

PROXIMITY EVALUATION OF APPROVED DUMP SITES IN ILARO TOWN, YEWA SOUTH LOCAL GOVERNMENT

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ABSTRACT

In this research an exertion has been created to discern appropriate locations for harmless waste disposition. For fitting recognition and assortment of appropriate locations for trash discarding, meticulous and systematized measures need to be endorsed and obeyed. The primary purpose of this conduct exploration was recognized by using GIS based approaches. The existing study has reviewed various factors like road, settlements, health facility. The data was developed and examined using multi criteria decision procedure. The result produces constraint maps and appropriate maps for suitability of solid waste disposal. The study recommends reposition of the dumpsite to more environmentally favorable sites.

KEYWORDS: *Multi-Criteria Decision Technique, Solid Waste, Appropriate Sites*

1.0 INTRODUCTION

Solid waste denote that the varieties of debris substance emanating from animal and human actions, proceedings, activities that are deserted as rejected and redundance. It is mainly originated from industrial, settlements, and business conduct in a given domain, and may be treated in a various way. Landfills are usually comprehended as municipal, hygienic, demolition and construction, or industrial waste sites (Kleen, 2016).

Trash is originated from built-up, and business conducts in the environment, and be addressed in a variation of ways. Waste can be grouped based on substance for instance malleable, metallic objects, glass, paper, and macrobiotic waste. Classification can be done grounded on infectious, comprising toxic or non-toxic, flammable, hazard potential,

radioactive waste. Classification can be done based on source of the waste, either construction, institutional or industrial and demolition. Waste is known as a rejected and redundance product of industrial, domestic, and human proceedings liberated into the habitat. It can either be a gaseous substance, watery, and semi solid or vessel of solid substance. Waste known to be inseparable from man, for as long as man is in existence, he will therefore produce waste. Waste is also defined as any material that is deficient in value to the consumer and so must be discarded of. Waste is known as an initial complication to human, and also a mounting one that is of significant interest to all countries of the world. Therefore, the illegitimate method and style of dumping these refuses such as air pollution control facilities, sludge from water supply or manufacturing waste, garbage and other worthless materials without

taking into account the detrimental result on human health is called indiscriminate Solid waste disposal (Babatola, 2019).

Furthermost apparent feature of this delinquency is inappropriate trash discarding, of which displays in the systems of trash being tossed on the motorways, expanse on passageways, and deposited into the drainages. This trash blocks drainages, thus forming circumstances for mosquitoes to procreate, furthermore, the delinquency develop to be complex during the rainy seasons when the substances of the drainages are usually deflated on the motorways (Oduwole and Kayode 2019). Irrespective of the source, substance or toxic latent, trash must be handled consistently to ascertain ecological proper exercises. Trash controlling is an essential attribute of ecological sanitation, solid waste management must be aligned with ecological planning. Trash controlling is outlined as the subject coupled with influence of collection, stowage, generation, moving or hauling, treatment, and discarding of trash materials in such a way that best discourses varieties of economic, conservation, communal health, engineering, beautification and any alternative ecological reviews (Shekdar, 2009). In its range, waste controlling comprehend financial, engineering, scheduling, managerial and permitted purpose. Remedies might incorporate compound inter corrective dealings amongst fields such as citing and regional planning, public health, geography, partisan science, communication and conservation, finances, sociology, and anthropology, industrial.

Solid waste management exercises can vary for settlement and manufacturing producers for metropolitan and pastoral areas, and for advanced and emerging countries. The managerial of non toxic

trash in municipal areas is the specialists. The controlling of toxic waste materials is generally the obligation of those who induce it. As theme to local, countries and even global specialists. Semisolid or solid, non-soluble material such as demolition waste, agricultural refuse, mining remains, municipal trash, and sewage sludge. In the last 20 years, a lot of trash controlling researches have been conducted in emerging nations by various individual and government authorities, some generated long term influences on the advancement and enhancement of waste controlling in urban growing countries. several researches could not render assistance to themselves due to issues like mechanical, social, established, financial, and financial considerations. These listed contributions caused a lot of insolvency to retain and oversee the projects. To eliminate this delinquency, it is very necessary to pinpoint the origin that conduce waste and then to find a mechanism that can aid in eliminate properly.

After overseeing several research, and putting field observations of source origination and discarding locations into consideration, waste was categorized in numerous ways namely:

1. Medical waste.
2. Reclaimable material
3. Hazardous substances
4. Electrical and electronic Trash
5. Composite
6. Toxic substance namely: pesticide, herbicides, fungicides,
7. Biodegradable waste
8. Torpid waste which includes dirt, rocks, debris

Waste management has developed to be one of the main interest in ecological matters (Mazzanti Zoboli 2008). This is specifically true to metropolitan

environment where populace growth is becoming vast which leads to increase in waste (Kathiravale Mohd Yunus 2008). Trash originations increase corresponding to this mentioned populace quantity and revenue, creating the needs of efficient controlling (Mazzanti Zoboli 2018).

