportioned to the party that is best able to manage it thus minimizing costs. Moreover, Design, Build, Operate and Maintain (DBOM) approaches are encouraged in order to encourage the private sector entity to come up with a design model that will reduce the overall life-of-asset costs.

15.4 Solid Waste Management

15.4.1 Restatement of Issues

The synthesis of issues revealed that the main causes of poor solid waste management in Nyandarua are inadequacy of solid waste collection and handling infrastructure in urban areas, low levels of waste segregation at source, and minimal adoption of new technologies in waste management and disposal.

Also, there is low compliance to environmental legislation especially in urban areas where open dumping is often practiced.

15.4.2 Strategies

i. Adopting Integrated Solid Waste Management

Integrated SWM management is an approach to protecting and conserving the environment by implementing sustainable waste management practices. It establishes the preferred order of SWM alternatives as follows.

i. Waste Avoidance and Reduction

This is the foundation of the waste hierarchy. The aim is to minimize the amount of waste generated and consequently that which enters the waste stream.

ii. Recovery, Re-use and Recycling

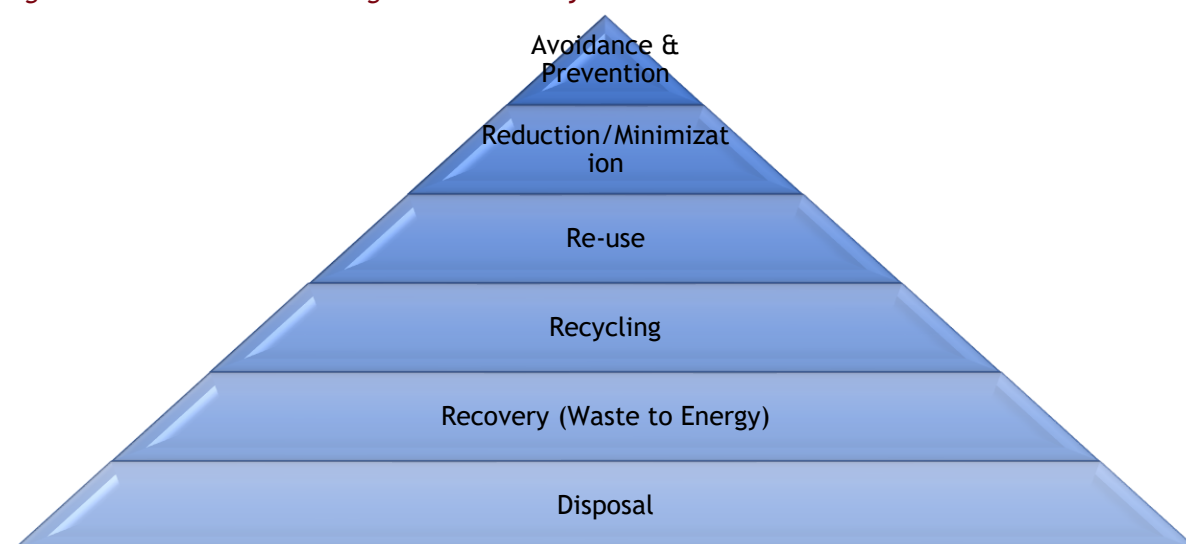
These are different physical processes all aimed at reclaiming material from the waste stream thus reducing the amount of waste that moves down the waste hierarchy. Recovery refers to any operation the principal result of which is waste serving a useful purpose instead of other materials which would otherwise have been used for that particular purpose. Recycling on the other hand refers to processing of waste into a new product of similar chemical composition while re-use involves either the subsequent use of an item by its first owner or passing down the item to a second user.

iii. Waste Disposal

Disposal refers to any operation that involves dumping and incineration of waste. The figure below illustrates the waste hierarchy; avoidance is the most preferred whereas disposal is the least preferred alternative.

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Figure 15-1: Solid Waste Management Hierarchy



Source: NEMA, 2015

iv. Provision of Adequate Waste Handling Facilities and Equipment

The waste management cycle comprises five main activities namely generation, collection, transportation, treatment and disposal, each which requires certain facilities to be conducted effectively and efficiently. There is therefore need to provide facilities and equipment for every stage in the management cycle i.e. from waste collection to disposal to achieve sustainable waste management in Nyandarua.

Plate 15-2: A Waste Transportation Truck



Source: NEMA, 2015

v. Establishment of Sanitary Landfills in Selected Towns

These are currently the most recommended facilities for waste disposal. The physical planning handbook recommends one landfill/disposal site to serve a catchment population of 100,000 persons or more. Of the five disposal sites in Nyandarua, only the one in Olkalou is operational. The Olkalou waste disposal

site and the other four sites in Malewa, Kaharu, Tulaga and Mbuyu should be used to establish sanitary landfills for solid waste disposal.

vi. Investing in New Waste Management Technologies

The failure to embrace new technology may be ascribed to various factors such as inadequate financial resources, lack of incentives, resistance to change, lack of awareness and weak enforcement. Technologies for waste recovery, recycling and treatment such as sorting systems and incinerators should therefore be embraced not only for handling municipal waste but also for medical and hazardous wastes.

vii. Encouraging Private Sector Involvement (PPPs)

With increasing urbanization, income levels and industrial activity, waste generation in Nyandarua will increase manifold hence the need to enhance waste management and handling capacities through PPPs. The World Bank has indicated that involvement of the private sector is one of the proven ways of obtaining efficiency gains in solid waste management. This especially in a framework of competition, transparency and accountability. Notably, evidence from past studies shows that waste management services provided by the public sector in a monopolistic setting are more expensive than when competitively contracted private institutions are involved.

viii. Awareness Creation and Enforcement of Regulations

Some of the major challenges of solid waste management in Nyandarua are largely attributed to lack of awareness and the general attitude of the population towards sustainable waste management practices. These include waste segregation and recycling. There is therefore need for sensitization to promote waste segregation and in general, to advocate for the concept of waste generator's responsibility in waste management. Moreover, there is need to enforce regulations on solid waste management and increased surveillance on illegal waste disposal activities.

ix. Promoting Timely Collection and Management

Inasmuch as there is need for providing adequate facilities for collection, transportation, treatment and disposal to achieve sustainable waste management in Nyandarua, care must be taken to ensure that waste is collected in a timely fashion either from individual households or collection points for transportation. This is imperative if the spread of waste to undesignated areas is to be avoided.

15.4.3 Proposed Projects and Programmes; Solid Waste Management

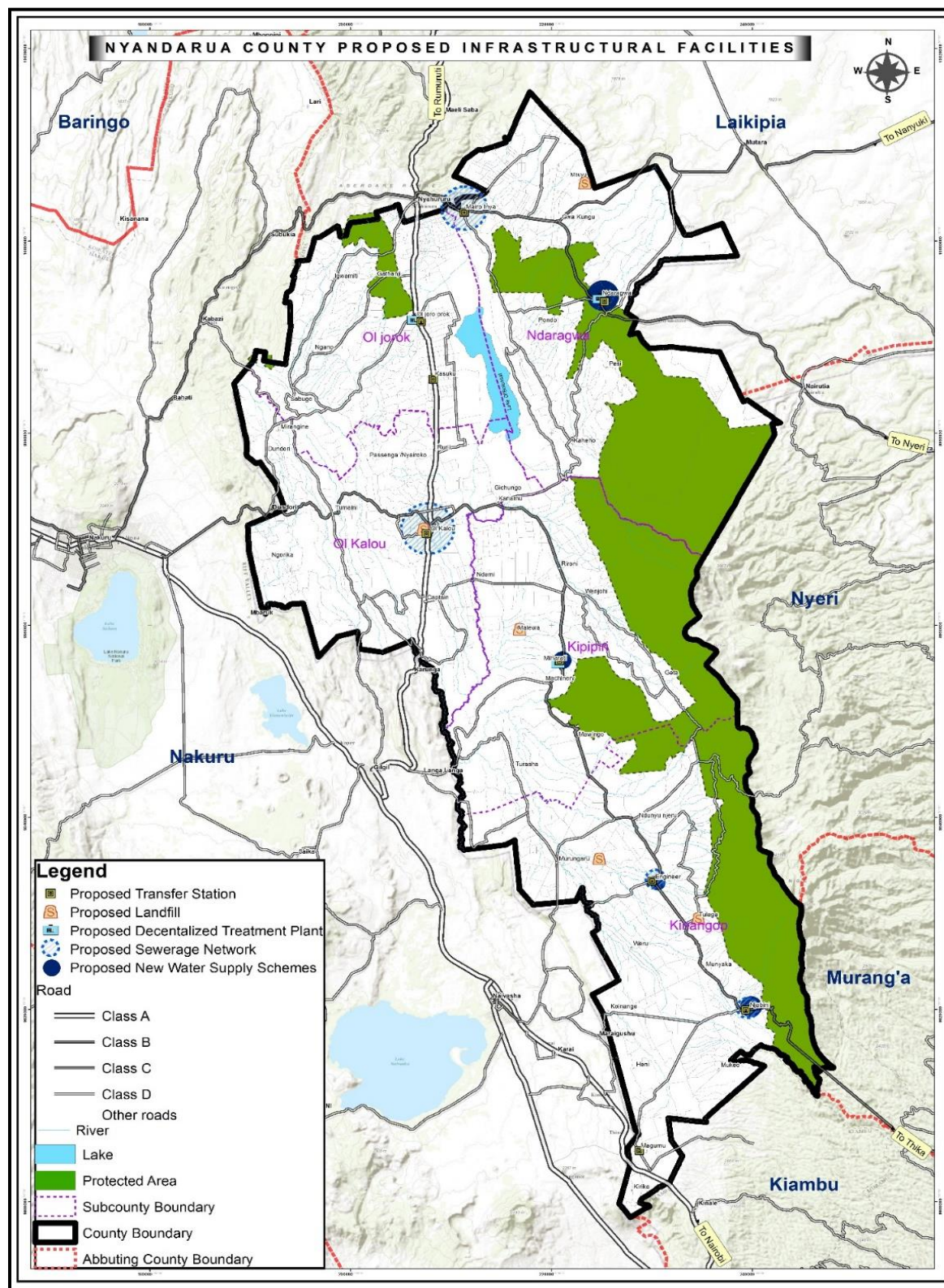
The following proposals have been made to ensure adequate solid waste management in the county:

- Sensitizing people to adopt integrated solid waste management approaches i.e. waste avoidance and reduction; waste recovery, re-use and recycling.

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- Providing waste transportation trucks; one for each Sub County except Kinangop which will have two.
- Provide color-coded bags and bins in major urban centres to promote waste segregation (Olkalou, Mairo Inya, Njabini and all sub county headquarters).
- Establish transfer stations in the following urban centres; two each in Olkalou, Njabini, Engineer and Mairo-Inya, one each in Ndaragwa, Oljoro-Orok, Miharati, Kasuku and Magumu.
- Establishment of sanitary landfills in Olkalou, Malewa, Kaharu, Tulaga and Mbuyu.
- Provision of incinerators in all health facilities from level 3 (health centre) and above.
- The County Government to partner with private firms in solid waste management.
- Enforcement of NEMA laws and regulations.

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Map 5: Proposed Infrastructure Facilities

15.5 Electricity and Information Communication Technology (ICT)

15.5.1 Restatement of Issues

Low access to electricity was attributed to skewed distribution of transmission lines, unaffordable connection costs and low adoption of alternative power sources such as solar energy. On the other hand, inadequacy of ICT services was due to low budgetary allocation (below 1% of county revenue), inadequate staff and capacity, as well as attitude constraints whereby ICT projects are less prioritized compared to others.

15.5.2 Strategies

Electricity

i. Extension of Power Transmission Network

Necessary infrastructure to extend transmission to sub served areas including substations, transformers, poles and distribution lines are essential to ensure wider electricity coverage in Nyandarua County. Moreover, there should be regular monitoring and maintenance of infrastructural installations to reduce breakdown and thus enhance the reliability of power supply in the county.

ii. Use of Alternative Renewable Energy Sources

There is need to embrace other energy sources particularly in the rural areas to supplement the national grid deficit. Kenya has promising potential for power generation from renewable energy sources. These include solar, wind and biogas.

From 1994 to 2010, Nyandarua had an average annual irradiation ranging between 1,600 to 1,800 kWh/m². Only parts of the Aberdare ranges had annual irradiation less than 1000 kWh/m² (<https://www.africa-eu-renewables.org>). This shows the high potential for solar power generation in the county. Also, due to the large amounts of agricultural waste in the county, there is potential for use of biogas for households as well as public institutions. Moreover, there is potential for hydroelectric power development in Nyandarua due to the presence of numerous rivers traversing the entire County.

Information Communication Technology (ICT)

ICT is needed in order to enhance efficiency in administration by governing institutions and also to improve public sector services such as education and health among others. The following are the strategies proposed to increase the uptake of ICT in Nyandarua.

iii. Increased Access to Computers

Without the necessary hardware, uptake of ICT is not tenable. Hence there is need to provide computers in all administrative offices not only at county level but also in the sub counties and wards. Additionally,

public institutions such as schools and hospitals should at least have open access centres since provision of computers in all offices is rather costly.

iv. ICT Capacity Building and Training

County administrators or public officers should be trained in basic computer skills in order to use the machines effectively. Necessary skills include the Microsoft Office software package to enable word processing, use of spread sheets, power point presentations etc. in addition, training on the use of internet and email is also crucial.

v. Internet Connectivity

The internet is an invaluable tool in offices as it enables instant sharing and access to information through search engines, research on innumerable topics and round the clock communication via email and social media. Additionally, it may be used as a powerful tool for marketing and awareness creation and an avenue for e-services. The first CIDP (2013-2017) proposed installation of internet connectivity in all sub county headquarters; this had been achieved by the time of the preparation of the second CIDP (2018-2022).

vi. Recruiting and Deployment of Trained Staff

The county government should also deploy trained support staff to each public office for regular maintenance of hardware and upgrading of software. This will ensure that functionality is always at optimal levels.

It must however be noted that reliable electricity is a pre-requisite for the success of the strategies proposed to increase the uptake of ICT in Nyandarua County.

15.5.3 Proposed Projects and Programmes; Electricity and ICT

Electricity Projects

- Extension of power supply network to increase electricity access to 100% and connectivity to 85%
- Adopt alternative sources of renewable energy - solar, wind, hydro-power and biogas energy to reduce dependent on firewood, charcoal and hydro-carbon from 76% to 35%. For example, develop strategy to reactivate the Green Wind Power energy in Kinangop.
- Construct mini-hydropower stations in the existing water falls in the county
- Encourage PPPs in power generation and distribution.

ICT Projects

- Develop a County ICT policy
- Cyber Optic Cable to be fully rolled out in the County.

- Partnerships with ICT stakeholders to provide adequate telephony and big-data transmissions.
- Integrate ICT in county operations such as digitization and automation of essential services e.g. revenue collection, planning and development approvals, single business permits and trade licenses.
- Provision of internet-enabled computers in all county administrative offices to the ward level; at least one in each.
- Provide affordable ICT services through integrated data centres, e-citizen portals, internet and innovation hubs and business process outsourcing in all urban centres and sub-county headquarters
- Recruitment of IT officers in every Sub County.
- Regular updating of the Nyandarua County website.

15.6 Education

15.6.1 Restatement of Issues

A majority of households in Nyandarua, about 39%, cited inadequacy of staff in the education facilities as the main challenge they faced. Other challenges included inadequacy of the facilities themselves and skewed distribution which resulted in students having to walk long distances to access tuition services. Polytechnics were noted to have especial challenges including shortage of qualified instructors, costliness of accessing services leading to high dropout rates, as well as lack of teaching tools and equipment.

15.6.2 Strategies

Interventions to improve education services in Nyandarua are either on the supply side or on the demand side. Supply-side interventions aim to raise student achievements by targeting infrastructure or organizational deficiencies.

15.6.2.1 Improve the quality of education in the County

Improving the quality of education in the county is key to transforming the lives of Nyandarua residence and will be achieved through the following interventions.

i. Recruitment of Qualified Staff

This is needed in order to decrease the teacher-student ratios in Nyandarua schools. Additionally, trained teachers will be able to provide better quality education for the students in Nyandarua at all levels of learning. The plan has proposed an addition of 99 more VTC tutors and 402 teachers for ECD facilities.

ii. Provision of Adequate Teaching Facilities

This will involve providing school materials which support the learning process and improve teaching quality. They include furniture, flip charts, textbooks and computers. This is of particular importance in

polytechnics where learning is largely hands-on and dependent on the adequacy of facilities in respect to quality and quantity.

iii. Improving Physical Conditions of Existing Schools

At the very minimum, an effective school facility should provide a physical environment that is comfortable, secure, accessible, well illuminated, well ventilated and aesthetically pleasing. Moreover, the facility should have adequate infrastructure for water supply and sanitation, electricity, fire suppression and information technology as well as facilities for outdoor learning, playgrounds and athletic fields. Furthermore, the needs of children with disabilities must be incorporated into the planning and design of schools to improve the overall 'place experience' for both students and educators.

iv. Encouraging Participatory/Community Management

Community management approaches may either be bottom-up or top down. Bottom-up approaches help to raise awareness of community needs for quality education services among actors whereas top-down approaches aid in channeling or optimizing resource deployment to the lowest level. Examples of participatory management approaches include Parent Teacher Associations (PTAs) and parent committees among others.

15.6.2.2 Improve access and quality of Tertiary Education

Tertiary education is vital in developing skilled labour force. In order to improve access to tertiary education the plan has proposed the following interventions.

v. Enhance the adoption of the reviewed curriculum (NVCET) in all the Vocational Training Centres.

Out of the 15 operational VTC's only seven have adopted the new curriculum, which offers entrepreneurial, and ICT courses. The plan therefore, proposes that the County Government should fast-track the full adoption of the new curriculum to the remaining eight Vocational Training Centres. This will ensure standardized tertiary education system in the entire County. In addition, the new curriculum will ensure that the youth in the County are equipped with modern skills and knowledge, which are compatible with job market.

vi. Fast track the establishment of modern garage at Olkalou VTC

The plan recognizes the need for a robust automotive sub-sector. Therefore, an automotive garage has been proposed in Olkalou VTC to equip students with necessary skills in order to respond to the current and anticipated needs in the private and public sector such as agriculture mechanization.

vii. Construction of hostels for the vocational Training Centres.

Majority of Nyandarua residents travel a long distance to access tertiary education. Construction of adequate hostels for the VTCs will ensure that students are retained in the existing facilities. Therefore, ensuring that students focus on their studies.

viii. Establish a training college for ECDE.

The plan acknowledges the importance of ECD education. The analysis established that the county requires additional 425 ECDE facilities by 2030 (see table 9-13). These facilities will require approximately 850 qualified teaching staff; therefore, justifying the need for the construction of the ECDE training college.

ix. Refurbish AHITI facility to reestablish its functionality

The plan proposes for the refurbishment of the Animal and Health Industrial Training Institute in Olkalou in order to equip the population with proper animal husbandry techniques.

x. Giving Incentives to students

Incentives for students aim at changing behavior which in turn optimizes the utilization of education services. Examples of incentives are merit-based scholarships, subsidized examination fees, free feeding programmes as well bursaries for students. The overall achievement of this programme will be the reduction in the drop-out rate in the county. In addition, the County should establish an internship/mentorship programme for gifted children to acquire skills, training and certification.

15.7 Healthcare

15.7.1 Restatement of Issues

From the analysis and stakeholder consultations, the challenges which arose in respect to health were inadequacy of health facilities, shortage of personnel, equipment and medicinal drugs. It was also noted that most healthcare facilities lack sufficient supporting infrastructure such as water supply and access roads.

15.7.2 Strategies

15.7.2.1 Increasing access to quality health Services

A healthy society is a wealthy society. The plan has proposed the following interventions to improve the access to quality health care services in Nyandarua County.

- Provision of adequate Health Facilities

Health facilities gaps analysis identified need for one level 5 (county referral) hospital, three level 4/county hospitals, one health centres (level 3), 11 dispensaries (level 2) and 51 community health units (level 1). The Plan has proposed the upgrading of JM Kariuki Memorial Hospital to a level 5. In an effort

to ensure every sub-county has a level 4 hospital, the following Health Centres have been upgraded to Sub-County Hospital, Manunga, Ndaragwa, bamboo, Mirangine and Ngano Health Centres. In addition, Shamata Dispensary has been proposed to be upgraded to a Health Centre (see map 15-1)

- Staff Recruitment and Training

There is need for more medical staff in county health facilities in order to bring the staff-patient ratios closer to the standard i.e. 23:10,000 from the current 11:10,000. Moreover, high quality pre-service training is needed to enhance competence of the medical personnel in Nyandarua. Systems should also be implemented to identify skills gaps to be filled through in-service training as well as facilitating staff access to new technical knowledge through information resources and learning events.

- Technology Development

The county government should identify the tools, equipment and materials needed for effective service provision in every level of hospital. The inventory of existing facilities will then be weighed against recommended standards for the establishment of gaps. This will then inform initiatives for provision of equipment in all county health facilities.

15.7.2.2 Provision of adequate support infrastructure and facilities

- Provision of adequate water and electricity

It was noted during analysis that many health facilities in the county had inadequate water supply, electricity and access. These facilities are essential for the efficient running of the institutions and must be adequately provided for. In addition, health facilities should be designed and built to promote wellness as opposed to only treating diseases. They should not only be able to cater to the patients' needs but also be functional and attractive.

15.7.3 Proposed Projects and Programmes; Health

The following projects and programmes have been proposed in order to improve service delivery in respect to healthcare in Nyandarua:

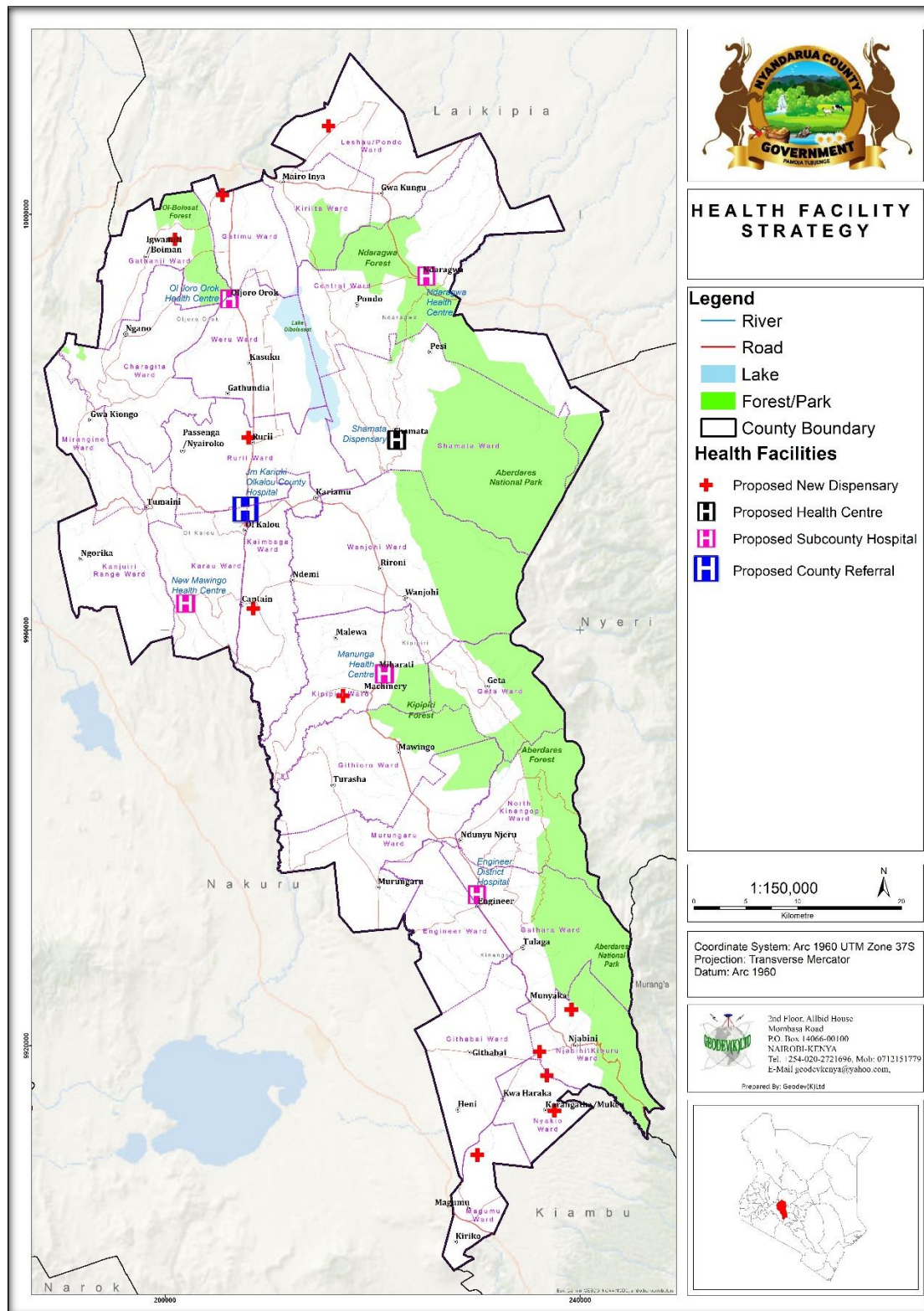
1. Construction of 3 health centres (level 3), 37 dispensaries (level 2) and 109 community health units (level 1) as per the need's assessment.
2. Provide an ambulance for each ward.
3. Develop and implement a Health Management Information System in health facilities to track distribution and abuse.
4. The County Government to undertake equipment needs assessment in county health facilities and provide accordingly.
5. Adoption of curative and preventive approaches in county health facilities.

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6. The County Government to formulate a county health policy guided by needs assessment to provide targeted medical care.
7. The County Government to partner with the National Government, NGOs and other development partners in the provision of health services.

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Map 15-6: Health Strategy



15.8 Recreational and Community Facilities

15.8.1 Restatement of Issues

Recreational facilities offer an avenue for relaxation and break from routine and include forests and nature conservation areas, water masses, open spaces, playgrounds, parks, stadia, and community facilities such as libraries and social halls. These facilities are deficient in Nyandarua County, hence this strategy proposes ways in which this situation may be improved.

