

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,**

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**DEPARTMENT OF GEOMATIC ENGINEERING**

**KNUST**

**IMPACT OF ZONING ON LAND USE IN PERI URBAN AREAS,**

**CITY OF KIGALI, RWANDA**

**BY**

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AND**

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**MASTERS OF GEOMATIC ENGINEERING**

**OCTOBER, 2016**

## CERTIFICATION

I hereby declare that this submission is my own work towards the MSc and that, to the best of my knowledge, it contains no material previously published by another person, nor material which has been accepted for the award of any other degree of the university, except where due acknowledgement has been made in the text.

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## DISCLAIMER

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## **ABSTRACT**

Zoning plans are primary land use controls used as urban regulation. They are used to guide the development of cities and serve as a tool for implementation of policies.

This study aims at assessing the effect of zoning plans in the peri-urban areas of Kicukiro District of City of Kigali in Rwanda. The study analyses the registered land use categories as against proposed land uses in zoning plans for 2025 and 2040 and assesses the possible challenges of implementation. Geographic Information System was used to detect the alterations in current registered land use categories in the study area. Cluster selection was performed using cadastral map of the study area to group current land use categories and results were analyzed. Interviews and questionnaires were also used to assess the participation of the community and its understanding of the zoning plans. The results revealed that by 2025 current agriculture land will decrease by 36%, residential use will increase by 41% while commercial use will increase by 600%. In 2040 the residential land use will increase to 149% and agriculture use will no longer appear in the land use plan of the area. The data obtained indicate that participation of the community in developing the zoning plans was very minimal. It is recommended that since the zoning plans will alter the livelihoods of the community members significantly, sensitization of communities on the zoning plans will be essential for effective implementation.

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## ACRONYMS

KDZR: Kicukiro District Zoning Report

KDZP: Kicukiro District Zoning Plan

GDP: Gross Domestic Product

REMA: Rwanda Environment Management Authority

RNRA: Rwanda Natural Resources Authority

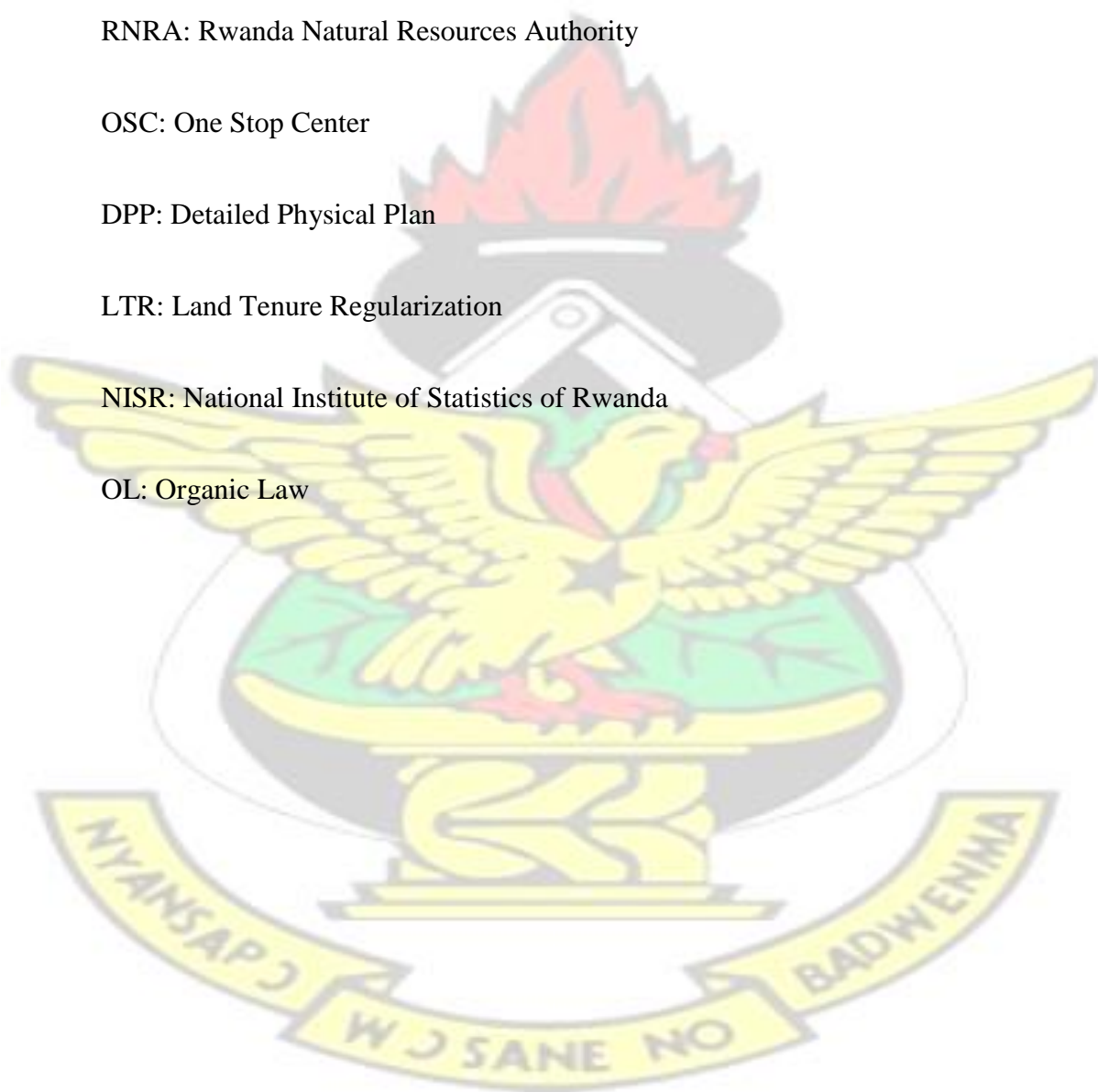
OSC: One Stop Center

DPP: Detailed Physical Plan

LTR: Land Tenure Regularization

NISR: National Institute of Statistics of Rwanda

OL: Organic Law



## CHAPTER ONE: INTRODUCTION

### 1.1 General Background

Rwanda is an African and land-locked country. The country's population is estimated to be more than ten million people NISR (2012). In Africa, compared to other countries, Rwanda is among those with the highest population density and was considered to be the smallest and one of the poorest countries in the world (Word Bank, 2007). In 2007, the country was the 14th poorest country in the world, based on gross domestic product (GDP) (Word Bank, 2007). More than 80% of livelihoods depends on farming or other land related activities. Land is consequently of paramount importance. The overall development of Rwanda is dependent on the proficient system of land administration and management. Scarcity of land resource and rapid population growth demands efficient land management. Land management comprises land use and land development as core functions(Williamson *et al.*, 2010). Land use management is an essential part of land administration systems and land use master plans are necessary to monitor physical development. The land use master plans and zoning plans play a great role in managing land use. Master plan are used to develop sustainable land management, which should lead to poverty reduction (Tims, 2009).

Land use and zoning involves regulations of the use and development of real estate and zoning districts. Zoning plans are considered the most important method of land use regulations used by local government (Fischel, 2000). Zoning aims to segregate the uses that are believed to be mismatched. It is used to avert new development from interfering with existing residents or businesses. Zoning not only regulates land use, but also determines the type of activity that will be allowed on specific lots (Fischel, 2000).

Zoning practice is used as primary land use control in Rwanda. The properties of the same type like residential or commercial are designated for a particular geographic zones and impose some restrictions on a particular plot. However, Williamson *et al.* (2010) revealed that the rights in land include the right of use and the most important include ownership and long-term leaseholds; permitted, conditional and prohibited uses are main categories of land uses which may limit the rights that people hold in land.

## **1.2 Research problem**

Since its creation, City of Kigali has been experiencing the spatial expansion, population growth and developmental activities (REMA, 2013). According to NISR (2012), City of Kigali has expanded from 112km<sup>2</sup> in 1991 to 730 km<sup>2</sup> in 2012. In 2013, REMA has confirmed this to be the reason of increasing land consumption, modification and alteration in land cover/ land use (REMA, 2013). To expand City of Kigali, more rural land have been acquired from surrounding areas for potential urbanization.

Land use planning was the main focus for decentralization policy of the government of Rwanda in City of Kigali (MINALOC, 2012), to implement strategies and policies that support and guide the land management in the city and control economy and population growth. Since the city is growing fast and the size is increasing, the monitoring of urban land use planning has become difficult (Manirakiza, 2012). Urban land uses include residential, commercial, industrial, social and government infrastructure and agriculture. However the agriculture occupies the largest proportion of the city's land area (60.5 per cent) (MINECOFIN 2000).

In the past few decades, the government of Rwanda has put in place and started implementation of regulations and policies and urbanization plans, in line of orientating the city of Kigali development toward a sustainable city (Manirakiza, 2012). Surbana (2012) highlighted some of key policies and plans to make the city's future sustainable, these include: City of Kigali conceptual master plan (2008), National land use planning (2012), National Urban Housing Policy (2008), City of Kigali Master Plan (2013) and Rwanda Vision 2020 plan (Surbana, 2012). Zoning and land use regulations are the most powerful tools to implement the master plans and some of the policies.

In 2013, the City of Kigali has adopted the zoning plans to support the implementation of master plan. These zoning plans designed for City of Kigali will be implemented in two phases (2025 and 2040).

This research intends to investigate the impact of zoning plans on current land use in peri-urban areas of Kicukiro District, Kigali city.

### **1.3 Research Objectives**

The core objective of this research is to investigate the effect of zoning on land use in the peri-urban area of Kicukiro District in Kigali city, Rwanda. The achievement of this research objective, will depend on the following sub-objectives.

#### **1.3.1 Specific Objectives**

1. To analyze how zoning conforms to the current land use in the study area.
2. To determine how the community was involved in zoning establishment and its understanding on zoning plan

3. To assess the challenges of implementation of zoning regulations in the study area

### **1.3.2 Research Questions**

#### **Question for specific objective 1**

- How did the existing land use inform the design of the zoning plans?

#### **Question specific objective 2**

- How has the community been involved in zoning districts determination?

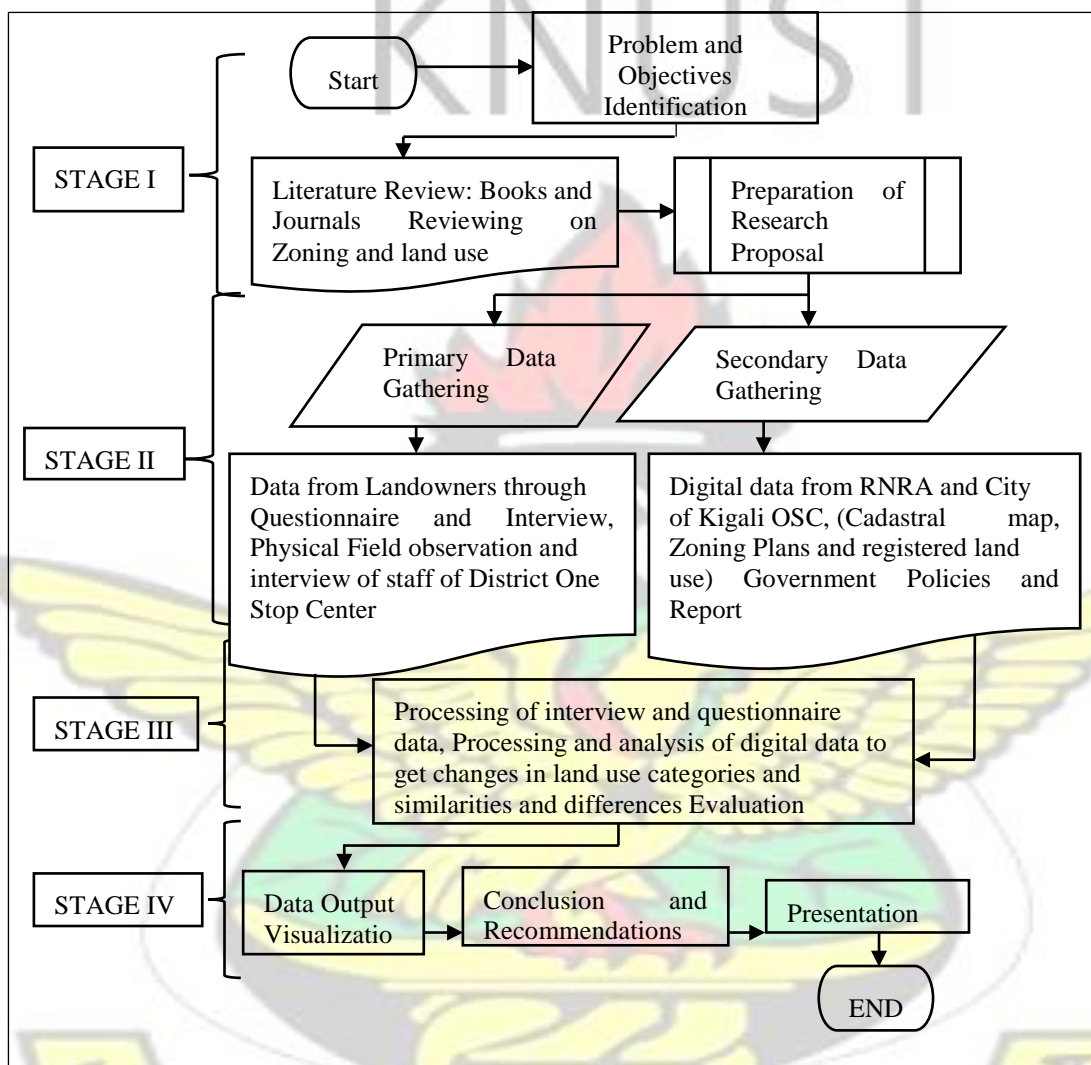
#### **Question for sub objective 3**

- What are the main challenges to implementing the zoning plans?