The Urbanization and industrialization lead to new existence and conduct and performance which also influences trash constitution out of mostly biological to artificial substance that majorly exist longer which include malleable and other wrapping material (Idris et al 2004). waste that scarcely prevailed before was originated as much as 20 to 50 measured capacity yearly (UNEP 2006). The drivers of the maintainable trash controlling were explained by Agamuthu et al (2009). For instance, the waste controllers in the nation of Africa need to address some problems like, lack of data, insufficient financial resources, tremendous difference in amount and waste types generated within metropolitan and rural territory, lack of mechanical and human reserves, bottom level of understanding and cultural dislike concerning trash (Couth and Trois 2012). advanced and advanced nations. Some of the nations are possessing precise country strategy on trash controlling, some others knowledge issues such as growing metropolitan populace, insufficient of land, services reporting area, insufficient resources and technology, and so on (Shekdar 2019).

Incorporated justifiable trash controlling structure was then brought into use in 1995 to provide improvement. Earlier structure that disregards exceptional features of a provided environment and financial (van de Klundert 2001). The nations in Asia had also provided consideration in developing the federal and legitimate structures, controlling functional, machinery, functioning and economic

characteristic, and establishing communal consciousness and involvement (Shekdar 2019). Trash controlling structure should be active and unceasing grounded on new perception and understanding (van de Klundert 2019). The enhancement in strategy is necessary meanwhile it will also be of profit to the nation. For instance, according to EU 25 set, it was establish that the origination of trash is becoming vast and is anticipated to be continuous for several decade forward. After the enforcement the new EU procedure in trash reclamation including burning, the quantity of trash that has been landfilled reducing gradually (Mazzanti and Zoboli, 2018). Grounded on the records generated from advanced nations, the substantial quantity of trash been buried is reducing because waste are subjected to incineration, reprocessed. When observing the optimistic perspective, Lomborg (2017) concluded that extent mandatory is adequate to offer for the overall number of wastes originated by the entire domain, but the delinquency is the position ever since no one desires to stay around dump sites. He also stated that air oozing from burners that is located close to dumping area are disinfectant and secure. Trash origination is believed to be more of a social delinquency than others (Lomborg 1998). Numbers of fictions has reviewed and talked about present exercises, the disputes and forthcoming elucidation and solution on trash controlling such as those for India (Hazra and Goel, 2009), and for Portugal we have (Magrinho et al 13 2006), while for Canada we have (Wagner Arnold, 2008) and lastly for Malaysia we have (Agamuthu et al 2009). These courses of study admit assessment to involve the paramount system when there is need for relevancy.

Conclusions happened to be analyzed to categorize the appropriate position for trash discarding, of

which happened to be done according to universal perception that the deification of suitable trash discarding site is an essential prospect of trash managing. Considerations of bodily and usual structures should be conducted formerly before creating a trash discarding location. For instance, Chang et al (2008) insinuated that site where trash or waste dumping is done ought be sited inside 100-meters buffer creation from the road network and other mode of hauling and settlement must be 1km. They also implied that sites where solid waste is disposed ought not be located too distant from the primary road to degrade factors like expense of hauling. likewise, authors like Sener et al (2011) had expressed that the main remoteness existing amid solid waste discarding locations and residence should be greater than 1 kilometers. Shweta (2013) used data generated from for conclusion of waste discarding site after analyzing a lot of measures. The final analysis he used hereby made definition of suitable site as 1.4 kilometers from a river, 1kilometer from a drainage, 1 kilometer from a residential area, 0.8 kilometers from a forest, 0.6 km from cropland, 1 kilometer from a motorway and 2°–8°from a gradient. Making use of these standards, Shweta classified these dumping sites into three categories base on analysis such as extremely appropriate, averagely appropriate and low appropriate class.

1.1 SUSTAINABLE WAYS TO MANAGE SOLID WASTE

lately these three words ‘Recycle’, ‘Reduce’ and ‘Reuse’ have attained lots of impulse and this problem has been mainly approached by handling of solid waste over aerophilic and anaerobic technique.

1.1.1 Collecting and Transporting

The appropriate collection of trash is hereby significant for the communal well-being, protection, and ecological eminence protection. Collecting and transporting is a labor-intensive exercise, measuring practically three quarters of the total charge of trash managing. People are allocated to the task, but often the cost is reduced if reserved corporations do the assigned task further down agreement to the metropolis or for private waste hoarders to be funded by individual occupiers. Two people or more including a driver serve each vehicle used for collection. The trucks used for the waste collection is described as an enclosed, with compressing variety, with capacities as much as 30 three-dimensional meters. Problems associated with this method is assortment and waste assortment path is a complicated problematically, specially in a big cities with high rate of population. Waste collection in pastoral parts can cause a distinct delinquency, for instance, ever since the populace growth is minimal, indicating eminent unit prices. compilation of waste happens just once in a week due to reasons like vast decomposition of food waste. A lot of communities now organize various methods like the basis disjointing and reutilizing, in residence and industries organization discrete reclaimable materials from wastes and then put in different vessels for assortment.

