https://doi.org/10.29013/AJT-22-5.6-45-49

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MODERN ENGINEERING AND GEOLOGICAL PROCESSES ON THE TERRITORY OF THE CITY OF KARSHI

Abstract. In the article, the authors consider dangerous geological processes presented as a consequence of human engineering activity in the process of urban development. Geological and engineering-geological processes, in particular abnormal climatic phenomena that negatively affect the general state of operation of buildings and structures, as well as the vital activity of the population. These processes are described in detail and prescribed in state regulatory documents, SNC1.02.09–15. Conducting engineering and geological surveys, specialists most often have to solve the problems most common in urban areas of Uzbekistan associated with dangerous geological processes: ·flooding (foundations, pits, etc.); ·karst-suffusion processes; ·erosion processes; slope processes (landslides, collapses, avalanches), etc.

Keywords: hydrogeology, groundwater, deformation, shrinkage, erosion, underflooding, drainage, moisture, evaporation.

Introduction. Due to the growth of the population, the development of its infrastructure, and the needs of modern urban planning, a comprehensive study of the engineering and geological conditions of the territory of Karshi is strategically important. Based on this, engineering-geological studies aimed at identifying dangerous geological and engineering-geological processes in urban areas are identified as one of the significant areas.

Currently, dangerous geological processes are of great importance for good operation, durability and reliability of buildings and structures in urban conditions. A mandatory point in the course of engineering surveys is to identify such processes and predict changes in dangerous geological processes over time. In the presence of these processes at the research site, certain protective measures are taken to reduce the negative impact on adjacent buildings, structures or their complete elimination (if possible).

Hazardous geological processes are engineering-geological and geological processes, in particular hydrometeorological phenomena that negatively affect the general condition of buildings and structures, as well as the vital activity of the population.

These processes are described in detail and prescribed in state regulatory documents, SNK 1.02.09–15 When conducting engineering and geological surveys, specialists most often encounter the most common dangerous geological processes in urban areas of Uzbekistan: flooding (foundations, pits, etc.); karst-suffusion processes; erosion processes; slope processes (landslides, collapses, avalanches).

Research methodology. The tasks were solved using a set of methods, including scientific analysis of factual materials, field, laboratory, desk engineering and geological studies, retrospective comparative analysis, and mathematical statistics, processing of research results using geoinformation technologies, mapping and zoning.

Discussion of the results. The theoretical foundations and scientific research on the study of hazardous engineering-geological and geological processes of urban areas were developed by scientists from leading on scientific centers and higher

educational institutions of the world: S. P. Larson, M. R. Anderson, Y. K. Cheung, P. C. Trescott, E. S. Dzekzer, A. J. Muftakhov, V. I. Sologaev, etc. Scientific and methodological aspects of studying the problem of studying the processes of urbanized urban areas of Uzbekistan and practical aspects of forecasting were studied at different times by G. A. Mavlyanov, K. P. Pulatov, N. N. Khodjibaev, E. V. Mavlyanov, Yu. I. Irgashev, F. B. Abutaliev, B. Ya. Neiman, Ya. S. Sadykov, V. A. Heinz, M. M. Krylov, M. R. Rakhimov, V. U. Magdiev, N. N. Kamilov, J. H. Jumanov, S. H. Khushvaktov, A. B. Alimbayev, P. P. Nagevich, O. V. Chebotarev, I. N. Gracheva, etc., as a result, a technology for modeling hydrogeological conditions for the territory of the Republic of the Uzbekistan was developed, the criteria for conducting regional and local monitoring in various geological and engineering-geological conditions have been established.

Underflooding – ubiquitous in the territory of the city of the Karshi in most cases is a consequence of both man-made and partially natural processes. This process is possible as a result of any violation of the water regime, as well as the general balance of the area for a specific billing period. In this case, the groundwater level rises significantly and reaches critical levels characteristic of a certain type of territory (in particular, for the functional purpose of the structure).

The engineering and geological conditions of Karshi are largely favorable to the destructive effects of karst-suffusion processes. This category of dangerous geological processes includes the interaction of processes such as suffusion and karst. Suffusion is an erosive process of leaching microparticles from rocks with filtered water. At the same time, voids form in the rock, which eventually lead to deformation of the soil, shrinkage of the foundation, etc.

Engineering and geological surveys are often carried out on the sites of construction pits. The sides of the pits are represented by loess-like loams and sandy loams are prone to the manifestation of dangerous slope processes. This group of processes includes landslides, avalanches, collapses etc. This leads to the movement of individual soil particles or entire arrays downhill due to the impact of a certain load and movement of groundwater. Landslides occur due to the movement of soil under its own weight on the surface of construction pits, pits, etc. Also, landslides occur due to the erosion of the territory, and in some cases seismic phenomena. At the same time, it is very important to predict in a timely manner the possibility of the appearance of processes at the research site and to carry out a number of protective measures to prevent them.

