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Three-Dimensional Modeling of Visual Pollution of Generator Wires in Ramadi City

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ABSTRACT
Visual pollution is one of the problems of the times and its continued spread threatens the urban future of every city, so it must be addressed and appropriate solutions clarified. And visual pollution is defined as (it is every artificial human act that changes the features of the urban environment of the city and distorts the views and causes command psychological discomfort that leads to a dissonance in the components that make up the visual scene of the city, and visual pollution is a result of neglect, poor planning and design, as well as social and economic misconduct. Visual fatigue and discomfort, and it can be said that it is a product of the civilized and civil development of the era of speed).

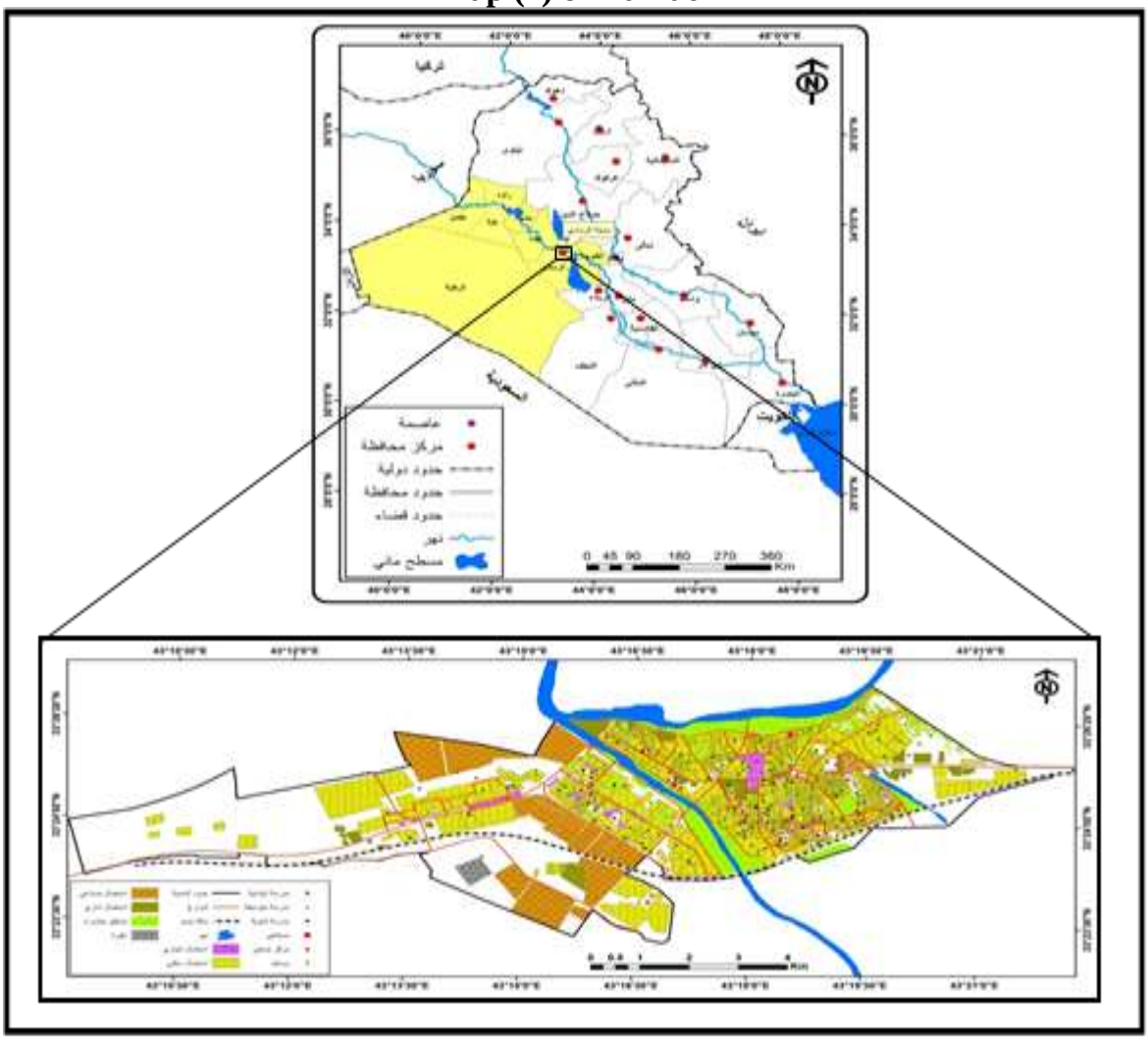
Research problem:
Are the generator wires among the features that cause visual pollution in Ramadi?