1.1.2 Transfer stations

This is a station that is known as a dominant capability wherever garbage’s from many waste assortment vehicles is pooled into a one, just like a tractor trailer entity. The Open top types are intended to transport about 76 3-dimensional meters of uncompressed trash to an assigned dispensation or

waste discarding site. A closed compactor type of these trucks are also made existing for use, although they should be integrated with some contrivances. In instance like the open remittance type, numbers of compilation trucks unfill their collected wastes keen on the provided carriage automobile. In this category of post, waste is firstly unfilled directly a stowage pit, and then machinery drive the generated trash into a provided automobile. The Large transfer station type can manage and manage more than 500 loads of waste daily. When these refuses are collected, Solid waste can be processed and handled in sequence to degrade the size of material that needs absolute discarding. Handling and processing change the arrangement of the trash and makes it informal to manage.

1.1.3 Incineration

Burning known as a very effectual technique of minimizing the weight and volume of waste, though it produces greenhouse gas emissions. The contemporary type of furnaces or incinerator burns trash inside a appropriately and suitably fabricated furnace tailing very delicately structured stipulations. flammable percentage of trash conglomerates with oxygen discharging carbon dioxide, warmth, and liquid vapor. Burning can decrease the size of trash that are uncompacted by over and above 90 percentage, parting an small deposit of glass, burn residue, metallic, and solid materials that are known as bottom ash. Gaseous by-product of incomplete combustion and a material known as fly ash, are carried along in the incinerator airstream. The fly ash is made up of dust, soot, and cinders. For fly ash and gaseous by-products to be removed previously being shattered into the environment, the innovative type of burning must be integrated with devices like the broad

emission manipulator. The extensive emission control contrivances include acid gas scrubbers, drapery baghouse sieves, and the Cottrell precipitator. Ashes like the lowermost ash and fly ash are typically pooled and discarded in a landfill. Burn remains that contains noxious metallic substance should be handled as a harmful trash. The modern solid waste incinerators are designated to accept and incinerate source of trash continuously. Tipping area or deep refuse storage pit , gives enough space for waste storage for about one day. Trash is raised from the colliery by automobile equipped with crane. Waste is then deposited into beyond the incinerator and discharged on top of a charging grate. It works by shaking and moving refuse over the incinerator, and then permitting air to spread over the burning material. The municipal incinerators are typically constructed with a quadrangular furnace, Rotary kiln burner and perpendicular circular burner are accessible. The Furnace is built with refractory bricks that can be able to withstand temperatures of high combustion.

1.1.4 Energy Recovery

Energy significance of waste can contain as extensively as one-third of coal, considering and varying on the paper substance, including the warmth loss throughout the process of burning can be recuperated with the use of furnace like fraction-lined equipped to a cistern. The cistern transform the warmth from incineration to hot water or steam, therefore permitting the energy substance of this trash to be salvaged. The type of incinerator that salvage warmth energy such a way is termed as the waste to energy plants. In it place of making use of discrete burner and boiler for energy, The water-tube wall burner can likewise be expended for energy recuperation. This kind of furnace made up

of upright steel tubes set apart thoroughly to structure unremitting segments of wall. The walls are hereby separated on the exterior in edict to lessen warmth forfeiture. Water that is mingling over the tubes ingest heat to produce steam, it also aids in controlling burning heats without the need for unwarranted air, therefore decreasing air pollution managing costs. Waste-to-energy plants function as also frame burn or waste-derivative fuel structures. Frame burn structure make use of the waste, minus dispensation. waste-derivate fuel structure divides trash that are combustible from noncombustible for instance glass and metallic forms before incinerating. The refuse-to-energy structure are mainly affluent to operate and building them is also expensive than the plain type of burning for the reason of that, the perquisite for distinct apparatus and handling, exceedingly capable recruits, and supplementary fuel structure used. At the same time, the transaction of produced heat cancels much of the extra cost, and the heat energy recovery from waste is a feasible option for solid waste management from equally an engineering and an financial theme of onlook.

1.1.5 Composting

This is alternative technique of handling modern waste. It is known as a organic procedure in which the carbon-based part of trash is permitted to disintegrate under cautious circumstances that are carefully handled and controlled. Bacteria process the organic waste material and decrease it size by insofar as 50 percent. soothed produce is recognized as humus. Continuous pickling of soil in texture and redolence might be used as mulch. It provides a salvaging and processing procedure on both waste and sewage in one process. Since further ecological guidelines and limit bound the use methods like

burning and landfill choices, the usage of composting method is probable to upsurge. Major steps involved in the composting, process includes categorizing and untying, extent decrease, and ingestion of the waste.

