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Preparation of a Water-Management Balance and a Proposal for Water-Supply Infrastructure Related to the Málinec – Látky Pumped-Storage Hydroelectric Plant

SUMMARY

Stage 1 – Determination of Drinking-Water Demand for Individual Municipalities in the Districts of Detva, Zvolen, Poltár, Lučenec, Veľký Krtíš, and Rimavská Sobota

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Determination of Drinking-Water Demand in the districts of Detva, Zvolen, Poltár, Lučenec, Veľký Krtíš, and Rimavská Sobota (Stage 1)

I. INTRODUCTION

The aim of Stage 1 is to assess the drinking-water demand in the area affected by the planned construction of the Málinec – Látky pumped-storage hydroelectric plant, with the objective of creating a basis for updating the water management balance and designing the effective development of water-supply infrastructure. The results of this stage will also form the basis for subsequent parts of the project (a proposal of measures and infrastructure).

1. Methods and documents used (legislation, technical standards, strategy documents)

a) Methodological approach

A standardised methodological framework was used, based on the methodology of the national water management balance and the recommendations of the Ministry of the Environment of the Slovak Republic and the Ministry of Agriculture and Rural Development of the Slovak Republic. The water-demand calculations were carried out using a combination of:

- **direct data collection** (technical data from water-supply companies);
- **model calculation of water demand** based on population numbers, demographic projections, and consumption coefficients by purpose;
- **spatial assessment** of municipalities according to type of supply and availability of resources;
- **comparisons of actual measurements with the calculated demand**, in order to identify potential gaps or disparities.

b) Input and analytical data

The processing was based on the following data and analytical sources:

- **Operating data** from Stredoslovenská vodárenská spoločnost, a.s. and Stredoslovenská vodárenská prevádzková spoločnost, a.s. – in particular, records on connections, technical parameters of distribution networks, and their operational limits.
- **Spatial plans of all municipalities in the area of interest** – as a basis for calculating future water demand, identifying development areas, new residential construction, recreational zones, and areas for civic amenities.
- **Demographic forecasts** – an assessment of demographic development in the area of interest.
- **Public Water Supply Development Plan for the Banská Bystrica Region** (update 2020–2025) – identification of priorities for expanding and reconstructing water-supply infrastructure.

c) Legal and technical documents

The following legal and technical standards were observed in the processing:

- **Act No 364/2004** on water (Water Act);
- **Act No 442/2002** on public water supply and public sewerage systems;
- **Decree of the Ministry of the Environment of the Slovak Republic No 684/2006**, technical requirements for the design documentation and construction of water mains;
- **Decree of the Ministry of the Environment of the Slovak Republic No 418/2010** laying down details on methods for assessing the quantity and quality of water;
- **STN EN 805**: Water-supply systems outside buildings – Requirements for design and construction;
- **STN 75 5115**: Calculation of water demand.

d) Strategy documents

- **Development Plan for Water Supply and Sewerage Systems in the Slovak Republic up to 2030;**
- **Development Programme of the Banská Bystrica Self-Governing Region;**
- **Climate-Change Adaptation Strategy in the Conditions of the Slovak Republic**.

2. Definition of the area under review

The area under review includes selected districts of the Banská Bystrica Region, specifically:

- **Zvolen district**,
- **Detva district**,
- **Poltár district**,
- **Lučenec district**,
- **Veľký Krtíš district**,
- **Rimavská Sobota district**.

These districts collectively form the area of interest in terms of:

- existing or planned connection to the water-supply system fed from the Málinec water reservoir;
- actual or potential dependence on the capacity of the Málinec, Hriňová, and Klenovec water-supply sources;
- the territorial reach of the operation of the planned Málinec – Látky pumped-storage hydroelectric plant.

The entire area of interest lies within the river basins of the Ipeľ and Rimava, which are significant in terms of drinking-water supply as well as environmental considerations (protected water-management areas and protection zones of water-supply sources).

The balance includes all municipalities in these districts that:

- **are connected** to public water mains operated by Stredoslovenská vodárenská společnost, a.s., or have their own municipal water mains;
- have the **potential for connection** to a group water-supply system in the future (according to spatial-planning documentation);
- **lie within the hydrogeographical reach** of the Málinec reservoir or other water-supply sources connected to the regional system (StSVS).

A total of **298 municipalities** were included, each evaluated individually on the basis of technical infrastructure, population, types of consumption, and available data.

The definition of the area under review was based on the following criteria:

- **spatial and engineering connection** with supply from the Málinec water reservoir and its potential influence by the operation of the pumped-storage plant;
- **organisational structure** within the competence of Stredoslovenská vodárenská společnost, a.s. and its operating company;
- **availability of relevant data** on consumption and infrastructure (connectivity, consumer categories, existing or planned extensions).

Based on the analysis of data, municipalities were classified according to the type of water-supply operation, as shown in the following table:

- **municipalities without a public water main** – typically small municipalities not connected to group systems;
- **water mains owned and operated by StVPS** – the most common case for municipalities connected to the Central Slovak Water System (StSVS);
- **exclusively municipal water mains** – typically in small municipalities or stand-alone systems;
- **mixed forms of operation and ownership** – combined models (municipality as owner + StVPS as operator).

Overview of water-supply systems in the districts of interest with respect to ownership of public water mains

District	Total municipalities	Total municipalities connected to the system	Total municipalities outside the system	Municipality without a public water main	Public water main owned by StVS a.s.			Public water main owned by the municipality (or in combined ownership with StVS a.s.)				
					Operated by StVPS, a.s.	of which:		Operated by StVPS a.s. and municipality (or private company)	Operated by municipality (or private company) only	Operated by StVPS a.s.	Total	
						Connection to the system	Stand-alone water main				Connection to the system	Stand-alone water main
Detva	15	5	8	2	0	0	0	5	8	0	5	8
Lučenec	57	27	8	22	23	18	5	0	3	9	9	3
Poltár	22	14	4	4	9	7	2	0	3	6	7	2
Rimavská Sobota	107	28	38	41	37	15	22	1	11	17	13	16
Veľký Krtíš	71	44	20	7	53	43	10	0	2	9	1	10
Zvolen	26	1	22	3	12	0	12	8	3	0	1	10
Total	**298**	**119**	**100**	**79**	**134**	**83**	**51**	**14**	**30**	**41**	**36**	**49**

**Note: VV – public water main*

II. SUPPLY OF DRINKING WATER VIA PUBLIC WATER MAINS (status as at 2024)

As part of the balance analysis, municipalities were identified and classified according to their connection to public water mains in the reference year 2024. The analysis is based on a combination of data provided by the owners and operators of water-supply infrastructure (StVS, a.s. and StVPS, a.s.), data from the ZBERVAK database supplied by the Water Research Institute, and data from the Concept for the Development of Public Water Mains of the Slovak Republic, as well as publicly available databases and municipal spatial-planning documentation.

Municipalities were divided into categories according to the ownership and operation of the public water main, and according to the existence or absence of a connection to the public supply system. The primary assessment parameter was the number of municipalities with a functionally operational drinking-water distribution infrastructure supplied through a public water main. The current operational state was considered, irrespective of source yield or quality.

Supply of municipalities with drinking water via public water mains as at 2024

District	Number of municipalities	Municipalities with public water main	% of municipalities with public water main	Municipalities without public water main	% without public water main
Detva	15	13	86.67%	2	13.33%
Lučenec	57	35	61.40%	22	38.60%
Poltár	22	18	81.82%	4	18.18%
Rimavská Sobota	107	66	61.68%	41	38.32%
Veľký Krtíš	71	64	90.14%	7	9.86%
Zvolen	26	23	88.46%	3	11.54%
Total	**298**	**219**	**73.49%**	**79**	**26.51%**

**Note: VV – public water main*

The table shows that a public water main is not available in all municipalities in the districts of interest, with the level of coverage differing significantly between regions.

Within the area of interest, several municipalities are not connected to group water-supply systems operated by StVPS, a.s., but provide drinking-water supply through their own (mostly stand-alone) systems. These systems are operated either by municipal enterprises, associations of municipalities, or private companies.

The most significant operators other than StVPS include, for example, the Coordinating Association of Municipalities of the Podpoľanie Micro-region, Karman, s.r.o., AQUASPIŠPLUS, s.r.o., WASPE, s.r.o., and municipal enterprises such as Obecný podnik Nenince, s.r.o.

Supply of municipalities with private or municipal operators, by district

District	Operator	Number of municipal
DETVA	Coordinating Association of Municipalities of the Podpoľanie Micro-region Vígľaš	10
LUČENEC	Aquaspiš – vodné hospodárstvo, s.r.o. Rudňany	1
LUČENEC	Municipality as operator	1
LUČENEC	ČOV-KA KERTESZ s. r. o. Panické Dravce	1
POLTÁR	AQUASPIŠPLUS, s.r.o. Rudňany	1
POLTÁR	Karman, s.r.o. Mýtna	2
RIMAVSKÁ SOBOTA	Karman, s.r.o. Mýtna	3
RIMAVSKÁ SOBOTA	WASPE, s.r.o. Banská Bystrica	1
RIMAVSKÁ SOBOTA	Municipality as operator	5
VEĽKÝ KRTÍŠ	Obecný podnik Nenince, s.r.o. Nenince	2

Quality and availability of existing water-supply sources:

In the area of interest, there are **surface water-supply sources** used for drinking-water supply, namely Hriňová, Málinec, Klenovec, Klokoč, Drňa, and Poľovno. The last three have only small permitted abstraction, which is negligible in the context of the entire system.

Groundwater sources play a local role in the drinking-water supply system in the districts of Detva, Lučenec, Poltár, Rimavská Sobota, Veľký Krtíš, and Zvolen. They form a key element of decentralised supply in rural areas, particularly where the infrastructure of a group water-supply system has not been completed, or where extending it would not be technically or economically feasible. In such cases, groundwater sources are often the sole source of drinking water for municipal water mains or for individual supply.

Within the available database, dozens of groundwater sources were identified with varying yields, water quality, and operational significance. Most of these sources consist of springs, drilled or dug wells that are connected directly to individual municipalities.

In some cases, the systems belong to municipal water mains operated by the municipality itself, or by a private entity. While some groundwater sources serve only individual settlements or parts of a municipality, others cover a wider area and are capable of supplying several municipalities simultaneously.

A fundamental aspect in assessing the usability of groundwater sources is **water quality**. Based on data provided by StVPS a.s. and the Water Research Institute, available water-quality analysis results from 2024 were evaluated.

The geographical distribution shows that the highest concentration of groundwater sources is found in the districts of Zvolen, Veľký Krtíš, and Rimavská Sobota. These are areas with extensive rural settlement, where centralised supply is lacking and the use of decentralised solutions is standard practice. In some cases, these sources also have potential for future development, particularly if the water quality is satisfactory and if there is a possibility of integrating them into a wider distribution system.

From the perspective of long-term planning, groundwater sources must be regarded as a supplementary and stabilising component of the water-supply system. In many cases, they represent technically usable capacities that nevertheless require the modernisation of abstraction facilities, refurbishment of storage tanks, reconstruction of the distribution network, and above all, consistent protection of source protection zones. A combination of these measures can ensure their sustainable and hygienically safe use in the future.

Identification of deficit areas and groups of municipalities:

Core municipalities without a connection to the group water-supply system

Within the balance and the evaluation of the condition of public water mains, municipalities were identified that are located in the immediate region of the existing water-supply system (Málinec – Hriňová – Klenovec water reservoirs), but are not technically connected to this group infrastructure. These municipalities lie in close proximity to the main branches of the system or in areas naturally sloping towards existing water treatment plants. For this reason, they have strong potential for effective integration into the system in the medium- or long-term horizon.

For assessment purposes, the municipalities were divided into two main groups:

a) **Municipalities with an existing public water main and their own local water source**

These municipalities have a public water main operated either by the municipality itself or by another entity (for example, a micro-region or a private company).

Supply is based on their own water sources – predominantly groundwater – which may, however, pose long-term sustainability concerns:

- In many cases, these are sources with limited yield or fluctuating water quality, dependent on climatic conditions, seasonality, or anthropogenic load.
- In drier years, or if qualitative parameters change, external water supply from the superior system would be necessary.

Given their close distance to the main water-supply branches, constructing secondary connection pipelines is technically feasible – often requiring only a short interconnection pipeline, or the addition of one or two pumping stations (where height differences exist).
For example, in the districts of Detva or Poltár, the municipalities are situated in gently undulating to flat terrain, which simplifies construction. In areas such as the eastern part of the Rimavská Sobota district, where height differences are more pronounced, pumping stations would need to be added to ensure sufficient pressure, given the geodetic elevation.

Overview of the number of core municipalities without connection to a group water-supply system that have their own water main, with future consideration of their connection to the water-supply system.

District	**Number of**	**Population**
Detva	8	5,019
Lučenec	3	1,934
Poltár	1	936
Rimavská Sobota	10	4,087
Veľký Krtíš	2	2,270
Total	**24**	**14,246**

b) Municipalities without an established public water main

This group of municipalities is the most vulnerable type of settlement in terms of public drinking-water supply. These settlements rely on individual water-supply methods – predominantly private wells. In many cases they are small municipalities with a low population.
Nevertheless, many of these municipalities lie in areas close to the main routes of group water-supply systems, allowing their gradual connection as satellite branches.

Municipalities in the core area without an established public water main, with future consideration of their connection to the water-supply system.