15.8.2 Strategies

- Gazettement of Nature Conservation Areas

This is crucial in order to preserve these areas in their natural condition. Human settlement encroachment on natural resources such as forests, lakes and rivers is a constant threat to the longevity of these resources. Human activities and the extent to which these resources are to be utilized must therefore be regulated by law in order to maintain them in usable conditions.

- Enforcement of Environmental Conservation Laws

Adherence to riparian reserves, buffer zones and enforcement of EMCA and other regulations which guide the use of rivers, lakes, forests, wetlands, hilltops as well as preservation of biodiversity is crucial to deter activities that adversely interfere with recreational assets in the county.

- Provision of Recreational Facilities in Urban Areas

Recreational facilities in urban areas include libraries, social halls, public playgrounds and parks. Provision of these facilities is demand driven and are to be put up in urban centres which are large enough to support them. They are therefore proposed in the designated urban centres of the county as per the hierarchy of service centres.

15.8.3 Proposed Projects and Programmes; Recreational and Community Facilities

The following proposals have been made in respect to recreational and community facilities in Nyandarua:

- Gazettement of forests, lakes, wetlands and hilltops for protection, conservation and enhanced recreational activities.
- Appropriate tree planting programme around Lake Ol'bolossat and the existing forests.
- Construction of Olkalou stadium to national status
- Construct stadia in all sub counties.
- Upgrading of Ndaragwa, Oljoro-Orok and Engineer playgrounds to stadia.
- Provision of a stadium in Miharati and public playground in Mairo Inya.

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- Construction of a County Cultural Centre in Ol'kalou with artifacts and historical manuals preserved, conference hall, accommodation facilities, museum and ICT Centre
- Provision of community multipurpose halls/centers per sub-county
- Construction of a youth centre and a community library in every ward
- To create a sports fund to support and sustain sports talent.
- Establish high altitude athletics training academies e.g. in Geta

16 INTEGRATING TRANSPORT

16.1 Overview

Integration of transport refers to the organizational process through which the planning and other system elements of transportation are associated regardless of the mode, providers and institutions with the aim of increased economic and social benefits.

An integrated transport system works in complementarity and merges seamlessly with other land uses, thus increasing the work efficiency of the various land use elements. Integration is done at three levels i.e. physical, operational and managerial and involves three major interest groups: the providers of public transport, users of public transport and the regulating authorities/governments.

An integrated transport system should provide enough transportation choices and enable a sustainable economy while supporting compact urban areas.

16.2 Restatement of Issues

Inefficiency in transportation is the main challenge in Nyandarua. This is contributed to by several factors namely poor road surface conditions, limited modal choice and poor inter-linkage of transportation modes, inadequacy of public transport and the lack of access roads in some areas of the County. Due to these constraints, major economic activities such as trade, tourism and industry are adversely affected causing a lull in the county's economic development.

16.3 Strategies

16.3.1 Road Upgrading and Maintenance

Upgrading of roads will make travel more reliable, make it easier for residents to go to work and school and ensure businesses will continue to prosper by fostering access to more workers and markets. Therefore, facilitating ease of mobility within Nyandarua and improving its connectivity to other counties will boost economic growth. Nevertheless, in order to realize this, the upgraded roads must be regularly maintained and kept in a state of good repair. This will ensure that road infrastructure is always in safe and functional conditions. Notably, only 5.4% of the roads in Nyandarua are paved.

It is proposed that all roads of class A to D i.e., arterial and collector roads be upgraded to bituminous standards while local roads i.e., class E, F and G be upgraded to gravel standards.

16.3.2 Extending the Road Network to Inaccessible Areas

Roads in the County form the foundation of the transportation network. This underpins the need to invest in roads which will not only increase local and regional connectivity but will also improve the movement of goods. During analysis, some parts of Nyandarua were identified as being inaccessible by road. These

include Gachua in Githioro and parts of Central Ward in Ndaragwa Sub County. These areas need new roads opened up for easy access.

16.3.3 Promoting Demand-Driven Public Transport

The cost-effectiveness of transit routes is generally a factor of nearby land use. Public transport routes exist in areas where the communities connected are large enough to generate adequate demand. Investment in public transport should therefore focus on high ridership routes i.e., those connecting major urban centres.

This notwithstanding, sparsely populated areas should also receive services but at a level commensurate with the demand. This calls for the need to develop measurable guidelines to monitor transit service performance in these areas so as to clarify the conditions under which different levels of transit will be provided.

16.3.4 Upgrading Transport Terminals

A transport terminal refers to any location where passengers and freight either originate, terminate or are handled during the transportation process. They may be points of interchange within the same mode or points of transfer between modes. Terminals are essential links in transportation chains in that all spatial flows, excepting personal vehicular and pedestrian trips involve movement between terminals.

In order to function adequately, they require specific facilities such as waiting areas, ticket counters, lavatories and food services among others. Nyandarua has 22 terminals though only 9 are fully functional. Moreover, 6 of the terminals are earthen. There is need to upgrade these terminals and to provide necessary infrastructure for smooth movement and accessibility in the county.

16.3.5 Promoting a Multi-Modal Transportation System

A transportation mode may be defined as a type of travel. A multi-modal transport system is therefore a system which can accommodate more than one mode of transport. This concept should be promoted both at the regional and urban level for the ferrying of both passengers and goods. For instance, the use of road, rail and air should be promoted at the regional scale whereas urban streets should be able to support public transport, pedestrians, bicycles as well as private vehicles. Thus, a multi-modal system accommodates more trips by more people but within the same space; making transit of goods and people faster and also saving on costs.

The transport system in Nyandarua is predominantly unimodal i.e., road transport. The Gilgil-Olkalou-Nyahururu railway is out of use whereas the Oljoro-Orok Airstrip is neglected and inadequately serviced. These facilities should be renovated to usable standards.

16.3.6 Inter-Agency Coordination and Partnership

The complexities and shared responsibilities of regional transportation require coordinated effort from many stakeholders including governments (national and county), the private sector, community organizations and residents. This coordination is essential in making investment and management decisions in order to ensure optimal performance of the transportation system as well as user satisfaction.

16.3.7 Legislative and Regulatory Support

Policies should be made which promote efficient transportation. These include regulation of fares and freight charges among other policies that encourage the use of a particular mode/means of transport either for passengers or goods. Also, regulations should cater for the convenience of all users, regardless of physical or social condition. Notably, persons living with disabilities should be given particular consideration in transportation policies especially in urban areas.

16.3.8 Supporting use of Non-Motorized Transport (NMT) in Urban Areas

The urban population in Kenya is growing at a rate of 4.24% annually (World Bank, 2016). Main towns such as Olkalou, Engineer, Njabini and Mairo-Inya are expected to be more populous by 2026 thus increasing the likelihood of traffic congestion and delays. Integrating NMT i.e. pedestrianization and cycling with transit will largely facilitate ease of mobility and traffic flow in these towns. Moreover, NMT is low cost, energy and space efficient making it a more desirable means of transport in towns.

16.3.9 Development of Transportation Corridors

In order to enhance accessibility in Nyandarua, there is need to establish new transportation corridors aside from the current one running through Gilgil-Olkalou-Nyahururu; which will be promoted as the super corridor. This is because it connects Olkalou, the county headquarters, to Nakuru and Laikipia Counties.

The plan has created a second super-corridor running from Mang'u (in Kiambu County)-Njabini-Engineer-Machinery-Rironi-Ndaragwa-Nyeri to enhance accessibility in the eastern parts of the county. All roads which connect Nyandarua to other counties directly will in turn be developed as main corridors. These are Dundori-Olkalou-Miharati-Njabini, Gwa Kung'u-Nanyuki, Dundori-Nyahururu and Ndunyu Njeru-Naivasha corridors. Sub-corridors will then link the main urban centres within the county including Njabini-Magumu, Wanjohi-Rurii and Engineer-Oleriondo.

16.4 Proposed Projects and Programmes; Transportation

The following proposals have been made in order to integrate transportation in Nyandarua:

- Upgrade all sections of Mang'u -Njabini-Engineer-Machinery-Rironi-Ndaragwa-Nyeri road to bitumen standards in order to perform a national function.
- Tarmacking of the following roads:

Table 16-1: Roads Proposed for Tarmacking

Road Name	Class	Length
Charagita- Sibilwet- Nyahururu	C486	16.8849
Engineer- Kamba- Kinja- Gathara- Tulaga	D1318	22.3767
Gathara- Kianguyu- Mberekenya	D1320	19.7276
Gichungo- Olkalou Sec Sch	D1325	1.4799
Kabazi- Kwa Kiongo- Tumaini- Mawingu- Gilgil	C483	34.502
Kamahia- Machinery	C493	16.8607
Karunga- Karuri- Jura- Murungaru	C488	22.5328
Karunga- Langa Langa- Munyugu	C492	13.2893
Kiamariga- Uruku- Kihara- Kilimanjaro- Shamata- Kaka	C484	40.6319
Maili Kumi- Ndaragwa- Mutara	D1323	17.0388
Mairo Inya- Kalamton- Leshau	D1319	21.7684
Mairo Inya- Ol Borosat- Gichungo- Kariamu	C485	24.3701
Maraigushu- Githabai- Njabini	C489	10.2855
Mawingu- Ol Loliondo- Kagaa- Captain- Wanjohi- Geta- Ndinda- Kirima- C167 Nai	C482	71.3786
Mawingu- Karunga- Kaimbaga- Kamande	C491	20.2284
Mawingu Rd_1	D1335	0.0148
Mirangini- Chagarita- Dundori- Gwa Kiongo- Ol Joro Orok	C487	11.9604
Mirangini- Ruiru- Ngano- Ngatha- Gathanji- Gatimu	D1317	24.3028
Munyeki- Olkalou	D1327	0.7228
Ol Joro Orok- Weru- Rurii	D1316	26.7074
Ol Kalou- Munyeki- Gichungo	D1332	0.1821
Ol Kalou- Munyeki 1	D1330	0.2143
Ol Kalou- Munyeki 2	D1331	0.2107
Ol Kalou- Munyeki 3	D1333	0.0959
Ol Kalou- Munyeki 4	D1334	0.0546
Olkalau- Olkalau Pri Sch 1	D1328	0.3768

Olkalou- Olkalou Northern	D1329	0.2178
Olkalou- Olkalou Pri Sch- Munyeki	D1326	0.8457
Subuku- Shamata- Kaka	D1322	11.7866
Wanjohi- Kiambogo- Geta	D1321	18.6162

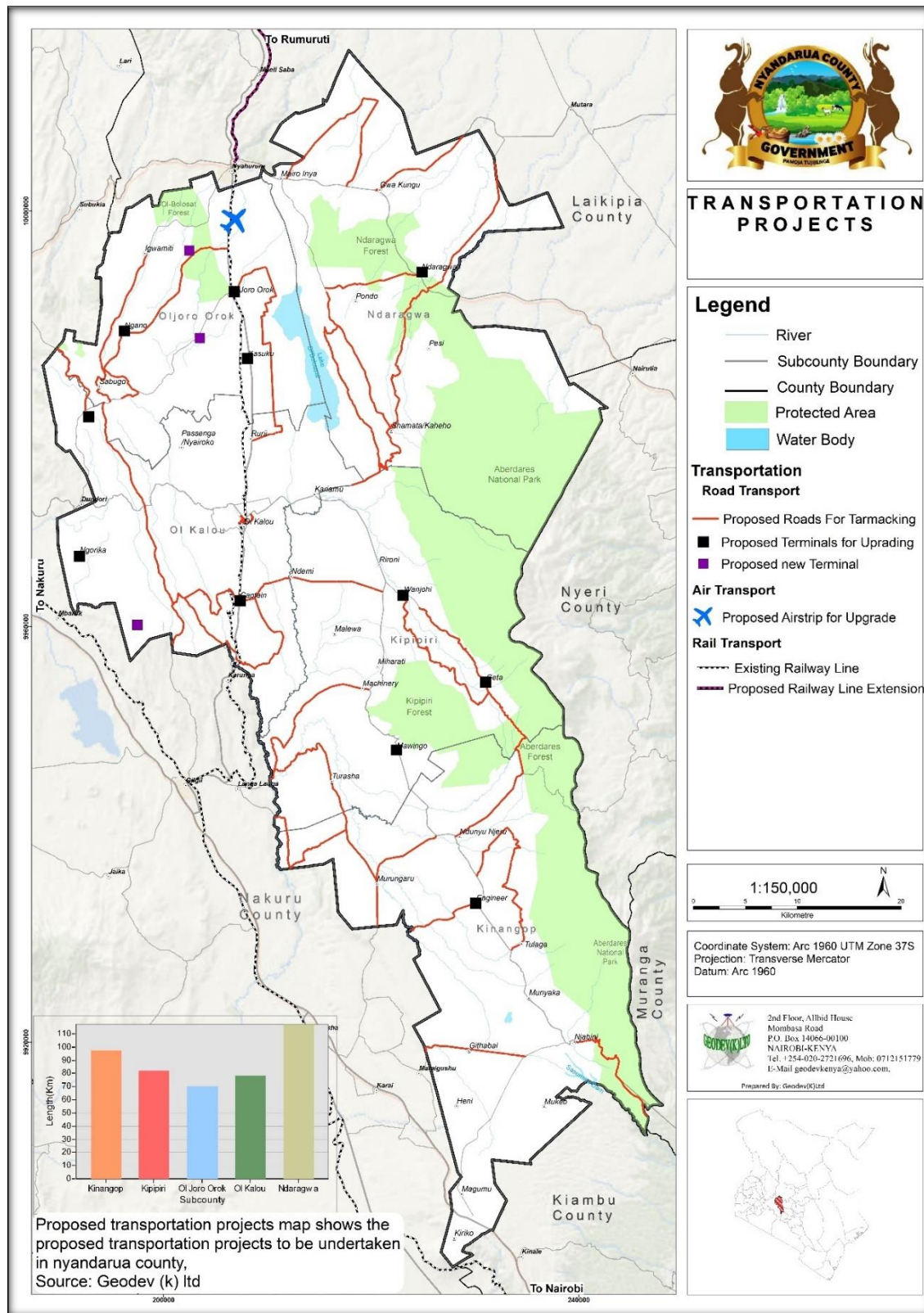
Source: Consultant's Analysis

The following roads are also proposed for upgrading as per stakeholder consultations:

- a. Olkalou-Ndunyu Njeru-Nyeri
- b. Njabini-Murang'a
- c. Gwa Kungu-Nanyuki
- d. Kariamu- Ndaragwa
- e. Murungaru-Ririchua-Gilgil
- f. Mairoinya-Ndongine-Rumuruti
- g. Kasuku- Olbolossat
- h. Kasuku- Kirimanyai- Charagita
- i. Captain-Ndemi-Muthangari
- j. Kari-Ngano-Charagita
- k. Kipipiri-Gilgil
- l. Wanjohi-OL'bolossat Road
- m. Charagita- Olkalou
- n. Ndunyu Njeru road (C481) off Olkalou-Njabini road (B21).
- o. Mirangine road off Olkalou-Dundori road (B21).
- p. All roads linking Happy Valley Homes: Rironi-Kirima Rd, Wanjohi-Satima Road, Ndunyu-Njeru-Kahuruko-Geta Rd,
- c) Ensure proper maintenance of all tarmacked roads in the county
- d) Rehabilitate the existing meter-gauge railway (Gilgil-Olkalou-Nyahururu)
- e) Renovation of the old railway stations in Olkalou and Oljoro-Orok to enable handling and storage of goods
- f) Upgrading of Oljoro-Orok airstrip to handle commercial flights hence enabling the exploitation of local tourism as well as ease exportation of perishable horticultural produce.
- g) Opening up inaccessible areas e.g., Geta, Githioro and Central wards.
- h) Using the cadastral layer, identify all encroached roads sections, prepare a data base for the same and commence the process of reclamation.
- i) Development and upgrading of termini:
 - Upgrading of the following: Ngorika, Mirangine, Oljoro-Orok, Kasuku, Ndaragwa, Ndemi, Captain, Geta, Mawingu, Engineer, Ngano and Wanjohi.
 - Development of new termini: Kangui, Kanjuiri, and Gathanji.
- j) Partnerships between County Government and KURA, KERRA, Kenya Railways, KWS, CBOs and other development partners in road upgrading and maintenance.
- k) Develop a multi-modal transport master plan for Nyandarua County.

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Map 16-1: Proposed Roads project



17 MANAGING HUMAN SETTLEMENTS

17.1 Overview

In order to achieve the vision of the plan and the overarching objective in respect to human settlements, that is, to facilitate the development of a well-balanced system of human settlements, it is desirable that they be sustainably managed so as to optimize their potential. Management of settlements consists of establishing the priority centres where growth should be directed, and coming up with ways to exploit them as instruments of development in Nyandarua. Also, it means setting up a hierarchy of service centres, such that facilities and services which the populace is in need of are proximate and easily accessible.

17.2 Restatement of Issues

By managing human settlements, the plan aims to address the key challenges that urban areas in Nyandarua are grappling with. These challenges include but are not limited to: unplanned urbanization, insufficient infrastructure development, non-existence of urban management structures (town and municipal boards), rural-urban migration and the emergence of informal settlements.

The strategy then aspires to establish a human settlements model that will facilitate integrated development in the county; focusing on the centres not only as isolated entities/organs but also as integral parts of an overall development system.

17.3 Strategies

17.3.1 Selection of Service Centres

As stated in the analysis section, selection of service centres is based on the central-place theory which is based on the assumption that consumers travel to the nearest place so they can obtain the commodities/services they need. The centres in Nyandarua have therefore been ranked based on their current and anticipated future functions into four categories: urban, rural, market and local centres in descending order.

In light of the above discussion, the selection of service centres in the county and the logic for the selection are briefly discussed below.

1. Proposed Urban Centres

These are the highest category of planned service centres. They are designated to become foci for commercial, industrial, administrative, recreational and social services needed by the rural population. They are desired to serve a rural hinterland of 100,000 to 150,000 people with a residential population in excess of 5,000. Recognizing the foregoing assessments, the plan proposes seven designated urban centres namely Olkalou, Engineer, Oljoro-Orok, Ndaragwa, Miharati, Njabini and Mairo Inya.

2. Proposed Rural Centres

This is the next highest level of designated service centres. Rural centres are envisaged to serve a population of approximately 40,000 people with a residential population of 2,000 to 10,000 inhabitants. Rural centres will be of particular importance in improving the standard of amenity in rural areas and are especially recommended for agro-based industries. Facilities to be obtained therein include a secondary school, health centre with maternity as well as banking facilities. The following nine centres are recommended as designated rural centres; Rurii, Wanjohi, Mawingu, Magumu, Ndunyu Njeru, Gwa Kung'u, Kwa Haraka and Kasuku.

3. Proposed Market Centres

These proposed centres have been designated to serve a rural population of approximately 15,000 people in the hinterland. They will host commercial and local administrative services and are expected to have a resident population of below 2,000 persons. The plan proposes all ward headquarters as market centres except those that also serve as Sub County headquarters and those which are designated as rural centres. They are Gwa Kiongo, Captain, Ngorika, Pondo, Shamata, Geta, Karangatha, Githabai, Murungaru, Boiman Charagita, Rironi and Ngano.

4. Proposed Local Centres

These centres represent the lowest level of service centres and are to serve the local needs of the people within walking distance of the centre (5-8 kilometres). They are planned to serve a catchment population of approximately 5,000 people. The designated local centres are shown in the table below.

The table below shows the proposed hierarchy of settlements in Nyandarua.

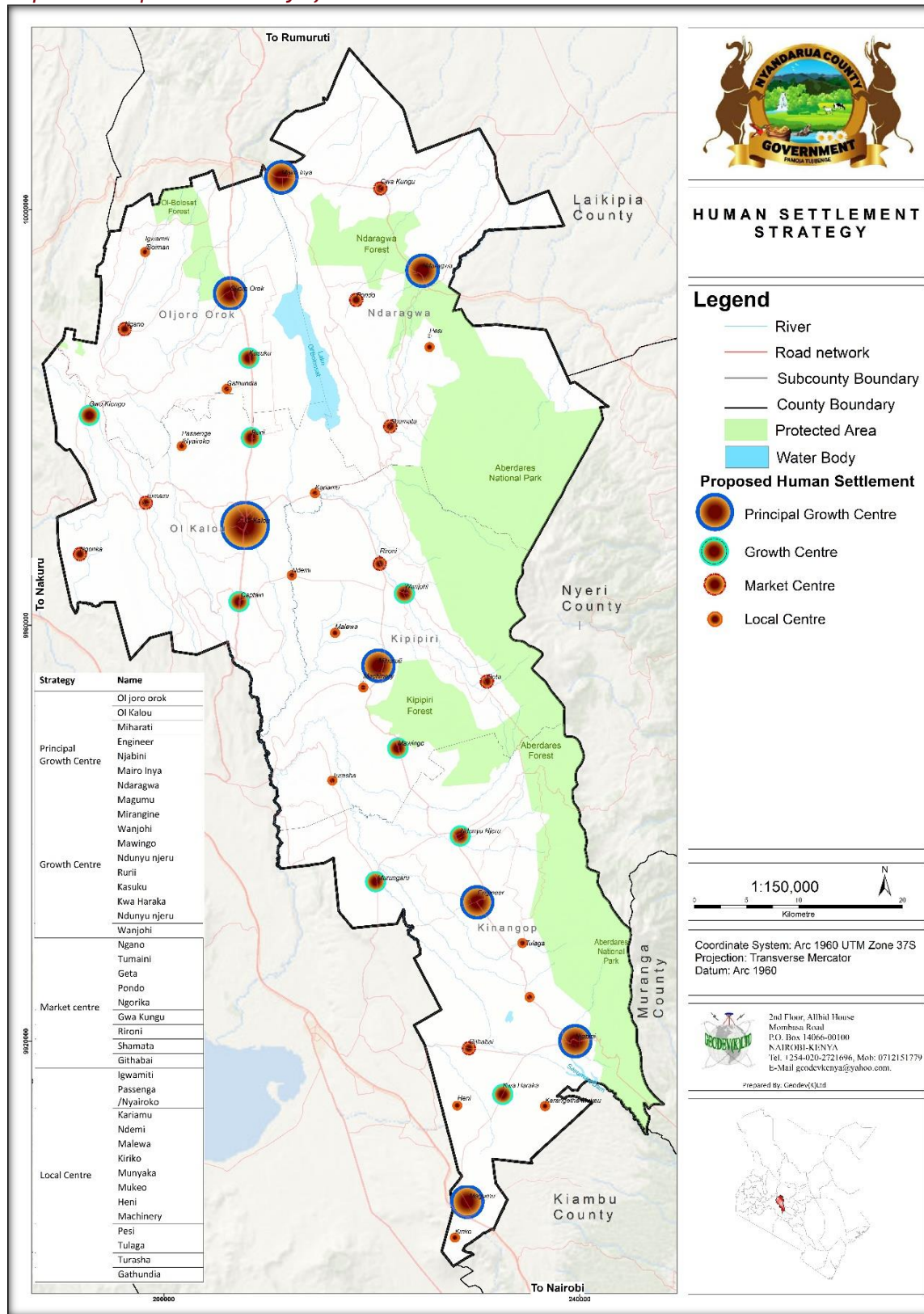
Table 17-1: Proposed Human Settlement Hierarchy

Proposed Service Centre	Name of the Centre
Urban Centres	Olkalou, Engineer, Oljoro-Orok, Ndaragwa, Miharati, Njabini, Mairo Inya
Rural Centres	Rurii, Wanjohi, Mawingu, Magumu, Ndunyu Njeru, Gwa Kung'u, Kwa Haraka and Kasuku
Market Centres	Gwa Kiongo, Captain, Ngorika, Pondo, Shamata, Geta, Karangatha, Githabai, Murungaru, Boiman, Charagita, Rironi, Tumaini, Ngano
Local Centres	Heni, Gichungo, Igwamiti, Machinery, Kimathi, Kiriko, Gathundia, Mukeu, Munyaka, Ndemi, Kariamu, Passenga (Nyairoko), Pesi (Kambaa), Tulaga, Malewa, Turasha, Mirangine

Source: Consultant's Analysis

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Map 17-1: Proposed Hierarchy of Service Centres



Conferment of Municipality Status

In cognizance of the objectives of the Urban Areas and Cities Act, namely to classify all urban areas and provide a framework for their governance, the plan proposes several centres for the conferment of either municipal or town status.

The plan proposes for conferment of municipality status, all other centres proposed as urban centres including all the Sub County headquarters namely Engineer, Oljoro-Orok, Ndaragwa, Miharati, Njabini and Mairo Inya. The projected population of these respective centres meets the threshold stipulated in the UACA. Moreover, they have appropriate infrastructure such as tarmacked roads, banking facilities, wholesale and retail services among others which are indicators of financial viability and revenue generation potential.

The county government should promote development of these six (6) proposed towns so that they can realize their maximum potential. This will entail among others: allocation of requisite resources, infrastructure provision, and political goodwill so as to attract capital investments therein.

17.3.2 Selection of Growth Centres

These are growth poles which aim at inducing growth functions in a few strategically selected larger centres. They have potential for one or more specialized growth functions and can achieve major redistribution of the population. Growth centres are potential centres for urban and industrial growth.

This strategy will be achieved by fast-tracking the development of selected urban centres by harnessing their development potential. Its key objective is to create favorable opportunities for commercial and industrial developers to activate development in a few smaller towns. Also, the strategy endeavors to tap economic development potential in hitherto neglected areas.

The growth centres must be integrated with rural development policies by promoting agro-processing industries rather than capital-intensive manufacturing; functioning as an alternative destination for rural migrants to the primate centres and strengthening the service hierarchies in rural regions.

In view of the foregoing, the plan proactively proposes the following, on the basis of their strategic potential, to be designated and planned as the growth centres:

- *Industrial Towns*

The proposal of industrial towns is done leveraging on the competitive advantages of the respective towns such as accessibility, vast agricultural hinterland and availability of raw materials. In light of this, the plan proposes Njabini and Ndaragwa to be developed as industrial towns.

Njabini is designated as a growth centre on account of its already existing broad infrastructural base required in attracting industrial development. Notably, it is connected by the Olkalou-Njabini road (B21), is proximal to the Aberdares water tower and has sufficient power supply. It is also located within Potato

and Dairy Farming Promotion Areas (refer to the Structure Plan) hence viability of potato and dairy processing industries. Ndaragwa on the other hand is an administrative centre; the headquarters of Ndaragwa Sub County. In addition, it has special potential in respect to fruits and beef cattle production (refer to the Structure Plan), and is well serviced by the Nyahururu-Nyeri road (B20). Other centres that have future development potential to be promoted as gateway towns include: Murungaru and Oleoliendo.

