

Mapping and Analysis of the rate of compliance of Egbu-Uratta road right of way in Owerri, Nigeria.

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ABSTRACT

The study aim at analyzing and assessing the rate of compliance of Egbu-Uratta road right of way (ROW), in Owerri, Imo State. Public rights of way includes highways, streets roads, footpaths, sidewalks and gullies etc. The study had adopted the reconnaissance survey and geospatial techniques. It had utilized a layout map with coordinates used for geo-referencing the quick bird satellite data. The ArcGIS 10.5 software was used for buffering of a 30m right-of-way (ROW), and for digitizing existing buildings within Right of way ROW in order to ascertain the rate of compliance of Egbu-Uratta road Right-of-Way (ROW). The total Length and Area of ROW in the study were 7.08km and 3.98km² respectively. The results shows that the total building extracted within the layout is approximately 2930 and 460 buildings were found to be encroached into the road right of way at Egbu-Uratta road. Results generated from the ground truthing survey also showed that there are building encroachment on the ROW of the study area. Owing to this, there is need for demolition of buildings within the study area.

I. INTRODUCTION

Right of Way (ROW) is simply the rites of passage to a person's land or property. ROW is often used by land surveyors and civil engineers, with association to land usage rights. Right of Way can be further highlight an easement, which permits an individual or entity to pass through a property for various reasons (K.L Jeje (2015). The driveway ROW is one that allows a person's neighbors, with no access to a public walkway, to access the street across your land. Right of way that allows services such as gas, water, electricity, telephone and drainage to pass through neighboring land is also highlighted. (Adam Hoffman, 2013). Right of way standard differs in all civilizations. It can be projected as standards which are enacted to solve

problems, such as ease in movement and transportation of humans and resources. The right of way standard of a layout depends on its location, it could be in an urban location or rural location. A right-of-way encroachment permit will be executed between the City and property owner with right-of-way improvements by the property owner are desired. Alternative materials are acceptable within the public right-of-way provided all conditions listed above are met, the material is approved by the city engineer, and the property owner agrees to maintain the alternative material within the ROW. In the event a property owner does not improve on the right-of-way, the city will maintain ¾ inch road-mix within the entire right-of-way (Andrew et al, 2011).

The compliance of right of way standard, has been a topic of immense interest in several studies which involves ROW. Right of ways includes rights of way of roads, telecommunication, mega electric poles, crude oil pipelines and water front etc, These highlighted rights of way standards comes with a strict setback policies respectively, which are formulated by the administrative government unit in charge of the jurisdiction in question (Ibrahim and Wali, 2020). These standard/setbacks serves in its capacity to ensure the protection and management of life, property and the ease of transportation and navigation (Meyer, 2015). To critically and holistically understand the extent to which these standards are met in an a government jurisdiction, the Surveyor may use array of techniques, of which the most popular technique increasingly associated with the mapping of the right of way standard is the use of Remote-sensing and Geographic information system G.I.S, integrated application for the monitoring and query to the compliance of right of way standard. Remotely sensed data offers the means to measure spatial attributes of an urban landscape as it acts as a tool for data collection in geographic information

The study was carried out by obtaining the necessary information for the creation of a topographic digital map depicting the Egbu – UkwuUratta layout in Owerri north, IMO state and pointing out the compliance to the right of way standard.

Reconnaissance survey was observed in the study. Here, the features acquired were used for geo-reference of the layout-map acquired for the study. The primary and secondary sources of data were utilized in the study. The primary sources of data were the building location (coordinates) collected with the Leica hand held GPS while the secondary sources of data where the topographic maps, documents and other literature highlight the nature of the study. Administrative map and Quickbird imagery where also the relevant secondary data utilized in the study. Ground trothing was also observed in the study, by observing the geographical coordinates of the ground with the GPS technology, and to determine and to update the existing situation on the base map and the nature of

the satellite images (Table 1). Personal and oral interview was conducted in the study with the different stakeholder and professionals which contributes to the layout. Questions were asked and documentation was done in order to determine the parameters, variables and problems associated with the encroachment into the right of way standard in layouts. The hardware used in the study were high plug-speed , memory digital electronic HP laptop pc, processor core i5 CPU , RAM 8.00gb and a Pentium based personal computer, screen digitizer, A2 and A3 laser printer/plotter, Garmin map 72csx hand held GPS, . Plotters were used for the production of large format and high resolution maps in vector form. The arc map ArcInfo version 10.1, and open library were the major software adopted in the study. The ArcInfo version 10.5 software was used for displaying and processing of the image. The Open library software was used to create data base for the study. The database is created in a tabular format (attribute table) and linked to a vector data.

