ASSESSMENT OF THE ENGINEERING AND GEOLOGICAL CONDITIONS OF THE SAZAGAN SOLAR POWER STATION CONSTRUCTION AREA

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Abstract. *In recent years, due to the increase in the population, the need for electricity is increasing. Therefore, in our country, great attention is being paid to the construction of facilities based on new technologies, which are renewable energy sources, that is, wind and solar power plants. Before starting the construction of New Wind and Sun power stations, it is necessary to carry out engineering-geological survey work on the site, and it is necessary to determine the level of strength of the foundation of the structure being built on the basis of it.*

This article describes the evaluation of the engineering-geological conditions of the construction site of the Solar Power Plant in the village of Sazagan, Nurabad District, Samarkand Region, using field, laboratory and camera works.

Keywords: *solar power plants, engineering geology, laboratory, sedimentation, international standard.*

Introduction. A solar power plant is a large-scale project that cannot be completed in a day. It is clear that its implementation requires detailed study in order to be a person who, if not an expert in the field of "green" technologies, at least understands its basic concepts.

First of all, it is necessary to consider the most necessary requirements for a solar power plant (SPP):

1. Selection of the construction site, focusing on the optimal solar radiation and sunlight for most of the day;

- assessment of external factors: conducting geological and hydrological studies of the site, analyzing seismic activity, possible threats (for example, floods, storms, etc.) that may affect the safety and stability of the power plant assessment of other factors.

2. Engineering and construction requirements:

- Perform calculations and design work: Analyze solar radiation data to determine the optimal orientation of solar panels and the required amount of panels to provide the required power.

- Building Codes and Standards: Adhere to all building codes and standards, including building codes, electrical codes and safety codes.

- Use of environmentally sustainable technologies: priority should be given to the use of materials and technologies that have minimal impact on the environment.

- saving water and energy: introducing measures to save water and energy in the process of construction and operation of the power plant.

3. Electrical requirements:

- Power grid connection: The solar power plant must be connected to the existing power grid in accordance with local grid requirements and regulations.

- Remote control and monitoring: providing the ability to remotely monitor and control the operation of the power plant.

- Safety: provide protection system against over voltage, short circuit and other electrical accidents.

4. Economic and legal requirements:

- Optimal costs: construction should be carried out taking into account economic efficiency, cost optimization and return on investment.

- Compliance with local laws and regulations: The construction and operation of the power plant must comply with the requirements and permits of local authorities.

When building a solar power plant, it is recommended to take into account factors such as disposal and processing of construction waste, training of local workers and operational personnel. It should be noted that there are many requirements that are necessary to one degree or another to create such a large object, without which there is no need to talk about SES.

It doesn't matter where the solar power plant is located, whether it's around the house, on its roof or any other option - the main thing is that the available space can allow free placement of solar panels facing south. Only with this condition, it is possible to start making calculations related to the construction of a solar power plant and all subsequent processes.

In 2013, a number of projects were developed for the construction of solar photoelectric power plants in Nurabad and Past Dargom, as well as Kattakorgan districts of Samarkand region. Projects were presented by European countries, including Spain, France, Russia, as well as companies from the United States of America. On the basis of these projects, the construction of a solar power plant was planned in the village of Sazagan, Nurabad district, Samarkand region, and engineering and geological studies were carried out in this construction area.

In the Republic of Uzbekistan, indirect application is allowed in cases where direct application is considered impossible due to non-compliance with climatic, geographical, technical, technological and other characteristics of international standards [1]. ISO international standards are approved by the Technical Regulatory Agency of Uzbekistan [2]. Taking this into account, in accordance with the current norms and rules of the Republic of Uzbekistan and world standards - American Society for Testing and Materials (ASTM), British Standard (BS), CIS Interstate Standard (IS), Construction Standards and Rules (CSR) and Urban Development Norms and Regulations (UDNR) were implemented in accordance with the requirements.

