Chapter One

Introduction

1.1General:

Computer techniques had great advantages, it's application provides true information in short time and high accuracy, which leads to accomplish several types of work in a short limited time.

1.2 Problems statement:

1- The traditional system which depended on direct field work expensive, inefficient, slow, unreliable to manage electricity network.

2- The existing management system depends on paper maps which doesn't have all desired information, field work and massive files operation are needed to accomplish work.

1.3 Research Objectives:

1-Complete design digital system which have high efficiency, accuracy and low cost to enable the management of electricity network.

2-The ability to determine the possibility of providing new customer with electricity service.

3- The possibility of detection of errors in lines, improve services and customers care using geographic information system.

1.4 Research Questions and Hypotheses

1- Digital system utilizing geographic information system achieve efficient monitoring and efficient analysis.

2- Geographic information system is a suitable method to manage electricity network in quick, economical and reliable manner.

1.5 Research Methods:-

The study had presented a database to manage electricity network applying GIS. In this Study two methods had been chosen:

Desktop search method and practical application Method (case study), the first one depends on Books, internet, scientific literature, the second one depends on map and GIS.

1.6 Research Scope and Limitations

1- Algadesya (Square No1-6) – Gabalawleaa locality had been choosing as an area of study.

2-Dificallcy of getting attributes data from electricity offices.

3- Observing poles with GPS navigator produce accuracy less than required.

1.7 The importance of study

Offering good services and customer care, development, maintenance, other problems make it necessary for an effective system of managing electricity network using digital systems.

1.8 The study layout

This research includes six chapters, chapter one contains introduction includes the definition of the problem of research, its objectives and its importance of study in addition to the research hypotheses and methods which used in the study.

Theoretical framework consists of two chapters (chapter two and chapter three).

Chapter two contains a Study of the Science of Geographic Information Systems and chapter three deals with electricity.

In chapter four the data is collected and organized and supported with attributes data.

Chapter five deals with data, the data analyzed discussion and results.

Chapter Six contains conclusions and recommendations.

Chapter Two

Geographic Information Systems

2.1 Definition:

There are many different definitions of (GIS) presented below, different emphases are placed on various aspects of GIS. Some miss the true power of GIS, its ability to integrate information and to help in making decisions, but all include the essential features of spatial references and data analysis.

- (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present all types of geographical data.

-GIS is a special-purpose digital database in which a common spatial coordinate system is the primary means of reference. Comprehensive GIS require a means of:

1. Data input, from maps, aerial photos, satellites, surveys, and other sources
2. Data storage, retrieval, and query
3. Data transformation, analysis, and modeling, including spatial statistics
4. Data reporting, such as maps, reports, and plans

Three observations should be made about this definition:

First, GIS are related to other database applications, but with an important difference. All information in a GIS is linked to a spatial reference. Other databases may contain locational information (such as street addresses, or zip codes), but a GIS database uses geo-references as the primary means of storing and accessing information.

Second, GIS integrates technology. Whereas other technologies might be used only to analyze aerial photographs and satellite images, to create statistical models, or to draft maps, these capabilities are all offered together within a comprehensive GIS.

Third, GIS, with its array of functions, should be viewed as a process rather than as merely software or hardware. GIS are for making decisions. The way in which data is entered, stored, and analyzed within a GIS must mirror the way information will be used for a specific research or decision-making task. To see GIS as merely a software or hardware system is to miss the crucial role it can play in a comprehensive decision-making process.

- A definition quoted in William Huxhold's 1991:

"The purpose of a traditional GIS is first and foremost spatial analysis. Therefore, capabilities may have limited data capture and cartographic output. Capabilities of analyses typically support decision making for specific projects and/or limited geographic areas. The map data-base characteristics (accuracy, continuity, completeness, etc) are typically appropriate for small-scale map output. Vector and raster data interfaces may be available. However, topology is usually the sole underlying data structure for spatial analyses."

-C. Dana Tomlin's 1990:

"A geographic information system is a facility for preparing, presenting, and interpreting facts that pertain to the surface of the earth. This is a broad definition . . . a considerably narrower definition, however, is more often employed. In common parlance, a geographic information system or GIS is a configuration of computer hardware and software specifically designed for the acquisition, maintenance, and use of cartographic data."

-From Jeffrey Star and John Estes 1990:

"A geographic information system (GIS) is an information system that is designed to work with data referenced by spatial or geographic coordinates. In other words, a GIS is both a database system with specific capabilities for spatially-reference data, as well [as] a set of operations for working with data . . . In a sense, a GIS may be thought of as a higher-order map."

-And Redlands, CA: Environmental System Research Institute, 1990:

A GIS is "an organized collection of computer hardware, software, geographic data, and personnel designed to efficiently capture, store, update, manipulate, analyze, and display all forms of geographically referenced information."

2.2 Components of GIS:

Figure (2.1) Components of GIS

A working GIS integrates these five key components: hardware, software, data, people, and methods.

2.2.1 Hardware

Hardware is the computer on which a GIS operates. Today, GIS runs on a wide range of hardware types, from centralized computer servers to desktop computers used in stand-alone or networked configurations.

2.2.2 Software

GIS software provides the functions and tools needed to store, analyze, and display geographic information. Key software components are

- A database management system (DBMS).
- Tools for the input and manipulation of geographic information.
- Tools that support geographic query, analysis, and visualization.
- A graphical user interface (GUI) for easy access to tools.

2.2.3 Data

Maybe the most important component of a GIS is the data. Geographic data and related tabular data can be collected in-house or bought from a commercial data provider. Most GISs employ a DBMS to create and maintain a database to help organize and manage data.

2.2.4 People

GIS technology is of limited value without the people who manage the system and to develop plans for applying it. GIS users range from technical specialists who design and maintain the system to those who use it to help them do their everyday work.

