



Geodesy, Cartography and Cadastre Authority of the Slovak Republic

INTRODUCTION

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QKEN

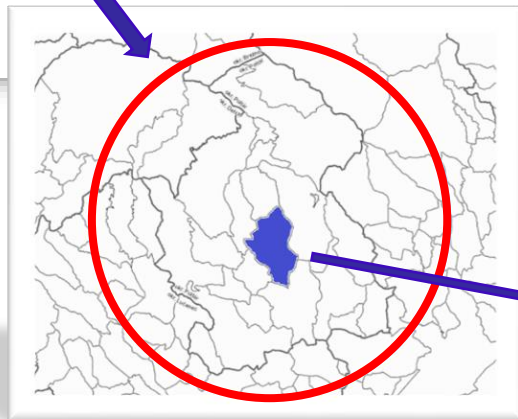
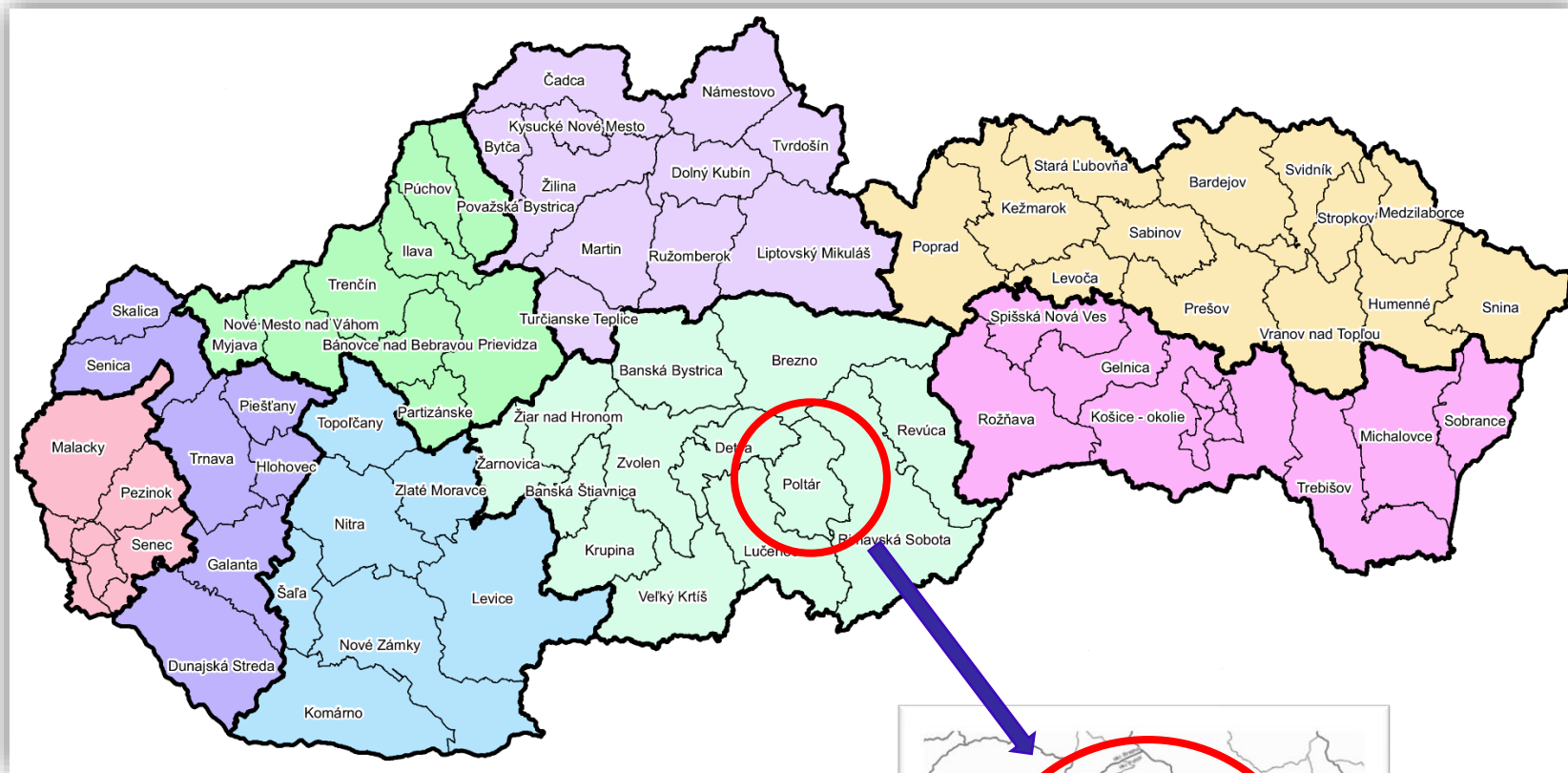
Bratislava, Slovakia, 9 October 2024

Main facts about Slovakia



- Established: 1.1.1993
- Capital: Bratislava
- Population: 5.45 million
- Density: 111/km²
- EU Member: 2004
- Currency: Euro – 2009
- Area: 49 035 km²
 - Water: 1.6%
 - Forrests: 41%
 - Agricultural land: 49%
 - Other: 8.4%

Administrative units



- 8 regions
- 79 districts
- 75 cadastral offices
- 2 927 municipalities
- 3 559 cadastral districts



Central state administration

- Government
 - Ministries (15)
 - Central state administration bodies (10) →

Local state administration

- 72 district offices

- Statistical Office
- **Geodesy, Cartography and Cadastre Authority**
- Nuclear Regulatory Authority
- The Industrial Property Office
- Telecommunications Office
- ...
- ...