### **1.4 The research design**

The research is divided into four stages. In stage one, the problem is identified and books, journals articles on zoning and other related field were reviewed to prepared the research proposal. Collection of primary data using interviews and questionnaire and secondary data gathered from various governments departments, was done in

second stage. The processing of interviews and questionnaires (transcription) and analysis of secondary data using GIS tools were performed in third stage. The fourth stage contained the data visualization, conclusions and recommendations and presentation as it is shown in figure 1.1



**Figure 1.1: Research Design**

### 1.5 Thesis structure

This research is organized into five chapters. Chapter One is introduction and provide the background and the problem statement of this research. The objectives; main and specific, and research questions are also included in this chapter. Finally the chapter gives the structure of the report. Chapter two reviews related literature to the research

topic. Forms of zoning and land use controls in zoning are discussed. It includes definitions of the land tenure and land tenure regularization and concepts of security of tenure. Land use change factors in peri-urban areas are also discussed. Chapter three provides the materials and methods used to conduct the research. It states the research design and description of study area. The chapter describes the tools and methods used to collect, process and analyze data. Chapter four contains the results and findings derived from the analysis of data gathered from interviews and questionnaires administered to landholders. The discussions of the results also are provided in this chapter. Chapter five gives conclusions and recommendations.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

Research is laid on concepts and theories. Thus, this chapter consists of review of the literature relating to this research and takes hints from those concepts and theories which support the research content and context. Among these are zoning and its forms, Kicukiro zoning plan and report, land tenure and regularization and finally peri-urban land use. The views accepted are thus matched in line with the research objectives as they serve as a guide to the study.

### **2.2 Land use controls**

#### **2.2.1 Zoning**

Zoning is frequently used as urban regulation by local governments. Zoning is defined by Fischel (2000) to be dissection of a an area or community in zones or districts where some land related activities are permitted while some others are forbidden in

each district. Ervin *et al.* (1977) defined zoning as the practice of dividing a land area into districts within which only specified activities may take place.

Zoning is also viewed as the main legal tool to control and order the production of appropriate built environment (Do Lago, 2006). Being universal form of development control, zoning can be divided into two categories: descriptive and cumulative zonings (Geshkov, 2010). Cumulative zoning assigns a grading of land use restrictions to zones in the city, first with less restricted zones heading to the high restricted zones. The grading is frequently justified by negative externality that some buildings or activities could impose on the surrounding environment. Prescriptive zoning defines the permitted use of land for each parcel of property. A special permit need then to be requested for the usage of land in parts of the city not zoned for that activity, even when the wanted use is classified higher in the hierarchy. The City of Kigali has adopted a combination of cumulative and descriptive.

For its implementation, zoning plans are accompanied by zoning code which stipulates the allowed or restricted land use in various zones of the city (Geshkov, 2010). Example when the zone is designed to be used as residential, the code defines the type of buildings for that use in that area. This also applies to commercial zone, industrial zones and so on. However in some cases, mixed uses are taken into consideration. The description above may be termed traditional zoning which is intended to segregate mismatched land uses. Recently, using codes in zoning have extended to cover many other types of limitations. The codes in zoning can also set limits on building size maximum height, location, lot size and even color. Codes in zoning can also restrict the size and number of off-street parking spaces and even the size and number of trees (Geshkov, 2010). The number of buildings in a particular zones and the size of parcel they should be set on can also be specified in zoning. Despite the fact of being very

strict, zoning codes may have some exceptions. For example, local government might allow one building to be higher than the maximum height restriction in a zone. The local government may issue exceptional permits to some activities that generally are not allowed in a zone. Pharmacies, fast food restaurants, gas stations are examples of activities that require a local government permit in order to be located in particular city zones.

In zoning, various terms are used. Nonconforming land use is one of them and the term refers to the state where the activities or uses located in conformity to zoning code become nonconforming under a new code (Geshkov, 2010). In this situation, local government allows the buildings in place to still be in existence, on condition that there is neither dramatic expansion nor change. This shows that local government possess the power to modify boundaries of zones and restrictions that apply to those zones. To achieve this, the zoning or planning board or committee should be put in place and variances or special permits applications are submitted by individuals or developers to them for review. People in the board are selected by the local government and are vested to approve or disapprove an application. Affected firms and individuals may object to the board's decision in special hearing (Geshkov, 2010).

#### **2.2.1.1 History of Zoning.**

Through the first few eras of the 20<sup>th</sup> century, zoning was adopted from Germany to the United States. Zoning became widely used technique of separating objectionable and industrial uses from living areas (Jones, 2012). Nowadays, in many cities in United States, zoning have been approved as a mutual tool of land-use control. The main objective was to cluster various and different enterprises in dissimilar Districts to minimize or reduce diffusion of smoke, dust, noise, etc., from one zone to another (Geshkov, 2010). In 1916, in New York City, the first zoning plan was established

(Fischel, 2004). Later, in the United States of America, more other cities considered and used zoning in that the same year. After only 20 years from 1916, zoning regulations was considered as an important tool of land-use control by 1936 zoning had been hosted by more than 1,300 cities worldwide (Geshkov, 2010). Since then the practice became the adopted technique in the development of cities especially in developed countries.

### **2.2.2 Description, effect and purpose of land-use controls used in zoning in periurban area**

Land use controls used in zoning specifically in peri-urban area, vary in their form and purpose. This section describes the land use controls based on their effect and purpose.

#### **2.2.2.1 Minimum Lot- size Zoning**

Being one of land use controls, Minimum Lot-size Zoning, has been described by (Bates & Santerre, 1994) using two contrasting theories concerning why communities agree to zoning requirements. The two theories are “Public interest theory and Special interest theory”. Based on the public interest theory, laws in zoning are established in order to minimize or eradicate the effect of negative externalities, while, the special interest theory claims that laws in zoning are intended to encourage the fiscal and exclusionary status of entrenched residents of a community. In the public interest theory, the authors described the Minimum Lotsize zoning as a tool which would decrease the density of population, thus mitigate negative externalities assumed to be linked with high population density, like fire, traffic congestion, crime and disease. Minimum lot size zoning, together with other population density restrictions, can be envisioned to exclude low-income suburbs (Mills, 2005). The two views can show the impact of minimum lot-size zoning on the expansion of urban areas.

#### **2.2.2.2 Maximum Lot-Size Zoning.**

Pasha (1992) revealed, the use of maximum lot size zoning intends to reduce the area of land for urban infrastructure within the City. When it is used, it can help in keeping low the price of land in some areas of the city and facilitate the living of the poor people especially in developing countries. For example, in Pakistan, many cities have adopted land use regulations and maximum lot size zoning have been increasingly used for the limitation of the consumption of land (Geshkov & DeSalvo, 2012). The use of maximum lot size in developed countries is seldom compared with developing countries.

#### **2.2.2.3 Building-Height Limitations.**

Numerous reasons may influence local governments to introduce building-height limitations. As per Geshkov (2010) one of the reasons is to achieve of a smooth visual skyline. The other reason can be the prevention of high skyline and to prevent high structures from overcrowding the view of small building and sunlight. From that perspective, building height restrictions is used to safeguard smaller infrastructures from being overshadow by taller buildings. It is believed that the minimum lot size restrictions and building height limitations as land use controls, decrease the population density, and this can cause the expansion of the urban area.

#### **2.2.3 Forms of zoning**

Zoning was created in the early 20<sup>th</sup> century as a response to problems associated with overcrowding in cities and the intrusion of heavy industry into residential areas, especially in America. Since then, zoning evolved in different forms. Nowadays various types of zoning exist with different characteristics and are discussed in the following sections.

### **2.2.3.1 Euclidian Zoning**

Land use, mapping of zones and dimensional standards, are the main elements of Euclidian zoning. In this form of zoning, maximum heights standards, minimum setbacks, minimum lot area, maximum coverage and minimum lot width, are used to regulate the development intensity for residential development but maximum floor area standards may be included for a non-residential development. In this type of zoning, different land uses are separated and concentrated into districts of similar land uses. Theoretically, placement of nuisance or incompatible uses in proximity, is prohibited by zoning of districts. The major challenge of this form of zoning, is the inflexibility in design and land use. Also the maps are subject to change and thus uncertain.

### **2.2.3.2 Conditional zoning**

This form of zoning come to complement Euclidian zoning. In this, the uses are permitted subject to the conditional permit. They are not simply classified as prohibited or permitted in zones. Also in this form, the community can approve rezoning (changes in zoning map requested by the property owner), with specific conditions (Eckenstahler, 2013).

### **2.2.3.3 Performance Zoning**

Performance zoning is concerned with few number of zones with distinct character. A wide range of uses is permitted in each district. Compatibility can be assured by altering the standards for uses in different character types for all uses to have the same character. The maximum and minimum open space are used in this form instead of minimum lot width and area as primary controls while allowing all types of houses in district.

#### **2.2.3.4 Form Based Codes zoning**

Form based codes is a new approach to development regulation adapted by architects and planners. They brought a graphic approach to zoning. Form based codes evolve in codes together with fewer Districts, frontage, prescriptive standards and street type. It consists of broader ranges of permitted uses compared to Euclidian model.

Even though there is land use flexibility, the codes tend to possess inflexible design standards. Apart from that, the tendency of form based codes to present terms and concepts that are not familiar with many codes stakeholders, may lead to confusion (Parolek *et al.*,2008).

#### **2.3 Kicukiro district zoning plan and report**

City of Kigali has three districts namely Kicukiro, Nyarugenge and Gasabo. The zoning plan were established for the whole city on district basis. This section deals with only Kicukiro District.

Kicukiro District Zoning Report (KDZR) aims at providing perfect strategy for the implementation of the master plan for Kicukiro District in order to give direction to private and public developers to follow a clear set of objectives and regulations in order to achieve the visions of the proposed master plan. The KDZR comprises the regulations, definitions of terms used in zoning plans and principles followed in preparation of KDZP.

Based on references from international practices, the Kicukiro District Zoning Plan (KDZP) has been elaborated under the supervision and consultation of One Stop Center of the City of Kigali. The report defines zoning as that practice which regulates the development intensity, the setting and height of buildings, and the types of use on plots. Thus, zoning plans are considered as tool of planning effectively and a guide to

organized development. Zoning plans give the developers and landowners the picture of what is permitted or prohibited in specific plots (Joshi, 2014). The zoning regulations and zoning maps are the components of zoning plans. The identification of specific zones are provided in zoning maps based on the predominant land use, desired density and building heights in the area.

In KDZP, the zoning regulations arrange the uses in three main types. There are: 1) permitted use, 2) prohibited uses and 3) conditional uses. As per definitions given in the report:

- **Permitted Use** is that use similar to the use specified in the particular zoning code and is permitted within the zoning district. But it also states that other specific additional regulatory restrictions may have to be complied with the development related to guidelines for urban development, conservation and heritage and so on.
- **Conditional land use:** This type of use put together such activities or land use that can provoke externalities to the adjacent neighbours. This can be through noise, significant traffic or other disturbances from the neighborhood. The conditional permission for such activities can be issued within a zone on the requirement of the development that is similar to the standards and regulations or conditions to be met throughout the set time. The regulations stipulates that the use of conditional permit would be offered after the evaluation and a wise review by One Stop Center (OSC) of City of Kigali. This also may be subjected to some conditions as deemed necessary by the review committee to ensure that conditional uses could not compromise the overall planning in a particular district.

- **Prohibited Use** are those uses which are not allowed on any plot in the district.

They are those activities that are identified as incompatible with the particular zone. For example, residential use is a prohibited use in industrial districts.

In addition to the stated uses in zoning, Kicukiro District Zoning Report (KDZR) include Overlay Zones. They are zones that the city will use to protect certain areas. They are superimposed over zoning districts.

The KDZR has a number of principles to follow. These include:

- Legal Non-Conformance
- Privacy
- Sustainable Design

Legal Non-Conformance is concerned with any statutory existing and approved development which does not conform to the requirements of zoning district within which it is located. This allow the development activity to retain its use subjected to the continuity without break beyond one year.

According to the KDZR, City of Kigali's OSC; currently represented at district level, may exercise discretion to allow for variances to the zoning regulations on case by case basis. The variances should neither interfere with the overall planning objectives of master plan nor compromise the general character, safety or amenities of the surrounding development.