District	Number of municipalities	Population
Detva	2	1,130
Lučenec	22	12,402
Poltár	4	864
Rimavská Sobota	20	6,817
Veľký Krtíš	1	176
Total	**49**	**21,389**

c) Assessment of municipalities outside the existing group water-supply system

Based on the processed data, municipalities were identified that are not currently connected to the group water-supply infrastructure but represent potential areas for future connection within the planned optimisation of drinking-water supply. These municipalities were grouped into logically and geographically coherent localities, considering their location, elevation and terrain conditions, and level of isolation from existing supply routes. A summary of the municipalities assigned to each locality is provided in the table below.

Assignment of municipalities by locality

Assignment	Number of municipalities	Population
Locality in the area labelled: "Krupinská planina"	12	1,539
OUTSIDE the water-supply system in the	24	62,547
"Teplý Vrch" locality	8	2,734
"Teplý Vrch South" locality	10	4,285
"Teplý Vrch North" locality	7	456

Assignment	Number of municipalities	Population
Locality in the valley between “Teplý Vrch” and “Tornaľská dolina”	4	1,581
Tornaľská dolina	10	4,185
Tisovec	2	3,605
Total	**77**	**80,932**

III. DETERMINATION OF DRINKING-WATER DEMAND

1. Calculation methodology and input data

The calculation of drinking-water demand is an essential prerequisite for planning the development of water-supply infrastructure and for deciding priorities for investment in public water mains. The basic task of the methodology is to quantify the water demand so that the requirements of all categories of consumers are met.

The methodological framework is based primarily on Decree of the Ministry of the Environment of the Slovak Republic No 684/2006, which defines technical requirements for the design and construction of public water mains. It also takes into account the technical standard STN EN 805, as well as recommendations from design practice and the experience of public water-main operators. The calculation is based on current demographic data, operational data, spatial-planning documents, and expert estimates of population and economic development.

The first step is to determine the number of permanent residents in each municipality, based on data from the Statistical Office of the Slovak Republic or on municipal data.

Each municipality is assigned a standardised daily per-capita water demand. This depends on the type of development, level of amenities, and assumed lifestyle of residents. Under Decree No 684/2006, daily water demand per person typically ranges between 80 and 150 litres. Calculations also take into account a future scenario assuming 100% connection of the population to the public water mains.

After determining the basic daily demand, variations within the day and year are considered – for example, peaks during summer months or seasonal tourist visits. These variations are reflected in the calculation of maximum daily or hourly demand using consumption-unevenness coefficients. The coefficients are adapted to the conditions of each municipality and to available operational data.

An important part of the methodology is the identification and categorisation of other consumers, such as industrial enterprises, services, agricultural undertakings, and public institutions. For these entities, water demand is determined individually based on the type of activity, size of the operation, and available data on actual or expected consumption.

Calculations also take into account inputs from spatial-planning documents, which determine the future development of municipalities, construction of new residential areas, industrial parks, and infrastructure projects. These assumptions are especially important for determining future water demand over a 20- to 30-year horizon. If the spatial plan anticipates the development of residential zones or new facilities, the projection assumes the possibility of full connection to the public water main.

Categorisation of demand:

a) **Population:** The most significant part of consumption is water intended for the supply of the population. Water demand is determined according to the number of inhabitants and the average daily per-capita consumption. Water consumption in this category is most affected by the type of housing, level of household amenities, seasonality, and the availability of alternative sources (private wells, rainwater harvesting).

b) **Industry and business entities:** This category includes consumers that carry out manufacturing, craft, or commercial activities and abstract water for technological purposes or for operating needs. In this case, water demand is determined individually – either on the basis of reported actual abstractions from the operator, or by calculation according to the purpose of use, number of employees, and operating regime. This calculation of industrial water demand is carried out on the basis of technical norms and indicative coefficients under Decree No 684/2006, which lays down details on technical requirements for the design, planning, and construction of public water mains and sewerage systems, and on the basis of supplementary data from spatial-planning documentation and business plans.

c) **Agriculture and animal production:** Agricultural abstractions form a separate category, representing water consumption for watering livestock, irrigation, and, where applicable, operating needs of farm complexes. In this field, consumption values are highly variable – they depend on the number of animals, the type of operation (for example, poultry farm, cattle farming, pig breeding), and on climatic conditions. If no real operational data is available, the calculation of agricultural water demand is carried out in accordance with indicative coefficients and the methodology laid down in Decree No 684/2006 and the relevant technical documentation. The calculation of water demand for animal production is based on the number of livestock units by species composition (cattle, pigs, poultry, etc.) and the normative water demand per unit per day.

In addition to these three main categories, the analysis also takes into account abstractions for other facilities and institutions, such as schools, healthcare facilities, social-care homes, sports and cultural centres, and recreational facilities. Where available, these abstractions are summarised in the category “**other facilities**”, or assigned to the basic groups according to the primary purpose of their activities.

2. **Assessment of demographic development for the area of interest** (separate annex)

This contains a detailed estimate, prepared by the Slovak University of Technology, of the future development of the number of inhabitants in the municipalities of six districts of the Banská Bystrica Region: Detva, Zvolen, Poltár, Lučenec, Veľký Krtíš, and Rimavská Sobota. This estimate is a key basis for planning water-supply infrastructure in the area of interest of the Málinec – Látky pumped-storage hydroelectric plant. For the forecasts prepared up to 2050, data from the Statistical Office of the Slovak Republic, spatial-planning documents, information from water-supply companies, and demographic studies were used.

The chosen approach combines standard methods of demographic forecasting, including the cohort-component method, scenario modelling (low, medium, and high variants), growth coefficients derived from district-level forecasts, and the share method for disaggregation to municipalities. The base year for the calculation is 2024, with each value projected for the years 2025, 2030, 2035, 2040, 2045, and 2050.

The results point to a systematic decline in population in most municipalities, with the downward trend most pronounced in the districts of Detva, Poltár, and Veľký Krtíš. This decline corresponds to developments at district and regional level, where a decrease in population is also expected, mainly due to low birth rates, population ageing, and negative net migration. The calculation algorithm used ensures proportionate projection of the population decline down to the level of individual municipalities.

The aim of this prediction is to provide a reliable basis for balancing drinking-water demand in the medium term. The value of the medium scenario, which reflects the most probable demographic development, is regarded as key. The results for each municipality in the area of interest are presented in detailed tabular form and form the basis for planning efficient and sustainable water-supply infrastructure in the region.

Forecast of population in the districts of the Banská Bystrica Region in selected years, 2023–2050

District	2025*	2030	2035	2040	2045	2050	Decrease 2025–2050
Detva	35,900	35,098	34,399	33,601	32,801	32,001	3,899
Lučenec	71,403	69,799	68,302	66,693	64,998	63,301	8,102
Poltár	20,099	19,603	19,101	18,599	18,098	17,601	2,498
Rimavská Sobota	78,597	76,698	74,802	72,901	70,902	68,802	9,795
Veľký Krtíš	43,097	41,902	40,704	39,496	38,198	36,897	6,200
Zvolen	62,201	61,000	59,801	58,602	57,401	56,200	6,001
Total	**311,297**	**304,100**	**297,109**	**289,892**	**282,398**	**274,802**	**36,495**

* 2025 represents the population forecast prepared by the research team for the year 2025.

3. Calculation of water demand

Equation for calculating average water demand :

$$Q_p = M \times q_š$$

where:

- Q_p is the average water demand in litres per day,
- M is the number of inhabitants,
- $q_š$ is specific per-capita water demand (in litres per day per person).

The value of $q_š$ reflects the technical amenities of households, standard of living, and real consumption according to Decree No 684/2006, and generally lies:

- in small municipalities: 80–110 l/person/day,
- in larger towns: 110–150 l/person/day,

Maximum daily and maximum hourly demand

In designing water-supply infrastructure capacity, the average demands are multiplied by unevenness coefficients:

The maximum daily water demand is calculated as:

$$\mathbf{Q_d = M \times q_{š} \times k_d}$$

k_d is the daily unevenness coefficient.

The maximum hourly demand is calculated as:

$$\mathbf{Q_h = M \times q_{š} \times k_d \times k_h}$$

k_h is the hourly unevenness coefficient.

4. Future drinking-water demand

The scenario of 100% supply from public water mains – the aim is to secure the necessary volume of drinking water for complete supply of the population with quality drinking water exclusively from public water mains connected to the central group water-supply system. The area considered includes all municipalities located within the sphere of influence of the water reservoir system Málinec – Klenovec – Hriňová, as well as other directly or secondarily connected areas. The calculation also includes all municipalities identified as lying outside the existing group water-supply system, in accordance with the classification set out in the previous chapters.

The 100% connection scenario is an important planning tool for:

- identifying maximum demands;
- sizing trunk mains and local water-supply systems;
- establishing a basis for investment planning and for prioritising areas in the development of the system.

This scenario also reflects the standard of strategic planning in water management, which aims to ensure equal access to quality drinking water for all inhabitants of the area – regardless of their current technical or geographical situation.

Future water demand represents the estimated development of drinking-water consumption over the coming decades, based on demographic development, expected population growth or decline, development of housing, industry, and agricultural production, as well as environmental and climatic aspects. For this assessment, future scenarios were analysed in detail for the following reference years: 2030, 2035, 2040, 2045, 2050, and 2055. For each year, the calculation of water demand was carried out separately for the categories of population, industry, and agriculture. The methodology is based on specific consumption values under Decree No 684/2006, as well as on data on abstractions. With regard to the gradual expansion of the group water-supply system, the forecast also takes into account network development and the connection of municipalities that are not yet supplied.

IV. ASSESSMENT OF THE CURRENT AND FUTURE CONDITION OF DRINKING-WATER SUPPLY AND WATER DEMAND

1. Supply of inhabitants of individual districts with drinking water

In the Detva district, there are currently 30,380 inhabitants, of whom 25,925 are connected to the public water main, representing approximately 85.3% of the district's total population. A total of 13 municipalities are connected to the public water main, abstracting water either from the group water-supply system or from their own source managed by a public operator. The municipality of Horný Tisovník is supplied from local water sources and does not have a public water main. The municipality of Korytárky has a partially constructed water main. The largest consumption centres are Detva and Hriňová. Average specific water demand in the supplied municipalities of the district is 62.0 l/person/day (weighted average by number of supplied inhabitants). There are several municipalities in the district that are not connected to the group water-supply system and are supplied from local water sources (for example, Detvianska Huta, Dúbravy, Klokoč, Látky, Slatinské Lazy, Stará Huta, Stožok, and Vígľašská Huta-Kalinka). By contrast, the municipalities of Horný Tisovník and Korytárky do not have a public water main and supply is provided from individual sources (wells).

In the Poltár district, there are currently 20,135 inhabitants, of whom 17,342 are connected to the public water main, representing approximately 86% of the total number. A total of 18 municipalities are connected to the public water main, abstracting water either from the group water-supply system or from local sources operated by a public or local supplier. The remaining four municipalities do not have a public water main, and supply is provided from local water sources or by individual means. The largest consumption centres are Poltár, Kalinovo, and Kokava nad Rimavicou, which together account for more than 57% of all supplied inhabitants of the district. Specific water demand varies significantly between municipalities. Average specific water demand in the supplied municipalities of the district is 62.6 l/person/day (weighted average by number of supplied inhabitants). Most of the municipalities in the district are connected to the group water-supply system fed by the Málinec and Klenovec sources (for example, Poltár, Kalinovo, Kokava nad Rimavicou, Málinec, and Cinobaňa). Some municipalities are connected to the water-supply system, but the water main is operated by a local operator (for example, Uhorské and Utekáč). A number of municipalities are not connected to the group water-supply system and are supplied from local water sources (for example, Hrnčiarska Ves, Šoltýska, and Zlatno). Other municipalities do not have a public water main – these include České Brezovo, Ďubákovo, Hradište, and Selce.

The **Lučenec district** is among the largest districts in the southern part of central Slovakia. The total population is 68,623, of whom 52,646 are connected to the public water main, representing approximately 76.7% coverage. A total of 35 municipalities are connected to the public water main; the others use local sources or do not have a public water main. The largest consumption centre is Lučenec. Average specific water demand in the supplied municipalities of the district is 61.7 l/person/day (weighted average by number of supplied inhabitants).
In terms of types of supply, most municipalities are connected to the group water-supply system managed by StVPS. Several municipalities are supplied from local water sources. Many municipalities do not have a public water main and use individual sources (wells or springs). These include Bulhary, Čakanovce, Fiľakovské Kováče, Holiša, Jelšovec, Kotmanová, Lipovany, Mašková, Mučín, Nitra nad Ipľom, Nové Hony, Panické Dravce, Píla, Pinciná, Pleš, Radzovce, Šiatorská Bukovinka, Šurice, Trenč, Lupoč, and Veľká nad Ipľom.

The **Veľký Krtíš district** is a large district with dispersed settlement and a high proportion of rural municipalities. The total population is 40,448, of whom 35,802 are connected to the public water main, representing approximately 88.5% coverage. A total of 64 municipalities are connected to the public water main, with supply provided either from the group water-supply system or via local operators. The remaining seven municipalities use local water sources or individual supply (wells and springs). The largest consumption centre is the town of Veľký Krtíš. Specific water demand in the district varies widely. Average specific water demand for the supplied inhabitants of the district is 63.1 l/person/day (weighted average by number of supplied inhabitants). Most municipalities in the district are connected to the group water-supply system managed by StVPS (for example, Veľký Krtíš, Bušince, Vinica, and Želovce). Several municipalities are supplied from local sources (for example, Čebovce and Nenince). Some smaller municipalities do not have a public water main (for example, Brusník, Červeňany, Horná Strehová, Horné Strháre, Senné, Slovenské Kľačany, and Šuľa).