These advantages notwithstanding, the towns will require massive infrastructure investments to achieve a level of self-sustaining growth and in turn optimize their envisaged functions.

- Gateway Town

Also referred to as border towns, these will act as economic bridges linking Nyandarua to the neighboring counties. Premised on stakeholders' consultations and study evaluation, the plan proposes Magumu, Mairo-Inya and Dundori (Gwa Kiongo) Centres as gateway towns. Magumu is the portal to Nyandarua County from Nairobi and Kiambu Counties through the Nairobi-Nakuru Highway. It is approximately 62 kilometres from Nairobi Central Business District.

Additionally, the town is economically and financially viable owing to numerous economic opportunities; activities such as large and small-scale sawmilling; and her strategic location proximate to the nation's capital. This also qualifies it to be a commercial hub of the county.

Mairo-Inya is located at the border of Laikipia and Nyandarua County. It is well connected with Nyahururu-Ndaragwa-Nyeri Road (B20). This therefore qualifies it as a border town connecting Nyandarua and Laikipia County. On the other hand, Gwa Kiongo centre is located on the western side of Nyandarua, that is, towards Nakuru County. It is equally well served with Njabini-Olkalou-Nakuru Road (B21).

Nevertheless, urban interventions to enhance economic performance of the proposed gateway towns are needed. These should especially focus on providing adequate infrastructure and service facilities.

Notably, all gateway towns shall be planned and developed taking into consideration the existing situation and development proposals across the borders.

- Eco and Resort Towns

These are towns with tourism potential that can be leveraged on to spur their economic status. Further, these towns can be classified as Resort Towns because of their functions. Resort towns typically experience an on-season where the town is bustling with tourists and workers, and an off-season where the town is populated only by a small amount of local year-round residents.

From the above explanation, this plan proposes Geta and Kasuku to be planned and developed as Eco and Resort Towns respectively. Geta centre is found within the Aberdare Ranges which is richly endowed with flora and fauna, recreational activities including mountain climbing and nature trails among other

touristic assets. Due to the existence of wildlife and rich biodiversity, the centre can also be a hub for agriculture-based research and tourism.

Fundamentally, it is important to note that eco-town developers should use the measures of ecological footprint and carbon dioxide emissions to assist in designing the eco-town and as a monitoring criterion.

On the other hand, Kasuku is ideal for designation as a resort town because of its proximity to Lake Ol'bolossat. Moreover, the land within the centre is already subdivided and is therefore suitable for putting up hospitality facilities as opposed to agriculture. Notwithstanding that Kasuku is well serviced by the Gilgil-Ol Kalou-Nyahururu Road (Class A4), support facilities including tourist accommodation, transport, travel agents, licensed tourist guides, food and beverages, souvenir/curio shops among others should be promoted.

▪ **Knowledge Town**

Ideally, the knowledge town should comprise of agricultural research centres, state-of-the art schools and universities, management institutes, agro-based health centres and other learning institutions.

In line with this, the plan qualifies Oljoro Orok centre to be planned and promoted as a knowledge town. This is because it has research and training institutions such as Kenya Agriculture and Livestock Research Organization (KALRO) and Animal Health and Industry Training Institute (AHITI). In addition, the centre is also connected with Gilgil-Ol Kalou-Nyahururu Road (Class A4). Further, the existence of the airstrip at Gatimu makes it especially suited for the proposed function. The concept of knowledge town has worked well in Gwachon Knowledge Information Centre in Korea.

It is also important to note that Murungaru centre has the potential for offering hospitality services owing to its proximity to Naivasha which hosts Lake Naivasha. Due to its hospitality potential, Meetings, Incentives, Conferencing and Exhibitions (MICE) can be successfully promoted.

The table below shows the selected growth centres, their qualifying characteristics and envisaged functions.

Table 17-2: Proposed Growth Centres in Nyandarua

Growth Centre	Qualifying Characteristics	Envisaged Function
Njabini	<ul style="list-style-type: none"> ▪ Linkage by Olkalou-Njabini (B21) road ▪ Availability of power supply ▪ Close to the Aberdare water tower 	Industrial town
Ndaragwa	<ul style="list-style-type: none"> ▪ Administrative centre; Ndaragwa Sub County headquarters ▪ Rich hinterland with agricultural potential; ranching ▪ Linkage by Nyahururu-Nyeri (B20) road 	Industrial Town
Magumu	<ul style="list-style-type: none"> ▪ Linkage by Nairobi-Nakuru (A8) highway ▪ Strategic location in close proximity to the capital; Nairobi- 62 km away ▪ Commercial hub; large scale and small scale saw milling 	Gateway Town

Mairo-Inya	<ul style="list-style-type: none"> Located at the border of Laikipia and Nyandarua County It is well connected with Nyahururu-Ndaragwa-Nyeri Road (B20) 	
Gwa Kiongo	<ul style="list-style-type: none"> Located at the western periphery of Nyandarua i.e. towards Nakuru County Well served with Njabini-Olkalou-Nakuru Road (B21) 	
Geta	<ul style="list-style-type: none"> Found within Aberdare Ranges Surrounding area is rich in flora and fauna Hub for agriculture-based research and tourism 	Eco Town
Kasuku	<ul style="list-style-type: none"> Proximity to L. Ol'bolossat Land is already subdivided into small units Located along A4 Road 	Resort Town
Oljoro Orok	<ul style="list-style-type: none"> Existence of KALRO and AHITI Existence of the Gatimu airstrip Located along A4 Road Sub County Headquarters 	Knowledge Town

Source: Consultant's Analysis

17.3.3 Adopting Smart Growth

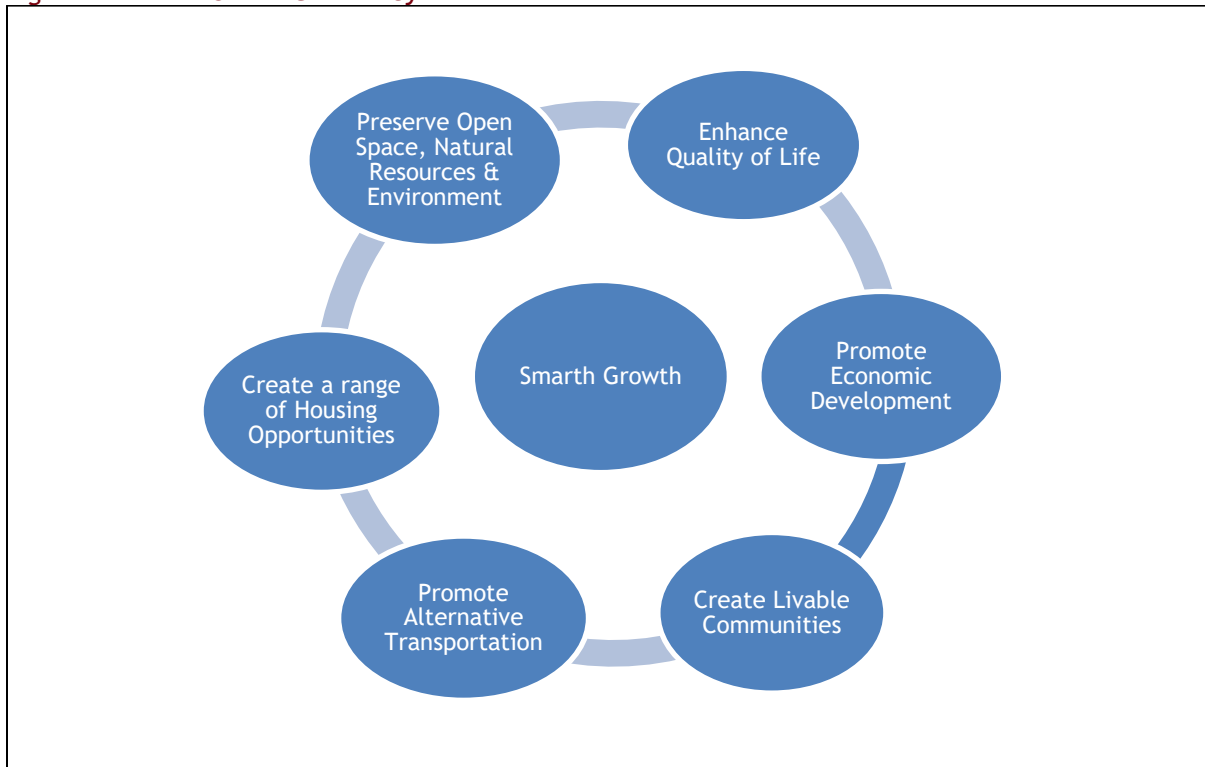
This is a planning strategy that has been defined by The American Planning Association (2002) as “the planning, design, development and revitalization of cities, towns, suburbs and rural areas in order to create and promote social equity, a sense of place and community, and to preserve natural as well as cultural resources.” It endeavors to achieve five key goals which include: preservation of public goods, minimization of adverse land use interactions and maximization of positive ones, minimization of public fiscal costs, maximization of social equity and very broadly, maximization of quality life.

To control urban sprawl in Nyandarua, this strategy aims at operationalizing the following smart growth tenets:

- Mixed land uses which help in saving agricultural land,
- Taking advantage of compact building designs,
- Creating a range of affordable and adequate housing opportunities and choices,
- Providing a variety of transportation choices; multi-modal,
- Preserving open space, farmland, natural beauty, and critical environmental areas,
- Creating walkable neighborhoods in urban areas, and
- Encouraging community and stakeholder collaboration in development decisions.

In a nutshell, this strategy will ensure that the existing urban land is used optimally by adapting the aforementioned principles. The Smart Growth cycle for sustainable towns is shown below.

Figure 17-1: The Smart Growth Cycle



Source: <https://www.google.com>

17.3.4 Embracing Urban Containment and Rural Protection

Urban containment and rural protection refer to the principle of encouraging new development to occur within planned and serviced areas of the county. There are multiple and inter-related benefits to upholding the principle of urban containment and rural protection. They include:

- Encouraging mixed-use development whereby homes and jobs are closer, helping cut the number of car trips.
- Maximizing the use of existing infrastructure and minimizing new infrastructure costs.
- Revitalizing decayed parts of some urban centres.
- Improving the viability of transit (public transport) by concentrating development.
- Protecting the environment.
- Promoting economic agglomerations.

The goals of this strategy are twofold; focusing development into growth areas and protecting rural lands. This would be achieved by encouraging infill and redevelopment of existing urban centres, reducing urban sprawl, densification, determination of the urban edges (urban growth limits) and developing policies to protect agricultural land and environmental resources.

17.3.5 Constituting Municipal Boards and Town Committees

Governance has profound implications for urban development as it provides the overarching framework for governing and managing urbanization and distributing its benefits. Urban governance and management are provided for in Article 184 of the Constitution. It is embellished under the Urban Areas and Cities Act, 2011 (Amended, 2019).

The aim of this strategy is to facilitate and contribute towards urban development in the County through the conferment of Municipal and or Town status; establishment of town management committees and municipal/town administrators which will be expected to: - oversee, administer, develop, implement, maintain and control policies, plans, strategies and programmes for service delivery as well as monitoring and evaluation of the activities recommended for the municipalities and towns.

In order to realize this aim and achieve the provisions of the UACA, this plan proposes full operationalization and implementation of the Act. This would culminate in the constitution and institutionalization of municipal board and town committees for Olkalou, Engineer and Mairo Inya municipality and the proposed towns respectively i.e. Njabini, Oljoro-Orok, Ndaragwa and Miharati. The benefits of having these institutions cannot be gainsaid. They will ensure that adequate and appropriate infrastructure and services are provided; and will promote revenue mobilization through pegging financial transfers to the efficiency of service provision by urban and municipal management entities.

17.3.6 Bridging the Gap between Housing Demand and Supply

The study assessed and noted that the housing demand in major urban centres outstrips supply hence deficit in good quality and affordable housing supply. With housing being one of the Jubilee government's 'Big Four Agenda', the plan proposes bridging this gap by: developing a demand-based master plan, promoting public-private partnerships frameworks (e.g., land swap), facilitating swift approvals for development applications, the national and county governments to offer incentives, tax rebates and subsidies to lower construction materials. The government should also revert to the provision of rental housing schemes; and promote the use of locally available building materials.

17.3.7 Revitalizing Rural Development

The overall objective of rural development in Kenya and Nyandarua in particular is the increased productivity of land as the major precursor to all other rural development activities. The strategy aims to address urban-rural disparities, particularly as regards income, and thus to empower the rural economy. This will be done by improving infrastructure including transportation and telecommunications; improvement of agriculture, infrastructure and community facilities, tourism, and human resources in rural areas.

This strategy therefore endeavors to forge a strong interdependence between town and countryside in Nyandarua by promoting inclusive rural-urban linkages to connect local farmers to urban consumers through farmers' markets and cooperatives. Further, it promotes the rural areas as the source of food and raw materials needed by the urban population (which provides a ready market) while simultaneously providing labour for industrial and service activities therein.

Thus, the following are crucial if rural development in Nyandarua is to be revamped:

- i. Increased farm production and provision of support services such as extension to further agriculture,
- ii. Provision of markets, and
- iii. Establishment of agro-processing industries.

It therefore follows that the success of rural development policies and development of urban centres especially in the countryside are dependent on each other. Nevertheless, it must be noted that the development of rural areas is not singularly tied to agricultural activities as is commonly assumed, but is also driven by tourism, light industry and trade among others.

In order to promote rural development in Nyandarua, the plan has delineated four different rural development clusters namely:

- Crop Production Cluster
- Tourism Cluster
- Beef and Fodder Production Cluster
- Cereal Production Cluster

Fundamentally, the clusterization has been undertaken based on factors such as availability of raw materials; availability of markets; accessibility of the cluster zone; availability of the infrastructure including water and power supply; and potentiality of the cluster zone among others.

Cluster I: Crop Production Cluster

This cluster covers parts of Gatimu, Gathanji, Charagita, Mirangine, Kanjuiri Range, Karau, Rurii, Kaimbaga, Weru, Kiriita, Shamata, Central, Wanjohi, Kipipiri, Geta, Githioro, N. Kinangop, Murungaru, Engineer, Githabai, Nyakio and Njabini/Kiburu wards. The key activity that is to be undertaken in this cluster is crop production which is expected to generate income and maximize employment opportunities. Promotion of higher yield agricultural crops will be encouraged for the rural people living in this cluster.

To diversify the rural economic base, the development of economic activities based on value-added agriculture-based activities should be encouraged in the cluster. Development of non-farm employment should, however, proceed in tandem with the modernization of agriculture, including the rationalization of management units and application of modern technology and methods.

Additionally, provision of infrastructure such as roads, electricity, water supply and provision of support services such as extension, market development and farm training will be needed.

Cluster II: Tourism Cluster

This plan endeavors to promote Community Based Tourism Enterprises (CBTEs) which is a new facet of tourism that empowers local residents to take charge in the decision-making process in tourism development. CBTEs enable rural residents to work together with other stakeholders to develop opportunities for employment, participation in planning, conservation and running of enterprises either collectively, or by local individuals or families.

Communities bordering tourist attractions sites such Lake Ol'bolossat, Mau Mau Caves, Aberdare Ranges among others are highly encouraged to participate in promotion of CBTEs.

Cluster III: Beef and Fodder Production Cluster

This cluster covers the north eastern parts of Nyandarua including Leshau/Pondo, Kiriita and Central wards in Ndaragwa Sub County and extends downwards to parts of Kipipiri, Wanjohi, Rurii, Weru, Gatimu and Kaimbaga wards. Fodder bulking will therefore be encouraged in this cluster; noting that it is complimentary to beef cattle farming which will utilize the same feeds.

Cluster IV: Cereal Production Cluster

This cluster covers parts of Murungaru, Githioro, Kipipiri, Kaimbaga and Wanjohi wards. The main cereals proposed for this cluster are wheat and barley. Fodder crops such as oats and Rhodes grass will also be promoted though secondarily.

17.3.8 Integration of Rural and Urban Areas by Providing Requisite Infrastructure

This plan accentuates the need for spatial integration of urban and rural areas to complement and supplement each other. Strengthening urban-rural linkages through provision of integrated transportation and communication system would reduce the rate of unplanned urbanization and uncontrolled development thus improving and shielding the rural economy. This can be successfully realized through provision of quality roads; which would induce efficient trade and movement of goods between rural and urban settlements; and by providing schools, hospitals and vocational training institutions. In addition, all proposed urban centres should be provided with adequate water supply, street and drain cleanliness, sewer systems, proper waste disposal facilities among other facilities required in an urban centre to function effectively and efficiently.

Further, by making the rural areas more attractive, rural to urban migration would decrease and urban areas would be relieved of the corresponding burden of expenditure.

17.4 Possible Models/Patterns of Urban Development in the County

In light of the above analysis and evaluation, this plan promotes two models of urban development in the county that will deliver balanced development between rural and urban areas. These models cannot function in isolation but must work in combination to satisfy the human settlement objective. They include:

- Model of Selective Dispersal.
- Model of Selective Concentration.

17.4.1 Model of Selective Dispersal

There is a principle positing that in any well-developed human settlement pattern, there are fewer larger places than smaller ones in an area and that the larger centres provide a greater number and variety of goods and services than the smaller places. Also, smaller places depend on the next highest level of centres for more specialized services and functions.

The key functions of these centres include the provision of various services such as marketing, education, health, administration, storage and handling and agricultural processing for the hinterland. This model is principally rural development oriented and should form an integrated part of any strategy for accelerated rural development and revitalization because it can play a critical role in the improvement of the quality of life in rural areas. It is also imperative to note that this model is mainly associated with the strategy of selection and development of service centres.

17.4.2 Model of Selective Concentration

This model is basically urban development oriented as it deals with the distribution of major urban and industrial growth functions and as a result of this, the alternative growth pole should therefore be developed to a size sufficient to generate economies of scale. The development of such an urban pattern tends to prevent excessive over urbanization in some few centers and usually results in a more balanced distribution of urban and industrial developments.

There is a common belief that concentration of government investments and industrial activity within certain growth poles will, in the long run, stimulate a higher level of industrial and economic development than if it had been spread over a wider region. Premised on the experience that the prosperity gained in these urban growth poles spreads outwards, this model can be used to promote development in underdeveloped high potential areas in the county.

The model should therefore be encouraged in Nyandarua by allowing the relative predominance of Olkalou to continue and at the same time selecting a small number of strategically located centres which should be developed as alternative growth poles through the development of new productive activities. These are as outlined in the selection of growth poles strategy namely Njabini, Ndaragwa and Magumu.

17.5 Proposed Projects and Programmes

For the effective management of settlements in Nyandarua, the projects and programmes below have been proposed:

1. Fast track 100% issuance of title deeds to colonial villages
2. Conferment of Municipal status to Mairo-Inya and Engineer.
3. Prepare urban development plans for Olkalou, Engineer, Oljoro-Orok, Ndaragwa, Miharati, Njabini & Mairo Inya.
4. Provide adequate basic services in all the urban centres such as water, firefighting equipment, affordable housing, sewer facilities etc.
5. Undertake the assessment and classification of all centres in the county.
6. Institutionalize Olkalou Municipality to become a semi-autonomous institution with established departments, functions, own revenue sources etc.
7. Constitute and institutionalize town committees for Engineer, Njabini, Oljoro Orok, Mairo-Inya, Miharati and Ndaragwa.
8. Survey and issue title deeds to all public land and institutions
9. Formulate a county housing policy.

18 PROTECTING AND CONSERVING THE ENVIRONMENT

18.1 Overview

Amongst the objectives of this plan, is to protect and conserve the environment. This involves sustainable use and management of environmental assets for improved quality of life and more habitable environment. Environmental assets in the county that need conservation include lakes, rivers, forests and catchment areas.

18.2 Restatement of Issues

18.2.1 Encroachment

In the county, encroachments have been observed in catchment areas, riparian areas of Lake Ol'bolosat, forests and river riparian reserves. Effects of encroachment on these environmental assets include pollution, diminishing forest cover, siltation of wetlands and loss of biodiversity. The root cause of encroachment on these assets is weak enforcement of environmental laws.

18.2.2 Pollution

Air and water pollution are dominant in the county. This has brought about effects such as reduced water quality, loss of biodiversity and climate change. The root causes of water pollution include poor farming practices such as unregulated use of pesticides and other farm chemicals. Siltation is also observable if farming is done on steep slopes. Also, washing of clothes, livestock watering and grazing on riparian reserves, waste disposal on wetlands and industrial effluents have been major contributors to water pollution.

Air pollution has majorly been caused by overreliance on wood fuel mainly through charcoal burning, use of firewood and paraffin. Air pollution through agricultural activities comes mainly in the form of ammonia, which enters the air as a gas from heavily fertilized fields adding to the greenhouse effect. Soil contamination, on the other hand, has majorly been caused by excessive use of agro-chemicals.

18.2.3 Loss of Biodiversity

Biodiversity loss has been observed in wetlands majorly Lake Ol'bolosat and the rivers in the county. The major causes include pollution of the wetlands as a result of weak law enforcements and in turn, encroachment on riparian reserves. This has consequently caused loss of plant and animal life through unsustainable human activities.

18.2.4 Diminishing Forest Cover

Forest cover in Nyandarua County has been decreasing gradually and currently stands at 18.4%. Effects associated with diminishing forest covers include desertification and global warming. This results to

reduced discharge from catchments areas leading to water shortages. The root causes of this issue include deforestation and logging as a result of overreliance on wood fuel.

Nearly 97% of the households in Nyandarua County rely on wood fuel as an energy source. This is attributed to high cost of substitute energy, lack of awareness on alternative sources, ease of access /low cost of wood fuel and weak law enforcements in regard to deforestation and logging.

Additionally, the increasing need for land for settlement and agriculture as well as forest fires which have been reported in parts of Geta and Ndaragwa forests have occasioned a drop in the county's forest cover.

18.2.5 Land Degradation

Land degradation in the county has majorly been caused by unsustainable land use practices. These practices include poor solid waste disposal methods, particularly in the urban areas, deforestation, unregulated quarrying as well as poor farming practices such as cultivation on steep slopes which gradually leads to soil erosion and excessive use of chemicals which leads to soil contamination.

Land degradation is greatly known to reduce land productivity and environmental aesthetics.

18.2.6 Human-Wildlife Conflict

Human-wildlife conflicts in and around Lake Ol'bolossat have majorly been caused by lack of a fence to surround the lake. This has in turn resulted in the free movement of hippos into and out of the lake foraging for food thus destroying crops and occasionally injuring and, in some instances, killing people.

Within the Aberdares Ranges, human-wildlife conflicts have also been reported. The root cause for this conflict is poor management/wildlife monitoring by KWS and incomplete fencing which is resultant to inadequate funding.

18.3 Strategies

Environmental strategies aim to address the root causes of identified environmental issues and provide concrete solutions geared towards promoting the right to a clean and healthy environment as well as sustainable development.

18.3.1 Enforcement of Environmental Laws and Regulations

Enforcement is needed in order to protect water bodies, catchments, forests and other environmentally sensitive areas.

The Environmental Management and Coordination Act (EMCA) of 1999, the Water Act No.43 of 2016 provides for the regulation, management and protection of catchments and seeks to ensure quality of water resources through hindering activities with adverse effects. With enforcement of laws, threats

such as encroachment which result to degradation, loss of biodiversity and pollution of these water resources can be prevented.

The Forest Conservation and Management Act, 2016 particularly calls for protection and sustainable forest management through establishment and implementation of various rules and regulations to govern all trade forms in forest produce and rehabilitation, maintenance and protection of forestlands for the benefit of all by ensuring sustainable exploitation, utilization, management and conservation of the environment and natural resources while working to achieve and maintain a tree cover of at least ten per cent of the land area of Kenya .

Moreover, the Forest Management and Conservation Act, section 46, which give rules and regulations regarding quarrying, provides for the assessment of state of environmental compliance of all active and inactive quarries, safety compliance, tax compliance, proper administration and maintenance. It also indicates the mechanisms for rehabilitation and utilization of inactive quarry sites as well as respective penalties for lack of compliance.

With proper enforcement of these regulations, all resources in the environment will be sustainably exploited.

18.3.2 Adoption of Climate-Smart Agriculture (CSA)

Climate-Smart Agriculture is an approach that reorients agricultural systems to effectively support development and ensure food security in a changing climate. CSA has three main objectives: to sustainably increase agricultural productivity and incomes; adapting and building resilience to climate change and reducing greenhouse gas emissions. CSA will therefore increase productivity by mitigating negative traditional practices such as over-reliance on rain fed agriculture and over use of agrochemicals.

Poor farming practices have majorly contributed to pollution and degradation of environmental assets in Nyandarua County. With water pollution which eventually leads to eutrophication, loss of biodiversity is a consequence. Poor farming practices include farming on steep slopes, overgrazing, mono-cropping and excessive use of farm chemicals.

Therefore, farmers need to be trained and sensitized on CSA so as to reduce the levels of environmental pollution and degradation. Good farming practices include agroforestry, natural pest management, terracing and mulching.

18.3.3 Providing Solid Waste Management Infrastructure

A lot of pollution in the county, notably in the urban centres, is particularly caused by poor waste management and disposal methods. A lot of industrial effluents and chemicals from flower farms end up in rivers or underground water hence polluting the county water sources. At the same time, cloth washing, disposal of waste water and littering in the rivers are a major cause of pollution.

In Lake Ol'bolossat, disposal of waste in the lake is not rare and this has contributed to pollution and loss of biodiversity.

This therefore calls for provision of proper infrastructure for waste management in all stages of the waste management hierarchy i.e., generation, collection, transportation and disposal. Additionally, residents need to be trained on the benefits of an integrated approach to waste management including waste prevention, reduction, re-use and recycling. It should also be borne in mind that the environmental assets form the main base for tourism in the county; facilities such as color-coded litter bins therefore need to be provided in these sites accordingly.

18.3.4 Promoting the use of Alternative Energy Sources

Use of wood fuel in the county as an energy source is one of the root causes for diminishing forest cover and land degradation. Therefore, residents need to be sensitized on the adverse effects that are brought about by deforestation such as erosion and land degradation which are a result of over reliance on wood fuel. They need to be informed and educated on alternative energy sources such as solar power and biogas which are more sustainable.

