

## ПРОБЛЕМЫ ГЕОЛОГИИ И ОСВОЕНИЯ НЕДР

### FORMATION OF NEW MICRODISTRICTS AREA WITHIN THE SANITARY PROTECTION ZONE OF THE TOMSK UNDERGROUND WATER INTAKE

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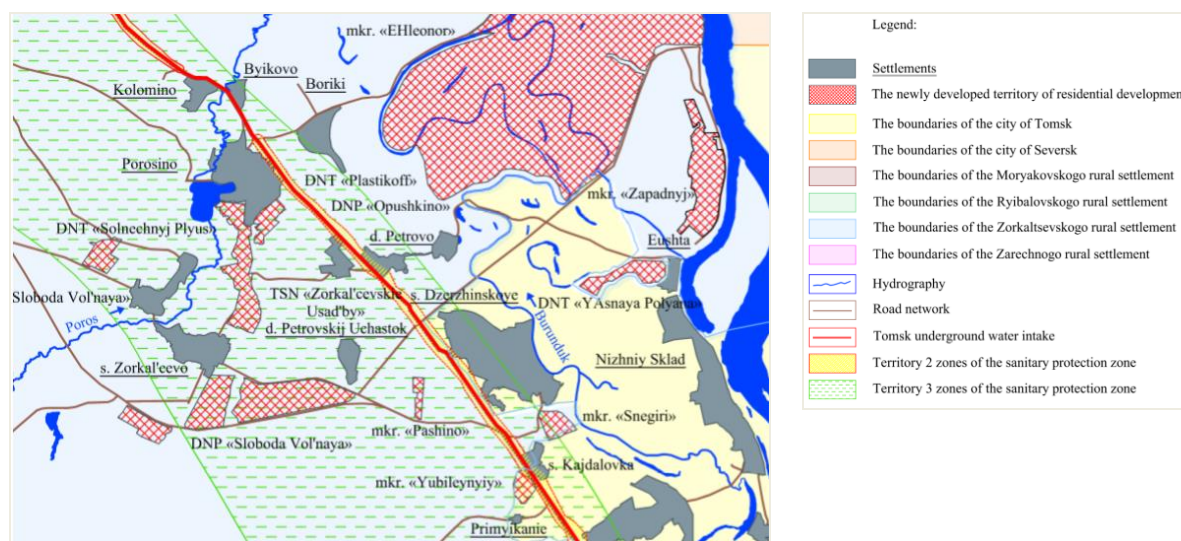
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Water is the most important natural resource for all living organisms including humans. However, a great number of enterprises in cities (and in close proximity to them) significantly worsen the quality of surface waters, which makes city dwellers use groundwater for their domestic needs. The city of Tomsk can serve as an example in this case, as here an underground water intake located in the territory of the Ob-Tomsk interfluvium has been used as a main source of water supply since 1973.

Since the useful resources of the Tomsk water intake are mainly conditioned by infiltration of atmospheric precipitation, it is very important to prevent any chance of groundwater contamination from the surface. This circumstance imposes certain restrictions in the economic use of the sanitary protection zone of the water intake, excluding any threat of contamination of the used groundwater [1].

All wells are located in the first ring of the sanitary protection zone (strict regime), where there are only bodies of the Tomsk water intake (wells, pavilions above them, and water channels) [3]. In February 2014, the boundaries of rings 2 and 3 of the sanitary protection zone were included in the State Cadastral Register by the Department of Natural Resources and Environmental Protection of the Tomsk Oblast, within which (as well as the left bank of the Tom River) there are many settlements.

Currently (the last 10 years), the boundaries of these settlements increase mainly due to former collective farm lands for agricultural purposes because of adding new microdistricts: South part s. Zorkal'cevo, TSN «Zorkal'cevskie Usad'by» (s. Zorkal'cevo), DNP «Sloboda Vol'naya» (okr. s. Zorkal'cevskoe), DNT «Solnechnyj Plyus» (okr. s. Zorkal'cevskoe), DNT «Plastikoff» (okr. d. Porosino), DNP «Opushkino» (okr. d. Porosino), mkr. «Pashino» (d. Petrovskij Uchastok), mkr. «Zapadnyj» (d. Petrovo), DNT «Yasnaya Polyana» (okr. d. Ehushta), mkr. «Ehleonor» (d. Popadejkiino), mkr. «Snegiri» (s. Kajdalovka), mkr. «Serebryanj Bor» (p. Kajdalovka), mkr. «Severnyj Park» (d. Kislovka, s. Timiryazevskoe).