One of the main research activities is drilling. Drilling of wells was carried out with the help of the URB-2A2 drilling rig with a diameter of up to 180 mm in order to determine the lithological structure, take samples from intact and damaged rocks, determine the physical properties of soils, and determine the depth of the groundwater level.

According to GOST 25100-2020 [3] classification, lithological structure of rocks, physical-mechanical properties, 3 (three) engineering-geological elements (EGE) were determined in the soil layer at a depth of 20.0 m in our studied area.

EGE-1. Sandy soil, silty, light brown, hard, sedimentary, small layers and lenses with irregularly grained sands, together with inclusions of fine-grained stones up to 15%.

EGE-1 soil thickness varies from 0.2 to 17.1 m.

According to laboratory analysis, the total value of subsidence of the soil from its own weight (when it is wetted with water until it is completely saturated) varies from 4.4 cm to 19.4 cm. Based on these data, the sandy soil layer was divided into two types according to the level of

subsidence, the areas with a total value of subsidence up to 5.0 cm are classified as type 1, and the total value of subsidence is higher than 5.0 cm. regions were divided into type 2.

EGE-2. Sand is gravelly, uneven-grained, large-grained sand to gravel, gray-brown in color, from low to medium water saturation, loose structure, with clay filler, from 3.3% 41.4% with gravel and crushed stone. The thickness of MGE-2 varies from 0.3 to 2.6 m.

According to table B.10 of GOST 25100-20 [3], MGE-2 sands with a natural composition according to the porosity coefficient have a free content.

EGE-3. Gravel is crushed stone gray-brown, with low moisture, sandy soil, not the same composition:

MGE-3 soil thickness varies from 0.5 to 4.8 m.

According to Table B.8 of GOST 25100-20 [3], MGE-3 soils do not have the same composition.