Table 1. Ground points observed during ground truthing along egbu-uratta

Points	Easting	Northing
1	OO513384	OO163117
2	OO513575	OO163955
3	OO513631	OO164412
4	OO513686	OO164456
5	OO513952	OO165510
6	OO513967	OO165541

3.1. Data Processing

Coordinates of the study areas were picked from the acquired imagery, map and registered to create a box which defines the subset with the ArcGIS 10.5 software. Here, clipping was done by overlaying a polygon on one or more target features (layers) and extract from the target feature (or features) only the target feature data that lies within the area outlined by the clip polygon. The cut tool is used to perform this functions, which is particularly useful for creating a new dataset. The imagery were geo-referencing by associating features on the scanned image with real world x and

y coordinates. It was digitized and buffered by 30m with the ArcGIS software. Query analysis and overlay operation was also observed in the study.

IV. RESULT AND DISCUSSION

In the study, the major road were extracted by digitization. These roads were UmuobaUratta and Egbu. Another important road indicated with a red line links the major roads together. These extracted major roads in the study is shown in Figure 2. The road has a total length of 7.08km²

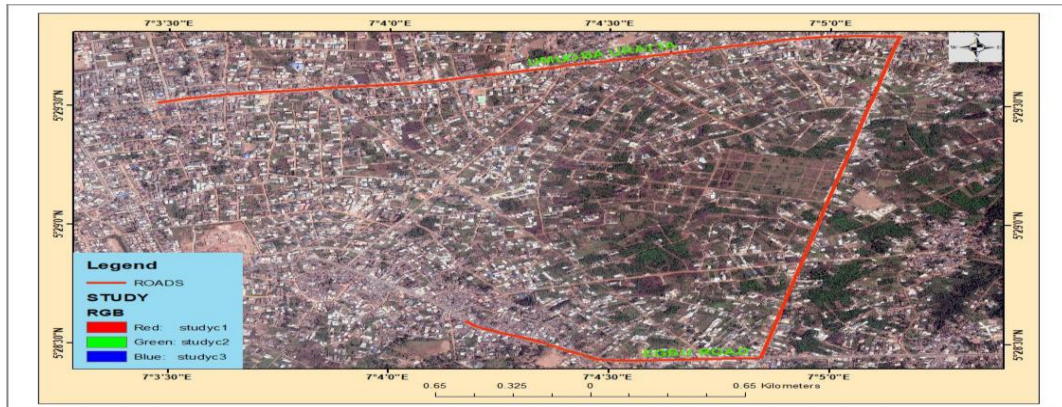


Figure 2. Extracted road features in the study

4.1. Buffering

A buffer analysis of 30m was created in the study to monitor the level of compliance in the public right of way (ROW). Buffer analysis was

performed from the Analyst Tools in ArcGIS 10.5 software. Figure 6 shows the 30m buffer analysis of the study.

