

Improving the creation of digital cards of nuclear power plants on the basis of MZM

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Abstract. In this article, nuclear power plants are numerical improvement and geospatial mapping based on MZM emphasis is placed on placement issues. Nuclear power plants 1:10000 and 1 within a radius of 30 km of the planned construction area 1: 25000 from drones when updating scale cards The materials obtained were widely used in this data primary and the rest are auxiliary materials.

Keywords: Cartographic, remote sensing materials, (MZM), UAVs, Opaznak, AES, GAT.

Enter. Compiling digital cards of nuclear power plants and a wide range of UAVs for creating 3D models was used. Aerial photography using drones in the process, the specialist goes directly to the work area of the flying machine action determines direction and programs it.

MZM from drones when renewing cards The following steps were taken to obtain the data:

- obtaining and specifying technical conditions;
- data collection and systematization
- obtaining cartographic or photographic materials, points form a list of coordinates;
- analysis of the natural-geographic features of the research object to determine the average temperature of forest, mountain, water;
- the Defense of the Republic of Uzbekistan to carry out the flight obtaining permission from the Ministry;
- to specify horizontal and vertical image symbols selection of points as well as the coordinates of these points choosing a detection method;
- technical inspection of instruments and preparation for flight;
- installation of safety measures for aerial photography.

The main part. Nuclear power plants are planned to be built in the territory after the above-mentioned works are carried out notices have been installed. Each one is placed in the installation of the guards characters are numbered in the order of 1,2,3...500.



Figure 1. The location of the landmarks of the area.

These embedded points are control, with dots in black Positions are indicated by - in an elliptical form. 6 in the facility aerial photography from flight stations was carried out [3].

It is small for aerial surveying of the area in drones It was divided into regions and 21 flights were carried out by multi-route method increased Fig. 2.



Figure 2. Flight route diagram.

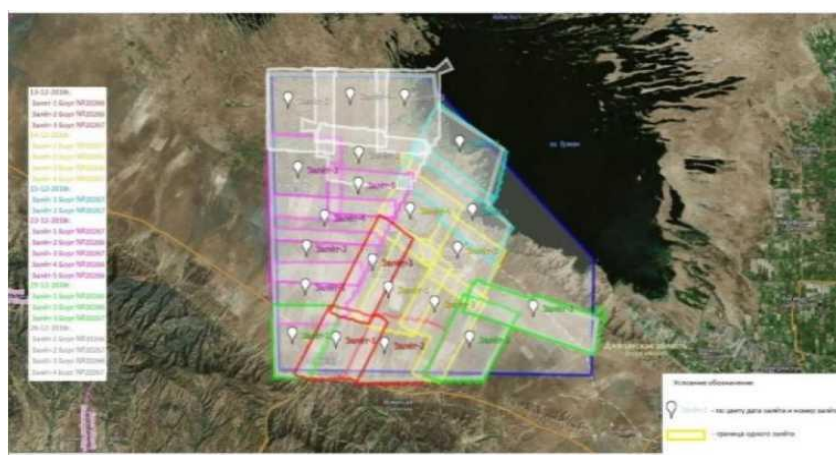


Figure 3. Scheme of flight distances.

