REPUBLIC OF SERBIA
MINISTRY OF MINING AND ENERGY

STRATEGIC ENVIRONMENTAL ASSESSMENT OF THE STRATEGY FOR THE MANAGEMENT OF MINERAL AND OTHER GEOLOGICAL RESOURCES OF THE REPUBLIC OF SERBIA FOR THE PERIOD FROM 2025 TO 2040, WITH PROJECTIONS UNTIL 2050

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AP - Autonomous Province
BAT – Best Available Technology
BAU - Business as usual
CCS – Carbon Capture and Storage
CRIRSCO – Committee for Mineral Reserves International Reporting Standards
CRMs – Critical Raw Materials
ELV – Emission Limit Value
EPS – Electric Power Industry of Serbia
EU – European Union
IEA - International Energy Agency
GDP – Gross Domestic Product
GHG – Greenhouse Gas Emissions
INECP - Integrated National Energy and Climate Plan
Lden – Day-Evening-Night Noise Indicator
Lnight – Night Noise Indicator
LV – Limit Value
ELV – Emission Limit Value
MAC – Maximum Allowable Concentration
MR – Mineral Resources
NERP – National Emission Reduction Plan
PE – Public Enterprise
PERC – The Pan-European Reserves and Resources Reporting Committee
RES – Renewable Energy Sources
RHMSS – Republic Hydrometeorological Service of Serbia
RS – Republic of Serbia
SEA – Strategic Environmental Assessment
SPRS - Spatial Plan of the Republic of Serbia
SRM – Secondary Raw Materials
SWQI – Serbian Water Quality Index
UN - United Nations
UNFC – United Nations Framework Classification
VAT - Value-added Tax
WWTP - Wastewater Treatment Plant

Introductory Notes

The Strategic Environmental Assessment (SEA) is carried out with the aim of ensuring environmental protection and improvement by integrating the fundamental principles of environmental protection into the process of preparing, drafting, and adopting, in this case, the **Strategy for the Management of Mineral and Other Geological Resources of the Republic of Serbia for the Period from 2025 to 2040, with Projections Until 2050** (hereinafter referred to as the Strategy).

The Strategy is a document intended to comprehensively analyze the state of all mineral resources available to the Republic of Serbia, as well as to assess the current and define the future position of the country in terms of the development and utilization of its mineral resource potential. The Strategy should demonstrate how to best manage mineral resources to achieve the greatest benefits for economic growth with minimal harmful impacts on the environment.

This Strategy is being adopted for the first time to define the measures and activities necessary to achieve the long-term strategic goals in the fields of geological exploration, exploitation, and valorization of mineral and other geological resources.

The **Strategic Environmental Assessment Report** is an instrument used to describe, evaluate, and assess the potential environmental impacts that may result from the implementation of the Strategy.

The SEA Report on the Strategy for the Management of Mineral and Other Geological Resources, in addition to evaluating potential environmental impacts, should prescribe appropriate measures for the prevention, minimization, mitigation, remediation, or compensation of harmful effects on the environment and human health. The implementation of the SEA allows for an assessment of the spatial changes and consideration of the needs of the relevant environment. Within it, all measures and activities envisioned by the Strategy are critically reviewed from the perspective of environmental impact, after which a decision is made on whether its implementation will proceed and under what conditions, that is, which protection and monitoring measures will be prescribed.

It is important to emphasize that the SEA integrates the socio-economic and physical segments of the environment, connects, analyzes, and assesses activities from various sectors of interest, and directs policies and documents toward solutions that are, above all, in the interest of environmental protection.

The Strategic Environmental Assessment will comprehensively, spatially, temporally, and strategically integrate ecological aspects into the review of impacts from all development activities and objectives in the field of mineral and other geological resources. Based on the evaluation, it will be possible to select the most favorable solution and develop a unified integrated Strategy according to the concept of sustainable development, in which the preservation of nature and the environment is one of the key conditions for quality of life in the future.

The SEA in question must be harmonized with other strategic environmental assessments, as well as with environmental protection plans and programs, and it must be carried out under the procedure prescribed by the **Law on Strategic Environmental Assessment** ("Official Gazette of RS", No. 135/2004 and 88/10). This primarily refers to alignment with the Strategic Environmental Assessment of the **Energy Development Strategy of the Republic of Serbia until 2040 with projections until 2050** and the Strategic Environmental Assessment of the **Integrated National Energy and Climate Plan of the Republic of Serbia for the period until 2030 with a vision until 2050.**

In the preparation of this Report, numerous sectoral studies, strategic environmental assessments of planning and public policy documents, as well as projects from various areas of development were used. Detailed analyses of existing data were conducted to obtain the most comprehensive, complete, and high-quality assessment possible of the impacts of strategic activities on the environment and to prescribe protection measures.

The SEA Report was prepared based on the **Decision on the Preparation of the Strategic Environmental Assessment of the Strategy for the Management of Mineral and Other Geological Resources of the Republic of Serbia for the Period from 2025 to 2040, with Projections Until 2050**, adopted by the **Ministry of Mining and Energy**. The Decision was published in the Official Gazette ("Official Gazette of RS", No. 17/2024) according to the **Law on Strategic Environmental Assessment**.

To prepare the subject SEA, the Ministry of Mining and Energy, as the contracting authority, engaged the **University of Belgrade – Faculty of Mining and Geology** as the SEA contractor through a public procurement procedure.

According to Article 1, the subject of the Contract is the preparation of the **Report on the Strategic Environmental Assessment of the Strategy for the Management of Mineral and Other Geological Resources of the Republic of Serbia for the Period from 2025 to 2040, with Projections Until 2050**, following the Project Terms of Reference defined by the Ministry, the relevant legal framework, as well as regulations, norms, and standards applicable to this type of work, while adhering to the professional rules of the field.

One of the advantages of preparing the SEA Report lies in the fact that the activities related to the preparation of the Report follow the procedure of adopting the Strategy, which provides the opportunity for early identification of priority activities and projects and timely submission of potential suggestions aimed at environmental protection and improvement.

1. Foundational Principles of the Strategic Assessment

The Report on the Strategic Environmental Assessment represents the core document of the strategic assessment process, i.e., the outcome of the SEA. The scope and level of detail of the SEA Report are adapted to the scope of the specific plan or program. In this case, it is related to the Strategy for the Management of Mineral and Other Geological Resources, and it contains clear and precise guidelines and measures from the perspective of spatial and environmental protection.

The initial premises of the strategic assessment, as defined by Article 13 of the Law on Strategic Environmental Assessment, include the following content:

- a brief overview of the content and objectives of the Strategy and its relationship with other plans and programs;
- a review of the existing state and quality of the environment in the area to which the report applies;
- the characteristics of the environment in areas that could be exposed to significant impacts;
- environmental protection issues and problems considered in the Strategy, including an explanation of why certain issues and problems were excluded from the assessment process;
- an overview of the alternative solutions prepared concerning environmental protection in the Strategy, including the alternative of not implementing the Strategy and the most favorable alternative from the standpoint of environmental protection;
- the results of prior consultations with interested authorities and organizations relevant to the objectives and the assessment of potential SEA impacts.

The review of the existing state and quality of the environment, due to its complexity, will be addressed in Section 2 of the Strategic Environmental Assessment Report. The presentation and comparison of alternative solutions, as well as the explanation of the reasons for selecting the most favorable solution, will be addressed and presented in Section 4 of the Strategic Environmental Assessment Report.

1.1. Overview of the Scope, Content, and Objectives of the Strategy for the Management of Mineral and Other Geological Resources and Its Relationship to Other Documents

The Strategy for the Management of Mineral and Other Geological Resources of the Republic of Serbia more precisely defines the instruments, measures, and activities necessary to achieve the long-term goals of sustainable development in the mining sector. This includes attracting investments, applying global standards in environmental management and monitoring, and strengthening the cooperation of mining companies with local communities.

The subject of the Strategy

The Strategy for the Management of Mineral and Other Geological Resources of the Republic of Serbia for the Period from 2025 to 2040, with Projections Until 2050 is conceptually designed as a national strategy and is intended to become an integral part of the overall Economic Development Strategy of the Republic of Serbia.

The subject of the Strategy includes metallic mineral raw materials, non-metallic mineral raw materials, energy mineral raw materials, and underground and geothermal waters within the territory of the Republic of Serbia. The Strategy is expected to clearly outline the conditions for the sustainable development of the mining sector up to the year 2050.

The Strategy will define in more detail the instruments, measures, and activities necessary to achieve the long-term goals of sustainable development in the mining sector, attract investments, apply global standards in environmental management and monitoring, and strengthen cooperation between mining companies and local communities.

The adoption of the Strategy is expected to contribute in the long term to:

- stable and sustainable supply of the Republic of Serbia with mineral and other geological resources (especially strategic and critical mineral resources);
- establishing a balance between economic development and environmental impact;
- improving the processes of mineral resource exploitation and processing;
- more efficient application of new and updated legal solutions in the fields of geological exploration, mineral resource exploitation, and environmental protection;
- stimulating investments and creating new jobs in the mining and mineral processing sectors;
- increasing investments in geological exploration and the development of modern technologies and extraction methods in mining;
- strengthening the public, private, and academic sectors;
- raising awareness of the importance of sustainable resource management;
- early identification of risks and better risk management related to the exploitation and use of mineral raw materials; and
- sustainable and planned use of space.

The long-term mission of the Strategy for the Management of Mineral and Other Geological Resources is to support an active geological and mining sector that is globally competitive, ensures raw material supply, supports regional development, promotes the responsible use of natural resources, and continuously strengthens the key competencies and capacities of its workforce. The mining sector has a significant direct and indirect impact on the national economy, employment, and society as a whole.

In developing the Strategy and the related SEA, an integrated and continuous planning approach was applied, with an emphasis on seeking sustainability measures through the integration of realistic goals and potentials in mineral resource exploitation on the one hand, and the goals and needs of environmental protection, quality of life, and socio-economic development, on the other hand.

The Table of Contents of the Strategy

The development of the Strategy is based on the project task and a comprehensive overview of mineral and other geological resources in the Republic of Serbia. The content of the Strategy is presented through the following segments:

1. **Introduction and Methodological Approach**
   - 1.1. Foundational Elements for the Development of the Strategy for the Management of Mineral and Other Geological Resources in the Republic of Serbia
2. **Overview and Analysis of the Current Situation**
   - 2.1. National Legal Framework and Development Strategies in the Republic of Serbia
   - 2.2. Legislative and Institutional Framework for Geological Exploration and Mining and the Degree of Alignment with EU Policy and Legislation
   - 2.3. Economic Role of Mineral Resources, Groundwater, and Geothermal Resources
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   - 2.8. Status and Comparative Analysis of Fees for the Use of Mineral Raw Materials and Other Geological Resources in Countries with Similar Mineral Potential and Mining Development in the EU, the Region, and the Republic of Serbia
   - 2.9. Impact of Mineral Exploitation and Environmental Protection Guidelines
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   - 2.11. Global Trends in the Management of Minerals and Other Geological Resources
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3. **Vision**
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5. **Objectives**
   - 5.1. General Objective
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   - 5.3. Problems and Risks That May Lead to the Failure of Achievement the Objectives
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7. **Key Performance Indicators**
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9. **Final Considerations**

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Overview of the situation in the mineral and other geological resources sector

The mineral resource potential of the Republic of Serbia is highly significant, as its territory hosts not only critical mineral raw materials (CRMs) but also a large number of other deposits and occurrences of metallic, non-metallic, and energy mineral raw materials, as well as considerable reserves of groundwater and geothermal energy.

In 2022, mining production in the Republic of Serbia reached 110.0 million tons of ore, including 36.2 million tons of energy raw materials, 33.8 million tons of metallic raw materials, and 42.5 million tons of non-metallic mineral raw materials.

The coal sector represents the most important energy potential, currently accounting for nearly 70% of primary energy production. In recent years, annual coal production through surface mining in Serbia amounted to 35-38 million tonnes of lignite, around 400,000 tonnes of coal from underground mining, and about 200,000 tonnes from underwater mining (Kovin). Some open-pit mines (Drmno, Tamnava West Field) are in full exploitation, while others are in the investment development stage - replacement capacities (Field E, Radljevo). Coal processing includes the production of approximately 400,000 tonnes of dried coal.

In the oil sector, Serbia is a highly import-dependent country, with a relatively low share of domestic crude oil production: domestic crude oil accounted for 23% of total demand in 2022, and 21% in 2023.

The gas sector faces an even less favorable situation, with domestic production covering only about 10% of needs. There is a clear natural decline in gas production, as well as in crude oil, due to reservoir depletion, though in the case of gas, the decline trend is even more pronounced. Since 2009, gas production has increased by 19% due to the commissioning of new reservoirs.

Geological explorations conducted to date have identified more than 30 metallic mineral raw materials across over 2,000 ore occurrences and deposits. In recent years, Serbia's production of metallic mineral raw materials amounted to 40,964,064 tonnes from surface mining and 4,889,537 tonnes from underground mining, totaling 45,853,601 tonnes in 2023.

The production of non-metallic mineral raw materials in Serbia has continued its upward trend in recent years. In 2022, total production was 31,809,765 tonnes, and in 2023, it reached 36,906,318 tonnes. Limestone dominates production with 22,734,784 tonnes, alongside large-scale production of dolomite, sand and gravel, marble, loess, marl, and diabase.

Serbia ranks among countries rich in groundwater relative to its territory size; this resource provides about 75% of the drinking water supply for the population. Current groundwater abstraction from existing sources amounts to about 23 m^3/s, representing one-third of the total available potential of this resource in the country.

Serbia also has considerable geothermal potential, indicated by the terrestrial heat flow density, occurrences of thermal and thermomineral waters, as well as existing boreholes and wells with a total yield exceeding 150 l/s of free outflow, with an average thermal water temperature of 60°C. Available data show that approximately 3,000 geothermal systems have been installed across the country, providing total thermal consumption of up to 200 MW.

According to Article 4 of the Law on Mining and Geological Exploration, mineral resources of strategic importance for Serbia include: oil and natural gas; coal; copper and gold ores; lead and zinc ores; boron and lithium ores; oil shales; and other mineral raw materials designated by a special government act at the proposal of the competent ministry. Nickel, cobalt, and uranium are also considered important. According to EU methodology, the critical non-metallic mineral raw materials include barite, feldspar, fluorite, magnesite, natural graphite, and phosphates, in line with the critical raw materials act.

To pursue the general goal, a total of 26 individual measures have been defined across the eight identified sectors, addressing key issues in geological exploration, mining, environmental protection, economy, intensification of the use of technogenic raw materials, and other areas.

Based on the conducted analyses of the current situation and the expected projections from basic and applied geological exploration of mineral and other geological resources, the defined measures should clearly outline the direction needed to fulfill the set objectives.

Specific Objective 1 - Integrated sustainable management of mineral and other resources with continuous process innovation and the enhancement of state and corporate control in geological exploration and mining processes, including health and safety, implies:

- **Measure 1:** Implementation of the integrated system for managing mineral and other geological resources for the sustainable development of the mining sector, with optimization of locally and globally changing sustainability components related to stakeholders.
- **Measure 2:** Effective implementation of sustainable long-term mining projects.
- **Measure 3:** Establishment and alignment of common measures between different Ministries and industries regarding the implementation of the management system and strategic projects.

Specific Objective 2 - Ensuring access to mineral raw materials and other geological resources, and enhancing international cooperation in this field, implies:

- **Measure 1:** Increase the types, quantities, and quality of resources and reserves of mineral raw materials in the Republic of Serbia.
- **Measure 2:** Assessment of the Republic of Serbia's needs for mineral raw materials and other geological resources, based on analyses of existing and potentially deficient mineral raw materials in ore-bearing areas.
- **Measure 3:** Monitoring the extent to which resources, reserves, and the exploitation of mineral raw materials are integrated into spatial plans for various purposes.

Specific Objective 3 - Prospecting, exploration, and geological documentation of resources and mineral deposits and other geological resources, implies:

- **Measure 1:** Documentation and geological-economic evaluation of the results of exploration of mineral deposits and occurrences in the Republic of Serbia, along with establishing cooperation between the competent administrative authority, the Geological Survey of Serbia, and economic entities, to support investment in exploration activities.
- **Measure 2:** Identification and exploration of new geothermal energy resources and making them available for use.