Research hypothesis:
- The generator wires are among the aspects that cause visual pollution in Ramadi.

Research goal:
Preparing a geo database by collecting, classifying and analyzing the appearance of generator wires and building a digital (3D) mapping model through its layers that are based on the methods of information modeling (Spatial Data) and which represent the backbone of Analytical GIS to simulate the appearance. And the level of visual pollution from the city of Ramadi.

Study area:
The study area is represented by the municipal boundaries of the city of Ramadi according to the basic design map numbered 6327 on 5/11/2012, located astronomically between two circles of latitude (33,23,14) and (33,26,49) north, and two longitudes (43,9,4) And (14,22,43) to the east, as shown in Map (1).

Map (1) of Ramadi



Source:

1- Ministry of Irrigation, General Survey Authority, Iraq Administrative Map, Scale 1/1000000 for the year 2007.

2- The Ministry of Municipalities, General Directorate of Urban Planning, Basic Design No. 6327 on 5/11/2012.

Types of visual pollution:

1- Static Visual Pollution:

This type of pollutant is represented by all static and inanimate pollutants and can be seen from the spread of garbage on the side of the roads, the remains of unfinished building, advertisements and architectural distortions, and lack of commitment to a professional in design

2- Moving visual pollution:

It is represented in everything that is moving and affects the viewer negatively, such as carts of mobile salesmen, car traffic chaos, and mobile ads.

3- temporary visual pollution:

It is every circumstantial pollution that is likely to change, whether spatially or temporally, and this type of pollution is represented by the work carried out by a contractor and the materials and tools that indicate disgust and aversion remain.

4- Permanent visual pollution (coexisting):

It is a dangerous type that we resist at first, but it defeats us, and we get used to it and live with it, as in the presence of potholes filled with polluted water and distort the aesthetic and urban image of the street.

5- Imported optical pollution:
It is all the beautiful features and formations that come to the city from outside its homeland, but it is alien to our environment, our character and our circumstances, which creates visual disturbance.

Visual pollution measurement:
The problem of visual pollution is that it cannot be measured. Rather, it depends on the feelings and sensations of the seeker, unlike other pollutants that can be measured with precise technological devices. The measurement of visual pollution is also related to the degree of architectural awareness and artistic sense, and the degree differs from an engineer, designer and another, and the levels of visual pollution differ in the city and alleys, and even in the same building and its parts. Visual pollution and distort the aesthetic image of the city [2].

Field survey:
Geographic information systems require spatial and descriptive data on geographic phenomena as well as their novelty and realism when creating and building a database about them, as a field survey was conducted that included the 30 neighborhoods of Ramadi neighborhood, the aim of which was to search for visual pollution with generator wires. Its number reached (5), each division consisting of (5) people began to survey the city from the far east (Al-Sufiya neighborhood and Al-Malab) to the far west (Al-Amin neighborhood, Al-Firdaws and Al-Tasas). The period during which the survey was conducted is from 10/15/2020 until 12/15 / 2020, the number of occurrences of the visual pollution flowerbed by the generator wires in each neighborhood was collected by viewing as in Table (1) , It has been shown that the city of Ramadi suffers from many environmental problems that affected the urban environment and the urban structure that were reflected in the nature of its inhabitants' lives, which led to the creation of environmental problems represented by the imbalance of the components of the visual environment and the dissonance in the urban landscape. The manifestations of visual pollution in the city of Ramadi were analyzed and diagnosed according to forms and types, depending on public taste and field surveys, and knowledge of most places in them. These manifestations were represented in the city streets, in residential neighborhoods and urban areas, which in turn worked on the loss of the aesthetic value of the city and its distancing from the historical heritage of that. It is possible to determine the size of the problem by knowing the size of the manifestations of visual pollution that differ from one society to another according to the social and cultural background.

