A PROJECT REPORT

ON

IMPLEMENTATION OF RELATIONAL DATABASE SYSTEMS FOR CADASTRAL INFORMATION PRODUCTION OF IREWOLEDE ESTATE, ALONG NEW YIDI ROAD, ILORIN SOUTH LOCAL GOVERNMENT AREA, KWARA STATE.

BY

ELIJAH TOYIN DEBORAH

HND/23/SGI/FT/0121

SUBMITTED TO:

THE DEPARTMENT OF SURVEYING AND GEO-INFORMATICS,

INSTITUTE OF ENVIRONMENTAL STUDIES, KWARA STATE

POLYTECHNIC ILORIN.

IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF

HIGHER NATIONAL DIPLOMAIN SURVEYING AND

GEO-INFORMATICS

JULY,2025

CERTIFICATE

I hereby certify that the information given in this project was obtained as a result of the observation and measurement made by me and that the survey was carried out in accordance with survey laws, regulations and departmental instructions.

____

ELIJAH TOYIN DEBORAH

Matric No: HND/23/SGI/FT/0121

CERTIFICATION

This is to certify that this project was carried out by **ELIJAH TOYIN DEBORAH** with Matric No: **HND/23/SGI/FT/121** under my instruction and supervision for the award of Higher National Diploma in Surveying and Geo-informatics, Kwara State Polytechnic, Ilorin, Kwara State Nigeria. I hereby declare that he has conducted himself with due diligence and honesty on the said duties.

____________________ ____________________

SURV. R.S AWOLEYE DATE

(Project Supervisor)

____________________ ____________________

SURV. R.S AWOLEYE DATE

(Project Coordinator)

____________________ ____________________

A.I ISHAU DATE

(Head Of Department)

Surveying and Geo-informatics

____________________ ____________________

EXTERNAL EXAMINER DATE

DEDICATION

This project is dedicated to My Beloved Husband, whose unwavering support, love and encouragement has been my strength throughout this journey. Thank you for always being there.

ACKNOWLEDGEMENT

I wish to express my sincere gratitude to Almighty God for His grace and strength throughout the course of this project. My profound appreciation goes to my **HOD; MR. A.I ISHAU** and my Supervisor, **SURV. AWOLEYE R.S**, for their invaluable guidance, constructive criticism, and encouragement which contributed immensely to the success of this work.

I am also grateful to all the lecturers of Surveying and Geo-informatics department Kwara State Polytechnic; MR. ABIMBOLA I. ISHAU, SURV. ASONIBARE R.O SURV. AREMU A.G SURV. AYUBA ABD' SALAM, SURV. BANJI, SURV. DIRAN B.F, SURV. KABIR BABATUNDE, SURV. KAZEEM, for their support and contributions towards my academic journey. Special thanks to my Husband, my parent and siblings for their unwavering support and motivation during the research and writing of this project.

I am deeply grateful to my Parents **MR & MRS ELIJAH** for their unconditional love, support and backing. May you eat the fruit of your labour.

Lastly, I appreciate everyone whose contributions, directly or indirectly, made this project a reality.

ABSTRACT

This project focuses on the implementation of a Relational Database System (RDBMS) for cadastral information production, using Irewolede Estate, Ilorin South Local Government Area, Kwara State as the case study. The need for accurate, accessible, and well-managed cadastral data is critical for effective land administration, planning, and development. Traditional methods of storing cadastral records in physical files have proven to be inefficient, prone to damage, and difficult to update. This study addresses these challenges by designing and implementing a digital cadastral system using relational database structures.

TABLE OF CONTENTS

CHAPTER TWO

Literature Review

CHAPTER FIVE

Costing Estimation, Summary, conclusion, Recommendation and problems encountered

LIST OF TABLES

LIST OF FIGURES

Pages

CHAPTER ONE

1.0 INTRODUCTION

Land is one of the most valuable resources in any country. It serves as a foundation for housing, agriculture, infrastructure development, natural resource exploitation, and economic planning. As land-related activities grow in complexity, the need for accurate, efficient, and accessible land information becomes more urgent. Cadastral Information Systems (CIS) are tools developed to record, manage, and analyze land-related data, including ownership, boundaries, value, and usage. These systems form the backbone of any country’ s land administration framework and are essential for ensuring tenure security, reducing land conflicts, and enabling effective land taxation and planning

1.1 BACKGROUND OF THE STUDY

Traditionally, cadastral systems relied on manual record-keeping, paper maps, and fragmented archives. This approach has proven to be inadequate in dealing with increasing land demands, urbanization, and disputes arising from unclear or inaccessible land records. In response to these challenges, many countries are transitioning to computer-based systems that offer more robust and reliable ways of managing land data.

A key technological advancement in this regard is the use of Relational Database Management Systems (RDBMS). RDBMS offer an efficient structure for organizing and maintaining data using tables that are interrelated through unique keys. In a cadastral context, this allows land parcels, ownership records, transaction histories, and spatial data to be stored, accessed, and updated in a logical and consistent manner. RDBMS-based cadastral systems enhance data security, minimize redundancy, and improve the speed and accuracy of land administration functions.

In Africa and other developing regions, the adoption of RDBMS in cadastral information systems is gaining momentum. Countries like Ghana, Uganda, Kenya, and Rwanda have recorded significant improvements in land management outcomes through digital systems anchored by RDBMS. These systems not only enable better land governance but also contribute to broader development goals such as poverty reduction, economic growth, and environmental sustainability.

Land management and cadastral systems are foundational to the proper governance of a nation' s land and property. Cadastral information refers to records and data that describe the ownership, use, and boundaries of land parcels. These records are essential for a wide array of governmental and legal functions, including land taxation, planning, dispute resolution, and property transactions. The importance of an efficient and transparent cadastral system cannot be overstated as it is directly linked to the economic development and governance of any country.

Historically, many countries have relied on manual processes and paper-based records for cadastral information management. This method, although functional in earlier times, has several inherent challenges. As land transactions increased, the volume of data that needed to be managed grew exponentially. This resulted in issues such as data redundancy, inconsistent records, delayed processing of land transactions, difficulty in accessing up-to-date information, and a high potential for human error. Moreover, manual systems were often prone to misplacement of records and lacked an efficient means of ensuring data security and integrity.

The advent of computerization in the late 20th century paved the way for the development of computer-aided cadastral systems, which sought to digitize land records for more efficient management. The integration of Geographic Information Systems (GIS) with cadastral information provided a spatial dimension to land data, enabling better visualization, analysis, and decision-making. While GIS greatly enhanced the ability to analyze land data spatially, the storage, management, and integrity of the data itself still posed challenges for many land administration systems.

Relational Database Management Systems (RDBMS), with their ability to organize data into relational tables, brought about a significant shift in how land records could be managed (RM Bennett, M Pickering, J Sargent - Land Use Policy, 2019 - Elsevier). Unlike traditional methods, RDBMS allows for the efficient storage of large quantities of structured data in tables with predefined relationships. In the context of cadastral information, this means that data such as land parcel boundaries, ownership information, transaction histories, and land use records could be stored in a way that allowed for quick access, updates, and cross-referencing.

The key advantages of an RDBMS over traditional methods are numerous. Data consistency, accuracy, security, and efficiency are markedly improved. For example, the use of primary keys and foreign keys in relational databases ensures that each piece of information is uniquely identifiable and appropriately linked to other data. This system also reduces data redundancy, ensuring that the same information is not stored multiple times across different records, which helps save storage space and minimizes the risk of errors. Moreover, the ability to run complex queries to access specific data points or generate detailed reports empowers land administrators, planners, and legal entities to make informed decisions quickly and accurately.

As countries continue to urbanize and expand, the need for robust land management systems becomes even more pressing. For instance, land registration processes have become increasingly complex with the advent of land reforms, privatization, and changing land use patterns. As the number of transactions and the diversity of land rights increase, there is a growing need for systems that not only store vast amounts of data but also ensure that such data is accurate, up-to-date, and easily accessible.

Some countries have begun the process of modernizing their cadastral systems by adopting RDBMS technology. However, the transition to such systems is not without challenges. Data migration from legacy systems can be costly, time-consuming, and prone to errors. Furthermore, there are significant challenges related to training staff to effectively manage and use the new system, especially in countries where technical expertise in database management is scarce. Additionally, ensuring that the new system is adaptable and scalable to meet future demands is another critical consideration.

In this context, this study aims to investigate the implementation of RDBMS for cadastral information production and management. It seeks to understand the impact of RDBMS on the efficiency, accuracy, and accessibility of cadastral information systems, as well as identify the challenges and solutions involved in implementing these systems. By exploring real-life case studies and theoretical frameworks, the study will provide valuable insights into the adoption of RDS in cadastral applications.

This research is particularly timely as many developing and developed countries are considering or in the process of digitizing their land records. By examining how RDBMS can be applied to cadastral information production, the study will contribute to the broader body of knowledge on land governance and administration. Moreover, the findings of the study will be useful to policymakers, land administrators, and technology providers who seek to enhance land management practices using modern technological solutions.

Ultimately, the implementation of RDBMS in cadastral systems is not just about improving administrative efficiency. It is about ensuring transparency, reducing land disputes, increasing land tenure security, and contributing to sustainable urban development. As the importance of land as a resource grows globally, so too does the need for sophisticated systems that can ensure land is managed fairly, effectively, and securely. This study will explore how RDBMS can support this mission, leading to better outcomes for landowners, developers, governments, and societies at large.

1.2 PROBLEM STATEMENT

The management of cadastral information in Nigeria is fraught with inefficiencies. Many land records are still maintained manually, leading to problems such as:

- **Data Redundancy and Inconsistency:** The same land information may be recorded multiple times across different agencies, increasing the chances of discrepancies.
- **Difficulties in Retrieval and Updating:** Manually searching for land records is time-consuming, often leading to delays in transactions and disputes.
- **Lack of Integration:** Various government bodies, such as land registries, survey offices, and planning agencies, operate in isolation without a unified database.
- **Security Risks:** Physical records are prone to loss, damage, or unauthorized alterations, raising concerns about land fraud.

These problems hinder effective land governance, slow down urban planning, and increase the risk of disputes over land ownership. By implementing a relational database system, cadastral information can be efficiently stored, retrieved, and managed, reducing these issues significantly.

1.3 AIM AND OBJECTIVES OF THE STUDY

AIM:

The aim of this study is to implement a relational database system to enhance the accuracy, accessibility, and management of cadastral information.

OBJECTIVES:

This study seeks to achieve the following objectives:

1. To design a relational database model for storing and managing cadastral information.

2. To implement the database using appropriate software tools and enforce data integrity constraints.

3. To evaluate the performance and efficiency of the database system compared to traditional methods.

4. To provide recommendations for adopting relational database systems in cadastral information management.

1.4 SCOPE OF THE STUDY

This study focuses on the implementation of a relational database system for managing cadastral information. The geographical scope is limited to a specific area within Nigeria, which will serve as a case study for data collection and system implementation. The study will involve:

Database Design: Development of tables, relationships, and data constraints for land parcel records.

Data Entry and Querying: Inputing sample cadastral data and testing retrieval methods.

System Evaluation: Assessing the effectiveness of the database in terms of speed, accuracy, and usability.

1.5 PERSONNEL

MATRIC NO	REMARKS
HND/23/SGI FT/0121	AUTHOR
HND/23/SGI/FT/0058	MEMBER
HND/23/SGI/FT/0049	MEMBER
HND/23/SGI/FT/0050	MEMBER
HND/23/SGI/FT/0053	MEMBER
HND/23/SGI/FT/0061	MEMBER
HND/23/SGI/FT/0062	MEMBER
HND/22/SGI/FT/086	MEMBER

Table 1.1 Personnel involved in the project

1.6 STUDY AREA

The study area for the project is situated on Part of Irewolede Estate, Ilorin West Local Government Area, Kwara State. The geographic location of the study area lies between latitude 08° 27' 29.94"N to 08° 27' 49.59"N and longitude 04° 32' 56.74"E to 04° 33' 21.36"E. The area covered is approximately found to be 27.2 hectares.

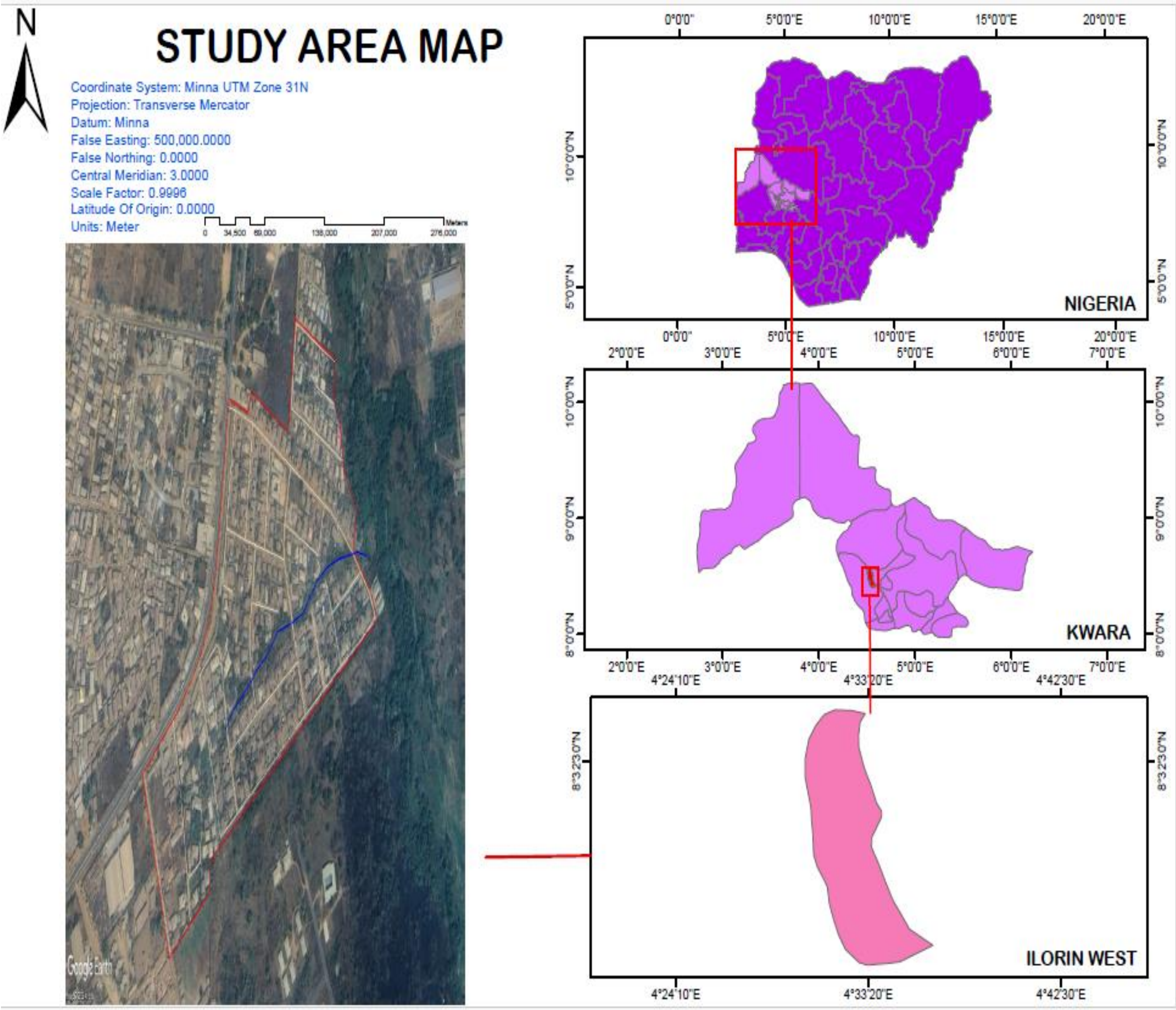


Fig 1.1 Showing map of the study area

1.7 SIGNIFICANCE OF THE STUDY

The implementation of a relational database system for cadastral information production is significant for several reasons:

- Government and Land Administration Authorities
    - Enables more efficient management of land ownership records.
    - Reduces disputes and fraud through secure data storage.
    - Facilitates policy-making and urban planning with accurate land data.
    - Surveyors and GIS Professionals
    - Provides a structured framework for data storage and retrieval.
    - Enhances integrations with GIS applications for mapping and spatial analysis.
    - Property Owners and Investors
    - Improves transparency in land transactions.
    - Reduces cases of duplicate land sales and fraud.
    - Academia and Future Research
    - Serves as a reference model for further studies in cadastral database management.
    - Contributes to the body of knowledge on digital land administration in Nigeria.

