Feasibility Study for Site Suitability by Using Geo-Informatics Technology for Building Warehouse

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Abstract: *Feasibility study for site suitability for building Warehouse study emphasize on the recent development of computer hardware and software technology, Geographic information System (GIS) has emerged as a valuable computer-based tool in supporting a variety of spatial problem tasks. It acts as a decision Support System (DSS) for taking a number of decisions. Feasibility study for site suitability for building Warehouse study provide status of barwala village's 2 Murrabas (approximately) which is situated on south of Barwala-Sarera Road within 7 km from bus stand. The tender will be released by HAFED on behalf of FCI and firm wants to present its proposal with accurate facts in terms of suitability of the site for ware house construction. For building a warehouse for grain storage a necessary and essential condition is that site for warehouse should be at on high elevation so that warehouse is safe in flooding situation. For this purpose firm requires spot height, flood water category and contour line of the area of interest. The main objective of the project is to provide all the required information for area under study in a timely and authentic manner for accurate decision making. The study provide all the required information on a single map for better decision making which is accurate status of each parcel of land. The scope of Feasibility study for site suitability for building Warehouse emphasize on the alignment of various roads heading to the proposed site and also about the area which flood prone. The scope of the study provide information for each parcel of land with satellite data having all cadestral information so that it may be find out that which area is flood prone. The Study follows the Method of Digital Interpretation and finds out the suitable site for building warehouses. The site suitability study for building warehouses includes all the processes of digitization, Geo referencing, Ground Truthing Survey which find out that either this site is suitable for warehouses or not.*

Keywords: Geo-Informatics, Remote Sensing & GIS, warehouse, storage

1. Introduction

Feasibility study for site suitability for building Warehouse study acts as a decision Support System (DSS) for taking decision about suitability of the site for ware house construction which is approximately 2 Murrabas (388,399) of Barwala village. The tender will be released by HAFED on behalf of FCI and firm wants to present its proposal with accurate facts in terms of suitability of the site for ware house construction. For building a warehouse for grain storage a necessary and essential condition is that site for warehouse should be at on high elevation so that warehouse is safe in flooding situation. For this purpose firm requires spot height, flood water category and contour line of the area of interest. In the process of site suitability of warehouse construction factors that may be considered- Site should not be in flood prone area, Availability of Convenient transportation in respect of Road and Railway, Vegetation and climate conditions must be appropriate for storage, Current status of parcel of land and water availability, Pest control measures must be taken correctly.

Geo-Informatics is a science which develops and uses infrastructure to address the problems of geo-sciences & related branches of engineering. Geo-informatics combines geospatial analysis and modelling for development of geospatial databases, information system design, human computer interaction and both wired & wireless networking technologies.

Application of Geo-informatics in warehouse construction- Geo-Informatics deeply rely on technological and scientific discipline for sensing, modelling, representing, visualizing, monitoring, processing, and communicating in all fields of Warehouse construction that are straightaway related to Geo-|informatics.

2. Hypothesis

Geo-spatial technology may check urban land acquisition & minimizes human interruptions. By studying Temporal Urban Patterns we can identify the Past, Present and Future urban scenario and also give our suggestion about the future perspective of urban sprawl by using the present analytical technique and side by side using the traditional method of land acquisition

3. Objective

The present study has been undertaken with the following objectives.

- To provide all the required information on a single map for better decision making.
- To provide accurate status of each parcel of land.
- To provide alignment of various roads heading to the proposed site.
- To demarcate areas that is flood prone

4. Study Area

Haryana is a situated between $27^0 39'$ to $30^0 56'$N latitude and $74^0 27'$ to $77^0 36'$E longitude. It covers area of about 44212 square kilometres. The state is divided into four divisions for administrative purpose - Ambala, Rohtak, Gurgaon and Hisar. Barwala village comes under the Hisar division which is located at 29°23′0″N and 75°55′0″E on National highway no 65, North East of Hisar Town. The land of this firm is situated on south of Barwala-Sarera Road within 7 km from bus stand.

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5. Methodology

Study was conducted following the steps mentioned below:

1. Collection of Satellite data, toposheet and Mussavies from concern village.
2. Mosaicing of satellite data in ERDAS 9.1 software.
3. Scanning and Geo-referencing of Mussavies and toposheet with the Satellite data.
4. Visual interpretation and On Screen Digitization of Barwala village from Mussavi as well as on satellite data was done in ArcGIS 9.2.
5. Extraction of flood prone area.
6. Conducting a ground truth survey for collecting GPS points on proposed site.
7. GPS points were draped on Satellite data, toposheet as well as on Mussavies for quality assurance.
8. Find out the suitability of the site for ware house construction.
9. Final report generation.

