

Modern technologies for providing spatial data of territories of fields

Tecnologías modernas de suministro de datos espaciales de áreas de depósitos

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ABSTRACT:

The article analyzes the use of geospatial information for the purpose of oil and gas industries. The analysis of the role of the modern automated technologies for the production of spatial information and their use in the performance of geodetic works for arrangement of pads and communications corridor for oil and gas fields.

Keywords: Cadastre, spatial data, engineering and geodetic surveys, field.

RESUMEN:

El artículo analiza el uso de la información geoespacial para las industrias del petróleo y el gas. El análisis del papel de las modernas tecnologías automatizadas para la producción de información espacial y su uso en la realización de trabajos geodésicos para la disposición de pads y el corredor de comunicaciones para campos de petróleo y gas.

Palabras clave: Catastro, datos espaciales, estudios geodésicos y de ingeniería, campo.

1. Introduction

Engineering surveying for construction provides topographic and geodetic materials and data on the situation and terrain (including the bottom of watercourses, water bodies and water areas), existing buildings and structures (aboveground, underground and aboveground), planning elements (digital, graphic, photographic and other forms), necessary for a comprehensive assessment of the natural and technogenic conditions of the construction site and justification for the design, construction, operation of facilities and maintenance of public facilities in asters and information systems of settlements, as well as recommendations for economically, technically, socially and environmentally sound design decisions.

In order to effectively solve the tasks of sustainable development of the territories of the Russian Federation, it is necessary to use modern information technologies based on the latest means of obtaining spatial data, including materials for surveying high-resolution

satellite systems and aerial photography, cartographic materials, geodetic measurements and data storage and processing facilities, including spatial databases and geoinformation technologies, which allow to integrate different types of spatial OF DATA coming from different sources in Rossreestra system and other organizations and agencies [1]. Bodies of state cadastral registration and maintenance of GKN are carried out by the Federal Service for State Registration, Cadastre and Cartography in accordance with [2].

The relevance of research on the geodetic support of spatial data of cadastral and land management works is the dynamic development of the industrial industry, which led to a sharp increase in the demand for land for the construction of industrial and other facilities, in particular, for field development.

The purpose of the study is to study the methodology and technology of providing cadastral and land management works with spatial data using satellite radio navigation systems.

One of the elements of the spatial data infrastructure is the digital mapping database, which is used as an information resource for solving a wide range of problems of planning and management of territories.

In the process of work, the following sources of information were used: regulatory and legal documents regulating engineering and geodetic surveys and land relations, statistical compilations on the main parameters of social and economic development of the Khanty-Mansiysk region (KhMAO-Ugra), materials of rules for cadastral, land survey and geodetic work. Also, textbooks, periodicals, and Internet tools were used to study the theory of spatial data technology for providing cadastral systems using satellite radio navigation systems.

The concept of a land plot in Russia is based on the allocation of a limited part of the earth's surface from all sides. At the same time, the owner is restricted in the right to invade the subsoil located under his land. The order of subsoil development is established by the Law of the Russian Federation No. 2395-1 of 21.02.1992 "On Subsoil" [3]. The owner is also limited by the existing building regulations with respect to the space above his plot. Thus, having received a land plot, the owner has no right to intrude into the depths of the earth deeper than the established one, and also to build structures that exceed the permissible values established for the given territory in height.

A land plot is a part of the earth's surface, the boundaries of which are defined in accordance with federal laws (Article 11.1 of the Land Code of the Russian Federation). This definition differs from the definition given earlier in the Law on the State Land Cadastre, according to which the land was recognized as part of the land surface (including the surface soil layer), the boundaries of which are described and certified in accordance with the established procedure by the authorized state body, and all that is above and below the surface of the land, unless otherwise provided by federal laws on subsoil, on the use of airspace and other federal laws s.

Thus, according to the first definition, a land plot is a flat concept. According to the second definition, the land plot is a three-dimensional concept, and height and depth restrictions are established in each specific case.