CHAPTER TWO

2.0 LITERATURE REVIEW

A relational database is a structured system for storing data in tables with predefined relationships. Unlike flat-file systems, relational databases eliminate redundancy by organizing data into multiple interconnected tables.

The efficient management of cadastral information is critical for land administration, urban planning, and economic development. Traditional methods of storing and retrieving cadastral data have proven inefficient due to redundancy, inaccessibility, and lack of integration. As a result, relational database systems have emerged as a viable solution for improving data accuracy, security, and retrieval processes. This chapter explores the concepts, technologies, and methodologies that form the basis of the study.

2.1 WHAT IS A RELATIONAL DATABASE?

A relational database is a collection of information that organizes data in predefined relationships where data is stored in one or more tables (or "relations") of columns and rows, making it easy to see and understand how different data structures relate to each other. Relationships are a logical connection between different tables, established on the basis of interaction among these tables. A relational database (RDB) is a way of structuring information in tables, rows, and columns. An RDB has the ability to establish links or relationships– between information by joining tables, which makes it easy to understand and gain insights about the relationship between various data points.

2.1.1 THE RELATIONAL DATABASE MODEL

Developed by E.F. Codd from IBM in the 1970s, the relational database model allows any table to be related to another table using a common attribute. Instead of using hierarchical structures to organize data, Codd proposed a shift to using a data model where data is stored, accessed, and related in tables without reorganizing the tables that contain them.

Think of the relational database as a collection of spreadsheet files that help businesses organize, manage, and relate data. In the relational database model, each " spreadsheet" is a table that stores information, represented as columns (attributes) and rows (records or tuples).

Attributes (columns) specify a data type, and each record (or row) contains the value of that specific data type. All tables in a relational database have an attribute known as the primary key, which is a unique identifier of a row, and each row can be used to create a relationship between different tables using a foreign key—a reference to a primary key of another existing table.

Let's take a look at how the relational database model works in practice:say you have a Customer table and an Order table.

The Customer table contains data about the customer:

- Customer ID (primary key)
- Customer name
- Billing address
- Shipping address

In the Customer table, the customer ID is a primary key that uniquely identifies who the customer is in the relational database. No other customer would have the same Customer ID.

The Order table contains transactional information about an order:

- Order ID (primary key)
- Customer ID (foreign key)
- Order date
- Shipping date
- Order status

Here, the primary key to identify a specific order is the Order ID. You can connect a customer with an order by using a foreign key to link the customer ID from the Customer table.

The two tables are now related based on the shared customer ID, which means you can query both tables to create formal reports or use the data for other applications. For instance, a retail branch manager could generate a report about all customers who made a purchase on a specific date or figure out which customers had orders that had a delayed delivery date in the last month.

The above explanation is meant to be simple. But relational databases also excel at showing very complex relationships between data, allowing you to reference data in more tables as long as the data conforms to the predefined relational schema of your database.

As the data is organized as pre-defined relationships, you can query the data declaratively. A declarative query is a way to define what you want to extract from the system without expressing how the system should compute the result. This is at the heart of a relational system as opposed to other systems.

2.1.2 THE ROLE OF RELATIONAL DATABASES IN CADASTRAL INFORMATION SYSTEMS

Relational Database Management Systems (RDBMS) have emerged as a robust solution for managing structured datasets, particularly in domains where data entities exhibit well-defined interrelationships. Within the context of cadastral information systems, RDBMS facilitate the storage and organization of land-related data in relational tables. Each table represents a specific entity, such as land parcels, property owners, legal transactions, or boundary delineations. These entities are interconnected through primary and foreign keys, thereby ensuring referential integrity and consistency across the database (Benediktsson et al., 2006).

The application of RDBMS in cadastral systems significantly enhances data management by reducing redundancy and enabling real-time updates. This ensures that any modification such as a change in ownership or an alteration in boundary configuration is consistently reflected throughout the system.

Empirical studies underscore the benefits of RDBMS in cadastral data management. For instance, Kogbe et al. (2017) emphasize that the use of relational databases improves the accuracy, consistency, and reliability of land records through the implementation of data constraints and structured relationships. This architecture not only supports the efficient tracking of historical changes but also facilitates synchronized updates, thereby maintaining the integrity of the entire system.

2.1.3 EXAMPLES OF RELATIONAL DATABASES

A relational database management system (RDBMS) is a program used to create, update, and manage relational databases. Some of the most well-known RDBMSs include MySQL, PostgreSQL, MariaDB, Microsoft SQL Server, and Oracle Database. Cloud-based relational databases like Cloud SQL, Cloud Spanner and AlloyDB have become increasingly popular as they offer managed services for database maintenance, patching, capacity management, provisioning and infrastructure support.

2.1.4 BENEFITS OF RELATIONAL DATABASES

The main benefit of the relational database model is that it provides an intuitive way to represent data and allows easy access to related data points. As a result, relational databases are most commonly used by organizations that need to manage large amounts of structured data, from tracking inventory to processing transactional data to application logging.

There are many other advantages to using relational databases to manage and store your data, including:

- Flexibility: It’ s easy to add, update, or delete tables, relationships, and make other changes to data whenever you need without changing the overall database structure or impacting existing applications.
- ACID compliance: Relational databases support ACID (Atomicity, Consistency, Isolation, Durability) performance to ensure data validity regardless of errors, failures, or other potential mishaps.

- Collaboration: Multiple people can operate and access data simultaneously. Built-in locking prevents simultaneous access to data when it's being updated.
- Built-in security: Role-based security ensures data access is limited to specific users.
- Database normalization: Relational databases employ a design technique known as normalization that reduces data redundancy and improves data integrity.

2.1.5 CASE STUDIES OF RDBMS IN CADASTRAL INFORMATION SYSTEMS IN AFRICA

The adoption of Relational Database Management Systems (RDBMS) in cadastral information systems across Africa has significantly improved land governance by addressing long-standing issues such as fragmented records, land disputes, and inefficient service delivery. Several African countries have implemented RDBMS-based cadastral solutions with varying degrees of success. Below are notable case studies:

1. Uganda – National Land Information System (NLIS)

Uganda's Ministry of Lands, Housing and Urban Development implemented the National Land Information System (NLIS), a computer-based cadastral and land registry platform supported by RDBMS. Developed under the Land Sector Strategic Plan with support from the World Bank, the NLIS uses a relational database to manage data on land parcels, ownership, transactions, and spatial information. The system has streamlined land registration, significantly reduced turnaround times for transactions, and improved transparency and service delivery across land offices (World Bank, 2014).

2. Ghana – Land Administration Project (LAP)

Ghana' s Land Administration Project (LAP) was launched to improve the efficiency and accessibility of land records. As part of this reform, the country digitized its land registry and cadastral records using a relational database system. The RDBMS facilitated the integration of land title data, survey plans, and ownership details. By ensuring consistency and eliminating redundancy, the system has helped resolve boundary disputes and enhanced public confidence in land tenure documentation (UN-Habitat, 2010).

3. Rwanda – Land Tenure Regularisation Programme (LTRP)

Rwanda undertook an ambitious Land Tenure Regularisation Programme, which involved the systematic registration of land parcels nationwide. A central database, based on RDBMS architecture, was used to store information related to land rights, parcel boundaries, and land use. The relational database design allowed for linking landowners to specific parcels, improving data traceability and integrity. The success of the system was instrumental in achieving over 95% of land parcels registered within five years, which significantly strengthened tenure security and land investment (Ali et al., 2014).

4. Kenya – Land Information Management System (LIMS)

Kenya introduced a Land Information Management System (LIMS) aimed at modernizing land registration and cadastral services. The RDBMS underpinning the system enables integration between land records, property boundaries, and administrative units. It also supports the automation of processes such as title search, issuance, and renewal. The database structure supports linkages between different departments, including the Ministry of Lands, Survey of Kenya, and county governments, promoting a holistic approach to land management (Republic of Kenya, 2020).

These African case studies underscore the importance of RDBMS in the digitization and modernization of cadastral information systems. The integration of relational databases in land administration contributes to improved efficiency, data consistency, and equitable access to land resources key factors in driving sustainable development across the continent.

2.2 RELATIONAL VS. NON-RELATIONAL DATABASES

The main difference between relational and non-relational databases (NoSQL databases) is how data is stored and organized. Non-relational databases do not store data in a rule-based, tabular way. Instead, they store data as individual, unconnected files and can be used for complex, unstructured data types, such as documents or rich media files.

Unlike relational databases, NoSQL databases follow a flexible data model, making them ideal for storing data that changes frequently or for applications that handle diverse types of data.

2.3 TRADITIONAL APPROACHES TO CADASTRAL INFORMATION MANAGEMENT

Historically, cadastral information records of land ownership, boundaries, and property details was managed using manual, paper-based systems. These systems were the standard before the advent of digital technologies and Geographic Information Systems (GIS). Though they served their purpose for a time, they were fraught with numerous inefficiencies and risks. Below is a detailed exploration of the challenges associated with these traditional methods:

1. Difficulty in Retrieving and Updating Records

Manual filing systems involved storing physical documents in cabinets or folders, often organized by location, parcel number, or landowner name. This approach made the retrieval of information time-consuming and labor-intensive. For example, locating the file of a specific parcel could take hours, especially in large jurisdictions with thousands of records.

Updating records required physically editing or replacing documents, increasing the chances of errors, duplication, or inconsistencies. The lack of instant access meant that decision-making and administrative processes were often delayed.

2. High Risk of Data Loss Due to Physical Damage or Misplacement

Paper records were highly vulnerable to environmental threats such as fire, flood, pests, or aging. In the event of a disaster, entire archives of critical cadastral data could be lost irreversibly. Additionally, documents could be misfiled, misplaced, or stolen, leading to the permanent loss of important land records. The absence of backup systems further increased the fragility of this method.

3. Lack of Standardization in Record-Keeping

Different cadastral offices or regions often developed their own formats and practices for recording land data. This lack of uniformity made it difficult to integrate, compare, or share data between agencies or jurisdictions. Inconsistent terminology, measurement units, and mapping techniques created confusion and reduced the reliability of cadastral records.

4. Limited Accessibility and Transparency

Only authorized personnel could access the physical files, and even they had to be physically present at the office. This created barriers for landowners, legal practitioners, and planners who needed timely access to cadastral data. The process lacked transparency, and corruption or manipulation of records was harder to detect in a purely manual system.

5. Labor-Intensive and Costly

Maintaining physical records required significant manpower for sorting, storing, securing, and updating files. Over time, storage space became a concern as archives grew. The operational costs of running such systems—including printing, copying, transporting, and protecting documents—were relatively high compared to modern digital alternatives.

With technological advancements, digital solutions have been introduced to improve the efficiency and accuracy of cadastral data management.

2.4 COMMON RELATIONAL DATABASE MANAGEMENT SYSTEMS (RDBMS)

Several database management systems support relational databases, including:

- MySQL: Open-source and widely used for web applications.
- PostgreSQL: Known for robustness and compliance with GIS applications.
- Microsoft SQL Server: Suitable for enterprise-level applications.
- Oracle Database: Used in high-performance and large-scale systems.

2.5. ROLE OF DATABASES IN LAND ADMINISTRATION

1. Efficient Storage of Land Parcel Details

Relational databases provide a systematic way of storing vast amounts of data related to land parcels. Each parcel can be represented as a record in a table, with fields capturing attributes such as parcel ID, owner information, land size, boundaries, land use, and legal status.

Unlike paper-based systems, databases allow data to be compressed, indexed, and archived in formats that save space and enhance data integrity. With normalization techniques, redundancy is minimized, and data consistency is maintained across tables.

2. Quick Retrieval of Ownership and Transaction Records

Relational databases support structured query languages (SQL), enabling users to quickly search, filter, and retrieve specific records based on various criteria. For example, a land officer can instantly generate reports on all parcels owned by a particular individual or identify properties within a specific region.

This speed and precision in retrieving information drastically improve administrative efficiency and support timely decision-making in activities such as land registration, valuation, and dispute resolution.

3. Data Security and Access Control

Land administration data is sensitive and must be protected against unauthorized access, tampering, or loss. Relational databases incorporate user authentication, role-based access control, and data encryption, ensuring that only authorized personnel can view or modify specific data.

Audit trails can also be maintained to track changes made to records, thereby enhancing accountability and transparency in land governance. Regular backups and failover mechanisms further help in preserving data integrity during system failures or disasters.

4. Integration with GIS for Spatial Analysis and Visualization

One of the most powerful applications of relational databases in cadastral management is their ability to integrate seamlessly with Geographic Information Systems (GIS). The attribute data stored in databases can be linked to spatial features on a digital map, allowing for interactive visualization of land parcels, boundaries, infrastructure, and land use patterns.

This integration enables spatial analysis, such as identifying land encroachments, planning urban development, monitoring land use changes, and supporting environmental management. GIS-database integration enhances both data accuracy and the decision-making process in land administration.

5. Support for Automation and Interoperability

Modern relational databases can be incorporated into automated workflows for tasks like issuing land titles, updating property tax records, and notifying stakeholders of changes. They also support interoperability with other systems (e.g., national tax systems, planning authorities, and surveying departments), creating a unified land information ecosystem.

2.5.1 DATABASE DESIGN FOR CADASTRAL INFORMATION

A well-structured database model for cadastral management typically includes the following tables:

- Land Parcels Table: Stores land parcel ID, size, and location.
- Ownership Table: Contains owner details and property rights.
- Transactions Table: Records land sales, leases, and transfers.
- Survey Data Table: Includes coordinate values and surveyor information.

These tables are linked using primary and foreign keys to establish relationships, ensuring data consistency.

2.5.2 THE EVOLUTION FROM 2D TO 3D CADASTRES

Traditional cadastral systems primarily rely on 2D digital or analog documents, which are efficient for simple land parcels (Çağdaş & Stubkjær, 2014). However, these systems face significant challenges in densely populated urban areas with complex, multi-level property situations (Heinen et al., 2024). The limitations of 2D representations become apparent when dealing with:

- Overlapping Property Rights: In urban environments, properties often overlap vertically, such as apartments in a building or underground utilities (Paulsson & Paasch, 2013). Representing these complex arrangements in 2D is difficult and can lead to ambiguities.
- Inadequate Representation of Spatial Extent: Two-dimensional descriptions often fail to accurately capture the actual spatial extent of complicated 3D property units, particularly in city centers (Adel, 2024).
- Registration Issues: Problems arise in the registration and mapping of real estates located under or above excluded spaces, such as tunnels or utility networks (Paulsson & Paasch, 2013).
- To address these issues, 3D cadastres are emerging as a viable solution, offering a more accurate and comprehensive representation of property rights and spatial information.