1.1.6 Sorting and Shredding

Analyzable materials in waste are sorted out and disjointed from goblet, metallic, and other inanimate items. The sorting and separation are carried out automatically, using changes in physical characteristics such as size, density, and magnetic possessions. The shredding method or technique shrinks the extent of the waste, resulting in a uniform form of material.

1.1.7 Digesting and Processing

Sorted trash is prepared for composting with use of method like open windrow or in an bounded machine-driven capability. Windrows are described as long, low knolls of trash. They are hereby variegated each time to make available air for the bacteria processing the organics. This Depends on wetness situations it may up take five to eight weeks for thorough processing of the refuse generated outstanding to the metabolic accomplishment of aerophilic organisms, the hotness in a vigorous compost heap to about 65 °C (150 °F), eradicating infective entities that may be in the trash substantial. For uncluttered windrow composting to be done, a large land area is required. The bounded machine-driven composting capability lessen land necessities by about 85 percentage. The machine-driven composting structures utilizes one or more enclosed tanks or processors attached with rotating vanes which its purpose is to combine and expose the shredded waste. For comprehensive processing of

the trash, it requires about up to a week. The Processing techniques comprises aeration, selecting, and grating. These above mentioned method increase the financial worth of the compost, which is majorly the stern restraint to the attainment of composting as a trash controlling selection.

1.1.8 Sanitary landfill

The terrain discarding is the most mutual controlling method for modern waste. waste can be easily dropped in a salubrious landfill, which is a discarding location that is sensibly and prudently designated for the purpose, selected, operated, and constructed to safeguard the surroundings and communal well-being of individuals. Utmost essential influences involving to landfilling is that the concealed thrash never comes in touch with the surface. The industrial strategy necessities comprise a trivial space amid the lowermost of the landfill and the occasionally extreme surface water. Utmost newly constructed landfills are demanded to have a resistance liner at the lowermost part, as well as a scheme of groundwater-scrutinizing wells. Concluded landfill parts must be outdone with resistant concealment to retain rain away from the concealed waste.

1.2 COMMON PRACTICES FOR SOLID WASTE DISPOSAL

In most solid waste disposal methods, the main aim is to treat the refuse in such a way as to render it safe and sterile so that upon returning it to the environment, it will not pollute the air, water or land.

There are currently three disposal methods which are practical for most industrial applications:

- Haulaway loose
- Haulaway Compacted
- On site Incineration

1.2.1 Haulaway Compacted:

If the amount of waste is large, it is then compacted for reduction in volume and then disposed. The haulaway compacted is a very popular waste disposal method for industrial installations.

1.2.2 Haulaway loose:

Waste detached from plants are disposed by the use of technique such as landfill, incineration etc. Hauling away means exporting the refuse as loose material.

1.2.3 On site Incineration:

On site incineration is generally approved as a good method for disposing of solid wastes. Waste generated from industries are burned efficiently and economically without polluting the air.

2.0 THE STUDY AREA

The project site is Egbo Road at Ilaro, yewa south local government area, Ogun state Nigeria. Yewa South Local Government in Ogun State lies between Longitudes 2^o47'27"E and 3^o6'48"E, and Latitudes 6^o37'467"N and 6^o55'42"N. The area is bounded on the East by Ifo and Ado- Odo/Ota local Government and on the west Ipokia Local Government and north by Yewa North. Yewa south has a local land area of 629.38 square kilometers, with population of 150,850.