Promotion of these alternative sources can be done through provision of subsidies to lower their costs and by enforcing anti-deforestation regulations to discourage the use of wood fuel.

18.3.5 Promotion of Reforestation and Agroforestry

Deforestation due to demand for wood fuel and encroachment due to the need for settlement and agricultural land are root causes for the diminishing forest cover in Nyandarua County. As a result, the county government and other interested partners/stakeholders need to promote reforestation and agroforestry through provision of free tree seedlings to farmers. Moreover, creation of awareness on the adverse effects of deforestation which include climate change and desertification is necessary. Agroforestry should also be promoted as a good farming practice to reduce soil erosion and siltation.

18.3.6 Containment of Wildlife

In order to reduce human-wildlife conflict experienced in some of the environmental sensitive areas such as Lake Ol'bolossat and the Aberdare National Park, there is need to provide adequate fencing on these sites.

Additionally, there is need for construction of designated livestock watering points in dams and water pans in order to deal with the issue of pollution which is partly contributed to by the direct watering of livestock.

There is therefore need to construct these facilities as a swift response to the noted challenges.

18.3.7 Containment of horizontal urban growth

In order to prevent encroachment into environmental sensitive areas, there is need to clearly define the urban growth limit based on the urban land requirements discussed in population chapter.

18.3.8 Capacity Building and Partnership Initiatives

Key stakeholders here include Kenya Forest Service, Kenya Wildlife Service, Water Resources Authority, NEMA and the county's ministry of water, environment, tourism and natural resources among others.

It has to be noted that a root cause for most of the underperformance in the environmental sector is low institutional capacity. Capacity building to improve performance is therefore imperative; it involves development of knowledge, management skills and capabilities through training, incentives, and technology acquisition.

Furthermore, partnerships are necessary between these institutions and interested groups for a collective action towards protection and conservation of environmental assets. This is also a great step towards avoidance of conflicting mandates and role duplication between these institutions.

18.4 Proposed Projects and Programmes

The following proposals have been made in order to protect and conserve the environment in Nyandarua County:

- a) Sensitization campaign and training of farmers on proper farming practices including climate-smart agriculture.
- b) Provision of proper waste management infrastructure in urban areas (refer to solid waste management projects).
- c) Provision of free tree seedlings to farmers to promote agro-forestry and re-forestation from the current 24% cover to 30%.
- d) Sensitization campaign on integrated waste management practices i.e. waste reduction, re-use and recycling (refer to solid waste management projects).
- e) Construction of designated water points for livestock.
- f) Enforcement of environmental laws and policies regarding water bodies, forests and catchment areas. Where no county policy exists, develop one.
- g) Rehabilitation of abandoned quarrying sites.
- h) Monitoring of water levels and quality in rivers.
- i) Provide Subsidies to promote use of alternative renewable energy sources e.g. solar panels and biogas digesters.
- j) Promoting the use of energy-saving *jikos* in rural areas.
- k) Development of partnerships between different institutions/stakeholders in the management of environmental resources.

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- l) Gazettement, rehabilitation, dredging & conservation of lake Ol'bolossat for water conservation and restoration of ecosystem.
- m) Tree Planting, afforestation, re-afforestation and complete fencing of the Aberdare Ranges and public forests in the County.
- n) Capacity building for KWS, and adequate funding of relevant institutions and interest groups.
- o) Introduce giant bamboo farming to the forest communities.

19 NYANDARUA COUNTY SPATIAL STRUCTURE

19.1 Overview

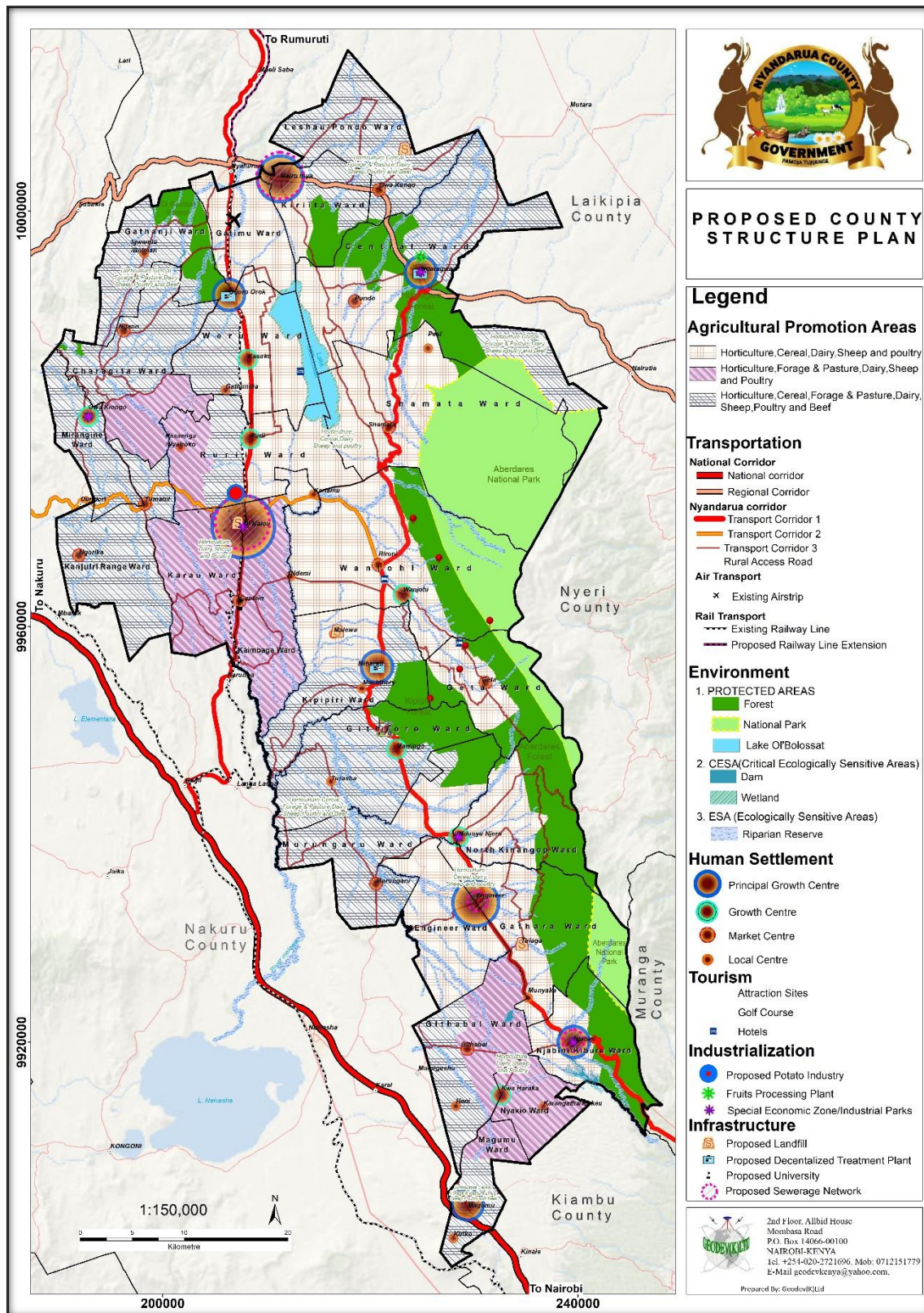
The structure plan is a long-term framework which will guide the development or redevelopment of land in Nyandarua County. It indicates the layout of the main land uses; agricultural/crop lands, conservation and protected areas, major transportation routes and roads proposed for upgrading, built-up areas and other key features for managing the direction of development.

The land use proposals included in the structure plan are arrived at through the process of land optimization. This is based on the sector based/thematic objectives of the plan as indicated below.

- i. To promote balanced and equitable development of the county.
- ii. To optimize the use of land and natural resources.
- iii. To spur economic development.
- iv. To facilitate the development of a well-balanced system of human settlements and enhance their livability.
- v. To protect and conserve the environment.
- vi. To provide appropriate and adequate infrastructure.
- vii. To provide an integrated transport system and improve connectivity.

The proposed structure plan for Nyandarua is as shown in Map 19-1:

Map 19-1: Proposed Nyandarua County Structure Plan



19.2 Components of the Structure Plan

The following land uses and features form the main components of the Nyandarua Structure Plan:

- a. Agricultural Promotion Areas.
- b. Human settlements.
- c. Environmental Sensitive Areas.
- d. Transportation network.

19.2.1 Agricultural Promotion Areas

The land available for agriculture in Nyandarua measures 2,409.73 square kilometres and has been categorized into three agricultural zones/promotion areas. In each of the promotion areas, there are primary enterprises that are to be promoted. Nevertheless, there are secondary enterprises that may be allowed in each of the agricultural zones, depending on the agro-ecological potential specific to a particular area. The proposed agricultural promotion areas are as follows:

- i. Horticulture, Cereal, Dairy and Sheep, Poultry.
- ii. Horticulture, Forage, Pasture, Dairy, Sheep and Poultry.
- iii. Horticulture, Cereal, Forage, Pasture, Dairy, Sheep, Poultry and Beef

Horticulture, Cereal, Dairy and Sheep, Poultry.

This zone covers sections of the following wards: Central, Engineer, Gathanji, Gathara, Gatimu, Geta, Githioro, Kaimbaga, Kipipiri, Kiriita, Murungaru, Njabini Kiburu, North Kinangop, Rurii, Shamata, Wanjohi, and Weru Ward. The area measures approximately 968.43 Km². Currently, the crops grown in these areas include potatoes, maize, cabbages, pyrethrum, carrots, and wheat. People here also keep dairy cattle, sheep, goats, and poultry.

The area is zoned for horticulture, cereal, dairy, sheep, and poultry agricultural activities based on the agro-ecological zonation. The crops that shall be promoted in the area include potatoes, beans, peas, and vegetables whereas carrots, plums, tree tomatoes, pears, apples, broad beans, and sunflower will be promoted as secondary enterprises. Moreover, zero grazings will also be allowed throughout the zone as well as the farming of bulb onions and strawberries in areas around Oljoro-Orok town in Weru Ward.

Land Management Policies

- Urban growth limits for the respective urban area within this zone shall be defined by the respective urban plans. This will help prevent encroachment into the agricultural land. Major Urban areas in the zone are Rurii, Kasuku, Oljoro Orok, Mairo Inya and Pondo.
- Water catchment areas in this zone shall be identified and conserved to ensure clean and adequate water.
- Roads and social infrastructure shall be developed, upgraded, and maintained.
- Developments in hilly areas (exceeding 12° slope) shall be accompanied by slope control measures.
- A 30-metre riparian reserve shall be observed to protect the rivers and Lake Ol'bolosat in this zone; growing giant bamboo is encouraged on all riparian areas.
- A 60-metre way leave shall be observed for the railway.
- Formulate an inter-county relations committee to fast-track linkage of the railway to SGR.
- Recommended lot size for agriculture in this zone is 4 hectares. However, based on the assessment of county cadastral layer it was established that most of the lots in this zone have not met the recommended land size. Therefore, land pooling is recommended. Incentives such

as subsidized issuance of farm inputs, ploughing etc. shall be provided to local farmers to encourage land pooling.

- For urban areas within this zone, the recommended minimum plot-sizes for other land uses (commercial, residential,) are 1 Hectare. Agricultural activities within those zones shall also be encouraged.

Horticulture, Forage, Pasture, Dairy, Sheep and Poultry.

This zone covers the following wards Charagita, Githabai, Kaimbaga, Kanjuiri Range, Karau, Kipipiri, Magumu, Nyakio, Rurii and Wanjohi Wards. It falls within the following agro-ecological zones UH1 (sheep, dairy or vegetation zone), UH2 (pyrethrum/wheat zone), and LH5 zone (suitable for ranching). The area measures 416.07 km². Currently the people here grow potatoes, pyrethrum, wheat, tomatoes, cabbages, carrots, maize, oranges, and passion fruits among other crops. Residents also keep dairy cattle, sheep, goats, and poultry.

This zone shall be conserved as a Horticulture, Forage, Pasture, Dairy, Sheep area as primary activities. The crops that shall be encouraged in the area include oranges, avocados, tree tomatoes, purple passion fruits, and tomatoes (under irrigation). Fodder production and sunflower growing will be encouraged with livestock such as dairy and sheep shall also be promoted as secondary activities.

Land Management Policies

- Urban limits shall be defined to avoid encroachment into the agricultural land. Major Urban areas in the zone are Ol'kalou, Captain, Githabai and Kwa Haraka.
- Water catchment areas in this zone shall be identified and conserved to ensure clean and adequate water.
- Roads and social infrastructure shall be developed, upgraded, and maintained.
- A 30-metre riparian reserve shall be observed to protect the rivers in this zone; bamboo growing is encouraged on all riparian areas.
- ESIA is to be carried out for all roads proposed for upgrading.
- Stocking levels will be within the carrying capacity set for each agro-ecological zone.
- A 60-metre way leave shall be observed for the railway.
- Recommended lot size for agriculture in this zone is 4 hectares.
- For urban areas within this zone, the recommended minimum plot-sizes for other land uses (commercial, residential,) are 1 Hectare. Agricultural activities within those zones shall also be encouraged.

Horticulture, Cereal, Forage, Pasture, Dairy, Sheep, Poultry and Beef

This zone covers Central, Charagita, Gathanji, Githabai, Githioro, Kaimbaga, Kanjuiri Range, Karau, Kipipiri, Kiriita, Leshau Pondo, Magumu, Mirangine, Murungaru, Rurii, Shamata, Weru Wards. The area measures approximately 1088.69 Km². The zones cover the LH3 agro-ecological zone, which is suitable for wheat/maize and barley, LH4 zone (ideal for cattle, sheep, and barley) and UH4 (suitable for beef farming), UH3 agro-ecological zones, which is suitable for wheat and barley, UH4 agro-ecological zone which suitable for ranching. At present, people in this zone grow potatoes, maize, cabbages, pyrethrum, and wheat, among other crops, peas, carrots, kales, tomatoes, maize, oats, oranges, and passion fruits among other crops. Livestock kept includes dairy cattle, sheep, goats, and poultry.

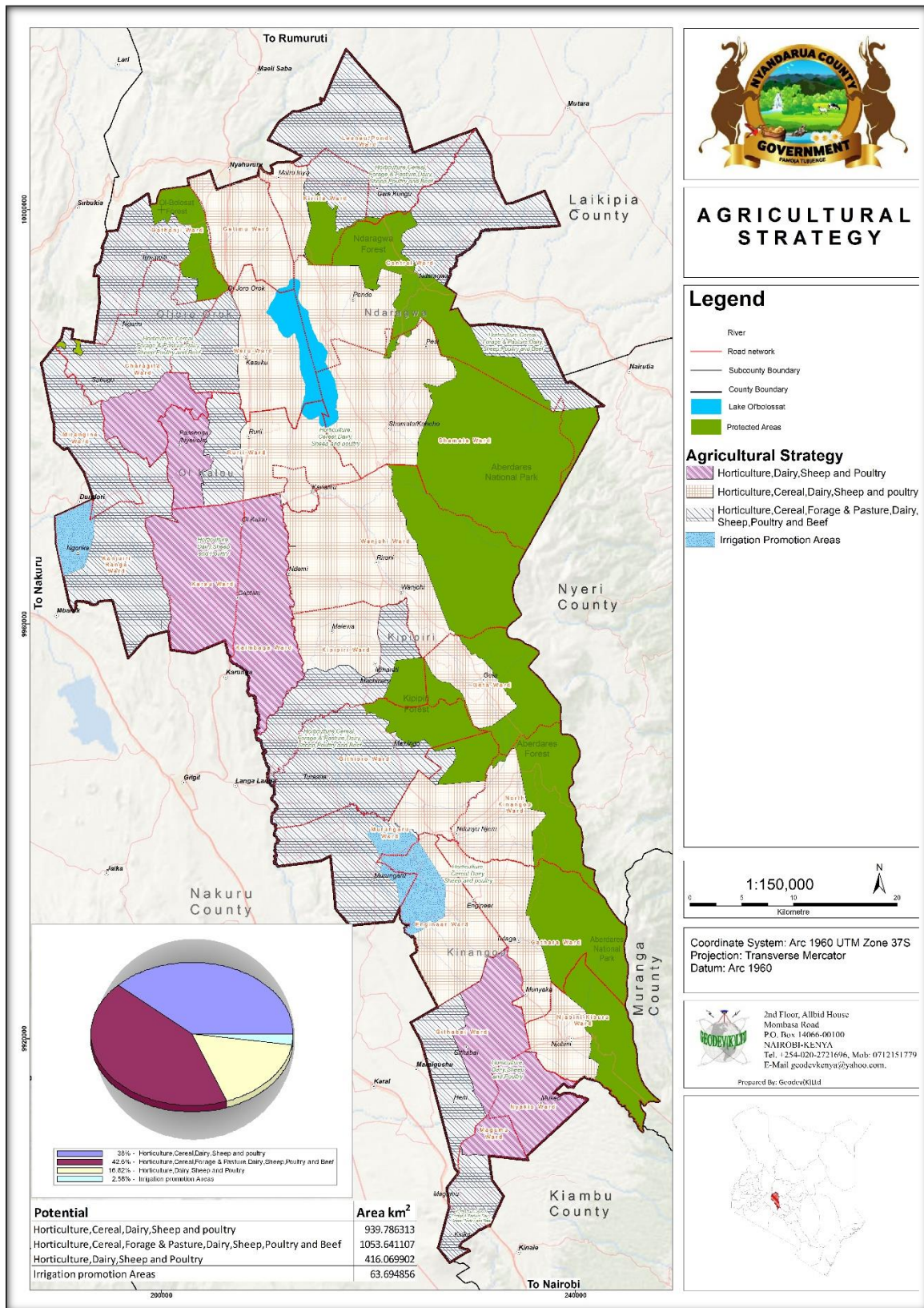
This zone is, therefore, set aside for horticulture, cereal, Forage, Pasture, dairy, sheep, poultry and beef. The crops that shall be promoted in the area include wheat, barley, fodder, potatoes, sunflower, green onions, fodder, tomatoes, carrots, maize, oranges, and passion fruits, among other crops. At the same time, dairy farming, and sheep rearing, as well as beetroot growing, will be promoted as secondary activities.

Land Management Policies

- Urban growth limits for the respective urban area within this zone shall be defined by the respective urban plans. This will help prevent encroachment into the agricultural land. Major Urban areas in the zone are Ndaragwa, Gwa Kung'u, Magumu, Gwa Kiongo, Ngorika, Ngano, Igwamiti and Tumaini.
- Water catchment areas in this zone shall be identified and conserved to ensure clean and adequate water.
- Roads and social infrastructure shall be developed, upgraded, and maintained.
- Developments in hilly areas (exceeding 12⁰ slope) shall be accompanied by slope control measures.
- A 30-metre riparian reserve shall be observed to protect the rivers and Lake Ol'bolosat in this zone; growing giant bamboo is encouraged on all riparian areas.
- A 60-metre way leave shall be observed for the railway.
- Formulate an inter-county relations committee to fast-track linkage of the railway to SGR.
- Recommended lot size for agriculture in this zone is 3 hectares.
- For urban areas within this zone, the recommended minimum plot-sizes for other land uses (commercial, residential,) are 1 Hectare. Agricultural activities within those zones shall also be encouraged

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Map 19-2: Nyandarua County Agricultural Strategy



19.2.2 Environmentally Sensitive Areas

The environmental assets in Nyandarua provide significant ecosystem services such as habitat, food supply, nutrient cycling and oxygen production, recreation service. They have been categorized into:

- Protected Areas
- Critical Ecologically Sensitive Areas (CESAs)
- Ecologically Sensitive Areas (ESAs)

Protected Areas

These are resources/assets which are legally protected through gazettment. They include the Aberdare National Park and gazetted forests namely Ndaragwa, Ol'bolossat, Geta, North Kinangop and South Kinangop forests as well as Lake Ol'bolossat.

Land Management Policies; Forests

- Urban growth limits for respective urban areas in this zone shall be defined by urban plans to avoid encroachment into the forest including Ndaragwa, Miharati, Njabini, Geta and Oljoro-Orok.
- ESIA to be carried out for all roads proposed for upgrading because they traverse the Protected Areas.
 - Olkalou-Ndunyu Njeru-Nyeri
 - Njabini-Murang'a
 - Gwa Kungu-Nanyuki
 - Kariamu- Ndaragwa
 - Kasuku- Ol'bolossat
 - Wanjohi-Ol'bolossat Road
 - Ndunyu Njeru road (C481) off Olkalou-Njabini road (B21).
 - Ndunyu-Njeru-Kahuruko-Geta Rd,
- Developments and agricultural activities shall not be allowed.
- The forest shall be replanted, conserved and promoted for ecotourism and research purposes.
- Surface and ground water resources shall be safeguarded and managed sustainably.
- In order to retain the present forest cover, no further excision of permanent forest reserves shall be allowed.
- Gazette catchment areas of existing and proposed dams to avoid encroachment and incompatible land uses.
- Local Plans shall identify and delineate water intake catchments and ground water recharge zones requiring special land use management.

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- Low impact nature tourism, research and education shall be permitted.
- Public dams and ground water resources catering for commercial, industrial and agricultural activities shall be monitored to avoid over abstraction.
- Water bodies shall be managed to protect the aquatic biodiversity and promote sustainability.
- Strategic Environmental Assessments (SEA) shall be used to rationalize the need for new dams.
- Firebreaks and access roads will be developed and improved.

Critical Ecologically Sensitive Areas (CESAs)

These refer to environmental assets which have crucial ecosystem services and should in essence be protected by law. However, their use is regulated by planning policy. CESAs in Nyandarua include, swampy areas and wetlands as well as public dams.

Land Management Policies; Lake

- Physical development must be 20 metres minimum from the waterline.
- Roads to be developed to facilitate easy public access to the lake.
- The lake shall be managed to protect the aquatic biodiversity and promote sustainability.
- Resource harvesting from the lake shall be controlled according to EMCA & NEMA provisions.

Moreover, all public dams shall be protected as critical county water sources and a reserve of 100 metres on all sides shall be observed. All developmental activities shall be accompanied by an Environmental Impact Assessment (EIA). Additionally, resource harvesting from wetlands shall be controlled according to EMCA & NEMA provisions and the due buffer zones shall be observed.

Ecologically Sensitive Areas (ESAs)

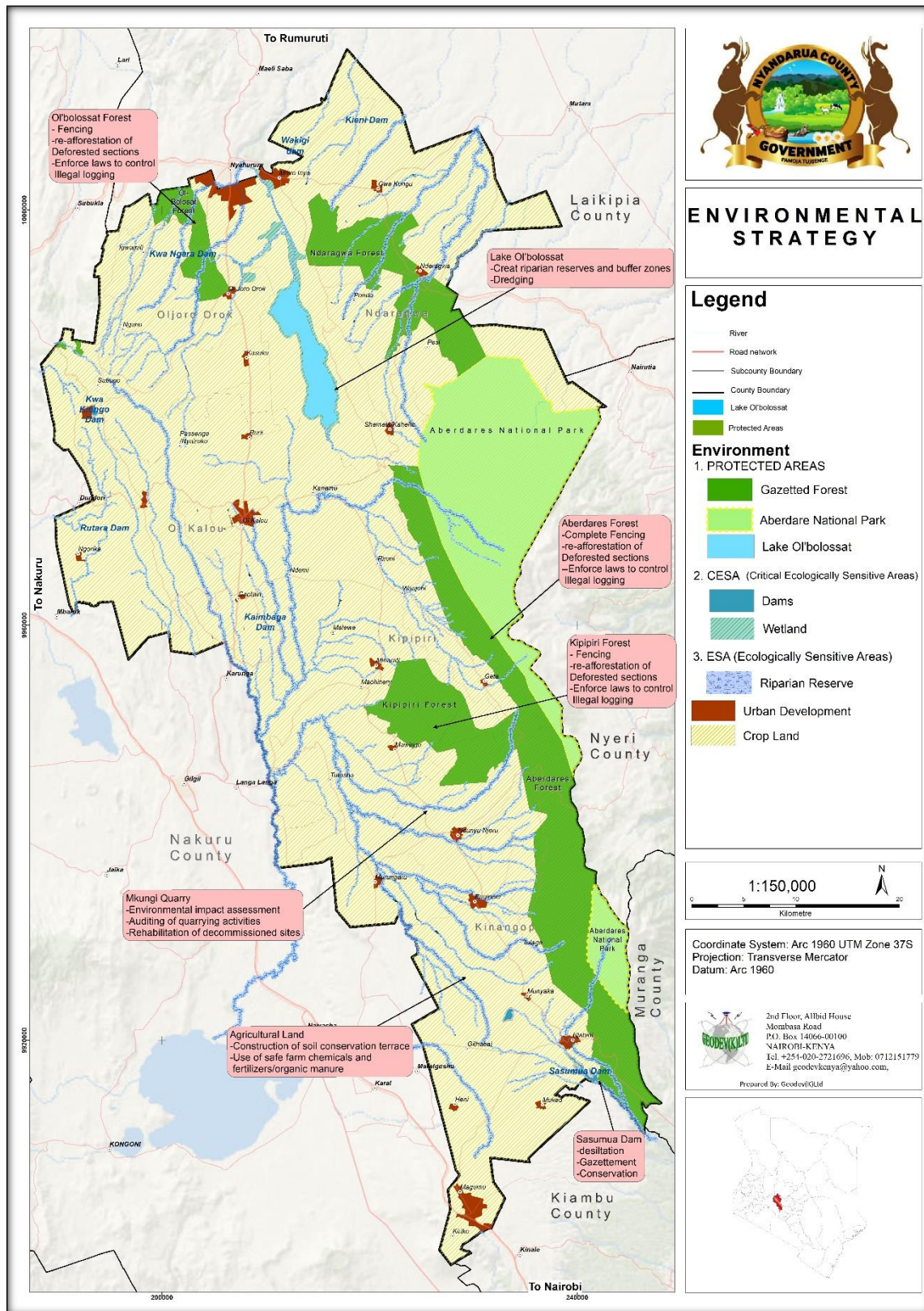
These are environmental assets which are available for use by people with minimal regulations. Rivers and springs fall into this category. These resources (rivers and springs) will therefore be protected as county water resources.