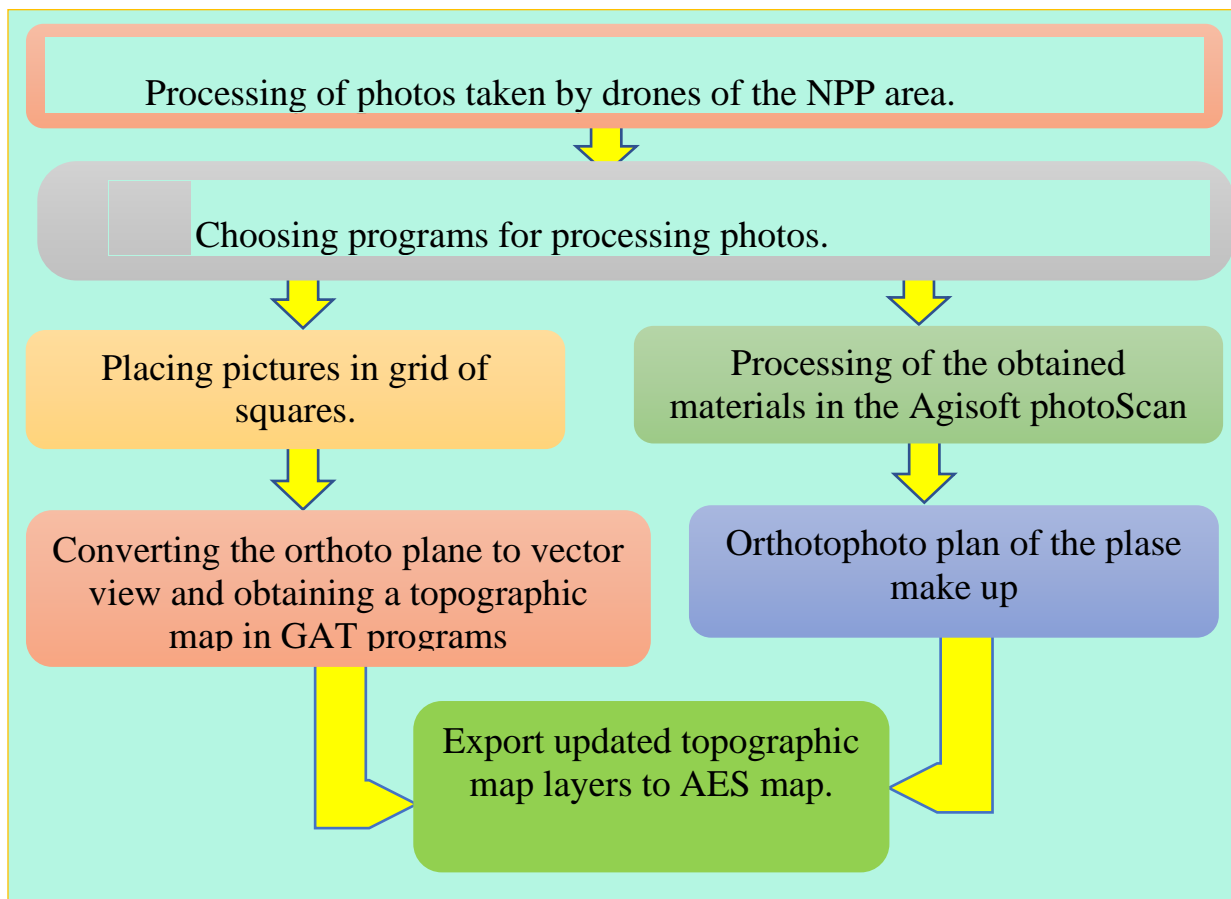
Flight control software for drones was carried out as follows. In this case, the operator is at the ground control station (NSO) the survey area, the height of the UUA when surveying ($H = 880$ m), defines the spatial resolution. In addition, with the help of a special program calculates the flight task. Following these flight operations the Geoscan Planner program was widely used. Geoscan Planner The program identifies the factors that have a negative impact on the syomka process and cases of expediency or opposite effect of syoming is controlled [1].

Flight control software for drones performs the following functions:

- drawing the workspace for user simulation;
- According to preliminary information, the flight of unmanned aerial vehicles calculate direction;
- according to the parameters of the digital camera, aerial photographs determining the value of longitudinal and transverse coverage;
- the maximum and minimum elevation of the relief in the shooting zone;
- calculation of wind speed and directions;
- determination of flight time and speed;
- drone movement and photography
- performs tasks such as calculating intervals.

Updating cards and monitoring location changes through data from drones increased. This includes identifying newly established and changed objects and specifically for the purpose of assessing the level of changes that occurred in the area technology was developed [5]. This technological scheme is the territory of AES re-photographs taken by drones operation, selection of programs, placement of pictures in a grid of

squares, processing of materials in the Agisoft PhotoScan program, GAT programs creation and conversion of orthophotoplan to vector view and topographical vectorization of map layers, creating an orthophoto plan of the place. export updated topographic map layers to AES map Scheme 1 covering issues.



Scheme 1. Taken from drones technological scheme of photo processing.

In the process of aerial photography using drones The specialist moves the flying machine directly to the work area determines the direction and programs it. Drones in addition to speeding up the work process It costs less than taking space photos.

After completion of field work, it is done in camera conditions things begin. Speeds taken by UUA in Agisoft PhotoScan software processed and an orthophotoplane is generated.

Creation of high-quality three-dimensional models based on orthophotoplan Agisoft Metashape software is considered a modern technology.

