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PLANNING OF WATER SUPPLY SCHEME USING GIS

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Abstract— This project introduces the design and implementation of a digital pipeline of "WATER SUPPLY SCHEME" in this paper. Our implementation focuses on using pipeline GIS (Geographical Information System) for water supply scheme in this paper. It concentrates on 2D & 3D spatial and property data acquiring, storing, processing, analyzing and sharing in the GIS framework.

Keywords— GIS, WSS, ArcGIS, Maps.

I. INTRODUCTION

Water supply scheme (WSS) is a complex system that integrates several spatial features. Therefore, it is needed to use multi- support information system to have capability of storing; managing and analysing the large data set.

Geographical Information System (GIS) provide some of the most comprehensive tools for storing, manipulation and analysing. The implementation of GIS can not only reduce the time needed for analysing information but also can ensure a more efficient use of the resource with high flexibility in time and scale. It enables user to store and display large amount of data graphically to greatly enhance the interpretation and analysis.

A. Geographical Information System (GIS)

A geographic information system (GIS) is a computer-based tool for mapping and analyzing things that exist and events that happen on earth. GIS technology integrates common database operations such as query and statistical analysis with the unique visualization and geographic analysis benefits offered by maps. These abilities distinguish GIS from other information systems and make it valuable to a wide range of public and private enterprises for explaining events, predicting outcomes, and planning strategies. The major challenges we face in the world today-overpopulation, pollution, deforestation, natural disasters-have a critical geographic dimension.

B. Water Supply Scheme (WSS)

Water is one of the essential requirements for life. All living things need water for their survival. Water is used for variety of purposes, including drinking, food preparation, irrigation and manufacturing. Although water covers more than 70% of the earth's surface, less than 1% of that resource is available as fresh water – and this is not evenly distributed throughout the world. More than one billion worldwide, mostly in developing countries, lack safe drinking water. Apart from the scarcity of water, there are many other challenges in providing a safe, adequate and reliable water supply in many parts of the world.

II. ArcGIS

ArcGIS is ageographic information system (GIS) for working with maps and geographic information. It is used for creating and using maps, compiling geographic data,analysing mapped information, sharing and discovering geographic information, using maps and geographic information in a range of applications, and managing geographic information in a database.

A. ArcMap

ArcMap is the main component of Esri's ArcGIS suite of geospatial processing programs,and is used primarily to view, edit, create,and analyse geospatial data. ArcMap allows the user to explore data within a data set,symbolize feature accordingly, and create maps. This is done through two distinct sections of the program, the table of contents and the data frame.

B. ArcScene

ArcScene allows you to overlay many layers of data in a 3D environment. Features are placed in 3D by providing height information from feature geometry, feature attributes, layer properties, or a defined 3D surface, and every layer in the 3D view can be handled differently. Data with different spatial references will be projected to a common projection, or data can be displayed using relative coordinates only. ArcScene is also fully integrated with the geoprocessing environment, providing access to many analysis tools and functions.

III. METHODOLOGY

A. Base Map

A Base map provides a background of geographical context for the content you want to display in a map. When you create a new map, you can choose which basemap you want to use. You can change the basemap of the current map at any time using the basemap gallery or your own layer as the basemap. You can also crate a basemap containing multiple layers from the contents pane in map viewer.