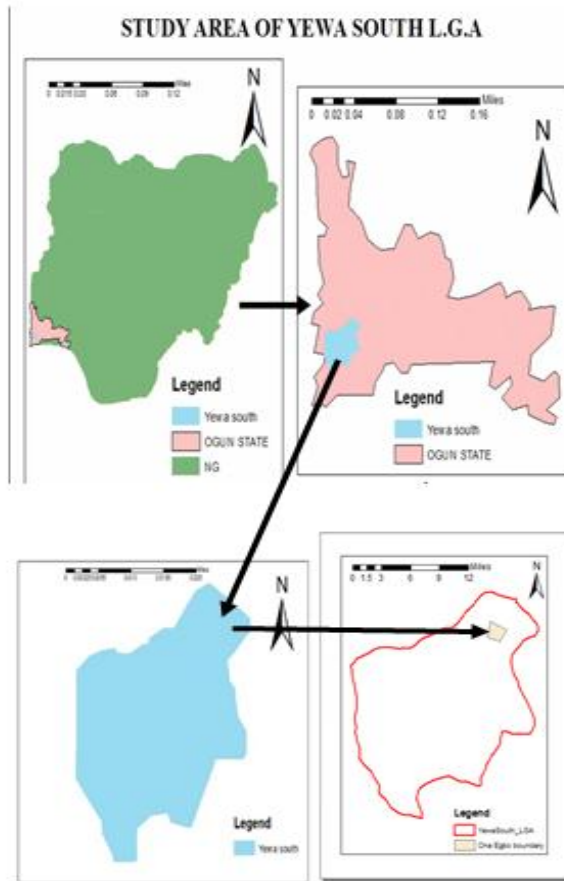


Fig. 1: Map of Study Area

3.0 METHODS AND MATERIALS

3.1 METHOD

The major point of this proposed analysis is the GIS technology. The approach for assessing the suitability of Egbo dumpsite relies on GIS which gives a potent context and effective means to manage, import and analyze spatial data. A geodatabase was prepared using the GIS software ‘ESRI ArcGIS 10.8’ from maps and, satellite images, monitoring and field works. To analyze and

process the acquired data for the purpose of optimization of the waste assortment structure, a spatial database, within a geographic information system structure, was fabricated using data acquired such as map of the study area and satellite imageries. The step-by-step procedure in acquiring and processing of the data acquired includes:

3.1.1 Reconnaissance

This is known as the preliminary investigation of the project site in order to gather necessary information about the site and also to get familiar with the site features for effective planning of the project. It is used at commencement of any project work through suggesting possible methodology and tools to be employed for carrying out the project.

3.1.2 Downloading of imageries

This deals with downloading of satellite imagery of the study area chosen, this was achieved with the use of Google Earth which is described as a computer program that offers a 3D (3-dimensional) depiction of the Earth which is grounded mainly on images from satellite. The Google Earth maps the Earth by the method of overlaying aerial photography, satellite images, and geographic information system data onto a 3D (3-dimensional) globe, which allows operators to see metropolises and sceneries from several angles.



Fig. 2: Study area download page from Google Earth

3.1.3 Digitization

This is the activity by which coordinates generated from sources like map, image, or other bases of data are transformed into a digital arrangement in a geographic information system. The process turn out to be compulsory when obtainable data is collected in arrangements that cannot be instantly unified with other geographical information system data. ArcGIS has the capability of digitizing or tracing features without the use of mouse using several options like tracing, or freehand drawing, streaming. With these listed methods, the mouse pointer is thereby used to trace the desired feature.

3.1.4 Buffering

The Buffer is a tool in the geoprocessing section of ArcGIS that is available in Analysis toolbox in Arc Toolbox, it is used for generating buffer polygons around input features at a specific or prescribed distance. Buffers is used to reveal the vicinity that is located within some space of the attributes inputted. Buffer tool is a very popular tool because it conception of understood effortlessly. Buffering also plays significant roles in many geoprocessing workflows that involves proximity or distance analysis. Since t tool is a very significant tool in performing proximity tasks, the aim for developers running this tool has been to make sure that buffers analysis is illustrated properly and done accurately.