Organisational structure



Direct management in the field of geodesy, cartography and technical activities

Geodesy, Cartography and Cadastre Authority of the Slovak Republic

71 employees

Management of state administration in the field of real estate cadastre

Geodetic and Cartographic Institute Bratislava

146 employees

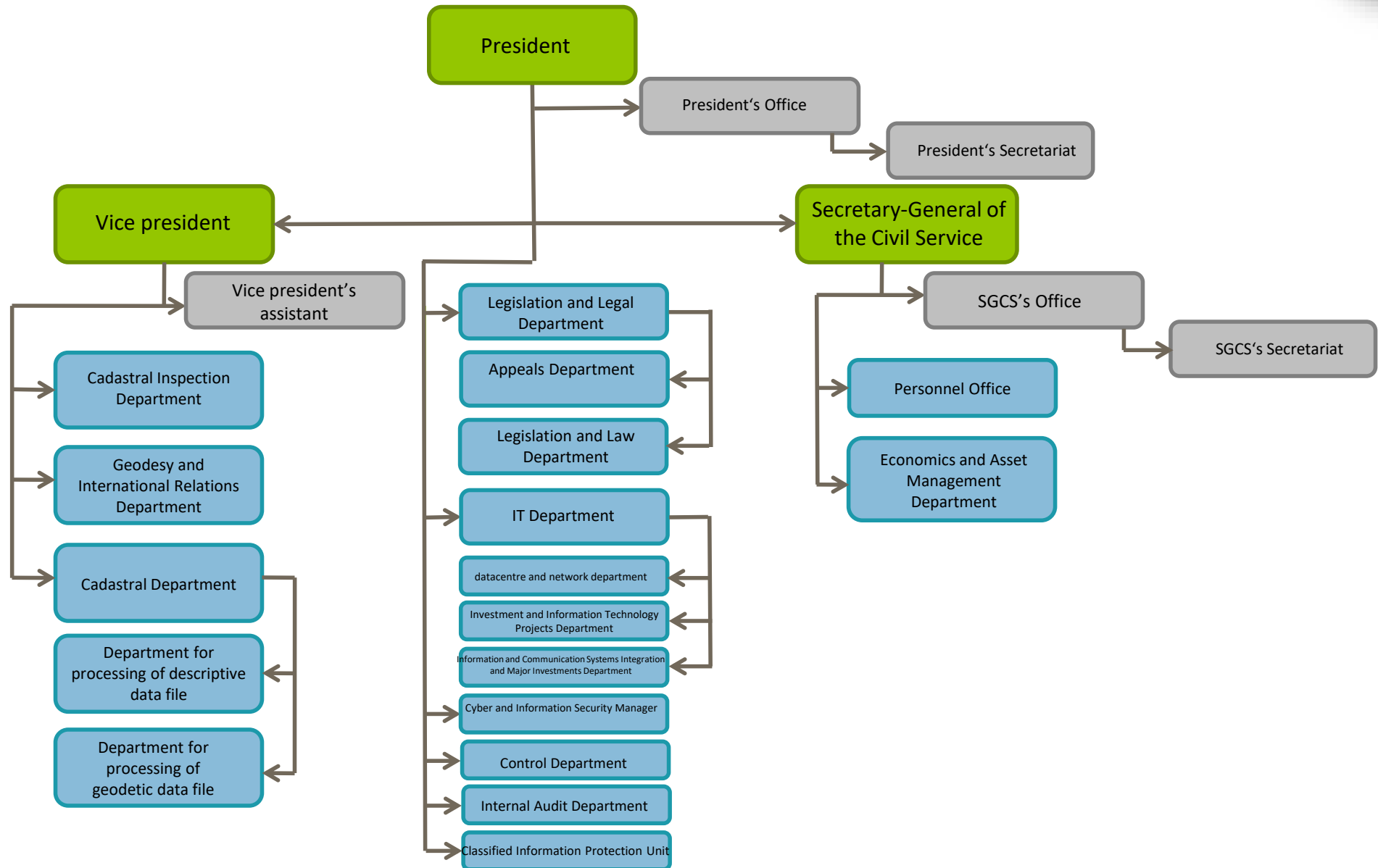
Research Institute of Geodesy and Cartography

22 employees

Ministry of Interior
75 cadastral offices

ca 1 800 employees

Authority structure





- Act on Geodesy and Cartography
 - Act on Real Estate Cadastre
 - Act on the Chamber of Surveyors
-



- Act on NSDI
- Act on certain measures for the organization of land ownership
- Act on Information Technologies in Public Administration
- Act on eGovernment
- Act on Free Access to Information



Transposition of Directive 2019/1024
(Open Data Directive)



Main role: public administration and professional supervision in the field of geodesy and real estate cadastre.