2.5.3 EMERGENCE OF 3D CADASTRES

To address these challenges, 3D cadastres are being developed and implemented in many parts of the world. These systems incorporate the vertical dimension into cadastral models, enabling the registration and visualization of volumetric property units.

2.5.4 CORE COMPONENTS OF A RELATIONAL DATABASE MANAGEMENT SYSTEM (RDBMS)-BASED CADASTRAL SYSTEM

1. Data Tables (Entities)

Each table in the RDBMS represents a specific cadastral entity. Common tables include:

Land Parcel Table – Stores parcel ID, location, area, land use, etc.

Owner Table – Contains details of landowners or right holders (name, ID, contact, etc.).

Transaction Table – Records of land sales, leases, inheritance, and other changes.

Boundary Table – Coordinates or geometry data defining parcel shapes.

Survey Table – Details on surveying activities, methods, and dates.

2. Primary and Foreign Keys

Primary Keys uniquely identify each record in a table (e.g., Parcel_ID, Owner_ID).

Foreign Keys link one table to another, allowing relationships between data entities (e.g., linking parcels to owners or transactions).

3. Relational Schema

A schema defines how tables are structured and related. It ensures:

Data normalization (reducing redundancy)

Logical relationships between datasets (one-to-many, many-to-many)

Consistency and integrity across the database.

4. Spatial Data Integration

Although RDBMS is primarily non-spatial, it often integrates with Geographic Information Systems (GIS) to manage:

Parcel Geometry

Coordinates and maps

Topology rules (e.g., parcels shouldn' t overlap)

Spatial data is usually stored using extensions like PostGIS (for PostgreSQL) or Oracle Spatial.

5. Data Integrity and Constraints

Check constraints ensure values entered into the database meet specific rules (e.g., area > 0).

Referential integrity ensures foreign keys correctly link to existing records.

Unique constraints prevent duplicate entries for fields like parcel IDs.

6. Query Language (SQL)

Structured Query Language (SQL) is used to:

Retrieve data (e.g., list all parcels owned by a person)

Update records (e.g., change ownership)

Generate reports (e.g., land valuation summaries)

7. **User Interface / Access Laye**r

Provides access for:

- Data entry clerks
- Surveyors
- Land administrators
- Public users (via web portals)

8. Security and Access Control

Defines who can access, modify, or delete specific data:

- Role-based access
- Authentication and authorization mechanisms
- Audit trails for data changes

9. Backup and Recovery System

Ensures data is protected in case of system failure, including:

- Scheduled backups
- Redundancy mechanisms
- Disaster recovery plans

10. Reporting and Analytics Tools

Allow generation of:

- Land ownership summaries
- Transaction histories
- Taxation reports
- Custom queries for decision-making

2.6 TECHNOLOGICAL INFRASTRUCTURE: RDBMS and GIS

RDBMS: Relational databases are used to store and manage large volumes of cadastral data, including spatial and non-spatial information. Key functions of RDBMS in 3D cadastres include:

- Data Storage: Efficiently storing cadastral data, attribute information, and relationships between different entities.
- Data Retrieval: Providing fast and reliable data retrieval capabilities for various applications.
- Data Management: Supporting data integrity, security, and concurrency control.
- GIS: Geographical Information Systems are used to visualize, analyze, and manage spatial data. Key functions of GIS in 3D cadastres include:
- Spatial Data Visualization: Displaying cadastral data in 2D and 3D, allowing users to visualize property boundaries and spatial relationships.
- Spatial Analysis: Performing spatial queries and analysis, such as calculating areas and volumes, determining spatial relationships between properties, and identifying potential conflicts.
- Data Integration: Integrating cadastral data with other spatial datasets, such as topographic maps, aerial imagery, and utility networks.

2.7 INTEGRATION OF RDBMS AND GIS

The integration of RDBMS and GIS provides a powerful platform for managing 3D cadastral data. This integration allows for:

- Seamless Data Access: GIS applications can directly access cadastral data stored in the RDBMS
- Advanced Spatial Analysis: Spatial analysis functions in GIS can leverage the rich attribute information stored in the RDBMS.
- Web-Based Access: Web-based GIS applications can provide access to cadastral data and spatial analysis tools to a wide range of users.

2.8 SECURITY AND ACCESS CONTROL IN RDBS

Security and access control are critical components in the implementation of relational database systems for cadastral information management. Cadastral data contains sensitive and legally binding information about land ownership, boundaries, transactions, and rights. Therefore, it is essential to ensure that such data is protected from unauthorized access, manipulation, or loss. Relational database systems offer a range of mechanisms to enforce security and manage user access effectively.

2.9 CONCLUSION

Cadastral Information Systems play a vital role in modern land administration, serving as the backbone for managing land ownership, usage, and legal rights. Traditional paper-based systems have proven inadequate in addressing the growing complexity and demands of land governance, particularly in fast-developing regions. The integration of Relational Database Management Systems (RDBMS) into cadastral operations has emerged as a transformative solution, offering improved data structure, accuracy, consistency, and accessibility.

RDS provide a flexible and efficient framework for storing and managing land-related data in structured, interrelated tables. This not only ensures the integrity and synchronization of information but also supports real-time updates and seamless data sharing across government agencies and departments. The application of RDBMS in countries such as Uganda, Ghana, Rwanda, and Kenya demonstrates the practical benefits of digitized cadastral systems, including increased transparency, reduced transaction time, and improved service delivery.

In summary, the implementation of RDBMS in cadastral information systems is essential for effective land governance, particularly in developing regions. It fosters legal certainty, minimizes disputes, enhances planning and taxation, and ultimately contributes to national development goals. Continued investment in technological infrastructure, capacity building, and policy reform is crucial for optimizing the potential of RDBMS-based cadastral systems in Africa and beyond.

CHAPTER THREE

3.0 METHODOLOGY

TESTS OF DIFFERENTIAL GPS

The two GPS receivers (Tersus Differential GNSS) were tested to ascertain its working capability on two known established points. The reference receiver (base) and rover receiver were setup using the RTK (Real Time Kinematics) mode with boosts from external radio to increase the communication linkup and range between the two receivers. The interface was access using S1 controller to set the parameter. The data acquired was downloaded using beam methods (Bluetooth) of the windows mobile platform in text format (.txt)

However, the result displayed the following on the controller:

Status (P):	Fixed
Horizontal Root Mean Square (H):	0.014
Vertical Root Mean Square (V):	0.021
Satellite Number (S):	10+4
Communication Mode (Channel):	4
Time (T)	11:05:38

3.1 CONTROL CHECK

Control check was carried out on the beacons PT 02 and PT 03 in order to ensure whether they were still maintaining their original positions. The reference receiver (base receiver) was set on PT 01 while the rover receiver was set on PT 02 and PT 03 respectively. The following are the result obtained

Table 3.5.1: Coordinate of the observed and the original values of PT 02

PILLAR	**NORTHING**	**EASTING**	**STATUS**	**REMARKS**
PT 02	935768.084	670900.867		ORIGINAL
PT 02	935768.099	670900.847	FIXED	OBESRVED
DISREPANCY	0.015	0.020		

Table 3.5.2: Coordinate of the observed and the original values of PT 03

PILLAR	**NORTHING(m)**	**EASTING(m)**	**STATUS**	**REMARKS**
SC/KW E4583R	935791.554	670975.362		ORIGINAL
SC/KW E4583R	935791.575	670975.384	FIXED	OBESRVED
DISREPANCY	0.021	0.022		

The result shows that the control pillars were in Situ and in good condition for the survey operation. In the case of the instrument, it can be concluded to be in good working condition.

3.2 DATA SOURCE

Control coordinate were given from existing map, which is considered as secondary data. This was plotted using AutoCAD. The main source of data used is primary source.

3.3 GEOMETRIC DATA ACQUISITION

This involve the acquisition of both northing and easting value of features that are present on the project site. During the data acquisition, Real Time Kinematic method was employed coordinates of boundary points, as well as details and notable features along the perimeter using total station. Boundary pillars are established and accurately measured. These points serve as reference markers and are essential for maintaining consistency and accuracy throughout the survey. Additionally, these coordinates serve as valuable information for future reference, analysis, or planning purposes. They can also be used to assess potential impacts on the survey area and aid in making informed decisions during the project's development or construction phases.

Data Acquisition

To gather the necessary data for the project, observations and measurements were carried out. Obtaining the information needed to create the project plan was the focus of this stage. The processes listed below were completed.

- Selection of control points. Perimeter Traverse
- Detailing

Complete surveying programs with the ability to record data and set parameters are included with the instrument used. Additionally, it uses software modules with built-in memory and has convenient memory management capabilities.

Perimeter Traverse

The act of traversing is the survey of a group of interconnected lines, known as traverse legs, the ends of which have been marked in the field and the lengths and directions of which have been established by observation. Traverse stations are places of changes or turning. Open and Closed

Traverses are the two basic categories into which traversing can be placed.

Closed traverse always begins and end on sets of known points (points with known coordinates previously established). Perimeter are frequently encircled by shapes, such as polygons, in closed traverse surveying. Although this type is expected to be employed in all projects in surveying generally.

An open traverse consists of a collection of traverse lines that are connected but do not begin and end at a known point. When no controls are present where the traverse action is to stop, this type is typically utilized. In this kind of traverse, the observer's main responsibility is to make sure that the task is being checked at each stage. Surveys of this kind are frequently used in the engineering industry, such as route surveys.

The closed traverse type was employed in this project as it was started on an existing control point (PT 02) and closed on the same control (PT 02).

Base Station Setup

The base station is required in order to ensure an accurate position to be used in the topographic survey of Extension to Textile Factory. The use of a base station is now a standard routine in surveying practice; this is to validate the fundamental principle of carrying out a survey **" from whole to part"** . This means that networks of horizontal and vertical control points are first established. The temporary adjustment (centering and leveling) was performed on it. All the connections necessary for RTK mode stated below was carried out,

- The base station comprising of Tersus GNSS GPS receiver shown in figure 3.1 below was setup on a tripod stand on PT 02.

Figure 3.1 Tersus *GNSS GPS receiver*

NB: The position of the base station used is 935768.084mN, 670900.867mE. It was located in an area free from obstruction and interferences. It has been set to the WGS 84 system with Clarke 1880 ellipsoid.

The procedure for the data capturing is stated below;

- The instrument was switched on using the power button and also the data lodger (**TC20**).
- Then the instrument was placed on the tribrach which was already attached to the tripod and levelled.
- On the data lodger, the **Nuwa app**, Survey Office software was launched.
- The software was allowed to load and then, on the Project creation page, a project folder called ‘ **CIS’** was created and then opened.
- On the series of pages that followed however, the datum was selected as ‘ Minna’ , the mask angle as ‘ 15^{o}’ , while the minimum observation time was set at ‘ 5 minute’ . After this page, the Base page was loaded.

- On the instrument **Connect page** (the Bluetooth connection page), the base station instrument serial number 52000754 was selected and down the page, the ‘ connect’ button was clicked. This connects the lodger to the base instrument.
- On the Base page, the **get location** icon was click, and this bring the approximate coordinate of PT 2control, the coordinate was then corrected to the values obtained after this, the ‘ start’ button was clicked and the base observation commenced.
- The Rover instrument’ s battery was then fixed into it and switched on using the power button then mounted on the tracking rod (a single legged pole) and tightened.
- The tracking rod was set at 2.00m as height of the instrument.
- On the instrument **Connect page** (the Bluetooth connection page), the base station instrument serial number 52000754 was then disconnected and the Rover instrument serial number 52000764 was selected and down the page, the ‘ connect’ button was clicked. This connect the lodger to the Rover instrument. The voice information **FIXED** was then heard from the instrument.

  A complete setup of the base and the interface of the Project Creation page are shown

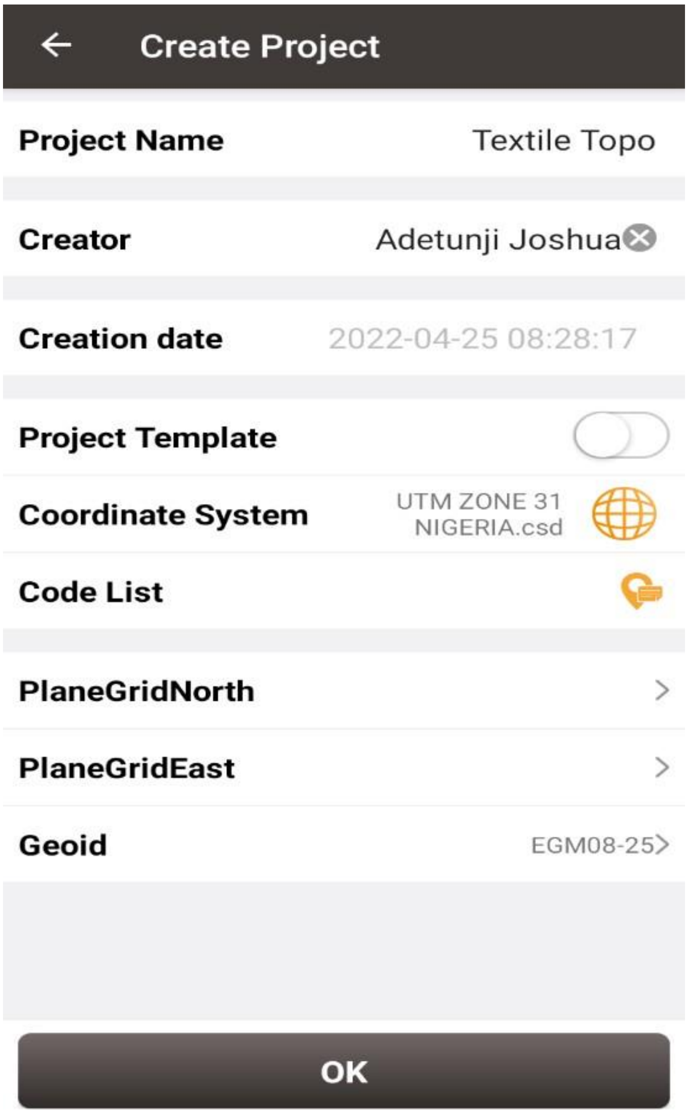


Figure 3.2 Showing the project creation page on Nuwa app

FIELD OBSERVATION

1. After setting up the base, the rover instrument with serial number 52000764 was taken to site.
2. **NOTE: -** Each station in a differential GPS observation is typically observed independently (though with direct reference to the base station), i.e., the instrument is placed on each station one at a time until the final point or detail in the site is observed.
3. The instrument was placed on the first station i.e. the base of the tracking rod was placed on the center of the pillar.
4. On the data lodger, the Nuwa app was launched and the Survey page of the app was click. On the Survey page, the **get location** icon was click to obtained the Northing and Easting of the station.
5. **NB:** Given that the time segment of the instrument has been set to 5secs already, the observation automatically ends when its period of the time segment already pre-set elapsed

- The Station ID was then changed from pt1 to P1.