Creating a 3D model of an object is done using stereopair photos is increased. Agisoft Metashape comes from this different angle allows you to use photos. In Agisoft Metashape the process of creating a three-dimensional model is completely based on artificial intelligence performed automatically. In this distance measurement and surface it was possible to calculate the area and volume [4].

Solved by users using Agisoft Metashape software the main task is to restore the textured 3D model of the object.

The project will be implemented in four stages:

1. Determining the parameters of external and internal direction of cameras.

At this stage, Agisoft Metashape generalizes the photos finds and from them to determine the following

parameters of the camera uses: location, orientation, internal geometry (focal length, distortion parameters etc.).

2. Setting the density of points when creating a three-dimensional model Creating a 3D model is done in the Agisoft Metashape program edit the elevation points before moving on to the next step possible

3. A 3D model is created based on the polygonal model of the object.

Also create different models in Agisoft Metashape allows you to do it in two main ways: the order is presented, that is, setting the height points on the squares;

In this case, the height points to the location representation, which has a structure determined according to.

Creating a 3D model of the area where NPP construction is planned the necessary pictures are selected and uploaded to the program Fig. 4.

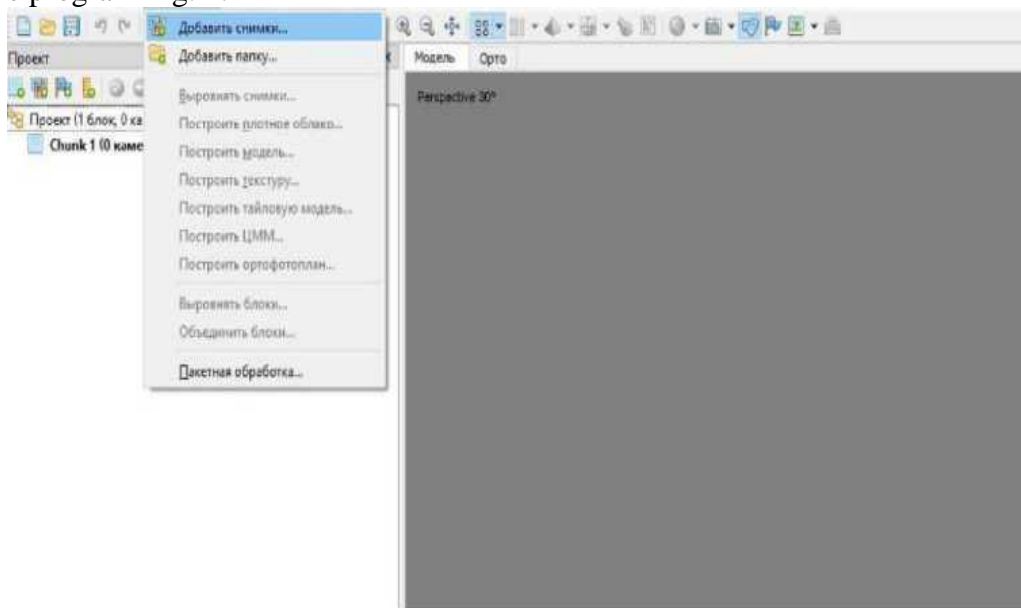


Figure 4. Transfer the pace to the program.

When uploading a collection of photos to this program, their formats, because Agisoft Metashape The following program JPEG, TIFF, PNG, BMP, PPM, OpenEXR, JPEG Multi-Picture formats [6].

Photos uploaded to the Agisoft Metashape program are in a separate folder collected and systematized for processing Figure 5.