2.2.5 Methods

A successful GIS operates according to a well-designed plan and business rules, which are the models and operating practices unique to each organization.

2.3 DATA STRUCTURE IN GIS:

Geographic features on a map are represented as: points, lines and polygons. Some-times it becomes useful to make a representation of a truly three dimensional surface, such as elevation data set. However, the representation of space in two dimensions, such as administrative boundaries of Bangladesh, is more common.

The contents of the spatial data base are a model of the Earth. Points are used to represent objects whose dimension is too small like tube wells, electric poles, market place, railway stations, etc., lines are used to represent the roads and streams and polygons are any region enclosed by lines (closed surface) that represents uniform features like water areas, agricultural lands, forests.

Besides the geometric data the attribute data characterizing the spatial data are also important.

There are two broadways of organizing the spatial data in a GIS: raster and vector data structures. While any spatial data can be expressed in either raster or vector format, but for the data representing a truly three dimensions surface, the raster format is treated to be suitable one.

2.3.1 Raster data structure:

In raster format, the spatial data is represented by regular cells of uniform shape and size where the attribute value is located at the center of the cell. The raster data consists of the arrays of such cells, called the picture element or pixel each of which has a position and a value representing the feature. The elements of the rows are called the samples and are numbered from the left to the right. The rows (some times called lines) are numbered from top to bottom. Thus the upper left corner of the raster file is considered as the origin and represents the first sample of the first line (1, 1).

For a raster data base, the accuracy of the measurement is limited by the size of the pixel. The smaller the pixel size, the higher is the spatial accuracy. In this data structure, the points cannot be located exactly, it belongs to either one cell or another and there is nothing in between. More-over, a point belonging to any location of the pixel is attached only with the center of the pixel. More commonly used tessellations of the raster structure are the square cells, where the neighboring cells are not equidistant because the diagonal cells have higher distance. Other tessellations of the raster structures are regular squares, triangles and hexagons. In hexagonal tessellations, the cells are equidistant. However, the use of a hexagonal or even a triangular data structure creates two problems. First, the cells can not recursively be subdivided in to smaller cells of the same shape as the original cells, as in the case of square system. Conversely, a hexagon made up of smaller hexagons will not be the same shape as those smaller ones.

The individual cells of the data base do not commonly refer to the real-world coordinate, but may be georeferenced using a ground control point file where the real-world positions corresponding to the same locations at the raster data base are registered. Occasionally a raster data base has a corresponding header file which contains the coordinate of the upper left corner, cell size in X and Y directions, map projection and number of overlays.

The examples of raster data base are: Digital Elevation Model (DEM) and computer classified satellite data.

2.3.2 Vector data structure:

In a GIS having a vector data structures, The X value and Y value of each point is encoded; together these are the (X, Y) coordinate pairs in a two-dimensional rectangular coordinate system. Thus the geographic features: points, lines and polygons are represented as follows:

- Points such as wells, telephone poles, archaeological sites etc. are represented by pairs of X and Y coordinates (X, Y).

- Line features such as streams, streets, etc. are represented by a number of line segments called arcs constituted by streams of such coordinate pairs. Starting and ending of a line segment or arc is designated as nodes. Each coordinate pair of the arc is called a vertex. The line features are displayed by joining the vertices together.

- Polygon features such as soils, land use, water-bodies, administrative boundaries, etc. are represented by a stream of vertices enclosing a particular surface. In another word a polygon may be constructed by one or more arcs.

Each of the features in a GIS is identified by a unique ID. Lines and polygons are displayed by joining the vertices.

2.3.3 Attribute data structure:

Feature attribute tables are the dBase data files which have specific items relative to the spatial data base. The spatial data base together with this attribute data base is called coverage. Every coverage has a feature attribute table which is automatically created when topology is created. The default attribute items are the same within each feature types (points, arcs or polygons) but additional user defined items can be added.

2.4 Concept of Topology:

The spatial data in some of the GIS are topologically linked which makes geographic data intelligent. ‘Topology’ determines the relationship between the spatial objects. The topological relationships have the following basic characteristics:

- Arcs join at nodes.
- Arcs join to make polygon.
- Arcs have directions (From-node to To-node) and ‘left’ and ‘right’ sides.

Topology helps to store data more efficiently, process larger data set, process data faster, combine adjacent polygons with similar characteristics and overlay geographic features. The topology of point, line and polygon coverage are different and each topology are built separately in a GIS like ARC/INFO.

Some of the topological features are given below with particular reference to ARC/INFO - GIS of ESRI.

- Arc-node topology tells which arcs are connected to each other

- Polygon-arc topology tells which arcs make up a polygon Left-right topology tells which polygons are adjacent to the arcs

GIS coverage consists of geographic features topologically linked and their associated attributes stored in an automated map. Coverage has the following features:

- Tic that links coverage to the real-world coordinates. In another word Tics may be referred as ground control points.

- Arc - Node - Feature IDS - Label Points at which the Label - Ids are positioned - Polygons - Annotations

2.5 Layer concept in GIS:

For most applications data base of the project area is created with many features and each feature type is stored in a separate coverage. The coverage are geometrically registered and have the same tics and boundaries and are called data layers. Such layers of spatial data describe many geographies of the real-world and allow complicated spatial, logical and arithmetic operations among the data layers to obtain totally new knowledge or develop environment models which were not possible before the development of computer based GIS technology.

Link between geographic features and attributes

In a GIS the geographic features and attributes are linked. The spatial data and the attribute data are related through the unique ID of the feature. Thus ID is stored in two places - with coordinate data and with attribute data (in attribute table).

An additional attribute data base can be created and linked to the attribute table of the GIS-coverage via a common item.