Specific Objective 4 - Ensuring favorable legal conditions for the development, modernization, and investment in geological exploration and sustainable mining with a service-oriented approach, implies the following main measures:

- **Measure 1:** Activities aimed at addressing institutional issues and improving the work of the Geological Survey of Serbia.
- **Measure 2:** Improvement of the legislative framework in the area of classification of mineral resources and reserves, methodology for preparing preliminary feasibility studies, and feasibility studies according to international standards (PERC, CRIRSCO standards, and in line with UNFC).
- **Measure 3:** Allocation of responsibilities and improvement of information flow among stakeholders in the mining industry.
- **Measure 4:** Digitalization of geological plans and documentation, introduction of e-government in the field of geological research and mining activities.
- **Measure 5:** Concession for geological exploration and exploitation of mineral raw materials.

Specific Objective 5 - Strategic spatial protection of mineral deposits and other geological resources, contains the following measures:

- **Measure 1:** Monitoring the effectiveness of the adopted criteria for selecting strategically important mineral deposits and their classification into the group of deposits under special protection.
- **Measure 2:** Incorporation of representations of mineral deposits into planning documents, with a special focus on deposits of strategic importance, aligning the processes of geological exploration, environmental protection, and sustainable development.

Specific Objective 6 - Ensuring access to and exploitation of technogenic raw materials and supporting the development of the circular economy, implies:

- **Measure 1:** Inventory of mining waste dumps and assessment of their potential for utilization.
- **Measure 2:** Raising awareness about the importance of recycling Secondary Raw Materials (SRM) and sustainable resource management.
- **Measure 3:** Development of raw material recovery from waste (especially strategic and critical raw materials), including the development of technology for processing such waste. In addition to using ash from thermal power plants for the cement industry and road construction, exploring the possibility of processing into new products such as humic acids, graphene, filters for water and exhaust gases, etc.
- **Measure 4:** Improvement and harmonization of legislative regulations with EU legislation regulating the principles of SRM management.

Specific Objective 7 - Expanding knowledge and continuously strengthening the key competencies and capabilities of the professional staff, along with broad public education, contains:

- **Measure 1:** Expanding and promoting knowledge related to geology and mining to raise public awareness about the measures that will be implemented.
- **Measure 2:** Introducing dual education at the secondary school level in the fields of mining and geology.
- **Measure 3:** Optimization and modernization of higher education in the fields of mining and geology.
- **Measure 4:** Expanding the knowledge of employees in the mining and geology sector.

Specific Objective 8 - Sustainable mining industry with incentives for joint infrastructure investments, research, innovation, and control of environmental degradation, contains the following measures:

- **Measure 1:** Coordinated joint investments in infrastructure for the growth of the mining industry and stimulating research and innovation.
- **Measure 2:** Transparency and implementation of sustainability in mining industry projects and control of environmental impacts, mine closure processes, and waste management.
- **Measure 3:** Implementation of standards that define sustainable and responsible mining.

Legal Framework

In the preparation of the Strategic Environmental Assessment and the drafting of the Strategy for the Management of Mineral and Other Geological Resources of the Republic of Serbia, the evaluation of spatial ecological sustainability and acceptability, the selection of the best-proposed solution, and the proposal of protection measures and guidelines were based, among other things, on the following legal regulations:

- Law on Environmental Protection ("Official Gazette of RS", No. 135/04, 36/09, 72/09, 43/11 – Constitutional Court decision, 14/16, 76/18, 95/18, and 94/24);
- Law on Strategic Environmental Assessment ("Official Gazette of RS", No. 135/04, 88/10, and 94/24);
- Law on Environmental Impact Assessment ("Official Gazette of RS", No. 135/04, 36/09, and 94/24);
- Law on Mining and Geological Exploration ("Official Gazette of RS", No. 101/15, 95/18 – another law, and 40/21);
- Law on Planning and Construction ("Official Gazette of RS", No. 72/09, 81/09, 64/10 – Constitutional Court decision, 24/11, 121/12, 42/13 – Constitutional Court decision, 50/13 – Constitutional Court decision, 98/13 – Constitutional Court decision, 132/14, 145/14, 83/18, 31/19, 37/19, 9/20, 52/21, and 62/23);
- Law on Nature Protection ("Official Gazette of RS", No. 36/09, 88/10, 91/10 – correction, 14/16, 95/18, 71/21);
- Law on Water ("Official Gazette of RS", No. 30/10, 93/12, 101/16, and 95/18);
- Law on Forests ("Official Gazette of RS", No. 30/10, 93/12, 89/15, and 95/18);
- Law on Soil Protection ("Official Gazette of RS", No. 112/15);
- Law on Waste Management ("Official Gazette of RS", No. 36/09, 88/10, 14/16, 95/18 – another law, and 35/23);
- Law on Air Protection ("Official Gazette of RS", No. 36/09, 10/13, and 26/21);
- Law on Environmental Noise Protection ("Official Gazette of RS", No. 96/21);
- Law on Integrated Prevention and Control of Environmental Pollution ("Official Gazette of RS", No. 135/04, 25/15, and 109/21);
- Law on Disaster Risk Reduction and Emergency Management ("Official Gazette of RS", No. 87/18); and
- Law on Cultural Heritage ("Official Gazette of RS", No. 71/94, 52/11, 99/11, 6/20, 35/21, 129/21, and 76/23).

In addition to the listed laws, other laws as well as numerous rulebooks and government decrees as secondary legislation were used in preparing the Strategic Assessment.

Reason for the development of the Strategy and Strategic Assessment and Legal Framework

The initiative to develop the Strategy was launched by the Ministry of Mining and Energy, which is responsible for preparing, implementing, and monitoring mineral policy and the development plans for geological exploration and the exploitation of mineral and other geological resources in the Republic of Serbia. The adoption of the Strategy was undertaken according to Article 12 of the Law on Mining and Geological Exploration, which defines that the general goals of mining and geological exploration development are to be determined through the Strategy.

The immediate reason for preparing this SEA Report is the *Decision on the Preparation of the Strategic Environmental Assessment of the Strategy for the Management of Mineral and Other Geological Resources of the Republic of Serbia for the Period from 2025 to 2040, with Projections Until 2050* ("Official Gazette of RS", No. 17/2024), adopted by the Ministry of Mining and Energy.

The legal framework for adopting the Strategy is defined by Articles 11–13 of the Law on Mining and Geological Exploration ("Official Gazette of RS", No. 101/15, 95/18 – another law, and 40/21). The Strategy is supposed to establish a dynamic development plan for the mining sector, the management of mineral resources, and the policy for geological exploration development.

The legal framework for preparing the Report, in addition to the aforementioned Decision on the preparation of the SEA, includes relevant regulations in this field, primarily the Law on Environmental Protection and the Law on Strategic Environmental Assessment.

General and specific objectives of the Strategy

The Strategy for the Management of Mineral and Other Geological Resources is a strategic document through which the Government, as the executive authority of the Republic of Serbia, defines the policy for geological exploration and the exploitation of minerals and other geological resources. Establishing the Strategy provides a foundation for further work, and it is implemented in relevant policy areas to achieve the set objectives. The goal of the Strategy is to define the policy of sustainable management of mineral and other geological resources and to set the conditions for the sustainable development of the mining sector.

The Strategy is intended to help address issues related to defining the long-term development goals for the mining and geological exploration of mineral and other geological resources, forecasting the needs for all types of mineral raw materials and other resources, developing the mining and geological exploration sectors, as well as issues related to the projection of imports and exports of all types of mineral raw materials in Serbia, taking into account economic, environmental, and social aspects.

The Strategy of the Republic of Serbia defines the **general objective** as the sustainable management of exploration and exploitation activities, aimed at meeting the current and future needs of the country for mineral raw materials and expanding the mineral resource base by intensifying activities related to the prospecting, exploration, and verification of mineral and other geological resources.

To achieve these goals and fulfill the vision, the Strategy comprehensively establishes strategic directions of action in the field of mineral and other geological resource management.

The achievement of the general objective is to result from the implementation of individual measures defined within the **specific objectives**, related to issues of geological exploration, mining, environmental protection, the economy, intensification of the use of so-called technogenic raw materials, and other areas. These are based on the analysis of the current situation and the projection of basic and applied geological exploration of mineral raw materials and other geological resources. They are generally grouped as follows:

- Integrated sustainable management of mineral and other resources with continuous process innovation and the enhancement of state and corporate control in geological exploration and mining processes, including health and safety.
- Ensuring access to mineral raw materials and other geological resources, and enhancing international cooperation in this field.
- Prospecting, exploration, and geological documentation of resources and mineral deposits and other geological resources.
- Ensuring favorable legal conditions for the development, modernization, and investment in geological exploration and sustainable mining with a service-oriented approach.
- Strategic spatial protection of mineral deposits and other geological resources.
- Ensuring access to and exploitation of technogenic raw materials and supporting the development of the circular economy
- Expanding knowledge and continuously strengthening the key competencies and capabilities of the professional staff, along with broad public education.
- Sustainable mining industry with incentives for joint infrastructure investments, research, innovation, and control of environmental degradation.

The Strategy is intended to be established as one of the most complex and significant mechanisms of modern management of non-renewable mineral resources, as well as of the unique spaces where mineral raw materials are located.

1.2. Relation to Other Strategic and Public Policy Documents

The Strategy for the Management of Mineral and Other Geological Resources is linked to and should be aligned with numerous public policy documents (strategies and programs), particularly those whose goals and tasks overlap or have shared outcomes. The most important documents are presented in the SEA, primarily the Energy Development Strategy of the Republic of Serbia, the Integrated National Energy and Climate Plan (INECP), the Spatial Plan of the Republic of Serbia (SPRS), and the Low-Carbon Development Strategy of the Republic of Serbia.

The **Energy Development Strategy of the Republic of Serbia until 2040 with projections until 2050** has set the main goal of ensuring secure and affordable energy supply for the population and the economy, while progressively reducing greenhouse gas emissions and other negative impacts on the environment and human health. The Strategy is based on Serbia's commitment to an energy transition that brings numerous economic, social, geospatial, and environmental implications at local, regional, and national levels. It transforms the entire Serbian energy system, from exploiting domestic primary energy sources, importing primary energy, producing electricity and heat, coal production and processing, to the energy and fuel transmission network. The mineral resources strategy should ensure that energy facilities have a sufficient supply of energy mineral raw materials to secure energy stability with limited environmental impact. The Strategy defines Serbia's energy resources and potentials as: fossil fuels (coal, oil, natural gas, and oil shale), nuclear mineral resources, and renewable energy sources (hydropower, biomass, wind, solar, hydrogen, biogas, landfill gas, etc.).

This strategic document plans the use of coal until 2050, with a gradual reduction in coal's share and an increase in renewable energy sources. Key priorities in Serbia's energy development during the transition process include decarbonization, energy security, the economic competitiveness of the energy sector, and an overall shift toward sustainable energy - the principles needed for developing energy policy.

The **Integrated National Energy and Climate Plan (INECP) of the Republic of Serbia** for the period up to 2030, with a vision to 2050, is a comprehensive strategic document that defines all necessary measures Serbia intends to take to achieve several strategic goals toward low-carbon development. INECP serves as the basis for shaping long-term energy and climate policy. The main policy priorities for each INECP dimension are:

1. **Decarbonization** - the state's commitment to climate action, decarbonizing the economy, and reducing emissions from the energy sector, with a special focus on increasing the use of renewable energy sources and reducing greenhouse gas emissions;
2. **Energy efficiency** - commitment to improving energy efficiency in all sectors, especially industry, transport, construction, and agriculture;
3. **Energy security** - diversifying energy sources and ensuring secure supply through solidarity and cooperation between the EU and Energy Community countries;
4. **Internal energy market** - creating a fully integrated and functional market that enables the free flow of energy within the Energy Community and the EU through appropriate infrastructure and without technical or regulatory barriers;
5. **Research, innovation, and competitiveness** - supporting innovation in the development of low-carbon and clean energy technologies.

INECP's main pillars include increasing the share of renewables in Serbia's energy mix, together with targeted energy efficiency measures aimed at reducing final energy consumption by improving performance. This clean energy transition pathway is focused on improving the country's energy security, reducing its energy dependence, and achieving a meaningful reduction in lignite use, significantly reducing GHG emissions by 2030. Achieving INECP goals will contribute to a healthier environment, a more secure energy supply with more green energy, energy independence, and efficient, cost-effective management of the decarbonization process.

The **Low-Carbon Development Strategy of the Republic of Serbia for 2023–2030 with projections to 2050** ("Official Gazette of RS," No. 46/23) details measures and activities in line with Serbia's obligations under the Paris Agreement and the UN Framework Convention on Climate Change, enabling Serbia's economy to make a significant shift toward a low-carbon and climate-resilient economy. Its main goal is to present opportunities and recommend desirable options to align Serbia's greenhouse gas (GHG) emission pathways with those of the EU in an economically acceptable and socially just manner. For this purpose and to assess various mitigation options, six GHG emissions scenarios were developed; the Strategy outlines the pathway to 2030 and suggests a range of options up to 2050. The accompanying Action Plan assesses options and proposes desirable measures and actions to achieve the Strategy's vision and goals. The Strategy identifies adaptation options relevant to reducing GHG emissions and mitigation measures. It also recognizes climate change risks to Serbia's sustainable development and defines goals that account for adaptation to changing climate conditions.

The **Spatial Plan of the Republic of Serbia (SPRS)** defines that the sustainable use, protection, and management of mineral raw materials and mining development in Serbia will be based on planning solutions, measures, and policies focused on fully integrating mineral resources as nonrenewable natural assets, mining as an economic activity, and the planned use of land, environmental protection, and sustainable local development. Mineral raw materials are seen as one of the essential foundations for Serbia's future industrial, economic, and social development.

The general goal is the sustainable use of mineral resources and maintaining Serbia's position as the regional leader in mining, as a cornerstone of the national economy and energy security. It is necessary to ensure economic, social, and environmental conditions for the survival of local populations in mining areas and their inclusion in decision-making processes regarding mineral resource management.

In terms of usage, protection, and management, an integrated approach will be applied in spatial development and the sustainable use of land and mineral resources in spatial and sectoral planning. This involves establishing better synchronization and a continuous process of research and planning in mineral resource use, spatial development, and environmental management. The SPRS defines the development concept for the mining sector covering energy mineral raw materials, metallic mineral raw materials, nonmetallic mineral raw materials, and groundwater.

According to SPRS guidelines, most issues will be addressed through the adoption and implementation of appropriate special-purpose spatial plans, which will include: strategic and regulatory planning provisions; population resettlement programs in mining activity zones; environmental protection, reclamation, and remediation measures for degraded areas; and guidelines for implementing planning provisions.

Additionally, Serbia's national public policy framework on mineral resource management and environmental protection is defined through several strategic documents aligned with EU policy and the Green Deal:

- National Emission Reduction Plan (NERP) for Major Pollutants from Existing Large Combustion Plants ("Official Gazette of RS," No. 10/20) was adopted to reduce air

pollutant emissions from large combustion plants with a total rated thermal input of 50 MW or more. The NERP represents Serbia's commitment to reduce emissions of pollutants from existing large combustion plants. In accordance with Article 5 of the Decision on the Implementation of the LCP Directive (Large Combustion Plants Directive), the NERP applies until December 31, 2027. By that date, the large combustion plants covered by the NERP must comply with the emission limit values defined in Part 1 of Annex V of the IED Industrial Emissions Directive, which have been transposed into national legislation. The NERP's goal is to reduce total annual emissions of sulfur dioxide (SO_2), nitrogen oxides (NO_x), and dust from large old combustion plants included in the NERP. This goal is ensured by setting maximum emissions for SO_2, NO_x, and dust. The NERP submitted to the Energy Community Secretariat included thermal power plants and combustion plants within refineries. The NERP does not apply to combustion plants that will use the "opt-out" mechanism (plants with limited lifespans). Plants covered by the NERP must comply with the annual maximum emissions specified in the plan.