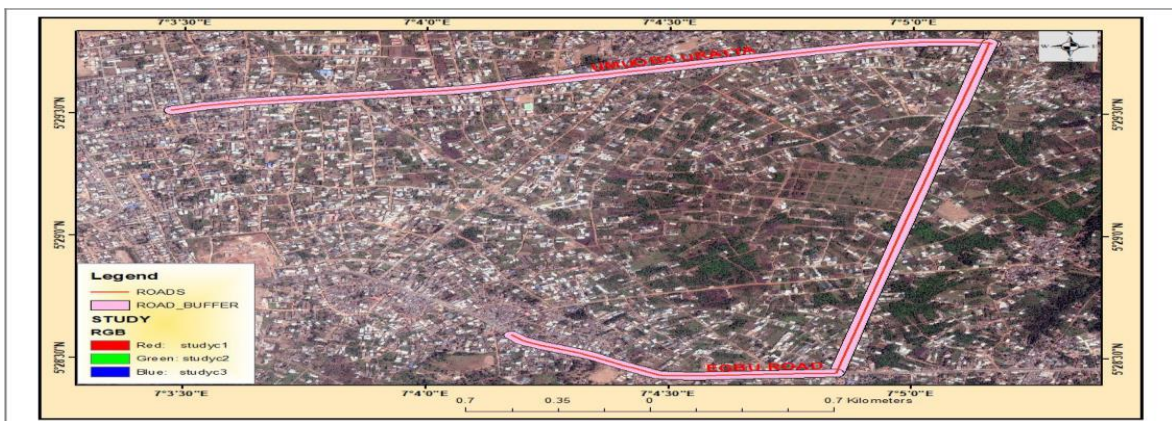


Figure 3. 30m Buffer analysis created in the study

4.2. Extraction of buildings

In the study, approximately 3045 building were extracted from the quickbird imagery. Vectorization and digitization were the processes adopted for the extraction of the buildings in the study area. The extracted buildings were overlaid on the buffer roads and then presented as a map as shown in Figure 4.

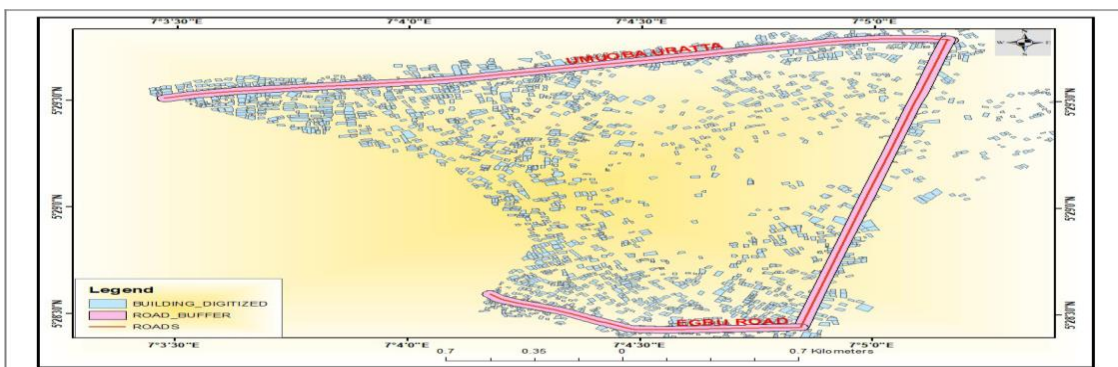


Figure 4. Extraction of buildings

4.3. Number of Compliance.

Figure 5 depicts buildings which are buffered at a distance of 30m, which do not comply with the right of way standard. The zone which is

marked depict areas of vulnerability. It shows the number of residents which are highly vulnerable to incidents of ROW encroachment. Areas of highest vulnerability are depicted with deep blue color.