2. Methodology

The area of works and pads of the Nizhne-Shapshinskoye field are located in the Khanty-Mansiysk District of the Khanty-Mansiysk Autonomous Okrug (hereinafter referred to as KhMAO-Ugra) and is presented in Figure 1 and Figure 2.

Fig. 1

Location of KhMAO - Yugra on the site of the geoinformation portal of the spatial data infrastructure of the Russian Federation [4, 5]

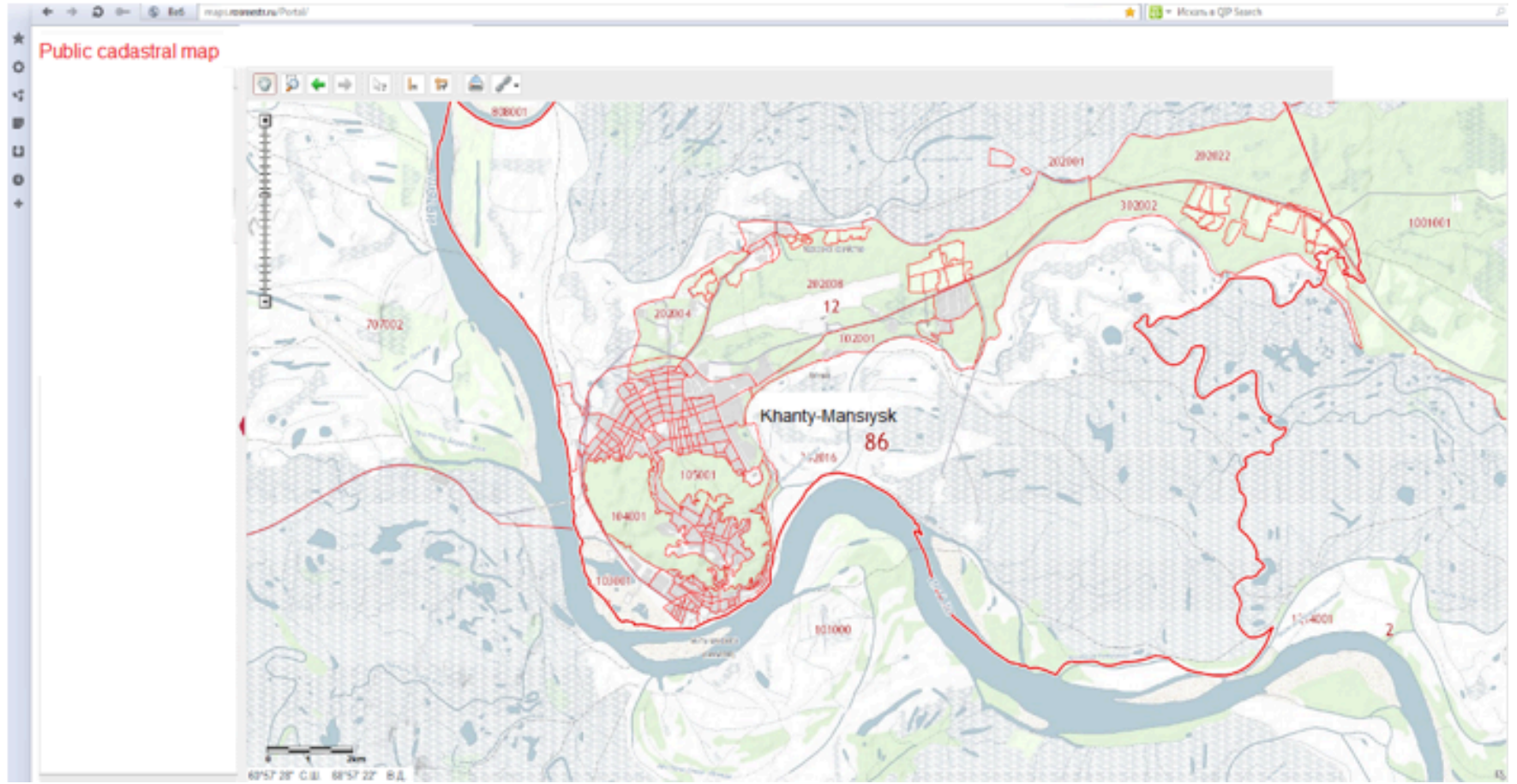
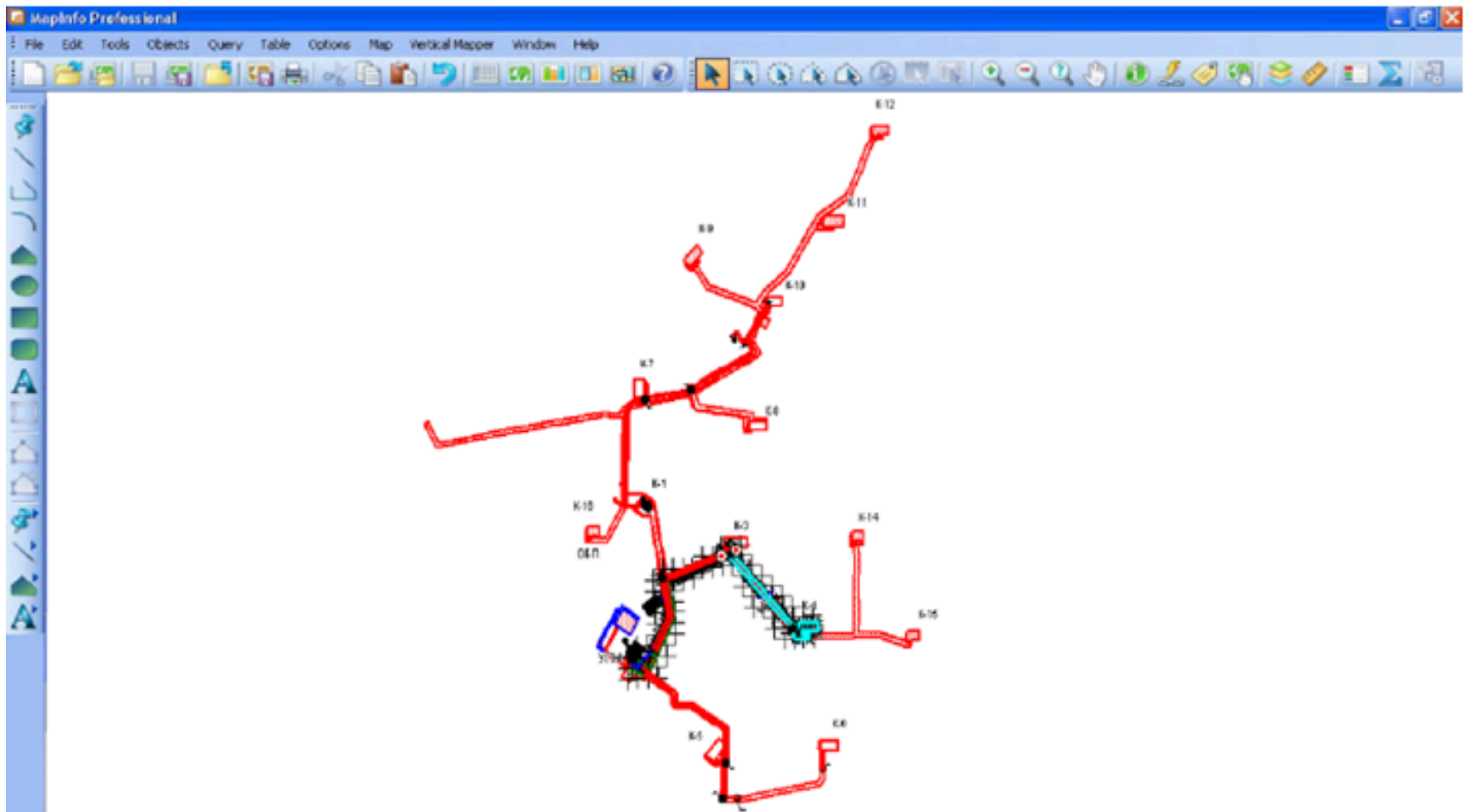