The **Rimavská Sobota district** is one of the larger districts of the Banská Bystrica Region, with a large number of small municipalities and a relatively low population density. There are 107 municipalities in the district, 66 of which are supplied through a public water main, either connected to the group water-supply system or using local sources and water mains operated by other entities. Of the district's total population (79,455), 53,882 are supplied, representing approximately 67.8% of the population. The town of Rimavská Sobota, as the largest settlement in the district (21,175 inhabitants), is fully connected to the public water main.
The second largest town in the district, Hnúšťa, has 6,436 inhabitants. Other important consumption centres include Jesenské, Klenovec, Ožďany, and Rimavská Seč.

The **Zvolen district** has, in terms of drinking-water supply, a different situation from the other districts of the Banská Bystrica Region. Of the total 65,370 inhabitants, 63,313 are supplied via the public water main, with the decisive part of the district, including the district town of Zvolen, connected to local water sources or to the Pohronský group water-supply system. A specific exception is the municipality of Zvolenská Slatina, which is connected to the water-supply system formed by the Hriňová, Málinec, and Klenovec water reservoirs. Average specific water consumption in the district is around 83 litres per person per day, which is slightly below the Slovak average, but corresponds to the character of the area and the structure of consumption. The largest settlement in the district is the town of Zvolen, with more than 39,000 inhabitants, supplied via the Pohronský group water-supply system. Another important settlement is the spa town of Sliač, with almost 4,800 inhabitants.

Current level of population connection to the public water main and water demand

District	Number of municipalities	Population living in municipalities	Population connected to the public water main	% connected
Detva	15	30,380	25,925	85.34
Lučenec	57	68,623	52,646	76.72
Poltár	22	20,135	17,342	86.13
Rim avsk	107	79,455	53,882	67.81
Veľký Krtíš	71	40,448	35,802	88.51
Zvolen	26	65,370	63,313	96.85
Total	**298**	**304,411**	**248,910**	**81.77**

2. **Drinking-water supply in individual districts provided from the large-capacity water-supply sources Hriňová, Málinec, and Klenovec**

Drinking-water supply in the individual districts is provided from the large-capacity water-supply sources Hriňová, Málinec, and Klenovec by means of trunk mains, with municipalities connected depending on the availability of pipeline branches and the configuration of the terrain.

The **Detva district** is supplied primarily from the Hriňová water source via the H–L–F trunk main, which supplies the municipalities of Detva, Hriňová, Kriváň, Podkriváň, and Vígľaš. This system is one of the stable and central water-supply systems in the region and all the municipalities listed are directly connected to this branch. A number of municipalities are supplied from local water sources.

The **Zvolen district** is specific in that it is not currently supplied from the main water-supply system connected to the Málinec, Hriňová, or Klenovec sources. The only municipality in the district directly connected to this system is Zvolenská Slatina, via the H–L–F pipeline from the Hriňová source.

The **Lučenec district** is supplied from two water-supply sources – Hriňová and Málinec – with water delivered by trunk mains according to catchment areas.

- From the Hriňová source, via the H–L–F branch, the following municipalities are supplied: Fiľakovo, Biskupice, Boľkovce, Divín, Halič, Stará Halič, Lehôtka, Lovinobaňa, Mýtna, Dobroč, Podrečany, Prša, Točnica, Tomášovce, Vidiná, Gregorova Vieska, Belina, Tuhár, Buzitka, and Veľké Dravce.
- From the Málinec source, via the M–P–L pipeline, the municipalities of Trebeľovce, Rapovce, Mikušovce, and Lučenec are supplied.

Some municipalities have the option of combined supply from multiple sources, for example Fiľakovo, Tomášovce, Vidiná, Lučenec, Trebeľovce, Rapovce, and Mikušovce, which increases the flexibility of water delivery in the region.

The **Veľký Krtíš district** is supplied primarily from the Hriňová water source via the H–L–F pipeline. This is a large territory with many connected municipalities, including border and hard-to-reach areas such as Veľký Krtíš, Bušince, Malé Straciny, Malé Zlievce, Pôtor-Žihľava, Príbelce, Dolná Strehová, Nenince, Slovenské Ďarmoty, and Ďurkovce. Given the scale of the connections, this district is among the most extensively supplied areas in the region.

The **Poltár district** can be supplied from all three water reservoirs.

- From the Hriňová source, the municipalities of Poltár, Breznička, Cinobaňa, and Mládzovo are supplied.
- From the Málinec source, the municipalities of Kalinovo, Málinec, Veľká Ves, Sušany, Hrnčiarske Zalužany, Rovňany, and Uhorské are supplied.
- From the Klenovec source, the municipalities of Utekáč and Kokava nad Rimavicou are supplied. Some municipalities, such as Poltár, Veľká Ves, Sušany, Hrnčiarske Zalužany, and Kalinovo, have the possibility of combined supply, increasing the reliability of water delivery.

The **Rimavská Sobota district** is supplied mainly from the Klenovec water source, with partial use of the Málinec source.

- From the Klenovec source, the following municipalities are supplied: Bátka, Číž, Gortva, Hnúšťa, Hodejovec, Hrachovo, Chanava, Jesenské, Klenovec, Kociha, Kružno, Lehota nad Rimavicou, Lenartovce, Pavlovce, Rimavská Baňa, Rimavská Seč, Rimavské Brezovo, Rimavské Janovce, Rimavské Zalužany, Rumince, Šimonovce, Širkovce, Tomášovce, Rimavská Sobota, Veľké Teriakovce, Zacharovce, and Vlkyňa.
- From the Málinec source, the municipality of Ožďany can be supplied.

In some municipalities, combined supply from both sources is possible.

3. Future water demand

Future water demand for 2030 was determined on the basis of demographic development and expected trends in individual consumption sectors. In drawing up the forecast, the gradual development of public water mains, construction of new infrastructure, and 100% connection of inhabitants to the public water main were assumed. The balance also takes into account municipalities that are not currently connected to the public water main, but are expected to be connected by 2030.

Overall, the water demand in the area supplied by the water-supply system formed by the Málinec, Hriňová, and Klenovec water reservoirs is expected to reach **447.32 l/s** in 2030 and **469.09 l/s** in 2050. Increases in consumption will reflect the rising share of population connected to public water mains, as well as increased consumption in the industrial sector. Another significant factor in the growth of water demand is that future scenarios assume a legally defined per-capita water demand, which is almost double the current demand measured in the region.

Future number of connected inhabitants and future water demand in 2030 and 2050 for the water-supply system formed by the Hriňová, Málinec, and Klenovec water reservoirs

District	Outlook for connection to the water-supply system					
	2030			2050		
	Number of connected inhabitants	Water demand		Number of connected inhabitants	Water demand	
		Water demand [l/s]	[thous. m3/year]		Water demand [l/s]	[thous. m3/year]
Detva	29,341	63.19	1,992.76	32,001	69.05	2,177.56
Lučenec	67,058	142.57	4,496.09	63,301	134.59	4,244.43
Poltár	17,812	34.53	1,088.94	17,601	33.15	1,045.42
Rimavská Sobota	57,503	145.09	4,575.56	68,802	159.33	5,024.63
Veľký Krtíš	28,052	56.33	1776.42	35,739	68.19	2,150.44
Zvolen	2,568	5.61	176.92	2,365	4.78	150.74
Total	**202,334**	**447.32**	**14,106.68**	**219,809**	**469.09**	**14,793.22**

From a district perspective, the highest increase in water demand is recorded in the Rimavská Sobota district, where consumption is expected to reach 145.09 l/s. Significant growth in demand is also expected in the Lučenec district (142.57 l/s) and the Detva district (63.19 l/s). Smaller, but still significant, values are expected in the Veľký Krtíš district (56.33 l/s) and the Poltár district (34.53 l/s). In the Zvolen district, connection remains limited to the municipality of Zvolenská Slatina, with expected demand of 5.61 l/s.

Future connection of municipalities in 2030 and 2050 for the water-supply system formed by the Hriňová, Málinec, and Klenovec water reservoirs

District	Total number of municipalities	Number of connected municipalities at present	Number of connected municipalities – outlook for 2030	Number of connected municipalities – outlook for 2050
Detva	15	5	7	15
Lučenec	57	27	49	57
Poltár	22	14	18	22
Rimavská Sobota	107	28	48	107
Veľký Krtíš	71	44	45	71

Zvolen	26	1	1	2
Total	**298**	**119**	**168**	**274**

The table illustrates the timeline of municipal connection to the water-supply system. At present, 119 of the total 298 municipalities are connected. By 2030, the connection of 168 municipalities is expected, and by 2050, the connection of 274 municipalities is anticipated. Full connection of municipalities by 2050 is assumed in the districts of Detva (15), Lučenec (57), Poltár (22), Rimavská Sobota (107), and Veľký Krtíš (71). In the Zvolen district, 2 of 26 municipalities are expected to be connected, with supply in the remaining municipalities continuing to rely on local sources and on the Pohronský group water-supply system.

The current water-supply system is designed to allow interconnections between individual branches, opening possibilities for various technical solutions to be assessed in the next stage of the project "Proposal for Water-Supply Infrastructure Related to the Málinec – Látky Pumped-Storage Hydroelectric Plant".

The analysis demonstrates that the water-supply system has the potential not only to maintain a stable supply of drinking water to the population in the area of interest, but also to support its development through technical measures aimed at interconnecting individual parts of the system and coordinating all currently available water-supply sources.

SLOVAK UNIVERSITY OF TECHNOLOGY IN BRATISLAVA
FACULTY OF CIVIL ENGINEERING
DEPARTMENT OF SANITARY AND ENVIRONMENTAL ENGINEERING

Preparation of a Water-Management Balance and a Proposal for Water-Supply Infrastructure Related to the Málinec – Látky Pumped-Storage Hydroelectric Plant

Stage 1 – Determination of Drinking-Water Demand for Individual Municipalities in the Districts of Detva, Zvolen, Poltár, Lučenec, Veľký Krtíš, and Rimavská Sobota

Annex 1 – Assessment of demographic development in the area of interest

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Contents

1. Demography and projected population development

Knowledge of population size is an important tool for decision-making processes in public policy, including infrastructure planning. Demographic statistics, together with regular population censuses, provide data on the population of the Slovak Republic as a whole, on its spatial distribution, size, structures, and characteristics at a given point in time. In Slovakia, according to census methodology, since 1961 the numbers and characteristics of the permanently resident population have been recorded and processed. The most recent population and housing census for Slovakia was carried out in 2021. As at 1 January 2021 Slovakia had more than 5.449 million inhabitants.

A fundamental and indispensable step before constructing a population forecast at any administrative level is a good understanding of the last known state and of developmental trends in the main components. For this reason, the following sections present, from various sources, an overview of forecasts of the population of Slovakia, its regions, and districts, as well as, for the purposes of determining future water demand for supply by water-supply infrastructure in the area of interest, the projected population development in the districts of the Banská Bystrica Region, focusing on the districts of Detva, Zvolen, Poltár, Lučenec, Veľký Krtíš, and Rimavská Sobota.

1. 1. Projected population development of Slovakia

Under the study [1], the population development forecast of the Slovak Republic has been prepared by several authors for different forecast periods with different starting points.

Bleha and his team prepared a forecast using the most commonly applied cohort-component method, in three variants. The base date of the forecast is the end of 2017 (31 December) and the time horizon is the end of 2060 (31 December). As they state, in line with the findings of several authors, three basic factors affect the quality and accuracy of population forecasts. The first is the size of the population, with the rule that the larger the population, the greater the likelihood that the population forecast will be more accurate. The second aspect is the length of the forecast period. Population forecasts over long periods are characterised by a markedly lower level of accuracy, and it is explicitly confirmed that a shorter forecast period can also mean a higher-quality forecast. This aspect is linked to one of the basic properties of population forecasts, namely the decline in accuracy and quality as the time elapsed since the base date of the forecast increases. The turning point is considered to be the moment when cohorts of forecast persons (women) begin to enter the forecast results (particularly from the fertility perspective). The last factor is the level of population dynamics, with the rule that the lower the intensity of fertility and mortality, the higher the probability of a more accurate forecast [2].

According to the population development forecast for the Slovak Republic up to 2060, forecast scenarios were produced by combining variants of fertility, mortality, and migration [3]. The authors examined three main scenarios, which represent the most probable future development of the size and age structure of the population, and two boundary values – low and high. Combining the medium (most probable) variants of the input assumptions produced the medium (most probable) scenario of future development. High fertility and migration in combination with low mortality form the basis of the high scenario of future development. In the background of the low scenario lie low fertility, high mortality, and low migration. As with the input variants, the output scenarios represent real possibilities of future development, although they are not equally probable. The medium scenario is the most probable future development of population size, growth, and age structure. The high and low scenarios are the limits to which future development could move in the case of favourable or unfavourable developments in fertility, mortality, and migration.

According to the forecast assumptions, the expected number of inhabitants in 2060 may range from 4,848,000 (low variant) to 5,906,000 (high variant). From today's perspective, the most probable scenario appears to be a slight increase in the population up to 2030 (to 5,558,000), followed by a decline to 5,345,000 by 2060 (Figure 1).