6. After 5sec of observation, the observation stopped automatically and then the instrument was moved to the next station i.e. P2
7. NOTE: - that the data lodger was not switched off after the first station had been observed since the stations are not far from one another i.e. not more than 50m from each another.
8. On the data lodger with the Survey page on, the ‘ get location’ icon was clicked and the observation started since the instrument had automatically given the next station name. The observation was allowed for 5sec again.
9. The process in step (v) was repeated for all the subsequent stations and other details that were observed on the site.
10. At the end of the observation, the instrument was switched off. The Survey page on the data logger was closed and the data lodger was also switched off (though in the warm boot mode).

11. The data logger was taken to the base station and switched on again. The instrument' s serial number was selected on the Bluetooth page which also led to the Base station page.
12. On the base station page, the ' stop base' button was clicked and then the instrument was
13. Switched off including the data lodger.

3.4 ATTRIBUTE/ SOCIAL SURVEY

This aspect of data acquisition entails the collection of other data which geometric in nature. Such data were directly related to the features to which geometric data was acquired. They included building names, the purpose of which the building is used for. etc.

To collect attribute data, survey was employed. This involves oral interviews, reading information from sign posts, wall signs, virtual observation, etc.

3.5 DATABASE CREATION/IMPLEMENT

For efficient and effective management of data in the computer environment, data item are usually arranged and stored in a database or databank. The content of this database could be in form of a text, number, polygon or graphics. The creation of this database involved the combination and storage of the acquired graphical and attributes data obtained in former designed GIS database of a generic structure for the purpose in spatial analysis and queries on project site.

In the creation of a land information system data mode, a widely used technique called layering was employed. The features that are present within the project site have been classified into different layers in the AutoCAD software independently. The poly line entities were joined using the poly line tool while appropriate symbols were used for the point entities. These layers were then exported to ArcGIS environment where shape files were created using attributes fields as conceptualized in the schema. These attribute table were then populated accordingly with attributes values for each particular entity as observed in the field and from the social survey template (attached as appendix) The personal Geodatabase was then created finally in Arc Catalog environment. Where other tables that are non-geometric where created while the already created shape files where imported. Relationship between these tables were also established and the tables were later populated in the Arc Map environment. The following are some of the tables created

3.6 DATABASE MANAGEMENT SYSTEM (DBMS)

According to Dale and McLaughlin (1998), database management system was defined as a computer program to control the storage, retrieval and modification of data in the database. DBMS comprises of set of programmers which are used to maintain and manipulate the data orderly and acts as the central control over all the interactions. It manages that data using alphanumeric data with limited capabilities of performing spatial queries

A DBMS must allow the definition of data and their attributes and relationships as well as providing security and on interface between the end users and their application and the data themselves it reduces redundancy. Therefore, Arc GIS 10.2 version was used to create, manipulate, maintain and access the database easily.

3.7 DATA QUALITY

Some forms of quality control and quality assurance were incorporated in the project at every phase. These include conformity with data templates, data competences and data accuracy. Conformity with data templates in this premises refers to the degree to which the captured data conformed with the designed templates, while data competence was understood as the degree to which the available data in the report and for which there are specific templates have been extracted.

3.8 DATA INTEGRITY

The data captured as exactly downloaded into the system then exported to AutoCAD via notepad and eventually into Arc GIS. The process involves ensuring that the data in the database were accurate and setting of certain constraint to prevent inconsistency in the database.

3.8.1 DATA SECURITY

Security is of great concern to land administration because of the legal implication of cadastral records. Security of the records is of almost importance to all concerned. These includes:

- Physical and system security
- Physical security: The use of burgling proof, fire-fighting equipment-controlled access, proper records of the moment of personal and our of the office circuit break
- System Security: Uninterrupted power supply (UPS) will be used to control voltage, use of passwords and backups

In view of the foregoing, locking mechanism was adopted to protect the data in the database from unconscious deletion. Password was used to prevent unauthorized user from breaking into the database and a backup was created for the whole project on the rentable DVD.

Having succeeded in analysis the methodology employed in the execution of this project to arrive at the successful completion. it is equally necessary to examine the processes undertaken to ascertain the reliability and effectiveness of the created land information system.

CHAPTER FOUR

4.0 DATA PROCESSING AND PRESENTATION

4.1 SPATIAL ANALYSIS

Spatial analysis is a specialized function that distinguish GIS from other information systems. It entails the examination of spatial and attributes characteristics of geographic features that are within the database to establish relationships from which spatial problems can be tackled. In this project work, spatial analyses were performed to select, combine and intersect existing geospatial data-sets in order to generate new information suitable for answering specific spatially-related questions.

The results from these analyses can be shown in a number of ways depending on the required output format. Where attribute information about map features is required, they can be presented as tables containing such valves as are needed from the query analysis. They can also be presented as maps with legend information showing the queried features and their topological relationships with other features shown on the map.

For this project AutoCAD 2007 was used to carry out the plotting of all the parcels. The drawing was exported to ArcGIS 10.3 where all other operations were carried out.

4.2 SPATIAL QUERY

Searching of data components using certain criteria of retrieving them from the database is known as spatial query. The information retrieved is used to support decision making. The Cadastral Information System (CIS) plays its role when a relational database is linked to graphics in real time.

A good Cadastral Information System (CIS) allows the user to select records or attributes in the database and to view the result on coverage displayed which can be printed on a hardcopy.

4.3 QUERY DESIGN

A query design is a precise definition of what is to be selected from the database. For example, the following queries designs were used in this project:

1. Query by P Status=Developed, P use=commercial

2. Query by P use = Residential

3. Query by P use = Residenial, P area = 1345.624sqm and Owners name = Mr Qudus

4.4 TESTING OF DATABASE

This is the test carried out to determine whether the relationship between the geometric data about the objects and their attributes is capable of being retrieved. This was done by designing a simple query and running the query to see if the desired result is achieved. The query ran, hence the database was confirmed fit for analysis.

4.5 EXISTING PARCELS AND BLOCKS

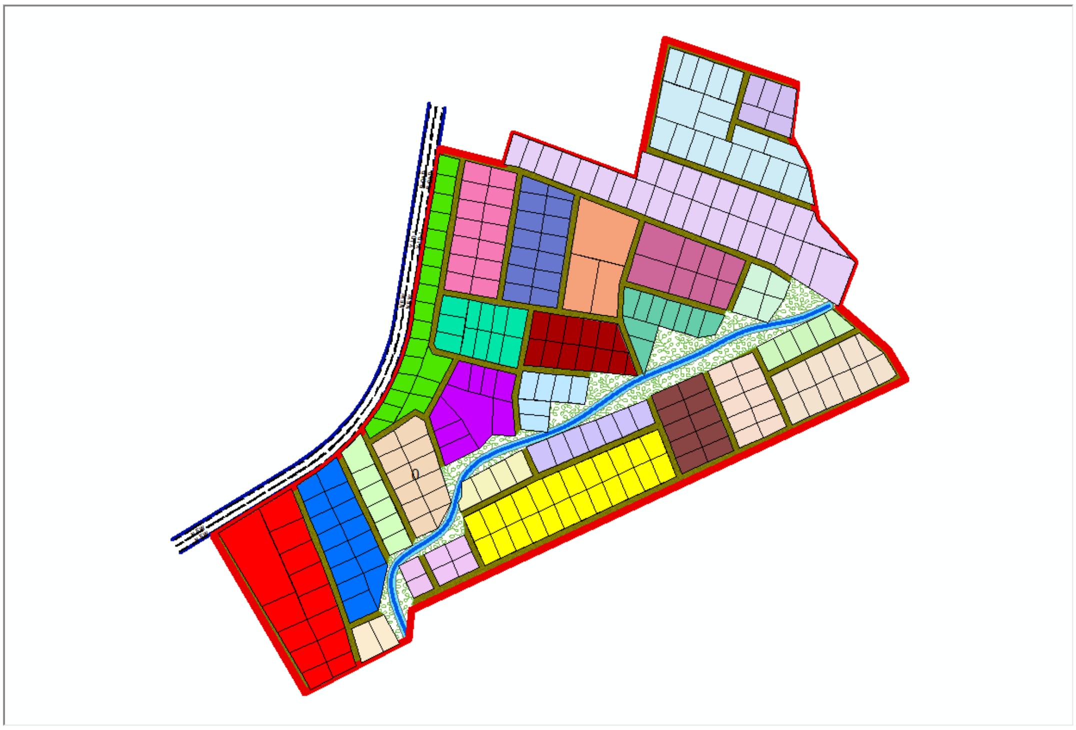


Fig 4.5.1:- the exported cadastral plan of the study area showing the blocks within the area

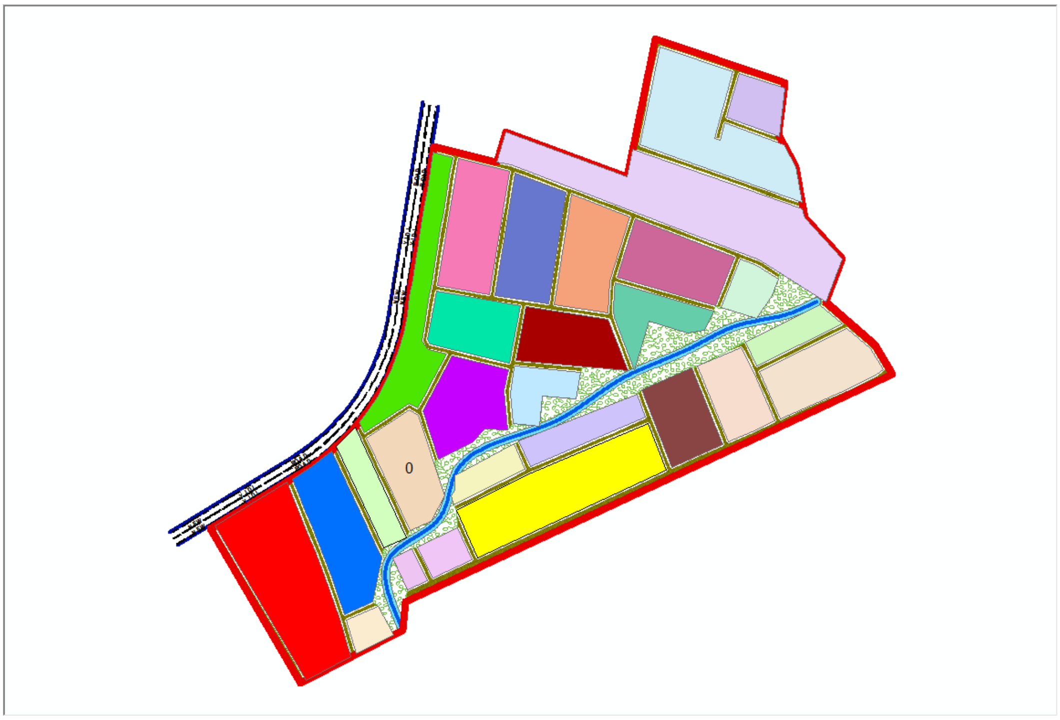


Fig 4.5.2:- the exported cadastral plan of the study area showing the all the parcels within the area.

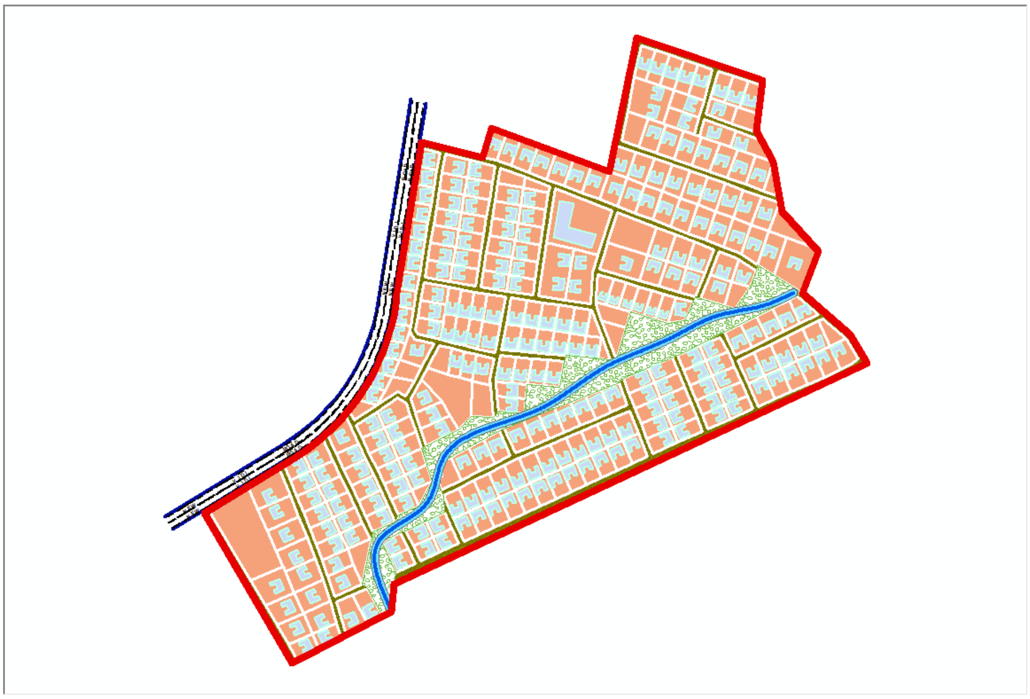
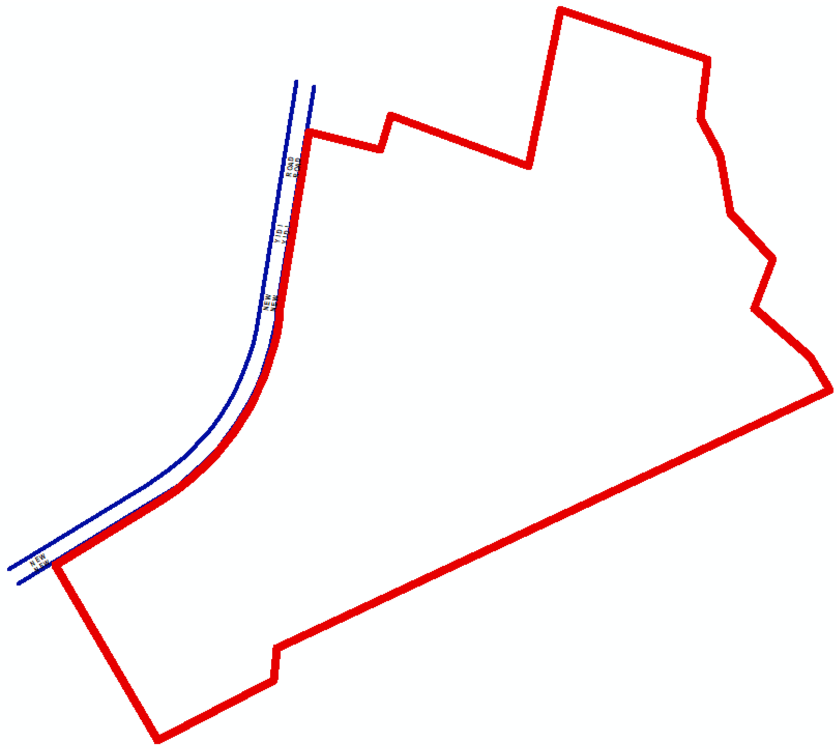


Fig 4.5.3:- the cadastral plan of the study area showing the boundary



4.6 Spatial Query

Queries were designed for the purpose of retrieving information from the database. The queries performed in this project gave answers to certain generic questions asked from the database. This was made possible as a result of the implicit link of both the spatial and attributes data. The queries were based on the products from the analysis carried out on the database.