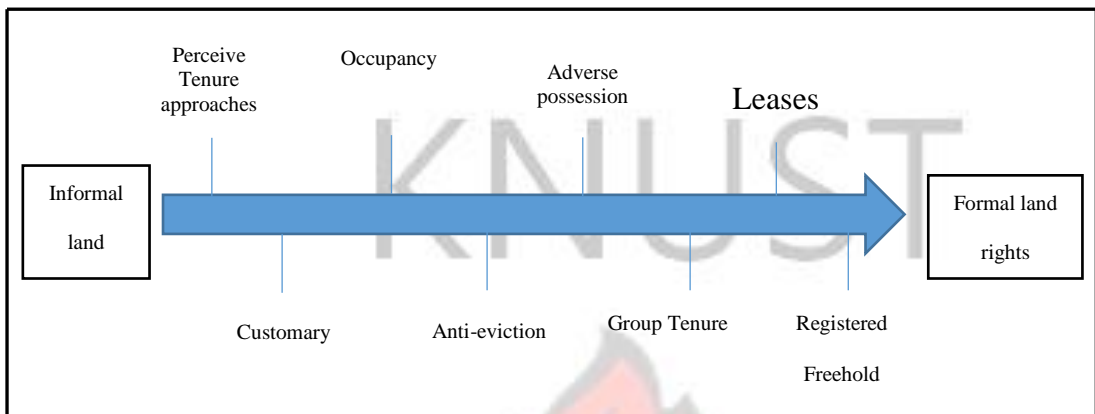
The report contains no regulations regarding infrastructure and access to parcels. These have been reserved for authority in charge even though main infrastructure site are included in the zoning plan and roads are illustrated only up to the main road in that plan. Meanwhile, the KDZP provides the definitions to the terms used in regulations, the meaning and way to interpret zoning maps and zoning regulations

itself.

## **2.4 Land tenure**

Basically, the way people access and use land and natural resources is termed „land tenure“. USAID (2010) defines land tenure as political, economic, social and legal structures determining the manner groups or individuals secure access to land and associated resources. Land tenure also determines who own and use land or resources for how long and under what conditions (USAD, 2010). Land tenure is also viewed as an institution with rules invented by societies to regulate behaviour. These rules of tenure establish how the allocation of land is done within societies. Land tenure designates the rights of individuals or groups to land, namely right to occupy, to develop, to use, to inherit, and to transfer land (Durand-Iasserve & Selod, 2007). Thus it should be viewed as relationship involving complex set of rules that governs the use of land and ownership. It refers also to human to land relationship. Ciparisse, (2003), describes land tenure as, the linking that exists between people and land. People may be represented by individual or group and link can be statutory or customary. The relationship then gives the individual or group some rights and imposes some restrictions. Therefore, whether it is customary or formal, some basic rules are related to the tenure, specifying how the rights on the property are assigned or distributed among the right holders. The systems of tenure may determine the use of a specific land or resource under definite conditions. Land tenure was defined by Williamson *et al* (2010), as the procedures which guarantee security in accessing land and system of allocation, surveying and mapping (to correct the information on parcel boundaries), modifications and alienation issues and conflict management in terms of boundary disputes. In the meantime, a well-defined system of tenure forms the basis of sustainable land administration. In order to define land tenure system, the continuum

of land rights defines various classification under the formal and informal classification as presented in figure 2.1 adopted from (Williamson *et al*,2010).



**Figure 2.1: Continuum land rights (Williamson *et al*,2010).**

Land tenure is viewed by Unruh (2010), Durand-Lasserve, A., & Selod, (2009) as the manner in which social relations are linked to land use and ownership. Land tenure can be also defined as a bundle of rights in a community, based on sharing the resources in a well-regulated way.

Land tenure is structured in different ways from different jurisdictions worldwide and this may favor the creation of different interest and rights in land (Zevenbergen, 2002). These rights are grouped in bundle of rights and include the right to use (usufruct rights), rights to grow crops plant and harvest trees and fruits and transfer rights which include rights to mortgage the property, to sell, lease and rent.

#### **2.4.1 Background to the land tenure system in Rwanda**

Rwandan land tenure system can be categorized into three main stages. It ranges from the pre-colonial through colonial up to post independence periods up to the land tenure regularization (LTR).

Collective ownership of land was the main characteristics of the land tenure system in Rwanda during the pre-colonial era. This system of tenure which was complementarity

between agriculture and livestock, comprised a number of aspects. According to Rurangwa (2013), the main aspects were:

- ✓ “Ubukonde” (clan rights), in this aspect of land tenure, the first land-clearer was the clan chief, and hold all rights to the land. The chief could own huge areas of land and could relocate numerous families (called “Abagererwa”.) on the land, and families enjoyed the rights on the land they occupy.
- ✓ “Inkungu” this system was enabling and authorizing the local political authority (either on his own or others“ behalf), to have rights on abandoned or escheated land. This was the source of land reserve which could be given to anyone who need it.
- ✓ “Igikingi” in this aspect of system of tenure, the king or one of his chiefs granted the right to grazing land to any family that depends on livestock
- ✓ “Gukeba” or “Kugaba”, denoted the practice of relocating families onto grazing land and was an exercise at the provincial level done by the local authority (Rurangwa, 2013).

Land rights were respected and transferred from generation to generation based on Rwandan culture and tradition (Rurangwa, 2013). In Rwandan tenure system, the rights on land were gained and enjoyed under the supreme protection of the King who was taken as the guarantor of wellbeing of the whole population. The ownership of land was more community based than individual. The colonial rulers came and found the described system in place which was governed by custom and officially recognized by the King. Then they superimposed new written-based land system on it.

Meanwhile, according to Musahara (2006), Sagashya & English, (2007), the land tenure system through the post-colonial era, was developed from the provision of the

1962 Rwandan constitution (Art.108). The constitution recognized Belgian land tenure regulations as binding, it stated that original inhabitants should hold their possession on land occupied while all unoccupied lands belonged to the state (Musahara, 2006). The system had a relationship with the Belgian and German colonial arrangements of land holding in the past.

However, the post-independence land tenure system introduced land management strategies as a result of land scarcity. This meant that individual ownership of land for cultivation reduced from about 2 hectares in 1960 to 1.2 hectares in 1984 and since the 1990s the country experienced a deadlock in the land issues. Rurangwa (2013) highlighted some challenges including inadequate agricultural production, increasing population pressure on natural resources, a growing number of landless peasants, and steep competition among projects of agriculture, livestock, and natural reserves. These were some of the reasons which pushed the land tenure regularization which was the basis of systematic land registration throughout the whole country which granted the secure land tenure currently in Rwanda.

#### **2.4.2 Customary tenure.**

Tenure can be viewed as landholding. Customary land tenure is defined as the systems that most rural African groups of people use to express and order ownership, possession, and access, and to regulate use and transfer (Alden Wily, 2012). In reality, customary resource tenure systems vary considerably depending on the context. Important differences exist, for instance, between pastoral and farming contexts (Cotula, 2007). As Fisher (1993) noted, the major characteristics of customary tenure is that the land is regarded as belonging to the whole social group and not to an individual. It is also referred to as a system of land relation in which the ownership of the land is vested in a collective (whether a family, lineage or a clan) while the

individual enjoys virtual unrestricted rights of usage. In Rwanda, the statutory tenure system has completely replaced the customary tenure through land regularization and compulsory land registration.

#### **2.4.3 Security of tenure.**

Secure tenure is seen in different way but mostly depends on how rights are recognized and guaranteed or how relationship between people and land is protected (Ciparisse, 2003; Williamson *et al* 2010). Security of tenure have an important role in operations of tenure due to the fact that it guarantees the landowners the sense of protected and sustained access to the land and its use (Unruh, 2010). Customary land tenure was observed not to give adequate security due mainly to those communal norms and values connected to land rights allocation (Fosudo, 2014). Currently, written policies and laws have replaced these communal norms and values specifically in Rwanda. Deininger *et al.* (2010), viewed security of tenure to have impact in landowners' decision with regards to investment, land use for different purposes such as building, buying, loaning, selling, inheriting or alienation based on how secure someone's rights are. Therefore, the lack of tenure security lead to the informal system which needs regularization.

#### **2.4.4 Land tenure regularization in Rwanda**

Security of tenure is the key of good land administration. Lack of tenure security lead to poor land tenure system, hence the need of regularization of land ownership. Regularization of ownership involve the conversion of informal holding of land to legal rights of the owner for the enjoyment of private ownership of land. Land tenure regularization (LTR) as described by Deininger *et al.* (2010) is administrative procedures undertaken to recognize and secure the current rights held by people and organizations apart from those of state over different types/ categories of land.

In the case of Rwanda, this includes individual land, State private land and private District, and City of Kigali Land. According to Durand-Lasserve & Selod (2009), LTR can be defined as the way of integrating informal tenure into structural recognition and a further delivery of rights to informal households, as has been done in Rwanda. All lands with informal status were systematically adjudicated to get them regularized, and legal titles were issued to all landowners (Rurangwa, 2013).

Although systematic registration in the form of holistic LTR is essential to guarantee proper land administration certain forces still impact on it (such as more resources and high cost in maintaining the registry). Regardless of the solution through LTR, it seems not to be a solution to the inadequacies of land registration, as Van der Molen (2002), and Zoomers (2000) speculates that, LTR is still not the global solution regarding to optimal land use. In Rwanda, LTR is to ensure that all landowners have security of title and in the long run ensure optimal use of their land. LTR guarantee the landowner, the confidence, to exploit his/her land to maximum benefit. But zoning regulations possess some restrictions and may reduce or increase the potential of exploitation by allowing or restricting uses of a particular plot based on zones.

## **2.5 Peri urban land use**

In this research land use is discussed in terms of peri-urban area, thus it is important to define the peri-urban for the purpose of this research. The term peri-urban is viewed as transitional zones between urban and rural extents which are experiencing urbanization and gradually assuming most of the characteristics of urban areas (Arko-Adjei, 2011). Such zones are said to be undergoing some transformation expressed in the rural-urban continuum phenomena known as the urban fringe.

European perspective of peri-urban areas by Zasada *et al.*, (2011), are defined as such mixed areas under urban influence having rural morphological traits. To characterize the peri-urban area, the link to the pressure on urban development either physically or socially and the urban lifestyle of rural areas is needed. Though, the definition of Arko-Adjei (2011) which describes the peri-urban with its transitional traits is adopted in this study, the assumption of fact that zoning has included rural area to be part of urban has been taken into consideration.

### **2.5.1 Land use change factors**

Peri-urban expansion can be influenced by different factors being social, institutional and economic. (Mugisha & Nyandwi, 2014), identified demographic changes and social heterogeneity as the social factor of peri-urbanization. According to them, in terms of economy, the land and housing markets can easily accelerate the urban expansion. Urban expansion is due to peri urban change. Ravetz *et al.* (2013) revealed that population and economic growth influence peri urban change, which result in demand for housing and commercial areas.

Some implications of urban expansion/peri urban change found by Mugisha & Nyandwi (2014) are the decrease of land for agriculture and the development of the new informal urban settlements.

### **2.6 Research technique**

Research methods are tools used to gather information in research. They are very important and need to be selected, designed and used effectively in order to achieve research objectives. They can be categorized into three namely qualitative, quantitative and mixed methods. Quantitative methods aim at trying to quantify things by using questions like “how long”, “how many” or “the degree to which” while qualitative

methods are used to attempt gaining an understanding of the reasons and motivations for an actions and seek to establish how people interpret their experiences and the world around them. Mixed method combine both qualitative and quantitative methods. Each method can have different sampling techniques. Teddlie (2009) observe that sampling methods are in two groups; probability and purposive. Probability sampling techniques are mostly used in quantitative oriented studies. It involve the selection of large number of units from a population or from subgroups of a population (Teddlie, 2009). Purposive sampling methods are used often in qualitative research in selecting units based on specific purposes in relation to the research questions. This technique is also defined by Palinkas *et al.* (2015) to be the a technique used to identify and select an information rich cases for most effective use of limited resources.

## **2.7 Land related laws in Rwanda**

Modalities of allocating, acquisition, transfer, management and use of land nationwide in Rwanda are determined by Organic Law (OL). The OL enacted in 2013, categorized land to be either urban or rural. Those categories include public or individual land. However the first OL of 2005 categorized land as Rural or Urban with individual, and state ownership. The categorization of land uses is established by the presidential order. In 2007, the presidential order No 30/01 of 29/06/2007 determined the exact number of years of lease for land, defined the land uses as summarized in the table 2.1.

**Table 2.1: Land uses in Organic Law**

S/N	Type of land use
01	Agriculture
02	Commercial
03	Economic

04	Industrial
05	Economic
06	Animal husbandry
07	Forest
08	Tourism
09	Science and scientific research
10	Social and cultural
11	Fishing
12	Uses in protected land

The exact term of leases depend on whether the land is under individual or State ownership. The duration of individual land is 99 years (ninety-nine) years. The duration of lease for private State, City of Kigali and district land ranges between 15 to 49 years and are as follow:

- Land for tourism or forestry, agriculture and animal husbandry, the lease duration is 49 years.
- Private district land for industrial, commercial, economic, social and scientific services, the lease duration is 30 years while the land for residential use has 20 years as lease duration. For fishing purpose the lease duration is 15 years as per the presidential order mentioned earlier.