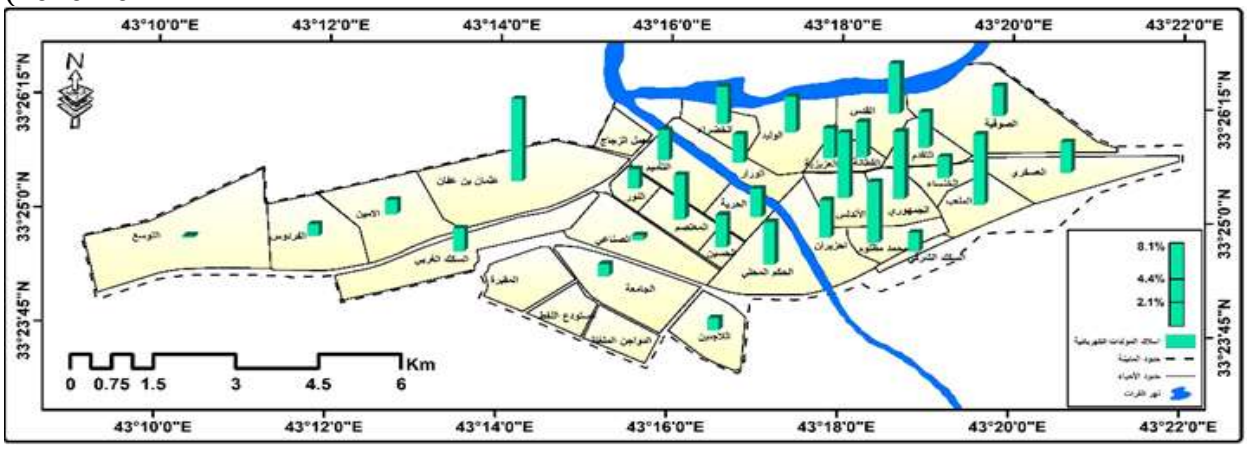
Table(1) Visual pollution caused by generator wires in Ramadi(2021-2020)

Percentage	Duplicates	Neighborhoods	T
8.1%	35	Othman Bin Affan (5 Kilo)	1
2.3%	10	Western railways	2
1.4%	6	Secretary	3
1.2%	5	paradise	4
0.2%	1	Expansion	5
1.2%	5	the University	6
1.2%	5	Refugees (Tash)	7
1.8%	8	(An-Nur)February 8	8
4.4%	19	(Al-Mu'tasim) July 30	9
3.0%	13	Nationalization	10
2.7%	12	(Al-Hurriya) Al-Kurd	11

		neighborhood	
3.2%	14	(Al-Hussein) Al-Qadisiyah the First	12
0.5%	2	Industrial	13
4.2%	18	(Local Government) Qadisiyah Second	14
3.7%	16	(June 1) Al Haouz	15
3.7%	16	(Green) Al-Dhubat Al-Oula District	16
2.8%	12	Alwar	17
3.5%	15	(Alwaleed) Association	18
3.0%	13	Azizia	19
3.5%	15	The liner	20
1.9%	8	(Easter Railway) Al-Aramel neighborhood	21
6.5%	28	Andalus	22
6.0%	26	Muhammad Mazloum	23
6.7%	29	Republican	24
3.0%	13	Military (Agriculture)	25
2.1%	9	(Al-Khansa) 14 Ramadan	26
6.9%	30	The stadium	27
3.0%	13	Sufism	28
4.9%	21	(Jerusalem) Al-Thailah	29
3.4%	15	(Progress) company	30
100%	432	Total	

Source: Field Survey 11/10/2020

Geographical distribution of visual pollution caused by generator wires in Ramadi (2020-2021



Source:

- Ministry of Municipalities, General Directorate of Urban Planning, Basic Design No. 6327 on 11/5/2012.
- Arc Map 10.4.1 outputs

Building 3D Model:

The D Model 3 is simply a simplified descriptive and spatial representation of a complex reality. D Model 3 3D models are widely used by engineers, planners, geographers, archaeologists and historians (). The 3D model is useful in the purposes of documentation, visual presentation, spatial representation, distributions and reconstruction, and the three-dimensional model can be very detailed or simply provide a quick overview of an architectural situation, and because they are digital models that can be shared globally through the Internet And easily store it digitally or print it out with a 3D printer. Due to the wide variety of 3D models, the range of their users can range from

professionals to consumers ().