- Air Protection Program in the Republic of Serbia for the Period 2022–2030 with Action Plan ("Official Gazette of RS," No. 140/22). The program's general goal is to reduce harmful health impacts from exposure to poor air quality by 2030 compared to 2015, by lowering air pollution exposure while aligning Serbia with EU regulatory limits for air pollution and minimizing harmful effects on ecosystems. Specific goals defined in the program include:
    1. Reducing SO_2 emissions by 92% and PM2.5 suspended particle emissions by 58.3% from the energy sector (including transport and individual heating) by 2030 compared to 2015;
    2. Reducing pollutant and heavy metal emissions from industrial processes and product use through compliance with BAT AELs;
    3. Reducing NH_3 emissions from the agricultural sector by 20.5% compared to 2015; and
    4. Promoting the transition to clean air for all.
- Waste Management Program in the Republic of Serbia for the Period from 2022 to 2031 ("Official Gazette of RS," No. 12/22) is a strategic document that sets goals for improving the waste management system and fundamental principles that all waste management stakeholders should follow to achieve these goals in Serbia during the 2022–2031 period. Implementation of this program, in addition to reducing environmental and climate impacts, should enable the conditions for using waste in the circular economy.
- Water Management Strategy of the Republic of Serbia until 2034 ("Official Gazette of RS," No. 3/2017) is a unique document defining long-term water management policy, i.e., the directions of sustainable action in water use, protection, river regulation, and flood protection. Based on this document, water sector reforms will be implemented to meet the required water management standards, including organizational adjustments and systematic strengthening of professional and institutional capacities at national, regional, and local levels. At the same time, the frameworks set by this strategy must be respected when drafting strategies and spatial planning, environmental protection, and other areas dependent on or affecting water. The analyses and development projections cover the period until 2034, during which significant improvements in the water sector compared to the current situation are expected, aligned with the country's social and economic capabilities and the EU water standards.

- Circular Economy Development Program in the Republic of Serbia for the Period 2022–2024 ("Official Gazette of RS," No. 137/22) is a public policy document linked to the second pillar of the Green Agenda. The general goal of the program is to create an enabling environment for the development of the circular economy to support the green transition in Serbia. The program covers the most important areas for the circular economy: waste management; water management; renewable energy sources and energy efficiency; chemicals management; voluntary environmental protection instruments; economic policy; innovation; and raising awareness. The program includes a three-year Action Plan that sets activities to achieve the measures and goals established by the program.
- Sustainable Urban Development Strategy of the Republic of Serbia until 2030 ("Official Gazette of RS," No. 47/19) defines measures for achieving urban development goals. The strategy expresses a commitment to pursuing sustainable development in urban areas through an integrated approach to achieve the desired quality of life, environmental standards, and spatial organization, and to strengthen identity and competitiveness. In addition, it outlines measures for mitigating climate change by improving the quality of all environmental parameters, and waste management systems, and measures for improving energy efficiency. Support programs for sustainable urban development using an integrated approach will be formulated for priority intervention areas in urban settlements. The strategy designates priority intervention areas as guiding for local integrated urban development strategies.
- The Industrial Policy Strategy of the Republic of Serbia for the Period from 2021 to 2030 ("Official Gazette of RS," No. 35/20) aims to increase industrial competitiveness. Among other points, the strategy notes that due to the application of a linear economic model in Serbia, there are significant losses in the flow of raw materials, materials, and products, leading to inefficient resource use. One of the specific objectives (Objective 5) focuses on transforming the industry from a linear to a circular model. The sectors identified as having the greatest potential for applying the circular economy concept in Serbia are the manufacturing industry (especially the food sector), construction, and primary agriculture. In the Action Plan for implementing the strategy ("Official Gazette of RS," No. 37/21), under Specific Objective 5, three measures (seven activities) are defined to be implemented over the next three years:
    1. Promoting the circular economy and educating economic operators;
    2. Encouraging investments in circular and low-carbon economy solutions as growth drivers;
    3. Promoting more efficient use of material resources and energy efficiency in industrial processes.

1.3. Environmental Protection Issues Considered and Reasons for Omitting Certain Issues from the SEA Process

Environmental degradation and protection issues, as well as the rational use and protection of space, must be considered simultaneously with the planning of development activities during the preparation of the Strategy for the Management of Mineral and Other Geological Resources and the SEA. The exploitation of mineral deposits has a significant impact on the economic development of the Republic of Serbia, but at the same time presents a challenge in the field of environmental protection.

The criteria for determining the potential significant environmental impacts of the program are based on the characteristics of the plan/program and the characteristics of the impacts. The SEA Report has identified key environmental issues based on available documentation, relevant reports, and data. The purpose of this SEA is to incorporate environmental protection goals and criteria into the preparation and implementation process of the Strategy.

When it comes to the Strategy for the Management of Mineral Resources, for which the SEA is being conducted, it is particularly important to identify environmental issues in areas directly affected by mineral resource exploitation and mining facilities, as well as to analyze the possible implications of these activities on environmental quality.

The mining sector in the Republic of Serbia plays a key role in securing energy and industrial resources, but its operations have impacts on air, water, and soil quality, as well as on the generation of mining waste. For these reasons, the SEA has considered issues primarily related to air, water, soil pollution, noise levels, as well as waste management, protected natural assets, and biodiversity, based on the characteristics of the current state of the environment.

During the preparation of the Strategy, identified environmental issues and limitations were:

1. **Regarding air pollution**, average concentrations of PM_{10} and $PM_{2.5}$ particles in mining regions occasionally exceed national and European standards. It is important to note that in the Republic of Serbia, mining facilities are almost always integrated with processing capacities (such as smelters) or end users (such as thermal power plants in the case of surface coal mines, etc.). Because of this setup, in most cases, it is not possible to separate the impact boundary of the mining facility from the accompanying processing or user capacities. This is particularly characteristic of major industrial and energy centers such as Bor, Lazarevac, and Kostolac. In Bor, PM_{10} particle concentrations reach a maximum daily value of up to 83 μg/m³ (City Park, 2023), with 13 days showing daily concentrations above 50 μg/m³ (limit value, LV). This figure illustrates the cumulative impact of the complex, with the smelter having a dominant influence at this monitoring site. A similar situation is observed in Kostolac, where PM_{10} concentrations reach up to 111 μg/m³ (2023), with 26 days above 50 μg/m³ (LV). In this case, thermal power plants have a dominant impact, which is also true for Lazarevac. In Lazarevac, PM_{10} concentrations reach a maximum daily value of 137 μg/m³ (2023), with 65 days above 50 μg/m³ (LV). Sulfur dioxide concentrations in Bor reach a maximum daily value of 106 μg/m³ (City Park, 2023), with no days exceeding the daily concentration of 125 μg/m³ (LV), indicating that the smelter has a dominant influence. In Kostolac, sulfur dioxide concentrations reach up to 127 μg/m³ (2023), with one day exceeding 125 μg/m³ (LV), directly linked to the operation of thermal power plants. In Lazarevac, sulfur dioxide concentrations reach a maximum daily value of 85 μg/m³ (2023), with no days above 125 μg/m³ (LV), while in Obrenovac, the maximum daily concentration is 124 μg/m³ (Center, 2023), again without days above 125 μg/m³ (LV), consistent with the previously mentioned influence of thermal power plants.
2. **Occasional water pollution** has been detected in areas with active mines. According to data from the Environmental Protection Agency – Ministry of Environmental Protection, heavy metal concentrations exceeding permitted limits were recorded in monitored watercourses. For example, in the Pek River, 200 m downstream from the confluence of the Mali Pek and Veliki Pek, the concentration of lead is <2.1 μg/l, arsenic is 2.9 μg/l, and cadmium was measured at values up to 1.3 μg/l (Institute of Mining and Metallurgy Bor, 2023).
3. **Regarding mining waste**, over 40 million tons of mining waste (flotation tailings) were produced in the Republic of Serbia in 2023. Mining waste refers to waste generated during geological exploration, exploitation, preparation, and storage of mineral raw materials, as well as waste from ore preparation processes involving mechanical, physical, biological, thermal, or chemical treatment. In 2020, the mining sector generated 45,709,000 tons of waste disposed of in mining landfills – tailings ponds (Statistical Yearbook of the Republic of Serbia, 2021). Additional research shows that over 40% of tailings ponds have adequate systems for managing wastewater and preventing leakage. Older tailings disposal sites, due to their method of deposition, have some impact on the quality of soil and water in the surrounding area.

Certain environmental protection issues were not relevant for consideration in the SEA because it is not part of project-technical documentation but part of strategic documentation. In this specific case, the absence of a more detailed impact assessment of individual facilities and activities in the mineral resource exploitation and mining sectors can be noted, as the Strategy itself has not reached the necessary level of detail for such analysis. This level of detail will be achievable when preparing documentation at a lower hierarchical level, i.e., for each planned facility. In this context, the SEA will primarily focus on assessing environmental trends resulting from individual activities and facilities or from the interaction of multiple mining activities.

1.4. Overview of Alternative Solutions Related to Environmental Protection

The alternative solutions and the reasons for selecting the most favorable alternative are elaborated in Section 4 of the SEA Report. The selection of the most favorable alternative was made based on an analysis of the evaluation of alternative solutions, i.e., according to the identified positive and negative effects of the alternatives relative to the SEA objectives.

1.5. Prior Consultations with Interested Authorities and Organizations

During the preparation of the Decision on the preparation of the Strategic Environmental Impact Assessment for Strategy for the Management of Mineral and Other Geological Resources of the Republic of Serbia for the period 2025–2040, with projections until 2050, consultations were held with relevant institutions. According to Article 11 of the Law on Strategic Environmental Impact Assessment, a request for opinions on the Draft Decision to conduct the SEA was sent to all relevant institutions, and this cooperation resulted in the final text of the Decision, which served as the basis for initiating the preparation of the SEA.

In the process of drafting the Strategy for the Management of Mineral and Other Geological Resources and conducting the SEA, consultations were held with representatives of relevant authorities and organizations, following Article 13.6 of the Law on Strategic Environmental Impact Assessment. After the preparation of the draft SEA Report, public consultations and a presentation of the SEA will be organized, where interested parties, competent authorities, and the public will be able to participate, in line with Articles 18 and 19 of the Law on Strategic Environmental Impact Assessment. Their opinions will be considered in the preparation of the final version of the Report.

Additionally, during the preparation of the Strategy and the SEA, data, conditions, and opinions were obtained from competent authorities and organizations, which were considered in drafting the strategic guidelines and their evaluation from an environmental protection perspective.

The Strategy for Mineral Resource Management and the Strategic Environmental Impact Assessment are the result of cooperation with relevant stakeholders (government bodies, the public and private sectors, and civil society organizations) who, through participation in the Working Group, monitor and actively contribute to the drafting process. The Ministry of Mining and Energy established the Working Group, and through consultations and discussions at its meetings, the decision-making process was carried out.

The entire process of drafting the Strategy and the SEA Report is coordinated by the Ministry of Mining and Energy, which is the competent institution and key beneficiary of the project.

2. An overview of the current state and quality of the environment in the area covered by the report

The state of the environment in the Republic of Serbia is determined by various factors, the most significant of which are the presence of urban, mining-energy, and industrial areas that exert pressure on the environment and space and may result in a significant impact on environmental quality.

When preparing the SEA, it is necessary to present the basic characteristics of the current state and quality of the environment. For this study, these have been defined based on an overview of the results of environmental measurements carried out by authorized organizations, existing planning documents, completed research studies, and available professional and scientific literature.

Due to the specific nature of the SEA, the first part of this chapter provides an overview of the current state and quality of the environment at the level of the Republic of Serbia, followed by an overview of environmental elements exposed to the impact of mining activities.

2.1. Overview of the Current State and Quality of the Environment

Air quality

Air quality in the Republic of Serbia can be assessed as unsatisfactory and represents one of the most pressing environmental issues. In addition to urban centers and their peri-urban zones, air quality is degraded in areas of mining, major thermal power, and industrial facilities, as well as along transportation corridors. The most common causes of air pollution include low energy efficiency, use of low-quality fuels, lack of gas purification facilities, outdated technology, failure to comply with emission standards for air pollutants and waste gas parameters, and unclear division of responsibilities between the state and local governments.

The energy sector is the largest emitter of greenhouse gases in the Republic of Serbia, accounting for 80.6% of total emissions, with the most important sub-sector being the energy industry, which includes public electricity and heat generation, refineries, and fuel production (representing 70% of emissions from the energy sector and 56% of total national emissions). Fossil fuels dominate consumption at 87.9%. Nevertheless, it is necessary to clearly define the boundary between geological and mining activities, which are the subject of this SEA Report and Strategy, and other industries and processing activities.

According to data from the Environmental Protection Agency, the production of electricity and heat was the dominant source of sulfur oxide emissions in 2023, accounting for 92.03%. Over the long-term observation period from 1990 to 2022, the largest contribution to the total amount of emitted sulfur oxides has consistently come from “Energy production and distribution” (Figure 2.1).

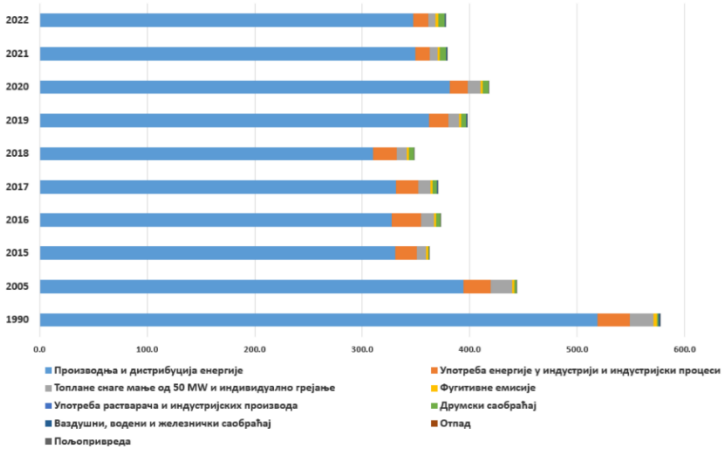

Figure 2.1. *Sulfur oxide emissions by sector in the period 1990-2022 expressed in thousands of tonnes (Source: Environmental Protection Agency, 2024)*

In total nitrogen oxide emissions, the road transport sector had the largest share in 2023 (40.52%), followed by the electricity and heat production sector with a slightly lower contribution of 38.95%. When observed over the long-term period from 1990 to 2022, the most significant contributions to the total amount of emitted nitrogen oxides come from "Energy production and distribution" and "Road transport" (Figure 2.2)

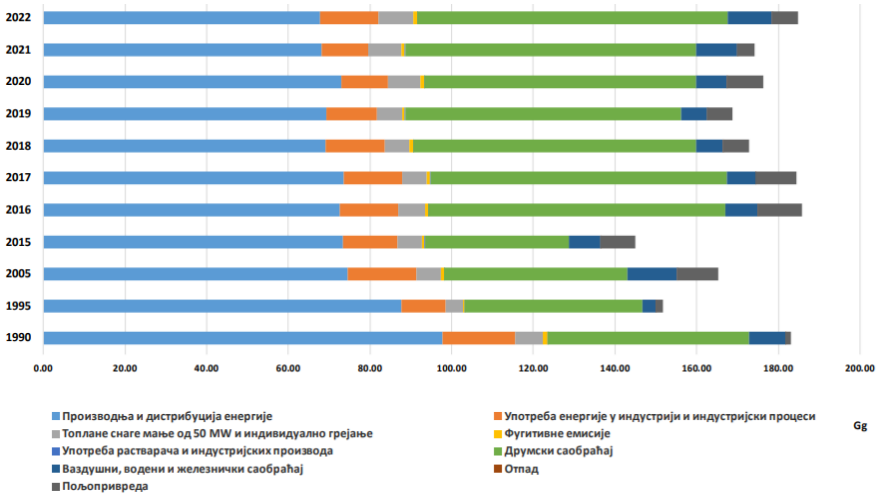

Figure 2.2. *Emissions of nitrogen oxides by sector in the period 1990-2022 expressed in thousands of tons (Source: Environmental Protection Agency, 2024)*

Suspended particles (dust, smoke, smog) are predominantly released into the environment during fuel combustion processes in the energy sector, transportation, and industrial production, but also from manure management. In 2023, the dominant share of PM_{10} suspended particle emissions, about 61.20%, came from heating plants with a capacity of less than 50 MW and individual household heating units. The impact of heating plants under 50 MW and individual heating units on total $PM_{2.5}$ suspended particle emissions was extremely high, amounting to 80%. Over the long-term observation period from 1990 to 2022, emissions of suspended particles predominantly originated from the aforementioned sectors (Figure 2.3).