Fig. 2

Shrub sites at the Nizhne-Shapshinskoye field of KhMAO-Ugra



The geodetic survey of the boundaries of the deforestation contour for the development of the K-4 pad and the corridor of communications at the Nizhne-Shapshinskoye field and the receipt of a topographic plan were carried out on the basis of the contract agreement between OOO ZapSibGeoKom and JSC NAK AKI-OTYR at the construction sites of OAO "NAK AKI-OTYR", in accordance with the requirements of the terms of reference, licenses for the performance of the relevant work, the Customer's original data and in accordance with regulatory documents:

- SniP 11-02-96;
- SP 11-104-97;
- SniP 3.05.02-88;

Fig. 4

GIS MapInfo – an example of results of engineering and geodetic survey at the site

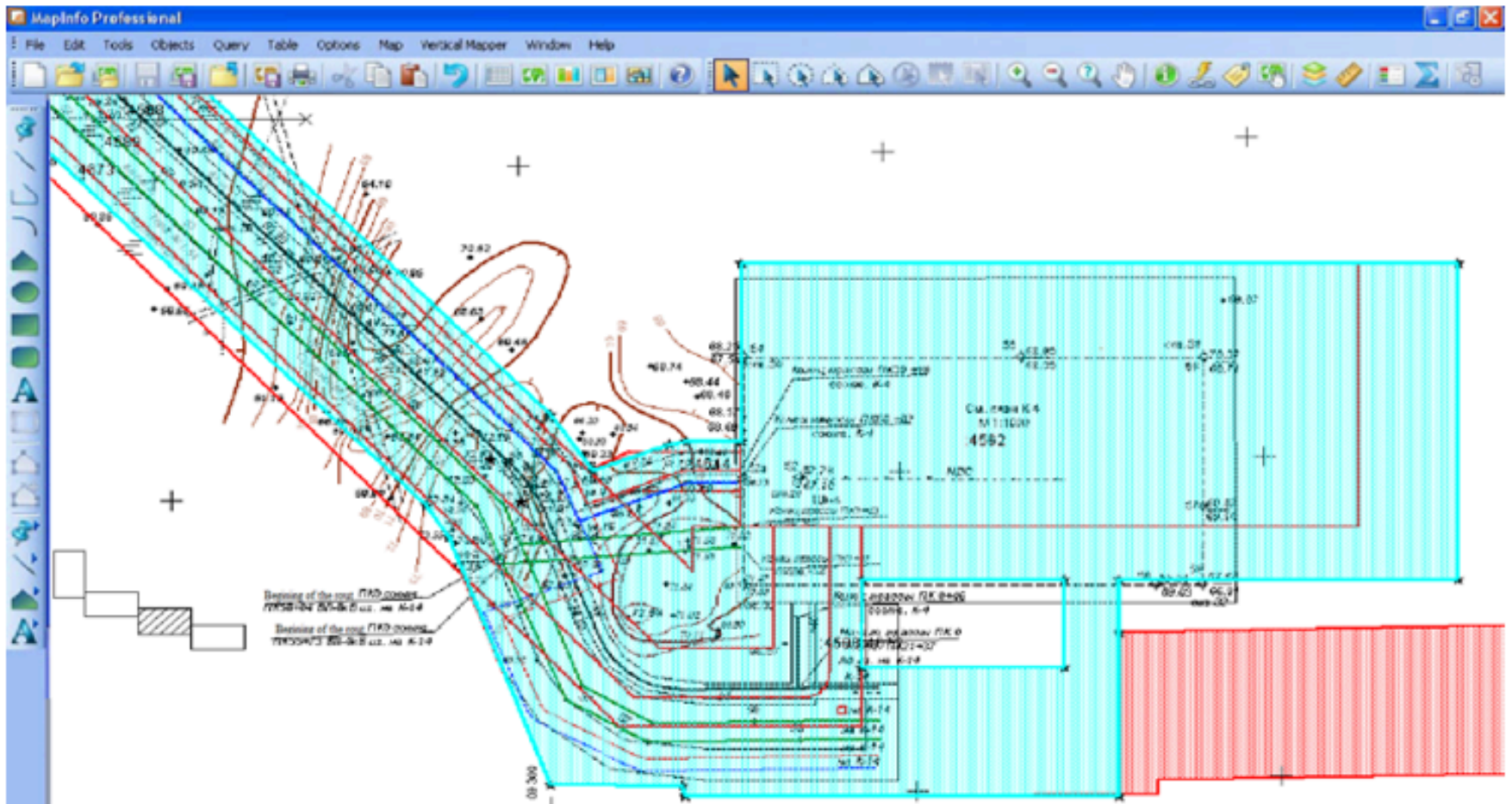
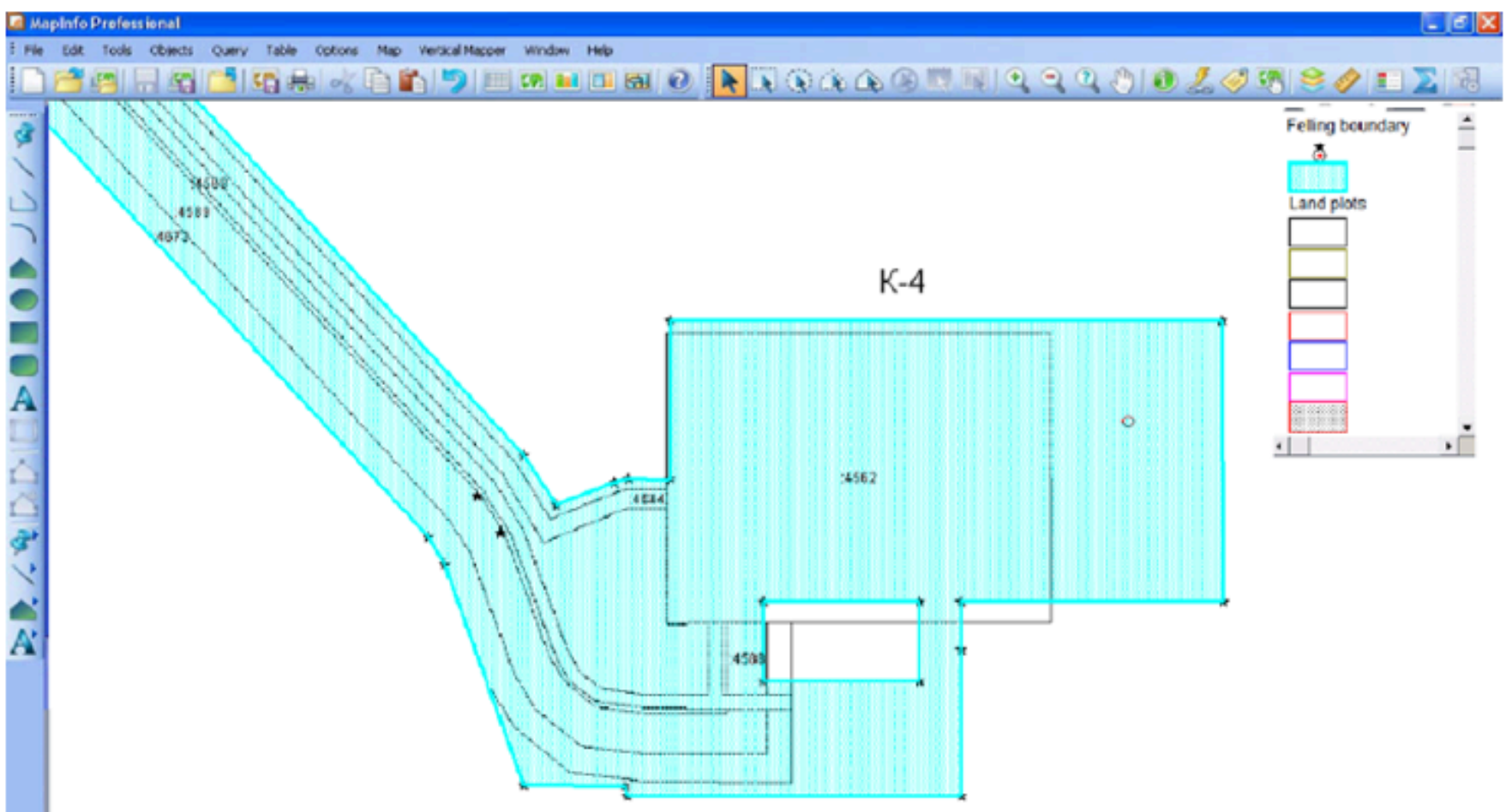