In addition, the 2013 Land Law and 2007 Expropriation Laws are the two important laws related to property rights and expropriation in the country. The right to private ownership of land acquired either through customary or statutory (by title) is confirmed by the article five of the law. The protection of ownership rights is provided in article 34 of the law stating that “the state recognizes the right to freely own land and shall

protect land owner from dispossession of the land whether totally or partially, except in case of expropriation due to public interest. For purpose, the expropriation law of 2007 defines the permissible acts that give the state the rights to perform expropriation. These acts include activities to implement land use plans and master plans, electric lines, airports and airfield, public entertainment playgrounds and buildings, motor car parks, train stations and port among others. The expropriation law also specify the procedures for expropriation. These include the valuation of the property, the identification of competent organs to do and approve the expropriation and process of paying compensation. The international standards are respected in the 2007 expropriation law and the law clarifies the right of individuals in the process of expropriation. “Just compensation” should be given to any individual or group for property lost and that compensation should be based on the market prices.

## **2.8 Role of Community participation in planning**

Community participation is a key ingredient in the delivery of good planning outcomes. City planning aims at utilizing land resources for people to benefit from its maximum uses (Kaur, 2007). Therefore the local community should be consulted and consultations are an important aspect of development. The outcomes needed by the community are likely to be realized or achieved in development when people are consulted. As Kaur (2007) highlighted, the non-participatory of community lead to people not feel the ownership or committed to the plan. Thus the community needs to be involved in initial stages of development and formulation of vision for the city to develop clear understanding of planning process, the community’s benefits for them to feel the ownership and responsibility for the plan. Meanwhile, the community participation provide an idea on local knowledge which serves as a valid source of information on which decisions are based especially in land use planning and natural

resources management (Auma, 2012). Burby *et al.* (2000) also described the community participation to be key element in land use planning. When it is combined with technical analysis, they support in making wise choices among alternatives and strategies in managing changes in land use. Community participation assists in identification of local problems and needs and foster a sense of local ownership and civic pride.



## **CHAPTER THREE: STUDY AREA AND RESEARCH METHODS**

### **3.1. Introduction**

This research aims at highlighting the impact of zoning on current land use in the peri-urban areas. The effects are discussed from the perspective of the zoning plans and existing land use and conditions or restrictions under which land development should follow. It was found important to assess to what extent changes will occur once these zoning plans are partially or fully implemented compared to the current land uses in place, and to assess how stakeholders (land owners) understand these regulations. To achieve these objectives, various methods were used to collect, process and analyze the data. This chapter is about the methods used in this research.

### **3.2 Study Area**

Rwanda is located on the eastern part of Africa continent and it is nicknamed “Land of Thousand hills” due to her beautiful mountains. The geographical coordinates range from latitude 1 degree and 4 minutes to 2 degrees and 51 minutes south with longitude ranging from 28 degrees 53 minutes to 30 degrees 53 minutes east. It is a land locked country, sharing borders with four neighbours namely Democratic Republic of Congo (DRC) to the west, Republic of Tanzania to the east, Burundi and Uganda to the south and north respectively. Having Kigali as administrative capital, the country is divided into four provinces in addition to City of Kigali. There are 30 Districts, 416 Sectors and 2146 cells. The smallest unit in the cell is the village known as “Umudugudu” in Kinyarwanda Language (Sagashya & English, 2007). City of Kigali has 3 districts: Kicukiro, Nyarugenge and Gasabo.

The study area comprises three cells in Gahanga Sector, one of the sectors of

Kicukiro District of City of Kigali as shown in Figure 3.1 below. Gahanga is located in the southern part of Kicukiro District. The area of Gahanga Sector is mostly greenfield with no remarkable development apart from clusters of low density developments along the road, and being used largely for agriculture with several scattered farm houses. The land area is around 1318 hectares. It is part of City of Kigali even though it was originally used for rural agriculture. The study area is part of zoning plans covering the City of Kigali.



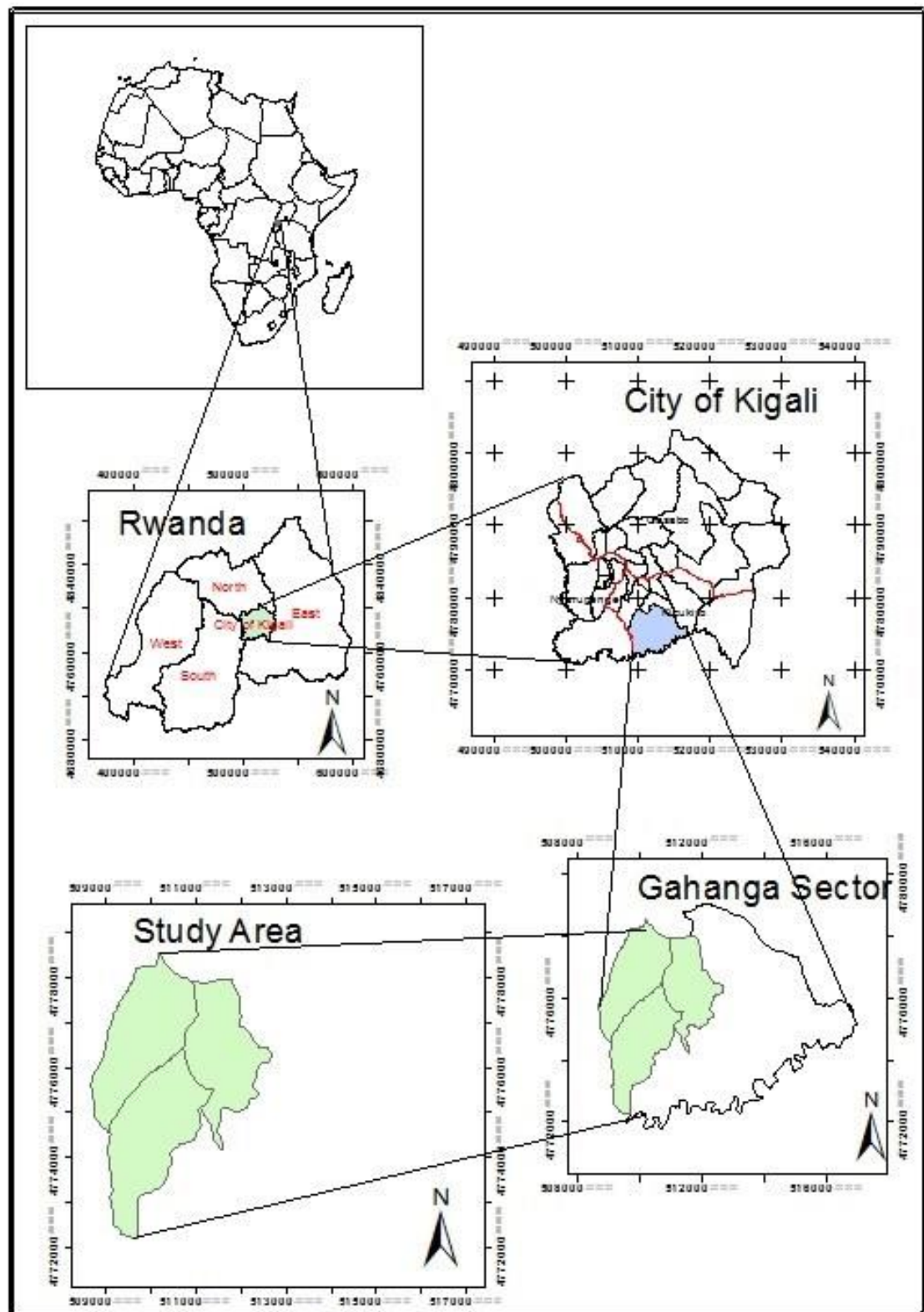


Figure 3.1: Study area

### 3.3. Research methods

Both quantitative methods which aim at gathering data that can be classified, sorted or measured; and qualitative methods which provide results that are usually rich and detailed are also used. Among quantitative methods, secondary data collation and analysis approach was used. This approach refers to the review of existing information and through interpretation and or presentation, come out with new insights (Reis *et al.*, 2000). In qualitative methods, different approaches exist. For the purpose of this research, both questionnaire and interviews were adopted. Questionnaire in English language (please see appendix A-1) were prepared and later translated in Kinyarwanda (local language) to guide the data gathering since the targeted population use Kinyarwanda in their daily communication.

Field observations, interviews and questionnaires were used for data collection. The survey used both self-administered and interviewer-administered methods during the data gathering. In self-administered method, the questionnaire is answered by the respondents themselves while interviewer-administered method the interviews are face-to-face between the respondents and interviewer. The studying of literature combined with geographic information system were complemented with interviews and field observations particularly those in relation to zoning and land use.

To analyze the alteration in land uses, the comparison between the current land uses and both zoning plans 2025 and 2040 were performed. Geographic Information System (GIS), through its spatial analysis strength, were used and found appropriate technique in this research. Selection by attributes of different categories of land use were performed and used to derive the statistics based on their respective areas. This was supported by the field observation made during data collection.

### **3.3.1. Sampling techniques**

In this research, purposive sampling method is adopted. This technique is widely used in qualitative research and the data gathered though it can be suitable for both

quantitative and qualitative analysis. It is used to identify and select information from rich cases and support the use of limited resources effectively (see section 2.6). The sampling was done by selecting three cells in Gahanga sector namely Nunga, Karembure and Gahanga, which combined together to be the study area. The study area location and its nature (agrarian) were the main factors for their selection. Also 75 landholders were selected using purposive random approach (to increase the credibility of the results) and interviewed for further qualitative analysis and validation.

### **3.3.2 Data collection**

In primary data collection, the information was obtained through the interviews and field observation. The summary of the methods used for the empirical study is shown in figure 3.3.

The information from interviews were needed in validation of research question and qualitative analysis. To do so, 75 land holders were selected through purposive random approach were interviewed in the study area. The number of interviewee was limited to 75 due to the limited time and resources that were available .The Sector

Land Manager (SLM) and Land Management Team leader in District One Stop Center were also interviewed to find out strategies and challenging issue in the implementation of zoning plans. The interview questions were the semi-structured allowing certain options to be selected or some open ended questions to be answered.

The questions were first prepared in English but because most of the questioned and

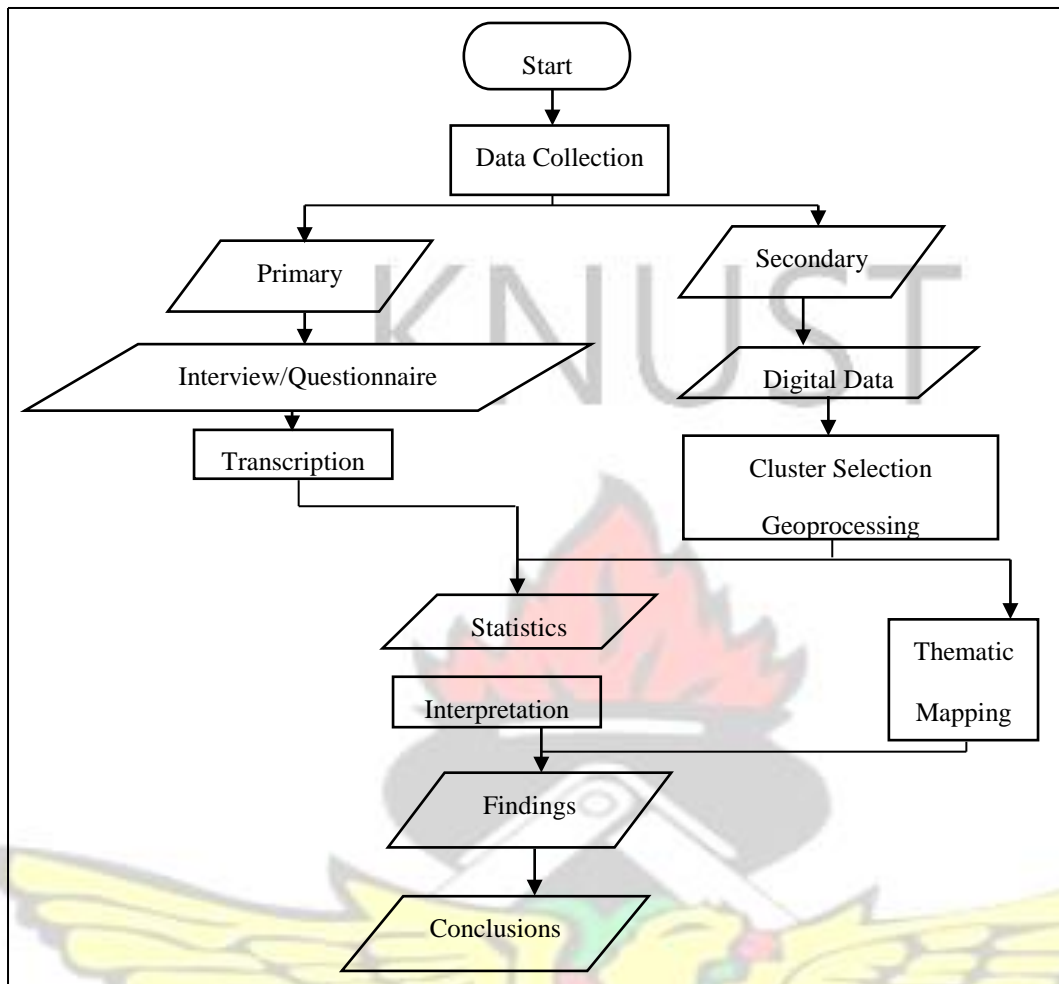
interviewed people uses Kinyarwanda, they were translated in Kinyarwanda for better communication between the researcher and the respondents. The researcher was using the questionnaire and asked the question in Kinyarwanda and either translate the response in English at the place and take note on questionnaire or fill it as it is and translate later. Recording also were used where it was possible and the translation was made at the end of the day. The interviews took place at homes due to the fact that the researcher was walking around in the study area and met the respondents at their homes

Information on ownership status, occupation, and use of land indicated on their certificates, challenges in developing land and the way the new regulations are affecting their life in general were part of the information collected through the interviews. For staff of Kicukiro District One Stop Center, the questions focused on the role the office played in the establishment of the plans, the measures in place for the implementation and how they handle the issue of non-conforming land use.