Geoecological problems of Karshi are very diverse and are determined, on the one hand, by the natural environment and, on the other, by planning solutions and their implementation in the development and operation of territories. It is also legitimate to talk about some general trends in the change of the geoecological situation of the natural territory, as it is transformed by urban development blocks and private impacts. The impact of the city is most actively manifested in the surface layers of the earth's crust to a depth of about 30–60 m, although in some cases in large cities of Uzbekistan are studied to a depth of 1.5–2.0 km.

The following compositions can be considered as the most general trends in changes in geoecological conditions. Changing the water balance between surface, ground and deep groundwater. Its most common consequence is an increase in the groundwater level caused by two unidirectional processes. Replacement of the natural soil cover with built-up and paved areas, which practically excludes evaporation from the soil surface and emergency manifestations of water supply and sewerage systems from the water balance, year-round providing the possibility of replenishing groundwater resources. Both of these circumstances, combined with the layout of the territory, the complete or partial elimination of natural drainage systems, lead to the rise of the groundwater mirror, the flooding of the foundations and foundations of buildings and structures, a decrease

in the bearing capacity of the foundation soils and, as a consequence, deformation, and in critical situations – the destruction of buildings and structures.

In cases when deep groundwater horizons are commercially exploited on the territory of the city and an adequate depression funnel occurs, provided that the groundwater aquifer is constantly replenished, the infiltration of groundwater into deep horizons increases. This process of activating the vertical movement of groundwater is accompanied by the development of processes of suffusion (removal of fine-grained material) or karst (dissolution and leaching of carbonate and sulfate materials is accompanied by the formation of karst cavities).

A change in the geodynamic situation caused by an additional, and moreover uneven, surface load due to the introduced masses of materials of building structures, within the city territory. This factor of additional load may also be accompanied by simultaneous pumping of groundwater, if they are used for drinking or technical needs of the population. As a consequence, against the background of the general lowering of the surface, local, focal landslide and solifluction processes are activated that can lead to deformation of buildings and linear underground utilities in urban conditions.

Violation of the geochemical balance of the surface, foundation soils and structures of buildings and structures is another geoecological process that occurs in extreme climatic conditions and has a decisive impact on the long-term stability of aboveground building structures. Its essence lies in the fact that in conditions when the evaporation exceeds the amount of precipitation, with steady flooding of intra-block territories and lack of drainage, the removal of some part of the excess moisture from the surface and from the soil layer occurs as a result of its evaporation. Evaporation, in turn, leads to a consistent and continuous increase in the mineralization of groundwater. The consequence of this process is the preservation of residual or the formation of new lenses of groundwater with increased mineralization, and moving them towards the base of buildings can lead to corrosion and deformation of the foundation and the building itself.

In general, for the city of Karshi and newly built-up areas of the city, forecasts of the development of hazardous geological and engineering-geological processes are developed on the basis of a model of the geological environment, which includes a set of maps and sections of different specifics: geological, geomorphological, hydrogeological, engineering-geological. The forecast is implemented in a scheme or measures to protect territories from dangerous geological processes. In recent years, computer technologies combined into a geographic information system (GIS) have been used to collect, analyze and present information related to the geological environment. Using this system allows you to quickly get a new information product based on available data, including forecast maps. When considering alternative protection options, in addition to environmental aspects, the technical and economic possibilities of implementing the planned measures are taken into account. When choosing a construction site for a future structure in a seismic area, it is necessary to take into account engineering and geological factors affecting the possible amplification of the building's own vibrations by the foundation rocks. To increase the strength and stability of structures and foundations, constructive measures (rigid frames, anchors, etc.) and strengthening measures (improving the properties of the rocks of the foundations) are used. When protecting against landslide processes common on the territory of our country, as well as landslides of steep slopes, active and passive protection measures are used. Active protection includes both engineering and management solutions.

Engineering measures include: 1) changing the relief of the slope in order to increase its stability; 2) regulating the flow of surface water using a surface drainage system, preventing water infiltration into the soil and underlying rocks. Anti-erosion measures: artificial lowering of the groundwater level; agroforestry;

consolidation of loose and fractured rocks composing slopes; construction of retaining slope structures.

Management measures include the establishment of security zones, restriction or prohibition of traffic and other similar decisions. Passive measures include the adaptation of structures to flow around them by a landslide. The device of trapping structures. In order to protect the soil cover of the urban area from erosion, measures are being taken to organize the drainage and regulation of the release of surface runoff, which is ensured by the development of storm sewers.

Construction in the steppe and forest-steppe zone of Karshi, where loess-like strata are widely developed, should be carried out using measures to prevent subsidence phenomena: protection of loess-like rocks from soaking by drainage of rain and meltwater. waterproofing to prevent infiltration: elimination of subsidence properties of loess-like rocks on the built-up massif by reclamation of rocks: presoaking from before compaction of loess rocks.

Conclusion. The geological appearance of the city of Karshi is constantly changing, sometimes quickly, more often imperceptibly for a person. Active economic activity leads to the intensification of technogenic or engineering-geological processes that have a negative impact on economic and industrial facilities, people's livelihoods.

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