Land Management Policies

- A riparian reserve of 60 metres will be observed for major/permanent rivers and a 30 metre riparian reserve shall be observed for minor/seasonal rivers.
- All developmental activities shall be accompanied by an Environmental Impact Assessment (EIA).
- Eco-tourism/environmentally friendly tourism may be promoted.
- Rivers shall be managed to protect the aquatic biodiversity and promote sustainability.

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Map 19-3: Environmentally Sensitive Areas



19.2.3 Transportation

The roads in Nyandarua have been categorized into four as follows:

- i. **National Roads:** These will be analogous with class A roads i.e., international trunk roads and may also be referred to as super corridors. These roads connect the county to main towns in Kenya and to other countries.
- ii. **Regional Roads:** These will be analogous with class B roads i.e., national trunk roads and may also be called main corridors. They connect Nyandarua to the neighboring counties.
- iii. **Corridor 1:** These roads connect the major urban areas and sub-County headquarters in the County. The roads are the major spines where development activities will be channeled.
- iv. **Corridor 2:** The roads will provide linkages between corridor 1 roads.
- v. **Corridor 3:** This class combines road classes C and D (collector roads) and are meant to collect traffic from local roads and connect it with arterials i.e., class A and B roads. They may also be called sub-corridors.
- vi. **Local Roads:** Consist of road classes E, F and G. They primarily provide access to residential, commercial or industrial areas with little or no through movement.

The transportation system will aim to integrate national transportation with county transportation as well as all transportation modes within the county. Currently, there is just one major spine/corridor in Nyandarua namely the Gilgil-Olkalou-Nyahururu (A4) road. As a result, accessibility to the eastern parts of the county including Shamata, Wanjohi and Geta is impeded.

The plan therefore proposes a new corridor going through Mang'u (in Kiambu County)-Njabini-Engineer-Machinery-Rironi-Ndaragwa-Nyeri to serve as a national road. This will open up the eastern parts of Nyandarua County. The roads connecting Nyandarua to other counties will be main corridors including Dundori-Olkalou-Miharati-Njabini, Gwa Kung'u-Nanyuki, Dundori-Nyahururu and Ndunyu Njeru-Naivasha whereas sub corridors e.g., Njabini-Magumu, Wanjohi-Rurii and Engineer-Oleriondo will link the major urban centres within the County.

Land Management Policies; Roads

- A 60-metre road reserve minimum to be observed for national and regional roads.
- A 20-30 metre road reserve minimum to be observed for all county roads.
- An 18-metre road reserve minimum to be observed for all local roads.
- Economic and Social Impact Assessment (ESIA) to be carried for all roads proposed for upgrading.
- Transport corridors shall not fragment important forest blocks and ecological corridors.
- Transport corridors shall go around the forest blocks and ecological corridors including incorporating wildlife crossing structures such as viaducts and tunnels.

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- Implementation of a transportation network may be undertaken incrementally but the overall work programme shall be consistently executed to achieve modal integration.
- Marking of the roads will be done concurrently with road construction to enhance road safety.

Land Management Policies; Rail

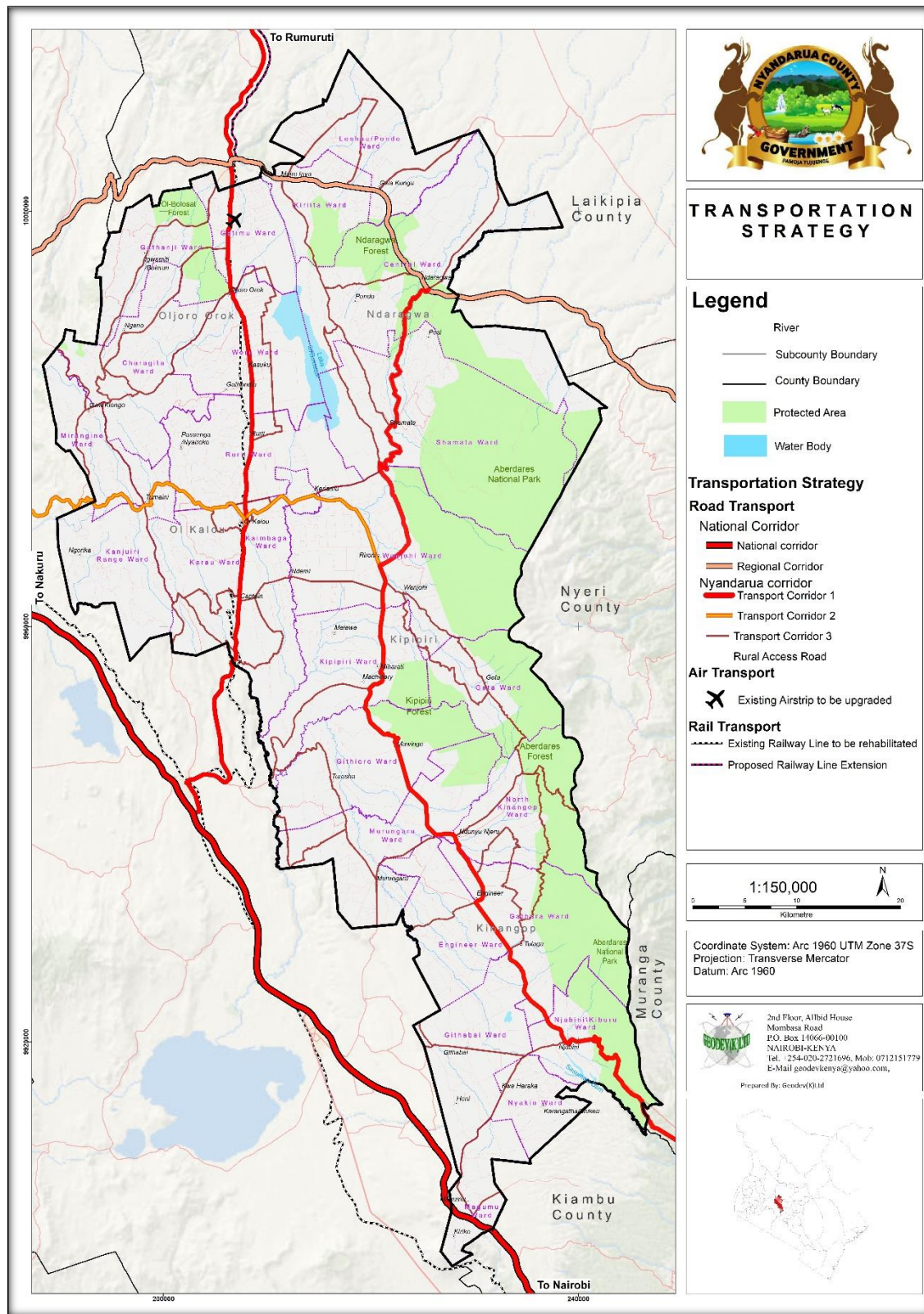
- A 60-metre way leave shall be observed.
- Formulate an inter-county relations committee to fast-track linkage to the Standard Gauge Railway (SGR).

Land Management Policies; Air

- The Airstrip in Oljoro-Orok shall be demarcated, mapped and gazetted.
- Land shall be set aside for the proposed airstrip in Olkalou.
- Incompatible land uses such as quarrying, dumping sites shall not be allowed within the vicinity of both the existing and proposed airstrip.
- Developments in the vicinity of the airstrips shall not exceed 15 metres for purposes of visibility.

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Map 19-4: Transportation Strategy



19.2.4 Human Settlements

To facilitate the development of a well-balanced system of rural and urban settlements in Nyandarua, selection of service centres has been carried out. Each level of service centre has a particular catchment population and recommended level of services.

Table 19-1: Proposed Hierarchy of Settlements

Proposed Service Centre	Name of the Centre
Principal Growth Centres	Olkalou, Engineer, Oljoro-Orok, Ndaragwa, Miharati, Njabini, Mairo Inya, Magumu
Growth Centres	Rurii, Wanjohi, Mawingu, Ndunyu Njeru, Gwa Kung'u, Kasuku, Kwa Haraka
Market Centres	Gwa Kiongo, Captain, Ngorika, Pondo, Shamata, Geta, Karangatha, Githabai, Murungaru, Boiman, Charagita, Rironi, Ngano, Tumaini
Local Centres	Heni, Gichungo, Igwamiti, Machinery, Kimathi, Kiriko, Gathundia, Mukeu, Munyaka, Ndemi, Kariamu, Passenga (Nyairoko), Pesi (Kambaa), Tulaga, Malewa, Turasha, Tumaini, Mirangine

Source: Consultant's Analysis

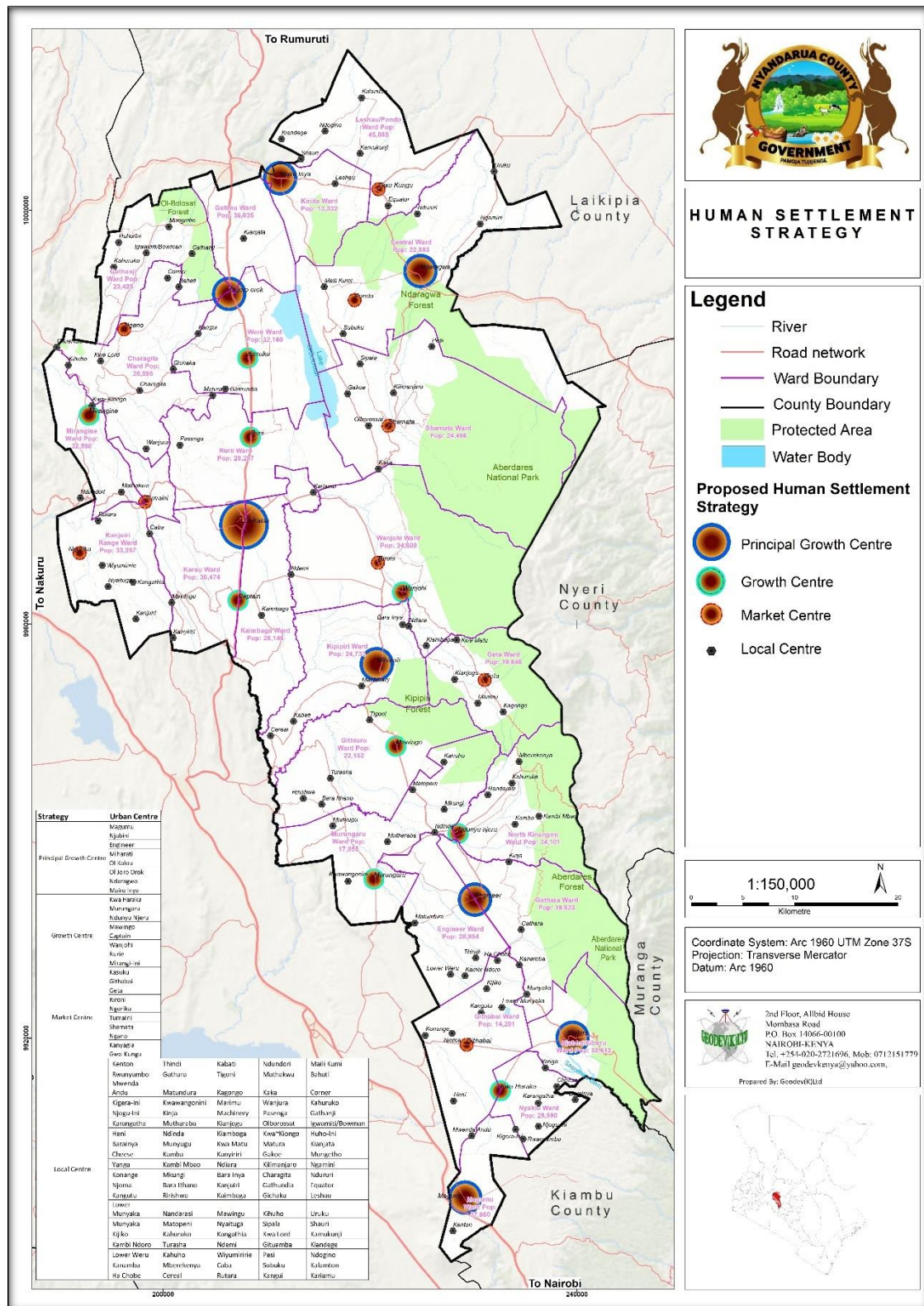
The management of human settlements shall be integrated with the sectoral policies in agriculture, environmental conservation and other sectors that have an impact on land use.

Land Management Policies

- All settlements shall be planned and provided with requisite services according to their proposed functions.
- Urban limits shall be defined to avoid encroachment into other zones, particularly the agricultural promotion areas and the environmental sensitive areas.
- Border towns shall be planned taking into consideration the existing situation and development proposals across the borders.
- All human settlements shall be integrated with the county transportation system.
- Land conversion and development applications shall be assessed with the objective of minimizing speculation.
- Public land within urban limits shall be reserved for public use such as open spaces and community facilities where appropriate.
- Local Plans shall identify areas for public housing ensuring proximity to places of work, good accessibility and taking into consideration the needs of the disabled and aged.

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Map 19-5: Proposed Human Settlement Strategy



19.2.5 Tourist Attraction Areas and Sites

The environmental sensitive areas in Nyandarua form the main tourism base in the county. These include Lake Ol'bolossat, gazetted forests, the Aberdare Ranges as well as rivers. Nevertheless, there are other tourist attraction sites such as the Mau Mau caves and Happy Valley homes. The table below shows the tourism enterprises proposed per ward in Nyandarua County.

Table 19-2: Proposed Tourism Attractions

Sub County	Tourism Products
Ndaragwa (Central)	Tafaria Castle Lodge, bird watching,
Ndaragwa (Kiriita)	Develop Manguo Hippo Point for game viewing
Ndaragwa (Shamata)	Eco-lodges for accommodation, sport fishing (trout), sport tourism (high altitude training camp at Kaheho), mountain climbing at twin peaks, hiking from Kaheho to Satima Peak (accessible through Shamata gate)
Oljoro-Orok (Weru)	Bird watching in L. Ol'bolossat, accommodation lodges, water sports (canoeing), Tabor Hill Lodge
Kipipiri (Wanjohi)	Happy Valley Homes (National Heritage Sites), Wanjohi caves, sport fishing, hiking and trekking
Kipipiri (Kipipiri)	Nature trails (Kipipiri Peak), eco-homes,
Kipipiri (Geta)	Develop Geta as an eco-tourism town, cable cars between Kipipiri peak and twin peaks (Aberdares), Nature trail and mountaineering (Satima Peak, Twin Peaks), sport fishing (R. Wanjohi, R. Gitei, R. Njangiri), Wang'ae caves, Philo Grande Camp, Gatuku waterfalls, 20 Km Marathon & Biking Circuit from Geta Forest through Marimu to Kagongo and back,
Kinangop (Murungaru)	Mau caves, hiking, bird watching
Kinangop (North Kinangop)	Mountain biking (Mutubio gate road), sport fishing, eco-lodges, game viewing (ANP through Mutubio gate), water sports (John Nimu and Karemeri dams), hiking, Happy Valley Homes,
Kinangop (Gathara)	Mountain biking in Pesi town
Kinangop (Njabini Kiburu)	Mountain biking, water sports/canoeing at Sasumua Dam, hiking to Elephant and Kinangop peaks (religious pilgrimage),
Kinangop (Nyakio)	Agro-tourism
Kinangop (Magumu)	Scenic view of rift valley escarpment

Source:

Other attractions include the Mt. Kipipiri Golf Resort and the elephant migratory route between Mt. Kipipiri and Aberdare ranges.

19.2.6 Industrial Sites

Several industries have been proposed as drivers of economic growth in Nyandarua. These are mostly agro-industries inasmuch as there also are cottage and Jua Kali (SMEs) proposed in some of the trading centres. The main industries in Nyandarua (existing and proposed) include:

Existing

- Midlands Ltd; potato processing in Njabini
- Kinangop Dairy processing plant in Ndunyu-Njeru
- Countryside Dairy Limited in Ndaragwa
- Kenya Cooperative Creameries (KCC) in Murungaru
- Honey Processing by Aberdares Farmers' Cooperative in Geta

Proposed

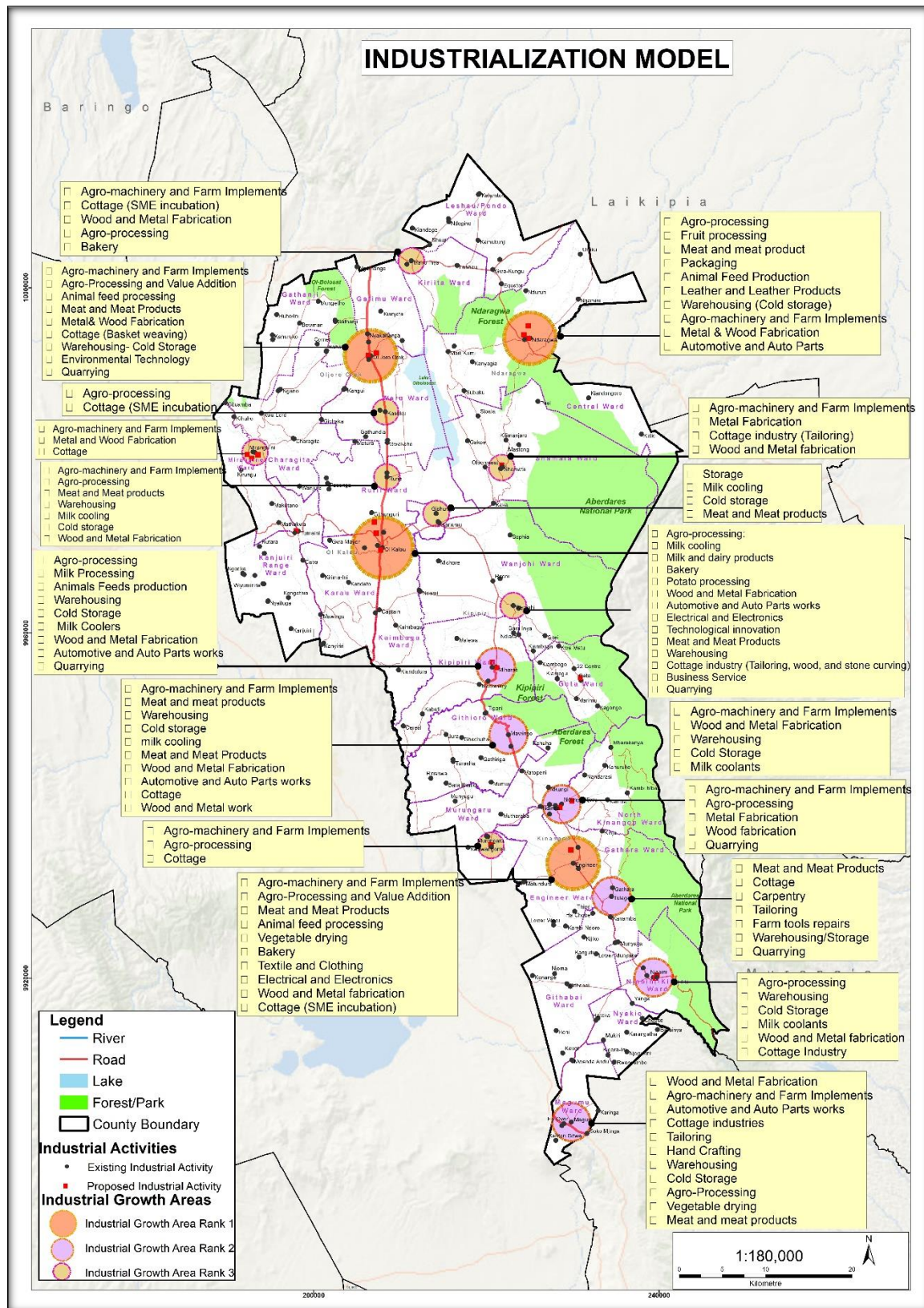
- Special Economic Zones/Industrial Parks- Olkalou, Mirangine, Ndunyu Njeru, Njabini and Ndaragwa
- Fruit processing- Wanjohi
- Wool processing and textile manufacturing- Engineer
- Leather tanning- Ndaragwa
- Animal feeds processing- Miharati
- Dairy meal processing in Mirangine and Miharati (small scale)
- Livestock feeds manufacturing plant- Ndunyu Njeru
- Poultry feeds manufacturing plant- Olkalou
- Cottage industries; thread milling (Njabini) and basket weaving (Oljoro-Orok)
- Cold storage facilities in Murungaru, Shamata, Geta, Tumaini and Oljoro-Orok

Land Management Policies

- Wherever possible, industries of the same category will be centralized in order to economize on the provision of infrastructure.
- Industries with special waste disposal requirements e.g., tannery, an adequate buffer will be provided to minimize potential Odour nuisance.
- Potentially air-polluting industries will be located in areas where the dispersion of pollutants is not inhibited in order to minimize the health hazard to the surrounding residential areas.
- High rise buildings and low air pollutant emitters shall not be collocated.
- Noise emitting industries will be located an adequate distance from incompatible uses such as residential, educational etc.
- If the required separation between industries and sensitive uses cannot be provided, noise mitigation measures will be incorporated.

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Map 19-6: Proposed Industrial Clusters



19.2.7 Major Infrastructural Installations

The structure plan also indicates major infrastructural installations in the county in respect to water supply, sewage disposal and solid waste management. Infrastructure installations proposed in the power supply and ICT sectors are however not included in the structure plan but are instead indicated in detail under sectoral strategies. The table below shows the main infrastructure project proposals as pertains to water supply, sewage disposal and solid waste management.

Table 19-3: Proposed Infrastructure Projects

Sector	Water Supply	Sewage Disposal	Solid Management	Waste
Proposed Projects	New water supply schemes in Engineer, Njabini, Ndaragwa and Miharati.	<ul style="list-style-type: none"> New sewerage systems in Olkalou, Mairo Inya, Njabini and Engineer. Decentralized treatment plants in Oljoro-Orok, Miharati and Ndaragwa. 	Sanitary landfills in Olkalou, Malewa, Kaharu, Tulaga and Mbuyu.	

Source: Consultant's Analysis

20 ACTION AREA PLANS

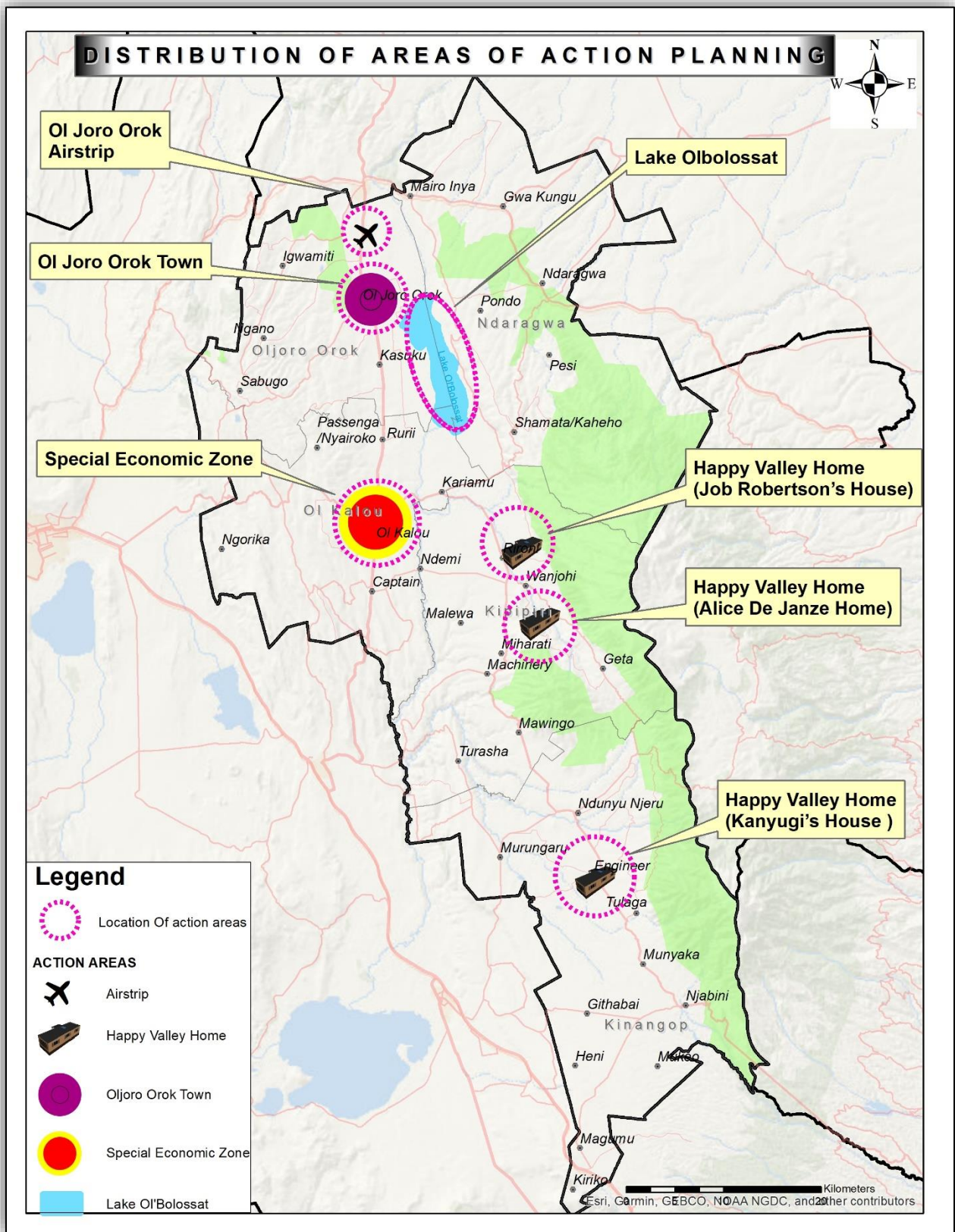
20.1 Overview

Action area plan purposefully establishes a set of proposals and policies for the detailed development of a specific area. The proposed sites for action planning in Nyandarua cover key development concerns such as economy, transportation, environmental and historical conservation. The selection of the areas requiring detailed planning intervention was through a consultative process by local and key stakeholders on areas of development that require real transformation to achieve the county's vision. The areas of action planning have been shown in the table below.

