

CARTOGRAPHIC ACTIVITIES IN UKRAINE

2019 – 2023

NATIONAL REPORT

**Prepared by the State Service of Ukraine for Geodesy, Cartography
and Cadastre**

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1. General overview of the cartographic activity development in Ukraine

Cartographic activity in Ukraine is regulated by the Laws of Ukraine “On Topographic, Geodetic and Cartographic Activity”, “On Geographical Names”, and “On National Spatial Data Infrastructure”.

The Law of Ukraine “On Topographic, Geodetic and Cartographic Activity” (1998) sets the legal framework for the regulation of relations in the sphere of topographic, geodetic and cartographic activity for the needs of the state and citizens by the results of topographic, geodetic and cartographic activities.

The Law of Ukraine “On Geographical Names” (2005) determines the legal framework for the regulation of relations and activities related to the establishment of geographical objects names, as well as the standartization, registration, accounting, use and preservation of geographical names.

The Law of Ukraine “On the National Spatial Data Infrastructure” (2020) defines the legal and organizational framework for the creation, operation and development of the National Spatial Data Infrastructure aimed at ensuring effective management decision-making by public authorities and local self-government bodies, meeting the needs of society in all types of geographic information, and integration into the Global and European spatial data infrastructures.

The State policy formation in the sphere of cartographic activity provides the Ministry of Agrarian Policy and Food of Ukraine.

The State Service of Ukraine for Geodesy, Cartography and Cadastre (StateGeoCadastre) is responsible for implementing government policy in the matter of cartographic activity.

Priority directions of activity of the StateGeoCadastre in the sphere of topographic, geodetic and cartographic activity include:

- creation, development and functioning of the National Spatial Data Infrastructure;

- development of the national reference system, ensuring the functioning and development of the State Geodetic Network and special-purpose networks;

- topographic mapping of the territory and development of the national mapping system, creation and updating of topographic maps;

- establishment, regulation, accounting, registration, use and preservation of geographical names;

- creation and maintenance of the State Register of Geographical Names;

- carrying out works on the demarcation of the state border of Ukraine;

- functioning of the State Cartographic and Geodetic Fund of Ukraine;

- state supervision (control) in the field of topographic, geodetic and cartographic activities;

- international cooperation in the field of geodesy, cartography, Spatial Data Infrastructure and geographical names.

Cartographic activities for the needs of defense and national security of Ukraine are organized by the Ministry of Defense of Ukraine through the General Staff of the Armed Forces of Ukraine.

Cartographic work in Ukraine is performed by subjects of entrepreneurial activity of all ownership forms.

As of 2023, state topographic, geodetic and cartographic enterprises operate in the sphere of management of the StateGeoCadastrе to meet the needs of the country's economy, science, education and defense in geospatial information and cartographic products, intensify basic and applied scientific research, and introduce advanced achievements of science, engineering and technology.

In order to increase the economic efficiency of state topographic, geodetic and mapping enterprises, the process of optimizing their activities on a regional basis (reorganization, termination) is ongoing.

2. The scientific cartographic activity

Scientific mapping activities are carried out by the scientific and research institutes of the National Academy of Sciences of Ukraine, state academic and research enterprises of the StateGeoCadastrе, and higher education institutions.

The scientific, research and development works are carried out by state enterprises in the following main areas:

geodesy, topographic cartography, geoinformatics and standardization – at the State Enterprise “Research Institute of Geodesy and Cartography”;

thematic cartography, standardization of geographical names, administration and maintenance of the State Cartographic and Geodetic Fund of Ukraine – at the State Research and Production Enterprise “Cartografiia”;

demarcation of the state border of Ukraine and state topography – at the State Enterprise “Ukrainian State Aerogeodesic Enterprise”.

The Institute of Geography of the National Academy of Sciences of Ukraine is a leading scholarly-research institution in Ukraine dealing with natural geographical, social geographical and cartographic research and investigation (theoretical and methodological foundations of geographic cartography, scientific development of fundamental cartographic works, in particular, the National Atlas of Ukraine). The main focus is on the integration and cartographic synthesis of knowledge about nature, population and its history and economic development, as well as the ecological state of the natural environment.

During the reporting period, the Institute's cartographers focused more attention on the development and creation of electronic cartographic products:

An electronic Atlas of natural, man-made and social hazards of emergencies was developed and created for the territory of the state;

The interactive electronic Atlas “Population of Ukraine and its natural and cultural heritage” was developed and created;

Separate detailed interactive maps of objects that may be potentially vulnerable to emergencies were compiled;

A series of maps of Ukraine's settlement network based on census data dating back to 1897 – 21 maps in total.

Institute of Geological Sciences of the National Academy of Sciences of Ukraine deals with fundamental and applied research in the field of natural sciences and geological mapping.

Vegetation mapping at the Institute of Botany M. G. Kholodny of the National Academy of Sciences of Ukraine;

Linguistic cartography and toponymical research at the Institute of the Ukrainian language of the National Academy of Sciences of Ukraine.