2.6 GIS Functional Elements:

There are five functional elements that a GIS must have (based on Knapp, 1978 and Jeffrey Stone and John Estes 1980). These are mentioned below:

2.6.1 Data Acquisition:

Data acquisition is the process of identifying and gathering of data required for application. This may be done through a number of procedures. One procedure might be to gather new data by preparing maps of required features using satellite observations, aerial-photographs or field observations. The another procedure of data acquisition is to locate and acquire the existing data in the form of maps, aerial or ground photography, surveys reports and documents. A GIS is of nous unless the relevant data has been identified, located and acquired.

2.6.2 Preprocessing:

The preprocessing consists of the following:

- Check the quality of the source data.
- Data entry: spatial and attribute data
- Digitize a map
- Scan a hard copy document
- Use the key board to enter coordinates
- Buy data in a commercial format (e.g. diskette, tape) and load it in your computer.
- Obtain digital copies from another department or agency.
- Enter attribute data from the key board
- Use existing files already on the computer

- Read existing data stored on tape, cartridge or diskette.
- Error Detection and Editing
- Edge matching.

2.6.3 Data management:

Data management consists of storage, delectation and retrieval of data. In most larger installations the data is managed by a system's administrator. If the works in the computer is done without managing the data, at one time a message will appear "DISK IS FULL". At the end of the day it is always good to delete the unnecessary files without piling these up and take a complete backup of the work that has already been done. A large volume of data storage is to be well indexed and managed.

The data base management systems (DBMS) with the GIS may be of additional help in managing the attribute data base. A data base management system is the software that permits one or more users to work efficiently with the data. The essential components of the system must provide the means to define the contents of a database, insert new data, delete old data and ask about the contents and modify the contents. The DBMS may be used to create additional data base relative to the spatial data.

2.6.4 Data manipulation and analysis:

The data manipulation and analysis in a GIS mainly consists of the following operations:

- Spatial operation: proximity analysis (buffering around a feature), neighborhood analysis, routing, classification and chloropleth analysis, spatial operations using logical selections based on the attribute data items and modification of the spatial data by any other means.

- Logical, arithmetic and statistical operations/analysis of the attribute data.

- Modeling using GIS data base.

- Create overlays of coverage with different features. The output coverage contains the spatial and attributes information of the input coverage.

2.6.5 Product generation:

Final products of GIS are maps, tables, charts, and reports.

Chapter three

Components of Electricity Network of Residential Areas

3.1 Introduction:

Power is a form of energy. It is the flow of electrons. All matter is made up of atoms, and an atom has a center, called a nucleus. The nucleus contains positively charged particles called protons and uncharged particles called neutrons. The nucleus of an atom is surrounded by negatively charged particles called electrons. The negative charge of an electron is equal to the positive charge of a proton, and the number of electrons in an atom is usually equal to the number of protons. When the balancing force between protons and electrons is upset by an outside force, an atom may gain or lose an electron. When electrons are "lost" from an atom, the free movement of these electrons constitutes an electric current.

Power is a basic part of nature and it is one of our most widely used forms of energy. We get power, which is a secondary energy source, from the conversion of other sources of energy, like coal, natural gas, oil, nuclear power and other natural sources, which are called primary sources. Many cities and towns were built alongside waterfalls (a primary source of mechanical energy) that turned water wheels to perform work. Before power generation began slightly over 100 years ago, houses were lit with kerosene lamps, food was cooled in iceboxes, and rooms were warmed by wood-burning or coal-burning stoves. Beginning with Benjamin Franklin's experiment with a kite one stormy night in Philadelphia, the principles of power gradually became understood. In the mid-1800s, Thomas Edison changed everyone's life -- he perfected his invention - the electric light bulb. Prior to 1879, power had been used in arc lights for outdoor lighting. Edison's invention used power to bring indoor lighting to our homes.

Electric power generating by a generator which is a device for converting mechanical energy into electrical energy. The process is based on the relationship between magnetism and power. When a wire or any other electrically conductive material moves across a magnetic field, an electric current occurs in the wire.

3.2 Electricity power system:

There are four major divisions of electricity power system:

3.2.1 Generation:

Is the process of converting energy from some electric form (mechanical, chemical , thermal , radiant …etc) to electrical energy.

3.2.2 Transmission:

Is the process by which the energy is transferred usually over relatively long distance via transmission line from the point of generation to some area where the energy is to be distributed and used.

3.2.3Distribution:

Is the process by which the energy is fed locally to various distribution stations in given area from one or more main transmission stations. and distribution is the division of interest in this project. Some components of distribution network used on this project are mentioned below.

3.2.3.1 Substations:

Substations transform voltage from high to low, or the reverse, or perform any of several other important functions. Between the generating station and consumer, electric power may flow through several substations at different voltage levels.

3.2.3.2 Transformers:

To solve the problem of sending power over long distances, George Westinghouse developed a device called a transformer. It transfers energy between two or more circuits through electromagnetic induction**.** The transformer allowed power to be efficiently transmitted over long distances. This made it possible to supply power to homes and businesses located far from the electric generating plant.

Transformers can thus be designed to efficiently change AC voltages from one voltage level to another within power networks.

There are two types of transformers:

-distribution transformers: is a transformer that provides the final voltage transformation in the electric power distribution system, stepping down the voltage used in the lines to the level used by the customer.

- Power transformers: used for relay and protection purpose in electrical power system. There are three types of distribution transformers:

1- Pole distribution substations mounted.

2- Under ground substations.

3- Total station substations.

3.2.3.3 Feeders:

Feeders are the conductors that carry electric power from the service equipment (or generator switchboard where power is generated on the premises) to the over current protective devices for branch circuits supplying the various loads. Sub feeders originate a distribution center other than the service equipment or generator switchboard and supply one or more other distribution panel board or branch circuits panel board or branch circuits code rules on feeders apply also to all sub feeders.