Sample questionnaires are found in the Appendix A1-3.

### **3.3.3 Data processing and Analysis**

Data processing was done for both primary data and secondary data. The interviews and questionnaires were processed by transcribing in Microsoft excel for further analysis. Based on information provided by respondents, tables were prepared showing the percentages of respondents to a question. All secondary data (cadastral map of study area and zoning plans) were in digital format and processed using the GIS through geoprocessing tools. GIS in its spatial analysis tool, cluster selection were used and features grouped together using selection by attributes to generate the total area use to categorize uses based on land use categories.



**Figure 3.3: Research methods**

## **CHAPTER FOUR: RESULTS AND DISCUSSIONS**

### **4.1 Introduction**

Findings and results are presented in this chapter. It comprises results from data gathered from landholders, the Kicukiro One Stop Center through interviews and questionnaires and observation made on the field. In addition, the chapter includes the results from the analysis of the level to which the zoned land uses are similar to the registered land uses, in the study area. The objectives of the research is to investigate the effect of zoning plans on land use in peri-urban areas of Kicukiro District of City of Kigali in Rwanda. As mentioned earlier (see section 2.3), the zoning plans

comprises zoning map and zoning regulations. Zoning maps serve in identification of definite zoning districts in the planning area with regard to the predominant land use, building height and the preferred intensity for that area. It was observed in the study area that the elaborated zoning plans have significantly altered the use of the land.

## 4.2 Results

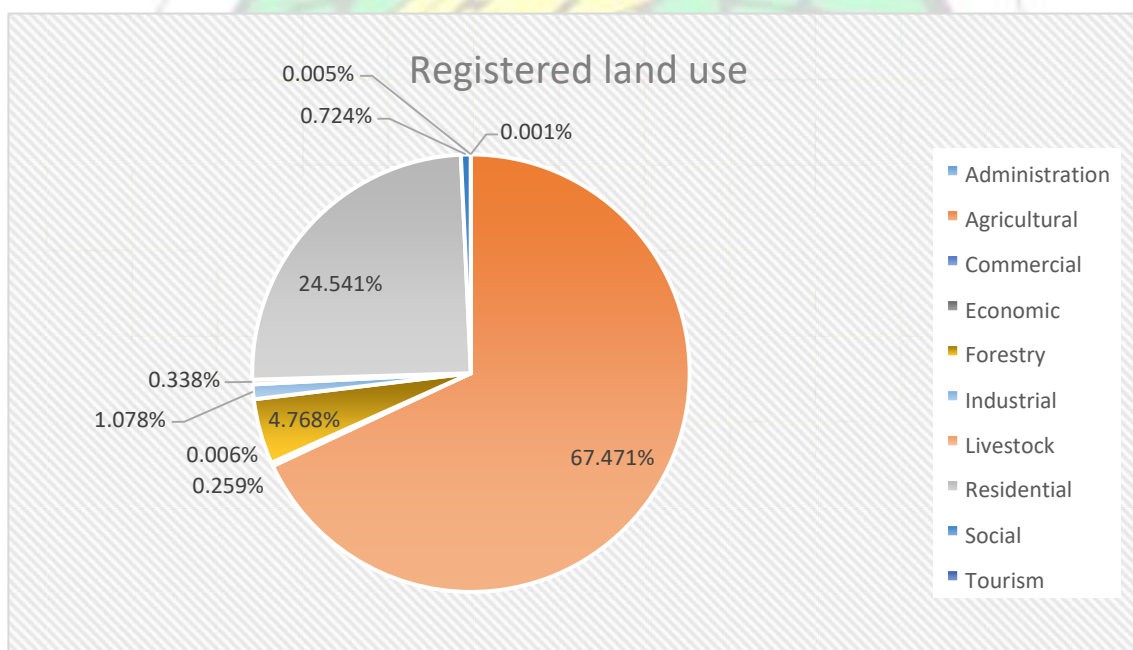
### 4.2.1 Current registered land uses

To determine the level at which the zoning plans conform to the current land uses, the current registered use of land in the study area were analyzed. Section 2.7 highlighted the land use categories as they are in the presidential order. In the study area, the results show that nine types of uses are similar to those presented in table 2.1 (section 2.7). Table 4.1 summarizes the land use categories in the study area with their respective calculated areas and percentages. The “administration use” in table 4.1 was, however, missing from the land uses categories in section 2.7, Table 2.1.

**Table 4.1: Current registered land use**

Land use type		Area/Ha	Percentage	Total (%)
Administration	Administration	0.016	0.001%	0.001 %
Agricultural	Agricultural individual land	776.654	67.471%	67.471 %
	Agricultural private government land	1.148	0.100%	
	Agricultural public government land	0.092	0.008%	
Commercial	Commercial district land	2.985	0.259%	0.259 %
	Commercial individual land	0.231	0.020%	
	Commercial Kigali land	0.349	0.030%	
	Commercial private government land	0.460	0.040%	
Economic	Economic individual land	0.064	0.006%	0.006 %

Forestry	Forestry individual land	54.886	4.768%	4.768 %
	Forestry private government land	1.393	0.121%	
	Forestry public government land	0.384	0.033%	
Industrial	Industrial District land	12.410	1.078%	1.078 %
Livestock	Livestock individual land	3.888	0.338%	0.338 %
Residential	Residential District land	282.488	24.541%	24.541 %
	Residential individual land	3.940	0.342%	
	Residential Kigali land	0.018	0.002%	
	Residential public government land	0.725	0.063%	
Social	Social district land	8.334	0.724%	0.724 %
	Social individual land	0.196	0.017%	
	Social Kigali	0.148	0.013%	
	social public government land	0.118	0.010%	
Tourism	Tourism individual	0.058	0.005%	0.005 %
	Tourism public government land	0.105	0.009%	



#### Figure 4.1: Current land use in percentage

From the figure 4.1. It is seen that the predominant land use is agriculture having 67.5% of the total area in the study area followed by Residential use with 24.9%. From the survey conducted in the study area, the respondents were asked the land use given to their land during certification. 45 respondents representing 60% affirmed their land to be registered as agricultural use, 27 representing 36% their land have been registered as residential while 3 of them representing 4% did not have information about the use in the certificate due to the fact that they are tenants and do not know what is written in the certificate.

**Table 4.2: Knowledge of registered land use**

Question/Answers	Agriculture	residential	No information	Total(Respondents)
What land use is indicated in your certificate?	45	27	3	75
	60.0%	36.0%	4.0%	100.0%

As discussed above, the agricultural use is predominant in study area. But the results from the study revealed that many of the parcel considered as agriculture land serve also as residential and the occupier use a portion of the land for one use and the rest for another. In Table 4.3, 70.67% (53 respondents) are using the land as both residential and agriculture. While 26.67% (20 respondents) use the land only for residential while 2.67% couldn't specify as they had no information on what is registered in certificate even though they reside on land as tenants. It is observed that in the sample of 75 respondent, all those having the agriculture as land use in their certificate, use the land also as residential. This has resulted in scattered housing in the study area.

**Table 4.3: The use of land use indicated in certificate.**

Question/Answers	YES(residential)	Both	others	Total(Respondents)
Are you using the land for the use indicated in certificate?	20	53	2	75
	26.67%	70.67%	2.67%	100.00%

The map presented (figure 4.2) portrays the spatial pattern of the land use categories as per current registry. It is observed that the agricultural land predominates other uses while the registered residential uses are grouped in settlements.



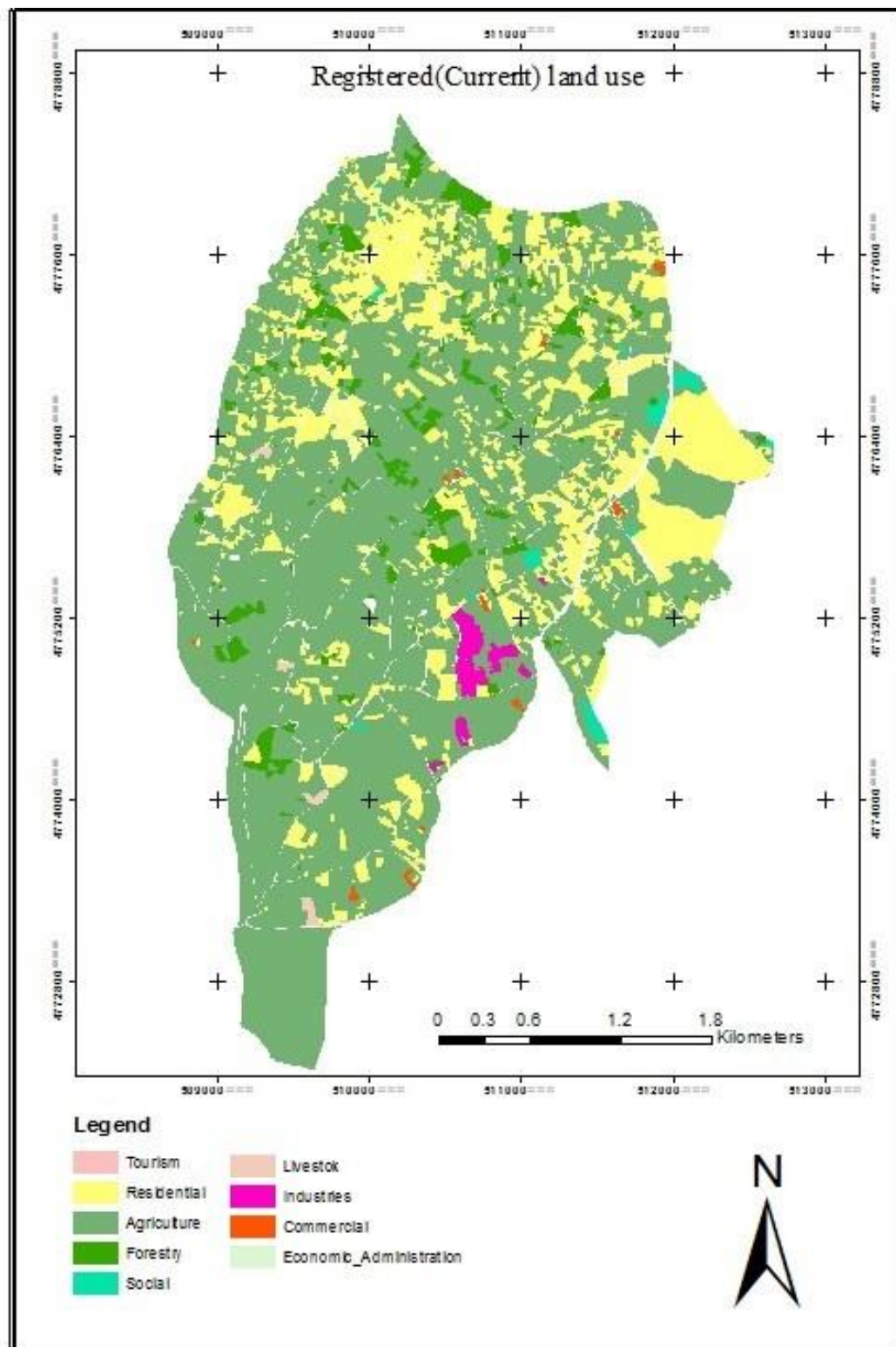


Figure 4.2: Map of current Land use

## 4.2.2 Land use categories in zoning plans

### 4.2.2.1 Overview on Kicukiro zoning plans

From the analysis done of zoning report for Kicukiro District, it is observed that land uses were altered and further detailed as compared to the current registered land use presented in Table 4.1. They were grouped into four main categories and are shown in table 4.4. From the analysis of the zoning maps, different proposed uses were observed. Table 4.4 shows the proposed land uses in both 2025 and 2040 zoning plans as specified in the KDZR.