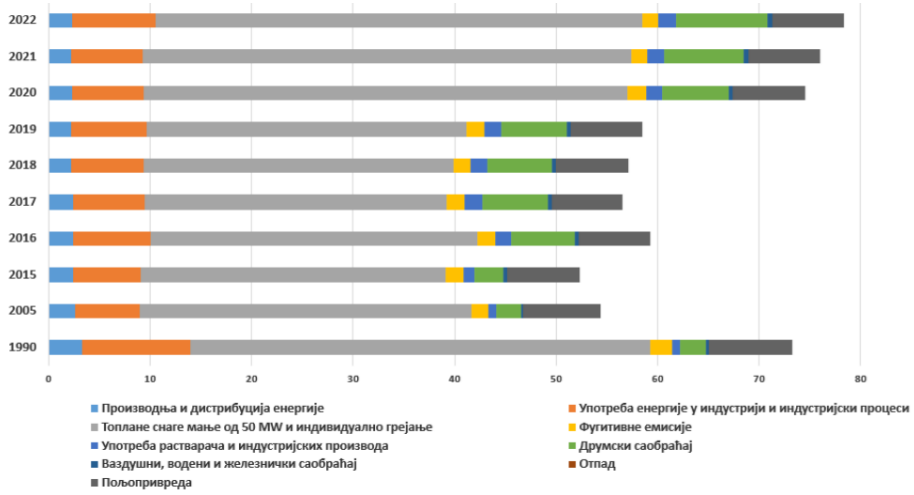

Figure 2.3. *Emissions of particulate matter by sector in the period 1990-2022 expressed in thousands of tons (Source: Environmental Protection Agency, 2024)*

An analysis of pollutant emissions confirmed the dominant share of thermal power plants in the emitted amounts of sulfur oxides in 2023, with the total emission of this pollutant amounting to 326.3 Gg, while the total emission of nitrogen oxides was 40 Gg. The largest emitted quantities of this pollutant come from thermal power plants, the mineral and chemical

industries, and sources from the food sector (Figure 2.4). The total emission of particulate matter in 2023 amounted to 6.2 Gg, with the most significant emitted quantities originating from the energy sector, intensive livestock production, and the food industry (Figure 2.5).

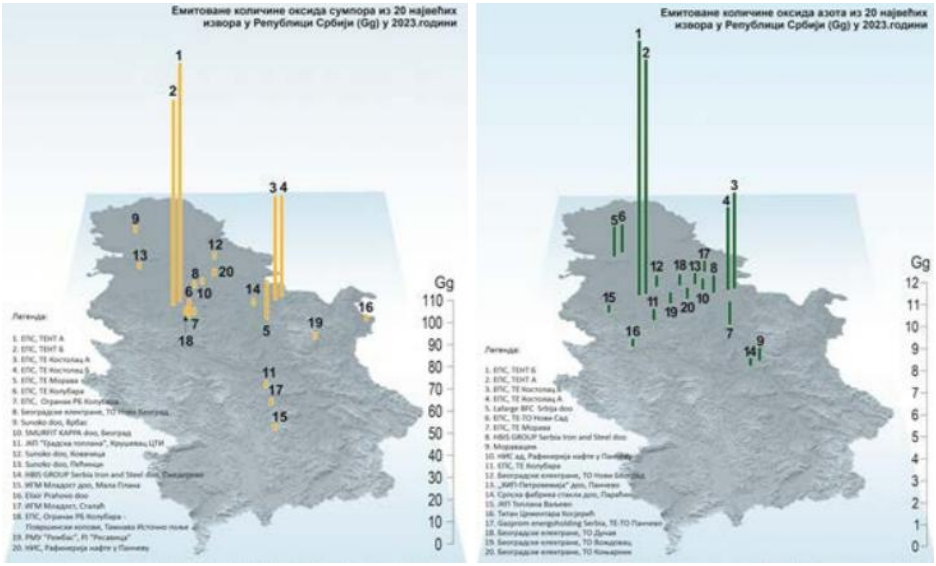

Figure 2.4. *The most important 20 sources of sulfur oxides (left) and the most important 20 sources of nitrogen oxides (right) in the Republic of Serbia*

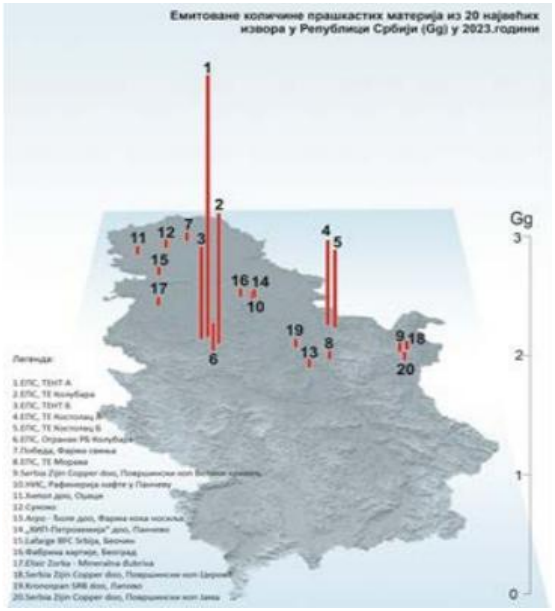

Figure 2.5. *The 20 Most Important Sources of Powdery Substances in the Republic of Serbia*
Source: Environmental Protection Agency, 2024

Excessive air pollution, according to data over the ten years from 2013 to 2023 (Table 2.1), indicates consistently excessive air pollution in several municipalities and cities in Serbia - Belgrade, Bor, Smederevo, Pančevo, among which Užice and Valjevo recorded Category III air quality for the entire period, while in some centers excessive pollution was registered immediately after being included in the monitoring network -Subotica, Zaječar, Novi Pazar, Kraljevo, Loznica, and others.

Table 2.1. Air quality trend by zones, agglomerations, and cities, period 2013-2023 Source: Environmental Protection Agency of the Republic of Srpska (comparative review of annual reports)

		Categorization of air quality										
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
ZONE	Central SERBIA	I	I	I	I	I	I	I	I	I	I	I
	AP Vojvodina	I	I	I	I	I	I	I	I	I	I	I
LARGER URBAN	Belgrade	III	II	III	III	III	III	III	III	III	III	III
	Novi Sad	I	I	II	I	I	I	III	I	III	III	III
	Niš	I	I	-	I	III	III	III	III	III	III	III
	Bor	III	III	III	I	I	I	III	III	III	III	III
	Užice	III	III	III	III	III	III	III	III	III	III	III
	Smederevo	III	III	-	-	-	III	III	III	III	III	III
	Pančevo	I	I	III	I	III	III	III	III	III	III	III
OTHER AREAS												
Valjevo		III	III	III	III	III	III	III	III	III	III	III
Kraljevo		-	-	-	-	III	III	III	III	III	III	III
Kragujevac		-	II	III	III	III	III	I	III	III	III	III
Kosjerić		II	I	-	-	-	III	III	III	III	III	III
Novi Pazar									III	III	III	III
Loznica										III	III	III
Paraćin							I	I	III	III	III	III
Zrenjanin								I	III	III	III	III
Zaječar								III	III	III	III	III
Sremska Mitrovica		-	II	III	III	I	III	I	I	III	III	III
Subotica		-	-	-	III	III	III	III	III	III	III	III
Sombor										III	III	III
Category I – clean or slightly polluted air (air quality parameters below the established limit values)												
Category II – moderately polluted air (some parameters exceed the limit values, but are below the tolerance values)												
Category III – Excessively polluted air due to concentrations exceeding the limit or tolerance value (tolerance values exceeded)												

During 2023, nitrogen dioxide concentrations exceeded the permitted annual limit value in Belgrade, so the air quality in Belgrade was classified as Category III, excessively polluted, due to the presence of nitrogen dioxide and suspended particles PM10 and PM2.5.

The cities of Valjevo, Novi Pazar, Niš, Smederevo, Pirot, Pančevo, Novi Sad, Kruševac, Užice, and Kosjerić were classified as Category III air quality due to excessive pollution with suspended particles PM10 and PM2.5.

The cities of Kragujevac, Sombor, Kraljevo, Subotica, Loznica, Zaječar, Šabac, Čačak, and Paraćin (Popovac) were also excessively polluted, with the cause being suspended particles of PM10 exceeding allowed limits. Bor was excessively polluted due to exceeded limit values for suspended particles PM10 and lead concentrations in them, while annual concentrations of arsenic and cadmium were above the target values.

Water quality

The current state of water quality in the Republic of Serbia is still at an unsatisfactory level. The main sources of water pollution in Serbia are untreated industrial and municipal wastewater, agricultural drainage water, leachate and percolation from landfills, as well as pollution related to river navigation and the operation of thermal power plants. Nevertheless, it is necessary to clearly define the boundary between geological and mining activities, which are the subject of this SEA Report and Strategy, and other industries and processing activities.

The *Serbian Water Quality Index* (SWQI) provides a measure of the condition of surface waters in terms of general surface water quality, without considering priority and hazardous substances. The index tracks nine physicochemical quality parameters (water temperature, pH value, electrical conductivity, oxygen saturation percentage, BOD-5, suspended solids, total oxidized nitrogen [nitrates + nitrites], orthophosphates, and ammonium) and one microbiological quality parameter (most probable number of coliform bacteria). The summary

value is an unclassified number from 0 to 100 as a quantitative indicator of the quality of a given water sample, where 100 indicates the best quality.

The poorest conditions in rivers and canals were recorded in the catchment area of AP Vojvodina (37.9% classified as "poor" and "very poor"), while the best quality in the "excellent" category was recorded in smaller watercourses in the hilly and mountainous areas of eastern, southeastern, and western Serbia.

An SWQI analysis was conducted at 48 measuring points where sampling was continuous during the period 2012–2022. In the Danube, Sava, and Morava River basins, an insignificant trend was identified, while across the entire territory of Serbia, a rising (positive) trend was recorded. Median SWQI values range between 80 and 88, corresponding to "good" and "very good" quality (Figure 2.6). Bačko Gradište (Bečej-Bogojevo Canal) showed a rising (favorable) trend, and Novo Miloševo (Kikinda Canal) showed an insignificant trend. An unfavorable (declining) trend was found at 15% (seven) of the measuring points: Trnski Odorovci (Jerma), Mislođin (Kolubara), Bajina Bašta (Drina), Prijepolje (Lim), Dimitrovgrad (Nišava), Hetin (Stari Begej), and Gugaljski Most (Zapadna Morava). It is positive that at these measuring points the water quality is "good," "very good," or "excellent.".

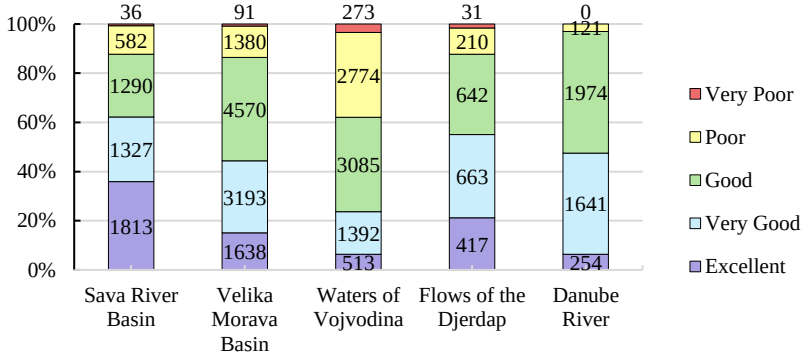

Figure 2.6. *Assessment of water quality in Serbia 1998-2022*
Source: Environmental Protection Agency of RS, 2024.

A particular issue is untreated municipal and industrial wastewater. The percentage of the population covered by wastewater treatment, according to the latest data from 2022, is very low, only 16.44% (Figure 2.7). The Northern Banat (90.9%) and Šumadija (88%) regions have coverage. The Central Banat, Belgrade, Branicevo, Jablanica, Zlatibor, Toplica, and Nišava regions do not have wastewater treatment during the same period.

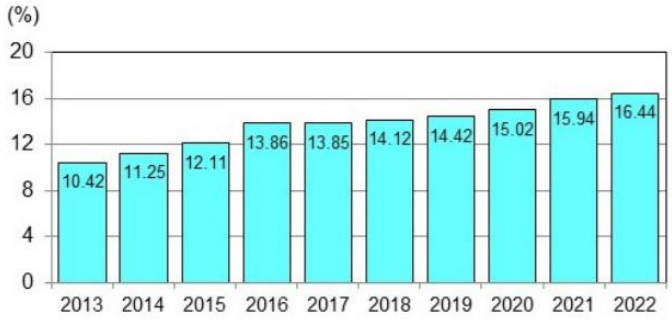

Figure 2.7. *Percentage of population covered by wastewater treatment Source: Environmental Protection Agency of the Republic of Srpska, 2024.*

The condition of sewage systems and the number of residents connected to public water supply networks is currently at an unsatisfactory level. The population not connected to public sewage

systems mostly uses septic tanks for wastewater disposal, which represents a major problem, while a smaller portion uses dry systems and improvised installations for wastewater evacuation. Currently, 69.4% of the population is connected to public sewage systems (2022), with the highest percentage in Belgrade (77.2%) and the Šumadija district (74.3%), and the lowest percentage in the West Bačka (31.8%) and Nišava (31.1%) districts, where the population is mostly connected to septic tanks (Environmental Status Report of the Republic of Serbia, 2024).

Soil quality

The quality of soil in the Republic of Serbia is degraded by both natural and anthropogenic factors. Among the main sources of soil degradation are erosion, the reduction of organic matter, loss of soil structure, acidification, contamination from industrial activities, mining and energy production, excessive use of chemicals in agriculture, compaction of agricultural land, and waste management. Based on the analysis of the content and distribution of potentially harmful and hazardous elements in the soil, several zones of ecological hot spots have been identified.

As of the most recently published data from 2020, 213 locations were identified in Serbia as potentially contaminated or contaminated sites. Depending on the concentration and type of pollutants in the soil, proximity to vulnerable facilities, site activities, complex size, and the estimated scope of remediation work, all locations where soil contamination has been confirmed are classified into four groups. Group IV (alarmingly contaminated soil) includes large industrial enterprises requiring cleanup and remediation, such as Bor Mining and Smelting Basin, Prva petoletka Trstenik, Smederevo Steel Plant, Zorka Chemical Industry Subotica, PKS Latex Čačak, and Viscose Chemical Industry Loznica.

The largest share of localized soil contamination comes from public municipal landfills at 71.83%, followed by metal production and processing at 11.27%, energy production, and the chemical industry (Figure 2.8).

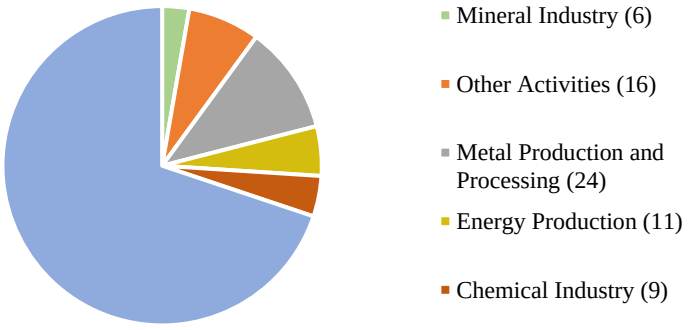

Figure 2.8. *Share of the main localized sources of soil pollution in the total number of identified sites (%) - state of affairs 2020 Source: Environmental Protection Agency of RS, 2021.*

Intensive urbanization, industrial development, transportation, and agricultural activities also lead to soil contamination with large amounts of waste materials that cannot be broken down by natural self-purification processes. In the period from 2017 to 2023, exceedances of remediation values were identified at 33 industrial complexes.

Soil quality testing in certain urban areas (Belgrade, Pančevo, Kruševac, Požarevac, Niš, Bor, Čačak, Smederevo, Novi Pazar, Bajina Bašta, Valjevo, Vrnjačka Banja, and Trstenik) shows that these areas are under strong human influence. At these locations, metals are the most common

pollutants, with exceedances of limit or remediation values for certain elements - in 2023, exceedances were recorded for Ni, Cu, Cr, Zn, Cd, Pb, As, Co, and Hg.

Soil degradation is present in areas of mineral resource exploitation, especially in open-pit mines. Based on available data from the Ministry of Mining and Energy from 2023 (Table 2.2), data are presented on degraded areas and deposited tailings from major mining companies in the Republic of Serbia. During 2023, a total of 404 hectares of land were degraded due to mining activities. On the other hand, in the same period, 150 hectares of land were reclaimed. The data show that in 2023, 199,259,436 cubic meters of overburden and 41,816,141 tons of flotation tailings were deposited.

Table 2.2. Degraded space and land degraded by the disposal of tailings of major mining companies in the Republic of Serbia Source: *Ministry of State and Energy of the Republic of Sakha*, 2023. year.