Cartographic scientific researches on ecological, socio-economic, nature conservation and tourist mapping, history of cartography and geoinformation mapping are carried out by higher educational institutions:

Taras Shevchenko National University of Kyiv

The Scientific National Cartography School was initiated by the professor Kharchenko.

The Department of Geodesy and Cartography of the Faculty of Geography conducts scientific work on the following areas of research: geoinformational maintenance of cartographical modelling and development of maps for educational needs, geodynamic researches, in particular deformation of engineering structures, land surveying, including ground, with the use of digital photogrammetry methods in architectural measurements and reconstruction, comprehensive thematic mapping, in particular ecological and medical-geographical problem-oriented mapping of Ukraine.

The Military Institute of Taras Shevchenko National University of Kyiv conducts research in the field of geoinformation technologies, military geography, geodesy, cartography and topography.

Kyiv National University of Construction and Architecture

The main areas of scientific research of the Department of Geoinformatics and Photogrammetric mapping of the Faculty of Geoinformation Systems are:

development of geoinformation models, technologies and systems for territorial management, land and town-planning cadastre and monetary valuation of land;

creation of WEB-services, development of instrumental geoinformation systems, development of software-methodical complexes;

development of methods and practical technologies of digital photogrammetry for the applied problems solution in construction and other branches of economy;

development of methodological foundations for the development of geospatial data infrastructure and standardization in the field of geographic information / geomatics.

The Institute of Geodesy of Lviv Polytechnic National University

The scientific areas of the Institute of Geodesy are photogrammetry and remote sensing of the Earth, the Earth shape researching, external gravity field of the Earth and planets, creating of geoinformation systems, creating of the software solutions and geospatial databases, general geographic and thematic mapping, mathematical modeling in cartography, geodesy, geophysics and history of cartography.

V. N. Karazin Kharkiv National University

Scientific research at the Department of Physical Geography and Cartography of the Faculty of Geology, Geography, Recreation and Tourism are evolving in the following areas:

theory and methodology of geographic science;
 scientific foundations of education modernization cartographic support at all levels of education;
 scientific fundamentals of landscape-ecological and geoinformation mapping;
 regional thematic (environmental protection, tourism) cartography and cartography theory;
 mapping of natural and historical-cultural heritage;
 assessment of surface water quality in the Siverskyi Donets basin (within the boundaries of the Kharkiv region);
 scientific fundamentals of the tourism system and recreational mapping of the regions of Ukraine.

The National University of life and environmental sciences of Ukraine

The basic scientific research at the Department of Geodesy and Cartography of the Faculty of Land Management are:

scientific principles of problems solution of land management of rural territories on the basis of geoinformation and cartographic modeling of land use indicators;

atlas electronic large-scale mapping of land resources of scientific research facilities;

the concept of the electronic geocological atlas of the river-basin system as an instrument for monitoring and management of nature use on the basin principle;

the latest concept of creating an instrument for regulating market land relations and spatial development – a digital Atlas of Land Value of Ukraine.

Ivan Franko National University of Lviv

The Faculty of Geography performs research works on soil-geographic classification of the territory of Ukraine.

3. Main types of cartographic activity

Topographic mapping

The national topographic mapping is carried out on a scale of 1:10 000, 1:25 000, 1:50 000, 1: 100 000, 1: 250 000, 1: 500 000 and 1: 1 000 000.

The state base topographic map is a topographic on a scale 1:10 000, which is the basis for geo referencing and the determination of the coordinates of all data coming to the geographic information system, designed to build the National Spatial Data Infrastructure and is used as a base layer for the state land cadastre, urban cadastre and inventories of other natural resources, registers of all kinds and definition of the state border of Ukraine on the ground.

The territory of Ukraine is fully equipped with topographic maps of different years, the publication on a scales:

The existing topographic maps at a scale of 1:10 000 were created using traditional mapping technology (without a digital vector version), which provided for their wide replication.

The territory of city settlements is covered by topographical plans in scale 1:5 000 and 1:2 000. For the separate city, village and production zone parts the topographic plans in scale 1:1000 and 1:500 are being developed.

There are topographic maps in scale 1:10 000 and 1:25 000 on internal reservoirs and areas of the continental shelf.

The creation and updating of topographic maps is carried out using the latest geoinformation technologies in the United State Geodetic Reference Coordinate System USC-2000 and the Baltic Elevation System in 1977. The geodetic framework for maps and plans is the State Geodetic Network and points of geodesic condensation networks. The scalability and nomenclature of all scale differentiations are subordinated to a single system.

Digital maps and plans are created in the classification and coding of topographical information within the rules for digital description of topographical objects and appropriate data storage format, development of geospatial data based on them.

Thematic and special cartography

State thematic maps are created by state-owned enterprises and organizations, branch scientific research and scientific technical institutions, enterprises and organizations on the basis of topographic maps of corresponding scales, taking into account the needs of science, education and culture.