- Reference Systems, Geodetic Control, Metrology
- Real Estate Cadastre
- Topographical Database - **ZBGIS**[®]
- Orthophoto
- Airborne Laser Scanning
 - Classified Point Cloud
 - Digital Terrain Model
 - Digital Surface Model
- State Maps
- Standardization of Geonames
- Central Map Archive



Metrology

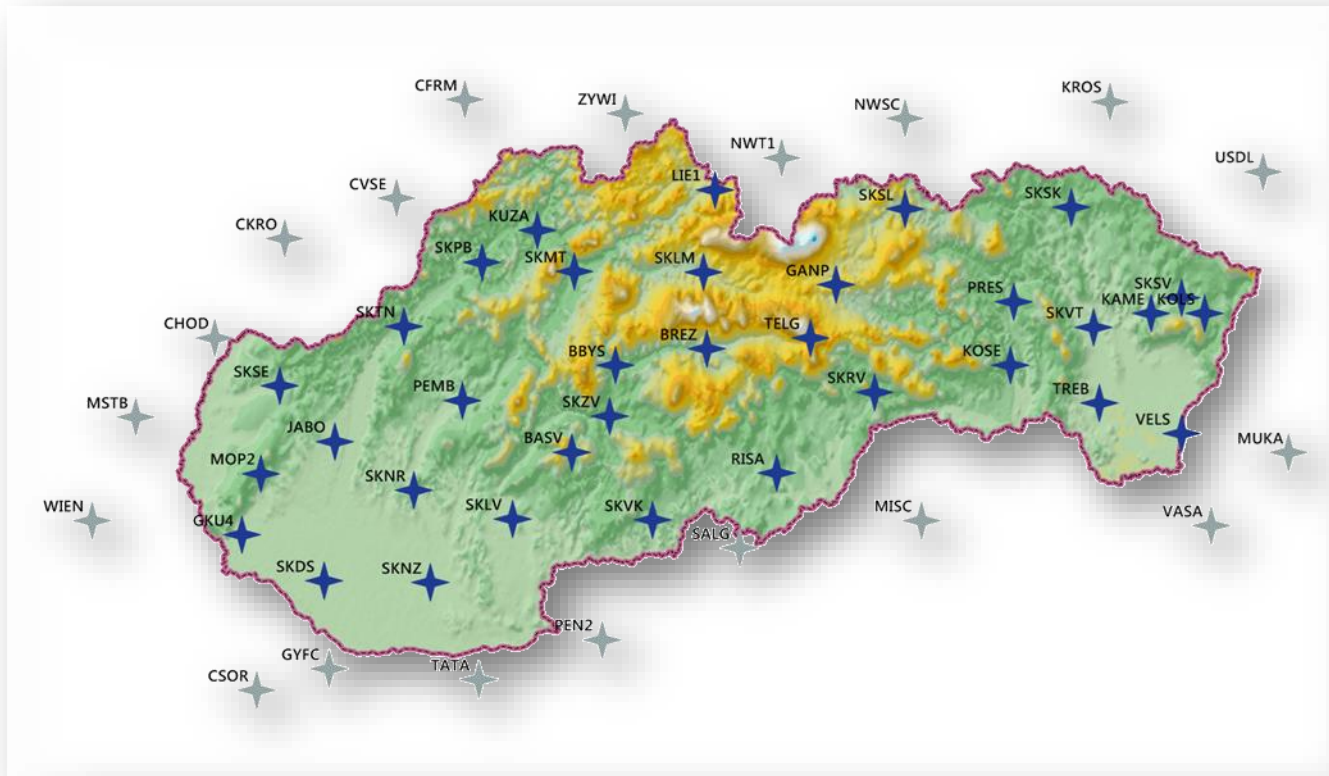
- Calibration Centre of Geodesy (established 2020)
- To check, test and calibrate systems, devices and instruments used for geodetic and cartographic activities
- Geodetic Calibration Base – Viničné (2018-2022)
- Calibration of total stations and EDM instruments (electronic distance measurement)
- Operational since summer 2024
- 606m, 7 pillars / geodetic control stations



Geodetic Control

- positioning networks (3D: ETRS89, 2D: S-JTSK)
 - Slovak GNSS real-time positioning service (**SK**POS)
- levelling network - Baltic height system, EVRS
- gravimetric network - S-Gr95

Slovak GNSS real-time positioning service (SKPOS)

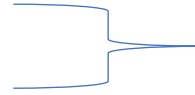


- 18 years of non-stop service (since 2006)
- 36 Slovak stations
- 21 foreign stations
- 3 472 active users
 - 50.2 % land surveyors
 - 49.8 % other users

- GPS
- Galileo
- GLONASS
- BeiDou



- **Cadastre**
- **Land Registry**



one office, one database

- REC consists of cadastral documentation arranged according to cadastral districts. The cadastral documentation contains these parts:

- Geodetic data file (i.e. cadastral maps)
- Descriptive data file
- Collection of documents
- Data on the land fund
- Land register and railway register



Úrad geodézie, kartografie a katastra Slovenskej republiky
VÝPIS Z KATASTRA NEHNEVNOSTÍ

Okres: 008 Name: Okresy v katastrálnom území: 24.3.2022
Okres: 00708 katastrálny území: Okresy v katastrálnom území: 9.9.22
Katastrálny území: 02008 katastrálny území: Okresy v katastrálnom území: 23.3.2022 16:00:00

