Shilova A.V. Young Researcher, Perm State University, shilova-av@yandex.ru Kovaleva T.G. Candidate of Geological and Mineralogical Sciences, Perm State University, kovalevatg@mail.ru

APPLICATION OF GIS-TECHNOLOGY FOR MODELING OF GROUNDWATER FLOW

Often of the bases the subgrade for buildings and constructions is thickness of quarternary integumentary deposits, which can be represented by almost all varieties - from coarse and sharp-edged rounded to the fine clay and organic-mineral soils. Development of incoherent sand deposits at the base of the foundations of buildings and structures is a prerequisite for the possible occurrence of suffosion processes. As a result of activation of suffosion processes the formation of dips on the surface and cavity - deep in the soil mass. For the purpose of an assessment of danger of development of geological processes need of complex studying of a condition of the geological and hydrogeological environment is obvious. At the previous stages of researches the geological component was studied in detail [1, 144; 3, 185], but the important role is played by hydrogeology.

In this paper the attempt of modeling of groundwater flow within the industrial site located in Berezniki (Perm, Russia).

Existence of a filtrational stream of underground waters [2, 123] in disperse deposits with high and non-uniform pores permeability causes emergence of the shifting power influence.

Thus, one of the best conditions for the appearance and development of suffusion cavities in the layered thickness is the emergence in some volume of breeds of hydrodynamic pressure. Hydrodynamic pressure is defined by a filtrational stream which has to exceed the effective tension in the rock mass providing its relative stability. Relatively high hydrodynamic pressure in a filtrational stream arises in case of alternation of layers with different permeability – relatively low permeable deposits show the considerable resistance to the movement in them of water and as result in a filtrational stream there are hydrodynamic forces – hydrodynamic pressure.

In this paper the attempt of modeling of groundwater stream within the industrial site located at Berezniki (Perm Krai, Russia) is carried out.

Modeling of an underground soil stream is carried out by means of ESRI ArcGIS 10 (Spatial Analyst module) with use of the built-in procedure "Darcy Flow".

Modelling of groundwater flow is carried out by means of ESRI ArcGIS 10 (Spatial Analyst module) with use of the built-in procedure "Darcy Flow". The counted model of an underground flow is based on the law of a laminar

filtration of Darci. The result of this calculation are areal raster model reflecting the difference specific charge raster between adjacent cells, as well as pressure gradient and the flow direction at each point of the model (figure 1-3).

REFERENCES

1. Катаев В.Н., Шилова А.В. Оценка опасности проявления геологических процессов в зависимости от грунтовых условий // Сергеевские чтения. Молодежная конференция. Выпуск 15. Материалы годичной сессии Научного совета РАН по проблемам геоэкологии, инженерной геологии и гидрогеологии (21-22 марта 2013 г.). – М.: РУДН, 2013. С. 144-148.

2. Шилова А.В. Характеристика химического состава грунтовых вод территории промлощадки в г. Березники Пермского края // Геология и полезные ископаемые Западного Урала: статьи по материалам регион. науч.-практ. иссл. ун-т.–Пермь, 2013. С. 123-126.

3. Shilova A.V. The assessment of hazard of geological processes depending on the ground conditions at Berezniki (Permsky kray, Russia) // Global View of Engineering Geology and the Environment: proceeding of the International symposium and 9th Asian Regional conference of IAEG, Beijing, China, 23-25 September 2013. CRS Press/Balkema, Taylor & Francis Group, London, UK, 2013. P. 185-188.



Fig. 1. The direction of an underground flow in the territory of the industrial site





Fig. 3. The variability of a gradient of an underground stream in the territory of the industrial site