Data Used

a) Cartosat-1 and Resources at P-6 LISS III satellite Images.
b) Quick-Bird (QB) Satellite high resolution data.
c) Toposheet from Survey of India.
d) Mussavies from the concern Patwari.

5. 1.Digitization of Musavi:

Cadastral Map (Mussavies) of Barwala village was received from District Revenue Officer (DRO) office. The mussavies were digitized for providing murraba grid, killa grid, Killa number, Murraba number, roads, canals etc. using Arc Map/GIS Software in separate layers. Finally all these layers were merged to a single field to provide all the information in single layer. The layer is named as cadastral murraba no. The format for this layer is first three digits are Murraba number Table1. Next there is Killa number with partition. For example **34112/1** implies Murraba number **341**, Killa number **12/1**.
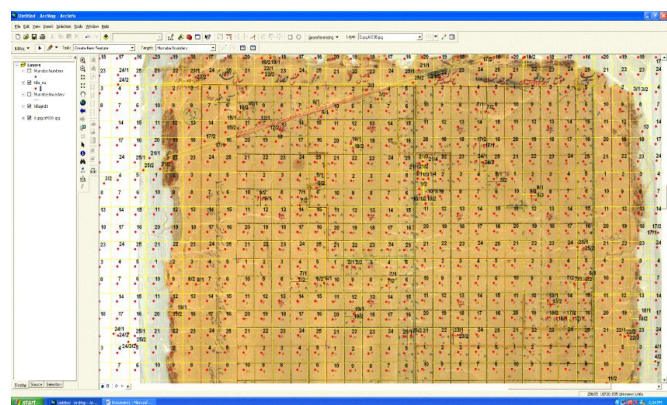

Figure 1: Digitized Mussavie of BARWALA Village

As we can see in figure2 38715/1 and 387/15/2 provides information that killa no 15 of murabba no 387 has 2 partition 15/1 and 15/2.The cadastral maps are digitized based on data of 1970. Updating given by patwari are also incorporated so that it may be find out that how much portions are updated with the time.
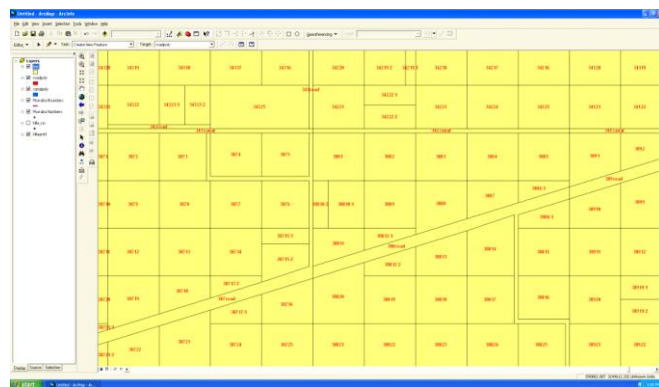

Figure 2: Cadastral layor showing Murraba number Killa Number

After creation of cadastral data the final layer was transformed to Quickbird data of resolution 0.5 m.

The cadastral polygon exactly matches the features on the Quickbird data because of high resolution .As shown in figure 3 the layer of cadastral data exactly matches the satellite data which clearly demarcate that these required Muraba nos are suitable for constructing warehouses..
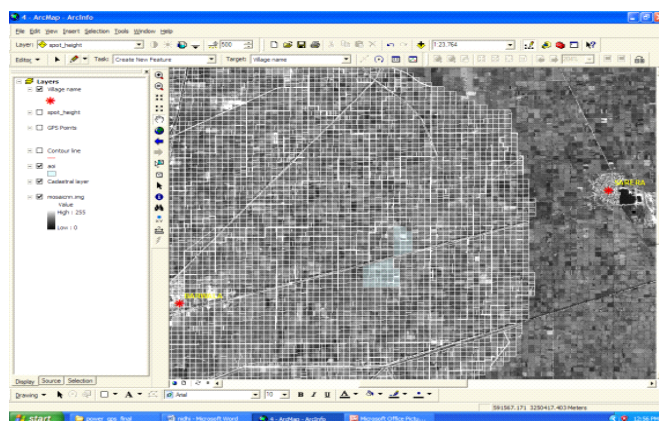