4.6.1 Single Criterion Query

A single criterion is carried out where one condition is used to design query. This condition is used to retrieve the information from the database.

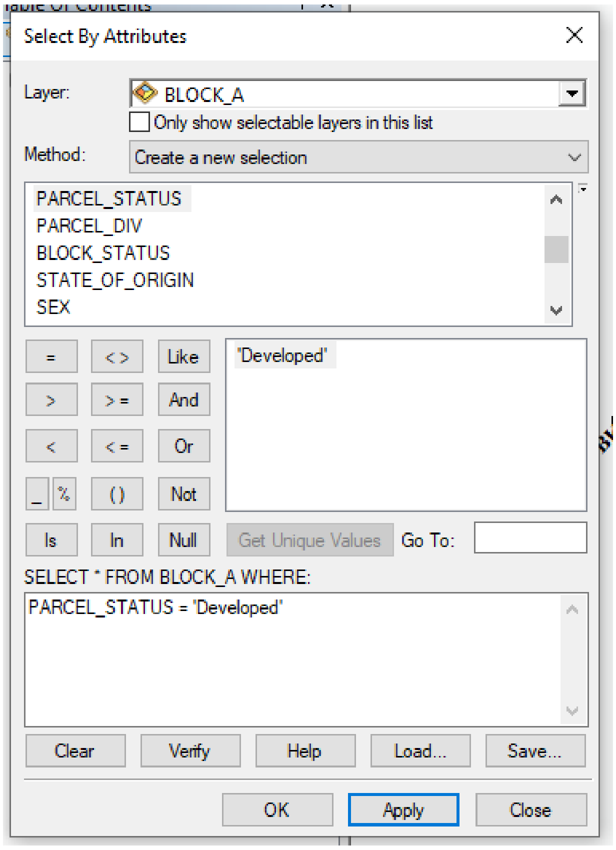


Fig 4.6.1.1:- Query for Parcel status for developed Purposes in the Study Area

SYNTAX; ([Parcel_status]) =’ developed’)

4.6.2 Query by Parcel Status (Developed)

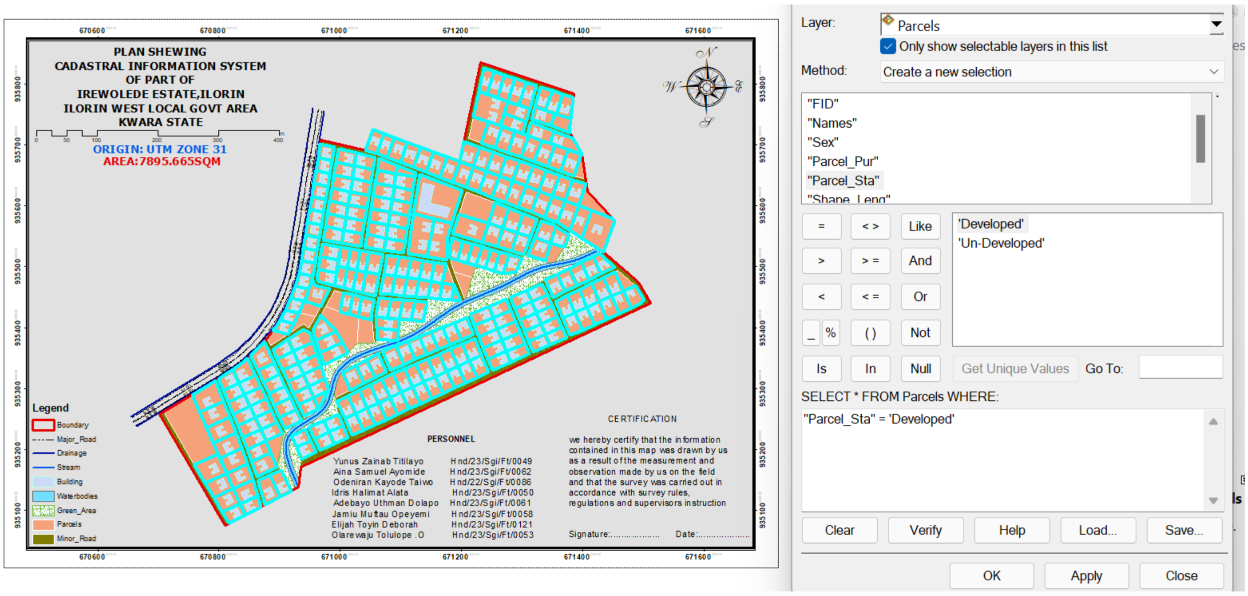


Fig 4.6.2.1: Result of Query for Parcel Used for Residential area in block A in the study area

SYNTAX; ([Parcel_status]) =’ developed’)

<u>Discussion of Result</u>

Figure 4.6.2.1 Shows parcels that are meant for developed purposes. It consists of the syntax model or the query builder box, attribute table as well as the map of the selected plot in light green color. The result shows that 8 parcels out of the 20 parcels are meant for commercial purposes.

4.6.4 Query by Parcel Status (commercial)

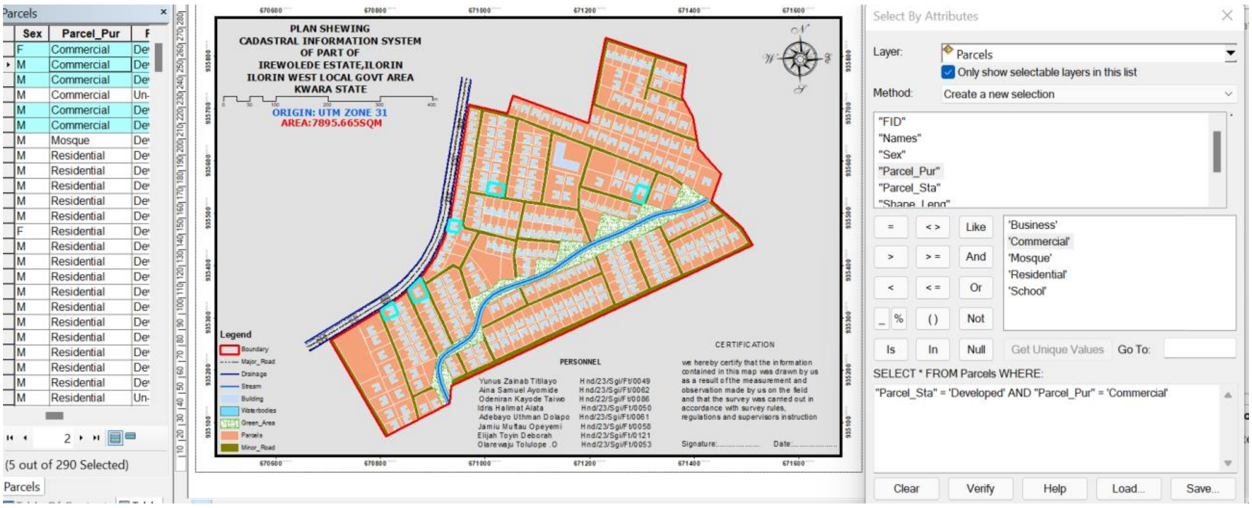


Fig 4.6.4.1: Result of Query for Parcels that are commercial purpose in the study area.

SYNTAX; ([Parcel status]) =' commercial')

4.7 DISCUSSION OF RESULT

Figure 4.6.4.1 shows parcels that already have some type of commercial on it. It consists of the syntax model or the query builder box, attribute table as well as the map of the selected plot in light green color. The result shows that 5 parcels out of the 290 parcels have been developed. This information, however will help in informing the necessary quarters the level of development within the layout.

4.8 MULTIPLE CRITERIA QUERY

The database created is then used for implementing several selection queries in determination of user-defined requirements such as parcels whose occupiers are actual owners, occupier' s citizenship, occupier' s occupation, number of residents in each flat, selection of unoccupied flats and other such security.

4.8.1 Query By Parcel Use And Parcel Status (Parcels meant for school, residential, commercial purposes that are " Developed"

Query was carried out in two stages, parcels meant for residential purposes were first queried by means of the parcel use field. In this case parcel use was selection criteria. The shape file data of the query was exported as a layer and named accordingly. Next, the attribute table of the query result was queried by means of parcels meant for residential purposes that are yet to be developed i.e. Developed Parcels using the " Developed" selection criteria. This gives result for the parcels meant for residential purposes that are developed this also will help inform on the level of development within the layout.

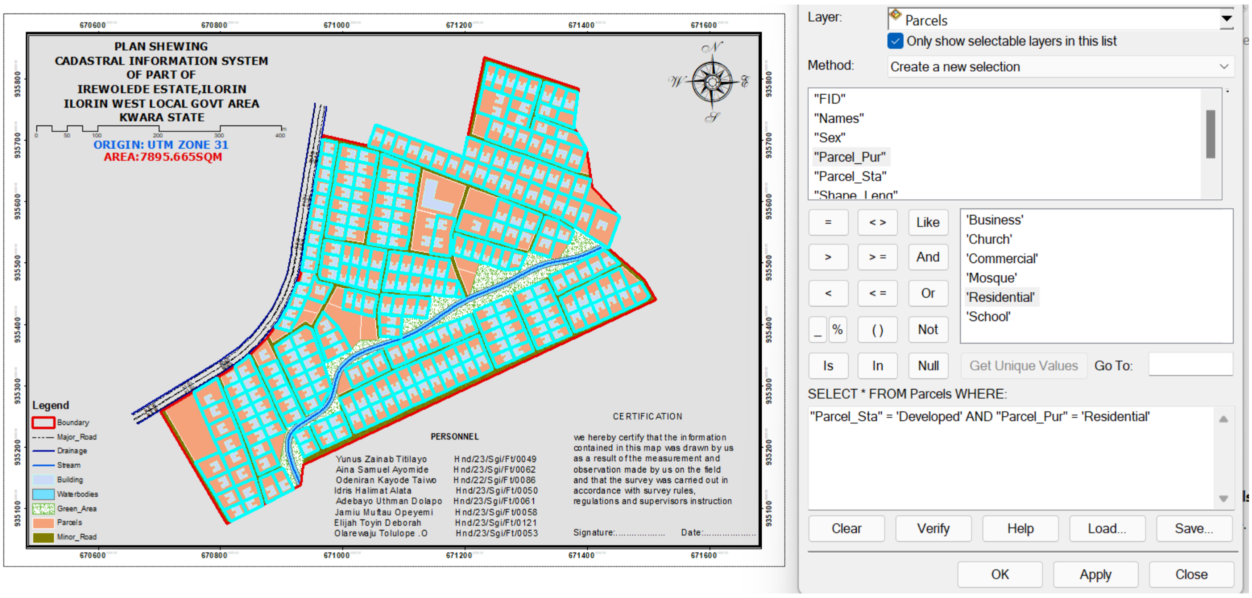


Fig 4.8.1.1: Screen print showing parcel use and parcel status in the layout.

SYNTAX;PARCEL_USE = 'Residential' AND PARCEL_STATUS = 'Developed’

Discussion of Result

Figure 4.8.1.1 shows the syntax modeled, the attribute table and the map of the multiple criteria queries ran on parcel meant for residential purposes and number of Developed residential purpose parcels within the study area, they are highlighted in Light green color. The result showed that 265 of the 290 parcels are developed.

4.8.2 Query By Parcel Use (Commercial) And Parcel Status (Parcels meant for commercial purposes that are “ Developed”)

Following the procedure in the query for parcels meant for residential purposes that are yet to be developed. All parcels meant for commercial purposes were first queried and then, the resulting attribute table, query was carried out for parcel for which are Developed.

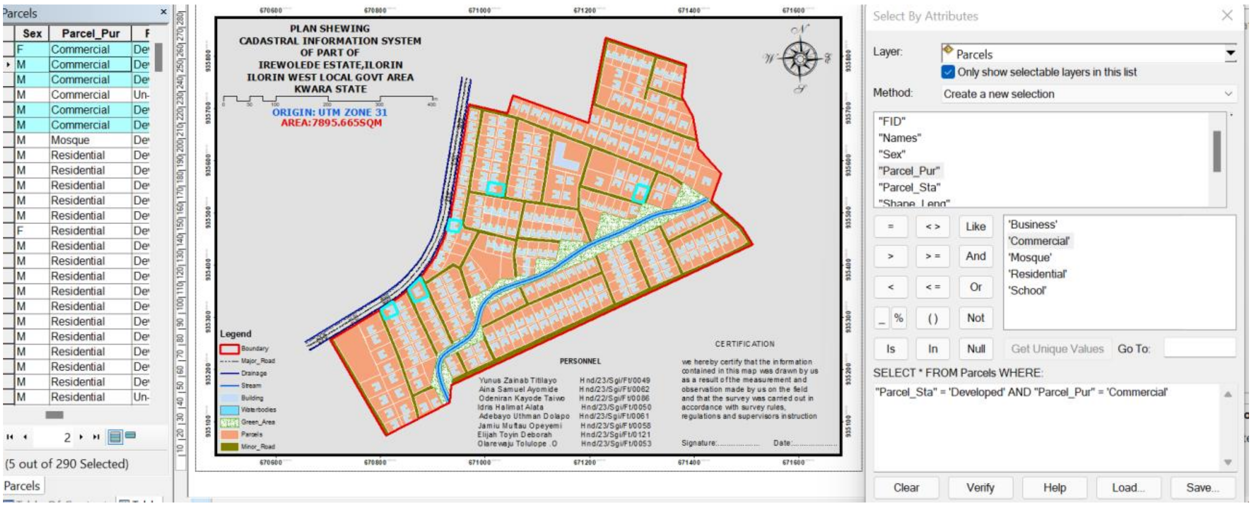


Fig 4.8.2.1: Screen print showing parcel meant for commercial purpose that are Developed in the layout.

SYNTAX;PARCEL_USE = 'Commercial' AND PARCEL_STATUS = 'Developed'4.7.2.1

<u>Discussion of Result</u>

Fig 4..8.2.1 shows the result of syntax modeled, attribute table as well as unformatted map of developed parcels meant for commercial purposes. The table shows that all the 5 parcels meant for commercial purposes are developed. This is a pointer to the high rate of commercial developments in the study area.

4.8.3 <u>Query By 10m Proximity to the stream</u> (Parcel within 10m proximity to the stream).

Following the procedure in the query for parcels within close proximity to the stream (10m), query was carried out to show the parcels within close range to the stream.