BUSINESS COMPANY	Degraded in 2023, [ha]	Remediated in 2023, [ha]	Disposed tailings in 2023, [m^3]	Disposed flotation tailings during 2023, [t]
Serbia Zijin Copper	127.96	49.19	68,795,640.00	39,635,015.12
Serbia Zijin Mining	20.00	0.00	477,212.93	1,433,416.20
Bosil Metal	0.00	2.00	8,543.00	0.00
NIS. A.D. Block Research & Production	49.67	66.05	0.00	0.00
IGM Neimar Zrenjanin	1.20	0.00	2,730.00	0.00
Lece Medveđa Mine	1.30	0.35	81,478.00	209,100.15
Veliki Majdan	0.20	0.00	21,887,60	0.00
Kovin Mine	0.00	2.62	181,244.00	0.00
Jugo-kaolin	5.05	0.00	570,671.10	0.00
Jelen DO	1.00	0.60	90,740.97	0.00
Rudnik Rudnik	0.00	0.10	18,125.00	266,620.00
EPS	185.65	27.00	128,530,460.00	0.00
Ekogradnja d.o.o.	0.00	0.00	16,500.00	0.00
Winerberger	1.50	1.30	113,303.00	0.00
Small business entities	8.26	0.30	49,493.00	0.00
Titan cement plant Kosjerić	1.70	0.00	153,800.00	0.00
Universe export-import	0.00	0.00	0.00	0.00
Moravcem	0.12	0.00	4,500.00	0.00
PE PEU	0.42	0.00	119,423.65	0.00
GROT	0.02	0.00	23,684.00	271,989.69
Total	**404.05**	**149.51**	**199,259,436.25**	**41,816,141.16**

Waste management

The current state of waste management in the Republic of Serbia is at a level that requires improvement. The existing system is characterized by insufficient coverage of the population with organized systems for waste collection, transport, and disposal; poor condition and filled capacity of existing landfills; an insufficient number of sanitary and regional landfills; inadequate handling and treatment of hazardous and special waste streams; and still a low recycling rate.

It is necessary to improve the waste management system, including collection, transport, storage, treatment, reuse, and disposal of waste. It is also important to establish a waste management hierarchy, which represents the order of priorities in waste management practice- a hierarchy applied as a priority order in prevention and waste management regulations and policies: prevention, preparation for reuse, recycling, other recovery operations (including energy recovery), and disposal.

According to the Environmental Protection Agency data for 2023, the average waste collection coverage was 88.3% of the population, with a total of 3.07 million tons generated, of which

2.59 million tons were collected and landfilled. The recycling rate, although showing a constant slight increase, remains very low, amounting to only 17.7% during 2022, and decreasing again to 15.5% during 2023 (based on the 2022 population estimate). So far, 12 sanitary landfills have been built in the Republic of Serbia, of which ten are regional and two are local.

The lack of infrastructure for hazardous waste treatment and disposal poses a particular problem. There are insufficient capacities for hazardous waste storage, while only limited capacities exist for physical-chemical treatment and hazardous waste disposal.

Mining waste is waste generated by the extractive industry, during geological exploration, exploitation, preparation, and storage of mineral raw materials, as well as waste obtained in the ore preparation process. The management of mining waste is regulated by the Law on Mining and Geological Exploration ("Official Gazette of RS," No. 101/2015, 95/2018 – other law, and 40/2021). The main problems related to mining waste primarily concern the disposal of large quantities of tailings.

During 2023, the mining sector generated 199,259,436 m³ of overburden-mining tailings (non-hazardous waste) and 41,816,141 tons of flotation tailings (potentially hazardous waste).

In the total amount of waste produced in the mining sector in 2023, the largest quantities belong to the category of mining waste (hazardous and non-hazardous), followed by metal waste (iron), mixed and unsorted materials, and rubber waste (Table 2.3).

Table 2.3. Generated quantities of waste in the mining sector according to the aggregated statistical list of waste, 2023 (source: Statistical Yearbook 2024, RZS)

EWC-Stat[1]	Description	Character Decay[2]	Quantity, [t]
1.3	Oils used	D	285
1.4,2,3.1	Chemical waste	N	9
6.1	Metal waste, made of iron	N	5,520
6.2	Scrap metal from other metals	N	128
6.3	Mixed Scrap Metal of Iron and Other Metals	N	205
7.2	Paper and cardboard waste	N	20
7.3	Waste rubber	N	1,185
7.4	Plastic waste	N	43
7.5	Wood waste	N	14
7.7	Waste containing PCBs[3]	D	4
8	Discarded equipment (except 08.1,08.41)	N	56
		D	23
8.1	Discarded vehicles	N	353
8.41	Waste batteries and accumulators	D	40
9.1	Animal and mixed waste from food preparation	N	7
10.1	Household and similar waste	N	177
10.2	Mixed and unsorted materials	N	1,553
12.2, 12.3, 12.5	Mining waste	N	131,461,453
		D	39,502,739

According to the Mining Waste Cadastre in Serbia, the largest number of closed or abandoned mines for metallic, non-metallic, or energy raw materials are located in the territories of Raška (6 mines), Krupanj (4 mines), Brus (3 mines), Ljubovija (3 mines), Boljevac (3 mines), Aleksinac (3 mines), Čajetina (3 mines), Nova Varoš (2 mines), as well as Dimitrovgrad,

[1] Statistical European classification of waste according to the European Commission Regulation (EC) 849/2010
[2] D- dangerous; N-Non-dangerous
[3] PCB – Polychlorinated Biphenyl

Kragujevac, Loznica, Prijepolje, Surdulica, Crna Trava, Knjaževac, Majdanpek, Kučevo, Zagubica, and Mali Zvornik.

To regulate mining waste management, the Ministry of Mining and Energy has adopted a Regulation aligned with the EU Directive on the management of mining waste. It should be noted that detailed instructions for obtaining mining waste management permits are available on the Ministry's website.

Noise Condition

Noise most commonly originates from traffic and industrial facilities, and in urban environments, local sources such as hospitality venues and craft workshops also pose a problem. In 2023, 48 local self-government units reported noise monitoring data to the Environmental Protection Agency, while 94 units submitted statements that they had not conducted noise measurements in their areas, most often due to a lack of budget funds.

Based on these results, the highest percentage of total daytime noise indicators (referred to as Lden) falls within the 60–64 dB range, while the highest percentage of nighttime noise indicators (Lnight) is within the 51–55 dB and 55–60 dB ranges. The percentage of measurements exceeding 70 dB is negligible.

Data were submitted to the Environmental Protection Agency from three major urban agglomerations in Serbia: Belgrade, Novi Sad, and Kragujevac, with a total of 54 measurement locations, as well as from 45 local self-government units with measured values at a total of 411 locations. When considering the data from the three largest agglomerations, regardless of other urban areas in Serbia where noise monitoring is conducted, it is concluded that the largest percentage of total noise indicators (Lden) falls within the 60–66 dB range, while the largest percentage of nighttime noise indicators (Lnight) is in the 55–60 dB range. Again, the percentage of measurements exceeding 70 dB is negligible.

Within the Kolubara Basin, noise sources at "Kolubara-Processing" come from facilities such as the heating plant, dryer, dry separation, and wet separation, as well as noise from industrial rail and freight road traffic. Noise is generated both during the processing phase and during the transport of raw and processed coal. Noise measurement sites include: "Baroševac" and "Strana" in Baroševac, "Naselje Radljevo," and "Kalenić." Measurement results show that the highest exceedances of daytime and nighttime noise levels were recorded at the Baroševac site.

In the Kostolac Basin, elevated noise levels can occur during all phases of lignite surface mining. Noise most often comes from mining machinery for excavation, transport, and auxiliary operations. Environmental noise measurements established that noise levels do not exceed the permitted outdoor noise levels for day and night.

2.2. Environmental Elements Exposed to the Impact of Mining Activities

One of the impacts of mining activities on environmental elements is reflected in land degradation and land occupation by mining facilities and the disposal of mining waste. A large number of tailings ponds in the Republic of Serbia are old and were built without modern protection measures, such as geomembranes and wastewater collection systems. In many cases, especially in smaller mines, protective measures are limited to formal compliance with regulations.

Water pollution is often a consequence of untreated wastewater being discharged into rivers and streams near mining facilities. In some cases, wastewater treatment plants are non-operational due to financial constraints or technical failures. Inadequate planning of mining activities and poor implementation of environmental impact assessments also contribute to these problems.

Soil contamination is mainly caused by atmospheric dust transport from tailings and open pits, as well as seepage water infiltrating the soil. One of the challenges faced by the mining sector is old, abandoned mines, tailings ponds, and mining facilities that need to be remediated and repurposed. To address these problems, the Ministry of Mining and Energy has established a Mining Waste Cadastre.

Because of all the above, the exploitation of mineral resources in the Republic of Serbia has led to a certain degree of air, water, and soil pollution in specific regions where the mining industry is present. Given these reasons alone, the need to introduce measures to improve the state of the environment and align mining activities with the principles of sustainable development becomes self-evident. According to reports from the Environmental Protection Agency, a certain portion of industrial pollution in the Republic of Serbia originates from mining activities, but primarily from mineral processing activities.

Environmental pollution from the mining industry in Serbia is not evenly distributed but is concentrated in certain regions where mineral resource exploitation is most intensive. According to data from the Environmental Protection Agency and the Ministry of Mining and Energy, the highest pollution has been recorded in the following parts of the country — the Bor-Majdanpek region, the Kolubara Basin, and the Kostolac Basin.

1. **Bor-Majdanpek Region** — This area has been a longstanding center for copper and gold mining. Occasional spikes in pollutant concentrations in the air, water, and soil represent a clear environmental problem. In Bor, in particular, the need to distinguish between the environmental impacts of mining activities and those of processing industries is most apparent. Elevated air pollutant concentrations, by their nature, indicate the dominant influence of processing facilities. However, the impact of mining capacities on surrounding water resources should not be overlooked. In the city of Bor, the inability to separate the environmental impacts within such a complex mining-smelting setup is most evident. This is often the source of conflicting claims regarding potential sources of pollution in the Bor area. The Majdanpek region is known for copper and other metal mining. Due to long-term mining activities and dust dispersion from active mining areas (work benches, mining waste dumps, flotation tailings dumps), elevated concentrations of lead and cadmium in the soil have been recorded.
2. **Kolubara Basin** — Intensive coal exploitation and thermal power plant activities have led to air and soil pollution. Sulfur dioxide emissions in the air, according to available measurement data, exceed limit values, which is a direct consequence of the operation of thermal power plants and their auxiliary plants, such as dryers, etc. In similar cases, the need to distinguish mining capacities from user or processing capacities is most apparent. The deposition of these air pollutants ultimately leads to soil contamination, including heavy metals. It is a fact that mining capacities also contribute to air and soil pollution to some extent, through dust particles lifted from active mining surfaces and carried beyond site boundaries by wind.
3. **Kostolac Basin** — The operation of thermal power plants and surface coal mines in the Kostolac Basin has impacted environmental quality in this part of Serbia. Sulfur dioxide concentrations in some parts of this region occasionally exceed limit values during winter months, which, as in the previous case, is solely the result of the operation of large thermal energy facilities and associated industries, not the result of surface mining or mining capacities. Added to this are the large quantities of ash from thermal power plants, which, besides occupying land, exert additional pressure on environmental factors, creating potential conditions for further risks to public health.

Air Quality

Kolubara Basin. In the areas of open-pit mines, the largest emissions are dust into the air as well as harmful gases such as nitrogen oxides, carbon monoxide, sulfur dioxide, and volatile organic compounds. Increased values of suspended and sedimentable solid particles are observed in the ambient air. The emission of airborne particles and sedimentable materials is also a problem. During 2022, air quality measurements were carried out (PM10, PM2.5, SO2, NO/NO2/NOx, CO, O3), and at the measurement locations Vodovod Medoševac and Baroševac, exceedances of the PM10 concentration limit value were found in 13 out of 15 periods (Baroševac site) and 14 out of 15 periods (Vodovod Medoševac), while one measurement gave a result exceeding the value of 100 μg/Nm³. In the open-pit mines (mining capacity) and ash landfills (thermo-energy capacity), and in their surroundings, increased emissions of suspended and sedimentable particles occur, e.g., in Medoševac and Junkovac. In the suspended and sedimentable materials, the presence of heavy metals was recorded: nickel, chromium, cadmium, manganese, lead, etc. Concentration values of nickel, chromium, and manganese occasionally exceed the Maximum Allowed Concentration (MAC). Here, again, the cumulative effect of mining and thermo-energy capacities on air quality is evident. Only detailed qualitative and quantitative analyses could determine which pollution source is dominant.

Unlike the open-pit mines and occasional emissions of suspended particles from active surfaces, in Vreoci, where coal processing takes place, pollution with so-called specific pollutants such as acrolein, phenol, formaldehyde, and organic nitrogen and sulfur compounds (unpleasant odors) is present. The emissions of these substances come from "Dry Separation," "Dryer," and the wastewater treatment plant (WWTP), i.e., from processing capacities, and their concentrations periodically significantly exceed the prescribed Limit Values of Immissions (LVI). Flue gases are treated in an electro-filter facility and released into the air through a chimney 80 m high. During 2023, no air quality measurements were carried out.

Kostolac Basin. The surface exploitation of coal in the Kostolac Basin, so far, has occasionally been a source of negative impacts on all environmental elements. Air quality has occasionally been impaired by the emission of suspended particles, and to a much lesser extent by exhaust gases from mining loaders, transport, and auxiliary machines, and is related to emissions of the following gases: carbon monoxide, carbon dioxide, nitrogen oxides, sulfur dioxide, acrolein, etc. The ash and slag landfill "Central Kostolac Island," linked to the thermo-energy complex, represents a secondary source of particle emissions, especially due to ash dispersion during strong winds, affecting the settlements of Kostolac, Kostolac village, Klenovnik, Drmno, and Petka.

Bor-Majdanpek Basin. The biggest air pollution problem in the process of disposing of flotation tailings is dust emissions from the flotation tailings dams. The concentration and density of the dust cloud dispersed in the air depend on the moisture level of the tailings, and atmospheric conditions (relative air humidity and wind speed). Flotation tailings dams, as a large dust source, threaten surrounding villages and agricultural land, thus limiting agricultural production and damaging public health. Large dust emissions occur due to: the technology of raising the flotation tailings dams, the lack of reclamation measures on the tailings dams, and the absence of sanitary protection zones. Unlike mining capacities, the processing capacities, i.e., the copper smelter, emit certain amounts of sulfur dioxide and arsenic emissions. Air quality monitoring is carried out with inadequate and outdated equipment, which does not allow immediate intervention in case of environmental incidents. In the areas of open-pit mines, dust emissions, i.e., suspended particles, dominate in the air. Emissions of harmful gases such as nitrogen oxides, carbon monoxide, sulfur dioxide, and volatile organic compounds are related exclusively to the working environment and, only in exceptional cases (appropriate climatic parameters), can represent an additional source of pressure on the environmental factors near the mining complex.

Water quality

Kolubara Basin. Surface and groundwater are exposed to potential pollution from major concentrated polluters within the complex, as well as from diffuse sources represented by numerous smaller discharges of used wastewater into recipients. The water from the pre-drainage and drainage systems within the "Open-Pit Mines" Branch constitutes a technological part of the coal exploitation system. The water pumped out (mine wastewater) from these systems is discharged untreated through sedimentation basins into nearby recipients: from "Field E" Baroševac into the Peštan and Turija Rivers, from Medoševac into the Peštan River, from "Tamnava Western Field" into the Kolubara river, and from "Field G" into the Kolubara river. In the technological process of processing and refining Kolubara lignite, wastewater is generated from the Wet Separation, Dryer, Boiler House - chemical preparation of boiler water, and sanitary water, which is treated at the wastewater treatment plant and discharged into a canal that transports it to the Kolubara river. According to the Environmental Status Report of EPS for 2023, the discharge of treated water from the wastewater treatment plant does not negatively affect the quality of the recipient, i.e., the Kolubara River, where no significant changes in water quality are recorded.

Kostolac Basin. Water from the "Drmno" mine drainage system is mostly directed to the cooling water basin of TPP "Kostolac B," with a smaller portion flowing into the Mlava River. Water from the drainage system of the ash landfill at the former "Ćirikovac" open-pit site accumulates near the facility. Groundwater near the ash landfill is characterized by increased mineralization (increased water hardness, sulfate content, etc.) and elevated levels of total solids, fats, and oils.