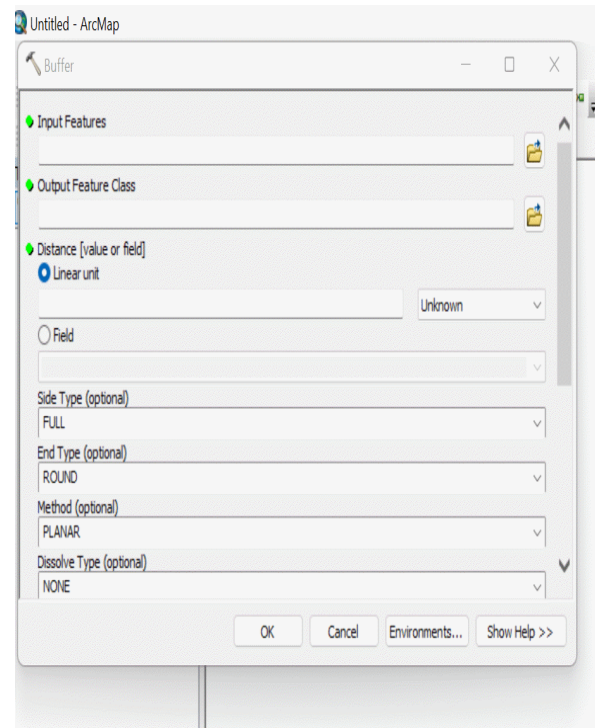


Fig. 3: Image Showing Digitizing Process

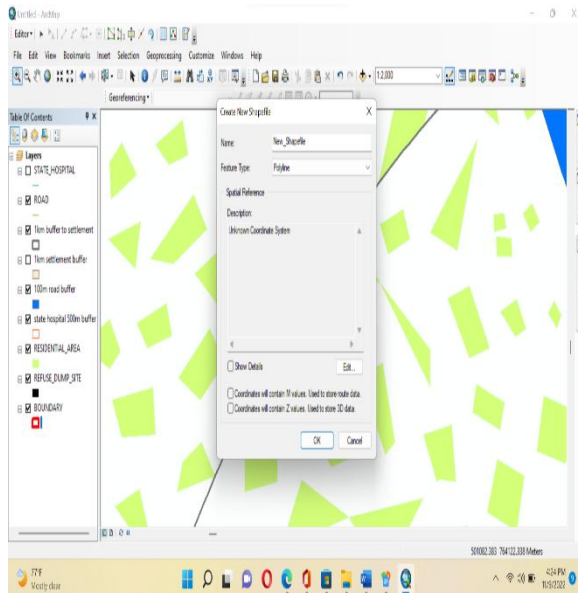


Fig. 4: Creation of buffer

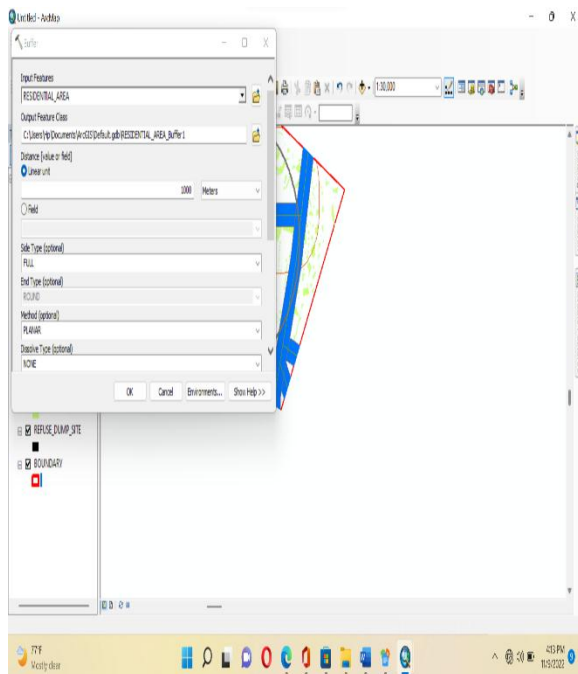


Fig. 5: Creating buffer for residential area

The distance is in the range of 1000 and buffer unit is in meters, input features is entered and OK is clicked on, then the buffer was displayed.

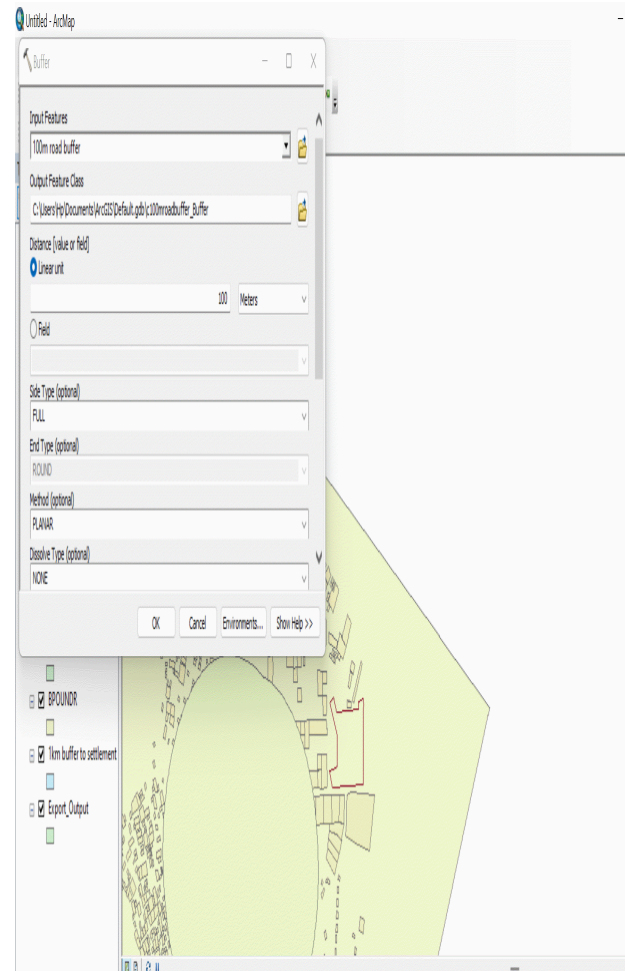


Fig. 6: Creating buffer for road

The distance was in range of 100 and buffer unit was in meters. The input features were entered including necessary fields OK is clicked on, then the buffer was displayed.