- In electric power distribution, a medium-voltage power line transferring power from a distribution substation to the distribution transformers
- An electrical wiring circuit in a building which carries power from a transformer or switchgear to a distribution panel
- A circuit conductor between the power supply source and a final branch circuit over current device.

3.2.3.4 Electricity over head lines:

An overhead power line is a structure used in electric power transmission and distribution to transmit electrical energy along large distances. It consists of one or more conductors (commonly multiples of three) suspended by towers or poles. Since most of the insulation is provided by air, overhead power lines are generally the lowest-cost method of power transmission for large quantities of electric energy.

3.2.3.5 Types Electricity over head lines:

1- High tension lines 33kilovolt, lines align in shape of triangle
2- Medium tension lines 11kilovolt, lines align horizontally.
3- Low tension lines 415 volt, lines align vertically.

3.2.3.6 Electricity cables:

Same as Electricity over head lines in concept, the different that cables are isolated by isolation material for safety purpose.

3.2.4 Utilization:

Is the process in which the electrical energy is brought to the point at which it

consumed i.e. converted from electrical energy to some other form such as heat , light , mechanical , or chemical energy.

Chapter Four

Data Collection and Processing

4.1 Introduction:

In this study GIS had been proposed to achieve high efficiency and accuracy and low cost to control and improve the distribution electricity services.

This chapter reflects the actual steps of the work which had done by using ArcGIS10 (GIS Software).

4.2 Sources of data:

In this research almost complete data base for Gabal Awleaa locality had been obtained from public electricity corporation in order to manage electricity network, which included:

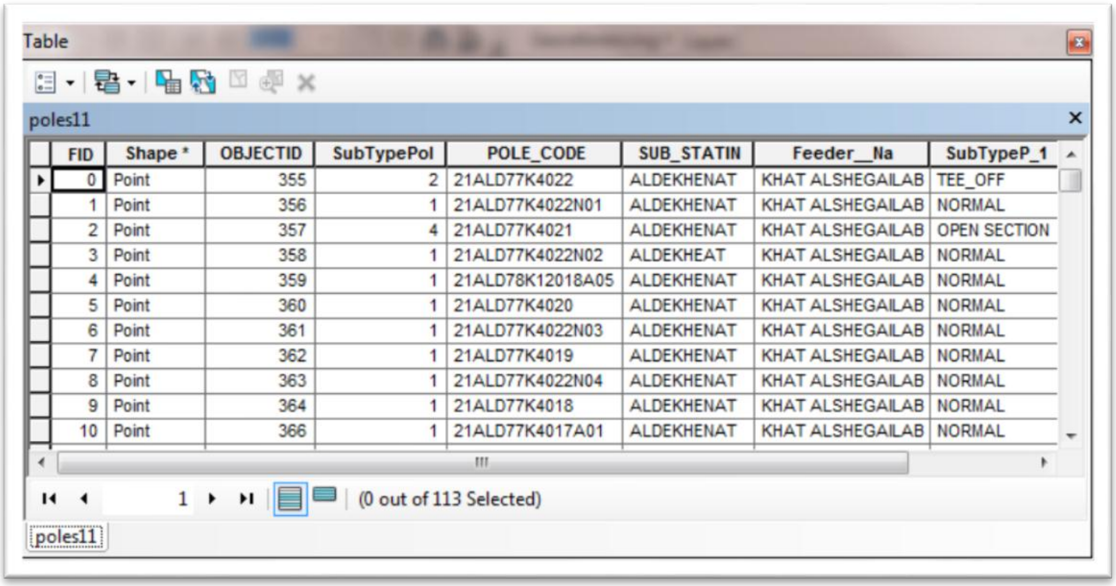
- Map of residential parcel of Algadesya Gabal Awleaa locality scale 1:12500.
- Map of electric network including electric poles, electric lines, transformers, and substation.
- Attributes of parcel owners had been collected from the site.
- Parcel numbers had been obtained from ministry of urban planning.
- Layers had been prepared datum and map projection had been defined as UTM WGS84, Zone 36N.

Layers which found with data base were:-

- Poles 33: which are poles carry 33kilo volt.

-Poles 11: which are poles carry 11kilo volt.

-Lt.poles: which are poles carry 415volt.