Výpis je sponzoriňný na prvého vlastníka
VÝPIS Z LISTU VLASTNÍCTVA č. 2076

ČASŤ A: MAJETKOVÁ PODMATA

Parcelný register „Z“ evidovaný na katastrálnej mape

Parcelný číslo	Výmera v m ²	Druh pozemku	Spôsob využitia pozemku	Druh obhospodávania pozemku	Spôsob vlastníctva	Vlastník pozemku	Druh právneho vzťahu
020076	326	Zemepisná plocha	18	1	1		
020077	330	Zemepisná plocha	4	1	1		
020078	346	Zemepisná plocha	17	1	1		

Právy v súlade s územným plánom č. 001/2015 evidovaným na parcelnom katastrálnom území 020076

Legenda:
01 Pozemok používaný v rámci katastrálneho územia v súlade s územným plánom, na ktorom sa nachádza objekt, ktorý je súčasťou katastrálneho územia.
02 Pozemok, na ktorom je postavený objekt, ktorý je súčasťou katastrálneho územia.
03 Pozemok, na ktorom je objekt, ktorý je súčasťou katastrálneho územia.

- Since 1 January 2015, all cadastral maps have been administered as vector cadastral maps
- Number of cadastral districts: **3559** (17 military areas)
- Average area of the cadastral district: ca **13,8** km²
- Average number of parcels per CD: ca **2000**

Access to Cadastral Data



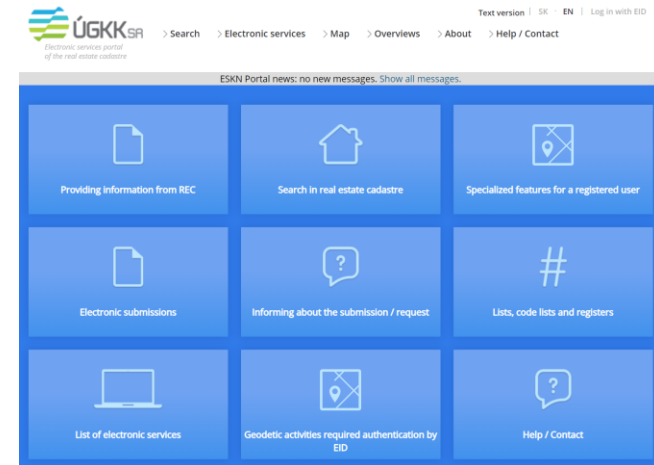
Portals:

- [MAPKA](#)
- [AKO](#)
- [ESKN](#)



Electronic services:

- we try to automate the registration process
- registration of transfers with 50% discount
- 30 % of all transfers in 2024 were electronic



Current activities:

- Improving and refining the cadastral data
- Testing new technologies for cadastral mapping
 - Laser scanning
 - Drones



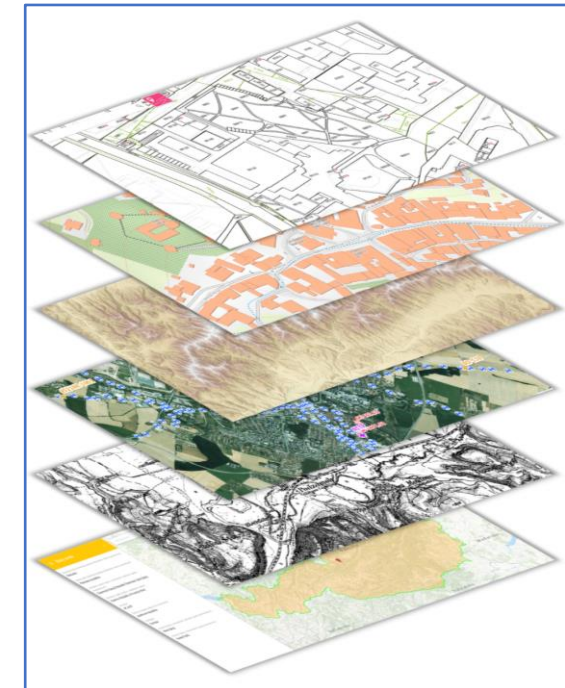
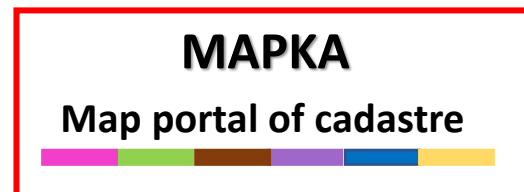
ZBGIS® - Basic Data Base for the Geographic Information System

ZBGIS® is a digital model of the real world with a precisely defined level of detail and abstraction through the ZBGIS Feature Catalogue. It contains spatial objects/data recorded in three dimensions with a relevant descriptive component (attribute) divided according to the thematic layer.