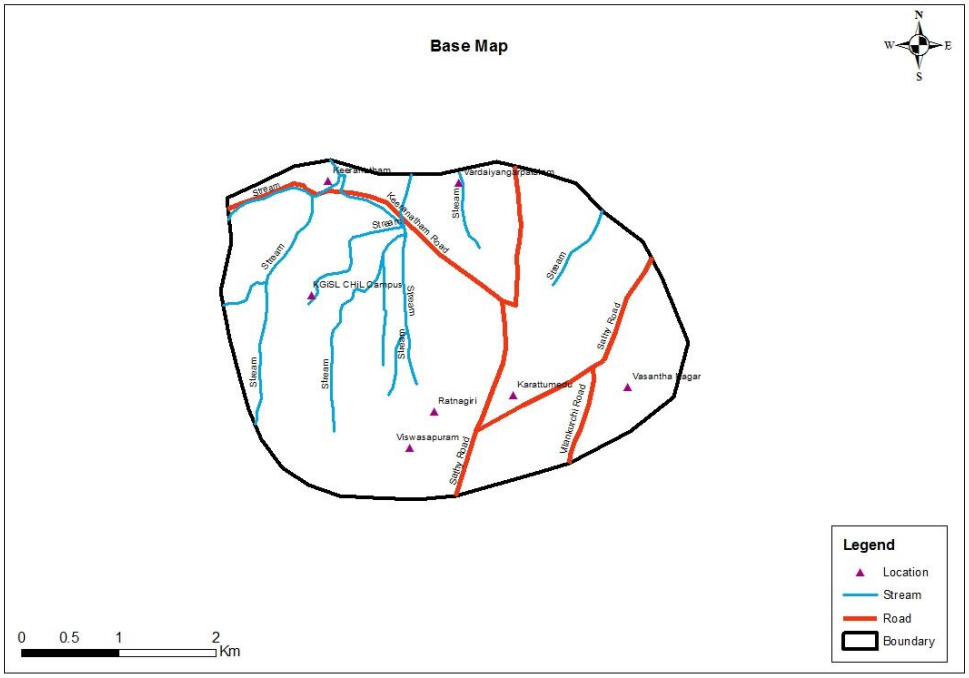

Fig. 1Baase Map

B. Contour Map

Contours are sets of lines of equal equal value across a surface. They are frequently created to represent surfaces on map.Here, the spot height values act as an input to derive the contour with the interval of 10m by surface analysis tool in the 3D analyst extension. Smoothing the output contour map by the process of generalization in the spatial tool. The smoothen output contour map is shown in the figure.In our study arean the level difference ranges from 400m to 430m.It is not much undulated.

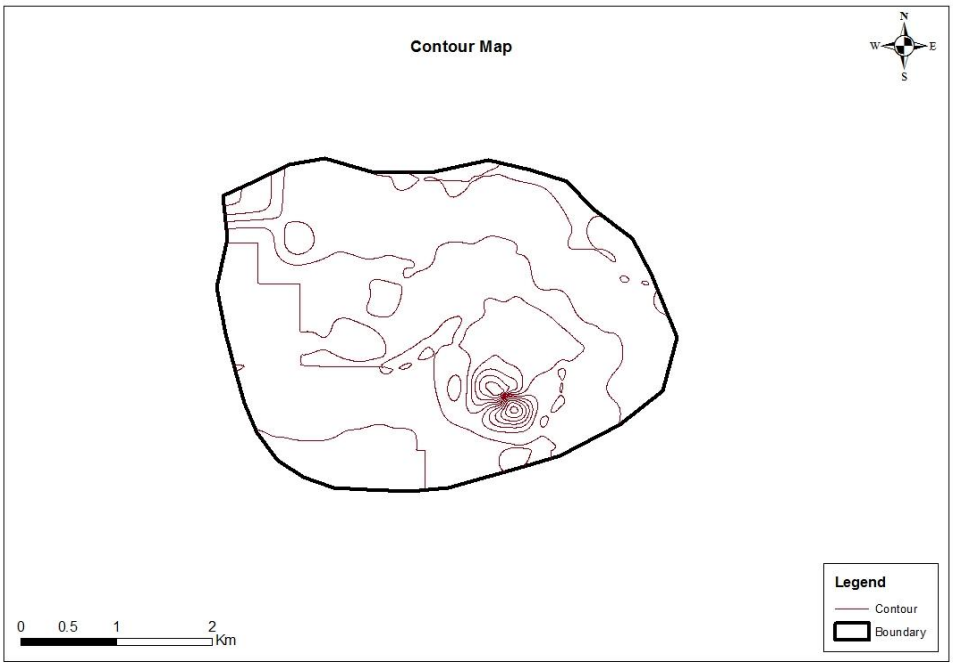

Fig. 2 Contour Map

C. Elevation Map

A Elevation Map is the main type of map used to depict elevation, often through use of contour lines. In a GIS, Digital Elevation Models (DEM) are commonly used to represent the surface of a place, through a raster dataset of elevations.