Table

poles11

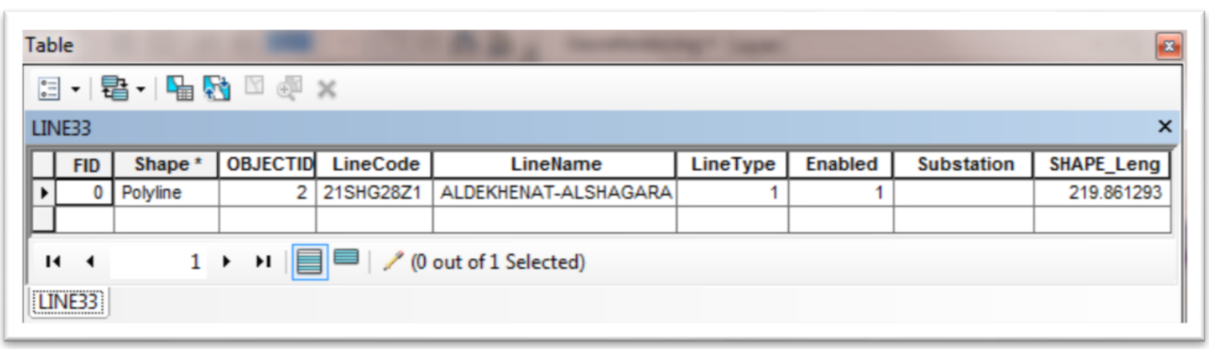
FID	Shape *	OBJECTID	SubTypePol	POLE_CODE	SUB_STATIN	Feeder__Na	SubTypeP_1
0	Point	355	2	21ALD77K4022	ALDEKHENAT	KHAT ALSHEGAILAB	TEE_OFF
1	Point	356	1	21ALD77K4022N01	ALDEKHENAT	KHAT ALSHEGAILAB	NORMAL
2	Point	357	4	21ALD77K4021	ALDEKHENAT	KHAT ALSHEGAILAB	OPEN SECTION
3	Point	358	1	21ALD77K4022N02	ALDEKHEAT	KHAT ALSHEGAILAB	NORMAL
4	Point	359	1	21ALD78K12018A05	ALDEKHENAT	KHAT ALSHEGAILAB	NORMAL
5	Point	360	1	21ALD77K4020	ALDEKHENAT	KHAT ALSHEGAILAB	NORMAL
6	Point	361	1	21ALD77K4022N03	ALDEKHENAT	KHAT ALSHEGAILAB	NORMAL
7	Point	362	1	21ALD77K4019	ALDEKHENAT	KHAT ALSHEGAILAB	NORMAL
8	Point	363	1	21ALD77K4022N04	ALDEKHENAT	KHAT ALSHEGAILAB	NORMAL
9	Point	364	1	21ALD77K4018	ALDEKHENAT	KHAT ALSHEGAILAB	NORMAL
10	Point	366	1	21ALD77K4017A01	ALDEKHENAT	KHAT ALSHEGAILAB	NORMAL

1 (0 out of 113 Selected)

poles11

Figure (4.1) pole 11 attributes data

-Line33: the line joined poles 33.



Table

LINE33

FID	Shape *	OBJECTID	LineCode	LineName	LineType	Enabled	Substation	SHAPE_Leng
0	Polyline	2	21SHG28Z1	ALDEKHENAT-ALSHAGARA	1	1		219.861293

1 (0 out of 1 Selected)

LINE33

Figure (4.2) line 33 attributes data

-Line11: the line joined poles11.

-Line415: the line joined lt.poles.

Table

LINE1_415

FID	Shape *	Id	SHAPE_LENG	LINE_CODE	TRANS_NAME	FEADER_NO
0	Polyline	61	2870.6299	2110412	Algadeseah bolock 1	F2
1	Polyline	65	3539.6499	0		F1
2	Polyline	71	2593.03	2110411	Algadeaeah bolock 1	F1
3	Polyline	66	1428.9	0		F1
4	Polyline	73	991.242	0		F1

1 (0 out of 6 Selected)

LINE1_415

Figure (4.3) line 415 attributes data

-Cable33: the cable joined poles33.

Table

CABLE33

FID	Shape *	OBJECTID	VoltLevel	LineName	Enabled	SHAPE_Leng
0	Polyline	1	1	Aldekhenat-Alshagra	1	61.167203
1	Polyline	4	1	Aldekhenat-Alshagra	1	16.866389
2	Polyline	0	1	Alalaf-Aldekhenat-Alshareka Alaraia	0	0
3	Polyline	0	1	Alalaf-Aldekhenat-Alshareka Alarabia	0	0
4	Polyline	0	0	Alalaf-Aldekhenat-Alshareka Alarabia	0	0

1 (0 out of 5 Selected)

CABLE33

Figure (4.4) cable 33 attributes data

-Trans_1: distribution transformers.

Table

trans_1

FID	Shape *	OBJECTID	StationNam	TransName	CapacityKV	LTPanelTyp	Feeder_Nam	Trans_Code	Update_	TYPE
0	Point	34	ALDEKHENAT	FARM EAST THE STREET	200	1	KHAT ALSHEGAILAB	211068	<Null>	HAWAAI
1	Point	48	ALDEKHENAT	ALGADESEAH SQ 1	500	4	ALGADESEAH	211041	<Null>	ARDHI
2	Point	97	ALDEKHEAT	AHMED OMER	200	3	ALKALAKLA ALWEHD	211059	<Null>	TOTAL STATION
3	Point	98	ALDEKHENAT	TAHSEEN AHMED OMER	200	3	ALKALAKLA ALWEHD	211075	<Null>	TOTAL STATION
4	Point	99	ALDEKHENAT	ALGADESEAH SQ 3	1000	3	ALKALAKLA ALWEHD	211076	<Null>	TOTAL STATION
5	Point	100	ALDEKHENAT	ALGAESEAH SQ 4	50	3	ALGADESEAH	211060	<Null>	TOTAL STATION
6	Point	101	ALDEKHENAT	ALGADESEAH SQ 4	200	3	ALKALAKLA ALWEHD	211061	<Null>	TOTAL STATION
7	Point	104	ALDEKHENAT	SER ALKHATEM ABDELL	200	3	ALGADESEAH	211069	<Null>	TOTAL STATION
8	Point	105	ALDEKHENAT	ALGADESEAH SQ 2	1000	3	ALKALAKLA ALWEHD	211077	<Null>	TOTAL STATION

1 (0 out of 9 Selected)

trans_1

Figure (4.5) trans-1 attributes data

-Trans_output: power transformers.