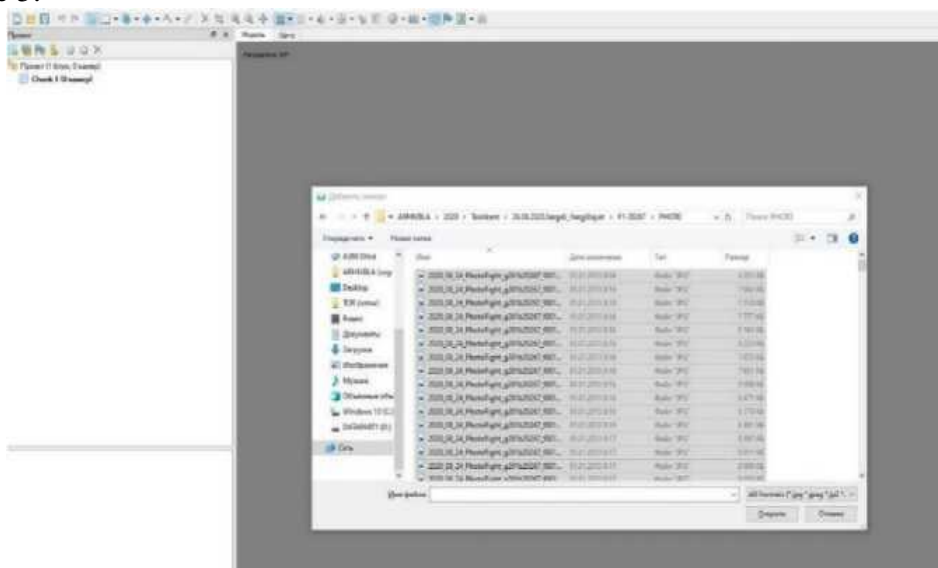


Figure 5. Show the folder where the tempos are located.

Cross montage of photos uploaded to the program is equalized through Equalize correct photos in the program The placement is controlled in the dialog box Figure 6.

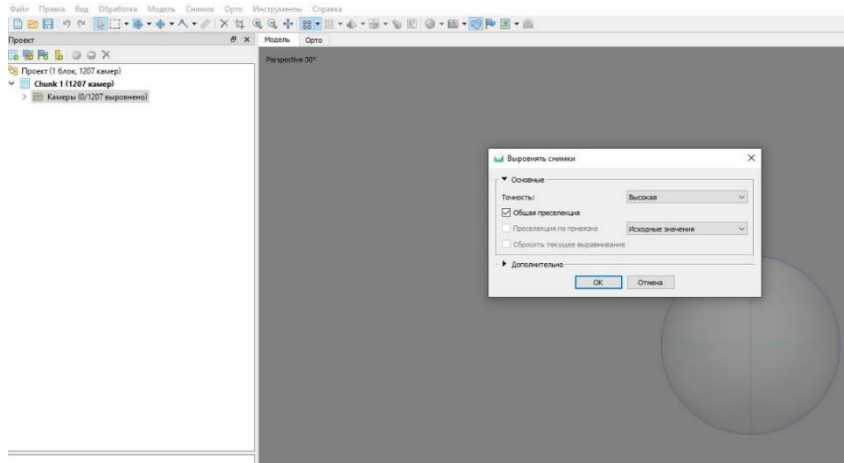


Figure 6 . Equalization of speed and correct positioning

Agisoft Metashape to create and render us a set of dense points allows. Based on the calculated camera positions, the program has Calculating height offsets for concave and convex surfaces comes out and the elevation points that need to be set between them will install automatically. A set of dense points using Agisoft Metashape can be edited and classified. Other special such dense points there is an option to export to programs for analysis Figure 7.

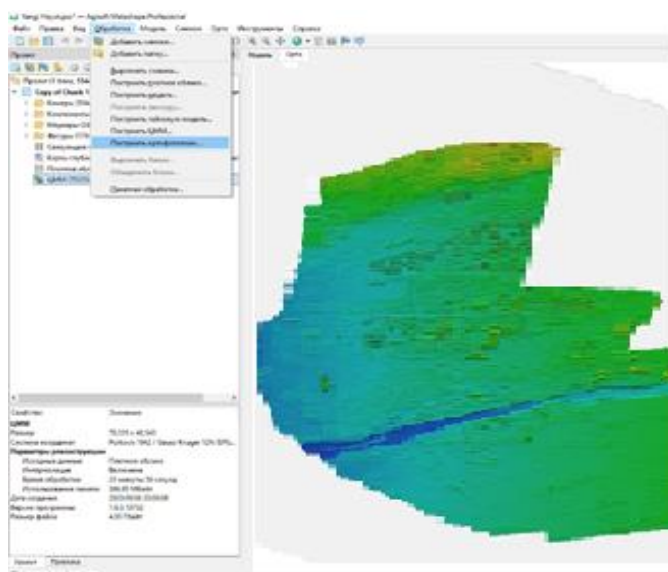


Figure 7. Creating a dense point cloud.

Agisoft Metashape software allows us to create an elevation model (DEM) and allows to show. Agisoft PhotoScan also height calculation of points, distances, areas and volumes, as well as create profiles according to the path defined by the user allows. Create contour lines and convert them to DEM or Orthotab can be displayed in orthomosaic. DEMs are only connected models is calculated for , so for the model before constructing the DEM we need to set the coordinate system Fig. 8.