Table 20-1: Action Planning Areas

S/No	Area	Justification for Selection
1.	Lake Ol'bolosat	The lake serves as one of the major tourist destination areas in the county. This calls for serious intervention in ensuring that it is properly safeguarded and managed.
2.	Oljoro-Orok Airstrip	Important is supporting key economic sector such as industrialization, transportation, and agriculture
3.	Happy Valley Homes	The homes are key historical sites and have huge tourism potential
4.	Olkalou Special Economic Zone	There is need to promote industrialization in the county in order to boost the county's economy. One way of promoting industrialization is by offering incentives to attract investments.

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20.2 Action Area 1: Lake Ol'bolosat

The wetland plays an important function to the community and the county at large. It is a source of fresh water for the local communities in the county and beyond as well as home to biodiversity including hippos and over 300 bird species. Despite the many opportunities, several challenges impede its optimal utilization. Such challenges include increased human-wildlife conflict, water abstraction, overgrazing, human encroachment, siltation and deforestation of catchment areas. The main objective is to promote the wetland as precinct tourist destination area while still protecting and conserving the rich biodiversity it possesses.

Objectives	Challenges	Actions
To protect and conserve the Lake	i. Siltation ii. Human encroachment	i. Desiltation of the lake to increase its coverage. ii. Plantation of trees on the lake reserve. iii. Survey to establish the highest water mark as a basis for determination of the lake's iv. riparian reserves. v. Compensations/ acquisition of the riparian reserve and fencing off the same. vi. Develop a hippo point and road infrastructure
To promote eco-tourism around the lake	Underutilization of the resource as tourist destination area	i. Develop and install infrastructural support facilities to spur growth of ecotourism activities around the Lake. ii. Gazettement of Lake Ol'bolosat as protected area to promote conservation and reduce human wildlife conflicts. iii. Promote blue economy aspect by developing lakefronts for economic and social prosperity along the lake. iv. Formulate programmes that will support and capacity build birds and wildlife conservation groups in the area.

20.3 Action Area 2: Oljoro-Orok Airstrip

Oljoro Orok airstrip provide the county with an opportunity to develop an integrated transport system that will augment transport efficiency. Currently the airstrip is underdeveloped and requires urgent interventions in order to achieve its full potential.

Objectives	Challenges	Actions
To develop an integrated transport system in order to augment transport efficiency	Underdevelopment of the airstrip	i. Reconstruction of the runway ii. Improvement of the airstrip pavements to bituminous standard.

20.4 Action Area 3: Happy Valley Homes

The objective of this action area is to rehabilitate Happy Valley homes that have been neglected and dilapidated to make them appealing for the tourism function. The homes are key historical sites and have huge tourism potential.

Objectives	Challenges	Actions
To rehabilitate Happy Valley Home to serve the tourism function.	Dilapidated due to negligence and poor maintenance.	Preparation of site plans. Preparation of building plans to guide renovation.

20.5 Action Area 4: Olkalou Special Economic Zone

The objective of this action area plan is to improve the capacity of the economic base in the county through creating an enabling environment for the functionality of SME clusters and value chain development for pursuing inclusive and sustainable industrial development in Nyandarua County.

Objectives	Challenges	Actions
i. To expand and diversify production of goods and services for domestic and export markets ii. To promote local entrepreneurship through small and medium.	i. Lack of designated land for industrial activity ii. Inadequate infrastructure.	i. Acquisition of land for the Special Economic Zone ii. Prepare a detailed site plan for the SEZ iii. Develop road network within the SEZ and link the zone with other districts. iv. Increase budget allocation for industrial sector by the county government.
1. To attract both local and foreign investors.	Lack of incentives to attract investors.	Tax reliefs and incentives to investors setting up industries.
2. Create Employment opportunities.	i. Low investment in industries ii. High rate of unemployment iii. Inadequate skilled labour. iv. Low technology uptake.	i. Provide incentives for setting up industries e.g. land. ii. Setting up of vocational training Institutes. iii. Promote value addition of products.

21 IMPLEMENTATION MECHANISM & CAPITAL INVESTMENT FRAMEWORK

21.1 Overview

Implementation describes the process or set of activities undertaken to ensure the plan proposals are actually executed. This section presents the expected project/programme timelines and the institutions/agencies which are charged with the responsibility of implementation. Details regarding project prioritization as well as funding alternatives have been addressed in the Capital Investments Plan section of this report. Additionally, a monitoring and evaluation framework has been provided for proposed projects.

21.2 Key Issues in Implementation

There are several prospective challenges that might hinder the implementation of the proposed projects and programs. These are as outlined below.

21.2.1 Inadequate Financial Resources

Majority of the projects proposed in the CSP are capital intensive and therefore securing enough financial resources to fund these projects is rather difficult. Aside from the equitable share from the national government, the County Government of Nyandarua must revamp its internal sources of revenue in order to cover the costs required for putting in place the plan proposals. Moreover, other external sources of revenue should also be prospected.

21.2.2 Inadequate Qualified Staff

Implementation of the CSP in Nyandarua requires competent technical personnel particularly planners, GIS specialists, surveyors and engineers among others. Moreover, a monitoring and evaluation specialist is necessary to ensure that the proposed projects are implemented from start to completion. Unfortunately, there is a current shortage of these professionals in the County Government of Nyandarua.

21.2.3 Poor Coordination between Implementing Agencies

The projects and programmes which have been proposed in the CSP fall within the jurisdiction of various sectors/departments ranging from agriculture, trade, tourism, industry, transportation, infrastructure etc. Notably, there will be various actors involved in the implementation of these projects, each with a specific role. This underpins the need to coordinate the efforts of these agencies for successful plan implementation. The CSP proposes a County Physical Planning Committee which shall be responsible for the coordination of various actors involved in plan implementation.

21.2.4 Weak Plan Monitoring and Review Capacity

In order to ensure that the plan is implemented in a consistent and incremental manner, there is need for human and financial resources in the agencies involved. Moreover, the transfer of skills and knowledge is crucial particularly as regards the GIS platform/database which will also require regular updating.

21.2.5 Poor Incorporation of Spatial Plan Proposals in Lower-Level Plans

There is need to give attention to the projects proposed in the Nyandarua County Spatial Plan (2020-2030) when undertaking cities and urban areas plans, action area plans and other lower-level plans. Of note, many of the proposals made under the County Spatial Plan will be realized through these smaller plans and it is therefore imperative that they are accordingly incorporated.

21.2.6 Poor Linkage between Budgetary Allocation and Plan Proposals

In order to fast-track the implementation of proposed projects and programmes, the budgetary allocation in the county should be proportionate to the cost of interventions proposed in each respective department/sector.

21.2.7 Potential Conflicts due to Loss of Property Rights

Some of the land management policies outlined for the effective operationalization of the proposed spatial structure have direct implications on individual land and property. This may result in major constraints in regard to resettlement and compensation of affected persons.

21.3 Agencies Involved in Spatial Planning and their Functions

As articulated under the Constitution of Kenya, the National and County Governments have specific functions with respect to planning and therefore the various proposed projects will fall under the jurisdiction of either of the two tiers of government.

Though several ministries will be involved in implementation at both the National and County levels, the main ministries entrusted with the responsibility of planning will be the Ministry of Lands and Physical Planning at the national level, and the Department of Lands, Housing and Physical Planning at the county level.

Other ministries that will play a key role in spatial planning (at the national level) include the Ministry of agriculture, Livestock, Fisheries and Irrigation, Ministry of Industry, Trade and Co-operatives, Ministry of Education, Ministry of Tourism and Wildlife, Ministry of Water and Sanitation, Ministry of Health, Ministry of Information, Communication and Technology as well as the Ministry of Energy.

All the county departments will be involved in the implementation of proposed projects and programmes namely: Department of Education, Gender, Culture and Social Services, Department of Transport, Energy and Public Works, Department of Trade, Industrialization and Cooperatives, Department of Agriculture, Livestock and Fisheries, Department of Water, Environment, Tourism and Natural Resources, Department

of Youth, Sports and Arts, Department of Finance and Economic Planning and the Department of Administration and ICT.

Other agencies which will be involved include the Kenya Wildlife Services, Kenya Forest Services, National Environmental Management Authority, National Housing Corporation, National Land Commission, Kenya Urban Roads Authority, Kenya Rural Roads Authority, Kenya National Highways Authority, Kenya Airports Authority, Kenya Railways Corporation and Kenya Power Company. Additionally, Non-Governmental Organizations, Community Based Organizations and other development partners will be involved.

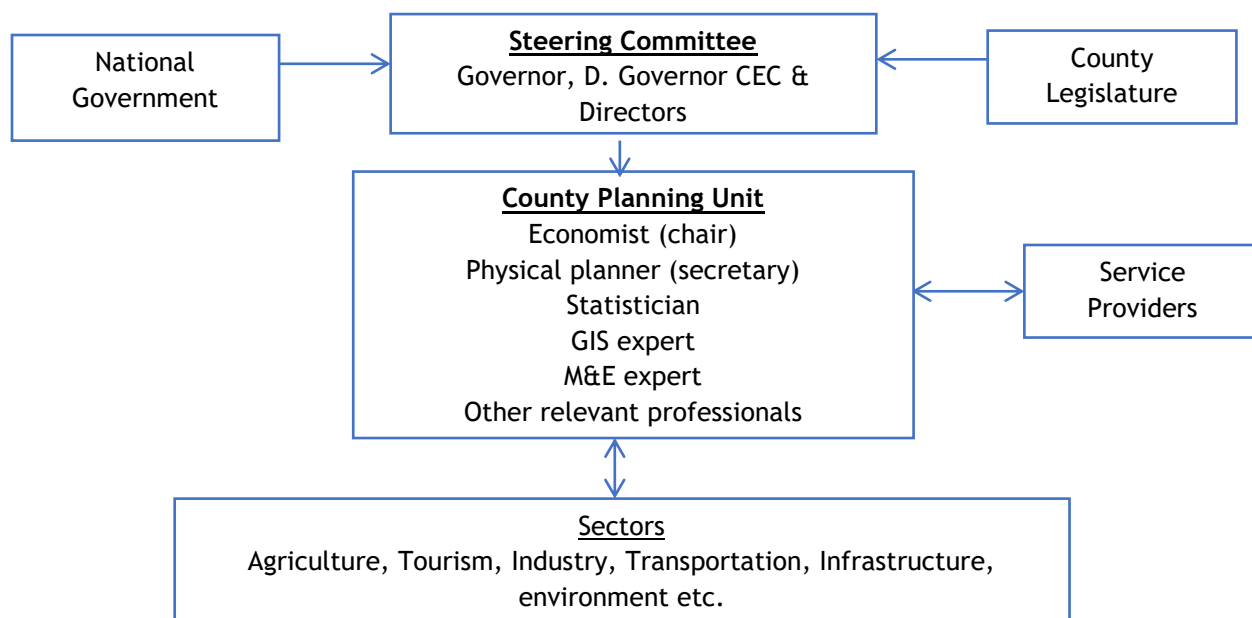
21.3.1 Establishment of a Physical Planning Committee

The CSP proposes a body for the implementation of the plan referred to as the County Physical Planning Committee. This body will have two major organs; namely the steering committee which will be comprised of the Governor, the Deputy Governor, County Executive Committee Members and Directors of all county departments and the county planning unit which will consist of the county economist (chair), county planner (secretary) and other professionals including a statistician, GIS expert and monitoring and evaluation (M&E) expert.

The County Physical Planning Committee will therefore be responsible for the implementation of all county plans namely County Integrated Development Plans (CIDPs), County Sectoral Plans, The County Spatial Plans (CSPs) and Cities and Urban Areas Plans. Additionally, this body will ensure that all county plans are in line with the national planning framework. The plan implementation mechanism in Nyandarua is represented in the organogram below.

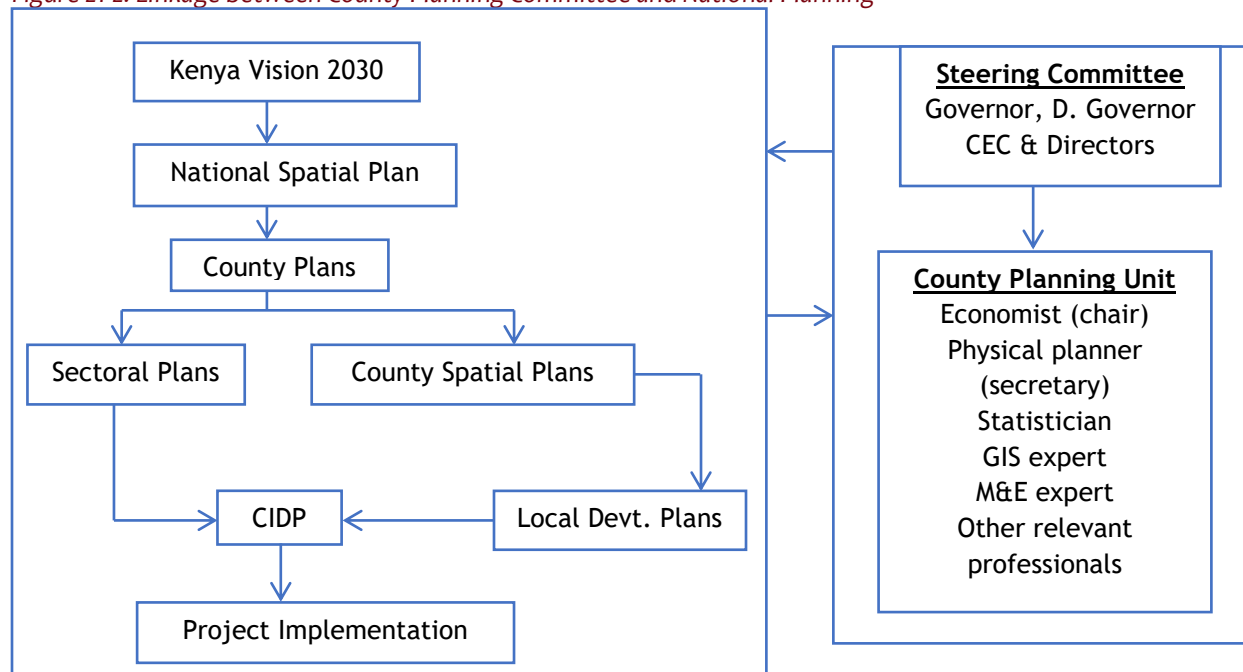
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Figure 21-1: Organogram for Plan Implementation in Nyandarua



The flow diagram below shows how the county planning committee links with the national planning framework.

Figure 21-2: Linkage between County Planning Committee and National Planning



The table below shows the implementation framework which comprises proposed projects, the expected time frame for implementation as well as the implementing agencies.

21.4 Implementation Matrices

a) Agriculture

Project/Programme	Time Frame														Implementing Agency
	Short Term (2020-2023)					Medium Term (2024-2026)					Long Term (2027-2030)				
Completion of potato processing industry at Ol'kalou opposite J.M Kariuki hospital with requisite facilities															<ul style="list-style-type: none">Dept. of Agriculture, Livestock and Fisheries
Provision of subsidized inputs including high-yielding seeds															
Establishment of irrigation schemes: Muti Umwe, Kwa Njora, Gathanji, Ngorika and Murungaru															<ul style="list-style-type: none">NIB,Dept. of Agriculture, Livestock and FisheriesMinistry of Agriculture, Livestock, Fisheries and Irrigation
Adopt a county agricultural policy advising on minimum plot sizes in agricultural land.															<ul style="list-style-type: none">Dept. of Lands, Housing and Physical Planning
Establishing County Tractor Hire Services															<ul style="list-style-type: none">Dept. of Agriculture, Livestock and Fisheries
Create a pool of integrated extension services and quality control, research, demonstration and advisory services															<ul style="list-style-type: none">Dept. of Agriculture, Livestock and Fisheries

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Recruitment and facilitation of extension officers for crops and livestock																	<ul style="list-style-type: none"> ▪ Dept. of Agriculture, Livestock and Fisheries
Seed multiplication ATCs to promote Pyrethrum, sugar beets, giant bamboo, avocado and sunflower growing																	<ul style="list-style-type: none"> ▪ Dept. of Agriculture, Livestock and Fisheries ▪ KALRO
Establish benchmarked quality control, weights and measures to standardize packaging of local crop produce.																	<ul style="list-style-type: none"> ▪ Dept. of Agriculture, Livestock and Fisheries
Establishing trading partnerships at regional, national and international levels																	<ul style="list-style-type: none"> ▪ Dept. of Trade, Industrialization and Cooperatives ▪ Development Partners
Establish technical training and demonstration programs for the youth in agriculture																	<ul style="list-style-type: none"> ▪ Dept. of Youth, Sports and Arts ▪ Dept. of Agriculture, Livestock and Fisheries
Promoting youth groups in agriculture																	<ul style="list-style-type: none"> ▪ Dept. of Youth, Sports and Arts ▪ Dept. of Agriculture, Livestock and Fisheries
Diversification into high-value crops																	<ul style="list-style-type: none"> ▪ Dept. of Agriculture, Livestock and Fisheries
Development of climate resilient crops and livestock in northern parts of Ndaragwa.																	<ul style="list-style-type: none"> ▪ Dept. of Agriculture, Livestock and Fisheries ▪ Dept. of Trade, Industrialization and Cooperatives

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Establishment of livestock sale yards in Ndaragwa and Geta																
Construction of fresh produce cold storage facilities, warehouses, and drying silos in Olkalou and in every subcounty headquarters.																
Introduce contracted farming with guaranteed markets e.g. Potatoes, vegetables, sugar beet, sunflower and fruits																
Undertake frequent soil testing to continuously determine the best crops for each region																
Diversify farming through collaboration with research institutions e.g. KALRO, KEPHIS																

▪ Dept. of Trade, Industrialization and Cooperatives

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b) Tourism

Project/Programme	Time Frame														Implementing Agency
	Short Term (2020-2023)					Medium Term (2024-2026)					Long Term (2027-2030)				
Develop a tourism master plan for the county															<ul style="list-style-type: none">Department of Water, Environment, Tourism and Natural ResourcesNEMAKFSKWS
Enforcement of environmental laws and regulations															
Rehabilitation, conservation and dredging of Lake Ol’bolossat															<ul style="list-style-type: none">Department of Water, Environment, Tourism and Natural ResourcesNEMA
Renovation of dilapidated Happy Valley Homes (Wanjohi)															
Development of three equator viewpoints in Gwa Kung’u, Kia Njata and Gwa Kiongo															<ul style="list-style-type: none">Department of Water, Environment, Tourism and Natural Resources
Construction of monuments to honor the Mau Mau freedom fighters i.e. Dedan Kimathi and Kung’u Karumba in Njabini and Gwa Kung’u respectively															
Formalize and regulate tourist activities as indicated in the projects section															

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Liaise with National Museums of Kenya, Ministry of Tourism, NEMA, KWS, and KFS among other stakeholders to gazette and protect archeological and cultural heritage sites e.g. Mau Mau caves and Happy Valley Homes.																
Marketing of touristic sites and attractions; county website, mainstream media, social media, billboards and other platforms.																
Integrate sports and tourism by constructing sports facilities and tourism facilities around Lake Ol'bolossat, in Geta and Karuru high grand-water fall of the Aberdares																
Establish an integrated tourism circuit covering; water sports, boating, hiking, game viewing, bird watching, sport fishing, agricultural and medical tourism.																
Establish Nyandarua County Investment Promotion Corporation																
Incentivize investors to put up star-rated hotels and restaurants in major urban centres and																

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strategically located centres/areas e.g. Lake Ol'bolossat Aberdare, slopes of Aberdares ranges.																
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c) Industrialization

Project/Programme	Time Frame														Implementing Agency
	Short Term (2020-2023)					Medium Term (2024-2026)					Long Term (2027-2030)				
Establish a fruit processing industry at Wanjohi															Dept. of Trade, Industrialization and Cooperatives
Establish a Wool processing/textile manufacturing industry at Engineer															
Establish a Leather tannery at Ndaragwa															
Establish an animal feed processing industry at Miharati															
Establish a dairy meal processing at Mirangine															
Establish a dairy meal processing at Miharati															
Establish a livestock feed manufacturing plant at Ndunyu Njeru															
Establish a poultry feed manufacturing plant in Olkalou															

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Establish a thread milling industry in Njabini																
Establish a basket weaving factory in Oljoro-Orok																
Special Economic Zones/Industrial Parks in Olkalou and Ndaragwa																
Cold storage facilities in Murungaru, Shamata, Geta, Tumaini and Oljoro-Orok																
Repossession of illegally acquired public land																
Providing innovation and incubation services to SMEs.																
Nurturing of youth talent through development of 'Jua Kali' associations in all Sub-Counties.																
Building artisan (Jua Kali) sheds in trading centres.																
Incentivization of prospective industrial investors through tax rebates and tax holidays.																
Formalizing MSMEs through streamlining licensing procedures and formulating suitable policies.																

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Review of curriculum in polytechnics to include manufacturing activities and processes.															
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d) Trade and Commerce

Project/Programme	Time Frame														Implementing Agency
	Short Term (2020-2023)					Medium Term (2024-2026)					Long Term (2027-2030)				
Create awareness for existing credit facilities.															▪ Dept. of Industrialization and Cooperatives
Increase uptake of government funded credit facilities															
Provide financial literacy and entrepreneurship programmes															
Construct business incubation in all major urban centres															
Establish county enterprise fund															
Branding and marketing of Nyandarua products															
Regional trade cooperation to establish trading blocs/partnerships.															

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Establishment of modern agricultural wholesale market at Magumu.																
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e) Transport

Project/Programme	Time Frame														Implementing Agency
	Short Term (2020-2023)					Medium Term (2024-2026)					Long Term (2027-2030)				
Upgrade Rironi-Shamata-Ndaragwa road and Mang’u- Njabini road to form 1 corridor from Mang’u to Ndaragwa through Njabini & Engineer															<ul style="list-style-type: none">Ministry of transport, infrastructure, housing, urban development and public worksKENHA
Tarmacking of Charagita- Silibwet- Nyahururu															<ul style="list-style-type: none">KERRA
Tarmacking of Engineer- Kamba- Kinja- Gathara- Tulaga															<ul style="list-style-type: none">Dept. of transport, energy and public worksKERRADevelopment Partners
Tarmacking of Gathara- Kianguyu- Mberekenya															
Tarmacking of Gichungo- Olkalou Sec Sch															
Tarmacking of Kabazi- Kwa Kiongo- Tumaini- Mawingu- Gilgil															
Tarmacking of Kamahia- Machinery															

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Tarmacking of Karunga- Karuri- Jura- Murungaru																	
Tarmacking of Karunga- Langa Langa- Munyugu																	
Tarmacking of Kiamariga- Uruku- Kihara- Kilimanjaro- Shamata- Kaka																	
Tarmacking of Maili Kumi- Ndaragwa- Mutara																	
Tarmacking of Mairo Inya- Kalamton- Leshau																	
Tarmacking of Mairo Inya- Ol Borosat- Gichungo- Kariamu																	
Tarmacking of Maraigushu- Githabai- Njabini																	
Tarmacking of Mawingu- Ol Loliondo- Kagaa- Captain- Wanjohi- Geta- Ndinda- Kirima																	
Tarmacking of Mawingu- Karunga- Kaimbaga- Kamande																	
Tarmacking of Mawingu Road																	
Tarmacking of Mirangini- Chagarita- Dundori- Gwa Kiongo- Ol Joro Orok																	
Tarmacking of Mirangini- Ruiru- Ngano- Ngatha- Gathanji- Gatimu																	

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Tarmacking of Munyeki- Olkalou																
Tarmacking of Ol Joro Orok- Weru-Rurii																
Tarmacking of Ol Kalou- Munyeki-Gichungo																
Tarmacking of Ol Kalou- Munyeki 1																
Tarmacking of Ol Kalou- Munyeki 2																
Tarmacking of Ol Kalou- Munyeki 3																
Tarmacking of Ol Kalou- Munyeki 4																
Tarmacking of Olkalou- Olkalou Pri Sch 1																
Tarmacking of Olkalou- Olkalou Northern																
Tarmacking of Olkalou- Olkalou Pri Sch- Munyeki																
Tarmacking of Subuku- Shamata- Kaka																
Tarmacking of Wanjohi- Kiambogo-Geta																
Tarmacking of Olkalou-Ndunyu Njeru-Nyeri																
Tarmacking of Njabini-Murang'a																
Tarmacking of Gwa Kungu-Nanyuki																
Tarmacking of Kariamu- Ndaragwa																

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Tarmacking of Murungaru-Ririchua-Gilgil																	
Tarmacking of Mairoinya-Ndongine-Rumuruti																	
Tarmacking of Kasuku- Olbolossat																	
Tarmacking of Kasuku- Kirimanyai-Charagita																	
Tarmacking of Captain-Ndemi-Muthangari																	
Tarmacking of Kari-Ngano-Charagita																	
Tarmacking of Kipipiri-Gilgil																	
Tarmacking of Wanjohi-Ol'bolossat road																	
Tarmacking of Charagita-Olkalou																	
Tarmacking of Ndunyu Njeru road (C481) off Olkalou-Njabini road (B21)																	
Tarmacking of Mirangine road off Olkalou-Dundori road (B21)																	
Rehabilitation of Gilgil-Olkalou-Nyahururu railway and renovation of Olkalou and Oljoro-Orok railway stations																	<ul style="list-style-type: none"> Ministry of transport, infrastructure, housing, urban development and public works Kenya Railways
Upgrading of Oljoro-Orok airstrip																	<ul style="list-style-type: none"> Ministry of transport, infrastructure, housing,

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																urban development and public works ▪ Kenya Airports Authority (KAA)
Upgrading of terminal facilities in Ngorika, Mirangine, Oljoro-Orok, Kasuku, Ndaragwa, Ndemi, Captain, Geta, Mawingu, Engineer, Ngano and Wanjohi																▪ Dept. of transport, energy and public works
Establishment of new terminals in Kangui, Kanjuiri, and Gathanji																

f) Human Settlement

Project/Programme	Time Frame															Implementing Agency
	Short Term (2020-2023)					Medium Term (2024-2026)					Long Term (2027-2030)					
Fast track 100% issuance of title deeds in colonial villages																▪ Dept. of Lands, Housing and Physical Planning
Conferment of Municipal status to Mairo-Inya and Engineer																
Prepare integrated urban plans for Olkalou, Mairo-Inya, Njabini and all sub county headquarters																
Provide adequate basic services in all the urban centres such as water,																

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fire fighting equipment, affordable housing, sewer facilities etc.																	
Undertake the assessment and classification of all centres in the county.																	
Institutionalize municipal board for Olkalou																	
Constitute and institutionalize town committees for Engineer, Magumu, Njabini, Oljoro Orok, Mairo-Inya, Miharati and Ndaragwa																	
Formulate a county housing policy																	

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g) Water Supply

Project/Programme	Time Frame														Implementing Agency
	Short Term (2020-2023)					Medium Term (2024-2026)				Long Term (2027-2030)					
Construction of 6 mega dams i.e. Pesi, Kinja, Malewa, Shamata/Kirima, Kiburu and Geta															<ul style="list-style-type: none">Ministry of water and sanitationDept. of water, environment, tourism and natural resources
Develop a county water and sewerage master plan															<ul style="list-style-type: none">
Extension of existing water supply schemes i.e. OLWASCO to cover all households within the municipality															<ul style="list-style-type: none">Dept. of water, environment, tourism and natural resources
Establishment of water supply schemes in Engineer, Njabini, Mairo Inya, Ndaragwa and Miharati															
Enforcement of environmental laws and regulations to protect water towers.															
Desiltation of rivers, dams and water pans															<ul style="list-style-type: none">Dept. of water, environment, tourism and natural resourcesWRAWASREB
Rehabilitate existing boreholes and sink new ones															<ul style="list-style-type: none">Dept. of water, environment, tourism and natural resourcesWRAWASREB

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Conduct sensitization campaigns to promote rain water harvesting																<ul style="list-style-type: none"> Dept. of water, environment, tourism and natural resources
Forge inter-agency partnerships in water supply and management																<ul style="list-style-type: none"> Water Resource Authority (WRA), Ministry of Water Regional Development Authorities KFS Kenya Water Towers Agency (KWTa)
Sensitization of the community in the management of dams and water pans.																<ul style="list-style-type: none"> Dept. of water, environment, tourism and natural resources
Construction of designated water points for livestock.																<ul style="list-style-type: none"> Dept. of water, environment, tourism and natural resources
Repossess all illegally acquired land previously occupied by dams and water pans.																<ul style="list-style-type: none"> Dept. of water, environment, tourism and natural resources

h) Sewerage and Sanitation (Wastewater Management)

Project/Programme	Time Frame													Implementing Agency	
	Short Term (2020-2023)					Medium Term (2024-2026)					Long Term (2027-2030)				
Establishment of sewerage networks and treatment plants in Olkalou, Mairo Inya, Njabini and Engineer															<ul style="list-style-type: none">Dept. of water, environment, tourism and natural resourcesDept. of transport, energy and public works

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Establishment of decentralized treatment plants in Oljoro-Orok, Miharati and Ndaragwa																
Sensitization campaign to promote on-site treatment/septic tanks in rural areas																
Partner with private firms/companies in wastewater management in a PPP framework.																