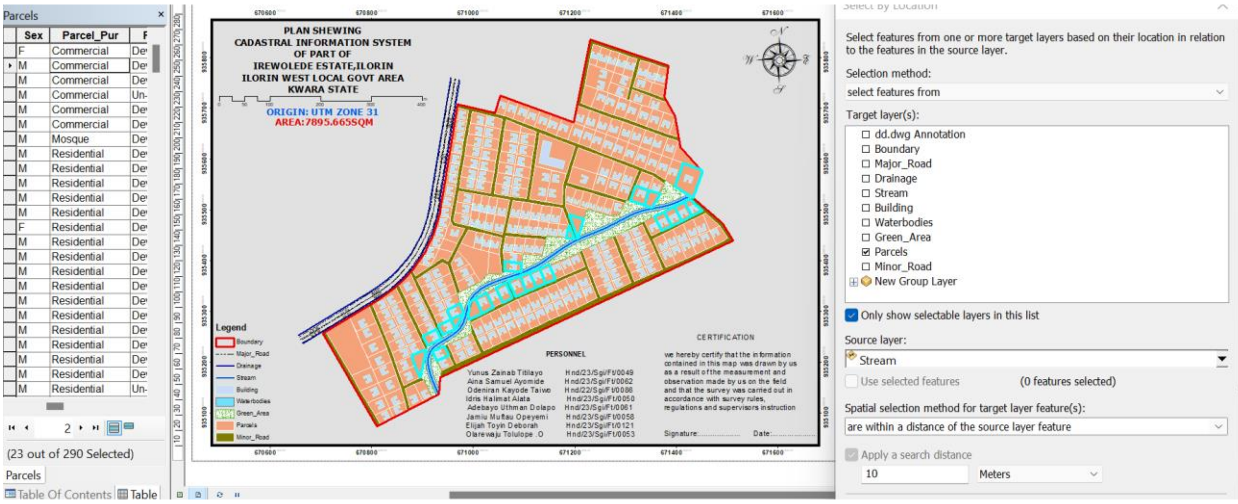


Fig 4.8.3.1: Screen print showing parcel within 10m proximity to the stream

4.8.3.2 <u>Discussion Of Result</u>

Figure 4.8.3.1 shows the result of syntax modeled, attribute table. The table shows that only two out of all the parcels, only 25 parcel are within 10m proximity to the stream.

Fig4.8.5.4 Screen-shot showing the database created for the study area

Screen-shot showing the database created for the study area

FID	Names	Sex	Parcel_Pur	Parcel_Sta	Shape_Leng	Area
48	YIO CONCEPT CYBER CAFE	F	Commercial	Developed	105.914363	676.531684
151	R.C.C.G	M	Commercial	Developed	105.345676	669.423255
187	MUSODIQ ABIOLA	M	Commercial	Un-Developed	304.781768	5048.847502
254	LIVING FAITH CHURCH IREWOLED	M	Commercial	Developed	100.327469	618.174764
273	VALENTINE CHICKEN LIMITED	M	Commercial	Developed	88.233768	495.630147
288	LIVING FAITH CHURCH IREWOLE	M	Commercial	Developed	128.147568	983.450418
283	MOSQUE	M	Mosque	Developed	195.909955	2149.344222
1	MUHAMMAD ABDULKAREEM	M	Residential	Developed	117.881686	847.942861
2	IBRAHEEM AMEEN	M	Residential	Developed	119.731431	849.18719
3	OLUDIRAN SOLIU	M	Residential	Developed	118.871832	839.260543
4	OLAYANJU MUSTAPHA	M	Residential	Developed	118.012234	829.333896
5	TAJUDEEN SODEEQ	M	Residential	Developed	117.152635	819.407249
6	KOLAWOLE AISHAT	F	Residential	Developed	116.293036	809.480602
7	ABDULRAHEEM TOHEEB	M	Residential	Developed	115.433437	799.553955
8	ALABI YUNUS	M	Residential	Developed	114.573839	789.627308
9	GAMBARI ABDULFATAI	M	Residential	Developed	113.71424	779.700661
10	ABDULSAMOD UTHMAN	M	Residential	Developed	120.06245	853.055973
11	ABDULGANIYU KOLAWOLE	M	Residential	Developed	120.06245	853.055973
12	OLAITAN ABIMBOLA	M	Residential	Developed	120.06245	853.055973
13	AYINDE ISAAC	M	Residential	Developed	120.06245	853.055973
14	BAMIDELE QUDUS	M	Residential	Developed	120.06245	853.055973
15	ABDULLAHI OLAJUWON	M	Residential	Developed	120.06245	853.055973
16	MAKINDE OLUWAKAYODE	M	Residential	Developed	120.06245	853.055973
17	QUDUS OLUWATOYIN	M	Residential	Un-Developed	122.475602	891.287531
18	AINA SAMUEL	M	Residential	Developed	102.289974	629.173672
19	OLARINDE MONSURAT	F	Residential	Developed	102.143306	627.668487
20	OLAONIPEKUN SHUKURAT	F	Residential	Developed	101.988709	626.043204
21	BERNAD OLUWASEGUN	M	Residential	Developed	101.846527	624.606378
22	BELLO OLAYOMI	M	Residential	Developed	101.695862	623.041457
23	YEMI OLUWATOSIN	M	Residential	Developed	101.548053	621.519234
24	ABDULRAHMON ABDULSALAM	M	Residential	Developed	101.400245	619.997012
25	ADELOLU DANIEL ADEWALE	M	Residential	Developed	101.252436	618.474789
26	DAHUNSI OLAWUNMI	F	Residential	Developed	101.104627	616.952566
27	ARWOLO NURUDEEN AYINDE	F	Residential	Developed	100.956818	615.430344
28	ISAAC JOY SALOMI	M	Residential	Developed	100.80901	613.908121

FID	Names	Sex	Parcel_Pur	Parcel_Sta	Shape_Leng	Area
28	ISAAC JOY SALOMI	M	Residential	Developed	100.80901	613.908121
29	OJERINDE HABEEBAT	F	Residential	Developed	101.56164	625.181046
30	ABASS KAFAYAT OPEYEMI	F	Residential	Developed	103.03259	636.631459
31	ABDULLAH YUSUF	M	Residential	Developed	104.31244	649.67201
32	BAMIGBOSE IDOWU	M	Residential	Developed	105.587483	662.625595
33	SOFIYULLAHI RIDWAN	M	Residential	Developed	106.939212	676.822452
34	MAYOWA DANIEL	M	Residential	Developed	108.038574	689.65928
35	MUHAMMAD MUSTAPHA	M	Residential	Developed	107.936789	687.097715
36	SOLIU AMEEN	M	Residential	Developed	106.822062	675.62187
37	OLUDIRAN IBRAHEEM	M	Residential	Developed	105.707409	664.146024
38	OLAYANJU ABDULKAREEM	M	Residential	Developed	104.592834	652.670179
39	TAJUDEEN AISHAT	F	Residential	Developed	103.478341	641.194334
40	KOLAWOLE SODEEQ	M	Residential	Developed	102.363935	629.718489
41	ABDULRAHEEM KAFAYAT	F	Residential	Developed	104.76305	671.155649
42	TOHEEB GAFAR	M	Residential	Un-Developed	175.151405	1870.663541
43	ABDULGAFAR BOLATITO	M	Residential	Developed	167.495547	1681.039498
44	DAUDA MONSURAT	F	Residential	Developed	120.066864	877.183459
45	ISIAKA RASHEEDAT GBOLAGADE	F	Residential	Developed	115.204924	816.467938
46	AYOOLA TOMILOLA	F	Residential	Developed	117.09239	839.705946
47	ADEBAYO ISLAMIYAT ADEDIRE	F	Residential	Developed	114.007468	801.380015
49	AJIMOTI JOSHUA	M	Residential	Developed	111.854357	765.940963
50	OYINDA TUNMININU	F	Residential	Developed	106.137332	683.281183
51	HASSAN TEMITOPE	M	Residential	Developed	105.754043	679.277089
52	DAUDA AYOTUNDE	M	Residential	Developed	106.364176	685.988525
53	ISIAKA RASHEEDAT ABIODUN	F	Residential	Developed	107.475154	697.997219
54	AYOOLA MEHEENAT	F	Residential	Developed	108.812981	712.71332
55	OLAMIDE ISLAMIYAT	F	Residential	Developed	106.97466	692.705467
56	HASSAN ZAINAB	F	Residential	Developed	110.150814	727.429484
57	JOHNSON MATHEW	M	Residential	Developed	107.465341	698.101328
58	OYINDAMOLA?á FOLASHADE	F	Residential	Developed	110.139162	719.678061
59	HASSAN ALAMEEN	M	Residential	Developed	106.530199	685.661637
60	OLATAYO OLUDAYO?á	M	Residential	Developed	106.649733	710.133671
61	ADENIKE?áBAMIDELE	M	Residential	Un-Developed	99.073175	469.546933
62	LAWAL RIDWAN OLATAYO	M	Residential	Developed	106.450458	685.5898
63	OLURONBI SHAKIRAH ABIODUN	F	Residential	Developed	106.83852	691.40124

FID	Names	Sex	Parcel_Pur	Parcel_Sta	Shape_Leng	Area
96	OLANREWAJU BABATUNDE	M	Residential	Developed	115.262386	721.813479
97	DADA TOSIN DAVID	M	Residential	Developed	115.262386	721.813479
98	SAMUEL DAMILARE	M	Residential	Developed	111.283872	638.355329
99	TAJUDEEN RASHIDAT	F	Residential	Developed	119.409724	815.247505
100	GBOLAGADE HAJARAT	F	Residential	Developed	121.845887	849.391306
101	OBASI DANIEL	M	Residential	Developed	109.190771	669.871424
102	FUNMIBI JULIANAH	F	Residential	Developed	182.273922	2057.040934
103	WAHEED BABATUNDE	M	Residential	Developed	119.353972	844.734413
104	WAHEED BABATUNDE	M	Residential	Developed	119.353972	844.734413
105	ADEPOJU HIKMAT	F	Residential	Developed	120.086227	853.190484
106	OLAYANJU YINKA	M	Residential	Developed	120.452354	857.418519
107	RIDWAN ABDULKHALID	M	Residential	Developed	120.818481	861.646555
108	OLUDIRAN SOLIU	M	Residential	Developed	122.246264	868.054214
109	SALAM HAFSAT	F	Residential	Developed	128.735422	946.188877
110	YEKEEN KUNLE	M	Residential	Developed	138.509838	1059.063842
111	IBRAHIM BABATUNDE	M	Residential	Developed	118.987845	840.506377
112	MUHAMMAD HALIMAH ADESOLA	F	Residential	Developed	118.620388	836.254701
113	MUSBAU TIMILEYIN FARIDAH	F	Residential	Developed	118.255612	832.050547
114	YUSUF BUSIRAT BUKOLA	F	Residential	Developed	117.889485	827.822511
115	AKINOLA MUNIRAT TOMIWA	F	Residential	Developed	117.270363	820.710958
116	ADEBIYI TOHEEB MAYOWA	M	Residential	Developed	116.573081	812.636845
117	OGUNMOLA CHRISTIANAH	F	Residential	Developed	116.040248	806.483688
118	SANNI?áOLUWASHIKEMI	F	Residential	Developed	106.870159	645.847431
119	OLABUKOLA BUSHIRAT	F	Residential	Developed	186.382937	2152.773883
120	TOHEEB ADEBIYI	M	Residential	Developed	114.849098	836.551344
121	OLUWASIKEMI MUSBAU	M	Residential	Developed	110.150299	711.530616
122	YUSUF HAMZAT	M	Residential	Developed	106.14791	669.905777
123	AKINOLA MUSHAFAR	M	Residential	Developed	102.145522	628.280938
124	MUHEEANAT OLAKUNLE	M	Residential	Developed	98.143134	586.656099
125	TIMILEYIN TOHEEBAT	F	Residential	Developed	82.520746	282.92184
126	OLUWATOSIN KOLAWOLE	M	Residential	Developed	92.998738	534.492959
127	AHMED OYINDAMOLA	F	Residential	Developed	93.038564	534.907143
128	OLADEPO MUHAMMAD	M	Residential	Developed	93.517586	539.91052
129	OLATAYO IBRAHEEM	M	Residential	Developed	94.439949	549.50309
130	ONI OLUBUNMI	M	Residential	Developed	96.284673	568.688229

FID	Names	Sex	Parcel_Pur	Parcel_Sta	Shape_Leng	Area
62	LAWAL RIDWAN OLATAYO	M	Residential	Developed	106.450458	685.5898
63	OLURONBI SHAKIRAH ABIODUN	F	Residential	Developed	106.83852	691.40124
64	IBIYEMI OLUWATOBI MATTEW	M	Residential	Developed	106.838996	691.408691
65	AMUDA KEHINDE TEMIDAYO	M	Residential	Developed	106.838996	691.408691
66	ADEWUYI TEMITAYO ADEWUMI	F	Residential	Developed	100.327653	553.09928
67	AZEEZ MALIK OLALEKAN	M	Residential	Developed	123.095783	853.297997
68	OJO OLAOTAN OLANREWAJU	M	Residential	Developed	139.806614	908.769314
69	OLAYANJU YINKA BLESSING	F	Residential	Developed	110.894569	718.296953
70	RAJI IBRAHIM BABATUNDE	M	Residential	Developed	105.742356	643.551136
71	ADEJOKUN ISAAC JESUFEMI	M	Residential	Developed	106.367158	654.047973
72	ALONGE WAHEED BABATUNDE	M	Residential	Developed	109.975857	712.726061
73	FAKUNLE FUNMIBI JULIANAH	F	Residential	Developed	105.782383	650.464244
74	OBASI DANIEL AKUMA	M	Residential	Developed	103.842071	620.792513
75	TAJUDEEN RASHIDAT OLUWASEU	F	Residential	Developed	105.600637	647.695938
76	AYELAAGBE YEKEEN KUNLE	M	Residential	Developed	105.180614	647.923936
77	ADELEKE SAMUEL DAMILARE	M	Residential	Developed	106.408896	661.613404
78	OLUSOLA GRACE OLANIKE	F	Residential	Developed	104.710897	644.819371
79	LAWAL AZEEZ	M	Residential	Developed	106.421191	661.613404
80	OLURONBI OLUWATOBI	M	Residential	Developed	103.767315	635.971153
81	ABIODUN SHAKIRAH	F	Residential	Developed	106.409224	661.388425
82	IBIYEMI AMUDA	M	Residential	Developed	102.454796	622.371739
83	ADEWUYI ADEBOLA	M	Residential	Developed	106.398654	661.332571
84	AZEEZ MALIK OLALEKAN	M	Residential	Developed	96.142082	541.059423
85	OJO OLAOTAN	M	Residential	Developed	98.986545	583.983402
86	BLESSING AINA	F	Residential	Developed	99.789708	596.083747
87	RAJI MUSBAUDEEN	M	Residential	Developed	99.789669	596.083175
88	ADEDOKUN ISAAC	M	Residential	Developed	99.789691	596.083482
89	ALONGE	M	Residential	Developed	95.057574	524.773433
90	FAKUNLE OLADAYO	M	Residential	Developed	97.849432	570.481191
91	AKUMA ADEBAYO	M	Residential	Developed	98.051886	578.826988
92	OLUWASEUN ABIODUN	M	Residential	Developed	96.910756	569.289355
93	AYELAAGBE JOMILOJU	M	Residential	Developed	94.988402	548.170267
94	ADELEKE ABDULGAFAR	M	Residential	Developed	116.63727	747.931273
95	OLUSOLA GRACE OLANIKE	M	Residential	Developed	115.262386	721.813479
96	OLANREWAJU BABATUNDE	M	Residential	Developed	115.262386	721.813479