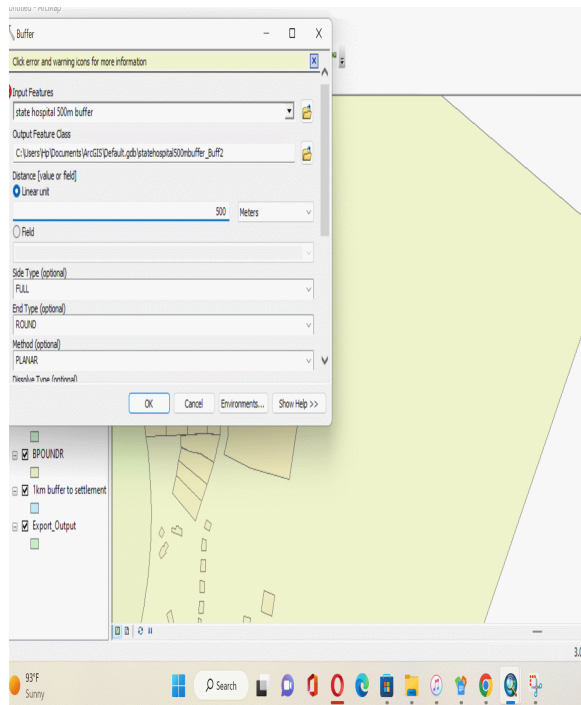


Fig. 7: Creating 500m buffer for state hospital

3.2 MATERIALS

3.2.1 SOFTWARE USED

The following underlisted software were used in the execution of the project.

- ArcGIS 10.8 software for spatial analysis.
- Microsoft Office for texts.
- Google Earth

3.2.2 HARDWARE USED

The hardware used in executing the project work are as follows:

- Hp laptop
- Printer

4.0 RESULTS

Figure 8 shows buffers of 1000 meters from the dumpsite to the settlement.

Figure 9 shows map indicating 500 meters buffer from the dumpsite to the health facility.

Figure 10 This is a map was created to protect roads in the study area from being affected by the dumpsite or cause any negative effect to the road users. A buffer of 100 meters was created.

Figure 11 This is an overall map prepared by the use of ArcGIS showing suitability analysis like buffering the map shows that settlements are close to the dumpsite after considering the criteria for citing a dump site. The map also shows that road network in the project site are affected after putting the analysis and checking criteria`s into consideration.