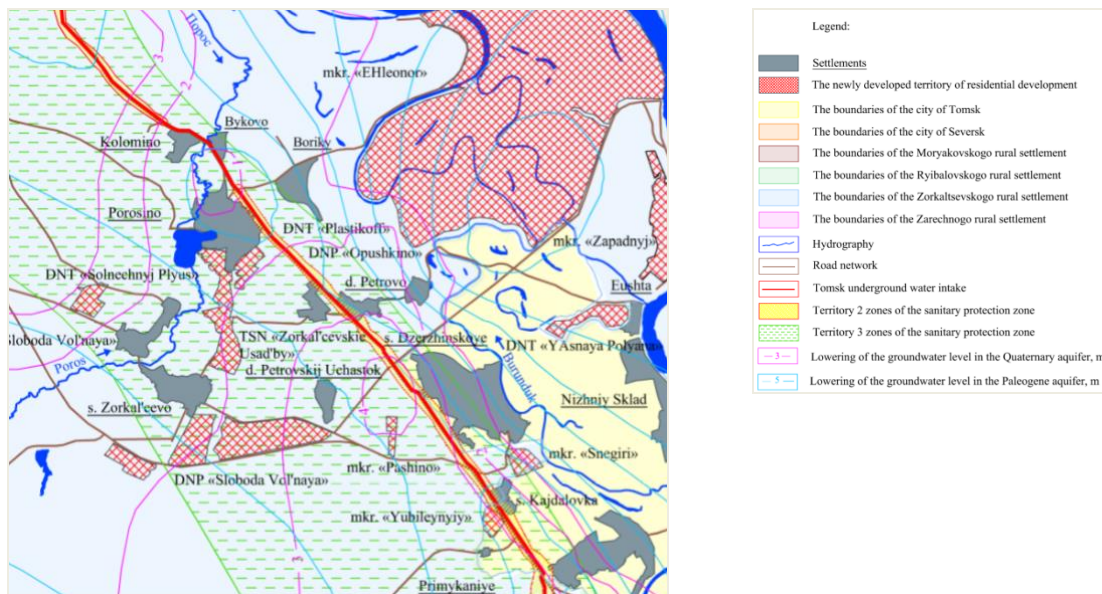


**Fig. 1** Fragment of territorial land management of the left bank of the Tom River  
(Tomsk and Zorkal'tsevo settlement)

As a result of the research, for the first time, a schematic map of territorial land management was designed for the territory of the lower reaches of the Tom River, the fragment of which is presented in Figure 1. This map shows the long-established and registered boundaries of settlements and new territories that are actively built up. In addition, the map of territorial land management takes into account not only the purpose of land management, but also the that of water use as socio-economic processes of the territory and means of production associated with land and water resources and influenced by changes in productive forces and production relations.

The initial data were: the regulatory framework (Federal Laws and Codes of the Russian Federation in the field of land management and water use, drafts of the sanitary protection zone of water supply sources, planning and land surveying projects, etc.), cartographic documents (1: 10000 scale ROSKOMZEM "VISKHAGI"), reference and information resources (public cadastral map pkk5), software (Microsoft Word and Microsoft Exel text editor, graphic material - AutoCAD LT 2017 programs and "Cadastre").

The urban sprawl and population increase have led to a significant growth in the volume of water consumption, which, accordingly, resulted in the formation and development of a depression funnel within the Tomsk underground water intake, as shown in Figure 2.



**Fig. 2** Fragment of the territorial planning scheme within the first stage of the Tomsk underground water intake

Currently, a new microdistricts is planned to be built in the agricultural lands (former marginal lands) located in the second and third rings of the sanitary protection zones, which are partially intended for permitted use, i.e. for summer construction. In permits, as a rule, there is no encumbrance under restriction of various types of activities in the areas of sanitary protection provided by SanPiN [3].

Most of the lands where new microdistricts are located are the share lands that were given to citizens for free in joint ownership in the early 1990s, arable lands and were intended for agricultural use. Businessmen bought these lands and transferred them to the category of settled lands.

Today all land plots of these microdistricts are included in the state cadastral register and owned by citizens and legal entities. All new microdistricts are referred to as cottage settlements, which imply the construction of cottages, individual garages, baths and outbuildings. In this case, a sewerage and cleaning system should be provided. However, according to the documents, the management of dacha and horticulture means mainly the construction of a dacha (garden) house and the cultivation of crops.

The development of new territories intended for permanent residence of citizens has a significant anthropogenic impact: the transport systems, the discharge of untreated municipal sewage, etc [2].

In addition, a number of new microdistricts are located in the floodplain of the Tom River. As is known, certain requirements are imposed for the construction in floodplains. Any building erected in the floodplain is an obstacle to flood flow, as it changes flow direction and speed, affects both the state of the floodplain and deformation of the channel in the adjacent areas. Floodplain inundates during floods, which is also a negative factor for construction of residential buildings.

Spatial planning considers new man-made loads on natural landscapes during the operation of engineering infrastructure facilities, which involves smart land management and water use.

As a result of the research, recommendations for the sustainable development of catchment urbanized areas have been developed, which can be used both for geomonitoring research and engineering surveys in the field of land management and efficient water use.

#### References

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