**Table 4.4 Zoning District categories**

Zoning categories	Zoning Name	Sub Category
Residential	R1	Single family District
	R1A	Mixed single family residential District
	R1B	Rural Residential District
	R2	Low rise residential District
	R2A	Low rise Residential District
	R3	Medium Rise Residential District
	R4	High rise residential District
Commercial	C1	Mixed use commercial District
	C2	Neighborhood Level Commercial District
	C3	City Level commercial District
	C3A	City Level commercial District
	C3B	City Level commercial District
	C3C	City Level commercial District
	C4	Regional level commercial District
	C4A	Regional level commercial District
	C5	Retail Warehouse District
Industrial	I1	Light industrial District
	I2	General Industrial District
Parks and Open space	P1	Passive recreational District
	P2	Active recreational District
	P3	Agriculture Area
	P4	Protected Area

Source:(Joshi, 2014)

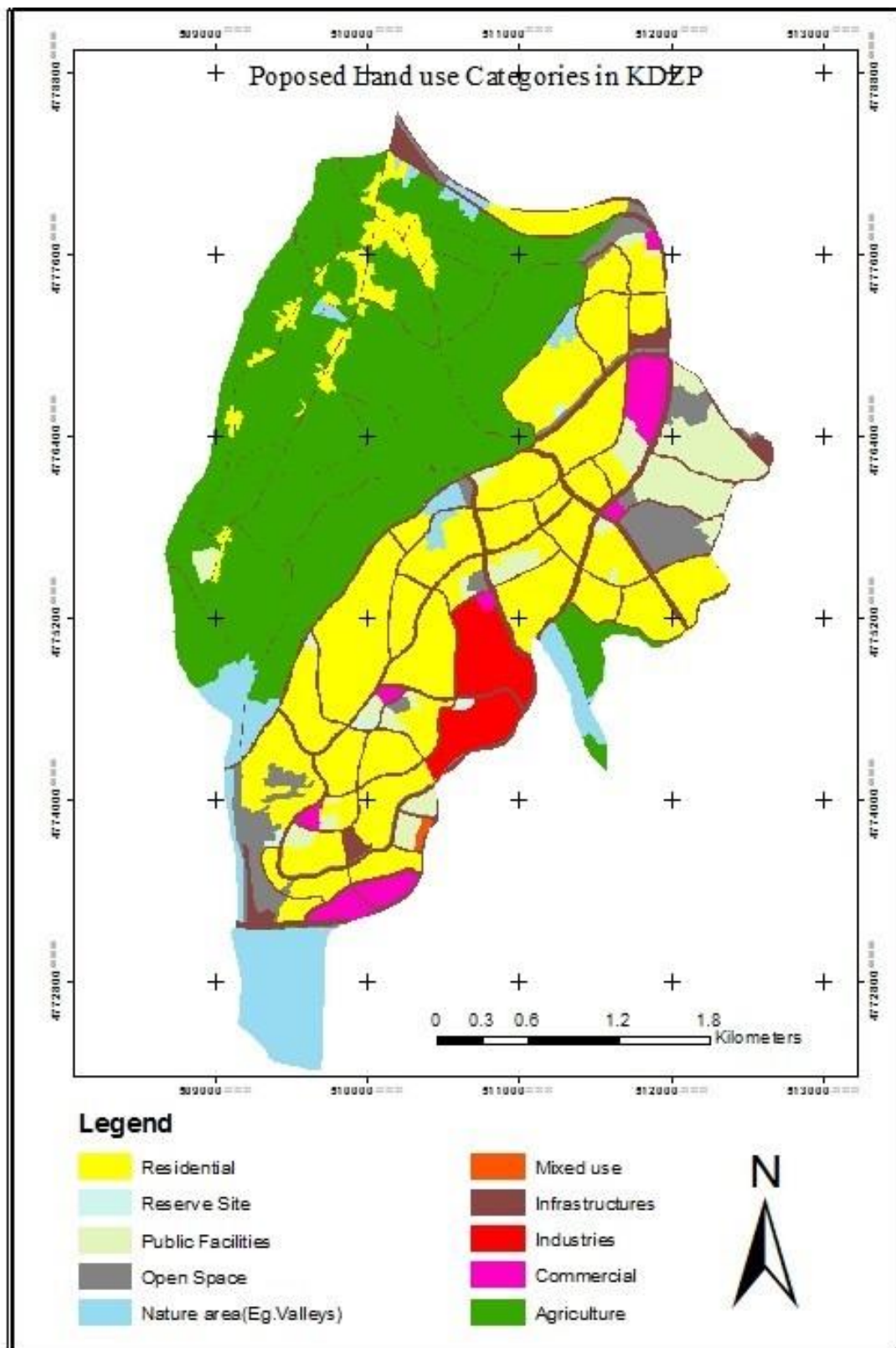
#### 4.2.2.2 Proposed land uses in KDZP 2025

In Table 4.3, the proposed land use categories in KDZP 2025 are presented. It was observed that the proposed land use categories as they are derived from KDZP, some other types of categories are included as compared to table 4.4 (section 4.2.1). In this plan, agriculture is still part of categories of land uses although it is also part of open space as sub-category (see table 4.4). Comparing with the registered land uses presented in figure 4.1, it is observed that agriculture use will decrease by 2025 to 37.88%

**Table 4.5: Land use in KDZP 2025 in study area**

Type of land uses	Area/Ha	Percentages
Agriculture	499.321333	37.88%
Commercial	28.166121	2.14%
Industries	40.746697	3.09%
Infrastructures	118.690036	9.00%
Mixed use	1.233927	0.09%
Nature area	93.442025	7.09%
Open space	57.638768	4.37%
Public facilities	71.270521	5.41%
Reserve site	3.88125	0.29%
Residential	403.799307	30.63%
<b>Total</b>	<b>1318.189985</b>	<b>100.00%</b>

The spatial pattern of proposed land use categories in KDZP 2025 is presented in figure 4.3. It is observed the agriculture land in the study area will no longer predominant.



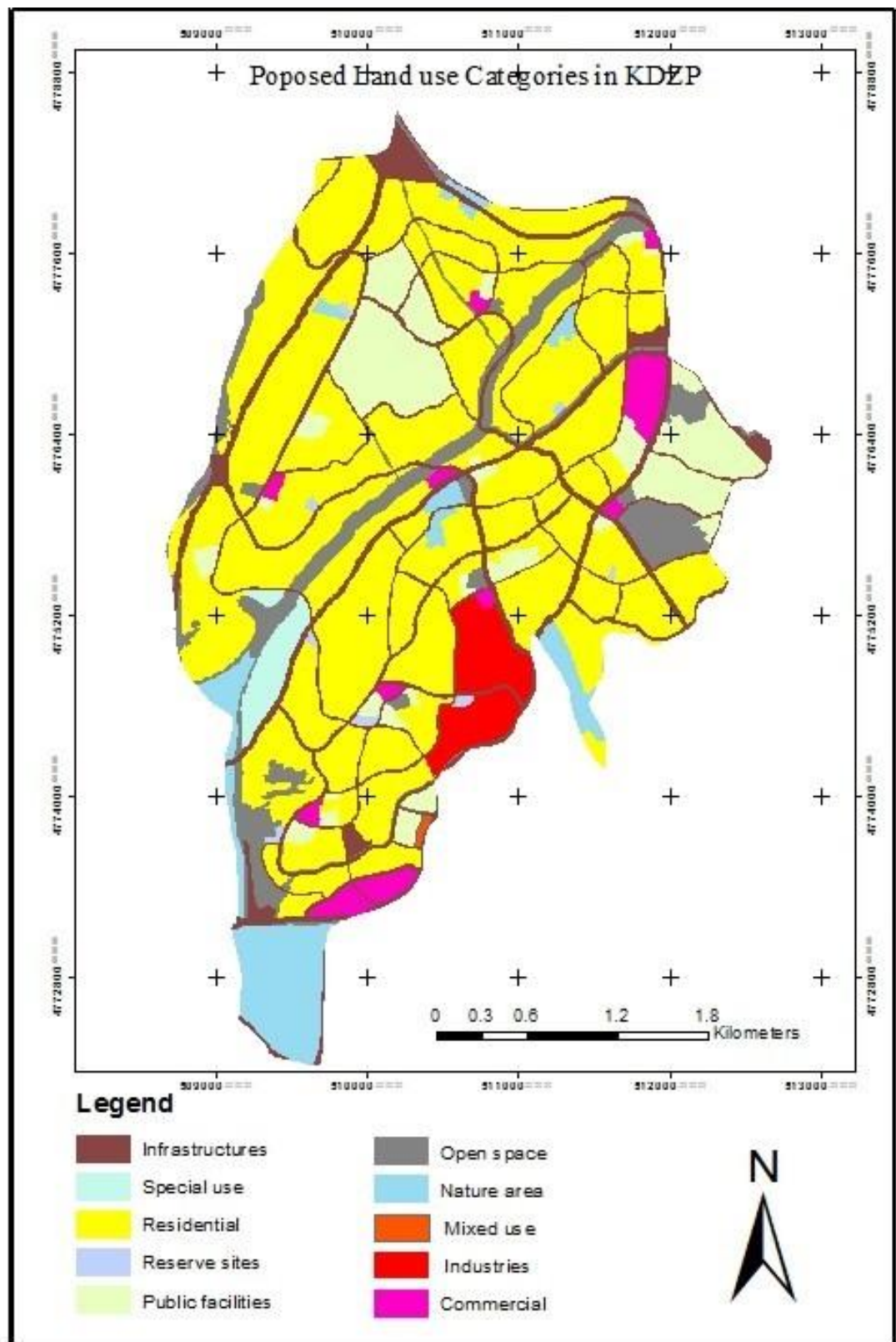
**Figure 4.3: Map of 2025 Zoning Land use**

#### 4.2.2.3 Proposed land uses in zoning plan 2040

Year 2040 is set as the final to have completed the implementation of the master plan of Kigali City which is supported by the zoning plans. In the study area, once it is implemented without changes, the agricultural use will only be part of open spaces and the residential use will be increased compared to both current land use and use in zoning 2025. The figure 4.5 shows that some other types of uses are included in this final stage of implementing zoning plans. This uses include public facilities and special use. Public facilities include educational institution, religious facilities, health facilities, sport and recreational facilities while graveyard is under the special use.

**Table 4.6. Land use in zoning 2040 in study area**

Types of land uses	Area/Ha	Percentages
Commercial	32.471322	2.46%
Industries	40.746697	3.09%
Infrastructures	176.80924	13.41%
Mixed use	1.233927	0.09%
Nature area	81.024517	6.15%
Open space	113.132124	8.58%
Public facilities	134.102609	10.17%
Reserve site	5.195169	0.39%
Residential	714.658524	54.22%
Special use	18.817521	1.43%
<b>Total</b>	<b>1318.19165</b>	<b>100.00%</b>



#### **Figure 4.4: Map of 2040 Zoning Land use**

#### **4.2.3 Status of land rights in study area**

The determination of nature of status of tenure in study area was made using information derived from questionnaire and interviews. 88% (66 respondents) indicated that they have had their certificates with leasehold as type of ownership during the LTR. 6.7% (5 respondents) responded as freeholder while 5.3% (4 respondents) had the tenancy agreement with the land owners. These results showed that the statutory ownership regime in the study area giving the community a secured tenure. This resulted from the LTR throughout the whole country. All lands with informal status were systematically adjudicated to get them regularized, and legal titles were issued to all landowners as discussed in section 2.4. The observation made on this is that some people are confusing the leasehold and freehold. Freehold ownership can only be given to the owner residing in developed area as it is provided in the law.

**Table 4.7: Land rights status in study area.**

Question/Answers	Leasehold	Tenant	Freehold	Total(Respondents)
What right do have on this Land?	66	4	5	75
	88.0%	5.3%	6.7%	100.0%

Land acquisition have been either through purchase or inheritance. The information derived from the questionnaire and interviews as in table 4.8 shows that 50.67% (38 respondents) acquired their land through purchase, 44% (33 respondents) have inherited the land while 5.33% (4 respondents) have their rights on land through tenancy agreement with owners.

**Table 4.8: Mode of acquisition of right on land in study area**

Question/Answers	Buy	Inherit	others/rent	Total(Respondents)
------------------	-----	---------	-------------	--------------------

Did you buy or inherit this land?	38	33	4	75
	50.67%	44.00%	5.33%	100.00%

#### 4.2.4 Participation of the community in zoning plans.

In the survey conducted, a number of questions were addressed to respondents through the interview and questionnaires. From the analysis of responses, it is observed that respondents are confused about land use regulations and zoning plans. Their understanding on zoning plans differ as Table 4.9 shows. 42.7% (32 respondents) thought of zoning plans as tool which is being used for development. 22.7% (17 respondents) see zoning plans as a means of revenue generation (taxes) as a taxes collector used by government, 20% (15 respondents) claimed zoning to be a policy from government while 8 % (6 respondents) confirmed to have no idea. In a sample size of 75 landholders, 6.7% (5 respondents) found zoning plans as no important while 15 among them claimed zoning to be a policy from government.

**Table 4.9: Understanding on zoning plans**

Question/Answers	For Development	For taxes collection	No importance	No idea	Policy from government	Total
What do you think these regulations can be useful for?	32	17	5	6	15	75
	42.7%	22.7%	6.7%	8.0%	20.0%	100.0%

From the results presented in table 4.9, it was observed that the people in the community have different understanding on zoning plans. This shows that they have not been educated on zoning plans earlier before its implementation. These different

views on the plans might be one of the factors which can delay the achievement of the goal at the specified time.

Participation in zoning districts establishment is very low. The results show 96% (72 respondents), confirmed to have not had any role during the establishment of zoning Districts. 4% (3 respondents), thought they have participated in the preparation but later it was observed that they only helped in the development of the Detailed Physical Plan (DPP) established for part of the study area. This are the plans being used in implementing the zoning plans and the one found in the study area is presented in the Appendix D-1 of this report.

**Table 4.10: Participation of community member in zoning establishment**

Question/Answers	Participated	No role	Total(Respondents)
What was your role in their preparation?	3	72	75
	4.00%	96.00%	100.00%

Most of the interviewed people have an idea on the plans „presence although they claimed to have no knowledge on what the regulations are. When interviewed, one of the respondents replied: “I heard that there are plan for our area but I don’t know exactly what are they for but I guess they are for the development of the place by providing roads.”