The process of creating 3D Model models for visual pollution manifestations is based on traditional field surveys, maps and aerial images, and the next generation of geographic information systems depends heavily on computer digital technologies, and it needs new methods of representing or modeling spatial data and occupies three-dimensional modeling. Model 3D is the forerunner in this representation through the use and employment of geographic information systems in the creation of 3D models, due to the ability of the three-dimensional digital model to link features (represented formally) with descriptions in the environment of geographic information systems, which has a set of advantages and benefits for managing 3D models. Model based on a real realistic environment, including ():

1- Spatial and Descriptive Information Management: The devices available in geographic information systems contribute to collecting, storing, retrieving, managing and converting data to modify the conditions and conditions attached to them, while presenting the information in a way that helps the user to visually understand it.

2- Dynamic systems: by controlling and changing unreal potential features of the represented elements, or by entering new data that identify the spatial locations and their related characteristics, the databases of these systems can be easily updated, making them dynamic dynamic systems.

3- The database of these systems allows the user to execute queries related to the studied site and some of its elements related to others, in addition to the properties of each of these elements.

4- Decision-making: The research and analysis carried out with the potential of geographic information systems is used as a decision-making tool for the purposes of avoiding the loss of studied information that may affect site studies and the urban planning process.

5- Interactive pictorial view: Geographic information systems can be used to create drawings, diagrams, images, maps, and animated films. Researchers can explore and study their topics in the advanced mode by turning on the visualization and picture viewing option.

This study aims to build a 3D model in a GIS environment using ArcGIS software through practical application to the manifestations of visual pollution through the use of Arc Scene to model visual pollution in Ramadi city, and it includes creating a database for the project and creating the necessary layers, drawing features and details within These layers are used by ArcMap in 2D and create a surface, then convert these layers into 3D layers and display them in Arc Scene to build the 3D Model.

Three-dimensional maps were used in our study to represent the variation in the geographical distribution of the manifestations of visual pollution in the study area, and the idea of three-dimensional models (3D models) is necessary to identify the relationship between the manifestations of visual pollution with each other through the identification of the dimensions (x, y, z).), And using them to know the geographical distribution of manifestations and trends of their impact and to analyze their whereabouts.

And the most important programs that were used:

1- Arc Map 10.4.1 Program: for processing, presentation, and building information layers and extracting results in the form of maps, figures and tables.

2- Arc Catalog: to build a geographic information base.

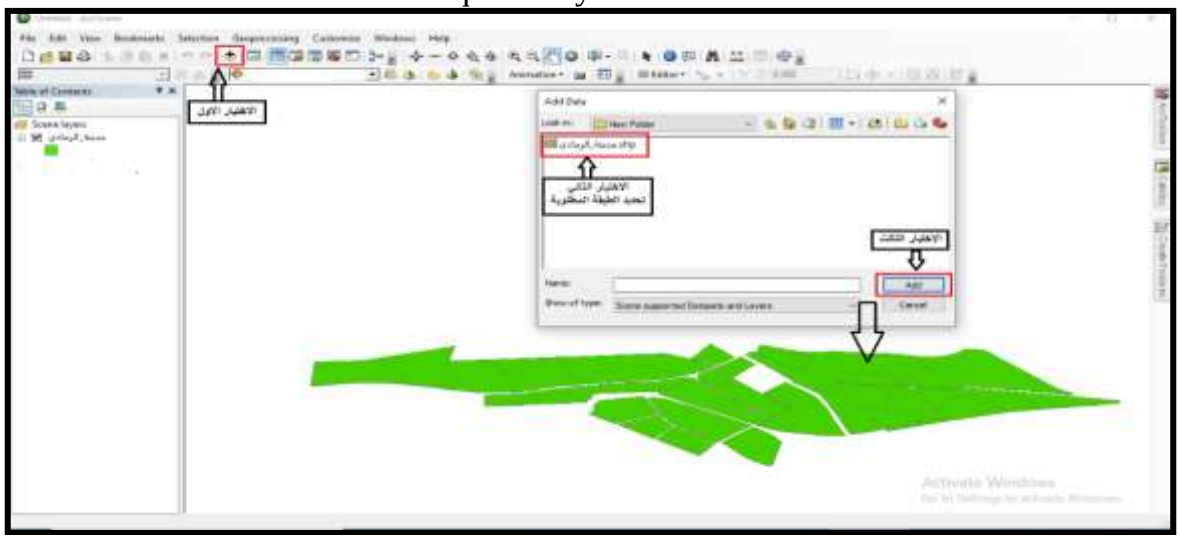
3- Arc scene: for 3D viewing and building cartographic layers cumulatively.