Bor-Majdanpek Basin. The water around the old Bor open-pit mine is characterized by high concentrations of dissolved heavy metals copper, zinc, and iron. Atmospheric waters that penetrate deep into the pit through various cracks, channels, and underground spaces are rich in copper solution, as they dissolve the surrounding ore while flowing through it. These waters, previously in much larger quantities, and now less due to the filling of the pit, accumulate at the bottom of the former pit and, together with rainwater from the open Bor pit, are pumped into the underground mine Jama. In the underground Jama facility, these waters mix with the underground mine water and are jointly pumped to the surface for further processing, i.e., copper extraction. This represents an additional and arguably the cheapest way to obtain copper, as it does not require additional excavation or the use of heavy machinery. Several exceedances of regulatory limits for heavy metals (mainly copper and nickel) and for suspended solids have been recorded in the Borska, Kriveljska, and Bela rivers (copper concentrations reaching up to 16 mg/l, while the limit is 0.1 mg/l).

Soil quality

Kolubara Basin. This area is characterized by soil degradation due to intensive coal exploitation at open-pit mines and the disposal of tailings, as a consequence of the mining industry, as well as ash disposal (from thermal power plants and related industries), leading to the formation of the lowest-quality soils, deposols, and technogenic soils. According to the Environmental Status Report of EPS for 2023, no soil quality testing was conducted during 2023 due to the absence of a legal obligation for annual monitoring, especially since no exceedances of maximum permissible concentrations (MPC) and remediation values of heavy metals were recorded in the continuous measurements from previous years. However, the 2019 report showed exceedances in the concentrations of certain metals-chromium, arsenic, nickel, zinc. Other negative impacts of coal exploitation include landscape devastation, destruction of agricultural cover, erosion, land use change, impact on biodiversity, loss of habitats for certain plant and animal species, and impacts on human health.

Kostolac Basin. Soil pollution is most intense in the immediate vicinity of open-pit mines, thermal power plants, and ash and slag landfills due to direct contamination by harmful particles, wastewater, and harmful gases. Annual monitoring of emissions impacting soil quality is conducted. Results showed that total mercury (Hg) and nickel (Ni) content exceeded maximum limits for heavy metals in almost all analyzed samples. Exceedances were also recorded for chromium (Cr), copper (Cu), and cadmium (Cd). Cadmium (Cd) content was above the maximum limit in 31.6% of samples, chromium (Cr) in 10.5%, and copper (Cu) in 10.5% of analyzed samples. Other analyzed parameters were within allowable limits.

Bor-Majdanpek Basin. Years of copper ore exploitation and processing around Bor have resulted in degraded soil due to the deposition of large amounts of mining waste and the presence of mine water. Additionally, prolonged mining activities have led to the occupation of agricultural and construction land, with the agricultural soil layer in some areas completely degraded. Due to sulfur dioxide emissions from metallurgical processes, i.e., processing facilities, soil acidification, vegetation damage, and erosion have occurred. According to the Environmental Protection Agency report (2020), a total of 20.10 ha of land was degraded by excavation within Serbia Zijin Copper Bor, while 58.68 ha was degraded by tailings disposal within this complex. It should also be noted that the company is investing significant funds in environmental protection, including water, flue gas, dust, and solid non-hazardous and hazardous waste treatment. Better protection of water resources has been established, resulting in all wastewater being returned to production and no untreated discharges into recipients. According to the latest data, more than 355 ha of land degraded by mining activities has been reclaimed so far.

The Impact of Oil and Gas Exploitation on the Environment

The most significant environmental impacts related to oil and gas exploitation are associated with drilling operations (generation of drilling mud), storage, and transport of crude oil. During the exploration of oil and gas wells, there is a potential risk of contamination of aquifers with layers saturated with oil or hydrocarbons. The protection of groundwater is ensured by the technical outfitting of the well. Oil and gas exploration and production inevitably lead to land loss, and since the largest reserves are in the Vojvodina region, which is predominantly agricultural and flat, there is often a loss of agricultural land. In the testing phase of a well, it is estimated that about 3 hectares of agricultural land are occupied. If the well is negative, it is decommissioned, and land reclamation is carried out. In the case of a positive well, a minimum of 10×10 meters is occupied for the well. Waste generated during the drilling process is drilling fluid (mud), which is stored in special tanks and reused at new wells. At certain well locations that are no longer productive, technological preparation and disposal of formation water into reservoirs are carried out.

The Impact of Surface Stone Mining (Quarry) on the Environment

Quarries in Serbia, as in many other countries, have a significant impact on environmental quality, reflected in various aspects of ecological balance, biodiversity, and human health. The environmental impact of quarries can be classified into several key categories: air, soil, and water pollution; noise; and disruption of biodiversity. Quarry operations can lead to significant air pollution due to dust and gas emissions. Dust generated during drilling, crushing, and transport of stone may contain microscopic particles that, when inhaled, can cause respiratory problems such as asthma and bronchitis. In higher concentrations, dust can negatively affect ecosystems and the health of plants and animals. Stone exploitation inevitably leads to soil degradation. Quarries can cause soil erosion and depletion of natural resources, reducing soil fertility. Waste materials such as fine sand, dust, and other by-products of stone extraction accumulate on surrounding land, destroying plant and animal habitats. In some cases, unmanaged quarry waste can contaminate surrounding agricultural land, reducing its quality and making it unusable for agriculture. Pollution

of watercourses and groundwater is another key environmental issue associated with quarries. Rainwater and wastewater from quarries can carry large amounts of sediment, dust, chemicals, and other harmful substances into rivers and lakes. This can lead to water turbidity, reduced drinking water quality, and the destruction of aquatic ecosystems. Open quarry pits often destroy natural habitats, leading to biodiversity loss. Quarry expansion into natural areas such as forests and meadows threatens local plant and animal species, reduces biological resources, and disrupts ecological chains. Therefore, although quarries can bring economic benefits through the production of construction materials, they often cause long-term ecological losses. Activities in quarries, such as drilling, crushing, and transporting of stone, generate high noise levels that can negatively affect the environment. Noise can disturb the migration and behavior of wildlife and cause stress in local communities. Additionally, light pollution from work lights and reflectors during night shifts can disrupt the natural cycles and behavior of animals, especially nocturnal species. By applying certain measures, these quarry impacts can largely be mitigated. Measures include, but are not limited to: the introduction of environmentally friendly technologies; improved waste management and proper disposal of materials; use of dust suppression and gas emission control systems; land rehabilitation after stone extraction; and biodiversity restoration activities.

The Impact of Underground Mining Mines on the Environment

Underground mineral exploitation represents an important segment of industrial development, but at the same time, it can have a significant impact on the natural environment. One of the most serious problems is the contamination of underground and surface waters due to mine water runoff (so-called acid mine drainage). These waters often contain heavy metals such as arsenic, lead, and mercury, which can have long-term toxic effects on humans, plants, and animals. Although less pronounced compared to surface mining, underground mines can emit harmful gases, which may impact local air quality but primarily affect workers' health. Ventilation systems can also contribute to the emission of pollutants into the atmosphere. Mining can cause land subsidence, which negatively affects agricultural land, infrastructure, and natural habitats. This phenomenon can be gradual but has long-term consequences for the safety and functionality of the terrain. Although the impact is less significant than with surface mining, access infrastructure, tailings disposal, and emissions from mines can threaten local biodiversity and disrupt natural ecosystems. All these impacts are accompanied by a series of measures that can successfully mitigate the effects of underground mines on the environment, such as: controlling and treating mining wastewater before discharge into natural waterways; monitoring air quality, and implementing air purification systems before releasing it into the atmosphere; stabilizing terrain and rehabilitating abandoned mining sites; and limiting surface impact through careful planning of access roads and infrastructure, among others.

3. General and Specific Objectives of the Strategic Assessments and Selection of Indicators

For the effective preparation of the Strategic Environmental Assessment (SEA) Report and the evaluation of the planned activities foreseen by the Strategy for the Management of Mineral and Other Geological Resources of the Republic of Serbia, it is extremely important to adequately define environmental and sustainable development objectives and indicators.

According to Article 14 of the Law on Strategic Environmental Assessment, the general and specific objectives of the SEA are defined based on the requirements and objectives regarding environmental protection set out in other plans and programs, the environmental protection objectives established at the national and international levels, collected data on the state of the environment, and significant issues, problems, and proposals related to environmental protection within the plan or program. Based on the defined objectives, appropriate indicators are selected to be used in the preparation of the strategic assessment.

3.1. General and specific objectives of the strategic assessment

General objectives of the Strategic Assessment were prepared based on strategic environmental protection issues relevant to the Republic and on the goals and requirements in the field of environmental protection from relevant national public policy documents.

Based on the requirements and objectives regarding environmental protection stated in plans and strategies, the general objectives of the Strategic Environmental Assessment (SEA) were defined, predominantly relating to the following environmental areas:

- protection of key environmental components (air, water, soil),
- sustainable use of natural resources,
- conservation of biodiversity, geodiversity, and landscape enhancement,
- rational use of mineral and other geological resources,
- improvement of waste management.

In addition to environmental areas, the general objectives also relate to the protection of cultural and historical heritage, the population, human health, and socio-economic development, as well as strengthening institutional capacities for environmental protection.

To implement the general objectives, it is necessary to establish specific objectives of the Strategic Assessment in particular areas.

The specific objectives of the Strategic Assessment represent a concrete formulation of the general objectives, expressed in the form of guidelines for changes and actions through which these changes will be carried out. They should provide decision-makers with a clear picture of the essential impacts of the Mineral and Other Geological Resources Management Strategy on the environment, based on which decisions can be made that serve the purpose of environmental protection and the achievement of the fundamental objectives of sustainable development.

The specific objectives of the SEA serve as a methodological benchmark through which the effects of the Mineral and Other Geological Resources Management Strategy on the environment are verified, i.e., the expected environmental trends as a result of the implementation of defined activities and projects. Table 3.1 contains and marks the list of specific SEA objectives.

Table 3.1. List of specific SEA objectives

Br.	Specific SEA objectives
1.	Reducing emissions of pollutants into the air to the prescribed values
2.	Improving the quality of surface and groundwater
3.	Preservation of the hydrological regime of groundwater and surface water
4.	Protecting forest and agricultural land
5.	Protecting the landscape
6.	Protecting natural values and preserving biodiversity
7.	Protecting immovable cultural property and archaeological sites
8.	Improving waste storage, reuse, treatment, and disposal
9.	Protection and improvement of health
10.	Mitigating the negative impact of development on the population
11.	Reducing the impact on settlements and facilities

Br.	Specific SEA objectives
12.	Institutional development and investments in environmental protection, monitoring, and control
13.	Encouraging economic development and local employment
14.	Introducing the application of BAT technologies and innovative solutions

3.2. Selection of Indicators

Within the SEA, the selection of indicators was made based on the Rulebook on the National List of Environmental Protection Indicators (Official Gazette of RS, No. 37/2011). This set of indicators is based on the "cause-effect-response" concept. "Cause" indicators denote human activities, processes, and relationships that affect the environment; "effect" indicators denote the state of the environment; while "response" indicators define options and other responses aimed at changing the "effects" on the environment. The set of indicators reflects the principles and goals of sustainable development.

Indicators are highly suitable for measuring and assessing activities and projects from the standpoint of potential environmental harm and for determining which adverse impacts should be reduced or eliminated. They serve as one of the tools for systematically identifying, assessing, and monitoring the condition, development, and circumstances of the environment and for understanding the consequences.

The selection of indicators listed in the following table aligns with the planned and ongoing development projects in the mining sector, their possible impacts on environmental quality, and socio-economic characteristics, and will be used for the evaluation of development projects.

Each specific SEA goal has been assigned one or more indicators (a total of 37 indicators).

The selection of indicators is harmonized with the planning concept of the Strategy for the Management of Mineral and Other Geological Resources and predictions of possible environmental impacts. The indicators will serve both for evaluating activities and projects and for monitoring the state of the environment during the implementation of the Strategy for the Management of Mineral and Other Geological Resources.

Table 3.2. Selection of general and specific SEA objectives and selection of relevant indicators

SEA Area	General SEA objectives	Specific SEA objectives	Indicators
AIR	Protecting air quality and reducing the impact of climate change	- Reduce emissions of pollutants into the air to the prescribed values	- Emissions of acidifying gases (NOx, NH_3 and SO_2), [kt/year] ; - Frequency of exceedances of daily limit values of SO_2, NO_2, PM10 and O3 (number of days during the year); - Emission of primary suspended particles and secondary suspension precursors. Particles.
WATER	Protection and conservation of water quality	- Improving the quality of surface and groundwater - Preservation of the hydrological regime of groundwater and surface water	- Serbian Water Quality Index (SWQI); - Emissions of pollutants from point sources into water bodies; - Change in water class quality, [%]; - Polluted (untreated) wastewater; - Lowering the level of groundwater, [m]; - Minimum and average flows in watercourses, [m^3/s];
LAND	Protection and sustainable use of land	- Protect forest and agricultural land	- Change in forest land area due to mining activities, [%]; - Change in agricultural land area due to mining activities, [%]; - Share of degraded areas as a result of activities in the mining sector, [%]; - Ground subsidence area [ha].
NATURAL VALUES	Protection, preservation, and improvement of landscape, natural values, and biodiversity	- Protect the landscape - Protecting natural values and preserving biodiversity	- Increase in area under mining activities, [%]; - Management of contaminated sites; - Increase in areas under mining activities affecting bio(geo)diversity, [%]; - Area of protected natural areas affected by the activities of the mining sector, [ha].
CULTURAL AND HISTORICAL HERITAGE	Protection of Cultural and Historical Heritage	- To protect immovable cultural property and archaeological sites	- The number of protected immovable cultural assets that may be affected by the mining sector.

SEA Area	General SEA objectives	Specific SEA objectives	Indicators
WASTE	Sustainable waste management	- Improve the storage, reuse, treatment, and disposal of waste	- The total amount of waste generated in the mining sector, [t/yr]; - Amount of separated, collected, reused, and disposed waste*; - Quantities of specific waste streams in the mining sector, [t/yr.]; - Waste Landfills
PUBLIC HEALTH	Improvement of public health standards	- Protection and improvement of the health of the population	- Drinking water quality *; - Percentage and number of population exposed to increased air pollution ; - Incidence of respiratory diseases, [%]; - A number of households potentially exposed to accident risks.
SOCIAL DEVELOPMENT	Improving living standards and social cohesion	- Mitigating the negative impact of development on the population - Reduce the impact on buildings and buildings.	- Change in population number, [%]; - Number of relocated households as a result of mining sector activities; - Number of residents exposed to the impacts of mining activities; - Number of damaged buildings (% of total); - Number of buildings to be demolished and relocated (% of total).
INSTITUTIONAL DEVELOPMENT	Strengthening institutional capacities for environmental management	- Institutional development and investments in environmental Protection, Monitoring, and Control	- Investments and current expenditures in environmental protection (thousands of dinars); - Development of an environmental management system; - Change the number of monitoring points.
ECONOMIC DEVELOPMENT	Promoting economic development	- To promote economic development and employment of the local population	- Percentage of employees in the mining sector with income above the average RS, [%]; - Decrease in the number of unemployed as a result of employment in the mining sector, [%].
TECHNOLOGICAL DEVELOPMENT	Application of modern technologies in the exploration and exploitation of resources	- Introduce the application of BAT technologies and innovative solutions	- Number of development programs and technologies for environmental protection in the mining sector.

*definition and description of indicators, as well as calculation methodology are given in the Annex to the Rulebook on the National List of Environmental Protection Indicators ("Official Gazette of RS", no. 37/2011)

4. Assessment of Potential Environmental Impacts

The main goal of preparing the Strategic Environmental Impact Assessment, as previously mentioned, is to evaluate the potential significant impacts of the defined measures and activities on environmental quality. The Mineral Resources Management Strategy will serve as a framework for the development of the mining sector with possible (positive and negative) implications for environmental quality and socio-economic development.

With that in mind, the SEIA does not focus solely on analyzing activities that may have negative impacts and trends but also on those activities and measures that may contribute to environmental protection and improving the quality of life for the population.