FID	Names	Sex	Parcel_Pur	Parcel_Sta	Shape_Leng	Area
131	USMAN ADEWALE	M	Residential	Developed	97.207036	578.280799
132	ADEWALE ADETUNJI	M	Residential	Developed	98.129398	587.873369
133	ABDULROFIU KHADIJAT	F	Residential	Developed	99.051761	597.465938
134	ADEBAYO ABDULKHADIR	M	Residential	Developed	99.974123	607.058508
135	SAHEED OLALEKAN	M	Residential	Developed	97.948325	567.904525
136	AWELE AFEEZ	M	Residential	Developed	115.534201	813.220951
137	OLOLADE GBAYESOLA	M	Residential	Developed	106.822062	675.62187
138	EMMANUEAL OLUWAPELUMI	M	Residential	Developed	105.707409	664.146024
139	HIKMOT OLAMIDE	F	Residential	Developed	104.592834	652.670179
140	AMEERAT ORIYOMI	F	Residential	Developed	103.478341	641.194334
141	ABDULSALAM YUSUF	M	Residential	Developed	102.363935	629.718489
142	ADEYEMO BOLUWATIFE	M	Residential	Developed	104.457933	666.706041
143	ABDULSALAM ORIYOMI	M	Residential	Developed	112.861811	784.981667
144	MUSTAPHA ABDULBASIT	M	Residential	Developed	105.587483	662.625595
145	KAMALDEEN BOLAKALE	M	Residential	Developed	108.099246	695.541056
146	NASIRUDEEN ISSA	M	Residential	Developed	103.728473	645.854738
147	ADESHINA MISTURAH	F	Residential	Developed	104.871396	664.341344
148	MUHAMAD KAFAYAT	F	Residential	Developed	104.966252	665.357726
149	SULAIMON TAIWO	M	Residential	Developed	105.061108	666.374108
150	KOFOWOROLA MISTURAH	F	Residential	Developed	105.155964	667.39049
152	AFEEZ KAYODE	M	Residential	Developed	105.25082	668.406872
153	IBARAHEEN AZEEZ	M	Residential	Developed	96.012846	509.538655
154	OLORIEGBE ABDULGAFAR	M	Residential	Developed	106.137303	677.868689
155	AHMAD IBRAHIM	M	Residential	Developed	106.327309	679.904609
156	AMINAT DAMILOLA	F	Residential	Developed	106.517316	681.940528
157	OPEYEMI SAMSON	M	Residential	Developed	106.707322	683.976448
158	MUSA SAHEED	M	Residential	Developed	105.762841	666.956727
159	ADEWALE ABDULWASIU	M	Residential	Developed	106.897329	686.012367
160	HAMEED SHAMSUDEEN	M	Residential	Developed	106.057288	676.952074
161	ADEBAYO MUBARAQ	M	Residential	Developed	106.266681	679.195718
162	BILAL MUBARAK	M	Residential	Developed	106.476073	681.439362
163	AWWAL SULAIMAN	M	Residential	Developed	106.685466	683.683005
164	MUBARAK BABATUNDE	M	Residential	Developed	103.621752	632.560233
165	SAKARIYAU ABDULGAFAR	M	Residential	Developed	106.894859	685.926649
166	ADEROGBA USMAN	M	Residential	Developed	84.76798	329.619361

FID	Names	Sex	Parcel_Pur	Parcel_Sta	Shape_Leng	Area
161	ADEBAYO MUBARAQ	M	Residential	Developed	106.266681	679.195718
162	BILAL MUBARAK	M	Residential	Developed	106.476073	681.439362
163	AWWAL SULAIMAN	M	Residential	Developed	106.685466	683.683005
164	MUBARAK BABATUNDE	M	Residential	Developed	103.621752	632.560233
165	SAKARIYAU ABDULGAFAR	M	Residential	Developed	106.894859	685.926649
166	ADEROGBA USMAN	M	Residential	Developed	84.76798	329.619361
167	ISHOLA ABDULRASAQ	M	Residential	Developed	107.048974	697.279724
168	AROYINKOLA ABDULRASAQ	M	Residential	Developed	104.880825	664.463334
169	AYANYEMI FEYISAYO	M	Residential	Developed	104.973611	665.457536
170	OYEYIPO DAMILOLA	M	Residential	Developed	105.066397	666.451738
171	ABDULLATEED SHIFAU	M	Residential	Developed	105.159183	667.44594
172	IBRAHEEM ABDULGANIYU	M	Residential	Developed	105.344755	669.434345
173	ABDULYEKEEN ABDULQUADRI	M	Residential	Developed	105.251969	668.440143
174	OLAJIDE ABISOLA	M	Residential	Developed	97.405171	523.182346
175	FAOLA ABIDEMI	M	Residential	Developed	97.405165	523.182251
176	QUAWIYY ABDULRAZAQ	M	Residential	Developed	97.405165	523.182251
177	ABDULMATEEN ADETAYO	M	Residential	Developed	95.116731	485.856985
178	ADENIYI SOBURI	M	Residential	Developed	99.598485	565.285502
179	QUAWIYY ABDULRAZAQ	M	Residential	Developed	97.405165	523.182251
180	ABIODUN AKANJI	M	Residential	Developed	97.773547	534.423671
181	QUADRI OLAYINKA	M	Residential	Developed	111.633271	783.920583
182	OLUWAKEMI MORENIKEJI	F	Residential	Developed	98.585427	598.522623
183	SULYMAN LATEEFAT	F	Residential	Developed	119.586726	891.16926
184	OJO IFEOLUWA	F	Residential	Un-Developed	101.073955	586.912038
185	BABALOLA MOSES	M	Residential	Un-Developed	118.598617	766.583058
186	AJETUNMOBI OLAMILEKAN	M	Residential	Un-Developed	121.121618	619.306252
188	IDRIS FAWAS	M	Residential	Developed	155.336624	1476.345022
189	RAFIU WASIU	M	Residential	Developed	140.527237	1175.925869
190	ALATISE NAFISAT	F	Residential	Developed	139.266985	1158.592264
191	ABDULRASAQ ABDULLAHI	M	Residential	Developed	137.09612	1128.09418
192	ALUKO GBOLAHAN	M	Residential	Developed	133.524555	1078.536389
193	ABDULKAREEM IBRAHIM	M	Residential	Developed	129.492805	1023.083373
194	OJO AYODEJI	M	Residential	Developed	123.785237	941.726444
195	AJADI RIDWAN	M	Residential	Developed	100.360977	589.302437
196	ADIGUN FARUQ	M	Residential	Developed	151.485667	1420.606256

FID	Names	Sex	Parcel_Pur	Parcel_Sta	Shape_Leng	Area
237	ADEYANJU WASIU	M	Residential	Developed	102.539606	639.030066
238	ADEOYE OLUWASOLA	M	Residential	Developed	101.378377	621.675671
239	ADEOYE OLUWASOLA	F	Residential	Developed	101.378377	621.675671
240	ADEYANJU WASIU	M	Residential	Developed	102.539606	639.030066
241	ADEOYE OLUWASOLA	M	Residential	Developed	101.378377	621.675671
242	ADEYANJU WASIU	M	Residential	Developed	102.539606	639.030066
243	ADEYEMI HALIMAH	F	Residential	Developed	98.330782	589.782734
244	ADEOLA JAMIU	M	Residential	Developed	102.427839	632.186308
245	GIWA JAMIU	M	Residential	Developed	101.563058	628.37608
246	AUDU ELIZABETH	F	Residential	Developed	107.857008	687.167634
247	IBRAHIM KAYODE	M	Residential	Developed	105.710867	671.839668
248	SANUSI YUSUF	M	Residential	Developed	109.809204	705.627485
249	ARANSIOLA EMMANUEL	M	Residential	Developed	122.950681	922.850128
250	AMINULLAH ABDULSAMAD	M	Residential	Un-Developed	134.165209	782.735016
251	ABEGUNDE MATHEW	M	Residential	Developed	100.244701	536.868271
252	OLARINDE MOJEED	M	Residential	Developed	115.343536	784.62058
253	LUKMAN FARUQ	M	Residential	Developed	102.170205	642.354092
255	NURUDEEN UTHMAN	M	Residential	Un-Developed	104.403706	643.09282
256	ISIAKA ABUBAKAR	M	Residential	Developed	95.648743	499.983496
257	MASTUROH ADEOLA	M	Residential	Developed	95.755765	502.01636
258	ABDULRASAQ ABDULQUDUS	M	Residential	Developed	108.75849	680.367296
259	SANUSI MUHYDEEN	M	Residential	Developed	115.841274	764.688077
260	AJADI BOLAKALE	M	Residential	Developed	124.29152	851.210708
261	ADULQODIR SULTON	M	Residential	Developed	117.571799	794.08127
262	ADEFOWOJU ADENIKE	F	Residential	Un-Developed	133.509657	1025.302157
263	OGEDENGBE ODUNAYO	M	Residential	Developed	91.912897	526.812222
264	OLADIMEJI YEMISI	F	Residential	Developed	89.939474	504.364005
265	SANUSI JAMIU	M	Residential	Developed	89.822314	503.108632
266	EZEKIEL VICTOR	M	Residential	Developed	89.705153	501.853259
267	SAMMIAT AYOMIPOSI	F	Residential	Developed	89.587993	500.597886
268	YUSUF ZAINAB	F	Residential	Developed	89.36159	498.088917
269	RAPHEAL OLUWASEGUN	F	Residential	Developed	89.310953	497.435076
270	ALLI BOLUWADURO	M	Residential	Developed	89.312951	497.768963
271	YUNUS MUSEFIU	M	Residential	Developed	88.297788	486.60079
272	AWODELE OLUSEGUN	M	Residential	Developed	88.048589	484.164676

FID	Names	Sex	Parcel_Pur	Parcel_Sta	Shape_Leng	Area
195	AJADI RIDWAN	M	Residential	Developed	100.360977	589.302437
196	ADIGUN FARUQ	M	Residential	Developed	151.485667	1420.606256
197	ADIGUN FARUQ	M	Residential	Developed	151.485667	1420.606256
198	JIBRIL AISHAT	F	Residential	Developed	129.517626	1022.399818
199	BALOGUN MUBARAK	M	Residential	Developed	122.94143	931.95028
200	ABDULKAREEM SALAM	M	Residential	Developed	103.189952	636.539792
201	SULYMAN ABUBAKAR	M	Residential	Developed	103.663116	631.173955
202	ARINDE TIMILEYIN	M	Residential	Developed	103.563212	630.618443
203	IDRIS RUKAYAT	F	Residential	Developed	103.36353	628.436266
204	SANNI SAMUEL	M	Residential	Developed	103.196188	626.796311
205	ABDULGANIYU MUBARAK	M	Residential	Developed	103.028846	625.156356
206	BABALOLA TAIWO	M	Residential	Developed	96.081722	556.233193
207	ZAKARIYAU ABDULRAHMAN	M	Residential	Developed	98.306298	578.034039
208	AKINOLA OLABODE	M	Residential	Developed	100.548359	600.117406
209	ISIAQ TOYYIB	M	Residential	Developed	102.736622	621.35321
210	LAWAL AL-AMEEN	M	Residential	Developed	93.857146	534.432347
211	IDRIS QUADRI	M	Residential	Developed	91.589722	512.107197
212	ALIYU ZAINAB	F	Residential	Un-Developed	88.895261	328.187234
213	ABIOLA OBAMO	M	Residential	Developed	69.417057	197.739844
214	AMINU RIDWAN	M	Residential	Developed	103.949944	632.536154
215	AJAO MUYIDEEN	M	Residential	Developed	103.949944	632.536154
216	ABDULLATEEF JAMIU	M	Residential	Developed	103.952026	632.569579
217	ISHAQ OPEYEMI	M	Residential	Developed	103.275745	631.647422
218	HABEEB OLOLADE	M	Residential	Developed	95.506804	501.495726
219	IBRAHEEM ABDULGANIYU	M	Residential	Developed	105.344755	669.434345
220	ABDULYEKEEN ABDULQUADRI	M	Residential	Developed	105.251969	668.440143
221	AKOLADE FAROUQ	M	Residential	Developed	95.471994	500.924011
222	KEHINDE SHERIFF	M	Residential	Developed	95.935536	505.120846
223	ADEWOLE MICHEAL	M	Residential	Developed	111.748665	754.933129
224	LAMBE ISREAL ADEGOKE	M	Residential	Developed	96.850869	512.337052
225	AKINWUNMI MUJTABAH	F	Residential	Developed	98.318847	520.72802
226	ABDULMUHMEEN ABDULAKEEM	M	Residential	Developed	110.395729	666.833258
227	AKANBI ADEWUNMI	F	Residential	Developed	103.760936	607.120116
228	ADEDAMOLA WAHEED	M	Residential	Un-Developed	107.528117	649.556432
229	NURENI ABIBAT	F	Residential	Developed	131.016289	1003.311342

FID	Names	Sex	Parcel_Pur	Parcel_Sta	Shape_Leng	Area
252	OLARINDE MOJEED	M	Residential	Developed	115.343536	784.62058
253	LUKMAN FARUQ	M	Residential	Developed	102.170205	642.354092
255	NURUDEEN UTHMAN	M	Residential	Un-Developed	104.403706	643.09282
256	ISIAKA ABUBAKAR	M	Residential	Developed	95.648743	499.983496
257	MASTUROH ADEOLA	M	Residential	Developed	95.755765	502.01636
258	ABDULRASAQ ABDULQUDUS	M	Residential	Developed	108.75849	680.367296
259	SANUSI MUHYDEEN	M	Residential	Developed	115.841274	764.688077
260	AJADI BOLAKALE	M	Residential	Developed	124.29152	851.210708
261	ADULQODIR SULTON	M	Residential	Developed	117.571799	794.08127
262	ADEFOWOJU ADENIKE	F	Residential	Un-Developed	133.509657	1025.302157
263	OGEDENGBE ODUNAYO	M	Residential	Developed	91.912897	526.812222
264	OLADIMEJI YEMISI	F	Residential	Developed	89.939474	504.364005
265	SANUSI JAMIU	M	Residential	Developed	89.822314	503.108632
266	EZEKIEL VICTOR	M	Residential	Developed	89.705153	501.853259
267	SAMMIAT AYOMIPOSI	F	Residential	Developed	89.587993	500.597886
268	YUSUF ZAINAB	F	Residential	Developed	89.36159	498.088917
269	RAPHEAL OLUWASEGUN	F	Residential	Developed	89.310953	497.435076
270	ALLI BOLUWADURO	M	Residential	Developed	89.312951	497.768963
271	YUNUS MUSEFIU	M	Residential	Developed	88.297788	486.60079
272	AWODELE OLUSEGUN	M	Residential	Developed	88.048589	484.164676
274	WAHAB ABDULQUDUS	M	Residential	Developed	87.637533	465.985829
275	RAHEEM LATEEF	M	Residential	Developed	0	0
276	ODESANYA ZIKIRULLAH	M	Residential	Developed	85.229076	433.400436
277	AWODELE SEGUN	M	Residential	Developed	89.148246	466.829478
278	MUSTAPHA ABDULBASIT	M	Residential	Un-Developed	88.197345	410.311278
279	NASSIRUDEEN ISSA	M	Residential	Un-Developed	130.441349	635.53933
280	ADESHINA MOJEED	M	Residential	Developed	133.971627	959.84878
281	SULAIMAN SAMAD	M	Residential	Un-Developed	216.100791	2432.308468
282	MUHAMMAD RAHEEM	M	Residential	Developed	185.907985	1811.965151
284	IBRAHEEM AZEEZ	M	Residential	Un-Developed	99.498708	382.396351
285	IBRAHEEM AYODEJI	M	Residential	Un-Developed	168.808748	957.228857
286	ABDULKADIR IBRAHIM	M	Residential	Un-Developed	96.169848	552.346149
287	AKEEM OPEYEMI	M	Residential	Developed	88.178251	487.942293
289	ADEBAYO SODEEQ	M	Residential	Developed	114.802792	804.456108
0	BOUNTIFUL SEED ACADEMY	M	School	Developed	261.829598	4234.238527

CHAPTER FIVE

5.0 COSTING, SUMMARY, PROBLEMS ENCOUNTERED, CONCLUSION AND RECOMMENDATION

5.1 COSTING

The project's costs were calculated in accordance with the Nigeria Institution of Surveyors' (NIS) fee scale for construction consultants. This summary outlines the total costs incurred from the project's initiation to its final stage.