Data and materials of public authorities, institutions and organizations are used to create state thematic maps.

In the structure of state bodies, there are institutions and organizations that carry out certain types of thematic mapping, including:

State Service of Geology and Subsoil of Ukraine, Ministry of Environmental Protection and Natural Resources (geological mapping);

State Agency of Forest Resources of Ukraine, Ministry of Environmental Protection and Natural Resources (mapping of forests);

government bodies subordinated to the Ministry of Communities, Territories and Infrastructure Development of Ukraine:

State Aviation Service (aeronautical mapping);

State Service of Maritime and River Transport of Ukraine (maritime and river navigation mapping).

Complex geological, hydrogeological, ecological-geological and engineering-geological mapping of the territory of Ukraine is carried out by the State Service of Geology and Subsoil of Ukraine. The priority type of geological mapping is geological study of the areas at a scale of 1:200 000 with the purpose of publishing the State Geological Map of Ukraine at a scale of 1:200 000 – a basic multi-purpose complex geological basis for planning the development of natural resources, development of the mineral resource base, development of scientifically grounded exploration works, construction, land reclamation, protection of mineral resources and the environment, as well as solving other urgent issues of the state development.

Special mapping of forests, creation of various thematic maps on inventory of forests, assessment and monitoring of the forest resources is carried out by the Ukrainian State Project Design and Forestry Production Association of the State Agency of Forest Resources of Ukraine.

The branch of the state institution “State Hydrography” – “Ukrmorkartografiya” of the Ministry of Communities, Territories and Infrastructure Development of Ukraine is a modern research and production complex, the only specialized authorized enterprise in Ukraine for the production and publication of official paper and electronic navigational charts, inland waterways and navigational guides in accordance with international and national standards, creation and maintenance of cartographic, topographic and hydrographic databases on the level of modernity it, as well as the publication of special publications.

The data of electronic marine navigational charts is standardized in terms of content, structure, current format of the exchange of hydrographic information, is fully in line with the special requirements and recommendations of the International Hydrographic Organization and are suitable for use in electronic navigation systems.

The functioning of the national air navigation system of Ukraine and the United Civil-Military Air Traffic Management System of Ukraine, high-quality and safe air navigation services in the airspace of Ukraine and in the airspace over the open sea, where the responsibility for servicing air traffic under international agreements is entrusted to Ukraine, is provided by the State Enterprise Air Traffic Service of Ukraine of the Ministry of Communities, Territories and Infrastructure Development of Ukraine with the help of air navigation maps, created in accordance with International Civil Aviation Organization (ICAO).

The State Scientific-Production Enterprise “Cartografiia” is the leading state cartographic enterprise, which works in the sphere of cartography and printing for 79 years.

Thematic cartography, carried out by SSPE “Cartografiia”, focuses mainly on the development and publication of basic scientific reference cartographic works, political-administrative, general geographic, tourist and reference atlases and maps of Ukraine, other countries and the world as a whole, as well as atlases and plans of Ukrainian cities, atlases and road maps of Ukraine and Europe, wall maps and atlases on geography and history, and contour maps.

At the moment the most important activity of the enterprise is the creation of electronic large-scale maps and plans of cities.

The company produces a wide range of cartographic publications: educational maps and educational atlases, wall maps for the teaching of history and geography, atlases and maps of motorways, plans and atlases of cities, tourist maps, reference maps and atlases of Ukraine, atlases of the world, maps to encyclopedic editions, for offices, that in content and quality meet the requirements of the most demanding consumer. The company also creates digital maps to order using modern GIS.

Among the most significant publications of recent years:

The wall educational map of the world “Peoples” at a scale of 1:22 000 000 and the wall map “Ukraine. Metallurgy and Metalworking” at a scale of 1:1 000 000, designed to be used as teaching guides for studying the geography of Ukraine in general secondary education institutions.

Wall educational map “Countries of America. Economic map” at a scale of 1:13 000 000 (2021), designed to study the course “Geography: Regions and Countries” (according to the new program) in the 10th grade for general secondary education institutions.

Wall map “National Liberation Struggle in Western Ukraine. 1941–1950” for grades 10-11 at a scale of 1:800 000 (2022) and the wall map “Europe” (with insets) at a scale of 1:4 150 000 (2023), which consists of the main map of modern Europe and four additional maps providing an overview of important stages in the formation of the political map of Europe.

A series of road maps and political administrative maps of Ukrainian oblasts with the boundaries of territorial communities under the new administrative structure (2019–2023).

“Ukraine. Atlas of Roads” at a scale of 1:500 000 with 55 city plans (2022), “Ukraine. Road Atlas” at a scale of 1:1 000 000 (2022), “Europe. Road Atlas” at a scale of 1:3 500 000 (2023).

Map of the series “Tourist routes. Carpathians. German Wet Ruzha – Mt. Bushtul” at a scale of 1:50 000 with light and shadow relief plastic as an example of high-quality tourist maps (2020).