According to Article 15 of the Law on Strategic Environmental Impact Assessment, the assessment of potential impacts of the plan/program on the environment includes the following elements:

- presentation of the assessed impacts of alternative solutions in the plan and program that are favorable from the standpoint of environmental protection, with a description of measures for preventing and limiting negative impacts or enhancing positive impacts on the environment;
- comparison of alternative solutions and presentation of the reasons for selecting the most favorable solution;
- presentation of the assessed impacts of the plan and program on the environment with a description of measures for preventing and limiting negative impacts or enhancing positive impacts on the environment;
- how environmental factors were taken into account in the assessment, including data on: air, water, soil, climate, ionizing and non-ionizing radiation, noise and vibration, flora and fauna, habitats and biodiversity; protected natural assets; population, human health, cities and other settlements, cultural-historical heritage, infrastructure, industrial and other facilities, or other created assets;
- how the characteristics of the impacts were considered during the assessment: probability, intensity, complexity/reversibility, temporal dimension (duration, frequency, repetition), spatial dimension (location, geographic area, number of exposed inhabitants, cross-border nature of the impacts), cumulative and synergistic nature of the impacts.

The primary role of the SEA is to provide decision-makers with an understanding of the expected trends in space and the environment that may arise during the implementation of the Strategy. It is important to emphasize that the SEA is not a direct implementation tool but an instrument for making decisions about future development. This chapter applies the method of multi-criteria impact assessment to evaluate the impacts of the activities and measures defined in the Strategy that may have significant environmental effects.

4.1. Assessment of the Impact of Alternative Solutions

The Law on Strategic Environmental Assessment does not prescribe what alternative solutions are subject to strategic assessment, but in practice, at least two alternatives are usually considered: the option where the Strategy is not adopted and implemented, and the option where the Strategy is adopted and implemented.

For public policy documents with a longer time horizon, such as this Mineral Resource Management Strategy, which carries greater uncertainty in its implementation, the use of development scenario modeling allows for the assessment of the positive and negative effects of alternative solutions. The assessment includes the conceptually set dilemma: whether the

option without implementing the Strategy or the option with full implementation of the Strategy is more acceptable for environmental protection and sustainable development.

Therefore, the Strategic Environmental Assessment considers the alternative without adopting the Strategy (current state – Alternative "A") and the alternative with adopting and implementing the Strategy (Alternative "B"), according to the objectives prescribed by public policies.

Table 4.1. Development of scenario-based assessment of alternative solutions

Mineral Resources and Mining		
Goals	Alternative A	Alternative B
1. Protecting air quality	- -	-
2. Reducing the impact on climate change	- -	-
3. Protection and sustainable use of water	0	0
4. Protection and sustainable use of agricultural and forest land	- -	-
5. Protection of Biodiversity and Geodiversity and Natural Resources	- -	-
6. Landscape protection	- -	-
7. Rational use of non-renewable and greater use of renewable energy sources	0	0
8. Improving the waste management system	0	0
9. Protection and improvement of public health	- -	-
10. Institutional development and investment in the field of environmental protection	0	+
11. Protection of cultural heritage and preservation of historical and archaeological sites	0	0

Note: The criteria for assessing the magnitude of the impact are given in Table 4.3.

After assessing the impacts of the alternative solutions, a comparison was made in the context of possible positive and negative impacts, serving as a basis for selecting the most favorable alternative solution. In Alternative "A," the current trend of managing mineral and other geological resources would continue without a clear development strategy for the mining sector and with partial adherence to environmental protection measures. Adoption of the Strategy, i.e., Alternative "B," would enable compliance with environmental quality parameters and the direct implementation of environmental protection and monitoring measures prescribed through this SEA and the Strategy.

Based on the above, it was concluded that, from a sustainability perspective, Alternative "B" is significantly more favorable compared to Alternative "A."

In addition to the mentioned alternative solutions, the Mineral Resources Management Strategy considered three development options: slow development of the mineral resources sector, realistic development of the mineral resources sector, and accelerated development of the mineral resources sector. When defining the development options, assumptions were made, the fulfillment of which is a prerequisite for achieving the planned option.

The development options for the mining sector in the Republic of Serbia depend on numerous factors, ranging from strategic energy plans, implementation of plans for copper and gold production, potential opening of new mines, environmental and social conditions, market prices, and more. In 2022, mining accounted for 2.7% of Serbia's GDP, and if the realistic development option of the mining sector were achieved, the share of mining in GDP could increase to about 5%.

Table 4.2. Development of scenario-based impact assessment concerning the development options of the mineral resources sector

Goals	Option of real development of the sector	An option to accelerate the development of the sector
1. Protecting air quality	- -	- - -
2. Reducing the impact on climate change	-	-
3. Protection and sustainable use of water	- -	- - -
4. Protection and sustainable use of agricultural and forest land	- -	- - -
5. Protection of Biodiversity and Geodiversity and Natural Resources	-	-
6. Landscape protection	-	- -
7. Rational use of non-renewable and greater use of renewable energy sources	0	-
8. Improving the waste management system	+	-
9. Protection and improvement of public health	-	-
10. Institutional development and investment in the field of environmental protection	0	0
11. Protection of cultural heritage and preservation of historical and archaeological sites	0	0

Note: The criteria for assessing the magnitude of the impact are given in Table 4.3.

Based on the above assessment, according to the set objectives, it was concluded that, from the perspective of sustainability, the option of realistic development of the mineral resources sector is more favorable compared to the option of accelerated development. Under current circumstances, this option represents the primary goal; however, in the future, when and if conditions allow, efforts toward the option of accelerated development should not be excluded, with the obligation to apply modern techniques and technologies that significantly reduce environmental impact. In the realistic development option, the necessary development of the energy mineral resources sector is projected to maintain the country's energy stability and independence, as well as the necessary development of the metallic, non-metallic, industrial, and other mineral resource sectors, with the application of environmental protection measures.

4.2. Evaluation of Characteristics and Significance of Impact

The evaluation of the significance of impacts is assessed to the magnitude (intensity) of the impact and the spatial scale at which the impact may occur. The impacts or effects of planned activities and projects are evaluated using numbers from -3 (negative impacts) to +3 (positive impacts).

Table 4.3. Criteria for assessing the magnitude of the impact

The magnitude of the impact	Label	Description
Critical	- - -	Significantly burdens the capacity of the space
Greater	- -	Largely degrades the environment
Smaller	-	Slightly degrades the environment
There's no impact	**0**	No direct impact on the environment and/or unclear impact
Positive	+	Minor positive changes in the environment
Affordable	++	Favorable changes in environmental quality
Very affordable	+++	Changes significantly improve quality of life

Table 4.4. Criteria for evaluating the spatial extent of impact

The Significance of Influence	Label	Description
International	**M**	Possible cross-border impacts
National	**N**	Possible impact at the national level.
Regional	**R**	Possible impact at the regional level.
Local	**L**	Possible local impact

Table 4.5. Scale for assessing the probability of impact

Probability	Label	Description
100%	**VV**	The impact is highly likely
more than 50%	**V**	The impact is likely
less than 50%	**M**	The impact is possible
less than 1%	**NV**	The impact is unlikely

Additional criteria can be derived based on the duration of the impact or consequences, such as temporary-intermittent (P) and long-term (D) effects.

Table 4.6. Development activities and measures in the Mineral Resources Management Strategy are covered by the impact assessment.

Activity/specific objective of the Strategy	Measures
Integrated sustainable management of mineral and other resources with continuous process innovation and the enhancement of state and corporate control in geological exploration and mining processes, including health and safety	1. Implementation of the integrated system for managing mineral and other geological resources for the sustainable development of the mining sector, with optimization of locally and globally changing sustainability components related to stakeholders
	2. Efficient implementation of sustainable long-term mining projects
	3. Establishment and alignment of common measures between different Ministries and industries regarding the implementation of the management system and strategic projects
Ensuring access to mineral raw materials and other geological resources, and enhancing international cooperation in this field	1. Increase the types, quantities, and quality of resources and reserves of mineral raw materials in the Republic of Serbia
	2. Assessment of the Republic of Serbia's needs for mineral raw materials and other geological resources, based on analyses of existing and potentially deficient mineral raw materials in ore-bearing areas
	3. Monitoring the extent to which resources, reserves, and the exploitation of mineral raw materials are integrated into spatial plans for various purposes
Prospecting, exploration, and geological documentation of resources and mineral deposits and other geological resources	1. Documentation and geological-economic evaluation of the results of exploration of mineral deposits and occurrences in the Republic of Serbia, along with establishing cooperation between the competent administrative authority, the Geological Survey of Serbia, and economic entities, to support investment in exploration activities
	2. Identification and exploration of new geothermal energy resources and making them available for use
Ensuring favorable legal conditions for the development, modernization, and investment in geological exploration and sustainable mining with a service-oriented approach	1. Activities aimed at addressing institutional issues and improving the work of the Geological Survey of Serbia
	2. Improvement of the legislative framework in the area of classification of mineral resources and reserves, methodology for preparing preliminary feasibility studies, and feasibility studies according to international standards (PERC, CRIRSCO standards, and in line with UNFC)
	3. Allocation of responsibilities and improvement of information flow among stakeholders in the mining industry
	4. Digitalization of geological plans and documentation, introduction of e-government in the field of geological research and mining activities
	5. Concession for geological exploration and exploitation of mineral raw materials

Activity/specific objective of the Strategy	Measures
Strategic spatial protection of mineral deposits and other geological resources	1. Monitoring the effectiveness of the adopted criteria for selecting strategically important mineral deposits and their classification into the group of deposits under special protection
	2. Incorporation of representations of mineral deposits into planning documents, with a special focus on deposits of strategic importance, aligning the processes of geological exploration, environmental protection, and sustainable development
Ensuring access to and exploitation of technogenic raw materials and supporting the development of the circular economy	1. Inventory of mining waste dumps and assessment of their potential for utilization
	2. Raising awareness about the importance of recycling Secondary Raw Materials (SRM) and sustainable resource management
	3. Development of raw material recovery from waste (especially strategic and critical raw materials), including the development of technology for processing such waste. In addition to using ash from thermal power plants for the cement industry and road construction, exploring the possibility of processing into new products such as humic acids, graphene, filters for water and exhaust gases, etc.
	4. Improvement and harmonization of legislative regulations with EU legislation regulating the principles of SRM management
Expanding knowledge and continuously strengthening the key competencies and capabilities of the professional staff, along with broad public education	1. Expanding and promoting knowledge related to geology and mining to raise public awareness about the measures that will be implemented
	2. Introducing dual education at the secondary school level in the fields of mining and geology
	3. Optimization and modernization of higher education in the fields of mining and geology.
	4. Expanding the knowledge of employees in the mining and geology sector
Sustainable mining industry with incentives for joint infrastructure investments, research, innovation, and control of environmental degradation	1. Coordinated joint investments in infrastructure for the growth of the mining industry and stimulating research and innovation
	2. Transparency and implementation of sustainability in mining industry projects and control of environmental impacts, mine closure processes, and waste management
	3. Implementation of standards that define sustainable and responsible mining

Assessment of the magnitude of impact intensity, spatial scale of impact, and probability of impact on the environment and elements of sustainable development are provided in the following tables.

Table 4.7. Assessment of impacts at the level of the specific objective of the SEA within the first specific objective of the Strategy.

Specific Objective 1 - Integrated sustainable management of mineral and other resources with continuous process innovation and the enhancement of state and corporate control in geological exploration and mining processes, including health and safety			
Specific SEA objectives	**VI***	**PR****	**V*****
1. Reduce emissions of pollutants into the air to the prescribed limit values	0		
2. Improving the quality of surface and groundwater	0		
3. Preservation of the hydrological regime of groundwater and surface water	0		
4. Protect forest and agricultural land	0		
5. Protect the landscape	0		
6. Protecting natural values and preserving biodiversity	0		
7. Protect immovable cultural property and archaeological sites	0		
8. Improve waste storage, reuse, treatment, and disposal	0		
9. Protect and improve public health	+	L	M
10. Mitigating the negative impact of development on the population	+	L	M
11. Reduce impact on settlements and structures	+	L	M

Specific Objective 1 - Integrated sustainable management of mineral and other resources with continuous process innovation and the enhancement of state and corporate control in geological exploration and mining processes, including health and safety			
Specific SEA objectives	**VI***	**PR****	**V*****
12. Institutional development and investment in environmental protection, monitoring, and control	+	L	M
13. Encourage economic development and employment of the local population	++	L	M
14. Introducing the application of BAT technologies and innovative solutions	0		

* VI – Magnitude of the intensity of the impact, ** PR – Spatial scale of the impact, *** V – Probability of the impact

The first measure enables the implementation of standards for a sustainable system of managing mineral and other geological resources. It forms the foundation for setting up and controlling exploration and exploitation processes and for the sustainable development of the mining industry. Based on this system, it is possible to timely assess the impacts of changes in ecological, social, and economic factors and to determine measures for appropriate management of the mining sector's development process, aligned with the country's economy. The second measure provides that strategic projects should have the status of a top national priority and public interest in the national permitting procedure. The project is to be implemented sustainably, particularly in terms of monitoring, preventing, and minimizing environmental impacts, as well as minimizing socially harmful impacts through the use of socially responsible practices, including respect for human and labor rights, especially in cases of forced resettlement. The third measure implies the synchronization of cooperation between the mining sector and ministries, related to the coordinated implementation of measures during exploitation.

Table 4.8. Assessment of impact at the level of the specific objectives of the SEA in the second specific objective of the Strategy

Specific Objective 2 - Ensuring access to mineral raw materials and other geological resources, and enhancing international cooperation in this field			
Specific SEA objectives	**VI***	**PR****	**V*****
1. Reduce emissions of pollutants into the air to the prescribed limit values	--	L	NV
2. Improving the quality of surface and groundwater	---	R	M
3. Preservation of the hydrological regime of groundwater and surface water	--	R	M
4. Protect forest and agricultural land	---	L	M
5. Protect the landscape	--	L	M
6. Protecting natural values and preserving biodiversity	-	L	NV
7. Protect immovable cultural property and archaeological sites	0		
8. Improve waste storage, reuse, treatment and disposal	--	R	M
9. Protect and improve public health	--	L	In
10. Mitigating the negative impact of development on the population	-	L	In
11. Reduce impact on settlements and structures	--	L	M
12. Institutional development and investment in environmental protection, monitoring, and control	0		
13. Encourage economic development and employment of the local population	++	L	In
14. Introducing the application of BAT technologies and innovative solutions	+	N	M

The first measure involves assessing the growth in types, quantities, and quality of all mineral resources and reserves of mineral raw materials important for the development of the economy of the Republic of Serbia, especially strategically important raw materials. The expected result is a high level of knowledge of the mineral resource potential of the Republic. The second measure considers the assessment of the needs for mineral raw materials and other geological resources and the possibilities of meeting the demand for the most important raw materials. It

analyzes active and thoroughly explored deposits, deposits whose exploitation has been abandoned, ore-prospective and potentially ore-bearing areas, and technogenic (anthropogenic) deposits. The third measure provides timely and reliable information on: areas where mining activities are taking place; areas without active mining production but where raw materials suitable for exploitation have been identified; areas with geological assumptions about the possibility of discovering new mineral raw materials; and areas where significant geological exploration works are underway or planned.

Table 4.9. Assessment of impacts at the level of specific objective of the SEA for the third specific objective of the Strategy

Specific objective 3 – Prospecting, exploration, and geological documentation of resources and mineral deposits and other geological resources			
Specific SEA objectives	**VI***	**PR****	**V*****
1. Reduce emissions of pollutants into the air to the prescribed limit values	-	L	NV
2. Improving the quality of surface and groundwater	---	R	M
3. Preservation of the hydrological regime of groundwater and surface water	--	R	M
4. Protect forest and agricultural land	---	L	M
5. Protect the landscape	-	L	M
6. Protecting natural values and preserving biodiversity	-	L	NV
7. Protect immovable cultural property and archaeological sites	0		
8. Improve waste storage, reuse, treatment and disposal	-	R	M
9. Protect and improve public health	--	L	M
10. Mitigating the negative impact of development on the population	-	L	In
11. Reduce impact on settlements and structures	--	L	M
12. Institutional development and investment in environmental protection, monitoring, and control	0		
13. Encourage economic development and employment of the local population	++	L	In
14. Introducing the application of BAT technologies and innovative solutions	+	N	M

The goal of the first measure is the documentation and evaluation of the progress of geological exploration results for mineral raw materials on the territory of the Republic, with an emphasis on ore-prospective areas. This will enable the continuous integration of data on mineral deposits into planning documentation, creating a foundation for their further development and encouraging the mining sector to increase the scope of geological exploration and exploitation of mineral raw materials. This concerns both currently active mineral deposits and those whose exploitation was suspended but is assessed to have sufficient mineral potential to be redeveloped using modern methods and technologies for the extraction and processing of mineral raw materials. The second measure is expected to result in the development of a comprehensive development strategy that will define the main directions for the exploration and exploitation of geothermal resources and will be focused on the sustainable use of geothermal energy.