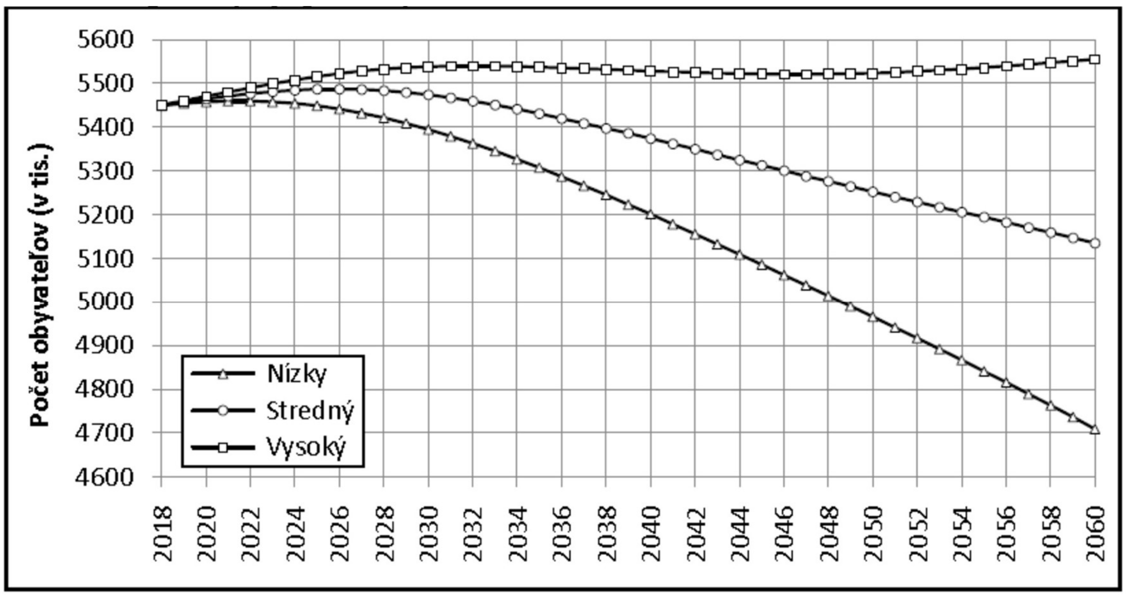

Figure 1 Forecast of the population of Slovakia up to 2060 (source: [3])

Decisive for the future development of population size will be the development of fertility and, especially, migration. Under the high scenario, population size would increase throughout the entire forecast period. The increase would be even and only after 2050 would signs of slowing appear, signalling that population growth would stop shortly after 2060, just below 6 million persons. Over the period from the base year to the final year of the forecast, the population of the Slovak Republic would increase by more than 450,000, i.e. by 8.4% (Figure 1). The development of population size according to the low scenario would entail a slight increase in the population up to 2020 and then a relatively sharp decline until the end of the forecast period. Between 2020 and 2060, the population would fall by roughly 620,000, i.e. a decrease of more than 11%. From the steepness of the decline at the end of the forecast period, it can be clearly inferred that, if reproductive characteristics develop in line with the low scenario, the population decrease would continue quite intensely beyond the horizon of this forecast (Figure 1).

The most probable scenario of population development divides the forecast period into two parts. Up to 2030, a moderate increase is expected, and after 2030, by contrast, a slight decrease in the population is projected. Even under the medium scenario, a decrease in the population of the Slovak Republic beyond the horizon of this forecast can be expected. The population is expected to peak around 2030 at about 5,558,000. The subsequent decline in population would mean that in 2060 the number of inhabitants would be only about 60,000 lower than the base figure in 2011 (Figure 1) [3].

The results of the forecast by Šprocha and his team clearly show (Figure 2) that in the coming decades the number of inhabitants of Slovakia will decrease [4]. The decline in population will very probably actually begin before 2030 and will be continuous and pronounced over the forecast period. Stabilisation of the population in Slovakia can be expected only beyond the horizon of this forecast.

In 2080, the population of Slovakia is expected to be in a range from 4.20 to 5.14 million. From today's perspective, development outside these bounds, defined by the low and high scenarios, appears unrealistic. This is a very wide margin, caused mainly by the considerable uncertainty in the development of migration, which has a direct effect on population development. Uncertainty in population development is also due to the fact that development under the low and high scenarios gradually diverges and, by 2080, the width of the range will reach almost 1 million.

We consider development according to the medium scenario to be the most probable. Development between the medium and the two extreme scenarios is considered realistic, but the further it diverges from the medium scenario and approaches the low or high scenario, the less probable it becomes. The low and high scenarios still represent developments that could occur in Slovakia, but are very unlikely.

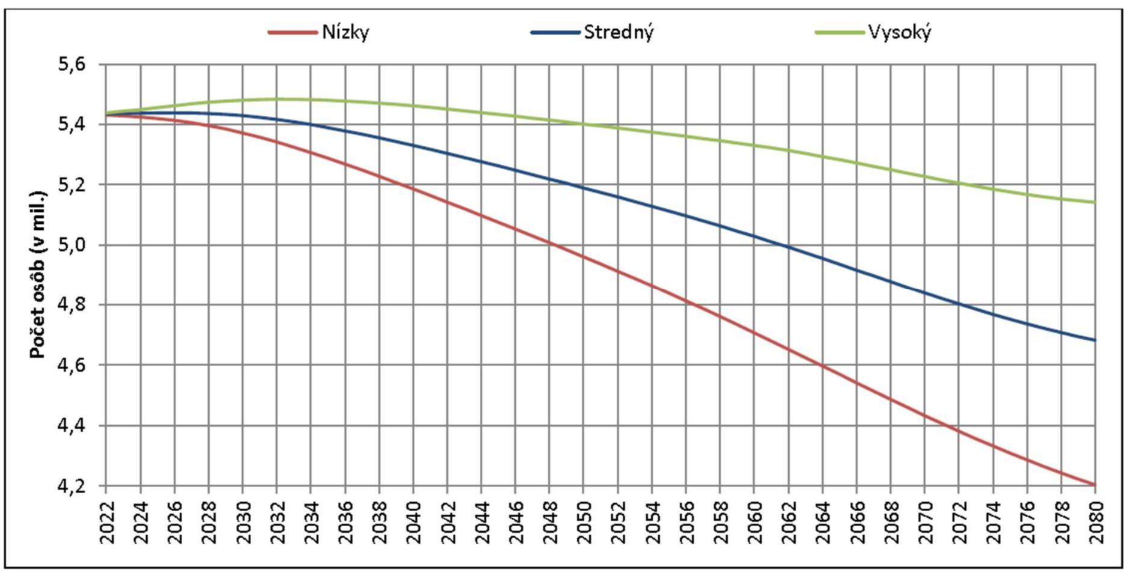

Figure 2 Forecast of population development in Slovakia in 2022–2080 (source: [4])

Development under the high forecast scenario would mean a milder decline in population than under the medium scenario. The decrease in population would begin to slow around 2033 and, by 2080, the number of inhabitants of the Slovak Republic would gradually fall to just under 5.2 million. Between 2022 and 2080, the population of the Slovak Republic would decrease by 297,000, i.e. by 5.5%.

Population development under the low scenario would bring a very marked population decline. The decline would begin practically immediately (in 2023) and, by 2080, the population would fall to about 4.2 million. Under the low scenario, the population of the Slovak Republic would fall by 1.23 million between 2022 and 2080, i.e. by 22.6%.

According to Bleha and his team and Vaňo, in the coming decades Slovakia must prepare for a decrease in the population and for intensive population ageing. A decline in population is very probable, and population ageing is irreversible [5,6].

The results of the forecast of population development in Slovakia (Figure 3) for 2022–2080 also show that the most probable future development assumes, at the next population census in 2031, a decrease of 0.5%. In subsequent censuses, the population decline will probably intensify further, partly due to higher mortality. Shortly after 2061, the population of Slovakia is expected to fall below 5 million. The most marked decline is anticipated between the 2061 and 2071 censuses, probably amounting to 3.8%.

Population development under the high scenario (which assumes a more substantial increase in fertility) indicates a milder decline in the population. The next census in 2031 forecasts an increase in population of 0.8%. Under the high scenario, the population is not expected to fall below 5 million at any time in the forecast period.

Population development under the low scenario (which assumes low fertility and high mortality) would bring a pronounced decline in the population. At the next census in 2031, a 1.4% decline in population is forecast, and the population is expected to fall below 5 million even before the 2051 census [7].

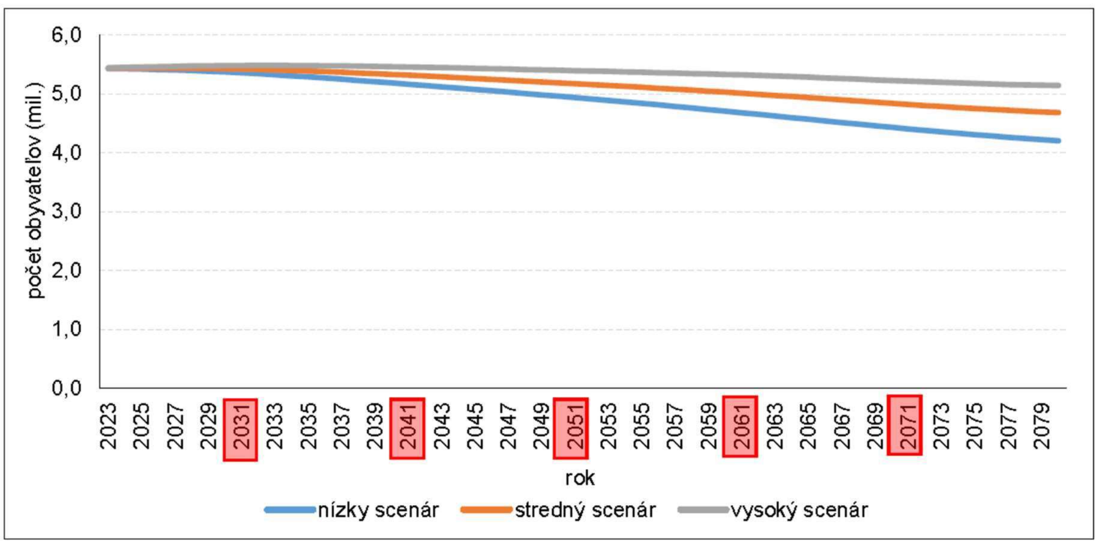

Figure 3 Forecast of population development according to projection scenarios in the Slovak Republic, 2023–2080 (source: [7])

The main trends in population development of the Slovak Republic for 2022–2080 are presented in the publication Štatistika v súvislostiach, demografia a sociálne štatistiky ("Statistics in Context, Demography and Social Statistics") [8]. The population forecast for Slovakia for 2025–2080 was constructed using a cohort-component model, in three scenarios of possible population development, with the medium scenario representing, at the time of preparation, the most probable scenario and the high and low scenarios forming the "boundaries" within which population development in Slovakia may move (Figure 4). The results of the latest baseline forecast show quite clearly that further development of the population size in Slovakia will be characterised by decline.

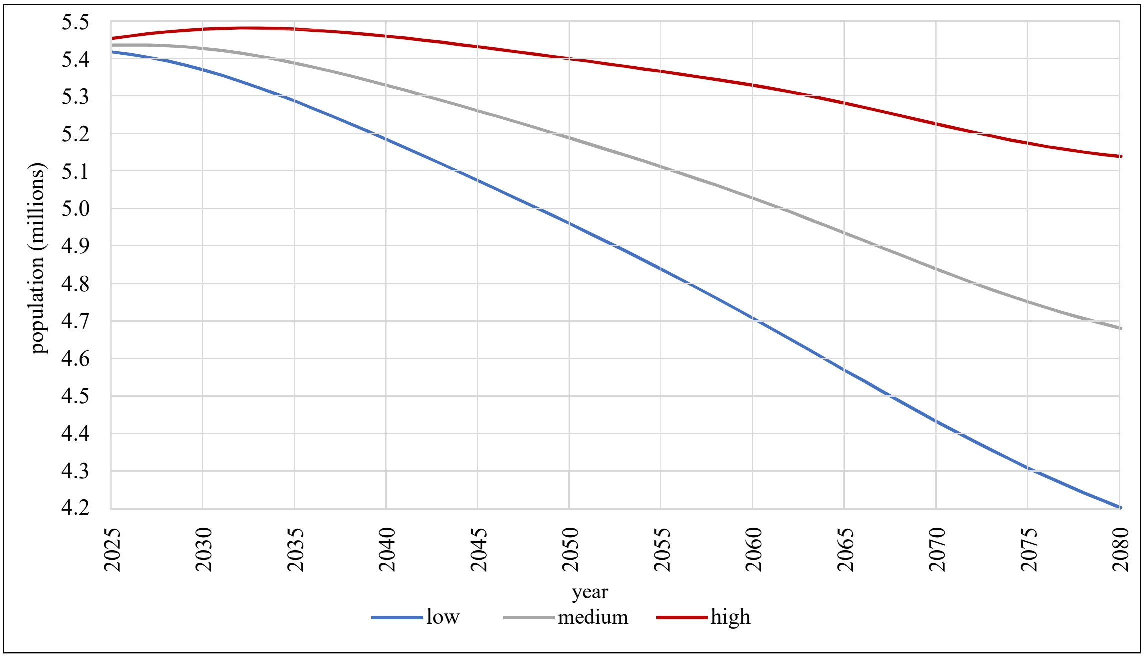

Figure 4 Population forecast for the Slovak Republic, 2025–2080 (source: [8])

1. 2. Comparison of forecasts

Individual forecasts may produce different results in the forecast data. An example comparing several forecasts is presented in the Population Development Forecast for the Slovak Republic up to 2060 [3].