Fig. 5

GIS MapInfo – location of land plots and their cadastral numbers at the K-4 site



Based on the results of the performed measurements, the technical control of field and camera work was carried out, with the result it was established:

- compliance of the methodology used by the performer, the requirements of the instructions, conventional signs, instructions;
- adherence to the technical tolerances and requirements for the development of field technical documentation;
- condition of instruments, timeliness and completeness of their research.

The acceptance of the performed works by the customer was carried out with the preparation of acceptance certificates with the conclusion that engineering and geodetic survey of the boundaries of the deforestation contour were carried out in accordance with the current instructions, meet the conditions of the contract and are properly decorated. The volume of the executed works has made 5,84 kilometers (table 1).

Table 1
The volume of the executed works

Type of work	Measure	Scope of contract	Volume after the fact
Defining the boundaries of the forest cutting contour	kilometers	4.00	5.84

It should be noted that modern GIS are effective in all areas where the accounting and management of the territory, including the fields and objects located on it, is carried out. These are practically all directions of the activity of the management bodies and administrations: transport, engineering communications, business development, emergency management, law enforcement and security, land and real estate management, demography, health care, ecology, etc. [11-14].

Scientists [15-19] estimated that most of the information (in different sources, values from 60% to 90% occur), which a person encounters in his life, has a territorial reference. Therefore, GIS can be used practically in any sphere of human labor activity.

4. Conclusions

Thus, we can draw the following conclusions:

1. The object of research is located on the land of industry and according to the town-planning legislation of the Russian Federation it is a cluster (industrial) site [19].
2. With the use of global navigation satellite systems, namely, a set of two-frequency GNSS receivers "Trimble R-7", the boundaries of the deforestation contour have been surveyed to equip the K-4 pad and the communication corridor at the Nizhne-Shapshinskoye KhMAD-Yugra field in the volume 5.0 km.
3. Cameral processing of the received results was carried out in Trimble® Business Center software and GIS MapInfo Professional 9.0.
4. The results of engineering and geodetic survey of the boundaries of the forest felling contour of the land plot for the construction of the K-4 pad and the communication corridor will be used to prepare documents, including those containing the necessary information for cadastral registration.

At all stages of the technology of engineering and geodetic survey, the example of the site and the corridor of communications at the Nizhne-Shapshinskoye deposit of KhMAO-Ugra offer its most appropriate methods and methods of using various modern technologies for obtaining spatial data and software for their processing, analysis and further modeling, in particular, for the formation of a land surveying plan and cadastral registration of land.

Thus, the approbation of the method carried out in the research is universal and can be used for development and development not only in the KhMAO-Ugra fields, but also in the territories of other deposits around the world.

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