Table

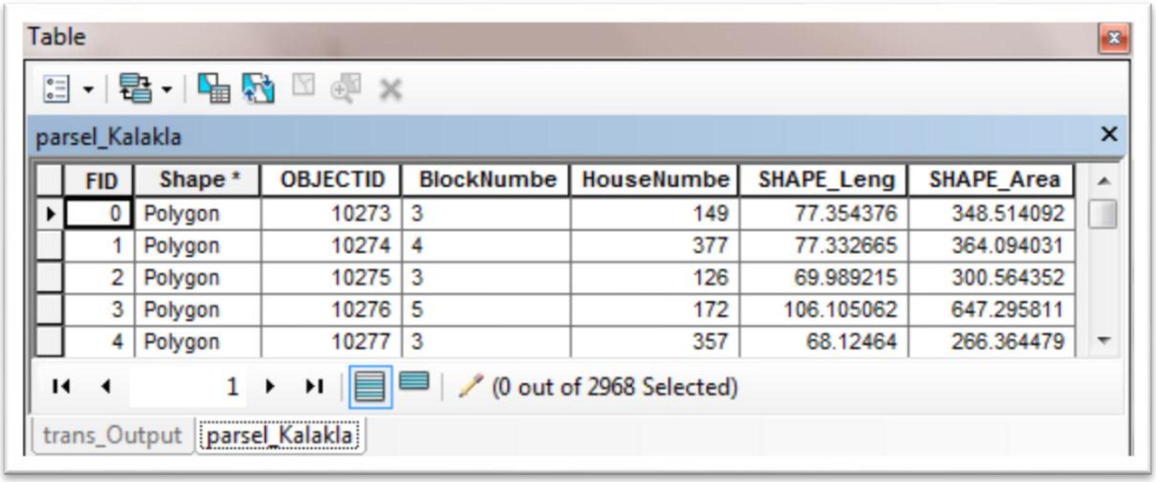
trans_Output

FID	Shape *	OBJECTID	NAME	TYPE	TR_CODE	CAP_	LINE_11
0	Point	16	ALSEHREEG ALDEKHEAT	0		200	ALMAGARO
1	Point	17	ALGADESEAH SQ 4	0		200	ALMAGARO
2	Point	19	TAHSEEN ALSOOG	0		200	ALMAGARO
3	Point	21	ALGADESEAH SQ 1	0		200	ALMAGARO

1 (0 out of 4 Selected)

Figure (4.6) Trans_output attributes data

-Parcel_kalakla:



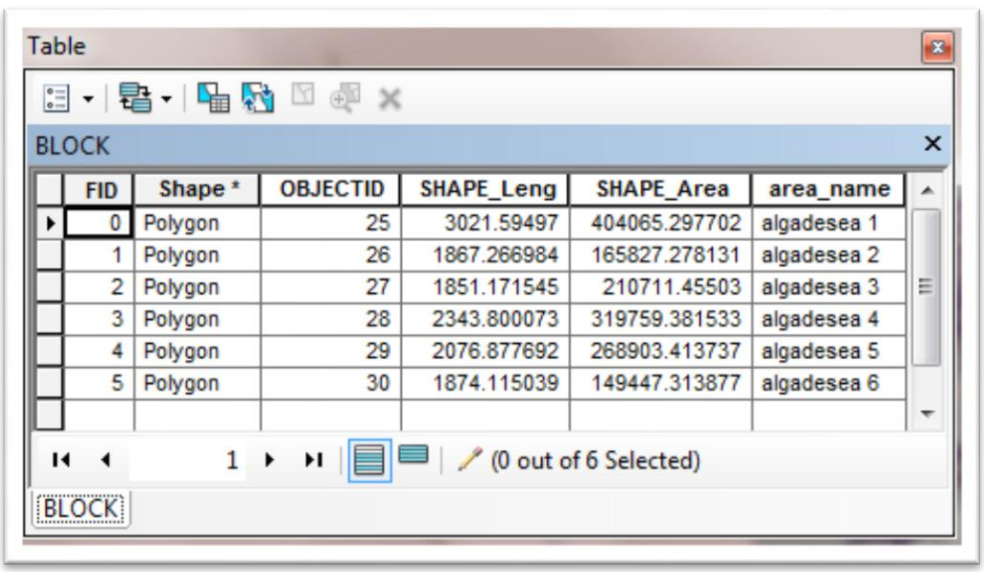
parsel_Kalakla

FID	Shape *	OBJECTID	BlockNumbe	HouseNumbe	SHAPE_Leng	SHAPE_Area
0	Polygon	10273	3	149	77.354376	348.514092
1	Polygon	10274	4	377	77.332665	364.094031
2	Polygon	10275	3	126	69.989215	300.564352
3	Polygon	10276	5	172	106.105062	647.295811
4	Polygon	10277	3	357	68.12464	266.364479

(0 out of 2968 Selected)

Figure (4.7) Parcel_kalakla attributes data

-Block:



BLOCK

FID	Shape *	OBJECTID	SHAPE_Leng	SHAPE_Area	area_name
0	Polygon	25	3021.59497	404065.297702	algadesea 1
1	Polygon	26	1867.266984	165827.278131	algadesea 2
2	Polygon	27	1851.171545	210711.45503	algadesea 3
3	Polygon	28	2343.800073	319759.381533	algadesea 4
4	Polygon	29	2076.877692	268903.413737	algadesea 5
5	Polygon	30	1874.115039	149447.313877	algadesea 6

(0 out of 6 Selected)