For comparison, the authors used two official forecasts of population development in the Slovak Republic prepared after the 2001 and 2011 censuses, and the Eurostat forecast. As regards population development, expected trends in all forecasts are similar, but the forecasts differ in the timing of the turning point in population development and the subsequent intensity of population decline (Figure 5).

The authors state that a comparison of the forecasts leads to the same conclusions as the comparison of the results of the three basic scenarios in their own forecast (Figure 1). It can be clearly concluded that the next 60 years will be characterised by a change in the trend of population development and by the continued ageing of the population. Despite uncertainty in the development of reproductive behaviour, population development exhibits substantial inertia, stemming mainly from the stability of the age structure of the population. It is therefore possible to forecast some basic features of population development with high probability. Even if developments occur that the forecast does not anticipate, they will certainly not reverse some of the basic trends in future population development beyond the bounds defined by the high and low forecast scenarios. It can be clearly concluded that the next 60 years will be characterised by a change in the trend of population development and by the continued ageing of the population. In 2060, the population of Slovakia will be smaller, older, and probably also more ethnically diverse. The decline in population in Slovakia will, with very high probability bordering on certainty, continue until the end of the forecast period. The population in 2060 is expected to be around 5.3 million.

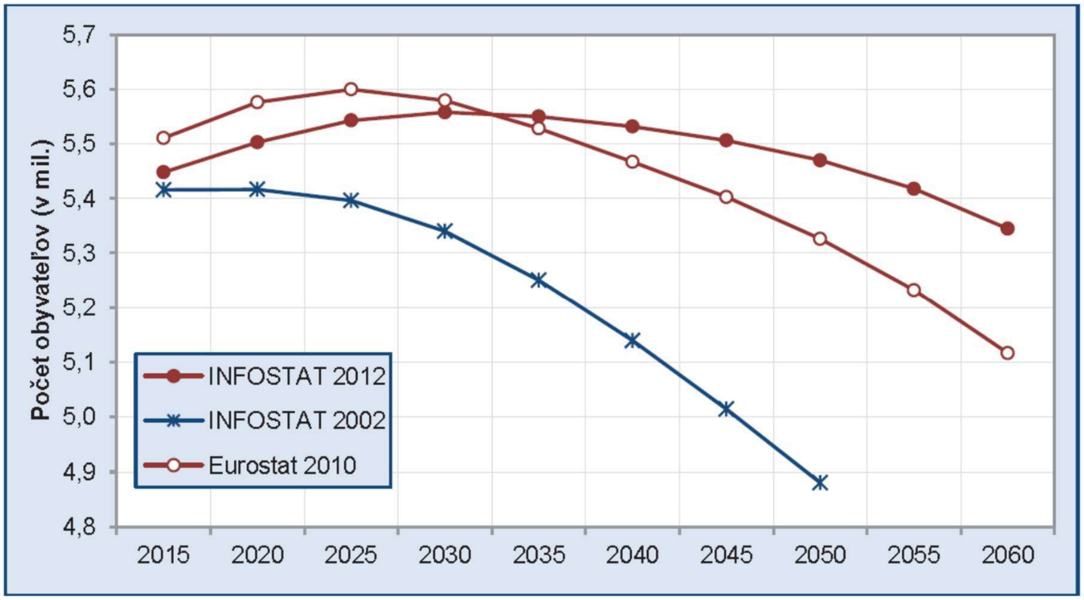

Figure 5 Forecast of the population of Slovakia (comparison of selected forecasts) (source: [3])

In general, based on the forecasts described above in more detail from several sources, it can be concluded that in the coming decades the population of Slovakia will decrease. The decline in population will very probably actually begin before 2030, or has already begun, and during the forecast period (up to 2025) it will be continuous and pronounced. Stabilisation of the population in Slovakia can be expected only beyond the horizon of this forecast.

1. 3. Projected population development in the geographic regions of Slovakia

Regional differences in Slovakia are significant and long-standing, and they also concern demographic development [9]. After every census, demographic forecasts are prepared that also focus on geographic regions, at the level of administrative regions and districts.

The regional forecasts from 2023 are prepared using the classical cohort-component method [9], which is a standard deterministic approach (i.e. in three or more scenarios) [10]. Its principle lies in shifting cohorts over time into higher ages, with the predicted development of the main demographic components – fertility, mortality, and migration – serving as the predictor of their development. The parameters of this development (intensity and age-specific timing) are the key element in compiling the forecast.

In the Analysis of the Results of the Baseline Population Forecast for Geographic Regions and Districts of Slovakia, the base year for the forecasts is 2022, the time horizon is 2050, the input consists of data from the Statistical Office of the Slovak Republic (population structure by sex and units of age at the end of 2022), and the outputs are presented for the forecast period in one-year time steps. The estimated parameters of future fertility, mortality, and migration balance are successively applied to the baseline age-sex structure of the population [9].

The assessment of the forecast results provides a description of the expected population development. The full results of the forecast are available on the website of the Demographic Research Centre [11].

1. 3. 1. Projected population development in the administrative regions of the Slovak Republic

The population in the individual administrative regions of Slovakia does not differ fundamentally, and the differences between the beginning and end of the period under review are not as marked as the differences at district level [1]. The population in the administrative regions of Slovakia in 2000 and 2022 is shown in Table 1.

Table 1 Population in the administrative regions of Slovakia in 2000 and 2022 (persons) (source: [9])

Region	2000	2022	Change 2000–2022	
			number	%
Bratislava	617,049	728,370	111,321	18.04
Trnava	551,441	565,573	14,132	2.56
Trenčín	608,786	570,675	-38,111	-6.26
Nitra	714,602	670,696	-43,906	-6.14
Žilina	693,853	688,106	-5,747	-0.83
Banská Bystrica	662,077	617,777	-44,300	-6.69
Prešov	787,483	808,090	20,607	2.62
Košice	767,256	779,505	12,249	1.60

At present, the group of regions with the smallest population includes (along with the Trnava and Trenčín Regions) the Banská Bystrica Region, with a population just above 600,000 (Figure 6). In the 2023–2050 period, the population will very probably decrease in almost all regions (except the Bratislava Region); in the Banská Bystrica Region, the decline is expected to be around 14% (Figure 7).

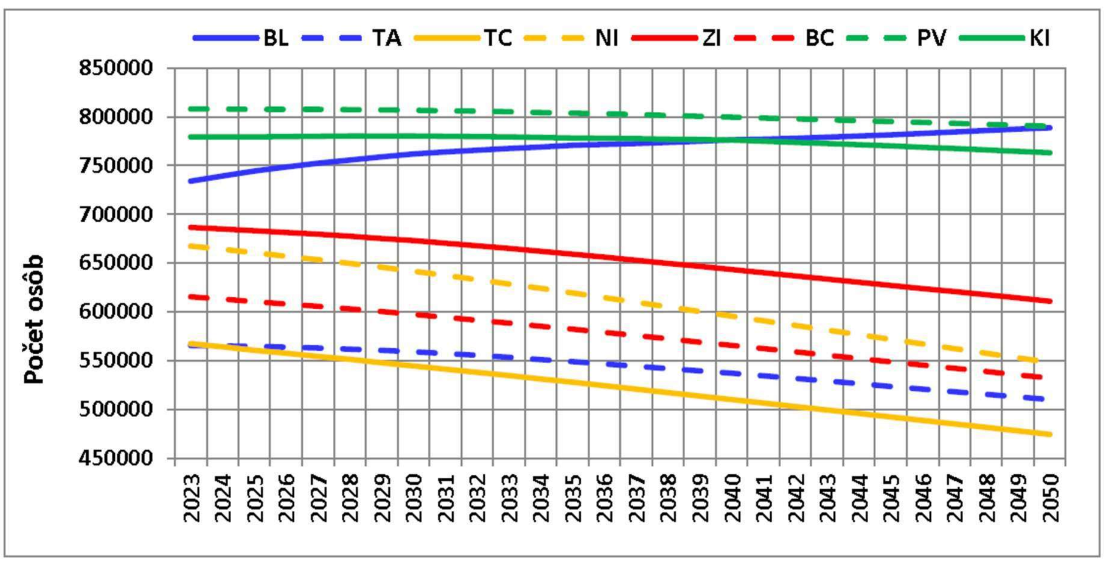

Figure 6 Population forecast for the administrative regions of the Slovak Republic up to 2050 (source: [9])

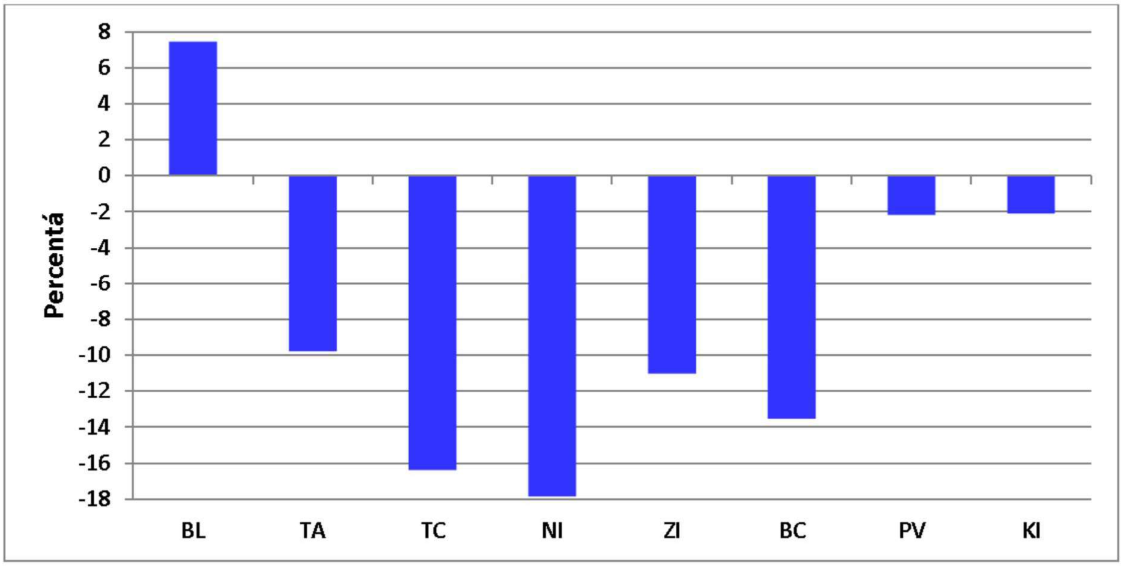

Figure 7 Expected change in the population in the administrative regions of the Slovak Republic in 2023–2050 (source: [9])

The forecast of overall population change in the administrative regions of the Slovak Republic up to 2050 is shown in Figure 8. Over the forecast period, overall population change will report a decrease in all regions of the Slovak Republic. In the Banská Bystrica Region, total population loss will increase from more than 3 persons per 1,000 inhabitants at the beginning of the forecast period to about 6 persons per 1,000 inhabitants at the end of the forecast period.

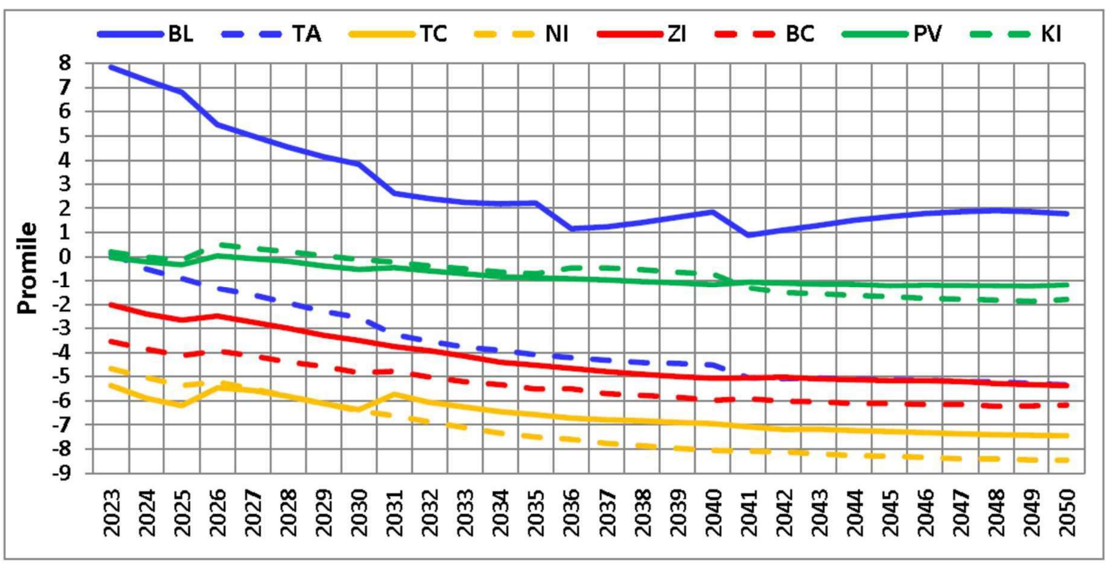

Figure 8 Forecast of overall population change in the administrative regions of the Slovak Republic up to 2050 (source: [9])

1. 3. 2. Projected population development in districts

Over the 2023–2050 forecast period, a decline in population is expected in most districts, which will reduce the average population per district. In most of the 61 districts with population decline, the population loss over the forecast period will exceed 10% (this applies to 40 districts).