“Tourist Carpathians” is a series of five maps: Carpathians – tourist map, Carpathians. Chornohora. Vorokhta – Yasinia; Carpathians. Yaremche – Vorokhta, Bukovel – Hoverla; Carpathians. Verkhovyna district; Carpathians. Rakhiv district (2021), etc.

4. National Spatial Data Infrastructure

The formation of the National Spatial Data Infrastructure is performed taking into account the compatibility and rules for the submission of geospatial data and metadata to ensure their joint use by EU countries in accordance with the recommendations of the Directive of the European Parliament and of the Council of March 14, 2007 on the implementation of the spatial information infrastructure in the European Union (INSPIRE).

On January 1, 2021, the Law of Ukraine “On the National Spatial Data Infrastructure” (hereinafter – the Law) came into force, which defines the legal and organizational framework for the creation, operation and development of the National Spatial Data Infrastructure.

The Procedure for the Functioning of the National Spatial Data Infrastructure, approved by the Resolution of the Cabinet of Ministers of Ukraine No. 532 of May 26, 2021, establishes requirements and introduces a mechanism for organizing the production, updating, processing, storage, publication, visualization, distribution and utilization of geospatial data and metadata, and other activities related to them.

Order of the Ministry of Agrarian Policy and Food of Ukraine dated November 10, 2021 No. 347 “On Approval of Technical Requirements for Geospatial Data, Metadata and Geoinformation Services of the National Spatial Data Infrastructure” (registered with the Ministry of Justice of Ukraine on January 12, 2022 No. 21/37357) establishes the uniform technical requirements for metadata, geoinformation services, structure and content of geospatial data specifications,

rules and methods for ensuring interoperability and compatibility of geospatial data sets and geoinformation services created and published in accordance with the Law.

In addition, Article 12 of the Law of Ukraine “On National Spatial Data Infrastructure” provides for the activities of the National Spatial Data Infrastructure Council aimed at ensuring the formation and implementation of state policy in the field of the National Spatial Data Infrastructure. The Council for the National Spatial Data Infrastructure was established by the Resolution of the Cabinet of Ministers of Ukraine No. 812 dated September 09, 2020.

The package of international standards ISO 19100 “Geographic Information / Geomatics” is being harmonized and implemented in Ukraine.

In order to ensure the creation and maintenance of the national geoportal, metadata database, and integration of geospatial data from data producers, the StateGeoCadastre Order No. 47 “On Appointment of the Administrator of the National Geoportal” of 28.01.2021 appointed the State Enterprise “Research Institute of Geodesy and Cartography” as the administrator of the national geoportal.

In accordance with Article 6 (1) of the Law, user access to geospatial data and metadata is provided through geoportals of data holders and the official website of the National Spatial Data Infrastructure.

In accordance with paragraph 3 of Resolution No. 134 of the Cabinet of Ministers of Ukraine dated February 12, 2020 “On Amendments and Invalidation of Certain Resolutions of the Cabinet of Ministers of Ukraine”, the State Enterprise “Research Institute of Geodesy and Cartography” successfully implemented an innovative pilot project on the National Spatial Data Infrastructure in the territories of Lviv and Kharkiv regions, cities of Lviv, Zhytomyr, Bila Tserkva, Mykolaiv, Mariupol, Poltava in 2020–2021, which was presented to a wide range of users on May 26, 2021 during the All-Ukrainian Forum “Ukraine 30. Earth” was presented to a wide range of users as a prototype of the national geoportal, which operates in a trial mode.

For the period of martial law, the administrator of the national geoportal closed access to the geoportal of the National Spatial Data Infrastructure Pilot Project to a wide range of users and provided the possibility of registration and further work on the geoportal to verified users, primarily executive authorities, local governments, legal entities of public law and natural monopolies, which are obliged by law to publish geospatial data and metadata on the national geoportal, the holders of which

In accordance with clause 22 of the Procedure for the Functioning of the National Spatial Data Infrastructure, the StateGeoCadastre ensures the creation, updating, processing and visualization of basic geospatial data sets on geospatial objects of national importance at the scale of 1:10 000 and 1:50 000 and access to them through the services of the national geoportal.

With the support of the Mapping Service of the Kingdom of Norway (Kartverket) and the international consulting company “ConsaltingWhere”, a Socio-Economic Impact Assessment Report was developed in Ukraine as part of the implementation of the Integrated Geospatial Information Framework (IGIF) in Ukraine.

In order to provide the National Spatial Data Infrastructure with sets of basic geospatial data of national importance, in January 2022, the StateGeoCadastrе presented an updated digital topographic map of 1:50 000 scale for the territory of Ukraine, created as a seamless topographic database with 1965 updated nomenclature sheets of digital maps. This map is uploaded on the NSDI pilot project geoportal and is available to verified users in the viewing mode.

During 2022–2023, at the request of the StateGeoCadastrе, with the support of the USAID Agricultural and Rural Development Program (AGRO), a group of consultants developed draft Terms of Reference for the creation of a national geoportal of the National Spatial Data Infrastructure.