Figure (4.8) block attributes data

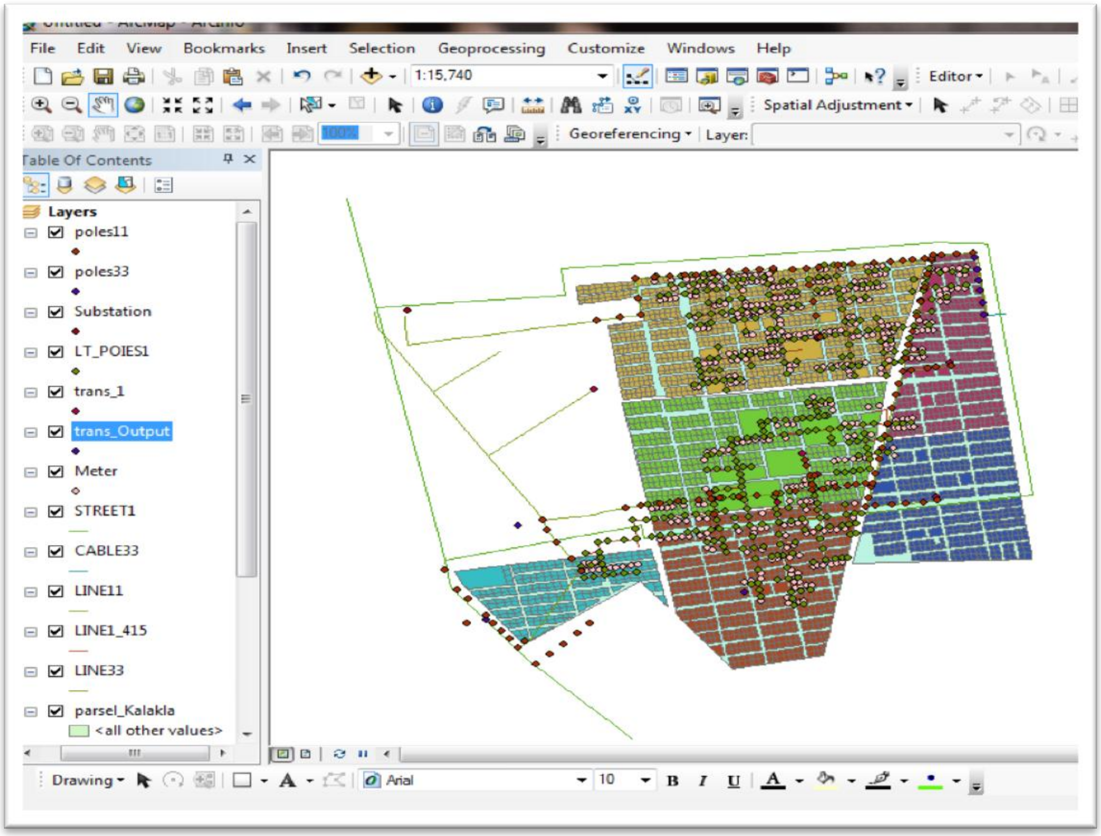


Figure (4.9) area of study

4.3 Steps of data editing:-

4.3.1Block layer needed to be adjusted to fit parcel_kalakla layer and that by using rubber sheet method from spatial analysis tool:

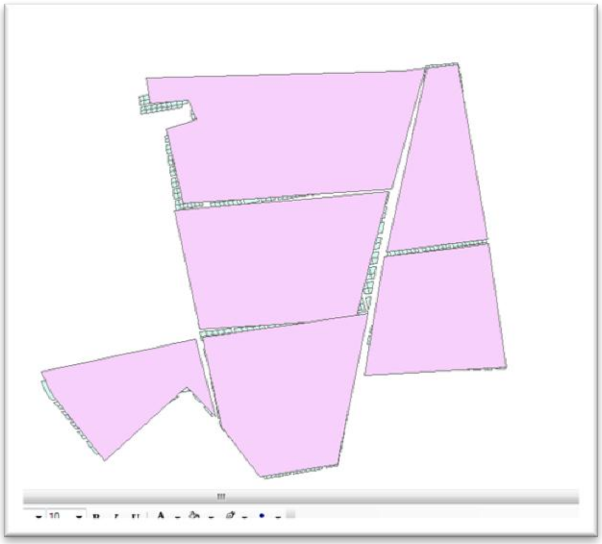


Figure (4.10) difference between block and parcel layers

4.3.3Coordinates of poles have been taken by GPS navigator and the layer of parcel have been drawn from airplane photo , the difference of precision between the source of data cause that most of lt_poles lies in side boundary of parcel, lt_poles have been redrawn and all attribute data have been written in the new layer lt_poles1 .

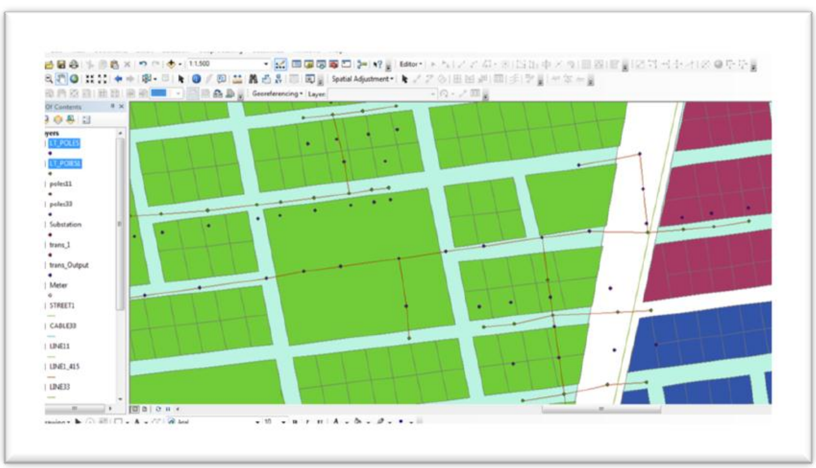


Figure (4.11) lt_poles lies in side boundary of parcel

4.3.4 In layer parcel_kalakla two columns added to the attributes table block number and house number.

4.3.5The layer of meter have been drawn according to low tension poles and the wire length should not exceed 25 meters.