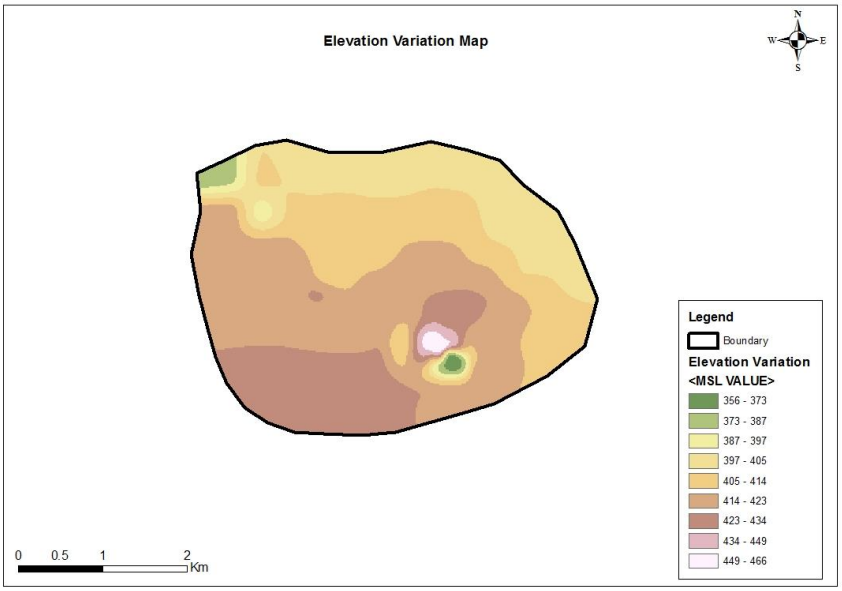

Fig. 3 Elevation Variation Map

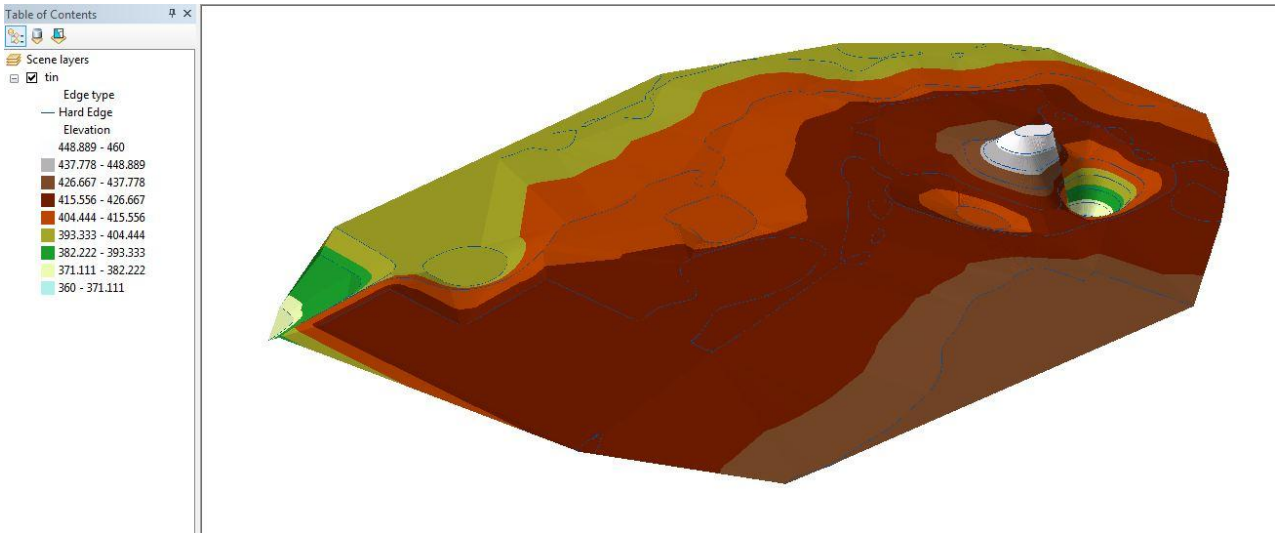

Fig. 4 3D View

D. Proposal Map

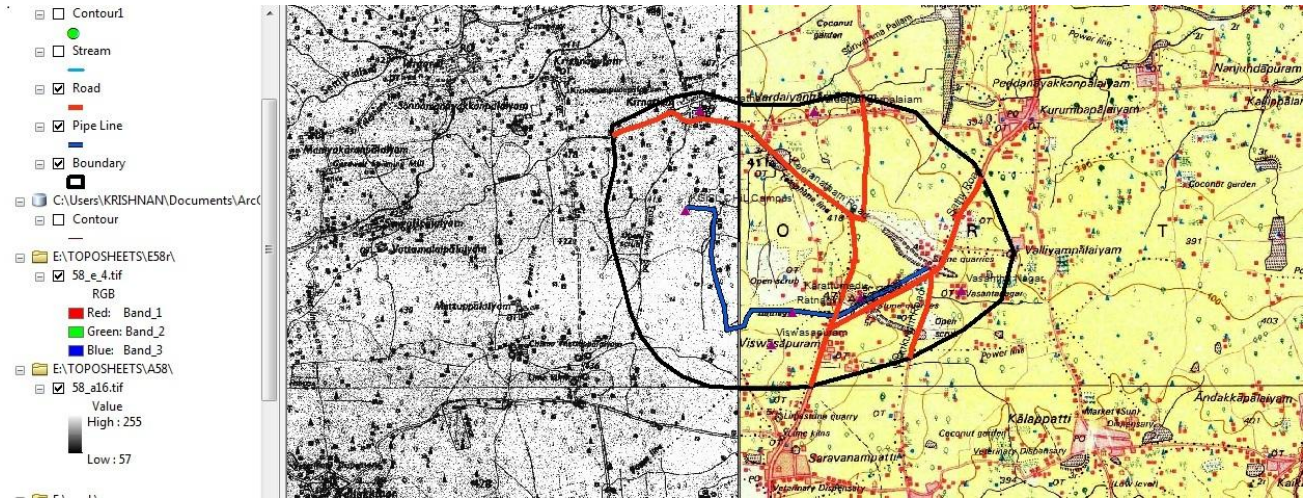

Fig. 5 Proposed pipeline with toposheet

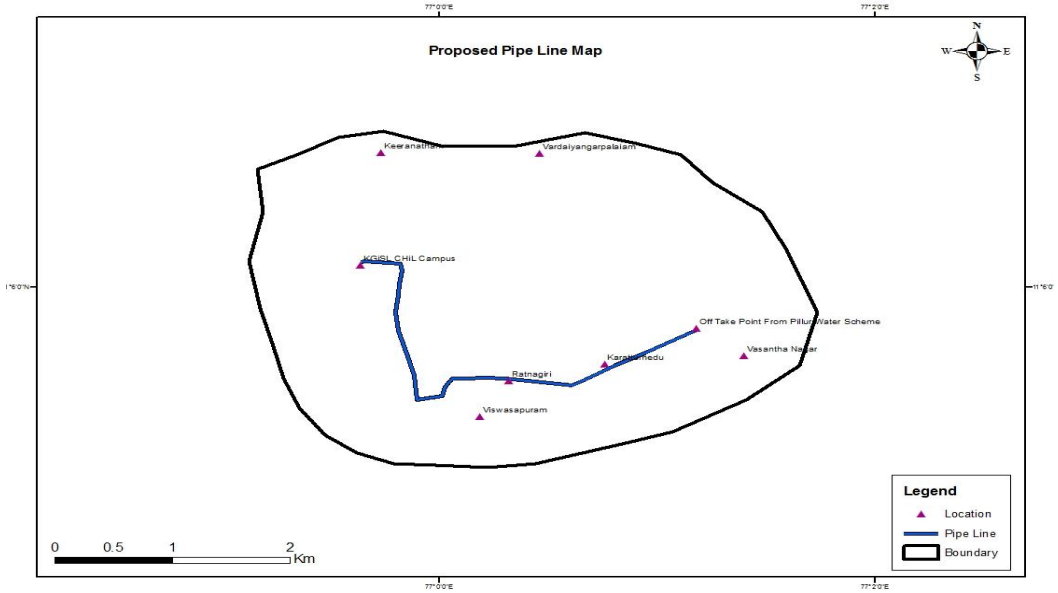

Fig. 6 Proposed pipeline without toposheet

CONCLUSIONS

Linear projects in developing world are human rights and environmental protection. Pipelines and similar large scale energy projects undertaken in majority countries are rarely vetted through a process of environmental or social impact assessment. But this study, by incorporating both the environmental and traditional sets of criteria an optimal route could be achieved.Safer and cheaper pipeline transportation of energy resources is a major concern for the public and the pipeline industry. Today, the pipeline owners and operators are under increasing pressure to produce accurate maps of pipeline routes to assure safety in design, construction, operation, maintenance, and emergency response of pipeline facilities. While demonstrated in this paper, ArcGIS Spatial Analyst module can be used in the optimum route selection of pipeline process to minimize impacts to environmental and costly aspects during construction.

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