Similarly, the average total population change is expected to show a decrease in almost all districts of the Slovak Republic. This is a logical consequence of the expected decrease in both fertility and net migration in the vast majority of districts. In most districts, the average value of the average total population change over the entire forecast period will be negative.

Districts with population growth and decline in 2023–2050 in central Slovakia are illustrated in Figure 9, and the average overall population change in the districts of central Slovakia is shown in Figure 10.

The group of districts with the largest total population loss in 2050 is expected to consist of 12 districts with a total annual loss of more than 7 persons per 1,000 inhabitants. These are expected to be the districts of Detva, Partizánske, Komárno, Prievidza, Humenné, Topoľčany, Žiar nad Hronom, Myjava, Snina, Šaľa, Levice, and Nové Zámky.

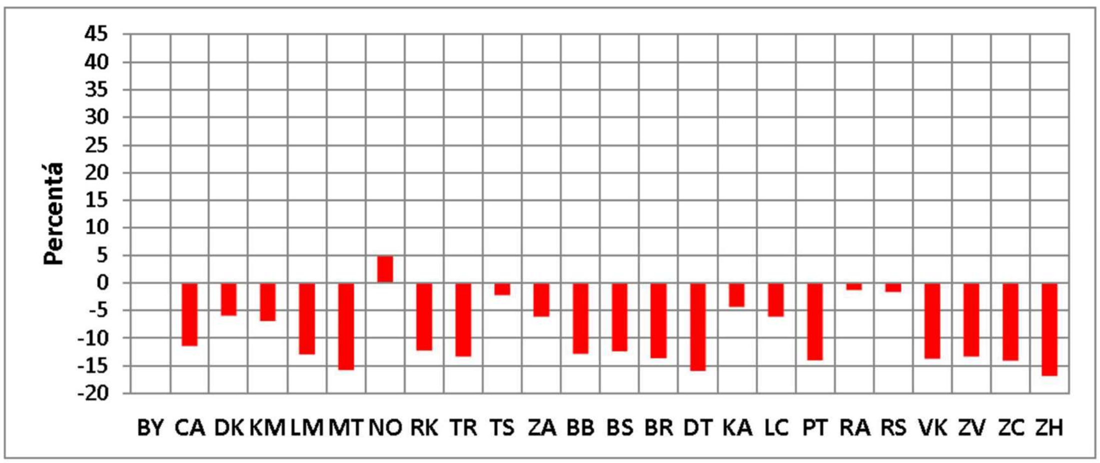

Figure 9 Change in population in the districts of the Slovak Republic in 2023–2050 – central Slovakia (source: [9])

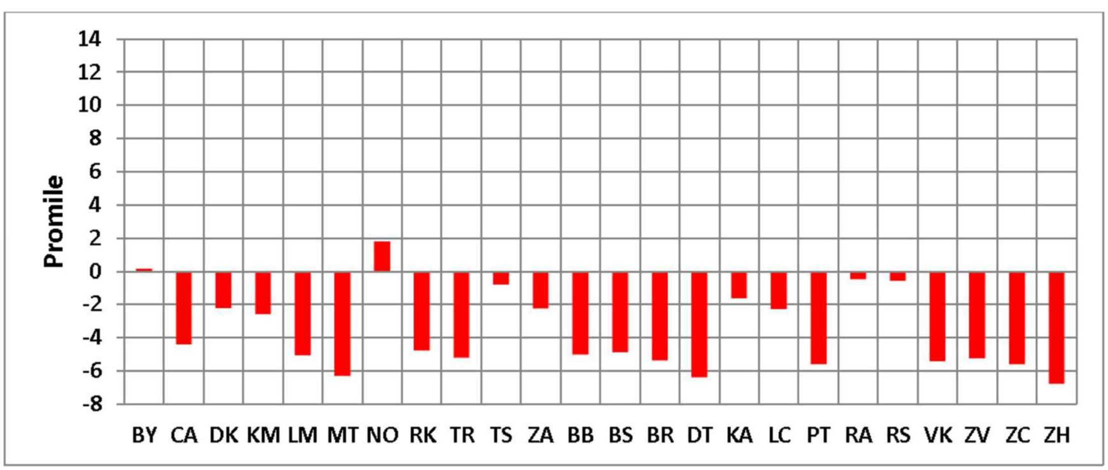

Figure 10 Average overall population change in the districts of central Slovakia (source: [9])

1. 3. 3. Projected population development in the Banská Bystrica Region and in the area of interest

For the purposes of determining future water demand for supply by water-supply infrastructure in the area of interest, it is necessary to know the forecast of the projected population development in the districts of the Banská Bystrica Region (Figure 11), with a focus on the districts of Detva, Zvolen, Poltár, Lučenec, Veľký Krtíš, and Rimavská Sobota.

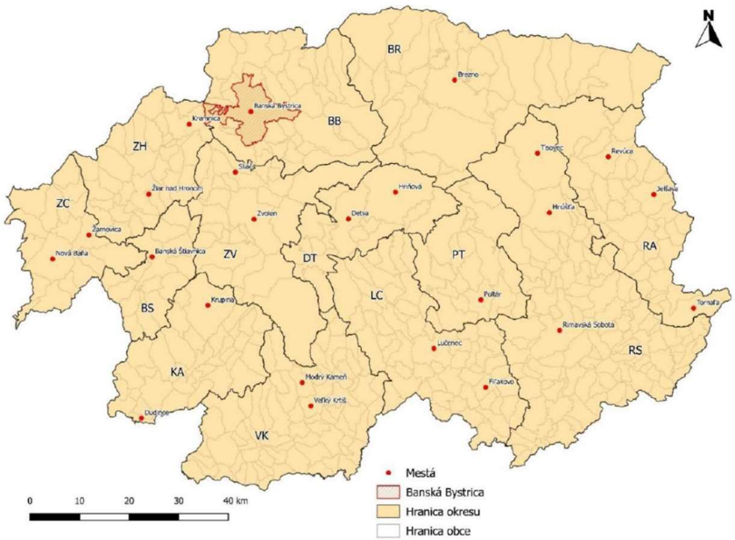

Figure 11 Banská Bystrica Region and its districts (source: [12])

Population development and the year-on-year population growth index in the Banská Bystrica Region in 1996–2023 are shown in Figure 12. In 2023, the Banská Bystrica Region had a total of 614,400 inhabitants, i.e. almost 52,000 fewer than in 1996. The change index between 1996 and 2023 was 92.5%, which corresponds to a declining population trend in the Banská Bystrica Region.

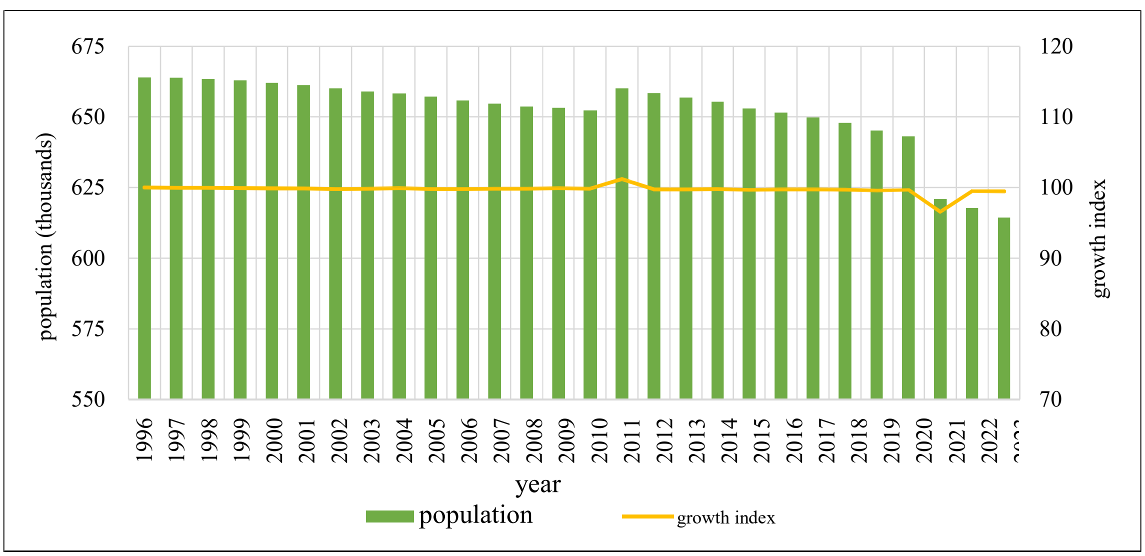

Figure 12 Population and year-on-year population growth index in the Banská Bystrica Region, 1996–2023 (source: [12])

The absolute and relative change in 2000–2022 in the population of the districts of the Banská Bystrica Region according to Vaňo is shown in Table 2 [1].

Table 2 Population in the districts of the Banská Bystrica Region and its absolute and relative change between 2000 and 2022

			Change 2000–2022	
District	2000	2022	Number of	%
Banská Bystrica	112,588	107,642	-4,946	-4.39
Banská Štiavnica	17,004	15,504	-1,500	-8.82
Brezno	65,715	58,672	-7,043	-10.72
Detva	33,351	30,711	-2,820	-8.41
Krupina	22,878	21,326	-1,552	-6.78
Lučenec	73,552	69,521	-4,031	-5.48
Poltár	22,858	20,365	-2,493	-10.91
Revúca	40,944	37,993	-2,951	-7.21
Rimavská Sobota	82,463	79,981	-2,482	-3.01
Veľký Krtíš	46,515	41,255	-5,260	-11.31
Zvolen	68,215	65,936	-2,279	-3.34
Žarnovica	27,582	24,822	-2,760	-10.01
Žiar nad Hronom	48,232	44,049	-4,183	-8.67

According to the publication Štatistika v súvislostiach ("Statistics in Context") [12], the population of the Banská Bystrica Region will very probably decline intensively in the coming decades. A steady decline is expected from roughly 615,000 (2024) to less than 555,000 in 2050. This would mean a reduction in the population by more than 62,000, i.e. by 10.1% [12].

In view of the time horizon, the regional forecast up to 2045–2050, prepared using the classical cohort-component method, can be considered a medium-term forecast [10]. At the level of district populations, long-term forecasts with a horizon up to 2070 and beyond can only be regarded as projections indicating possible development if established trends remain stable. Given the instability of development at the level of these relatively small population units, it is appropriate, in realistic terms, to work with a horizon of about 20 years, while accepting a reasonable degree of uncertainty in statements about future demographic processes. For this reason, the time horizon for the prediction in the area of interest was set at 2050.

The forecast of the population in the Banská Bystrica Region, 2024–2050, is illustrated in Figure 13.

Tables 3 and 4 contain the forecast population and the total population change for the districts of the Banská Bystrica Region, including the districts in the area of interest, i.e. Detva, Zvolen, Poltár, Lučenec, Veľký Krtíš, and Rimavská Sobota [9].

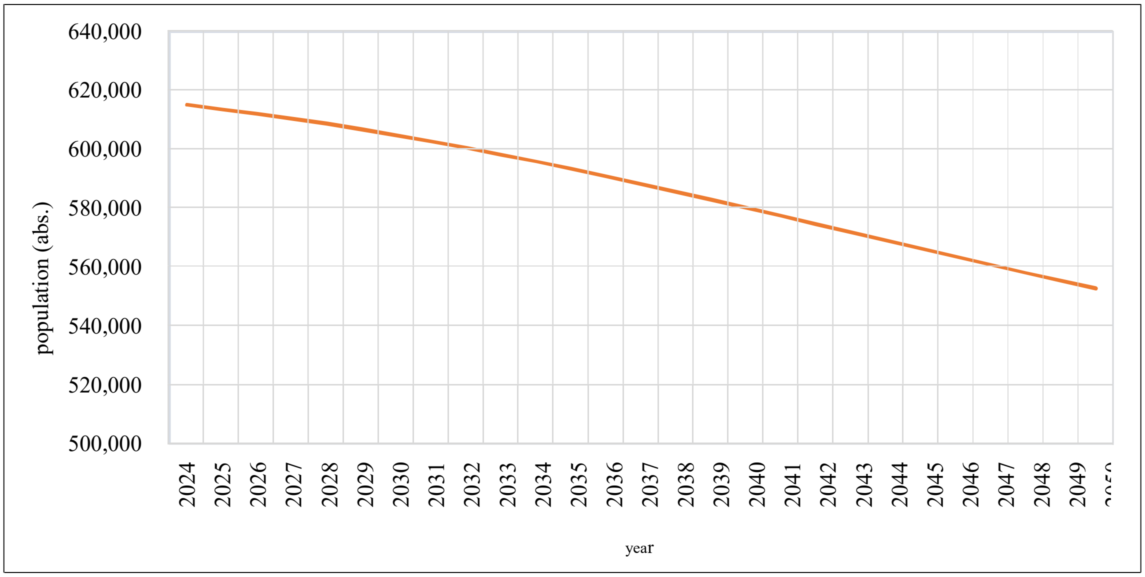

Figure 13 Population forecast for the Banská Bystrica Region, 2024–2050 (source: [12])

Table 3 Forecast of population in the districts of the Banská Bystrica Region in selected years, 2023–2050