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i) Solid Waste Management

Project/Programme	Time Frame														Implementing Agency
	Short Term (2020-2023)					Medium Term (2024-2026)					Long Term (2027-2030)				
Sensitizing people to adopt integrated solid waste management approaches i.e. waste avoidance and reduction; waste recovery, re-use and recycling.															<ul style="list-style-type: none">▪ Dept. of health services▪ Dept. of water, environment, tourism and natural resources
Equip environment department with 3 waste collection trucks															
Establishment of waste transfer stations; two each in Olkalou, Njabini, Engineer and Mairo-Inya, one each in Ndaragwa, Oljoro-Orok, Miharati, Kasuku and Magumu															
Establishment of sanitary landfills in Olkalou, Malewa, Kaharu, Tulaga and Mbuyu															
Provision of incinerators in all health facilities from level 3 (health centre) and above															

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The County Government to partner with private firms in solid waste management.																<ul style="list-style-type: none"> Dept. of water, environment, tourism and natural resources
Enforcement of NEMA laws and regulations																<ul style="list-style-type: none"> Dept. of water, environment, tourism and natural resources

j) Electricity

Project/Programme	Time Frame															Implementing Agency
	Short Term (2020-2023)					Medium Term (2024-2026)					Long Term (2027-2030)					
Extension of power supply network																<ul style="list-style-type: none">Kenya Power CompanyDept. of Transport, Energy and Public WorksDept. of Transport, Energy and Public Works
Sensitization campaign to promote alternative renewable energy sources e.g. solar and biogas																
Construct mini-hydropower stations in the existing water falls in the county																
Encourage PPPs in power generation and distribution.																

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k) Information Communication Technology (ICT)

Project/Programme	Time Frame															Implementing Agency
	Short Term (2020-2023)					Medium Term (2024-2026)					Long Term (2027-2030)					
Develop a county ICT policy																<ul style="list-style-type: none">Ministry of information, communication and technologyDepartment of Public Administration and ICTDepartment of Finance and Physical PlanningDepartment of Lands, Housing and Physical Planning
Fiber Optic Cable to be fully rolled out in the County.																
Partnerships with ICT stakeholders to provide adequate telephony and big-data transmissions.																
Integrate ICT in county operations such as digitization and automation of essential services e.g. revenue collection, planning and development approvals, single business permits and trade licenses.																
Provision of internet enabled computers in all county administrative offices to the ward level; at least one in each																<ul style="list-style-type: none">Dept. Of public administration and ICT
Provide affordable ICT services through integrated data centres, internet and innovation hubs and business process outsourcing in all																

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urban centres and sub-county headquarters																
Recruitment of IT officers in every Sub County																<ul style="list-style-type: none"> ▪ Dept. Of public administration and ICT ▪ Nyandarua County Public Board
Regular updating of the Nyandarua County website.																<ul style="list-style-type: none"> ▪ Dept. Of public administration and ICT

l) Education

Project/Programme	Time Frame															Implementing Agency
	Short Term (2020-2023)					Medium Term (2024-2026)					Long Term (2027-2030)					
Provide teaching and learning materials in Primary and Secondary schools.																<ul style="list-style-type: none">▪ Ministry of education▪ Dept. of education, gender, culture and social services
Provide playing and athletic fields in Primary and Secondary schools.																<ul style="list-style-type: none">▪ Ministry of education
Establish University of Nyandarua at Kaptain																<ul style="list-style-type: none">▪ Ministry of education▪ Dept. of education, gender, culture and social services
Establish a merit-based bursary/scholarship programme																<ul style="list-style-type: none">▪ Dept. of education, gender, culture and social services

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Review of curriculum in youth polytechnics to center on subjects that are more relevant to the economy of Nyandarua e.g. agriculture and industry																<ul style="list-style-type: none"> ▪ Dept. of education, gender, culture and social services
Establish an internship/mentorship programme for gifted children to acquire skills, training and certification.																<ul style="list-style-type: none"> • Dept. of education, gender, culture and social services
Develop talent academies and centres of excellence for upskilling and capacity building																<ul style="list-style-type: none"> • Dept. of education, gender, culture and social services
Encourage community participation in the management of schools through Parent Teacher Associations (PTAs) and parent committees to raise awareness of the community needs regarding education.																<ul style="list-style-type: none"> • Dept. of education, gender, culture and social services
Construction of adequate classrooms and sanitation facilities.																<ul style="list-style-type: none"> • Dept. of education, gender, culture and social services
Establishment of ECDE centres of excellence in every Sub County.																<ul style="list-style-type: none"> • Dept. of education, gender, culture and social services
Establish a training college for ECDE.																<ul style="list-style-type: none"> • Dept. of education, gender, culture and social services

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Construction of hostels for the youth polytechnics.																<ul style="list-style-type: none"> Dept. of education, gender, culture and social services
Institute home craft centres																<ul style="list-style-type: none"> Dept. of education, gender, culture and social services
Institute Olkalou Youth Polytechnic modern garage.																<ul style="list-style-type: none"> Dept. of education, gender, culture and social services
Construct youth polytechnic centres of excellence.																<ul style="list-style-type: none"> Dept. of education, gender, culture and social services

m) Health

Project/Programme	Time Frame														Implementing Agency
	Short Term (2020-2023)					Medium Term (2024-2026)					Long Term (2027-2030)				
Upgrading J.M. Kariuki hospital (level 4) to a county referral hospital (level 5)															▪ Dept. of health services
Upgrading of Engineer Hospital to level 4 (high density)															
Upgrading of Njabini Health Centre to Level 4															
Construction of 3 health centres (level 3), 37 dispensaries (level 2) and 109 community health units (level 1) as per the needs assessment.															

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Provide an ambulance for each ward																
Develop and implement a drug management system in health facilities to track distribution and abuse.																
Undertake equipment needs assessment in county health facilities and provide accordingly																
Formulate a county health policy guided by needs assessment to provide targeted medical care.																
Partner with the National Government, NGOs and other development partners in the provision of health services																

n) Recreation and Community Facilities

Project/Programme	Time Frame															Implementing Agency
	Short Term (2020-2023)					Medium Term (2024-2026)					Long Term (2027-2030)					
Gazettement of forests, lakes, wetlands and hilltops																<ul style="list-style-type: none">Ministry of environmentKFS
Enforcement of NEMA laws and regulations.																<ul style="list-style-type: none">Dept. of water, environment, tourism and natural resources

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Tree planting around L. Ol'bolossat																<ul style="list-style-type: none"> Dept. of water, environment, tourism and natural resources Dept. of youth, sports and arts
Construction of Olkalou stadium																
Upgrade Ndaragwa, Oljoro-Orok and Engineer playgrounds to stadia																
Construction of a stadium in Miharati and a public playground in Mairo Inya																
Establishment of a sports fund to support sports talent.																<ul style="list-style-type: none"> Dept. of youth, sports and arts
Establishment of high-altitude athletics training academies at Geta																<ul style="list-style-type: none"> Dept. of youth, sports and arts

o) Environmental Conservation Projects

Project/Programme	Time Frame														Implementing Agency
	Short Term (2020-2023)					Medium Term (2024-2026)					Long Term (2027-2030)				
Sensitization campaigns on proper farming practices and Climate Smart Agriculture (CSA)															<ul style="list-style-type: none">Dept. of water, environment, tourism and natural resourcesDept. of agriculture, livestock and fisheriesMinistry of tourism and wildlife
Rehabilitation of abandoned quarrying sites															<ul style="list-style-type: none">Dept. of water, environment, tourism and natural resources

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Sensitization campaigns to promote reforestation and agroforestry																	<ul style="list-style-type: none"> ▪ Dept. of water, environment, tourism and natural resources ▪ Dept. of agriculture, livestock and fisheries ▪ KFS
Fencing of Lake Ol'bolossat																	1 Ministry of tourism and wildlife
Complete fencing of Aberdare National Park																	<ul style="list-style-type: none"> ▪ Ministry of tourism and wildlife

21.5 Capital Investment Framework

Physical planning in the past has suffered from many deficiencies, amongst which the most important have been the inflexibility of the instrument and the difficulties of updating it; the other has been the split between planning and implementation. Capital Investment Plans (CIPs) are intended to help bridge this gap by providing practical and realistic guidance regarding the next steps in implementing the capital development aspects of the plan.

In order to be realistic, CIPs must have two very important qualities. The first is to be affordable and within current budgetary conditions. The second is to respond to real priorities in terms of the expectations of the stakeholders and technical needs of the county as conceived by the consultant/specialist. There arises a possible disparity between priorities of the stakeholders and those of the specialists, this report addresses this problem.

21.5.1 Project prioritization

Prioritization refers to evaluating a group of items and organizing/ranking them in order of importance or urgency. In essence, it refers to ‘doing first things first’. In order to arrive at the capital investment plan, all proposed projects were filtered by applying a set of criteria thus arranging them in order of priority.

Selecting the capital investments for a detailed study required a careful filtering process. This was carried out through a series of 5 steps as indicated below:

Step 1: Preparation of a catalogue of all proposed projects required for the achievement of the Nyandarua CSP objectives. These were outlined in the implementation framework in the Draft Plan Proposals Report.

Step 2: Prioritization of projects based on importance and urgency. The projects fell into 2 categories i.e., priority 1: important and urgent and priority 2: important but not urgent.

Step 3: Cross referencing of prioritized projects against the priorities established by stakeholders during the Visioning and Objective Setting Workshop.

Step 4: Preparation of a shortlist of projects sifted through steps 2 and 3.

Step 5: Preparation of a final list of capital investment projects as outlined in this report.

21.6 Prioritization Criteria

The projects and programs proposed by the Nyandarua CSP were prioritized based on how important or urgent they were. In turn, importance of projects was weighted based on their individual ability to facilitate the achievement of the plan’s objectives and the stakeholders’ vision of Nyandarua whereas

urgency was weighted based on a project's capacity to quickly attain to or facilitate the attainment of objectives. This ability/capacity is indicated by the attributes listed below.

- a) Economic productivity
- b) Creation of employment opportunities
- c) Generation of income
- d) Number of people positively impacted by the project

21.6.1 Economic Productivity

A country's ability to improve its standard of living over time depends almost entirely on its ability to raise its output per worker. Productivity is defined as a ratio between the output volume and volume of inputs. It therefore measures how efficiently production inputs such as labour and capital are used in an economy to produce a certain level of output. Hence the less the inputs used in the attainment of a specified level of output, the higher the productivity.

In the prioritization of projects, those projects with a larger potential for creating the highest levels of productivity in Nyandarua were chosen. These, therefore, are the projects with the largest bearing on the main activities driving the county economy including agriculture, tourism and trade. Also, in line with the 'Big 4' agenda, those projects that foster a suitable environment for manufacturing and industrialization have been chosen. In consequence, capital projects are referred to as economic enablers.

21.6.2 Employment Opportunities

Under this element, the CSP has aspired to pick the projects that have the aptitude to create job opportunities with a minimum level of investment, while simultaneously promoting the highest output. This is because the aim of minimizing the overall cost of achieving a particular output should be paramount. Therefore, in the choice of projects, there was a reasonable trade-off between the cost of a project, its output and the expected job creation.

21.6.3 Income Generation

Income is defined as the monetized value of the flow of goods and services and experience shows that increased income contributes to a better quality of life in the long run both at macro and micro levels (Kumar, 1989). This, in essence, is the overall goal of the Nyandarua CSP. Higher income will therefore be used as an indicator for the attainment of the plan's objectives. Therefore, the projects which were expected to contribute the most in increasing income levels both at household and county level were chosen.

At micro level, rising incomes will be indicated by better food and nutrition, clothing etc. whereas at macro level they are indicated by higher literacy levels, declining mortality and improved socio-political institutions among others.

21.6.4 Number of People Positively Impacted

Here, the projects that had the potential to positively impact the largest number of people in Nyandarua, either through increased productivity, creating employment or generating income, were chosen. This is based on the presumed notion that the larger the number of beneficiaries as a result of the implementation of a certain project, the higher the chances that the project promotes the achievement of preset objectives.

21.7 List of Prioritized Projects

The projects proposed under the Nyandarua CSP, having been subjected to the criteria outlined above, were prioritized by sector as shown in the tables below.

Agriculture

Project/Programme	Priority
Provision of subsidized inputs including high-yielding seeds	2
Establishment of irrigation schemes: Muti Umwe, Kwa Njora, Gathanji, Ngorika and Murungaru	2
Adopt minimum plot sizes in agricultural land	2
Establishing County Tractor Hire Services	2
Recruitment and facilitation of extension officers	2
Seed multiplication ATCs to promote Pyrethrum, sugar beets, giant bamboo, avocado and sunflower growing	1
Establish quality control measures to standardize packaging of local crop produce	1
Establishing trading partnerships at regional, national and international levels	1
Establish technical training and demonstration programs for the youth in agriculture	2
Promoting youth groups in agriculture	2
Diversification into high-value crops	1
Establishment of livestock sale yards in Ndaragwa and Geta	1
Construction of cold store in Olkalou	1
Construction of ponds	2
Establishment of fish mini-processing industry	2

Tourism

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Project/Programme	Priority
Enforcement of environmental laws and regulations	2
Rehabilitation, conservation and dredging of Lake Ol'bolossat	1
Renovation of dilapidated Happy Valley Homes (Wanjohi)	1
Development of three equator viewpoints in Gwa Kung'u, Kia Njata and Gwa Kiongo	2
Construction of Mau Mau monuments in Njabini and Gwa Kung'u	2
Develop Manguo Hippo Point for game viewing	2
Promote bird watching in Central Ward, L. Ol'bolossat and Murungaru	1
Promote sport fishing in Shamata and Geta Wards	2
Promote mountain biking in Geta, North Kinangop, Gathara (Pesi), and Njabini wards	2
Promote eco-lodges in Shamata, Kipipiri, Weru and Geta wards	2
Establish a high-altitude training camp at Kaheho (Shamata)	2
Promote mountain climbing and hiking/nature trails in Shamata, Kipipiri, Geta, Murungaru, Njabini/Kiburu and North Kinangop	2
Promote water sports/canoeing at L. Ol'bolossat (Weru), Sasumua Dam (Njabini/Kiburu) and John Nimu and Karemeri Dams (North Kinangop)	2
Establish cable cars in Geta (between Kipipiri peak and Twin peaks)	2
Marketing of Mau Mau caves in Wanjohi, Geta and Murungaru	2
Develop marathon and biking circuit in Geta	2
Gazettement of cultural heritage sites; Mau Mau caves and Happy Valley Homes	1
Establishment of County Tourism Website	1

Industrialization

Project/Programme	Priority
Fruit processing in Wanjohi	1
Wool processing/textile manufacturing in Engineer	1
Leather tanning in Ndaragwa	1
Animal feeds processing in Miharati	1
Dairy processing plant in Mirangine	1
Dairy meal processing in Mirangine	1
Dairy meal processing in Miharati	1
Livestock feeds manufacturing plant in Ndunyu Njeru	2
Poultry feeds manufacturing plant in Olkalou	2
Thread milling industry in Njabini	2

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Basket weaving industry in Oljoro-Orok	2
Special Economic Zones/Industrial Parks in Olkalou and Ndaragwa	1
Cold storage facilities in Murungaru, Shamata, Geta, Tumaini and Oljoro-Orok	1

Trade and Commerce

Project/Programme	Priority
Sensitization on existing credit facilities	2
Establishment of regional trading blocs	1
Establishment of modern agricultural wholesale market at Magumu	1

Transportation

Project/Programmes	Priority
Upgrade Rironi-Shamata-Ndaragwa Road and Mang'u- Njabini road to form 1 corridor from Mang'u to Ndaragwa through Njabini & Engineer	1
Tarmacking of Charagita- Silibwet- Nyahururu	1
Tarmacking of Engineer- Kamba- Kinja- Gathara- Tulaga	2
Tarmacking of Gathara- Kianguyu- Mberekenya	2
Tarmacking of Gichungo- Olkalou Secondary School	2
Tarmacking of Kabazi- Kwa Kiongo- Tumaini- Mawingu- Gilgil	2
Tarmacking of Kamahia- Machinery	2
Tarmacking of Karunga- Karuri- Jura- Murungaru	2
Tarmacking of Karunga- Langa Langa- Munyugu	2
Tarmacking of Kiamariga- Uruku- Kihara- Kilimanjaro- Shamata- Kaka	2
Tarmacking of Maili Kumi- Ndaragwa- Mutara	2
Tarmacking of Mairo Inya- Kalamton- Leshau	2
Tarmacking of Mairo Inya- Ol Borosat- Gichungo- Kariamu	2
Tarmacking of Maraigushu- Githabai- Njabini	2
Tarmacking of Mawingu- Ol Loliondo- Kagaa- Captain- Wanjohi- Geta- Ndinda- Kirima	2
Tarmacking of Mawingu- Karunga- Kaimbaga- Kamande	2
Tarmacking of Mawingu Road	2
Tarmacking of Mirangini- Chagarita- Dundori- Gwa Kiongo- Ol Joro Orok	2
Tarmacking of Mirangini- Ruiru- Ngano- Ngatha- Gathanji- Gatimu	2
Tarmacking of Munyeki- Olkalou	2
Tarmacking of Ol Joro Orok- Weru- Rurii	2

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Tarmacking of Ol Kalou- Munyeki- Gichungo	2
Tarmacking of Ol Kalou- Munyeki 1	2
Tarmacking of Ol Kalou- Munyeki 2	2
Tarmacking of Ol Kalou- Munyeki 3	2
Tarmacking of Ol Kalou- Munyeki 4	2
Tarmacking of Olkalou- Olkalou Pri Sch 1	2
Tarmacking of Olkalou- Olkalou Northern	2
Tarmacking of Olkalou- Olkalou Pri Sch- Munyeki	2
Tarmacking of Subuku- Shamata- Kaka	2
Tarmacking of Wanjohi- Kiambogo- Geta	2
Tarmacking of Olkalou-Ndunyu Njeru-Nyeri	1
Tarmacking of Njabini-Murang'a	1
Tarmacking of Gwa Kungu-Nanyuki	1
Tarmacking of Kariamu- Ndaragwa	1
Tarmacking of Murungaru-Ririchua-Gilgil	1
Tarmacking of Mairoinya-Ndongine-Rumuruti	1
Tarmacking of Kasuku- Ol'bolossat	1
Tarmacking of Kasuku- Kirimanyai- Charagita	2
Tarmacking of Captain-Ndemi-Muthangari	2
Tarmacking of Kari-Ngano-Charagita	2
Tarmacking of Kipipiri-Gilgil	1
Tarmacking of Wanjohi-Ol'bolossat Road	1
Tarmacking of Charagita-Olkalou	1
Tarmacking of Ndunyu Njeru road (C481) off Olkalou-Njabini road (B21)	1
Tarmacking of Mirangine road off Olkalou-Dundori road (B21)	1
Rehabilitation of Gilgil-Olkalou-Nyahururu railway and renovation of Olkalou and Oljoro-Orok railway stations	1
Upgrading of Oljoro-Orok airstrip	1
Upgrading of terminal facilities in Ngorika, Mirangine, Oljoro-Orok, Kasuku, Ndaragwa, Ndemi, Captain, Geta, Mawingu, Engineer, Ngano and Wanjohi	1
Establishment of new terminals in Kangui, Kanjuiri, and Gathanji	1

Human Settlements

Project/Programme	Priority
Conferment of Municipal status to Mairo-Inya and Engineer	2

Prepare integrated urban plans for Olkalou, Mairo-Inya, Njabini and all sub county headquarters	2
Classification of all urban areas within the county	2
Constitute and institutionalize municipal boards for Engineer and Mairo Inya	2
Constitute and institutionalize town committees for Engineer, Magumu, Njabini, Oljoro Orok, Mairo-Inya, Miharati and Ndaragwa	2
Formulate county housing policy	1

Water Supply

Project/Programme	Priority
Construction of 6 mega dams i.e. Pesi, Kinja, Malewa, Shamata/Kirima, Kiburu and Geta	1
Extension of existing water supply schemes i.e. OLWASCO to cover all households within the municipality	1
Establishment of water supply schemes in Engineer, Njabini, Ndaragwa, Mairo Inya and Miharati	1
Desiltation of rivers, dams and water pans	2
Rehabilitate existing and sink new boreholes	1
Sensitization campaigns to promote rain water harvesting	1

Sewerage and Sanitation (Wastewater Management)

Project/Programme	Priority
Establishment of sewerage networks and treatment plants in Olkalou, Mairo Inya, Njabini and Engineer	1
Establishment of decentralized treatment plants in Oljoro-Orok, Miharati and Ndaragwa	2
Sensitization campaign to promote on-site treatment/septic tanks in rural areas	2

Solid Waste Management

Project/Programme	Priority
Sensitization campaign to promote waste reduction, re-use and recycling	1
Purchase of 3 waste transportation trucks	1
Establishment of transfer stations; two each in Olkalou, Njabini, Engineer and Mairo-Inya, one each in Ndaragwa, Oljoro-Orok, Miharati, Kasuku and Magumu	1
Provision of color-coded bags in all urban centres (Olkalou, Mairo-Inya, Njabini and all sub county headquarters)	2
Establishment of sanitary landfills in Olkalou, Malewa, Kaharu, Tulaga and Mbuyu	1

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Provision of incinerators in all health facilities from level 3 (health centre) and above	2
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Electricity Supply

Project/Programme	Priority
Extension of power supply network	1
Sensitization campaign to promote alternative renewable energy sources e.g. solar and biogas	2

Information Communication Technology (ICT)

Project/Programme	Priority
Laying of Fiber Optic cables to connect the County and Sub County headquarters	1
Provision of internet enabled computers in all county administrative offices to the ward level; at least one in each	2
Recruitment of two IT officers in every Sub County	2

Education

Project/Programme	Priority
Establish University of Nyandarua	2
Establish a merit-based bursary/scholarship programme	2
Review of curriculum in youth polytechnics to center on subjects that are more relevant to the economy of Nyandarua e.g. agriculture and industry	1

Health

Project/Programme	Priority
Upgrading J.M. Kariuki hospital (level 4) to a county referral hospital (level 5)	1
Upgrading of Engineer Hospital to level 4 (high density)	1
Upgrading of Bamboo, Manunga, Mirangine, Ngano and Ndaragwa Health Centres to Level 4	2
Provide an ambulance for each ward	2
Undertake equipment needs assessment in county health facilities and provide accordingly	2
Formulation of a county health policy	2

Recreation and Community Facilities

Project/Programme	Priority
Tree planting around L. Ol'bolossat	2
Construction of Olkalou stadium	1
Upgrade Ndaragwa, Oljoro-Orok and Engineer playgrounds to stadia	1
Provision of a stadium in Miharati and public playground in Mairo Inya	2

Environmental Conservation Projects

Project/Programme	Priority
Sensitization campaign on proper farming practices and Climate Smart Agriculture (CSA)	2
Rehabilitation of abandoned quarrying sites	2
Sensitization campaign to promote reforestation and agroforestry	1
Fencing of Lake Ol'bolossat	1
Complete fencing for Aberdare National Park	2

21.8 Funding Option

This section presents the county's revenue and expenditure performance and identifies ways of improving county revenue. Moreover, challenges encountered in revenue collection and budget implementation have been explored with the aim of developing an efficient and sustainable revenue generation, proper management and utilization of county resources in order to facilitate the implementation of projects proposed in the Nyandarua CSP.

21.8.1 County Budget

The total county budget for the financial year 2015/16 was Ksh.5.6 Billion. Out of this, Ksh.3.4 Billion (60%) was meant for recurrent expenditure and Ksh.2.2 Billion (40%) was meant for development expenditure. This budget was to be financed by 4.3 Billion (79%) from the national equitable share, and the remaining 1.3 Billion (21%) from conditional grants and local revenue sources.