The StateGeoCadastrе has also been organizing events to exchange knowledge in the field of geospatial data, the most recent of which were

March-April 2023 – a basic training course “Fundamentals of creating interoperable geospatial data for the NSDI development” organized by the Ministry of Agrarian Policy and Food of Ukraine and the StateGeoCadastrе with the support of the USAID Agricultural and Rural Development Program. As a result of the course, 137 representatives of central and territorial authorities, state-owned enterprises, institutions and organizations dealing with geospatial data successfully completed the training and received certificates of advanced training;

April-May 2023 – an in-depth training course “Fundamentals of interoperable geospatial data creation for the NSDI development” aimed at specialists of government agencies involved in geospatial data. The event was attended by close to 300 participants;

in June 2023 – an online seminar within the framework of cooperation between the StateGeoCadastrе and the Geospatial Commission of the UK for representatives of executive authorities and other holders responsible for creating and updating geospatial data sets and metadata. The total number of participants was around 90.

The components of the National Spatial Data Infrastructure created by the StateGeoCadastrе are used by both the public and private sectors through the following geoportals (during the martial law imposed in Ukraine since February 24, 2022, open access to registers/portals is limited):

Public Cadastral Map of Ukraine – provides access to the key data of the State Land Cadastre on the cadastral number of the land plot, its boundaries, area, form of ownership, and intended purpose, according to the classifier. The Protocol of Information Interaction between the information systems of the State Land Cadastre and the Pilot Project of the National Spatial Data Infrastructure was signed and approved by the Order of the StateGeoCadastrе No. 120 dated 06.04.2023.

State Geodetic Network – provides access to metadata and geodetic information on points of the State Geodetic Network, which coordinates are defined in the USC-2000 coordinate system and which are the basis for topographic, geodetic, cartographic and land management works, and the provision of services for transformation of coordinates.

Administrative Territorial Structure of Ukraine – provides creation, completion, updating of the database and metadata about administrative and

territorial units, topographical objects, settlements, highways and railways, legislative data on changes in the administrative and territorial structure, prospective plans for the formation of community territories, data on conglomerated territorial communities, image of the state border, the borders of the Autonomous Republic of Crimea, oblasts, cities of Kyiv and Sevastopol, rayons, cities, settlements and villages.

State Register of Geographical Names

The State Register of Geographical Names is established and maintained on the basis of the Law of Ukraine “On Geographical Names” and Resolution of the Cabinet of Ministers of Ukraine No. 622 “On Approval of the Regulation on the State Register of Geographical Names” dated May 11, 2006, Order of the Ministry of Agrarian Policy and Food of Ukraine No. 219 “On Approval of the Registration Forms of the State Register of Geographical Names” dated June 11, 2014, registered with the Ministry of Justice on June 24, 2014, No. 683/25460.

The State Register of Geographical Names was created as an automated system for recording standardized geographical names, which provides for ongoing updating of information on the names and renaming of geographical objects, changes in their status, category, type, etc. based on official data.

The electronic database of names of geographical objects of Ukraine of the State Register of Geographical Names was updated by administrative-territorial units (the Autonomous Republic of Crimea, oblasts, rayons, cities, village and settlement councils) on the basis of a topographic map at a scale of 1:100 000. The database contains information on 46 indicators: registration number, standardized name of the geographical object in Ukrainian and Latin, type of geographical object, administrative status (for settlements), administrative-territorial reference, geographical coordinates (latitude and longitude), information on renaming of the geographical object, historical names, etc.

The database of the State Register of Geographical Names contains more than 105 000 names of settlements and units of administrative and territorial structure, physical, geographical and socio-economic objects of Ukraine.

In 2023, it is expected to create (compile) the second part of the State Register of Geographical Names of Geographical Objects of other states and territories of the world with a total of 80 000 units (established and standardized geographical names) in the form of relevant accounting and registration forms filled in using the information and communication system.

5. Cartographic Fund

Topographic geodetic, cartographic, aerial survey materials and data created by state topographic geodetic and cartographic enterprises, subdivisions of the Ministry of Defense of Ukraine, and by entrepreneurs are stored and systematized in the State Cartographic and Geodetic Fund of Ukraine.