4- Arc Toolbox: to implement the action steps.

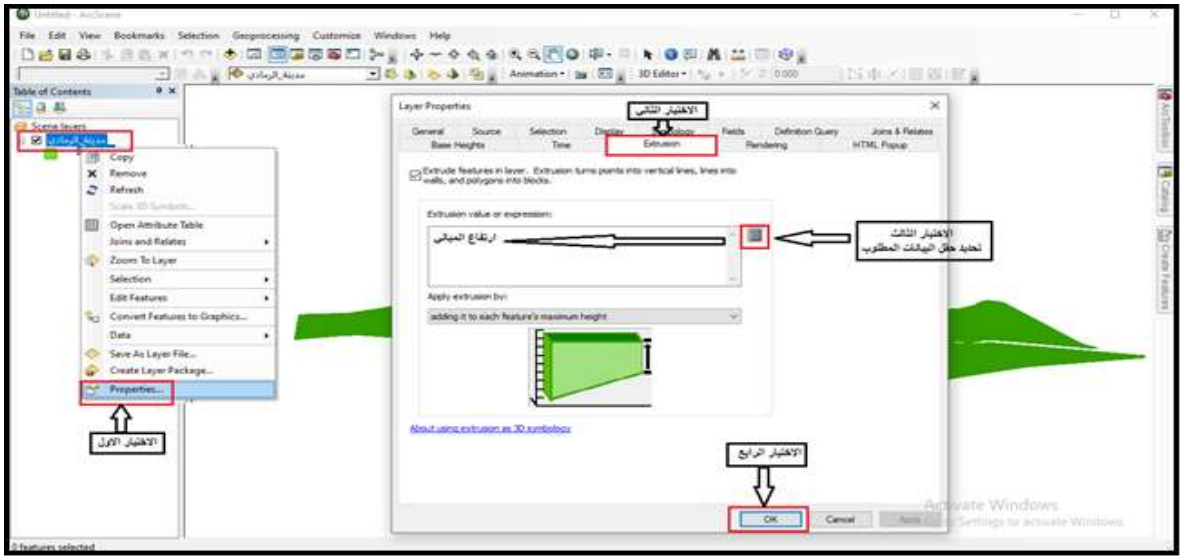
5- Geostatistical Analyst: for spatial statistical processing.

The most important steps that have been taken to build a three-dimensional model can be illustrated:

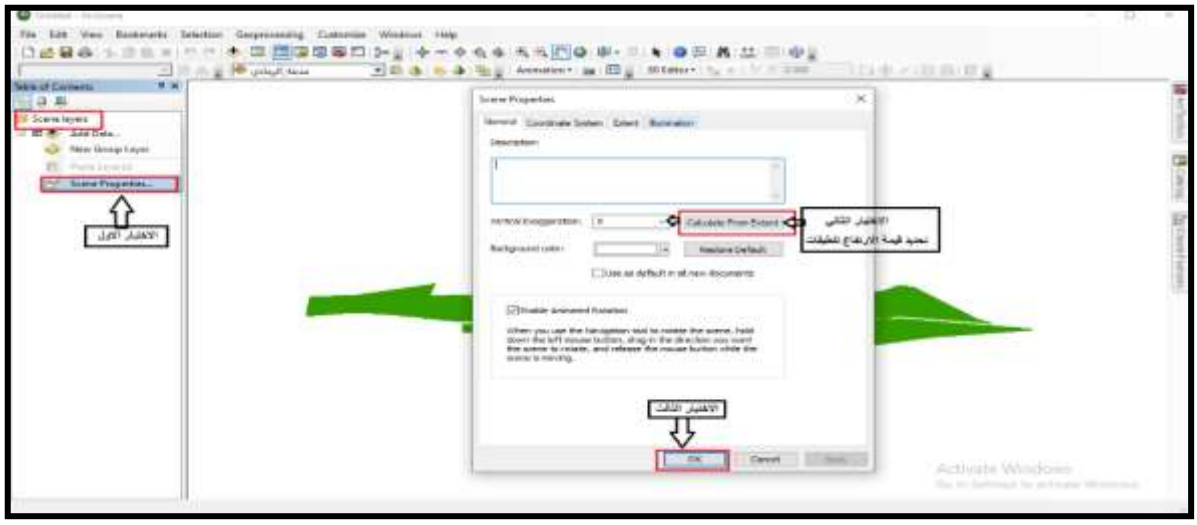
1- Summons the required layer to build a 3D model:



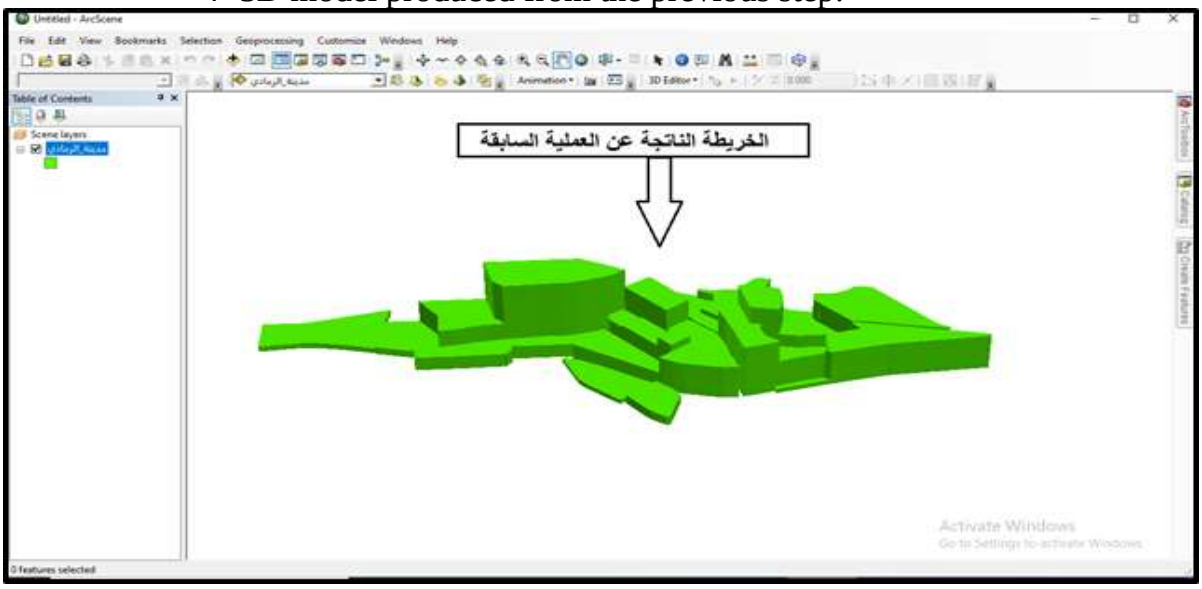
2- Field selection of wires and generators:



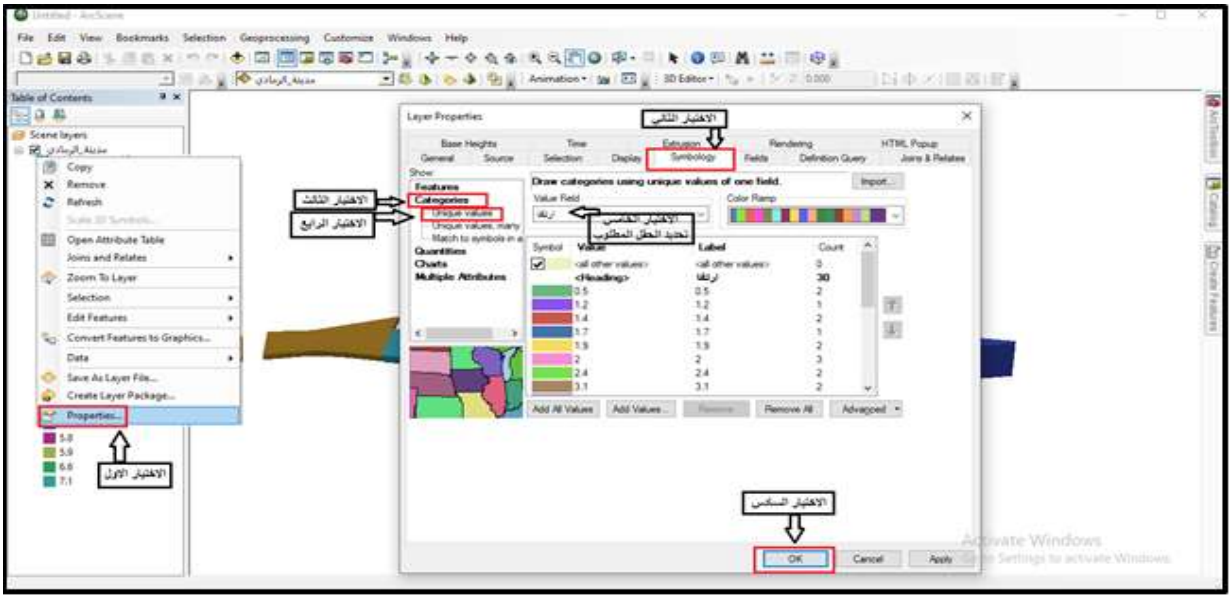
3- Determines the height value for a 3D model:



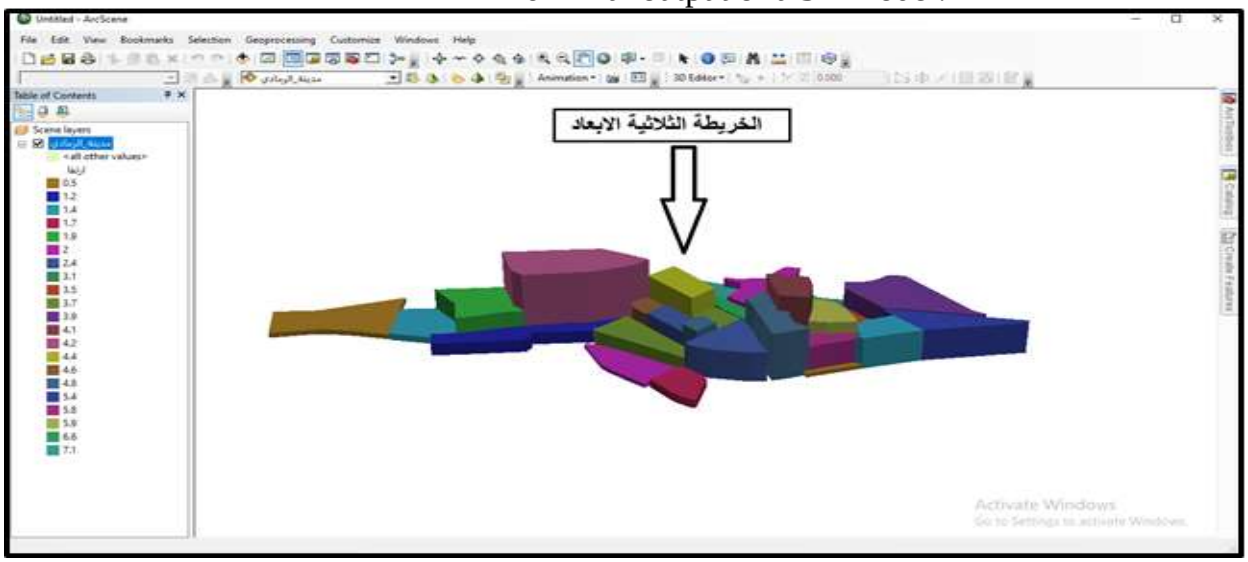
4- 3D model produced from the previous step:



5- 3D model coding:



6- Final output of a 3D model:



Source: Based on Arc Scene 10.4.1.