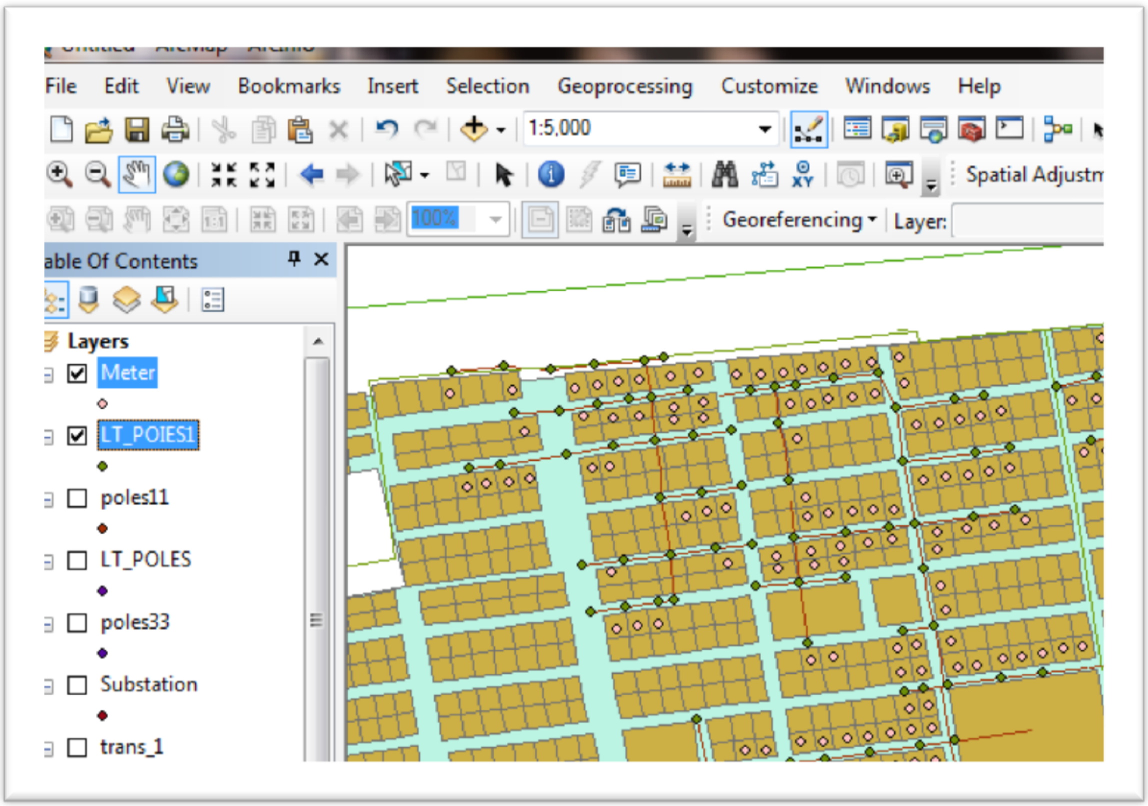


Figure (4.12) layer of meter

Meter

Shape *	Id	meter_no	phone_no	Name_1	Name_2	trans_name	Feeder_no
Point	0	985363353	117557699	mohmed		Gadesya Sq 1	F2
Point	0	896553795	123467876			Gadesya Sq 1	F2
Point	0	864368355	127557272	ali omer o		Gadesya Sq 1	F2
Point	0	765297426	922627031	omer has		Gadesya Sq 1	F2
Point	0	763262384	129678449	rnda bbah	maged als	Gadesya Sq 1	F2
Point	0	748362373	122181973	eddres ad	amera alli	Gadesya Sq 1	F2
Point	0	738264832	923067567	aweddd		Gadesya Sq 1	F2
Point	0	738263548	127538358	amna moh		Gadesya Sq 1	F2
Point	0	736923648	125568655	hmed alli		Gadesya Sq 1	F2
Point	0	654336543	927879737	elhag nae		Gadesya Sq 1	F2
Point	0	654327163	929002955	adel omer		Gadesya Sq 1	F2
Point	0	642948361	111511245	nagge nm		Gadesya Sq 1	F2

Figure (4.13) meters attributes table

Chapter five

Results and Analysis

5.1 From electricity office of Gabalawleaa two transformers feed the area, Algadesya block 1 and Algadesya block 4 as shown in the table below:

Transformers load

Transformer name	Algadesya block 1	Algadesya block 4
Capacity in kilo volt	500	200
Numbers of feeders (f)	3	3
Houses feeds from f1	98	52
Houses feeds from f2	121	96
Houses feeds from f3	0	0

Table (5.1)

5.2 Distance between house and nearest pole should be in range of (25) meters.

5.3 Distance between house and Transformer should be 1 kilometer.

5.4 Transformer distributes power according to the capacity, in ratio of one kilo volt to each house.

5.5 Provide new customer with electricity service depends on sketches from survey office and this cause some low tension poles lies inside borders of parcels instead of road, and this means it doesn't based on a map.

Figure (5.1) low tension poles lies inside borders of parcels

5.6 If there is no pole near the new customer within the limited distance, then the customer must pay for the cost of new poles which is expensive, but in annual enhancement the cost is free, so great numbers of structured houses don't has electricity service comparing data base with Google earth image.

Figure (5.2) structured houses with no electricity service

5.7resultes above (5.5 and 5.6) should be included in annual enhancement.

Chapter six

Conclusion and Recommendations

6.1Conclusion:

In addition to the use of the system in management, and network extensions and optimization, the following benefits can also be obtained:

- House number and name of house owner are only information needed from new customer
- Full database of electric capacity to control loads with it.
- Determination of the suitable pole for the new customers according to the distance from transformer and nearest pole and the transformer load.
- In planning of routine maintenance.
- In easy handling of customer’s inquiries.
- In network configuration.
- In provision of back-up system that eliminates the problem of data loss, easy and speedy retrieval of information, data update and possible sharing of data among different users simultaneously.

6.2Recommendations:

The study recommends:-

- To follow procedure to correct GPS data.
- The researchers in this field to improve comprehensive database include all services.

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