In order to maintain the State Cartographic and Geodetic Fund of Ukraine, the StateGeoCadastre ensured the creation of the geographic information system of the State Cartographic and Geodetic Fund of Ukraine. At present, geodetic, topographic and cartographic materials (topographic plans and maps of the entire scale range

from 1:500 to 1:1 000 000), hydrographic and aerial survey materials are to be submitted to the State Cartographic and Geodetic Fund through the geographic information system in accordance with the following requirements:

1) The State Cartographic and Geodetic Fund of Ukraine operates as part of the National Spatial Data Infrastructure and is developed on the basis of collection, processing, and accounting of topographic and geodetic and cartographic materials in electronic (digital) form, obtained as a result of national topographic, geodetic and cartographic works, as well as special topographic, geodetic and cartographic works, the results of which are of interagency importance, for use by state authorities and local self-government bodies, as well as individuals and legal entities;

2) maintenance of the State Cartographic and Geodetic Fund of Ukraine is carried out by creating and maintaining a geographic information system and relevant geographic information services that ensure acceptance, accounting, storage, analysis and processing of materials and data received for storage, as well as publishing metadata on the national geoportal;

3) formation and maintenance of the State Cartographic and Geodetic Fund of Ukraine, acceptance of materials and their automated verification (validation) shall be carried out by the administrator – a designated state unitary enterprise, state organization (institution, establishment) that belongs to the sphere of management of the central executive body implementing the state policy in the field of land relations;

4) the administrator of the State Cartographic and Geodetic Fund of Ukraine shall provide access to certified land surveyors for automated verification (validation) of compliance of an electronic document containing information on the results of topographic and geodetic and cartographic works in electronic (digital) form with the established requirements for content, structure and technical characteristics for the development of such a document prior to submission of an application for entering relevant information to the State Cartographic and Geodetic Fund of Ukraine. Based on the results of the inspection, an electronic inspection report with a description of errors (if any) is generated.

At the time of submission of this report, the geographic information system of the State Cartographic and Geodetic Fund of Ukraine is in trial operation. From 24.02.2022 until the end of martial law in Ukraine, the Administrator of the State Cartographic and Geodetic Fund of Ukraine decided to restrict access to the data stored in the State Cartographic and Geodetic Fund. Users will be informed about the full restoration of the State Cartographic and Geodetic Fund's operation additionally. To ensure the access to the geographic information system of the State Cartographic and Geodetic Fund of Ukraine, users must complete the registration and verification procedure.

The archive of topographic maps of different years of publication in the State Cartographic and Geodetic Fund of Ukraine includes more than 250 thousand copies.

Cartographic materials are also kept there:

The State Academic and Research Center “Pryroda” of the State Space Agency of Ukraine – data of space surveys;

The State Academic and Research Enterprise “State Information Geological Fund of Ukraine” is a scientific and production institution of the State Service of Geology and Subsoil of Ukraine that collects, stores, analyzes and provides information that has been formed in the process of geological study and use of subsoil, and preserves unique cartographic materials.

A big collection of cartographic products is stored in the libraries

V.I. Vernadskyi National Library of the NAS of Ukraine is the main Ukrainian bookstore, the national comprehensive library-information, scientific-research, scientific-methodical and cultural-educational center with the largest amount of documents and information resources of the bookkeeping of Ukraine. The cartographic fund contains about 50 thousand copies.

Vasyl Stefanyk Lviv Scientific Library of the NAS of Ukraine is the state depository of unique handwritten and printed historic notice of book culture works of Ukrainian and foreign art, one of the largest collection of cartographic early printed books in Europe, the XVI century edition, atlases and maps of the XVII-XVIII centuries (more than 22 thousand depositary items).

The Scientific Library of the Ivan Franko Lviv National University – contains a collection of cartography from 1511.

A page for viewing city plans from the collection of the Scientific Library
Cartographic collections are retained in the state archival establishments, primarily in the Central State Historical Archives of Ukraine (Lviv), as well as in such museums:

- the D.I. Yavornytsyi Dnipropetrovsk Historical Museum;
- the Odessa Archaeological Museum of the NAS of Ukraine;
- the Alupka Palace Museum;
- the Odessa Museum of Local Lore;
- the Crimean Republican Museum of Local Lore.

6. Cartographical education

In Ukraine there is a branched network of establishments for the preparation of experts of “Junior Specialist”, “Bachelor” and “Master” academic levels and training of highly qualified personnel in postgraduate education and doctoral studies in the sphere of topographic-geodesic and cartographic activity. Training of specialists in cartography, geodesy, photogrammetry and geoinformatics is provided by the following higher educational establishments:

The Taras Shevchenko Kyiv National University

The Department of Geodesy and Cartography of the Geographical Faculty is one of the oldest departments of the Taras Shevchenko National University of Kyiv (1838).

The basis for the advanced professional training of all students is the fundamental sciences: physics, economic and social geography, geology, geomorphology, meteorology, climatology, hydrology, soil science, biogeography,

physical geography of continents and oceans, economic and social geography of foreign countries, landscape ecology, topography, cartography, geodesy, aerospace research methods, geoinformatics, etc. As of January 1st, 2023, the Department of Geodesy and Cartography has 15 teachers (3 doctors of geographical sciences, 3 professors, 9 candidates of sciences, 3 assistants).

On the basis of the department a specialized edition of geographical sciences “The Journal of Cartography” is published.

The Kyiv National University of Building and Architecture

The Department of Geoinformatics and Photogrammetry of the Faculty of Geoinformation Systems of Territory Management training of bachelors and masters on the specialty “Geodesy and Land Management”, specialization “Geographic information systems and technologies”, “Space monitoring of the Earth”. The teaching staff of the department consists of 21 people: 3 doctors of sciences, 9 associate professors and 10 candidates of sciences, including 3 professors, 2 senior lecturers, 5 assistants, one engineer of the second category and a master.