							Change 2023–2050	
District	2025	2030	2035	2040	2045	2050	Numbe	%
Banská Bystrica	106,907	104,902	102,186	99,295	96,392	93,611	-13,838	-12.9
Banská Štiavnica	15,343	15,041	14,672	14,259	13,890	13,536	-1,909	-12.4
Brezno	57,926	56,657	55,247	53,675	52,069	50,492	-7,955	-13.6
Detva	30,245	29,428	28,504	27,533	26,600	25,698	-48,58	-15.9
Krupina	21,294	21,323	21,058	20,803	20,569	20,384	-936	-4.4
Lučenec	69,533	69,244	68,615	67,715	66,537	65,250	-4,299	-6.2
Poltár	20,071	19,630	19,125	18,550	17,977	17,423	-2,840	-14.0
Revúca	38,000	38,084	38,071	37,900	37,956	37,498	-513	-1.3
Rimavská Sobota	80,184	80,429	80,407	79,414	78,730	78,730	-1,340	-1.7
Veľk ý	40,823	40,020	39,023	37,867	36,668	35,470	-5,648	-13.7
Zvolen	65,320	63,966	62,235	60,604	58,785	56,980	-8,774	-13.3
Žarnovica	24,528	23,997	23,336	22,598	21,887	21,237	-3,485	-14.1

Table 4 Forecast of overall population change in the districts of the Banská Bystrica Region in selected years 2023-2050 (per mille)

District	2025	2030	2035	2040	2045	2050	Average 2023–2050
Banská Bystrica	-2.77	-4.55	-5.73	-5.93	-5.91	-5.83	-5.0
Banská Štiavnica	-3.71	-4.51	-5.11	-5.46	-5.11	-5.39	-4.86
Brezno	-4.6	-4.88	-5.48	-6.03	-6.14	-6.05	-5.38
Detva	-5.15	-5.97	-6.94	-6.89	-6.76	-7.15	-6.38
Krupina	-0.94	-1.32	-1.9	-2.45	-2.14	-1.37	-1.61
Lučenec	-0.23	-1.29	-2.26	-3.03	-3.73	-4.0	-2.27
Poltár	-5.02	-4.78	-5.64	-6.57	-6.45	-6.08	-5.59
Revúca	-0.39	0.39	-0.45	-1.16	-1.09	-0.85	-0.47
Rimavská Sobota	0.66	0.27	0.4	-1.42	-1.69	-1.61	-0.56
Veľk ý	-3.74	-4.62	-5.45	-6.28	-6.54	-6.65	-5.41
Zvolen	-3.4	-4.68	-5.62	-5.86	-6.18	-6.29	-5.23
Žarnovica	-4.15	-4.95	-6.03	-6.54	-6.34	-5.79	-5.59
Žiar nad Hronom	-5.27	-6.13	-7.05	-7.6	-7.76	-7.62	-6.78

1. 4. Projected population development in the municipalities of the area of interest

For the purposes of determining current drinking-water demand and establishing the projected water demand for supply via the water-supply infrastructure in the area of interest, it is necessary to know both the current situation and the forecast of the expected population development. As follows from the demographic forecasts for Slovakia as a whole, and for its regions and districts, a decline in population is expected in the area of interest over the period to 2050.

In supplementing the forecast of the population of the municipalities in the area of interest, the authors proceeded as follows:

a) Sources

In the area of interest in municipalities of the Detva, Lučenec, Poltár, Rimavská Sobota, Veľký Krtíš and Zvolen districts, the authors had population data from several sources, as listed in the references. These included, in particular:

- data concerning the individual municipalities in the area of interest from the Statistical Office for 2024;
- data from the spatial plans of all municipalities in the area of interest;
- data from Stredoslovenská vodárenská spoločnosť as at 30 June 2024;
- population forecasts for Slovakia covering various time periods;
- the population forecast for districts in Slovakia (Banská Bystrica Region) in selected years (2025, 2030, 2035, 2040, 2045, 2050).

The authors used the data from these sources as the basis for determining the current population of the individual municipalities in the area of interest (2024), and also for supplementing the population forecast for these municipalities, prepared according to three scenarios (low, medium, high).

b) Theoretical basis

Standard methods of demographic forecasting were used, including:

- the application of growth coefficients derived from the district forecast;
- the disaggregation method;
- scenario-based modelling of population development (low, medium, high variants);
- interpolation where specific municipality-level data was lacking.

c) Procedure for calculating the forecast for municipalities

The following algorithm was applied when calculating the municipal forecasts:

1. Population data for each municipality in the area of interest for 2024 was obtained from the Statistical Office. Based on these figures, population totals for the individual districts Y (Detva, Lučenec, Poltár, Rimavská Sobota, Veľký Krtíš and Zvolen) for 2024 were calculated.

2. From the source data (as per Table 3), the population forecast for the districts in the area of interest for 2025–2050 was obtained.

3. To calculate the growth factor for the relevant district Y, the baseline population of district Y in 2024 was related proportionally to the population of that district in each forecast year x (2025, 2030, 2035, 2040, 2045, 2050), according to the formula:

$$\text{District growth factor} = \frac{\text{District P 2024}}{\text{District P year } x}$$

where

- District growth factor2024– x is the ratio of the population of District Y in 2024 to the population of District Y in year x = 2025, 2030, 2035, 2040, 2045, 2050
- District P 2024 is the population of district Y in 2024
- District P year x is the population of district Y in year x (2025, 2030, 2035, 2040, 2045, 2050),

4. The population forecast for a given municipality in district Y in a given year was then calculated as:

$$\text{Municipal forecast} = \text{District growth factor} \times \text{Municipality } P \text{ 2024}$$

- District growth factor2024– x is the ratio of the population of District Y in 2024 to the population of District Y in year x = 2025, 2030, 2035, 2040, 2045, 2050
- Municipality P 2024 is the population of the municipality in 2024

Using this method, the forecast for all municipalities in the area of interest was calculated for 2025–2050 (specifically for 2025, 2030, 2035, 2040, 2045 and 2050). Each value was rounded to whole persons. The results are presented in Tables 5 to 10.

To supplement the population forecast for the individual municipalities in the area of interest, the method of scenario-based population modelling was used for the low, medium and high variants. Data for the calculation was sourced from the Statistical Office of the Slovak Republic. Population data for each municipality in the area of interest for 2024 was obtained and, for the methodology, combined with the main national-level population-development trends. In 2024, a national population forecast for Slovakia for 2025–2080 [8] was produced, in three scenarios of possible population development, with the medium scenario representing the most probable at the time and the high and low scenarios forming the “boundaries” within which Slovakia’s population development might fall. For the purposes of this forecast, data was obtained for 2025–2050.

Using the application of growth coefficients from the district and national forecasts, together with the disaggregation method and interpolation as needed, the forecast population for each municipality in the area of interest was calculated for the low, medium and high variants for 2025, 2030, 2035, 2040, 2045 and 2050. The results are presented in Table 11 and form the computational basis for the drinking-water demand balance for the population of the area of interest.

Table 5 Forecast population up to 2050 for the individual municipalities in the Detva district

Municipality	2024	2025	2030	2035	2040	2045	2050
Detva	13629	13488	13123	12711	12278	11862	11460
Detvianska Huta	685	678	660	639	617	596	576
Dúbravy	959	949	923	894	864	835	806
Horný Tisovník	186	184	179	173	168	162	156
Hriňová	7023	6950	6762	6550	6327	6113	5905
Klokoč	479	474	461	447	432	417	403
Korytárky	936	926	901	873	843	815	787
Kriváň	1727	1709	1663	1611	1556	1503	1452
Látky	543	537	523	506	489	473	457
Podkriváň	546	540	526	509	492	475	459
Slatinské Lazy	536	530	516	500	483	467	451
Stará Huta	309	306	298	288	278	269	260
Stožok	1162	1150	1119	1084	1047	1011	977
Vígľaš	1501	1485	1445	1400	1352	1306	1262
Vígľašská Huta - Kalinka	341	337	328	318	307	297	287

Table 6 Forecast population up to 2050 for the individual municipalities in the Lučenec district

Municipality	2024	2025	2030	2035	2040	2045	2050
Ábelová	217	219	218	216	213	209	205
Belina	616	621	618	612	604	594	582
Biskupice	1134	1143	1138	1127	1113	1093	1072
Boľkovce	628	633	630	624	616	605	594
Budiná	196	197	197	195	192	189	185
Bulhary	335	338	336	333	329	323	317
Buzitka	454	457	456	451	445	438	429
Čakanovce	1125	1133	1129	1118	1104	1085	1064
Čamovce	568	572	570	565	557	548	537
Divín	2027	2042	2034	2015	1989	1954	1916
Dobroč	596	600	598	593	585	575	563
Fiľakovo	9683	9756	9715	9627	9501	9335	9155

Fiľakovské Kováče	904	911	907	899	887	872	855
Gregorova Vieska	140	141	140	139	137	135	132
Halič	1647	1659	1652	1637	1616	1588	1557
Holiša	649	654	651	645	637	626	614
Jelšovec	315	317	316	313	309	304	298
Kalonda	196	197	197	195	192	189	185
Kotmanová	263	265	264	261	258	254	249
Lehôtka	365	368	366	363	358	352	345
Lentvora	77	78	77	77	76	74	73
Lipovany	230	232	231	229	226	222	217
Lovinobaňa	1907	1921	1913	1896	1871	1839	1803
Ľuboreč	346	349	347	344	339	334	327
Lučenec	25018	25206	25101	24873	24547	24120	23653
Lupoč	221	223	222	220	217	213	209
Mašková	327	329	328	325	321	315	309
Mikušovce	290	292	291	288	285	280	274
Mýtna	1122	1130	1126	1115	1101	1082	1061
Mučín	761	767	764	757	747	734	719
Nitra nad Ipľom	375	378	376	373	368	362	355
Nové Hony	182	183	183	181	179	175	172
Panické Dravce	737	743	739	733	723	711	697
Píla	251	253	252	250	246	242	237
Pinciná	197	198	198	196	193	190	186
Pleš	188	189	189	187	184	181	178
Podrečany	519	523	521	516	509	500	491
Polichno	124	125	124	123	122	120	117
Praha	73	74	73	73	72	70	69
Prša	188	189	189	187	184	181	178
Radzovce	1548	1560	1553	1539	1519	1492	1464
Rapovce	921	928	924	916	904	888	871
Ratka	345	348	346	343	339	333	326
Ružiná	836	842	839	831	820	806	790

Stará Halič	645	650	647	641	633	622	610
Šávoľ	592	596	594	589	581	571	560
Šiatorská Bukovinka	268	270	269	266	263	258	253
Šíd	1429	1440	1434	1421	1402	1378	1351
Šurice	454	457	456	451	445	438	429
Točnica	394	397	395	392	387	380	373
Tomášovce	1335	1345	1339	1327	1310	1287	1262
Trebeľovce	847	853	850	842	831	817	801
Trenč	540	544	542	537	530	521	511
Tuhár	333	335	334	331	327	321	315
Veľké Dravce	686	691	688	682	673	661	649
Veľká nad Ipľom	949	956	952	943	931	915	897
Vidiná	1702	1715	1708	1692	1670	1641	1609

Table 7 Forecast population up to 2050 for the individual municipalities in the Poltár district

Municipality	2024	2025	2030	2035	2040	2045	2050
Breznička	737	731	715	696	675	654	634
Cinobaňa	1995	1978	1934	1884	1828	1771	1717
České Brezovo	441	437	428	417	404	392	379
Ďubákovo	75	74	73	71	69	67	65
Hradište	224	222	217	212	205	199	193
Hrnčiarska Ves	932	924	904	880	854	828	802
Hrnčiarske Zalužany	834	827	809	788	764	740	718
Kalinovo	2233	2214	2165	2109	2046	1983	1922
Kokava nad Rimavicou	2737	2713	2654	2585	2508	2430	2355
Krná	49	49	48	46	45	44	42
Málinec	1381	1369	1339	1304	1265	1226	1188
Mládzovo	110	109	107	104	101	98	95
Ozdín	278	276	270	263	255	247	239
Poltár	5170	5125	5012	4884	4737	4590	4449
Rovňany	244	242	237	230	224	217	210

Selce	116	115	112	110	106	103	100
Šoltýska	73	72	71	69	67	65	63
Sušany	422	418	409	399	387	375	363
Uhorské	506	502	491	478	464	449	435
Utekáč	837	830	811	791	767	743	720
Veľká Ves	406	402	394	384	372	360	349
Zlatno	447	443	433	422	410	397	385

Table 8 Forecast population up to 2050 for the individual municipalities in the Rimavská Sobota district

Municipality	2024	2025	2030	2035	2040	2045	2050
Abovce	637	641	647	653	651	643	636
Babinec	64	64	65	66	65	65	64
Barca	604	608	614	619	617	610	603
Bátka	831	836	844	852	849	839	829
Belín	185	186	188	190	189	187	185
Blhovce	783	788	796	803	800	791	781
Bottovo	202	203	205	207	206	204	202
Budikovany	65	65	66	67	66	66	65
Cakov	363	365	369	372	371	367	362
Čerenčany	537	540	546	551	549	542	536
Čierny Potok	126	127	128	129	129	127	126
Číž	682	686	693	699	697	689	681
Dolné Zahorany	174	175	177	178	178	176	174
Dražice	254	256	258	260	260	257	253
Drienčany	195	196	198	200	199	197	195
Drňa	212	213	215	217	217	214	212
Dubno	148	149	150	152	151	149	148
Dubovec	497	500	505	510	508	502	496
Dulovo	271	273	275	278	277	274	270
Figa	426	429	433	437	435	430	425
Gemerček	92	93	93	94	94	93	92
Gemerské Dechtáre	417	420	424	428	426	421	416