Thematic layers:

- Anthropogenic elements-culture
- Vegetation
- Hydrography
- Surface
- Boundaries
- Altimetry
- Aerial-navigation information

- Visualization of ZBGIS®
 - Map themes



Orthophotomosaic



Western part of SR

Capturing period:

Summer 2023

Availability:

July 2024

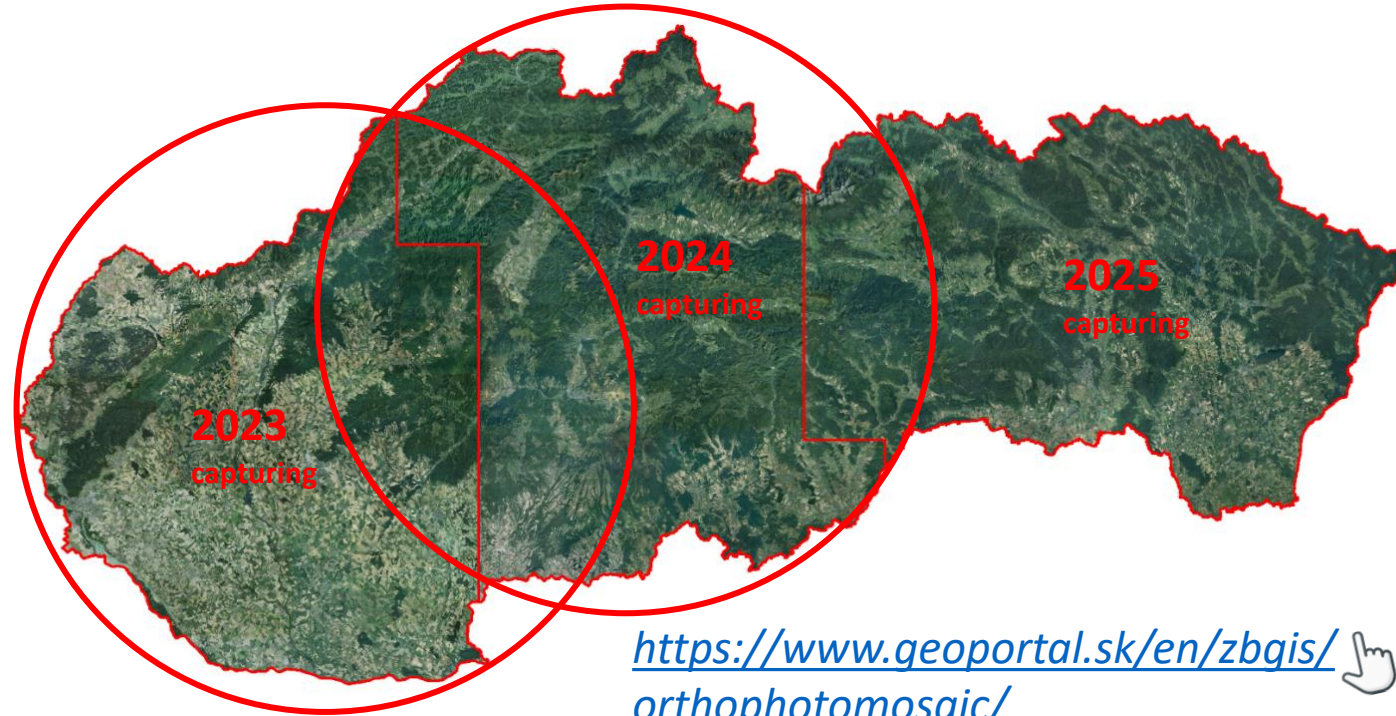
Central part of SR

Capturing period:

Summer 2024

Availability:

May 2025



<https://www.geoportal.sk/en/zbqis/orthophotomosaic/> 

	1 st cycle (2017-2019)	2 nd cycle (2020-2022)	3 rd cycle (2023-2025)
Ground Sampling Distance (GSD):	25 cm/pixel	20 cm/pixel	15 cm/pixel
Number of channels:	3 (RGB, 8-bit)	4 (RGB+NIR, 8-bit)	4 (RGB+NIR, 8-bit)
Root mean square error $RMSE_{xy}$	$RMSE_{xy} = 0,30$ m	$RMSE_{xy} = 0,21$ m	$RMSE_{xy} =$ (West $RMSE_{xy} = \mathbf{0,17}$ m)