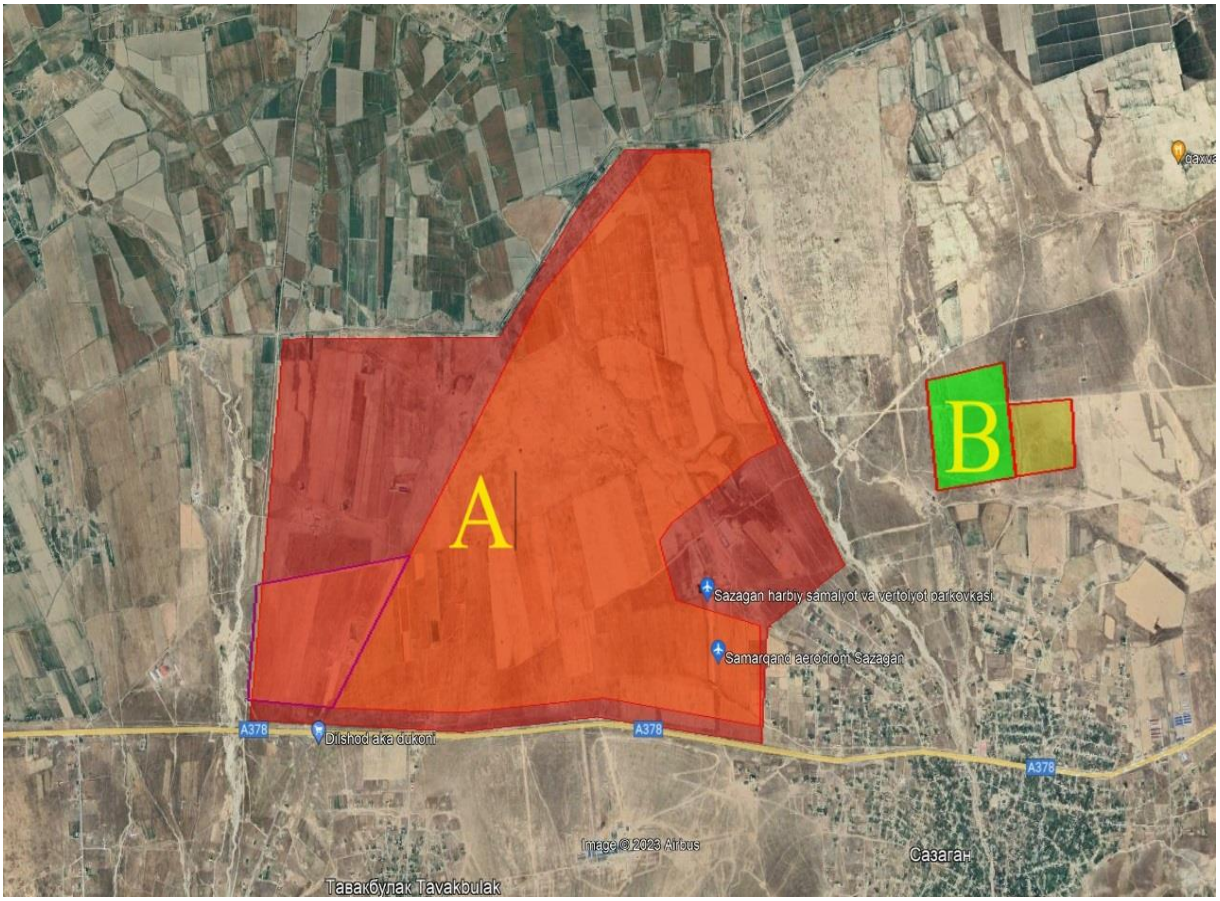

Figure 1. division of the Earth's area into sections based on the composition and physical-mechanical properties of rocks.

Suggestions and summary.

Based on the analysis of engineering-geological conditions, the studied area can be classified as a conditionally favorable area for construction. Based on the received information, our territory was zoned in engineering-geological terms, which is considered important for construction. Here, taking into account the level of underground water, the composition and physical and mechanical properties of the rocks scattered in the area, it was divided into sections A and B (Fig. 1).

According to laboratory tests, the total amount of subsidence of the soil from its own weight (until it is completely saturated with water) is from 4.4 cm to 19.4 cm. Based on the results obtained

from the laboratory and engineering-geological zoning, our A-area is suitable for construction considering that it is a type I sedimentary area, and our B-area is considered to be a spread of type II sedimentary soils and requires complex engineering measures. designated as an unfavorable area for construction. According to the content of readily soluble salts, the soils range from slightly saline to moderately saline, and according to the content of moderately soluble salts, the soil does not contain gypsum. During the research conducted in May 2023, groundwater was not opened at a depth of 20 m. 2.01.03-19 [7] in accordance with the annexes 1 and 2 of the Ministry of Internal Affairs, taking into account changes No. 1, the seismicity of the area is 7 points with the recurrence of earthquakes once in 200 years (Djuma).

Recommended engineering measures:

1. Antiseismic measures should be taken in accordance with the requirements of Construction Standards and Rules 2.01.03-19 [7], taking into account the fact that our territory experiences 7-point earthquakes.

2. In accordance with the requirements of CSR 2.02.01-98 [8], elimination of subsidence characteristics for type I and II soil conditions from the point of view of subsidence, driving piles along the sedimentary layer to a solid foundation, foundation thickness waterproofing and waterproofing.

3. Solar panels are mounted on piles driven into the ground at a certain height from the surface of the earth, in which anti-aggressive measures are required for the piles against moderately saline soil. The surface of the piles should be protected by mechanically durable coatings or by chemical means, the use of a brand not lower than W6 for the waterproofing of concrete and piles, the surface of the piles should be covered with lacquer-paint in accordance with the requirements of CSR 2.03.11-96 [9] It is recommended.

4. Stopping the movement of flood flows that can be observed in the area or weakening its dynamic properties, diverting them from the construction area;

5. Transporting the soil and plant layer of the construction site to another place.

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