21.8.2 Revenue

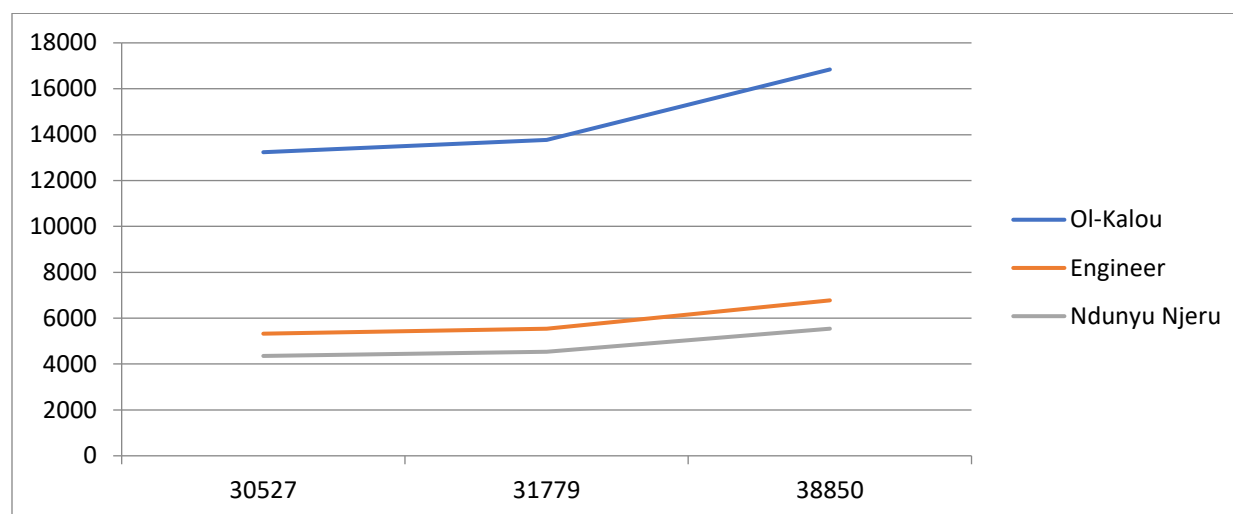
In the financial year (FY) 2019/20, the county was projected to receive Ksh. 5.6 billion from the various sources, with Ksh. 4.8 billion (79%) being from the national equitable share. This was projected to rise to about Ksh. 5.5 billion in the FY 2016/17 and 5.7 billion in the FY 2017/18.

21.8.3 Expenditure

In the FY 2015/16, total county expenditure amounted to Ksh. 4.9 billion, 87.5% of the Ksh. 5.6 billion budgets. Out of the expended 4.9 billion, 3.2 billion (86%) was recurrent expenditure whereas the remaining 819,530,101 (14%) was development expenditure. Notably, the recurrent expenditure was 94% of the money released whereas the development expenditure was 77% of the funds released. This signifies a lower absorption rate for development expenditure compared to recurrent expenditure.

Remarkably, county expenditure has been steadily rising from the FY 2013/14 to 2015/16 as shown on the graph below.

Chart 21-1: Trends in County Expenditure



Source: County Dept. of Finance and Economic Planning, 2017

21.9 Challenges of Revenue Collection

The major issues constraining revenue collection in Nyandarua are:

- Lack of political good will.
- Weak internet services.
- Structured services not fully implemented (automated).
- Potential revenue sources that are not exploited e.g., non-food business premises, health inspection fee and tourism related activities.

21.10 Revenue Resource Mapping

It has already been noted that Nyandarua relies on the national equitable share for most of its revenue which was Ksh. 4.3 billion (79%) in FY 2015/16 and is projected to be Ksh. 5.5 billion (88%) in FY 2019/20. In the FY 2015/16, local collections amounted to Ksh. 0.281 billion, accounting for only 5.9% of the total county revenue. This is as shown in the table below which indicates revenue projections from FY 2015/16 to FY 2019/20.

Table 21-1: County Revenue Projections

REVENUE	AMOUNT PER FINANCIAL YEAR				
	2015/16 (Actual)	2016/17 (Projected)	2017/18 (Projected)	2018/19 (Projected)	2019/20 (Projected)
Balance B/F	591,051,795	296,375,595	0	0	0
National Transfers	4,307,070,831	4,647,384,382	4,959,688,612	5,221,801,092	5,535,109,158

Local Collections	281,941,469	350,000,000	371,000,000	393,260,000	416,855,600
CODITIONAL GRANTS					
Fuel Levy Fund	54,714,122	71,407,130	130,725,000	71,407,130	1,407,130
Maternal Health Care	30,690,000	46,514,879	50,716,400	46,514,879	46,514,879
User Fees Foregone	13,898,986	13,122,239	13,898,986	13,122,239	13,122,239
Leasing of Medical Equipment	95,744,681	95,744,681	95,744,681	95,744,681	95,744,681
DANIDA (Donor Grant)	18,860,000	9,430,000	0	0	0
European Union (Donor Grant)	0	0	66,000,000	44,000,000	0
TOTAL	5,393,971,884	5,529,978,906	5,687,773,679	5,885,850,021	6,178,753,687

Source: Nyandarua County Fiscal Strategy Paper, 2017

Of the local revenue sources in the FY 2015/16, Single Business Permits (SBPs), cess and royalties, parking fees and land rates were the leading sources. In the FY 2015/16, SBPs accounted for Ksh. 0.81 billion (about 29 %) of the total local revenue. This was a rise from Ksh. 0.72 billion in the FY 2014/15.

21.11 Revenue Enhancement Strategies

Nyandarua County has a potential of generating higher local revenues, principally from property tax and entertainment tax, which are two tax bases assigned to them under Article 209 (3) of the constitution. In addition, Article 209 (4) enables counties to collect fees and user charges for services provided under county legislation.

The legislation framework created by the Finance Bill, 2014 also gives the County legal mandate to collect taxes from additional revenue streams within its jurisdiction. The following cross-cutting institutional changes are to be considered in order to enhance revenue across all revenue streams:

1. Improve coordination in terms of assessment, collection, administration and data sharing: the integration of various revenue functions is critical to ensuring that all revenue sources are easily mapped and reliable predictions about revenue potential can be made for all the revenue sources.

2. Utilize the CSP-GIS database and IT solutions to improve effectiveness for several revenue functions.
3. Introduce comprehensive monitoring and evaluation systems for each revenue source.
4. Create adequate revenue intelligence and vigilance system: proactive efforts to gather information about tax evasion are required.

The following recommendations have been made in respect to the major revenue sources in Nyandarua:

a) Single Business Permit (SBP)

- Preparation of an inventory of all business premises within Nyandarua.
- Introduce a decentralized collection process to enable better revenue realization.
- Integrate SBP with other revenue databases.
- Improve penal mechanism for defaulters.
- Capacity building of staff responsible for SBP administration.

b) Land Rates

- Expand coverage.
- Utilize the CSP-GIS database system to review and update rates database and identify properties for which land rates accounts have not been created.
- Set up mass valuation system for generation and collecting bills.
- Ensure that SBPs and other permits for non-essential facilities are denied until rates have been fully paid.
- Introduce simple IT solution to offer online payment options.

c) Parking Fees

- Conduct parking demand studies and expand parking facilities across the county accordingly.
- Develop enforcement and monitoring to ensure that all the existing parking spaces are utilized effectively.
- Develop a systematic method for determining parking charges based on the demand. Areas of higher demand should have higher parking fees.

21.11.1 *Other Strategies for Raising Revenue*

a) Developing an Inventory of County Assets

The County Government of Nyandarua should prepare a comprehensive database of its assets which will not only show revenue collection potential in the county but also provide a means for monitoring the extent of payment and/or default.

b) Build ICT Capacity

The county should build ICT capacity at the sub county and ward levels in order to operationalize the GIS database system whereby all property regarding the size of land, development status, ownership etc.

are recorded for tracking of county revenue. Therefore, there is need to extend the fiber optic cable to all sub counties, procure computers and recruit qualified staff.

c) Strengthening Institutional Framework and Capacity Building

The institutions responsible for revenue collection and management in the county should have autonomy within their jurisdiction in order to boost coordination and prevent duplication of roles.

Ultimately, movement towards an integrated e-governance platform is imperative. This will correct the fragmented manner in which revenue sources currently function thereby increasing efficiency in revenue collection and monitoring as well as convenience to the consumer.

21.12 Public participation

A plan proposals validation workshop was carried out by the consultant, Geodev (K) Ltd in Olkalou on the 3rd of October 2018. The stakeholders were asked to certify whether the proposals (including CIP) made by the consultant would steer Nyandarua towards the desired end state i.e. the vision. Moreover, they confirmed whether the proposals were adequate and/or appropriate and were asked to make further recommendations in respect to the plan proposals.

Plate 21-1: The Plan Proposals and CIP Validation Workshop



The Capital Investment Projects have therefore been vetted and approved by the concerned parties and are in line with the achievement of both the national and county government development goals/objectives.

21.13 Capital investment plans

Having considered the priorities set by stakeholders during the visioning and objective setting workshop, and the consultant's evaluation of the individual projects based on the criteria outlined in section 2 of this report, the CSP has proposed capital investment projects. These projects have been selected from the list of prioritized projects, and as was said earlier, they are envisioned to have the maximum impact in improving the quality of life of the people of Nyandarua within the shortest time.

21.14 List of Capital Investment Projects

The proposed Capital Investment Projects for Nyandarua County are shown in the table below:

Table 21-2: Capital Investment Projects

Project	Component Project	Unit	Number of Units	Estimated Cost	Responsibility
1. Upgrade Rironi-Shamata-Ndaragwa Road and Mang'u-Njabini road to form 1 corridor from Mang'u to Ndaragwa through Njabini & Engineer	Rironi-Shamata-Ndaragwa	Kilometres	38	2,660,000,000	Nyandarua County Government/KeRRA
	Njabini-Mang'u	Kilometres	52.2	3,654,000,000	KeNHA
2. Tarmacking of Roads	Olkalou-Ndunyu	Kilometres	50.3	3,521,000,000	KeNHA
	Njeru-Nyeri				
	Gwa Kungu-Nanyuki	Kilometres	79	5,530,000,000	KeNHA
	Mairoinya-Ndongine-Rumuruti	Kilometres	29.8	2,086,000,000	KeNHA
3. Rehabilitation of Gilgil-Olkalou-Nyahururu railway and renovation of Olkalou and Oljoro-Orok railway stations	Kasuku-Ol'bolossat		5.3	371,000,000	Nyandarua County Government/KeRRA
		Kilometres-railway	76.6	1,000,000,000	Ministry of Transport/Kenya Railways

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4. Construction of 6 mega dams	Pesi Dam	Cubic meters	435,687M ³	14,000,000,000	Ministry of Water and Sanitation - National Water Conservation and Pipeline Corporation (NWPC)
	Kinja Dam	Cubic meters	116,923M ³	7,000,000,000	Ministry of Water and Sanitation - National Water Conservation and Pipeline Corporation (NWPC)
	Malewa Dam	Serve 500,000 Population (Nyandarua and Nakuru counties)		6,000,000,000	Ministry of Water and Sanitation - National Water Conservation and Pipeline Corporation (NWPC)

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	Shamata/Kirima Dam		176,000M ³	8,000,000,000	Ministry of Water and Sanitation - National Water Conservation and Pipeline Corporation (NWPC)
	Kiburu Dam		100,000M ³	6,000,000,000	Ministry of Water and Sanitation - National Water Conservation and Pipeline Corporation (NWPC)
	Geta Dam		116,000M ³	7,000,000,000	Ministry of Water and Sanitation - National Water Conservation and Pipeline Corporation (NWPC)

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5. Establishment of water supply schemes in major towns	Engineer	Kilometres	52.3	12,191,020	Nyandarua County Government - Nyandarua Water and Sanitation Company
	Njabini	Kilometres	15.7	3,606,469	Nyandarua County Government - Nyandarua Water and Sanitation Company
	Mairo Inya	Kilometres	33.9	7,708,879	Nyandarua County Government - Nyandarua Water and Sanitation Company
	Ndaragwa	Kilometres	10.3	2,503,942	Nyandarua County Government - Nyandarua Water and Sanitation Company
	Miharati	Kilometres	17.7	4,078,299	Nyandarua County Government - Nyandarua Water and Sanitation Company

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6. Putting up Special Economic Zones/Industrial Parks	Olkalou	---		500,000,000	National Government Nyandarua County Government
	Ndaragwa	---		500,000,000	National Government Nyandarua County Government
7. Laying of Fiber Optic cables from Olkalou to the Sub County headquarters		Kilometres	120	42,000,000	Nyandarua County Government
8. Establishment of irrigation schemes	Muti Umwe	Acres	10	38,711,923	National Irrigation Board (NIB)
	Kwa Njora	Acres	10	27,228,887	National Irrigation Board (NIB)
	Gathanji	Acres	200		National Irrigation Board (NIB)
	Ngorika	---			National Irrigation Board (NIB)
	Murungaru	---			National Irrigation Board (NIB)

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9. Establishment of sewerage networks and treatment plants in major towns	Olkalou			800,000,000	Nyandarua County Government - Nyandarua Water and Sanitation Company
	Mairo Inya	Kilometres	21.2	470,869,954	Nyandarua County Government - Nyandarua Water and Sanitation Company
	Njabini	Kilometres	11.3	451,164,787	Nyandarua County Government - Nyandarua Water and Sanitation Company
	Engineer	Kilometres	14.0	457,174,034	Nyandarua County Government - Nyandarua Water and Sanitation Company
10. Establishment of modern agricultural wholesale market	Magumu				Nyandarua County Government
11. Rehabilitation, conservation and dredging of Lake Ol'bolossat		Kilometres(circumference)	38		Nyandarua County Government

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12. Formulate county housing policy				60,000,000	Nyandarua County Government
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21.15 Justification for Selection of Capital Investment Projects

The Capital Investment Projects were selected from the shortlist of priority projects due to the reasons outlined below:

Capital Investment Project 1: Upgrade Rironi-Shamata-Ndaragwa Road and Mang'u-Njabini road to form 1 corridor from Mang'u to Ndaragwa through Njabini & Engineer

This road will connect Nyandarua to Kiambu, Laikipia and Nyeri counties thus creating regional trading opportunities. It will also facilitate access to industries proposed in Ndaragwa, Wanjohi, Miharati, Engineer and Njabini thus enabling the efficient transportation of raw materials and finished goods. Moreover, it will foster access to major tourism attractions e.g., eco-lodges in Shamata, Geta and N. Kinangop as well as the biking and hiking routes proposed in Geta, Happy Valley Homes in Wanjohi among others.

Capital Investment Project 2: Rehabilitation of Gilgil-Olkalou-Nyahururu railway and renovation of Olkalou and Oljoro-Orok railway stations

Once the railway line is rehabilitated, it is expected to ease the transportation of inputs to and crop produce from the proposed food basket zone which lies mostly within Oljoro-Orok and Olkalou Sub Counties. Additionally, it will connect Nyandarua to Nakuru and Laikipia Counties thus creating access to outside markets for agricultural and industrial products.

Capital Investment Project 3: Construction of 6 mega dams i.e., Pesi, Kinja, Malewa, Shamata/Kirima, Kiburu and Geta

The mega dams are expected to greatly enhance water supply for domestic, commercial, agricultural and industrial use throughout the county. They will also raise potential for the generation of hydro-electric power.

Capital Investment Project 4: Establishment of water supply schemes in Engineer, Njabini, Mairo Inya, Ndaragwa and Miharati

This will enhance water supply for domestic, commercial and industrial use in the towns.

Capital Investment Project 5: Special Economic Zones/Industrial Parks in Olkalou and Ndaragwa

The SEZs and industrial parks are envisioned to not only enhance the development, transfer and commercialization of technology but also to create employment opportunities by encouraging growth of Small and Medium Enterprises (SMEs). Additional benefits of manufacturing and industrialization, which is in line with the 'Big 4' agenda, include value addition for agricultural produce, creation of market for local products as well as attraction of settlement to these towns which will lead to their economic growth.

Capital Investment Project 6: Laying of Fiber Optic Cables from Olkalou to the Sub County Headquarters

Laying of the fiber optic cable is expected to facilitate communication and access to information and enhance the efficiency of service delivery in government offices. It will also enable the creation of a digital inventory of all county assets and properties and thus ease revenue collection and monitoring.

Capital Investment Project 7: Establishment of Irrigation Schemes: Muti Umwe, Kwa Njora, Gathanji, Ngorika and Murungaru

The proposed irrigation schemes are in line with the 'Big 4' agenda on food security. Moreover, they will help in the commercialization of agriculture in Nyandarua through horticultural farming.

Capital Investment Project 8: Establishment of Sewerage Networks and Treatment Plants in Olkalou, Mairo Inya, Njabini and Engineer

These are the major towns in the county, two (Olkalou and Engineer) serving administrative functions whereas the other two are mainly commercial centres. It is therefore necessary, as a result of the current and projected agglomeration of people and economic establishments in these towns, to put in place functional sewerage systems. These include residential properties, businesses and industries among others.

Furthermore, selection was based on current and future population forecasts whereby Olkalou, the county headquarters, is expected to have close to 135,264 inhabitants by 2026. Within the same time period, Mairo Inya, Njabini and Engineer are projected to have a population of 20,199, 12,380 and 4,166 respectively.

Capital Investment Project 9: Tarmacking of Roads: Olkalou-Ndunyu Njeru-Nyeri, Gwa Kungu-Nanyuki, Mairoinya-Ndongine-Rumuruti, Kasuku-Ol'bolossat

The Olkalou-Ndunyu Njeru-Nyeri, Gwa Kungu-Nanyuki, and Mairoinya-Ndongine-Rumuruti roads connect Nyandarua County to Nyeri and Laikipia Counties therefore creating trading and investment opportunities in Nyandarua. Additionally, they facilitate the accessibility of markets in those counties. On the other hand, the road from Kasuku to Lake Ol'bolossat will enhance access to the lake via the Gilgil-Olkalou-Nyahururu (A4) highway, promoting tourist activities in the area.

Capital Investment Plan 10: Establishment of modern agricultural wholesale market at Magumu

Magumu is the gateway town into Nyandarua County from the southern side, being only about 62 kilometres from the capital of Nairobi. Establishment of this market is expected to attract not only traders within the county but also from the neighboring counties of Kiambu, Nyeri and Murang'a as well as those from Nairobi which is proximal to the town inasmuch as it does not border Nyandarua.

Capital Investment Plan 11: Rehabilitation, Conservation and Dredging of Lake Ol'bolossat

Lake Ol'bolossat is the only lake in central Kenya covering an area of about 33.3 square kilometres. It is a habitat for numerous plant and animal species including various rare birds, fish and hippos. The lake should therefore be protected from all adverse human settlement activities through gazettelement and proper fencing since it is not only a diverse ecosystem but also a primary tourist attraction in Nyandarua County.

Capital Investment Plan 12: Formulate County Housing Policy

The formulation of a county housing policy is in line with the Jubilee Government's Big 4 agenda. Under affordable housing, the government pledges to deliver half a million decent and affordable homes to working Kenyans. In Nyandarua, the need to implement public housing is rather dire, and has largely been contributed to by mass immigration of internally displaced persons (IDPs) due to the skirmishes that followed the 2007 general election.

21.16 Monitoring and Evaluation (M&E) Framework

21.16.1 Overview

Performance assessment of the envisaged projects and programs, including the outputs and outcomes, is essential in the realization of the real transformation of Nyandarua County. Monitoring and evaluation framework is, therefore, a necessary tool for every department to use in assessing progress as they implement the projects and programs proposed in the plan. The M&E framework is also fundamental for the governance to closely monitor impacts and outcomes which Nyandarua County seeks to achieve in the long run.

Monitoring and evaluation is internal to the project implementing agencies. In the context of Nyandarua County and Nyandarua County Spatial Plan, the implementing agents include the line departments, National Government agencies, Devolved Units at the Sub-County and Ward levels as well as the Community. On this backdrop, this plan recommends that each department and agency entrusted with the project and program implementation as envisaged in the implementation framework package. However, the Nyandarua Governance shall be holistically monitoring outcomes as the implementation of the plan progresses. The development of the monitoring and implementation framework for the various projects and programs along the departmental line lines as proposed to accommodate the indicator to be measured with the measurement frameworks as indicated below.

21.16.2 Measurement and Indicators

Measurement will be quantitative for the projects, however, the government of Nyandarua will measure the qualitative aspects which are the outcomes as indicated by the development indicators. The institutions that are identified in the implementation framework shall be expected to measure project and programs and the outcomes of the implementation of the various projects. Additionally, the government in Nyandarua County shall be expected to measure outcomes that signify the transformation.

The following indicators shall be measured along the departmental lines over given timelines.

- i. Lengths of roads developed.
- ii. Lengths of utility infrastructure developed.
- iii. Acres of land set aside /acquired for all development projects.
- iv. Amount of funds set aside in the budget for the various projects.
- v. The number of people benefiting/ have benefited from various investments and development projects.
- vi. The number of new facilities developed.

21.16.3 Reporting Framework

Officer in charge of reporting

The reporting framework that shall be used within the monitoring and evaluation of the plan proposals ensure that the implementing institutions have an individual officer preferably the directors in charge of the line departments and the national, departmental agencies responsible for providing a progress report on the project and program implementation.

Timeline

The officers in charge of reporting shall be providing annual progress reports to reveal milestones and setbacks encountered in the implementation of the plan at the various stages. The timely reporting shall be critical in creating a basis for reviewing the project proposals in the instances of setbacks or difficulties.

Targets

Every department shall establish targets that are intended to be achieved within given timelines to enable the work objectively in the realization of the plan objectives. The targets shall be in the form of proportions or levels of completion expressed in percentages.

Data source

The information that shall be reported shall be available in the line departments and institutions identified in the implementation framework of this plan. They shall be responsible for data protection, storage, and dissemination.

Reporting platform

The progress reports shall be published and made available for the public on various departmental and agencies, including any other institutions in charge's website and their annual reports.

The sample implementation framework recommended in this plan is as is illustrated in table 20-1;

Table 21-3: Sample M and E

OUTCOME	PROGRAMME/PROJECT	INDICATOR	TARGET	DATA SOURCE	RESPONSIBLE	REPORTING
<i>Overall Strategy: Enhancing Mobility and Integrating Land Uses</i>						
An efficient and integrated transport system	Upgrade Rironi-Shamata-Ndaragwa Road and Mang'u-Njabini road to form 1 corridor from Mang'u to Ndaragwa through Njabini & Engineer	Kilometres of road upgraded	95% in 5 yrs.	County Department of Roads, KeRRA	Regional Director, KeRRA, County Director in Charge of Roads	KeRRA Annual Reports, Departmental Annual Report
	Tarmacking of: <ul style="list-style-type: none"> • Olkalou-Ndunyu Njeru-Nyeri • Gwa Kungu-Nanyuki • Mairinya-Ndongine-Rumuruti • Kasuku-Ol'bolossat Roads 	Kilometres of road tarmacked	95% in 5 yrs.	KeNHA County Department of Roads	Regional Director, KeNHA, County Director in Charge of Roads	KeNHA Annual Reports, Departmental Annual Report
	Rehabilitation of Gilgil-Ol'kalou-Nyahururu railway and renovation of Olkalou and Oljoro-Orok railway stations	<ul style="list-style-type: none"> • Kilometres of railway rehabilitated • A renovated railway station 	50% in 5 yrs.	KRC, Ministry of Transport, Infrastructure, Housing and Urban Development	Chair of KRC Board of Directors County Director in Charge of Roads, Minister for Transport, Infrastructure, Housing and Urban Development	KRC projects webpage MoTIH&UD Annual Reports
<i>Overall Strategy: To provide Adequate and Appropriate Infrastructure</i>						

Adequate and reliable water supply	Construction of 6 mega-dams	Number of dams completed	40% in 5 yrs.	WRA MoTIHUD County Department of Water and Energy	Regional Director of WRA, Minister for Transport Infrastructure Housing and Urban Development, County Director Water and Energy	Annual Reports, Performance Reports
	Establishment of water supply schemes in major towns	Total length of pipes laid Number of households connected	100% in 5 yrs.	WASREB, Nyandarua Water and Sanitation Company, Nyandarua County Government	Chair of WASREB's Board of Directors Chairman Nyandarua Water and Sanitation Company Board of Directors County Director of Water and Energy	Departmental Annual Report
Improved Sanitation	Establishment of sewerage networks and treatment plants in major towns	Total length of pipes laid Number of households connected	100% in 10 yrs.	Nyandarua Water and Sanitation Company, Nyandarua County Government	Chairman Nyandarua Water and Sanitation Company Board of Directors County Director in charge of Sanitation	Annual Reports

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Seamless communication and access to information	Laying of Fiber Optic cables from Ol'kalou to the Sub County headquarters	<ul style="list-style-type: none"> Length of Fibre optic cable installed Number of offices connected 	100% in 5 yrs.	Ministry of ICT County Department of ICT	PS in the Ministry of ICT, County Director of ICT	Annual Reports
<i>Overall Strategy</i>						
Increased crop production	Establishment of irrigation schemes	Acreage under irrigation Installed	60% in 5 yrs.	NIB County Department of Agriculture	Chair of NIB County Director in charge of agriculture	NIB projects web page Annual reports
Conducive environment for exchange of produce	Establishment of modern agricultural wholesale market	Existence of a modern facility Number of stalls	100% in 5 yrs.	County Department of Finance and economic planning County Department of Agriculture	County Director in charge of finance and economic planning County Director in charge of agriculture	Annual Reports
<i>Overall Strategy: To protect and Conserve the Environment</i>						
Increased revenue flow	Rehabilitation, conservation and dredging of Lake Ol'bolossat	<ul style="list-style-type: none"> Number of tourists visits annually 	60% in 5 yrs.	County Department of Tourism	County Director in charge of Tourism	Annual Reports

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		<ul style="list-style-type: none"> • Number of tourist facilities • Registered recreational activities 				
<i>Overall Strategy: To enhance access to quality housing</i>						
Increased access to quality housing	Formulate county housing policy	County Housing Policy Document	100% in 2 yrs.	County Assembly, County Housing Department	County Director in Charge of Housing	Annual Report

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