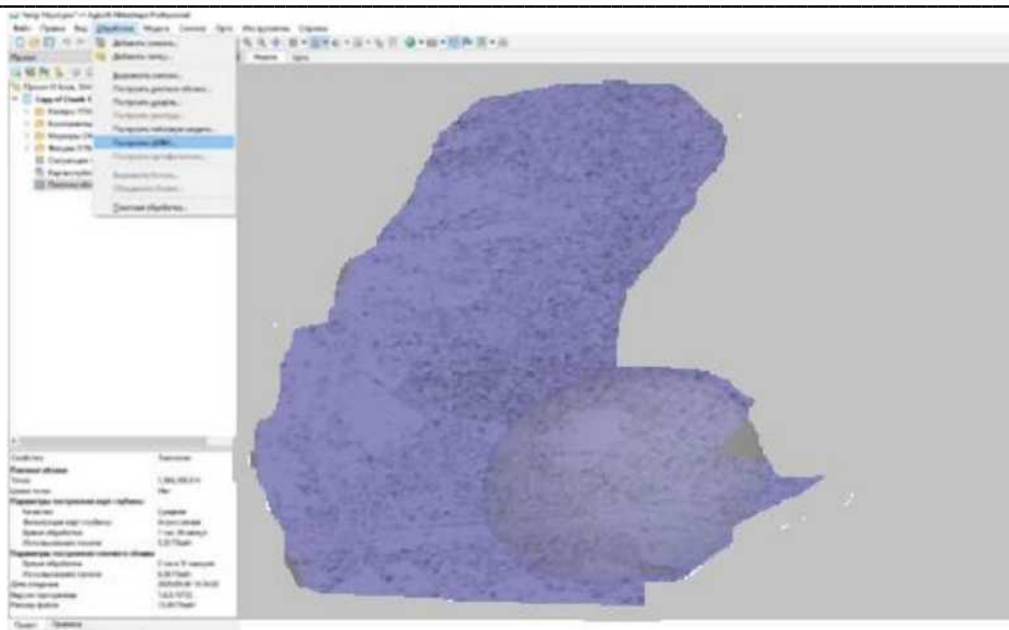


Figure 8. Create a digital model of the place.

Agisoft Metashape provides the ability to export results is enough. Three-dimensional models created using this program are available exported to other programs to create a topo map. Your place AutoCAD Civil 3D software was widely used to create the topo map [8]. For this purpose, all models created in the Agisoft Metashape program Export to AutoCAD Civil 3D to create a topo map of the place done Figure 9.

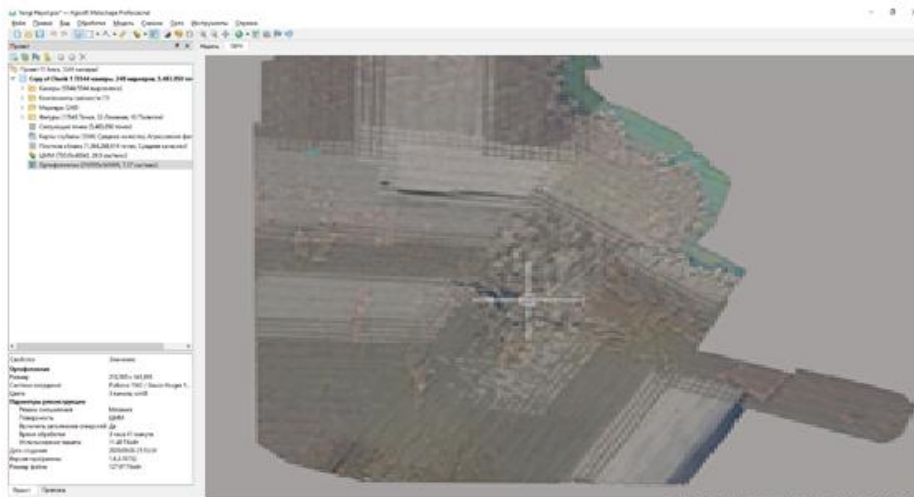


Figure 9. Orthophoto plan of the planned construction area.

Orthophoto plan of the planned construction area Agisoft Export from Metashape to AutoCAD Civil 3D a topographical plan was created. (Fig. 10- a and b).



a-Orthophotoplan b- topographic plan

Figure 10. Topographical plan created on the basis of orthophotoplan.