RECONNAISSANCE

PERSONAL/QUALITY	DAY(S)	UNITRATE(N)	TOTALAMOUNT(₦)
1 Senior Surveyor	1	18,443.92	18,443.92
Assistant Surveyor	1	10,849.37	10,849.37
Transportation	1	19,800.35	19,800.35
Basic Equipment	1	19,800.35	19,800.35
Logistics	1	8,000.00	8,000.00
TOTAL			#76,893.99k

TABLE: 5.1.1 shows the total amount spent for reconnaissance

BEACON= 2,100 × 8

=#16,800

BEACONING

PERSONAL/QUALITY	DAY(S)	UNITRATE(N)	TOTALAMOUNT(₦)

1 Assistant Surveyor	1	10,849.37	10,849.37
1 Assistant Surveyor	1	9,500.22	9,500.22
2 Labour Crew	1	6,468.61	6,468.61

Transportation	1	19,800.35	19,800.35
Basic Equipment(6)	1	19,800.35	19,800.35
Logistics	1	8,000.00	8,000.00
TOTAL			#74,418.9k

TABLE: 5.1.2 shows the total amount spent for beaconing

TRAVERSING

PERSONAL/QUALITY	DAY(S)	UNITRATE(N)	TOTALAMOUNT(₦)
1 Senior Surveyor	2	18,443.92	36,887.84
1 Assistant Surveyor	2	10,849.39	21,698.74
1 Chain Man	2	9,500.22	19,000.44
2 Labor Crew	2	6,468.61	25,874.44
Transportation	2	19,800.35	39,600.7
Basic Equipment	2	19,800.35	39,600.7
Logistics		8,000.00	16,000.00
TOTAL			#198,662.86

TABLE: 5.1.3 shows the total amount spent for traversing

DOWNLOADING DATA AND EDITING

PERSONAL/QUALITY	DAY(S)	UNITRATE(N)	TOTALAMOUNT(₦)
1 Principal Surveyor	1	30,378.22	30,378.22
1 Senior Surveyor	1	18,443.92	18,443.92
1 Assistant Surveyor	1	10,849.92	10,849.92
Basic Equipment	1	19,800.35	19,800.35

Consumables	1	13,927.00	13,927.00
Logistics	1	8,000.00	8,000.00

TOTAL			#101,400.86

TABLE: 5.1.4 shows the total amount spent for downloading data and editing

PLOTTING

PERSONAL/QUALITY	DAY(S)	UNITRATE(N)	TOTALAMOUNT(₦)
1Principal Surveyor	1	30,378.22	30,378.22
1Senior Surveyor	1	18,443.92	18,443.92
1Assistant Surveyor	1	10,849.92	10,849.92
Basic Equipment	1	19,800.35	19,800.35
Consumables	1	13,927.00	13,927.00
Logistics	1	8,000.00	8,000.00
TOTAL			#101,400.86

TABLE: 5.1.5 shows the total amount spent for plotting

INFORMATION PRESENTATION

PERSONAL/QUALITY	DAY(S)	UNITRATE(N)	TOTALAMOUNT(₦)
1Principal Surveyor	1	30,378.22	30,378.22
1Senior Surveyor	1	18,443.92	18,443.92
Transportation	1	19,800.35	19,800.35
Basic Equipment	1	19,800.35	19,800.35
Consumables	1	13,927.00	13,927.00
Logistics	1	8,000.00	8,000.00
TOTAL			#110,351.84

TABLE: 5.1.6 shows the total amount spent for information presentation

(1) #76,893.99k

(2) #74,418.99k

(3) #198,602.86k

(4) #101,400.86k

(5)#101,400.86k

(6) # 110,351.84k

TOTAL# 663,069.4K

MOBILIZATION AND DEMOBILIZATION=1.5%

:1.5%.÷100×663,069.4

=0.015×663,069.4

=9,946.041

V.A.T=1.75%

:1.75%÷100×663,069.4

=0.0175×663,069.4

=11,603.7145

ACCOMODATION=2%

:2 ÷100×663,069,4

=0.02× 663,069.4

=13,261.388

TOTAL=663,069.4

9,946.041

11,603.7145

13,261.388

=691,880.5435

Reconnaissance	#105,984.47

Cutting of line &Tracing of layout	#565,858.96

Ground Control Establishment	#216,649.21
Traversing	#216,649.21
Data Capture	#216,649.21
Data Processing	#270,195.88
Plotting using ARCGIS	#179,826.00
Technical Report	#210,195.88
Total	#1,982,008.82

TABLE:5.1.4 shows the total amount spent for all tables

5.2 SUMMARY

The project is based on implementation of relational database for cadastral information(RDBs) of Irewolede Estate Along New Yidi Road Ilorin, Ilorin south local government area, kwara state. The reconnaissance was done in order to have thorough sketch of an area, the data were acquired using total station survey method in a static mode. The pillar descriptions and detailing were done using total station, the data processing involves transformation of reduction book and adjustment of acquired data using forward computation.

The survey was done in accordance to the specifications stipulated and a total number of thirty- two (5) pillars were buried all together and the final coordinate (X,Y, Z)value of all buried pillars were obtained. The plan was produced using AutoCAD and GIS software data suitable scale and data were presented in both hardcopy and softcopy finally, a comprehensive report was written covering the whole procedures employed in the execution of the project using Microsoft word.

It is occasional for a successful project to start and end without facing any problem but every problem encountered was taking to be a challenge. The pole was given a problem during the project is not good at all and also, Communication between rover and reference was another serious problem encountered mobile phone was employed to resolve the problem.

5.3 CONCLUSION

Having completed the project successfully, the aims and land information system were achieved to serve as a base for further survey operations. The whole project was done in accordance with specification stipulated and direct supervision according to departmental instructions.

5.4 RECOMMENDATIONS

i. More digital equipment should be bought by the school which could be used for the precise work so as to build up students to meet up with advanced technology and to make work easier for them.

ii. The school authority should try and find solution to the issue of instrument and the project should be issued on time to enable the student to meet up with the date specified.

iii. Finally, the (RDBs) should be extending to other part of the town by student for public and private uses and records should be kept in order to avoid land dispute of in our area.

5.5 PROBLEM ENCOUNTERED

It is occasional for a successful project to start and end without facing any problem but every problem encountered was taking to be a challenge. The pole was given a problem during the

project is not good at all and also, Communication between rover and reference was another serious problem encountered. Hence, mobile phone was employed to resolve the problem.

REFERENCES

AJOL (African Journals Online): https://www.ajol.info

Akingbade, A. L., Navalgund, K., & Ajayi, A. (2007).Developing a GIS-Based Cadastral

Dale, P. & McLaughlin, J. (1999) Land Administration.Oxford University Press.

FIG Publication No. 34 Cadastre 2014.

Future vision of cadastral systems and database implementation.

Google Scholar: https://scholar.google.com

IEEE Xplore / ScienceDirect / SpringerLink

Journal of Geography and Regional Planning, 2(3), 44-50.

Kufoniyi, O. (1998).Cadastral Surveying and Mapping: A Tool for Land Registration in Nigeria.

Lemmen, C., van Oosterom, P., & Bennett, R. (2015).The Land Administration Domain Model Land Use Policy, 49, 535– 545.

Oyeniyi, B. A. (2009).Development of a Digital Cadastral Database Using GIS.
ResearchGate: https://www.researchgate.net

Uluocha, N. O. (2007). Managing Cadastral Records in Nigeria: The Role of GIS and RDBMS.

Williamson, I., Enemark, S.,Wallace, J., & Rajabifard, A. (2010) Land Administration for Sustainable Development.

Worboys, M. & Duckham, M. (2004).GIS: A Computing Perspective (2nd ed.).CRC Press.

APPENDIX

NORTHING	EASTING	NORTHING	EASTING
935609.976	671158.208	935610.110	671030.195
935685.660	671212.601	935588.956	671026.735
935622.014	671387.359	935546.647	671019.817
935629.861	671365.636	935567.802	671023.276
935637.708	671343.913	935664.242	671076.822
935645.555	671322.190	935645.404	671074.784
935653.402	671300.467	935624.237	671071.395
935661.249	671278.745	935603.069	671068.005
935669.097	671257.022	935581.902	671064.616
935676.944	671235.299	935539.915	671057.753
935716.912	671249.292	935560.735	671061.227
935709.268	671271.086	935639.619	671105.861
935701.623	671292.881	935618.433	671102.569
935693.979	671314.675	935597.248	671099.278
935686.334	671336.469	935576.062	671095.987
935678.690	671358.263	935534.572	671089.394
935671.046	671380.057	935554.877	671092.696
935725.350	671227.181	935655.785	671106.863
935240.915	671022.720	935679.816	671010.043
935249.541	671041.425	935658.092	671006.633
935258.168	671060.131	935636.946	671003.128
935266.794	671078.837	935615.800	670999.623
935275.421	671097.543	935594.655	670996.117

935284.048	671116.249
935292.674	671134.955
935301.301	671153.660
935309.927	671172.366
935318.554	671191.072
935327.180	671209.777
935336.027	671228.624
935269.006	671010.266
935277.890	671028.849
935286.775	671047.415
935295.653	671065.988
935304.533	671084.563
935313.039	671103.241
s935321.370	671122.060
935329.702	671140.880
935338.033	671159.699
935346.365	671178.518
935354.696	671197.337
935363.530	671216.911
935596.725	671224.596
935563.069	671214.309
935584.247	671260.588
935552.140	671250.658
935575.974	671284.398
935544.888	671274.792
935538.411	671297.333
935568.137	671307.769

935552.364	670989.106
935573.509	670992.612
935524.068	671205.203
935515.221	671235.964
935519.645	671220.583
935510.884	671250.773
935504.090	671283.194
935506.546	671265.582
935529.850	671189.894
935557.110	671337.973
935547.745	671361.057
935528.420	671327.953
935522.537	671351.230
935498.124	671202.080
935472.693	671203.593
935231.108	670754.994
935285.608	670781.967
935257.017	670793.476
935231.699	670804.245
935206.333	670814.776
935180.802	670825.001
935155.206	670835.135
935129.538	670844.802
935107.378	670852.546
935167.868	670786.896
935167.868	670786.896
935140.042	670801.171

935433.953	671370.158
935405.605	671382.624
935414.568	671402.715
935443.362	671390.053
935452.770	671409.947
935423.531	671422.806
935462.179	671429.842
935432.518	671442.880
935471.388	671449.462
935441.629	671462.734
935451.108	671483.132
935476.286	671467.271
935468.597	671353.972
935478.261	671373.662
935487.975	671393.422
935497.690	671413.182
935504.834	671432.220
935719.739	671329.150
935704.331	671369.279
935762.962	671371.238
935770.229	671352.385
935776.532	671334.275
935747.563	671333.903
935736.698	671363.979
935358.509	671292.218
935345.200	671261.646
935376.305	671285.023

935115.530	670813.691
935093.982	670824.527
935502.026	671084.189
935499.132	671103.593
935496.224	671123.004
935493.321	671142.406
935490.418	671161.809
935463.704	671136.585
935466.019	671117.070
935468.337	671097.552
935470.649	671078.036
935461.388	671156.099
935459.070	671175.602
935483.156	671177.142
935453.430	671189.700
935427.021	671129.515
935428.791	671109.892
935430.561	671090.268
935432.350	671070.662
935514.752	671006.514
935503.179	670980.879
935524.324	670984.384
935511.905	671021.844
935509.146	671037.212
935506.012	671056.247
935482.715	671001.291
935479.456	671016.515

935363.475	671254.509
935394.616	671277.589
935381.896	671247.186
935412.976	671270.160
935400.358	671239.962
935431.389	671262.824
935418.907	671232.943
935374.037	671327.634
935391.311	671320.459
935409.422	671312.917
935427.707	671305.270
935445.993	671297.622
935386.102	671355.184
935402.922	671348.018
935420.838	671340.270
935439.009	671332.411
935457.067	671324.282
935781.749	671308.542
935787.881	671290.829
935793.688	671273.367
935799.496	671255.905
935805.767	671239.660
935755.833	671291.382
935735.338	671285.147
935705.906	671056.621
935759.977	671246.836
935635.714	671245.297

935406.672	671077.743
935388.609	671077.778
935304.276	671001.256
935132.843	670881.560
935143.924	670901.723
935199.080	670944.115
935217.901	670935.258
935325.946	670882.117
935287.781	670900.075
935306.864	670891.097
935249.617	670918.034
935268.699	670909.055
935305.492	670850.972
935267.327	670868.931
935286.409	670859.952
935229.162	670886.889
935248.245	670877.910
935293.188	670824.574
935254.605	670841.591
935273.888	670833.084
935215.952	670858.275
935235.332	670850.059
935196.705	670865.611
935174.652	670873.956
935203.130	670893.197
935476.149	671031.692
935472.246	671050.137

935627.491	671266.888
935619.441	671288.540
935611.305	671310.162
935603.168	671331.783
935594.978	671353.413
935585.241	671374.680
935574.896	671395.501
935643.850	671223.675
935651.986	671202.055
935660.122	671180.433
935668.259	671158.812
935676.332	671137.182
935684.392	671115.525
935692.489	671093.889
935699.732	671074.318
935560.442	671424.725
935379.334	670934.082
935358.770	670942.090
935339.340	670949.618
935319.912	670957.145
935300.484	670964.672
935282.407	670967.180
935242.796	670988.892
935223.786	670997.339
935212.953	670973.883
935231.870	670965.236
935269.705	670947.943

935482.431	670977.757
935313.233	670816.342
935443.675	670992.243
935439.993	671009.974
935436.238	671025.075
935431.771	671042.892
935376.631	670980.972
935357.973	670989.395
935397.772	670970.938
935394.162	671041.033
935687.989	670976.739
935666.376	670973.276
935645.229	670969.777
935624.082	670966.277
935602.936	670962.778
935560.723	670955.792
935581.827	670959.299
935539.550	670952.250
935518.387	670948.846
935497.160	670945.233
935476.333	670940.522
935435.900	670925.461
935417.749	670916.522
935400.550	670906.629
935384.335	670893.462
935409.826	670937.803
935454.280	670960.722

935288.622	670939.296	935401.806	671004.824
935307.540	670930.650	935544.173	671162.659
935326.457	670922.003	935551.179	671132.073
935345.374	670913.356	935659.225	671395.568
935363.828	670905.558	935604.088	671414.051
935350.086	671086.877	935430.315	670949.641
935358.537	671107.690	935455.752	670933.596
935366.356	671126.728	935350.755	670871.399
935374.174	671145.766	935327.572	670841.425