Students are studying the most effective achievements in the field of information technology and programming, object-oriented geospatial databases, geographic information collection and processing methods, geoinformation analysis and modeling, web mapping, Earth remote sensing and digital photography, digital information, GIS cadastral systems, GIS in engineering networks. The educational process at the department is carried out by using the international standards of the series ISO 19100 “Geographic Information / Geomatics” and the INSPIRE specifications. In the scientific and educational process, the department uses the latest computer and photometric technologies and software licensing for geoinformation and remote sensing: ArcGIS, PostGRE / SQL, QGIS, Autopilot Map, Delta CMS, 3D Civil, Erdas, ENVI, TerraScan, MicroStaton, etc.

In 2023, the training course and teaching guide “Fundamentals of Interoperable Data Creation for the Development of the National Spatial Data Infrastructure” were launched, created by the teaching staff of the Kyiv National University of Construction and Architecture with the support of the USAID Agriculture and Rural Development Program.

The “Lviv Polytechnic” National University

At the Institute of Geodesy of the National University “Lviv Polytechnic” today, there are 6 professors, 8 doctors of sciences, 21 associate professors and 13 Ph.D, 6 senior lecturers, 1 assistant, 15 engineers and 2 laboratory assistants. More than 600 full-time and part-time students study at the Institute of Geodesy. Their training is provided by six departments: Geodesy, Cartography, and Geospatial modeling, Higher Geodesy and Astronomy, Engineering Geodesy, Photogrammetry and Geoinformatics, Cadastre of territories.

The collected book “Geodesy, Cartography and Aerial Photography” is published in order to highlight current problems in astronomy, the theory of the figure of the Earth and planets, gravimetry, precise leveling, triangulation and trilateration, as well as studies in the field of earth's refraction, earth surface

movements, higher geodesy, engineering geodesy, cartography, aerial photography, photogrammetry, and geoinformatics.

The N.V. Karazin Kharkiv National University

The Department of Physical Geography and Cartography of the Faculty of Geology, Geography and Recreation conducts its history since 1804 and is the oldest geographical faculty of Ukraine. The department carries out preparation of bachelors, masters, and specialists on the specialty "Geography". Masters and specialists have the opportunity to receive special training on specialties: "Land inventory and monitoring", "Regional studies and tourism", "Geographical cartography", "Physical geography and geoecology", "Physical geography and hydrometeorology", "Management of education", as well as postgraduate study on specialties "Geographical cartography" and "Constructive geography and rational use of natural resources". Professional training is provided by 3 doctors of sciences, 4 professors, 10 candidates of sciences, 9 associate professors, 2 leading specialists in geography and specialists in the field of education, management, tourism, geodesy and land management of such professionally oriented disciplines as: topography with the basics of geodesy, earth sciences, ecology, general hydrology, cartography, remote sensing of the Earth, meteorology and climatology, landscape science, nature management and nature conservation, physical geography of Ukraine, physical geography of continents and oceans, theory and methodology of geographic science, methodology of teaching geography, etc

The Ivan Franko Lviv National University

The Faculty of Geography is the leading scientific center for the training of specialists of high qualification level. Today, there are eight departments in the Faculty of Geography: physical geography, economic and social geography, geomorphology and paleogeography, rational use of natural resources and nature conservation, the geography of Ukraine, soil science and soil geography, constructive geography and cartography, and tourism. The departments of the faculty carry out training of the students on the specialties "Secondary education", "Ecology", "Earth sciences", "Geography", "Hotel and restaurant business", and "Tourism". More than 180 scientific and pedagogical employees work at the faculty, more than 1500 full-time and part-time students study at the faculty.

National University of Life and Environmental Sciences of Ukraine

The Department of Geodesy and Cartography of the Faculty of Land Management provides training for bachelors and masters in specialties: "Geodesy and Land Management". The Department provides preparation of candidates for physical geography, geophysics and geochemistry of landscapes specializations; candidates and doctors of sciences in the sphere of economics of nature use and environmental protection. The staff of the department provide teaching of such disciplines: topography, geodesy, engineering geodesy, topographic and land blackening, geodesy, mathematical processing of geodetic measurements, higher geodesy, satellite geodesy and spherical astronomy, electronic geodetic instruments, cartography, geography of tourism and political geography of the world, computer technologies in cartography, cartographic provision of land management, thematic

mapping, methodology of geospatial data modeling of transformation processes, modeling in cartography (land management), National Spatial Data Infrastructure, mapping of natural resources.

The training of specialists in cartography, geodesy and geoinformatics is also carried out by the following higher educational institutions:

Donetsk National Technical University (Pokrovsk);

Kryvyi Rih National University;

National University of Water Management and Natural Resources (Rivne);

National Aviation University;

Lviv State Agrarian University (Dublyany, Lviv region);

East-European National University of Lesia Ukrainka;

Military Institute of Taras Shevchenko Kyiv National University.