Figure 3: Cadastral data transformed to Quickbird image

In figure 4 with the help of digitization of Contour lines and spot height suitability of site can be clearly seen. In the toposheet both the features were digitized on same scale .we can see that Barwala and Sarera village road connecting them to Badhawad Distributaries where the area of interest falls.
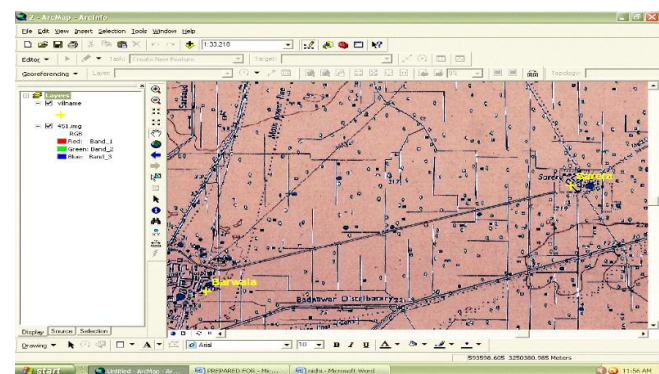

Figure 4: Toposheet O-15

5.2. Digitization of Flood Prone Area Map:

After all these processes the study requires information about the Flood prone area which can be seen in the figure 5

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digitized on the scale of 1:50,000. By seing different categories it can be find out the information i.e. Receded water area/wet land, standing water etc which clear the picture that this area is suitable site for constructing warehouses.
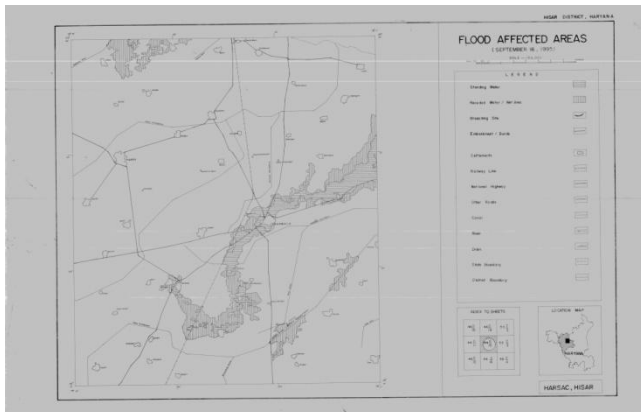

Figure 5: Flood Effected Area

5.3. Conducting a ground truth survey for collecting GPS points on proposed site
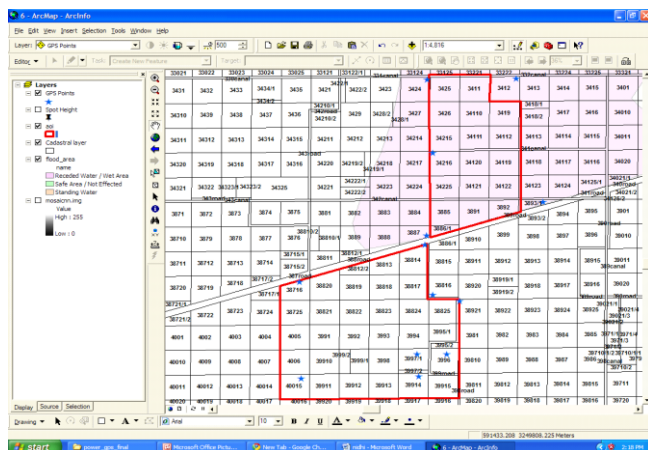

Figure 6: Cadastral data showing area of interest

Ground truth survey was conducted for the proposed site for enhancing the quality of the study. Field checks locate the actual site on the ground based on satellite data. Cropping pattern of the particular land was also analyzed. In the survey GPS points were taken on the proposed site. Figure 7 shows GPS points that exactly drapes on satellite image.
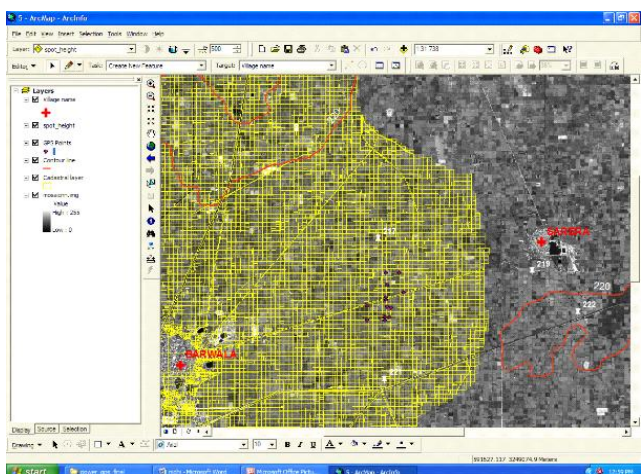