This shows the level of some understanding of the community on zoning plans, however, the sensitization is still needed on how and what plans are intended to be implemented and their usefulness.

### **4.3 Discussions**

#### **4.3.1 Comparison of land use: current, zoning 2025 and 2040**

To determine the difference and similarities between the current land use and uses in both zoning 2025 and 2040, a comparison have been made using percentages.

Table 4.2, 4.5 and 4.6 represent the registered, zoning 2025 and zoning 2040 land uses respectively. The decrease of 36% in agriculture, increase of 600% in commercial use, increment of 228% in industrial use and increase of 41% in residential use was observed and will occur in 2025. Meanwhile, the 100% decrease in agricultural use will occur by 2040 while in the same year, the residential use is expected to have increment to 149%, industrial use will increase by 228% and commercial use by 707%.

#### **4.3.2 Implementation of zoning plans and its effect on the community**

Measures and strategies are set to facilitate the implementation of zoning plans. The construction of new houses is only allowed in the zoned districts with residential use. As explained by District OSC, to offer the construction permit also requires that the DPP for the zoned district is available (see an example of DDP in Appendix D-1).

According to zoning regulations in the area, a non-conforming use will be permitted to keep its current use on condition that there is no discontinuity in operations beyond one year. This is a restriction on the development of properties in terms of housing. The necessary additions and alteration for maintenance of existing and its use will be allowed as the regulations state but no change of material used to construct building which are different from those prescribed in zoning regulations specifically Kicukiro zoning regulations will be permitted. Also further intensification of non-conforming use is prohibited (Joshi, 2014). Most often, land development refers to the changes in landforms from a natural or semi natural state for a purpose like agriculture or housing.

Due to this, and the fact that regulations need to be followed, it was observed that procedures for getting construction permit is a challenge to people who need to develop their land.

Changes bring positive and negative impacts. As zoning regulations intend to promote safety, health, welfare, convenience, morals and prosperity in general, definitely changes will occur. As positive impact, the roads and other infrastructures could be established, hence the development of the area. As in Table 4.9, the development is thought to be one of the reason of zoning plans in the study area by the community, though some think of the zoning plans to be for other purposes. This raises the challenge to the implementation as there is not education on the zoning plans and this might make the implementation process difficult. This was also confirmed by the District Land Management Team Leader when interviewed. She mentioned different understandings on zoning plans by community would affect its implementation. She also highlighted the expropriation of property specifically where the main infrastructures like roads are planned to be established to one of the challenges of implementation not because people are reluctant to give out the land but because of many properties which might be expropriated.

In general, the majority in the study area confirmed to have not participated in the process of district selection during zoning establishment. They suggested they should have been involved in the process to input their ideas. This was seen as one of the factors contributing to low understanding of the regulations.

The respondents were optimistic that zoning plans would; once implemented, bring development of the area but could affect those with low income. Those who will be adversely affected are people currently holding land that has been zoned for

nonresidential use because the residential use is the main land use categories in zoning plans and residential districts have potential to be developed before any other uses specified in the zoning plans.

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## **CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS**

### **5.1 Introduction**

The chapter consists of the conclusions derived from the results from the analyzed data collected for this research. Some recommendations also are provided in this chapter.

### **5.2 Conclusion**

The main objective of the research was to investigate the effect of zoning on land use in the peri-urban area of Kicukiro District in Kigali city, Rwanda. To achieve the objective, sub objectives were established and are discussed below;

1. To analyze how zoning conforms to the current land use in the study area.

Two questions were used to achieve this objective as they are discussed below:

- What are the current land use categories?

From the analysis performed, nine different land use categories were identified. The agricultural land use has 67.471%, residential land use 24.541% and forestry as a type of use is represented by 4.768% while 1.078 is for industrial use. Other types of uses namely social, tourism, commercial, livestock, administration and economic are all less than 1% (section 4.2). The survey conducted revealed that 60% of respondents have their registered land use as agriculture and 36% have residential use (section 4.2). Therefore it can be concluded that the agricultural land use predominate other uses categories in the area.

- How that existing land use has have been taken into consideration in the zoning plans?

The proposed land uses in zoning plans 2025, shows alteration in land use categories. Agriculture, residential, commercial and industrial land use categories were found similar to the current uses and have 37.88%, 30.63%, 2.14% and 3.09% respectively.

This indicate decrease of 36% in agriculture, increase of 600% in commercial use, increment of 228% in industrial use and increase of 41% in residential use was observed and will occur in 2025. Meanwhile, the 100% decrease in agricultural use will occur by 2040 while in the same year, the residential use is expected to have increment of 149%, industrial use will increase by 228% and commercial use by 707%. Thus it can be concluded that the zoning plans will bring changes in land use and predominant land use has not been taken into consideration in establishing the zoning districts. This is because by 2040 no agriculture land will be left in the area which is currently predominantly agriculture

2. To determine how the community was involved in zoning establishment and community's understanding of the zoning plan.

In order to determine the participation and understanding of the community on zoning plans, a survey was conducted. The analysis shows that 96% of respondents confirmed to not have any role during the zoning districts establishment. 4% have participated not in zoning districts establishment but in the lay out of the DPP designed to facilitate the implementation of zoning plans (section 4.5). The results also revealed that the community's understanding on zoning plans is different. 42.7% of respondents think of zoning plans to be for development, 22.7% take them as taxes collection tool, 20% see them as a policy, 6.7% found them to have no importance while 8% have no idea (section 4.5). The study found the nonparticipation of the community and various understanding of the community of the zoning plans and based on literature review, it was found that the non-participation of community lead to apathy and community members do not feel the ownership of the plan (section 2.8 refers).

3. To assess the challenges of implementation of zoning regulations in the study area

From the survey conducted, the observed main challenge to implement the zoning plans was the non-participation of the community in the project which lead to different views on zoning plans. The land tenure in study area was found to be statutory and 88% have had their leasehold. Due to the fact that in zoning plans infrastructures and public facilities are given importance, this will lead to envisage expropriation of properties for public interest. This also applies to the community members who will not be able to develop their land according to the new regulations. The expropriation cost may be high as any property affected need to be compensated according to the laws.

### **5.3 Recommendations**

For successful implementation of zoning plans, the following suggestions are given:

- The government needs to establish a mechanism through which the people can get information about the zoning plans and keep sensitizing on the regulations to educate people so that they can have the same understanding on what is happening in their community.
- Further research can be conducted to depict the impact of zoning plans on the land/property value and highlight the potential properties to be expropriated in public interest.

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## **APPENDICES**

Appendix A: Semi- structure interview and questionnaire questions

A-1 Question for landholder (English)





**Title: the impact of zoning in peri-urban areas-Kigali.**

These interview questions are meant to gather data for M.Sc. research conducted by NOEL HAKUZWIYAREMYE. Your kind cooperation and objective response will be highly appreciated.

**Questions for individuals/landowners.**

**Introduction/courtesy:** Good morning (in local dialect) How are doing?. My name is NOEL HAKUZWIYAREMYE, I'm a student of KNUST, in Geomatic Engineering.

I'm doing a research on land use controls especially on the impact of zoning in peri urban. Please note that Information required is for academic purpose.

**Respondent details**

**Instructions: Please circle or tick the appropriate answer**

**Sex** ☐ Male ☐ Female

**Age** ☐ 15-20 ☐ 21-30 ☐ 31-40 ☐ 41-50 ☐ 50-

**Occupation:** ☐ Farmer ☐ Teacher ☐ Self Employment

Others (Specify).....

Q1 What right do have on this Land?

☐ Owner (Leaseholder) ☐ Freeholder ☐ Tenant ☐ Occupier

Others (Specify).....

Q2 How long have you been using this land before 2013? .....

Q3 Did you buy or inherit this land? ☐ Buy ☐ inherit

Others (Specify).....

Q4 a) What do you know about land use regulations?

.....  
.....  
.....

b) What was your role in their preparation?

.....  
.....



Q5 Did you register your land? (if he is the owner of land) ☐ Yes. Why?

.....

☐ No. Why not?

.....

Q6 Do you have your certificate? ☐ Yes ☐ No

Q7 For you to collect the certificate, who paid for it? ☐ Government ☐ Myself

Q8 a) What land use is indicated in your certificate? ☐ Agriculture ☐ Residential ☐

Commercial ☐

Others (Specify).....

b) Are you using the land for the use indicated in certificate? ☐ Yes ☐ No

c) If not, why is the land not used for the indicated land use?

.....

Q9 In 2013, City of Kigali approved the Kigali master plan which is supported by zoning regulations.

Do you know anything about these regulations? Yes ☐ No ☐

Q10 How useful are these regulations?

.....

.....

.....

Q11 What do you think these regulations can be useful for?

.....

.....

.....

Q12 What are the challenges you face in the development of your land before and after 2013?

.....

.....

.....

Q13 How are the zoning regulations affecting your way of life?

.....

.....

.....

A-2 Question for landholder (Kinyarwanda)



**Title: the impact of zoning in peri-urban areas-Kigali./Ingaruka z'amabwiriza y'imikoreshereze y'ubutaka mu nkengero z'umuji/Kigali**

Ibi bibazo bigenewe gukusanya amakuru kubushakashatsi bw'ikigero cya Gatatu cya Kaminuza bukorwa na NOHELI HAKUZWIYAREMYE. Tubashimiye byimazeyo ubufasha bwanyu.

**Ibibazo byagenewe abantu kugiti cyabo/Banyirubutaka**

**Intangiriro:** Mwaramutse/Mwiriwe. Amakuru yanyu?. Nitwa NOHELI HAKUZWIYAREMYE, ndi umunyeshuri muri Kaminuza yo muri Ghana yitiriwe KWAME NKRUMAH, KNUST, Mubijyanye no gupima no kubungabunga ubutaka.

Ndi gukora ubushakashatsi kubijyanye ningamba mu mikoreshereze y'ubutaka cyane cyane ku ngaruka z'amabwiriza y'imikoreshereze y'ubutaka mu nkengero z'umuji. Amakuru muduha nayo tuzakoresha mubijyanye nibyo ku ishuri gusa.

**Umwirondoro w'usubiza**

**Amabwiriza: Shyira akamenyetso X Aho bikwiye**

**Igitsina** ☐ Gabo ☐ Gore  
**Imyaka** ☐ 15-20 ☐ 21-30 ☐ 31-40 ☐ 41-50 ☐ 50-  
**Umurimo:** ☐ Umuhinzi ☐ Umwarimu ☐ Uwikorera

Ibindi (Sobanura).....

Q1 Nubuho burenganzira ufite kuri ubu butaka?

☐ Mbukodesha na Leta (Leaseholder) ☐ Bwanjye bwite (Freeholder) ☐ Nkodesha na Nyirabwo(Tenant)  
☐ Ndabucunga(Occupier)

Ibindi (Sobanura).....

Q2 Wakoresheje ubu butaka igihe kingana iki mbere 2013? .....

Q3 Waba waraguze cg warahawe n'ababyeyi ubu butaka? ☐ Naraguze ☐ Ku babyeyi

Ibindi (Sobanura).....

Q4 a) Niki waba uzi ku mabwiriza agenga ubutaka?

.....  
 .....  
 .....

b) Hari uruhare wagize mu mitegurire yayo?

.....  
 .....

Q5 Wandikishije ubutaka bwawe? (niba uri nyirabwo) ☐ Yego. Kubera iki?

☐ Oya. Kubera iki Oya?  
 .....

Q6 Ufite icyangombwa cyabwo? ☐ Yego ☐ Oya





Q7 Kugirango ubone icyangombwa,ninde wakurihiye? ☐ Leta ☐ Njye ubwanjye

Q8 a) Kucyangombwa handitseho ku ubutakabugomba gukoreshwa iki? ☐ Ubuhinzi

☐ Gutura ☐ Commercial

Ibindi (Sobanura).....

b) Ukoresha ubu butaka ibis nibyanditse kucyangombwa? ☐ Yego ☐ Oya

c) Niba ari Oya, kuki utabukoresha icyo bwagenewe gukora?

Q9 Muri 2013, Umujyi wa Kigali wemeje igishushanyo mbonera kiza gushyigikirwa namabwiriza agenga imikoreshereze y'ubutaka(zoning regulations. Haricyo waba uzi kuri aya mabwiriza? ☐ Yes

☐ Oya

Q10 Ni gute yaba afite akamaro?

.....  
.....  
.....

Q11 Utekereza ko yagira akamaro kubijyanye niki?

.....  
.....  
.....

Q12 Nizihe mbogamizi waba warahuye nazo mu mongerera agaciro ubutaka bwawe mbere na nyuma ya 2013?

.....  
.....

Q13 Ni gute amabwiriza y'imikoreshereze y' ubutaka yaba arimo ahindura Imibereho muri rusange?

.....  
.....  
.....





---

**Title: the impact of zoning in peri-urban areas-Kigali.**

These interview questions are meant to gather data for M.Sc. research conducted by NOEL HAKUZWYAREMYE. Your kind cooperation and objective response will be highly appreciated.

**Questions for Kicukiro District, One Stop Centre**

1. a) How was the master plan established?

.....  
.....

b) What was the role of community in its establishment?