The training of junior specialists and bachelors in cartography and geodesy is conducted by the College of Information Technologies and Land Management of the National Aviation University.

7. International cooperation

International cooperation in the sphere of geodesy, cartography and geographical names was carried out through the participation in the activities of the following international organizations:

Association of national cartographic-geodesic and cadastral services of European countries (EuroGeographics). Ukraine has been a full member of EuroGeographics since 2006. Ukraine participates in international projects EuroGlobalMap, EuroRegionalMap, EuroBoundaryMap, programs and projects of the Association European Location Services, INSPIRE and Copernicus Emergency Mapping Service.

UN Expert Group on Geographical Names (UNGEGN). Since 1993, Ukraine has been a member of the UN Expert Group on Geographical Names and is a part of its two divisions: the Eastern Europe, North and Central Asia Division, the Eastern, Central and Southeast Europe Division and as an observer in the Baltic Division.

United Nations Expert Committee on Global Geospatial Information Management (UNGGIM). Ukraine takes part in the activities of UN-GGIM and UN-GGIM EUROPE.

Open Geospatial Consortium (OGC). On December 8, 2022, Ukraine, represented by the StateGeoCadastr, became an associate member of the Open Geospatial Consortium. The membership of the StateGeoCadastr in the OGC will be valid for one year (with the possibility of extension) and will provide access to the best international practices in the development of standards and services in the field of geospatial information for the further development of the National Spatial Data Infrastructure in Ukraine, it will also facilitate the exchange of experience and knowledge to improve the national geoportal. It is worth noting that 20 OGC standards were used in the course of writing the Terms of Reference for the development of the National Spatial Data Infrastructure Pilot Project GeoPortal.

Council of European Geodetic Surveyors (CLGE). On May 12–13, 2023, the CLGE General Assembly was held, during which the CLGE Management Board unanimously approved Ukraine's membership in the CLGE.

Also, since 2019, Ukraine has annually participated in the World Geospatial Forums organized by the international non-governmental organization “Geospatial World”. In 2022, the jury of the Geospatial World Leadership Awards awarded the State Service of Ukraine for Geodesy, Cartography and Cadastre with the National Geospatial Agency of the Year award for exemplary service to the state.

In addition, during the reporting period, several memorandums were signed that will contribute to the development of the mapping industry in Ukraine:

Memorandum of Understanding between the State Service of Ukraine for Geodesy, Cartography and Cadastre and the Netherlands Agency for Cadastre, Land Registry and Cartography (Kadaster) on institutional and partnership cooperation in the field of National Spatial Data Infrastructure (2020);

Memorandum of Understanding in the field of land management between the State Service of Ukraine for Geodesy, Cartography and Cadastre and the Ministry of Climate Change and Environment of the United Arab Emirates (2021);

Memorandum of Understanding between the State Service of Ukraine for Geodesy, Cartography and Cadastre and the Ministry of Economy of the Republic of Azerbaijan on cooperation in the field of land relations, management of state-owned land and state land cadastre (2022).

There are four geodetic points on the territory of Ukraine (Baranivka – BARANIWKA, Katerinovka – KATERINIWKA, Felshtin – FELSCHTIN and Staronekrasivka – STARO-NEKRASSIWKA) within the cross-border object Struve Geodetic Arc, included to the UNESCO World Heritage List on July 15, 2005. 63 geodetic points of the Struve geodetic arc were discovered and inspected on the territory of the country, some of them included in the State Geodetic Network. In 2019, a survey was conducted on the location of the preservation of the geodetic points of the Struve geodetic arc and on the territory of the Odeska oblast (Izmail, Kotlabukh Sukhyi, Staronekrasivka, Tashbunar II) and Khmelnytskyi oblast (Baranivka, Katerynivka, Felshtyn).

Such NGOs are operating in Ukraine:

Ukrainian Society for Geodesy and Cartography (part of the International Federation of Surveyors);

Western geodesic society;

Ukrainian Society for Photogrammetry and Remote Sensing – is a permanent member of the International Association of Photogrammetry and Remote Sensing;

Ukrainian Geographical Society.

During the reporting period, the mapping sector in Ukraine was strengthened through international technical assistance projects:

The project “Maps for Good Land Governance in Ukraine” (2018–2021), implemented under the Agreement between the StateGeoCadastre and the Mapping Service of the Kingdom of Norway, to develop the State Topographic Map of

Ukraine as a topographic database that corresponds in content and accuracy to a topographic map at a scale of 1:50 000;

The Capacity Development Project for the Utilization of the National Spatial Data Infrastructure in Ukraine between the StateGeoCadastre and the Japan International Cooperation Agency (JICA) (2022–2025).

Project “Supporting Transparent Land Governance in Ukraine” (2020–2026) implemented by the International Bank for Reconstruction and Development with the support of the European Union.