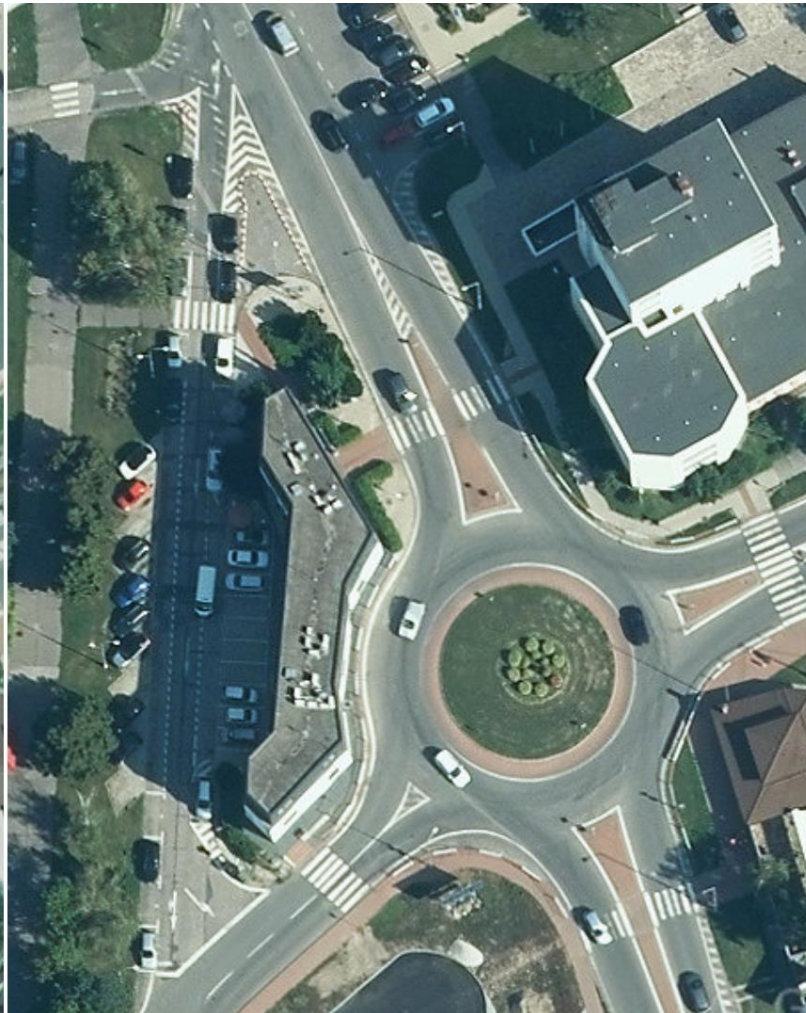
Orthophotomosaic



1st cycle: **GSD=25 cm**



2nd cycle: **GSD=20 cm**



3rd cycle: **GSD=15 cm**



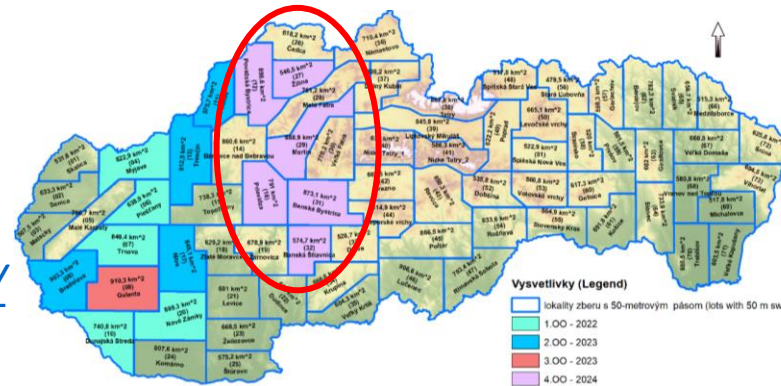
Airborne Laser Scanning



- **ALS** – highly accurate and detailed method of landscape mapping
- **1st project cycle:** 09.2017 – 05.2023
- **2nd project cycle:** 2022 – 2026

<https://www.geoportal.sk/en/zbgis/als/> 

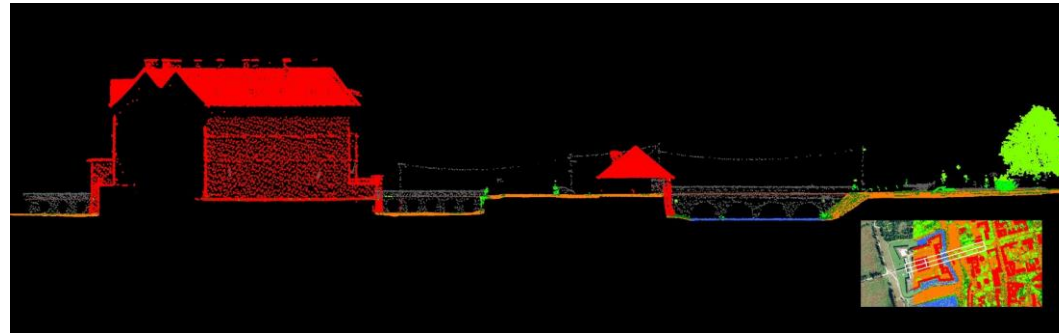
<https://www.geoportal.sk/en/zbgis/als/2nd-cycle/>



- **ALS** – during the vegetation-free winter period

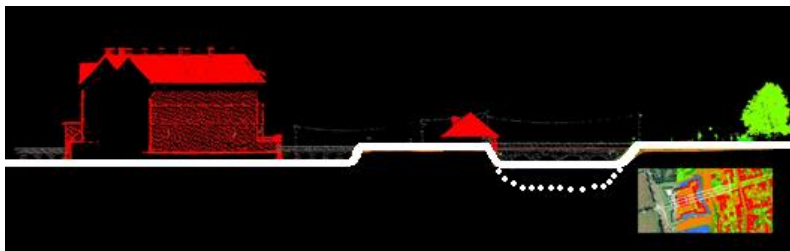
ALS products:

- Digital Terrain Model (DTM 5.0, DTM 6.0)



Classified Point Clouds

- Digital Surface Model (DSM 1.0, DSM 2.0)





■ Accuracy:

■ Required accuracy control on paved surface:

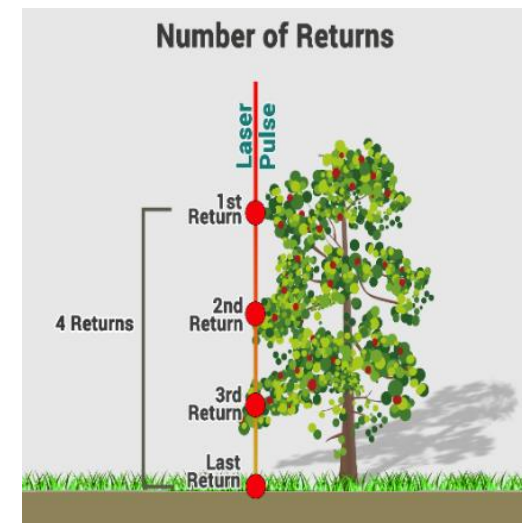
- vertical accuracy of cloud points (ETRS89-h): values up to **0,10 m (0,15 m for 1st cycle)**
- positional accuracy of cloud points (ETRS89-TM34): values up to **0,20 m (0,30 m for 1st cycle)**

Achieved accuracy:

■ 1 st ALS project cycle:	m_h $\langle 0,02m ; 0,09m \rangle$	m_p $\langle 0,04m ; 0,17m \rangle$
■ 2 nd ALS project cycle:	m_h $\langle 0,01m ; 0,05m \rangle$	m_p $\langle 0,04m ; 0,14m \rangle$

■ Average density of points:

- 1st ALS project cycle:
 - Required scanning density: **5 p/m²**
 - Achieved scanning density: **15 – 52 p/m²**
- 2nd ALS project cycle:
 - Required scanning density: **15 p/m²**
 - Achieved scanning density: **34 – 45 p/m²**





- **Within our Authority (UGKK SR):**

- Refinement/updating of topographical data
 - refinement of the water courses,
 - refinement of the location (position, height) of geomorphological features (peaks, saddles, etc.) and verification of their names
 - processing of the Orthophotomosaic of Slovakia,
- national border updating,
- 3D building modelling – LoD 2.



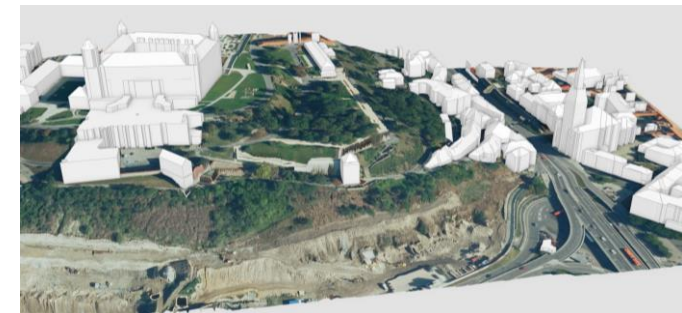
LoD 2 – shape of the object with an emphasis on the shape of the roof covering

- Land Consolidation

- Archaeology and Protection of Cultural Heritage

- Environment (Landslides, Flood maps, Landscape ecology, etc.)

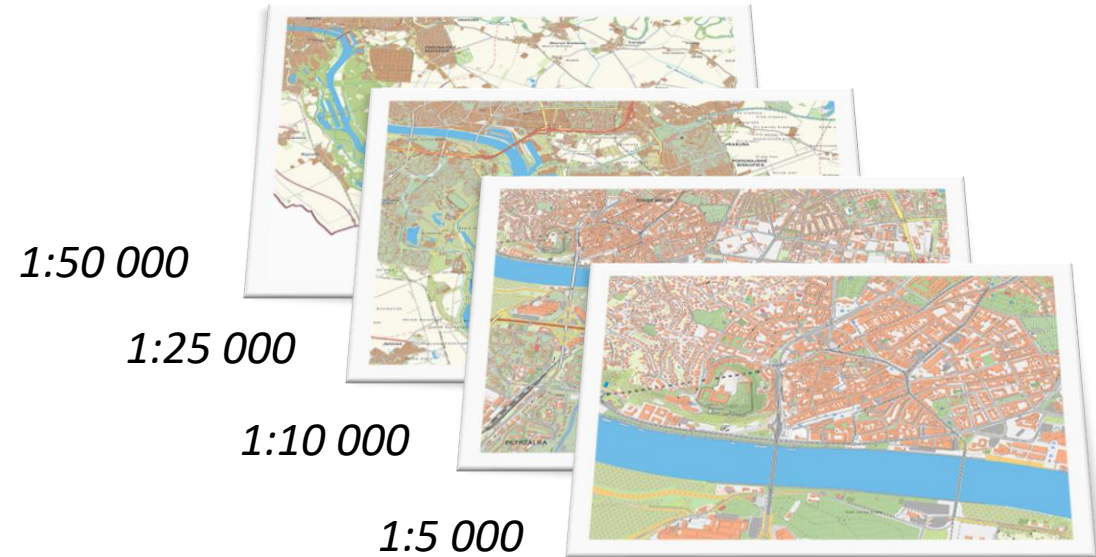
- Urban planning and Construction





State Maps

- cartographic visualisation of topographical database ZBGIS[®]
- digital cartography



ZBGIS[®] Raster

- data export from ZBGIS[®] information system databases in raster form in TIFF format in S-JTSK coordinate system (georeferenced TIF + TFW files)

Geographical names



- established in accordance with the rules of the written language, in relation to the current level of knowledge of geography, history, language
- one of the components of the maps from the earliest times
- part of the cultural heritage of the nation
- ensures unambiguous identification of the feature



Standardisation of GN

- set of measures that ensure the homogeneity of geographical names and the binding nature of their use
- systematic standardization of GN in Slovakia began with the establishment of a Name Commission in 1970
- database of standardized geographical names
- non-residential and specific residential geographical features from the territory of Slovakia
- common forms of names of residential and non-residential geographical features from outside the territory of Slovakia

Central Archive of Geodesy and Cartography



- one of the specialized archives in Slovakia
- established on 5 January 1990
- collects, retains, preserves and makes accessible archive documentation related to maps in our territory dating from the end of the 18th century until the present day



- 400 000 map sheets
- 500 common metres of documents
- 200 globes

- relief maps
- instruments and devices
- 1000 pieces of digital media containing cartographic products.