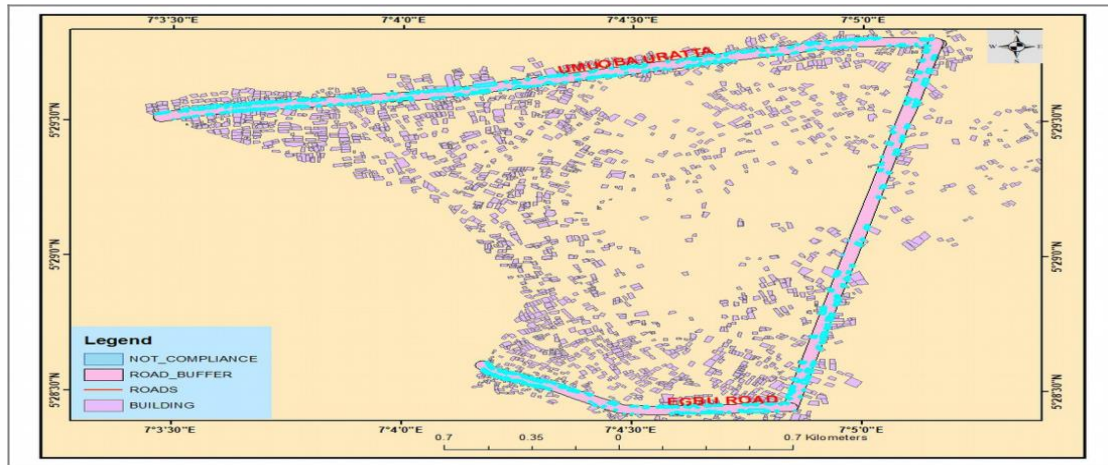


Figure 5. Non Compliance map

4.4. Query Analysis

The query analysis shows that 460 buildings do not comply with the Government regulations. The query analysis for the study is shown in Figure 6.

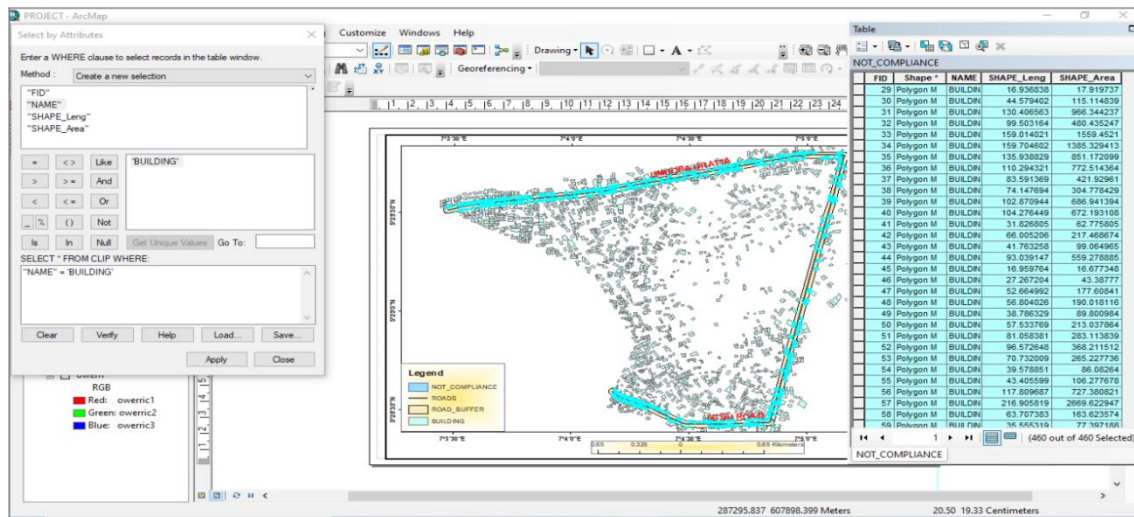


Figure 6. Query Analysis

V. SUMMARY AND CONCLUSION

The study had utilize the ArcGIS 10.5 software to create a geo-database of major roads network in Owerri, Imo state within the layout and building. The infrastructures were access using buffers of 30m, as a minimum right of way with standard width for a rural area. The buffer analysis had highlight the total number of encroaching

buildings and the estimated total number of persons affected in the study. The total number of buildings constitutes the population for this study. The overlay of the roads at public ROW with the satellite data shows that the buildings encroached was relatively high. The ground truth survey prove the rate of buildings encroachment with activities been executed on the positions of the public ROW.

These activities include welding and fabrication, caravans and motor mechanic workshop etc.

Recommendation

Based on the findings of the study, the following recommendation are presented.

- i. In the study area, the Land information system (LIS) should be upgraded on their Multipurpose Digital Cadastre (MDC). When this is introduced will make land information management easier.
- ii. Administering rules and regulations should be properly disseminated, with basis on rights of way standards based on different jurisdictions. This can be achieved through the use of universal and unique parcel identifier (UPI) tied to individual parcels, with several administrative documents and databases.
- iii. Cadastral information are easily shared by various map users and can produce customized map layers that will meet the need of the users.
- iv. Land information should be digitized, so that the information (survey plan, right-of-way and utilities) can easily be stored, retrieved, manipulated, reduced duplication and display of the geographically referenced information.

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