The gradient color variable was used by employing the quantitatively significant colors with the size variable to represent the third dimension to show the actual weight of visual pollution aspects of varying value according to levels and surfaces of varying height and employing them in the Arc GIS 10.4.1 program, which are as follows:

Generator wiring model:

The city of Ramadi suffers from a deficit in the main electrical system and thus does not meet the needs of consumers and citizens due to its continuous outages that may reach 12-15 hours a day. Which is looking for other alternatives to meet these needs by providing generators that are spread on the sidewalks, main streets and empty squares to compensate for the hours of interruption, especially in the hot summer. Which contributed to the presence of these generators in increasing the visual distortion of the city because of the spread of smoke, fumes and toxic gases left by these generators, and the greater the number of generators, the greater the number of subscribers and the increase in the number of wires, thus increasing the visual pollution in a positive manner depending on the population [3].

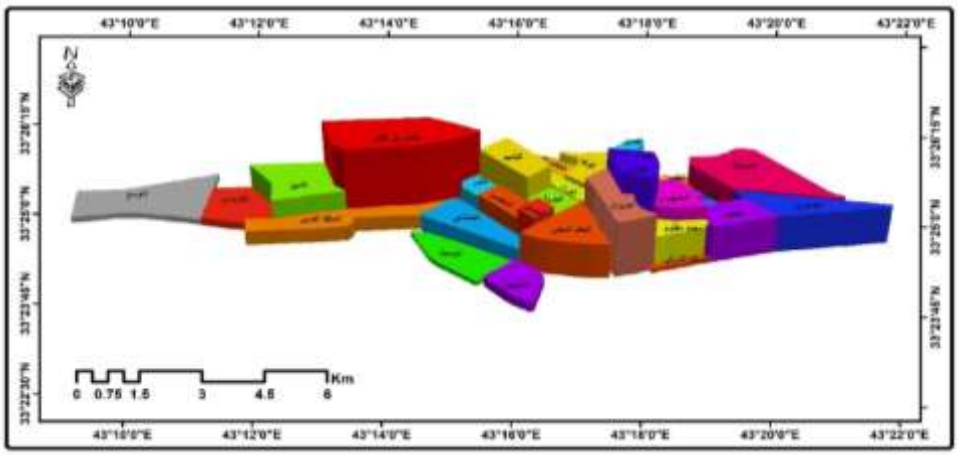
The entanglement of generator wires gives the city a bad visual image because it has a negative role as it distorts the city's sky, as in the image of (), so it is necessary to follow the system in force in many countries of the world and the Gulf countries, which is a ground system in its delivery and not being scattered in the air, and its overcrowding And their different colors, because they lead to great risks to the lives of the city dwellers [4].

And through the field survey as shown in table (), it was found that the neighborhoods that suffer from an increase in the number of wires is Othman bin Affan, which has reached the number of viewing frequencies (35), i.e. a rate of 8.1%, and the reason for its increase is due to the increase in the number of its inhabitants, which requires a number More generators to meet their needs. As for the neighborhoods in which the percentage of wires decreases, they are the expansion neighborhood, in which the number of frequencies of viewing reached (1), i.e. a rate of 0.2%, and that this percentage is low because these neighborhoods are not eligible for housing, as shown in the map.

Picture () of electrical generator wires

Field study 20/2/2021 Al-Andalus neighborhood
Field study20/2/2021 Al-malaab neighborhood

Map (3) 3D model of generator wires



Source: Based on Arc Scene 10.4.1.

Conclusions:

1- Visual pollution in the city of Ramadi is one of the problems of the era, because it caused an imbalance in the environmental balance and the aesthetics of the city.
2- Visual pollution is no less dangerous than other types of pollution (audio, aerial), etc., through its relationship to disturbing an individual's psychological and mental health.

3- The visual coexistence of the human being plays a dangerous role in guiding his behaviors. And thus reflect on the behavior of society, the lack of beauty leads to the corruption of public taste.

Recommendations

1- Preserving the heritage of the buildings and not making the western heritage replace the Arab heritage, which leads to the loss of the city's identity and privacy.
2- Developing and removing interlocking electrical wires for private generators and replacing them with the ground system in force in many countries of the world and the Gulf, which reduces the overcrowding and scattering of wires.

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