Gemerské Michalovce	92	93	93	94	94	93	92
Gemerský Jablonec	708	713	719	726	724	715	707
Gortva	461	464	468	473	471	466	460
Hajnáčka	1165	1172	1184	1195	1191	1177	1163
Hnúšťa	6504	6546	6608	6669	6647	6569	6491
Hodejov	1509	1519	1533	1547	1542	1524	1506
Hodejovec	158	159	161	162	161	160	158
Horné Zahorany	99	100	101	102	101	100	99
Husiná	544	547	553	558	556	549	543
Hostice	1044	1051	1061	1070	1067	1054	1042
Hostišovce	225	226	229	231	230	227	225
Hrachovo	777	782	789	797	794	785	775
Hrušovo	162	163	165	166	166	164	162
Hubovo	113	114	115	116	115	114	113
Chanava	708	713	719	726	724	715	707
Chrámec	455	458	462	467	465	460	454
Ivanice	243	245	247	249	248	245	243
Janice	313	315	318	321	320	316	312
Jesenské	2352	2367	2390	2412	2404	2375	2347
Jestice	155	156	157	159	158	157	155
Kaloša	812	817	825	833	830	820	810
Kesovce	285	287	290	292	291	288	284
Klenovec	2970	2989	3017	3045	3035	3000	2964
Kociha	195	196	198	200	199	197	195
Konrádovce	328	330	333	336	335	331	327
Kraskovo	121	122	123	124	124	122	121
Kráľ	934	940	949	958	955	943	932
Krokava	18	18	18	18	18	18	18
Kružno	359	361	365	368	367	363	358
Kyjatice	68	68	69	70	69	69	68
Lehota nad Rimavicou	257	259	261	264	263	260	256

Lenartovce	560	564	569	574	572	566	559
Lenka	200	201	203	205	204	202	200
Lipovec	86	87	87	88	88	87	86
Lukovištia	193	194	196	198	197	195	193
Martinová	209	210	212	214	214	211	209
Neporadza	302	304	307	310	309	305	301
Nižný Skálnik	188	189	191	193	192	190	188
Nová Bašta	500	503	508	513	511	505	499
Orávka	157	158	160	161	160	159	157
Ožďany	1590	1600	1615	1630	1625	1606	1587
Padarovce	136	137	138	139	139	137	136
Pavlovce	427	430	434	438	436	431	426
Petrovce	201	202	204	206	205	203	201
Poproč	22	22	22	23	22	22	22
Potok	19	19	19	19	19	19	19
Radnovce	1034	1041	1051	1060	1057	1044	1032
Rakytník	341	343	346	350	349	344	340
Ratkovská Lehota	38	38	39	39	39	38	38
Ratkovská Suchá	42	42	43	43	43	42	42
Riečka	215	216	218	220	220	217	215
Rimavská Baňa	510	513	518	523	521	515	509
Rimavská Seč	2221	2235	2257	2277	2270	2243	2217
Rimavská Sobota	21341	21478	21682	21882	21811	21553	21299
Rimavské Brezovo	506	509	514	519	517	511	505
Rimavské Janovce	1456	1465	1479	1493	1488	1470	1453
Rimavské Zalužany	338	340	343	347	345	341	337
Rovné	107	108	109	110	109	108	107
Rumince	350	352	356	359	358	353	349
Slizké	255	257	259	261	261	258	254
Stará Bašta	319	321	324	327	326	322	318
Stránska	363	365	369	372	371	367	362
Studená	287	289	292	294	293	290	286

Sútor	686	690	697	703	701	693	685
Šimonovce	519	522	527	532	530	524	518
Širkovce	962	968	977	986	983	972	960
Španie Pole	76	76	77	78	78	77	76
Štrkovec	377	379	383	387	385	381	376
Tachty	541	544	550	555	553	546	540
Teplý Vrch	303	305	308	311	310	306	302
Tisovec	3632	3655	3690	3724	3712	3668	3625
Tomášovce	238	240	242	244	243	240	238
Uzovská Panica	826	831	839	847	844	834	824
Valice	324	326	329	332	331	327	323
Včelince	809	814	822	830	827	817	807
Večelkov	214	215	217	219	219	216	214
Veľké Teriakovce	845	850	859	866	864	853	843
Veľký Blh	1128	1135	1146	1157	1153	1139	1126
Vieska nad Blhom	173	174	176	177	177	175	173
Vlkyňa	383	385	389	393	391	387	382
Vyšné Valice	259	261	263	266	265	262	258
Vyšný Skálnik	144	145	146	148	147	145	144
Zacharovce	386	388	392	396	395	390	385
Zádor	134	135	136	137	137	135	134
Žíp	301	303	306	309	308	304	300

Table 9 Forecast population up to 2050 for the individual municipalities in the Veľký Krtíš district

Municipality	2024	2025	2030	2035	2040	2045	2050
Balog nad Ipľom	763	762	747	728	707	684	662
Bátorová	335	335	328	320	310	301	291
Brusník	112	112	110	107	104	100	97
Bušince	1370	1368	1341	1308	1269	1229	1189
Čebovce	1013	1012	992	967	938	909	879
Čeláre	501	500	491	478	464	449	435
Čelovce	424	423	415	405	393	380	368
Červeňany	36	36	35	34	33	32	31

Dačov Lom	391	390	383	373	362	351	339
Dolinka	457	456	447	436	423	410	397
Dolná Strehová	995	994	974	950	922	893	863
Dolné Plachtince	600	599	587	573	556	538	521
Dolné Strháre	206	206	202	197	191	185	179
Ďurkovce	114	114	112	109	106	102	99
Glabušovce	117	117	115	112	108	105	102
Horná Strehová	144	144	141	137	133	129	125
Horné Plachtince	208	208	204	199	193	187	180
Horné Strháre	251	251	246	240	233	225	218
Hrušov	818	817	801	781	758	734	710
Chrastince	200	200	196	191	185	179	174
Chrťany	124	124	121	118	115	111	108
Ipeľské Predmostie	553	552	541	528	512	496	480
Kamenné Kosihy	356	356	349	340	330	319	309
Kiarov	257	257	252	245	238	231	223
Kleňany	269	269	263	257	249	241	233
Koláre	241	241	236	230	223	216	209
Kosihovce	569	568	557	543	527	510	494
Kosihy nad Ipľom	381	381	373	364	353	342	331
Kováčovce	301	301	295	287	279	270	261
Lesenice	484	483	474	462	448	434	420
Ľuboriečka	154	154	151	147	143	138	134
Malá Čalomija	185	185	181	177	171	166	161
Malé Straciny	147	147	144	140	136	132	128
Malé Zlievce	250	250	245	239	232	224	217
Malý Krtíš	468	467	458	447	434	420	406
Modrý Kameň	1659	1657	1624	1584	1537	1488	1440
Muľa	351	351	344	335	325	315	305
Nenince	1282	1280	1255	1224	1188	1150	1112
Nová Ves	441	440	432	421	409	396	383
Obeckov	424	423	415	405	393	380	368
Olováry	259	259	254	247	240	232	225

Opava	111	111	109	106	103	100	96
Opatovská Nová Ves	629	628	616	600	583	564	546
Pôtor	752	751	736	718	697	675	653
Pravica	116	116	114	111	107	104	101
Príbelce	561	560	549	536	520	503	487
Sečianky	323	323	316	308	299	290	280
Seľany	146	146	143	139	135	131	127
Senné	190	190	186	181	176	170	165
Sklabiná	908	907	889	867	841	815	788
Slovenské Ďarmoty	493	492	483	471	457	442	428
Slovenské Kľačany	175	175	171	167	162	157	152
Stredné Plachtince	600	599	587	573	556	538	521
Sucháň	265	265	259	253	245	238	230
Suché Brezovo	78	78	76	74	72	70	68
Širákov	184	184	180	176	170	165	160
Šuľa	74	74	72	71	69	66	64
Trebušovce	159	159	156	152	147	143	138
Veľká Čalomija	582	581	570	556	539	522	505
Veľká Ves nad Ipľom	435	434	426	415	403	390	377
Veľké Straciny	174	174	170	166	161	156	151
Veľké Zlievce	478	477	468	456	443	429	415
Veľký Krtíš	10457	10443	10238	9983	9687	9380	9074
Veľký Lom	132	132	129	126	122	118	115
Vieska	186	186	182	178	172	167	161
Vinica	1759	1757	1722	1679	1630	1578	1526
Vrbovka	321	321	314	306	297	288	279
Záhorce	653	652	639	623	605	586	567
Závada	401	400	393	383	371	360	348
Zombor	147	147	144	140	136	132	128
Želovce	1177	1175	1152	1124	1090	1056	1021

Table 10 Forecast population up to 2050 for the individual municipalities in the Zvolen district

Municipality	2024	2025	2030	2035	2040	2045	2050
Babiná	539	537	526	512	498	483	468
Bacúrov	158	157	154	150	146	142	137
Breziny	370	369	361	351	342	332	322
Budča	1379	1374	1345	1309	1274	1236	1198
Bzovská Lehôtka	130	129	127	123	120	117	113
Dobrá Niva	1852	1845	1807	1758	1712	1660	1609
Dubové	373	372	364	354	345	334	324
Hronská Breznica	244	243	238	232	226	219	212
Kováčová	1648	1642	1608	1564	1523	1477	1432
Lešť (military district)	27	27	26	26	25	24	23
Lieskovec	1377	1372	1343	1307	1273	1234	1197
Lukavica	281	280	274	267	260	252	244
Michalková	43	43	42	41	40	39	37
Očová	2462	2452	2402	2337	2275	2207	2139
Ostrá Lúka	333	332	325	316	308	299	289
Pliešovce	2265	2256	2209	2150	2093	2030	1968
Podzámčok	554	552	540	526	512	497	481
Sása	857	854	836	813	792	768	745
Sielnica	1415	1409	1380	1343	1308	1268	1230
Sliač	4761	4742	4644	4519	4400	4268	4137
Tŕnie	429	427	418	407	396	385	373
Turová	454	452	443	431	420	407	394
Veľká Lúka	878	875	856	833	811	787	763
Zvolen	39453	39300	38485	37443	36462	35368	34282
Zvolenská Slatina	2760	2749	2692	2619	2551	2474	2398
Železná Breznica	533	531	520	506	493	478	463

Table 11 Forecast population up to 2050 for the individual municipalities

see separate Annex

List of references

[1] VAŇO, Boris, PILINSKÁ, Viera, ŠPROCHA, Branislav, BLEHA, Branislav. Populačná prognóza krajov a okresov Slovenska (2023–2050). Bratislava: INFOSTAT – Výskumné demografické centrum, 2024. 138 pp. ISBN 978-80-89398-48-5.

[2] BLEHA, Branislav, ŠPROCHA, Branislav, VAŇO, Boris. Prognóza obyvateľstva Slovenska do roku 2060: Revízia poznatkov a predpokladov v kontexte pokračujúcej transformácie. Bratislava, November 2018. ISBN 978-80-89398-37-9.

[3] INFOSTAT – Výskumné demografické centrum. Prognóza vývoja populačného Slovenskej republiky do roku 2060. Bratislava: INFOSTAT, March 2013. ISBN 978-80-89398-23-2.

[4] ŠPROCHA, Branislav, BLEHA, Branislav, VAŇO, Boris. Kmeňová populačná prognóza Slovenska (2022–2080). Bratislava: INFOSTAT, 2024. ISBN 978-80-89398-49-2.

[5] BLEHA, Branislav, ŠPROCHA, Branislav, VAŇO, Boris. Prognóza obyvateľstva Slovenska do roku 2060. Revízia poznatkov a predpokladov v kontexte pokračujúcej transformácie. Bratislava: INFOSTAT, 2018. 75 pp. ISBN 978-80-89398-37-9.

[6] VAŇO, Boris. Hlavné trendy populačného vývoja v SR. Slovenská štatistika a demografia, 2019, Vol. 29, no. 2.

[7] VAŇO, Boris. Popis konštrukčných postupov, analýza a zhodnotenie získaných výsledkov populačnej prognózy jednotlivých variant. Bratislava: INFOSTAT, 2022. 38 pp.

[8] STATISTICAL OFFICE OF THE SLOVAK REPUBLIC. Štatistika v súvislostiach: Demografia a sociálne štatistiky. Hlavné trendy populačného vývoja v SR. Bratislava: ŠÚ SR, June 2024. ISBN 978-80-8121-985-6 (online), ISBN 978-80-8121-990-0 (print version).

[9] STATISTICAL OFFICE OF THE SLOVAK REPUBLIC. Analýza výsledkov kmeňovej populačnej prognózy krajov a okresov Slovenska. Bratislava: ŠÚ SR, 2023. Available from: www.statistics.sk.

[10] BLEHA, Branislav, ŠPROCHA, Branislav, VAŇO, Boris. Demografická prognóza okresov Slovenska do roku 2035 v kontexte odhaľovania geografickej nerovnomernosti a konvergencie. Acta Geographica Universitatis Comenianae, 2014, Vol. 58, no. 1, pp. 11–44.

[11] INFOSTAT – Výskumné demografické centrum. [online]. Available from: www.infostat.sk/vdc.

[12] STATISTICAL OFFICE OF THE SLOVAK REPUBLIC. Štatistika v súvislostiach: Hlavné trendy populačného vývoja v regiónoch SR. Bratislava: ŠÚ SR, October 2024. ISBN 978-80-8121-984-9 (online), ISBN 978-80-8121-991-7 (print version).

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