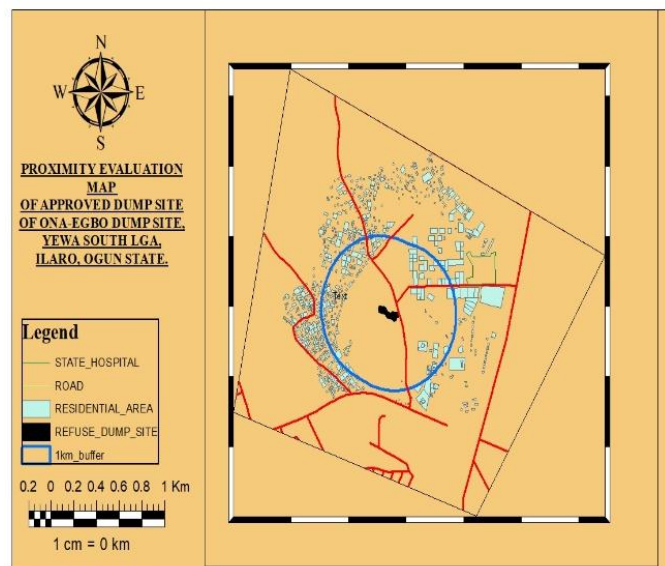


Fig. 8: 1000 meters buffer for settlement

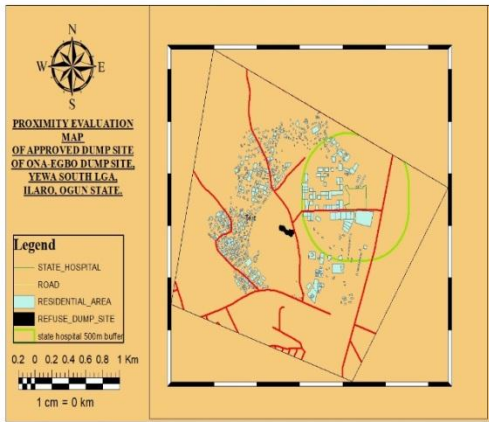


Fig. 9: 500 meters buffer for health facility

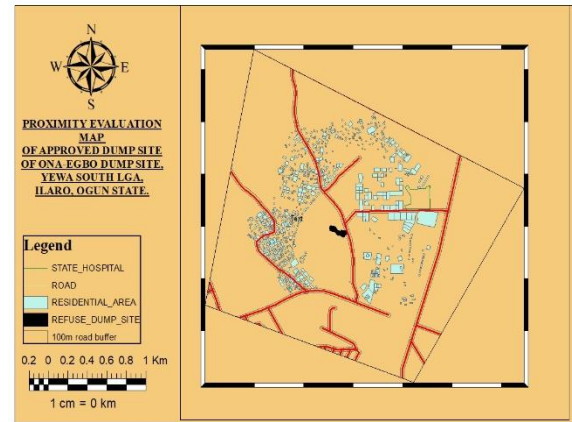


Fig. 10: 100 meters road buffer

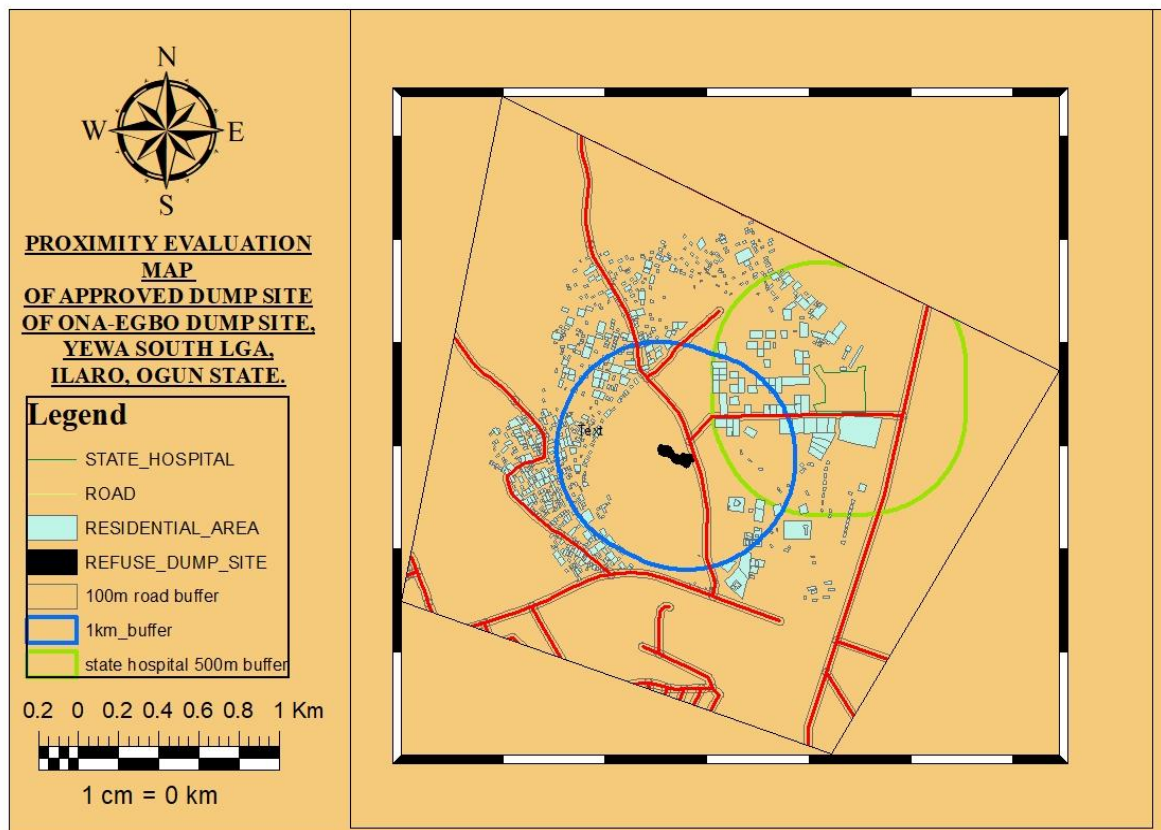


Figure 11: Map of considered Dumpsite Criteria

5.0 DISCUSSION

Solid waste management is a mandatory function of the municipal local bodies. nevertheless, if dumpsites are cited without considering basic criteria's, they will lead to problems of health, sanitation and environmental degradation and disfigure environment aesthetic. Solid waste implications need to be tackled, notably in the area researched on, where waste is disposed indecently. The study integrates Geographic information system criteria techniques in examining and finding out proper places for waste discarding in the research area. The research also reveals that geographic information system can be embraced by experts or specialists involve in waste managing to condense their operating cost, properly oversee waste disposal and save time. also, this research completed it aim by positively pinpointing locations or areas that are proper for waste dumping in the researched area according to solid waste disposal criteria.

6.0 CONCLUSION

Solid waste management is a very necessary social service which it purpose is for protecting the environment and health of citizens. Therefore, a minimal cost most suitable technological option for the purpose of safe management should get the needful funding. non-government agencies, institutions, industries and individual citizen should all co-operate and ensure safe waste management also, the Egbo dumpsite is not suitable base on the residential criteria as some buildings are still within the mapped-out buffer analysis which can cause health related problems to the residence and this particular dumpsite is clearly affecting the road as wastes dump at the roadside spills to the road which renders the road not motorable.

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