

# Examining the Change of Power Transmission Line in Urban Regeneration with Geographical Information System

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**Abstract**—In this study, spatial differences of Power Transmission Line (PTL) and effects of the situation before and after the urban regeneration are studied by using Geographical Information System (GIS). In addition, a questionable and analyzable structure is acquired by developed system. In the study area many parcels on the PTL were analyzed. The amount of the parcels, which are affected by the negativity of PTL is clearly seen with the aid of generated maps. Some kind of changes are exhibited in the system, which are created by GIS, for instance before urban regeneration PTL was very close to people's private properties and huge parts of PTL were among the buildings, however; after urban regeneration electricity lines were changed their locations to the underground. According to the results, GIS can be used as a device in planning and managing of PTL in urban regeneration projects and can be used for analyses. By the help of GIS technology, necessary investigations should be carried out in urban regeneration applications for creating sustainable cities.

**Keywords**—GIS, power transmission line, urban regeneration, technology.

## I. INTRODUCTION

**G**EOGRAPHICAL INFORMATION SYSTEM (GIS) is all of the functions of the tools function for gathering, storing, studying, transferring and viewing terrestrial data for a purpose. It is a way of general information management system which is used for viewing general map information.

Urban regeneration, which is an important device in troubleshooting of urban problems, is discussed in Turkey as in the world. There are a lot of different politics and methods being used on this topic. GIS and urban regeneration enable it to acquire effective results in planning studies by gathering graphical and non-graphical information in studies and analyses. Controlling and troubleshooting technical infrastructure systems of a city such as gas, electricity, drinking water, waste water, phone, sewage system, collecting duties properly, regular structuring and providing transportation, bursting on the scene as soon as possible in case of fire, accident or similar cases and healthy and fast decision making on lots of similar cases can be possible with GIS [1].

By using spatial searching feature of GIS, a graphical city map can be selected by pointer and definitional information such as owner of the building, address, number of floors, real

estate value, expropriation price can be searched and additionally, a building owner can be chosen in database section and his/her building can be viewed on computer screen [2]. Also all graphical and non-graphical information of urban regeneration projects can be analyzed spatially and results may be studied and commented by modeling). Many different data sources must be held together and evaluated for energy systems. For this reason, using GIS is of a great importance for energy systems. GIS, which enables gathering data within a system and examining them very fast, also speeds up gathering information about planning of energy systems investments.

Reference [3] shows that optimal route selection has been made for PTL by using multi decision making analysis and sensitivity analysis along with minimum cost analysis.

Reference [4] indicates that GIS can be applied to appropriation services in setting up PTL for using electric energy and provided a base for this issue. By this study, a sample appropriation information system is created for PTL appropriation projects.

Reference [5] explained using of GIS based on the route selection for overground PTL details and determined the best route alternative by comparing the route alternatives according to the criteria..

## II. MOVING POWER TRANSMISSION LINES TO UNDERGROUND FROM OVERGROUND IN URBAN REGENERATION AREAS

Urban regeneration can be defined as proper arrangement of real estates in areas with unplanned urbanized, slummed, susceptible to disasters and urban risks, insufficient and unqualified infrastructure, dense housing, against construction legislations or laws [6].

As soon as urban regeneration is adopted as an important device for cities, it has become clear that especially adoption of technical infrastructure facilities and other facilities structurally is of an important economical dimension [7].

There are many studies which are done during the urban regeneration in application area for solving technical infrastructure problems. One of these studies is the study of moving PTL from over ground to underground [5].

Cables used in transmission systems are divided into two as underground and over ground distribution systems. Underground systems are buried into channels, protective bricks and cables. Overground systems are, avenues, side streets, every overground distribution line, which are recumbent forests and gardens. Although overground line type

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is cheaper and is of shorter time in troubleshooting, underground network type is more advantageous in view of reliability, energy loss, and visual complexity [8]. Underground systems are especially preferred in inner cities, and in places that aerial line is not available. Energy must be transferred underwater via underground cable in strait passing. Underground cables break down rarely and they are not required an important maintenance [9].

Energy losses and following it become an important issue around the countries day by day. Studies for decreasing energy losses are of equal importance of producing power.

According to [10], some of the applications which are urban regeneration will bring for energy efficiency are;

- Obligatory water insulation in buildings as well as heat and noise insulation.
- Disallowance of building use in case that necessary precautions are not taken for water insulation which prolongs building's life
- Collecting garbage's in a healthier way and putting garbage containers underground in order to prevent visual pollution.
- It is foreseen that there should be a separate canal under the sinks for wasting plantal oils in the houses which will be built within regeneration.

The process of moving of PTL to underground can be added to mentioned energy efficient systems in above because underground systems three times more profitable than overground system [11].

### III.APPLICATION

Konya city is the biggest city of the Turkey with 39000km<sup>2</sup> square surface and on the Middle Anatolia plateau and neighborof Ankara, Aksaray, Niğde, Mersin, Karaman, Antalya, Isparta, Afyon and Eskişehir cities and between the 36° 22' and 39° 08' north parallels and 31° 14' and 34° 05' east meridians. It consists of Karatay, Meram, Selçuklu central districts, which are connected to metropolitan municipality (Fig. 1).

The sample area which takes place in the study is Konya city, Meram municipality Altınhamle Urban regeneration Project (Fig. 2). It is declared as urban regeneration area based on 5393 numbered Municipality Law's 69-73 statements. According to 5393 numbered Municipality Law's 69-73 statements Yenice, Hacı İsa Efendi and Geçit Avenues and old Meram Meat Combinat areas are declared as urban regeneration area.