Data Provision

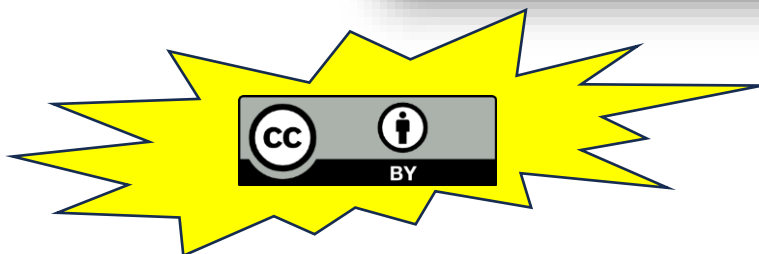
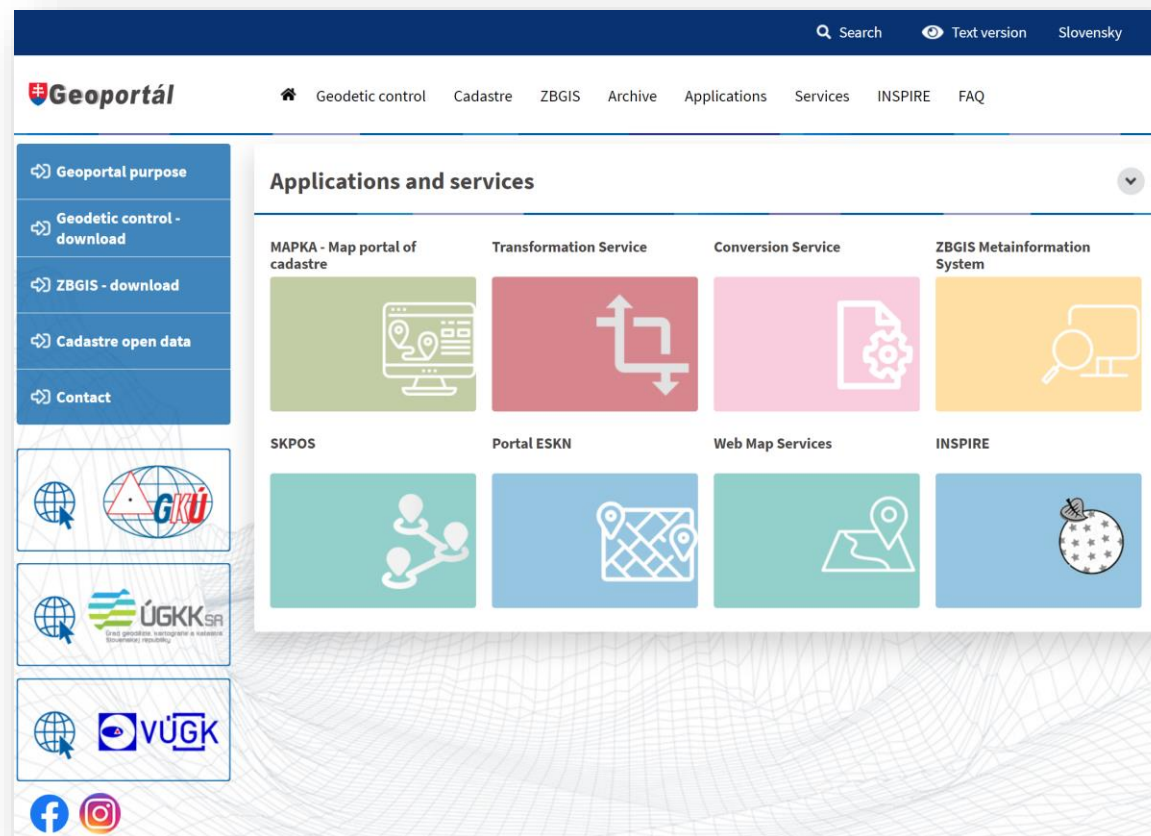


Purpose of [Geoportal](#) - provision of reference spatial data, spatial data services and information about spatial reference data in following areas:

- Geodetic Control
- Slovak Real Time Positioning Service [SKPOS](#)[®]
- Real Estate Cadastre
- Topographic data [ZBGIS](#)[®]
- State Map Series
- Archive
- INSPIRE

Main applications and services:

- MAPKA
- Transformation service
- Conversion service
- ZBGIS Metainformation system
- [SKPOS](#)[®]
- [Portal](#) ESKN
- Web Map Services



Except land registry data nearly all topographic data, cadastral map, electronic services and web applications are provided as **OPEN DATA**



Thank you for your attention