.....  
.....

2. What roles did your office play in the zoning establishment?

.....  
.....

3. How useful is the master plan?

.....  
.....

Who is/are responsible for its implementation?

.....  
.....

4. What are the challenges of its implementation?

.....  
.....

5. Now it is almost 3 years after the approval of Kigali City master plan and zoning maps to support its implementation, what are the strategies in place for the easy implementation of the plan in this district?

.....  
.....  
.....

6. What will happen to the landowners incapable to develop their land according to new regulations?

.....  
.....  
.....





7. Suppose there is a new process of the master plan and zoning regulations and your office is in charge, how will you go through it to obtain the output?

.....

.....

.....

.....

.....

.....



## Appendix B: Excerpts from transcription of interviews and Questionnaires

### B-1: Landholders

Interviewee		1	2	3	4	5	6	7
<b>Gahanga interview questions</b>								
What right do have on this Land?		owner	owner	owner	owner	owner	owner	owner
How long have you been using this land before 2013?		10 years	almost 20 years	5years	more than 50 years	50 years	2 years	7 years
Did you buy or inherit this land?		buy	I bought the land	I got the land through purchase(buy)	inherit	inherit	buy	buy
What do you know about land use regulations?		I heard from others that our place has become residential	nothing	what I know is that more than 90% of our village have been made to be residential	nothing	nothing	nothing but my husband may know something about it	nothing

What was your role in their preparation?		no role	nothing	I participated in physical plan establishment and I am part of management committee	no role	no role	no role	no role
--	--	---------	---------	---	---------	---------	---------	---------

Did you register your land? (if he is the owner of land) Yes or No. Why?		Yes. To get proof of ownership	yes, because everyone was asked to register his land by government	yes as it was a must to register land	Yes, they came as you come to us. It was an order from the government	yes, because it is my home but also to get the proof of ownership	we made a transfer of ownership because we bought the land	yes, it was an order from authorities
Do you have your certificate?		yes	yes	yes	yes	no, I lost it	yes	yes
For you to collect the certificate, who paid for it?		myself	myself	myself	myself	myself	myself	myself
What land use is indicated in your certificate?		residential but also I use the land for agriculture	agriculture but I also have a house of residence on it	residential but small part of it is used for small agriculture activities	Agriculture but I also live on. My house is on this land	agriculture but I also own my home on the land	I don't know	residential

Are you using the land for the use indicated in certificate?		yes	yes	yes	yes	yes, for both residential and agriculture	I use the land for agriculture and residential	yes
If not, why is the land not used for the indicated land								

use?								
Q9 In 2013, City of Kigali approved the Kigali master plan which is supported by zoning regulations. Do you know anything about these regulations?		yes	no	yes	no	no	no	yes

How useful are these regulations?		the uses are separated and the value of land increased	they are not useful to those of low income	they are useful as the value of the land has increased due to that regulations	no one came to tell us about them, so nothing I know about their usefulness	nothing I know about them	no idea	nothing
What do you think these regulations can be useful for?		developing the area	No importance. They have only taken away our land	for controlled development of the area	as for me, I see nothing important from regulations	no idea	no idea	they are useful to the government because what they want is what is being
								done

What are the challenges you face in the development of your land before and after 2013?		Before registering land, to build a house on your parcel was not requiring permission but after these regulations, I has become difficult. You need to build according to the master plan	it is not easy to get permission to develop your land especially in terms of building	since our place became part of the city, to get permission to build became a long process	before the requirements were not so much, after the is a need to develop land as specified in zoning plan	after in some areas, construction is not allowed while before it was	no idea	in general since the place meant to be part of city, to construct a house become difficult
How are the zoning regulations affecting your way of life?		The requirements to build a house now have become a lot. Like me whose main source of income is farming, I cannot build in this place, I am being forced to move away.	affected our profession of farming	Economically there is a change of life. Some are making money from their lands.	poor are highly affected, rich are coming to buy the land	the income have been decreased as the construction activities were one of man source of income for some people	no idea	decreases the income as they don't allow development different from what is in the zoning plans
<b>Gender</b>		F	female	male	male	male	female	female
<b>Occupation</b>		farmer	farmer	electrical technician	farmer	farmer	farmer	farmer

## Appendix C: Field Data collection support letters



**KWAME NKUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY - Kumasi**  
**GEOMATIC ENGINEERING DEPARTMENT**  
**COLLEGE OF ENGINEERING**

KUMASI  
GHANA, WEST AFRICA  
Tel: +233 (0) 3220 - 60227  
Fax: +233 (0) 3220 - 60227  
E-mail: [geomaticeng@knust.edu.gh](mailto:geomaticeng@knust.edu.gh)

Our Ref: GE.Postgrad/Vol.4/ 25

Date: January 26, 2016

### TO WHOM IT MAY CONCERN

Dear Sir or Madam,

### RE: REQUEST FOR SUPPORT

I hereby certify that Mr. NOEL HAKUZWYAREMYE is a second year Masters student of Geomatic Engineering at Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana.

As part of the MSc course, Mr. NOEL HAKUZWYAREMYE is undertaking a research titled "Impact of zoning on peri urban areas: case study of City of Kigali – Kicukiro District. The research and data collection will tentatively take place in City of Kigali Rwanda from 1 February to 5 March 2016. The Department of Geomatic Engineering will highly appreciate your support in providing him with the necessary data/information.

The Department guarantees that the data/information collected will only be utilized for the research objectives. Besides, Mr. NOEL HAKUZWYAREMYE will duly acknowledge and reference the source of the data/information in the final document.

Yours sincerely,

**Prof. Collins Fosu**  
*Head, Dept. of Geomatic Engineering*

GEOMATIC ENGINEERING DEPT.  
COLLEGE OF ENGINEERING  
KNUST - KUMASI  
GHANA



KWAME NKUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY - Kumasi  
GEOMATIC ENGINEERING DEPARTMENT  
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E-mail: geomaticeng@knust.edu.gh

Our Ref: GE.Postgrad/Vol.4/26

Date: January 26, 2016

The Mayor,  
Kicukiro District,  
P.O. Box 657,  
Kigali, Rwanda.  
Website: [www.kicukiro.gov.rw](http://www.kicukiro.gov.rw)

Dear Sir,

**LETTER OF INTRODUCTION: MR. NOEL HAKUZIYAREMYE**

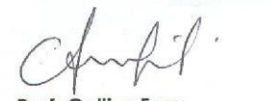
This is to certify that Mr. Noel Hakuwiyaremye is a second year MSc. student of this Department with Student number 20435390 and Index No. PG2233214. His final thesis is on the topic "Impact of zoning in peri-urban areas – Kigali City, Rwanda".

Mr. Hakuwiyaremye will need a letter authorizing his research within the District to help him with his work.

Any courtesies accorded him would be appreciated.

Yours faithfully,

  
Rev. Dr. E.O. Akrofi  
Project Supervisor

  
Prof. Collins Fosu  
Head, Dept. of Geomatic Eng.

GEOMATIC ENGINEERING DEPT  
COLLEGE OF ENGINEERING  
KNUST.-KUMASI  
GHANA



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GE. Postgrad/Vol.4/ 26

January 26, 2016

Our Ref:

Date:

**The Mayor,**  
**City of Kigali,**  
**P.O. Box 3527,**  
**Kigali, Rwanda.**  
Website: [www.kigalicity.gov.rw](http://www.kigalicity.gov.rw)  
Email: [info@kigalicity.gov.rw](mailto:info@kigalicity.gov.rw)

Dear Sir,

**LETTER OF INTRODUCTION: MR. NOEL HAKUZIYAREMYE**


This is to certify that Mr. Noel Hakuwiyaremye is a second year MSc. student of this Department with Student number 20435390 and Index No. PG2233214. His final thesis is on the topic "Impact of zoning in peri urban areas – Kigali City, Rwanda".

Mr. Hakuwiyaremye will need the zoning map (shape files) of Gahanga sector/Kicukiro District, Kicukiro Zoning Report to help him with his work.

Any courtesies accorded him would be appreciated.

Yours faithfully,

  
**Rev. Dr. E.O. Akrofi**  
*Project Supervisor*

  
**Prof. Collins Fosu**  
*Head, Dept. of Geomatic Eng.*  
GEOMATIC ENGINEERING DEPT.  
COLLEGE OF ENGINEERING  
KNUST.-KUMASI  
GHANA



**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY - Kumasi**  
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Our Ref: GE.Postgrad/Vol.4/26

Date: January 26, 2016

The Director General,  
Rwanda Natural Resource Authority,  
P.O. Box 433,  
Kigali, Rwanda.

Dear Sir,

**LETTER OF INTRODUCTION: MR. NOEL HAKUZWYAREMYE**

This is to certify that Mr. Noel Hakuwiyaremye is a second year MSc. student of this Department with Student number 20435390 and Index No. PG2233214. His final thesis is on the topic "Impact of zoning in peri urban areas – Kigali City, Rwanda".

Mr. Hakuwiyaremye will need the cadastral map (shape files) of Gahanga sector/Kicukiro District Orthophoto covering Gahanga Sector/Kicukiro District to help him with his work.

Any courtesies accorded him would be appreciated.

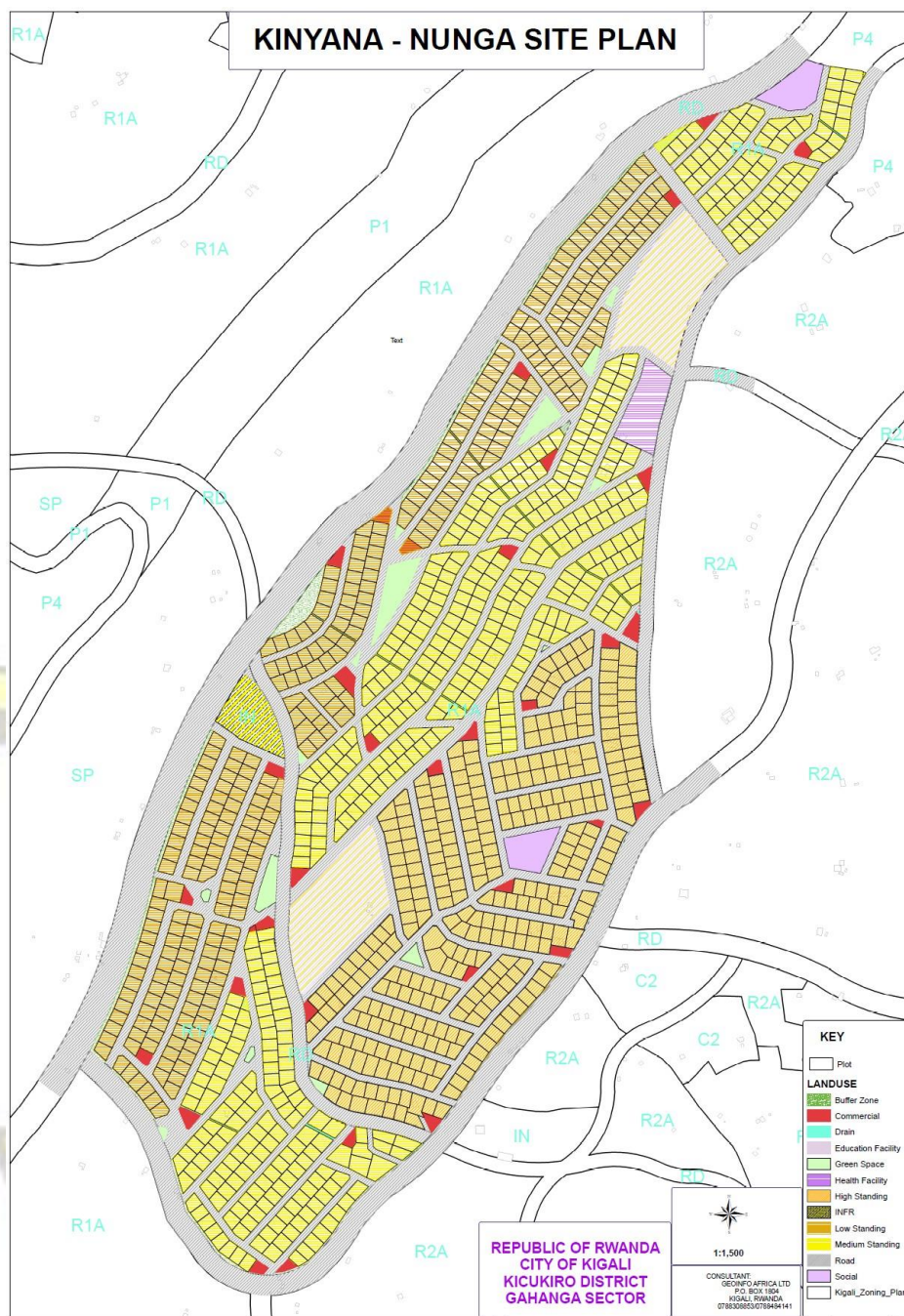
Yours faithfully,

  
Rev. Dr. E.O. Akrofi  
Project Supervisor

  
Prof. Collins Fosu  
Head, Dept. of Geomatic Eng.

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COLLEGE OF ENGINEERING  
KNUST.-KUMASI  
GHANA

## Appendix D: Others appendices



D-1: Sample of DPP required in implementing KDZP