Maps and paths of PTL are transferred into information system by ArcGis10 software. Changes of PTL before and after the urban regeneration are shown in Figs. 3 and 4 by using superposition feature of GIS.

All electricity lines were between the buildings before the urban regeneration but after the urban regeneration the part between the buildings have been moved into underground and other parts have been moved into park area from shared area (Fig. 5).



Fig. 1 Location of Konya in Turkey



Fig. 2 Altın Hamle urban regeneration area

Some kinds of searches become possible in the system which is created by GIS. The data which is organized in order to match the verbal data and geometrical data is combined through ArcGIS 10 software and the search performed effectively. For example it is analyzed that how many and which parcels are on the PTL. After the analyses, it is seen that they are on 146 parcels and 101 pieces are of single floor buildings (Fig. 6). Therefore, the amount of the parcels which are affected by the negativity of PTL is determined.

In case that PTL are on the private properties, limitations on the parcels are determined and constitution of servitude is done for registering officially. As it is understood from here, GIS is able to be used in constitution of servitude and analysis as well. It is possible to set up constitution of servitude, executing and making some analyses for PTL by GIS.

As seen in Fig. 6, PTL are very close to housings in people's private properties before urban regeneration. This was improper both legally and for the health of the people living in the area.

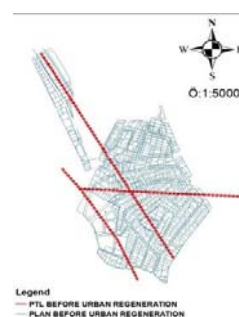


Fig. 3 PTL before urban regeneration

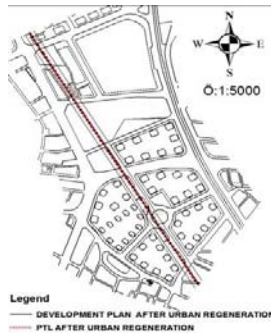


Fig. 4 Situation map which shows PTL and development plan after the urban regeneration

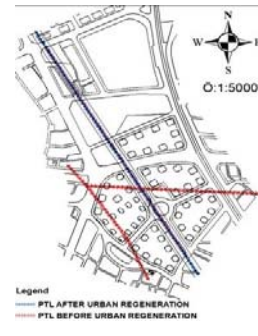


Fig. 5 Location of PTL before and after the urban regeneration

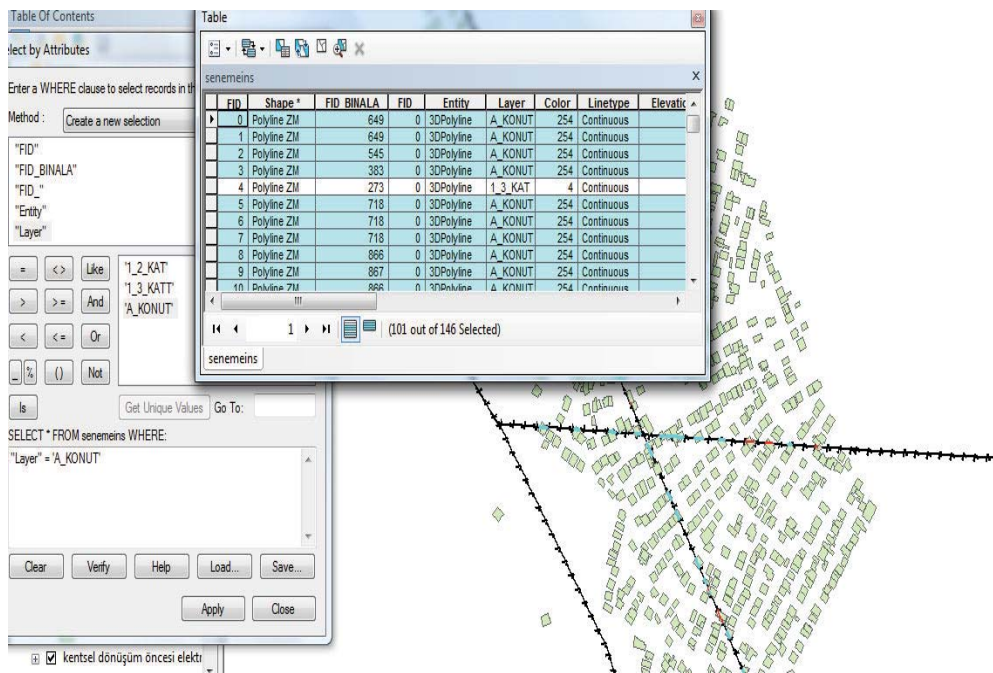


Fig. 6 Search screen of the project

#### IV. CONCLUSION

Urban regeneration are projects, which should be socially and technically studied and searched, which gain importance day by day and find a wide application area. It is necessary to use GIS by involving physical, economic, and social views in urban regeneration applications for creating healthier cities. By means of proper construction parcels created by urban regeneration, PTL are moved to public domains and constitution of servitude problems is prevented.

In many countries worldwide, a lot of energy is wasted because of the inefficient design or running of the equipment used to convert it into the services required; though there is an encouraging growth in awareness of energy conservation and efficiency. Well planned and managed energy efficiency and conservation programs can help avoid electricity shortages.

By this study, it is seen that GIS can be used as a device in planning and managing of PTL in urban regeneration projects and can be used for necessary analyses. State institutions and organizations can make all related plans and administrative

applications with GIS.

It is necessary to hold and evaluate lots of different energy sources for energy systems. For this reason, using GIS is very important for energy systems.

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