Figure 7: GPS points of area of interest

5.4. Georeferencing mussavies and satellite image in reference to GPS Points:
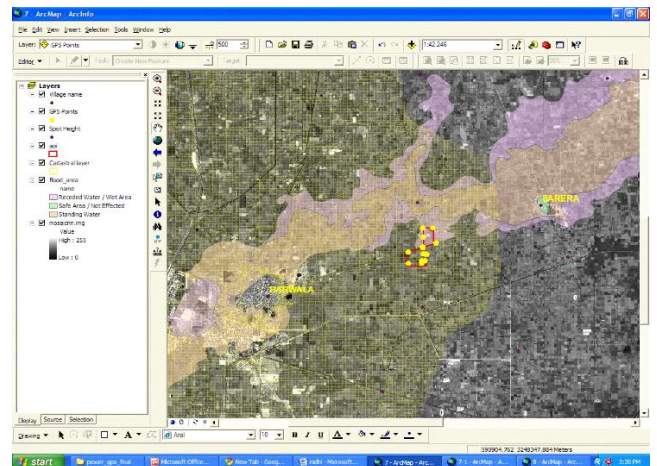

Figure 8: Flood area digitized

All the data was organized in an overlay form. After all this exercise Land SAT 1B image was opened in background of Georeferenced cadastral data. The land sat data in background shows that the vegetation (crop) in the concerned area is in good health after 8 days. The final maps were prepared and user's suggestion was taken. Accordingly the final maps were prepared on the user specification.

This exercise provide the following information to user:

- Murraba no in flood prone area.
- Status of vegetation after 8 days from flood.
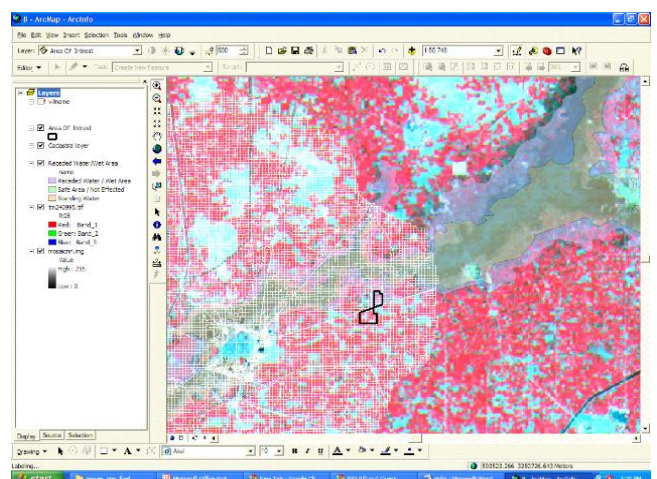- Study area is in safe zone.

Figure 9: Land SAT 1B image in background of composed data

6. Result and Discussion

The study of Feasibility study for site suitability for building Warehouse concluded that study area of the project which lies in Killa no: 12/2,13,14,17,18,19,20,21,22,23,24,25 falls under Murraba no 388and Killa no: 1, 2,3,4,5/1,5/2,7/1,7/2,8,9/1,9/2,10 falls under Murraba no 399 are in the safe zone. By examine the previous history from 16 September 1995 of these Murraba numbers 388,399 were found in safe zone category on 16 September 1995. The road in between these murabas acts as a barrier for flood water and

the height of road is approximate 1-2 feets. The flood water was not able to cross the road.

So by all these study it can surely be concluded that this area is highly suitable for constructing warehouses as this road in between the required area acts as a very safe part because this area and this road is on high altitude than the surrounding area. So in future if there any possibility of flood than this area is automatically safe to prevent this warehouse from flood. And beside it this road is standing as a barrier if any flood situation comes. This area is also suitable for constructing warehouses because there is good connectivity of road, availability of raw materials.

So, we can say that nobody can deny that Geo-informatics technology is emphasize on the recent development of computer hardware and software technology, Geographic information System (GIS) has emerged as a valuable computer-based tool in supporting a variety of spatial problem tasks. It acts as a decision Support System (DSS) for taking a number of decisions.

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