AutoCAD Civil 3D, as well as UUA for creating topo maps The materials obtained from the region are also

exported to the ArcGIS program relief was visualized using horizontal lines. of this terrain A digital model of the area was created through the horizontal lines Figure 11 [10]

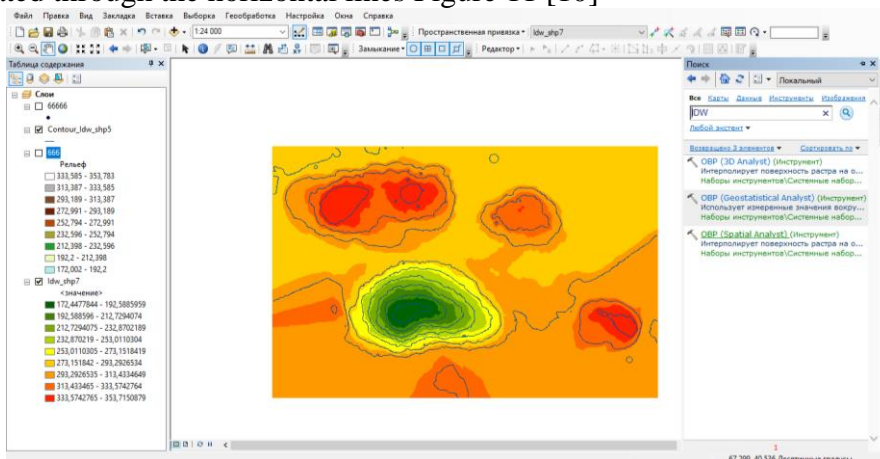


Figure 11. Digital model of the area using ArcGIS software create.

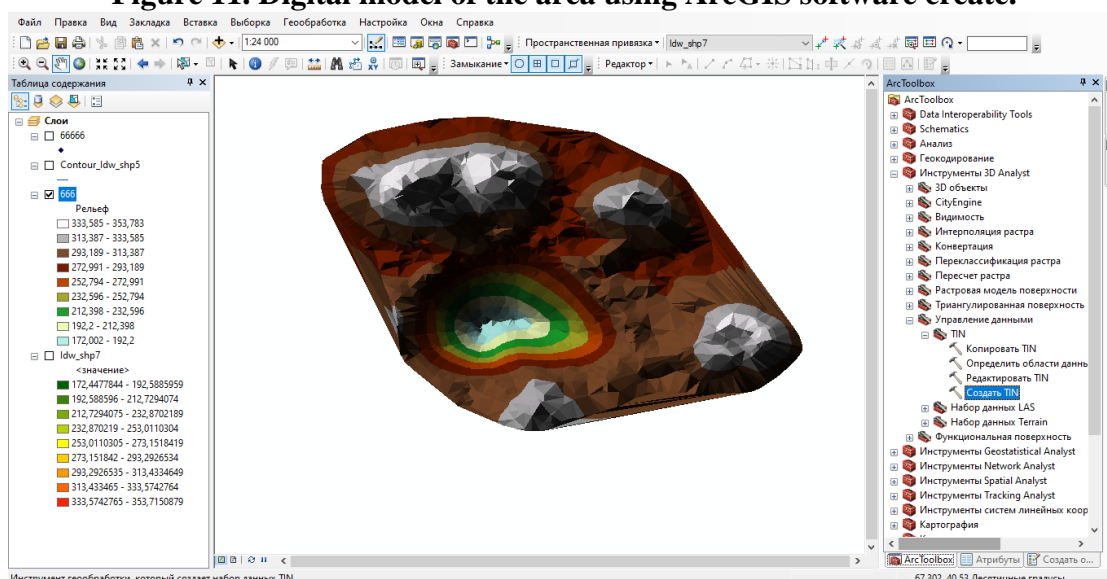


Figure 12. Creating a 3D model of the area using ArcGIS software.

The objects on the topo map and in the photo are compared with each other 1:5000, 1:10000, 1:25000 of the planned construction area new topographical basis with the change indicators of the maps was created.

Summary. Topographic using remote sensing materials special technology in updating cards and creating three-dimensional models was developed. The topography of the place was created on the basis of this technology cards and three-dimensional models were created. Such three-dimensional models It serves as the main source for planning the construction of NPP.

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