Table 4.10. Assessment of impacts at the level of specific objectives of the SEA in the fourth specific objective of the Strategy

Specific objective 4 - Ensuring favorable legal conditions for the development, modernization, and investment in geological exploration and sustainable mining with a service-oriented approach			
Specific SEA objectives	**VI***	**PR****	**V*****
1. Reduce emissions of pollutants into the air to the prescribed limit values	-	L	NV
2. Improving the quality of surface and groundwater	-	L	NV
3. Preservation of the hydrological regime of groundwater and surface water	-	L	NV
4. Protect forest and agricultural land	-	L	NV
5. Protect the landscape	0		

Specific objective 4 - Ensuring favorable legal conditions for the development, modernization, and investment in geological exploration and sustainable mining with a service-oriented approach			
Specific SEA objectives	**VI***	**PR****	**V*****
6. Protecting natural values and preserving biodiversity	+	L	M
7. Protect immovable cultural property and archaeological sites	+	L	M
8. Improve waste storage, reuse, treatment and disposal	0		
9. Protect and improve public health	0		
10. Mitigating the negative impact of development on the population	0		
11. Reduce impact on settlements and structures	0		
12. Institutional development and investment in environmental protection, monitoring, and control	++	R	M
13. Encourage economic development and employment of the local population	+	L	M
14. Introducing the application of BAT technologies and innovative solutions	0		

The first measure involves monitoring and improving the work of state institutions responsible for mineral resources, mining, and related areas, as well as improving the work of the Geological Institute of Serbia. The goal is for the relevant state authorities to align their activities and plans with the status and development prospects of mineral resources. The second measure involves monitoring changes in legal regulations to simplify access to exploration and exploitation permits at a single point and to increase investment in the modernization of geological exploration and mineral exploitation. This measure should enable the simplification and acceleration of procedures for obtaining permits in the field of geological exploration and planning of mineral exploitation. The third measure involves monitoring the clarity of the distribution of responsibilities and improving the flow of information among stakeholders in the mining industry. The fourth measure involves assessing activities related to the application of modern computer technologies to enable more efficient implementation of the state's administrative functions related to geological exploration and mining. The fifth measure points to the periodic monitoring of the introduced concession system for geological exploration and mineral exploitation with clearly defined conditions and a specified duration.

Table 4.11. Assessment of the impacts at the level of the specific objectives of the SEA in the fifth specific objective of the Strategy

Specific objective 5 – Strategic spatial protection of mineral deposits and other geological resources			
Specific SEA objectives	**VI***	**PR****	**V*****
1. Reduce emissions of pollutants into the air to the prescribed limit values	-	L	NV
2. Improving the quality of surface and groundwater	--	L	M
3. Preservation of the hydrological regime of groundwater and surface water	-	L	NV
4. Protect forest and agricultural land	--	L	In
5. Protect the landscape	0		
6. Protecting natural values and preserving biodiversity	-	L	NV
7. Protect immovable cultural property and archaeological sites	0		
8. Improve waste storage, reuse, treatment and disposal	0		
9. Protect and improve public health	-	L	M
10. Mitigating the negative impact of development on the population	-	L	In
11. Reduce impact on settlements and structures	-	L	In
12. Institutional development and investment in environmental protection, monitoring, and control	+	R	M
13. Encourage economic development and employment of the local population	+	L	In
14. Introducing the application of BAT technologies and innovative solutions	+	N	M

The first measure involves monitoring the classification of mineral deposits into the group of strategically important ones and selecting deposits that meet the adopted criteria, so they are covered by special protection. The measure aims to improve conditions for access to areas where deposits of mineral raw materials and other geological resources are located. It is necessary to ensure the protection of mineral deposits of strategic interest to the economy. Deposits whose exploitation is not planned for economic, social, or other reasons should be treated as a resource base, and ensuring direct access to these deposits, especially energy ones, guarantees the country's security in crises. The second measure intensifies activities related to improving the current state of the mining industry and mineral resource exploration, by setting research priorities, namely: non-ferrous metal resources, precious metals as by-products of non-ferrous metals, and gold as the main ore component in deposits, as well as alloying metal resources. Basic geological research of mineral resources should be concentrated in areas where metallogenetic assumptions for finding new deposits have been established.

Table 4.12. Assessment of impact at the level of specific objective of the SEA in the sixth specific objective of the Strategy

Specific Objective 6 - Ensuring access to and exploitation of technogenic raw materials and supporting the development of the circular economy			
Specific SEA objectives	**VI***	**PR****	**V*****
1. Reduce emissions of pollutants into the air to the prescribed limit values	-	L	NV
2. Improving the quality of surface and groundwater	-	L	M
3. Preservation of the hydrological regime of groundwater and surface water	0		
4. Protect forest and agricultural land	+	L	M
5. Protect the landscape	0		
6. Protecting natural values and preserving biodiversity	0		
7. Protect immovable cultural property and archaeological sites	0		
8. Improve waste storage, reuse, treatment and disposal	++	R	V
9. Protect and improve public health	0		
10. Mitigating the negative impact of development on the population	+	L	V
11. Reduce impact on settlements and structures	0		
12. Institutional development and investment in environmental protection, monitoring, and control	+	L	V
13. Encourage economic development and employment of the local population	++	L	V
14. Introducing the application of BAT technologies and innovative solutions	++	N	VV

The first measure promotes the assessment and exploitation of critical and strategic mineral raw materials that have significant recycling potential from secondary raw materials. By mapping primary and secondary potential deposits of mineral raw materials and creating a register containing all necessary information, it becomes possible to increase the capacity for mineral resource management. The second measure involves monitoring efforts to raise awareness among citizens and mining companies about the possibilities and importance of proper disposal and reuse of these potential raw materials. It aims to establish the obligation for their exploitation and processing as additional secondary sources of mineral raw materials, since they can represent a source of many valuable materials whose potential has not been fully explored or utilized. The third measure should support work on developing new technologies and introducing existing EU technologies in this field. The fourth measure relates to improving and harmonizing legal regulations with EU regulations governing the principles of secondary raw material management.

Table 4.13. Assessment of impact at the level of the specific objectives of the SEA in the seventh specific objective of the Strategy

Specific objective 7 - Expanding knowledge and continuously strengthening the key competencies and capabilities of the professional staff, along with broad public education			
Specific SEA objectives	**VI***	**PR****	**V*****
1. Reduce emissions of pollutants into the air to the prescribed limit values	0		
2. Improving the quality of surface and groundwater	0		
3. Preservation of the hydrological regime of groundwater and surface water	0		
4. Protect forest and agricultural land	0		
5. Protect the landscape	0		
6. Protecting natural values and preserving biodiversity	0		
7. To protect immovable cultural property and archaeological sites	0		
8. Improve the storage, reuse, treatment and disposal of waste	0		
9. Protection and improvement of the health of the population	0		
10. Mitigating the negative impact of development on the population	+	N	M
11. Reduce the impact on buildings and buildings.	0		
12. Institutional Development and Investments in Environmental Protection, Monitoring and Control	+	N	V
13. To promote economic development and employment of the local population	+	N	M
14. Introduce the application of BAT technologies and innovative solutions	+	N	M

Within the first measure, the goal is that during the implementation of the Strategy, and in complementarity with other specific objectives, special attention is given to social education, including a broad informational campaign regarding the sustainable measures being undertaken. Through social dialogue, build public understanding of the decisions made by mining-geological authorities regarding the protection of mineral raw materials. The second measure refers to secondary education in the field of mining and geology and creating the preconditions for introducing dual education. The focus of the third measure is the rationalization and modernization of study programs at faculties related to the field of mining and geology. The fourth measure refers to employees in the mining and geology sector, namely the improvement of skills and capacity building of employees in this sector. The mining inspection should have sufficient capacity to supervise compliance with the law on mining and research, exploitation, and ore processing for companies, etc.

Table 4.14. Assessment of impacts at the level of specific objectives of the SEA (Strategic Environmental Assessment) under the eighth specific objective of the Strategy

Specific objective 8 - Sustainable mining industry with incentives for joint infrastructure investments, research, innovation, and control of environmental degradation			
Specific SEA objectives	**VI***	**PR****	**V*****
1. Reduce emissions of pollutants into the air to the prescribed limit values	0		
2. Improving the quality of surface and groundwater	0		
3. Preservation of the hydrological regime of groundwater and surface water	0		
4. Protect forest and agricultural land	0		
5. Protect the landscape	0		
6. Protecting natural values and preserving biodiversity	0		
7. To protect immovable cultural property and archaeological sites	0		
8. Improve the storage, reuse, treatment and disposal of waste	++	R	VV
9. Protection and improvement of the health of the population	0		
10. Mitigating the negative impact of development on the population	+	L	V
11. Reduce the impact on buildings and buildings.	+	L	M

Specific objective 8 - Sustainable mining industry with incentives for joint infrastructure investments, research, innovation, and control of environmental degradation			
Specific SEA objectives	**VI***	**PR****	**V*****
12. Institutional Development and Investments in Environmental Protection, Monitoring and Control	++	N	M
13. To promote economic development and employment of the local population	+	L	NV
14. Introducing the application of BAT technologies and innovative solutions	+	L	M

The measure should assess investments in infrastructure for the growth of the mining industry, that is, the creation of reliable infrastructure that meets the needs of the mining sector. The second measure relates to the consistent implementation of legally regulated projects and control of environmental protection, mine closure processes, and waste management as obligations throughout the entire life cycle of the mine. It is necessary, within the project, already at the opening of the mine, to include funds in financial planning for ecologically sustainable mine closure, as well as for post-closure monitoring. The mine closure plan should include future land use and infrastructure facilities. The third measure ensures the application of the highest standards that define responsible mining. The application of standards includes the engagement of experts for assessing the impacts of mining operations on the environment and communities, as well as support for research and development projects of new technologies for sustainable mining.

4.3. Summary of the Significant Impacts of the Strategy

Based on the evaluation of the significance of impacts presented in the previous tables, it is concluded that the implementation of the Mineral Resources Management Strategy will produce a certain number of strategically significant positive impacts and a smaller number of negative implications for space and the environment. Most negative impacts are local in terms of spatial dispersion.

For each of the activities defined in the Strategy, possible implementation impacts were identified concerning each of the 14 specific SEA objectives.

Based on the evaluation, a certain number of strategically significant positive impacts were identified, the most important of which are on environmental quality and socio-economic development. Improvements in environmental quality are reflected in the reduction of air, water, and soil pollution through the introduction of Best Available Techniques (BAT) and innovative modern solutions in the mining sector. Many of the measures will result in positive impacts on mining waste management processes and the improvement of landfill conditions. Some measures are characterized by the improvement of the work of state institutions responsible for mineral resources and mining, as well as the improvement of legal regulations in this area. A positive impact of certain measures is also seen in stimulating economic development and employment of the local population.

The mentioned smaller number of negative impacts has been identified as a consequence of the development and natural potential of the Republic of Serbia, which must inevitably form the basis for further development of the mining sector. Continuation of mining activities in their current state, that is, using current practices (without applying modern principles and standards of sustainable mining), will in most cases result, in the areas where the activities take place, in environmental degradation (primarily of water and soil), air quality degradation, and landscape disturbance, particularly in surface mining. Potential threats to public health and impacts on settlements may manifest as long-term local problems. Existing surface mines for energy resource exploitation, as well as planned exploitation of mineral resources, may to some extent

burden the capacity of the area in terms of: pollution of key environmental components, impacts on public health, changes in landscape appearance, biodiversity, geodiversity, and social implications that may manifest as negative effects on public health.

The Republic of Serbia is a signatory to the ESPOO Convention on Environmental Impact Assessment in a Transboundary Context and the SEA Protocol to the ESPOO Convention, whereby it has committed to notifying other countries regarding the preparation of plans, programs, and projects that may have transboundary impacts. The SEA Protocol requires that if it is determined that the implementation of plans and programs may cause significant negative transboundary impacts, the "party of origin," i.e., the country, will undertake activities to ensure adequate and effective intervention, notifying every other potentially affected country as early as possible, and no later than when its public is informed of the activity. In this context, it can be concluded that the proposed activities and measures in the Strategy may have negative impacts on the environment of other countries, considering that there are plans and projects located in border zones with other countries, or whose mode of operation may cause certain transboundary impacts for which, according to the ESPOO Convention and SEA Protocol, transboundary consultations need to be conducted.

4.4. Cumulative and Synergistic Effects

In accordance with the Strategic Environmental Assessment Law (Article 15), the strategic assessment should also include an evaluation of cumulative and synergistic effects. Significant effects can arise as a result of the interaction between numerous smaller impacts from existing facilities and activities and various planned activities within one area.

Cumulative effects occur when individual sectoral solutions do not have a significant impact on their own, but several individual effects together can produce a significant impact. In the case of the Strategy, this certainly refers to large projects in the transport and industrial sectors in areas of intensive mining activities. Synergistic effects result from the interaction of individual impacts that produce a total effect greater than the simple sum of the individual impacts.

The strategic guidelines and planned activities and measures of the Strategy in the coal, oil, and natural gas sectors, as well as the application of more modern technologies in the exploitation of energy mineral raw materials, cumulatively contribute to public health by reducing emissions of pollutants into the environment. Strengthening institutional capacities, improving legislation, and advancing environmental monitoring will cumulatively affect the creation of favorable conditions for environmental management in the mining sector. The stated development activities in the Strategy will contribute to socio-economic development in various aspects (economic growth, employment in the mining sector, etc.).

Given that at surface mine sites there are also other sources of particle emissions (traffic, industrial plants, and households), it is possible, due to cumulative effects, to exceed limit values under unfavorable meteorological conditions. SO_2 and NO_x emissions from thermal blocks, after reconstruction in line with the Large Combustion Plants Directive, will not exceed emission limit values, but these pollutants together with emissions from other sources may potentially exceed limit values due to cumulative effects. Existing capacities could cumulatively and indirectly impact soil pollution. Exploration works, and especially the start of the exploitation of strategic mineral raw materials, as a new occurrence in the area, without the application of modern principles and standards of sustainable mining, can cause negative cumulative impacts. The increase in areas under coal and strategic raw materials will impact the reduction of agricultural land areas.

4.5. Description of Measures for Preventing and Reducing Negative and Increasing Positive Impacts on the Environment

The protection measures aim to keep the environmental impacts resulting from the implementation of activities and measures defined by the Strategy within acceptable limits, to prevent threats to the environment and human health. Protection measures enable development and prevent conflicts, thereby contributing to the achievement of sustainable development goals.

Based on the evaluation results of the planned measures and activities in the Strategy, guidelines, and measures for environmental protection have been defined. These are provided for the most significant activities foreseen by the Strategy, specifically for facilities in the mining sector which, by the nature of their operations, can be major polluters.

Considering the comprehensiveness of the Mineral Resources Management Strategy and the large number of activities across all mining sectors, only strategically significant and general measures for preventing and limiting negative environmental impacts will be presented here. Some activities will be implemented through planning documentation, project documentation, or direct implementation, leaving room for measures to be specified depending on the particular development project and the conditions in place at that time.

Starting from the principle that Serbia needs a modern, productive, and environmentally friendly mining industry that will ensure a safe and reliable supply of energy and industrial sectors with essential raw materials, it is necessary to implement a range of protection measures and guidelines. In this context, the application of national and international standards in the field of environmental protection, economic and social development, as well as standards on health, safety, the application of Best Available Techniques (BAT), etc., is required. Decisions on the potential exploitation of mineral resources should be made under the principles of social acceptability, environmental sustainability, and economic justification.

General guidelines and protection measures

1. The exploitation of mineral and other geological resources, groundwater, and geothermal resources must be preceded by the preparation of documentation according to the legal framework regulating environmental protection, protection of natural and cultural assets, planning, construction, etc. In addition to Strategic Environmental Assessments (SEA) and Environmental Impact Assessments (EIA), the legislative framework, aligned with EU directives, will also include the issuance of integrated permits and the consideration of acceptability assessments.
2. Strict enforcement of environmental regulations and the implementation of international obligations related to the mining and environmental sectors; application of more modern technological solutions, best available techniques (BAT), and cleaner production concepts in the implementation of projects that may negatively affect environmental quality.
3. Implementation of the environmental protection guidelines defined in this SEA and their detailed elaboration during the realization of planned activities through the preparation of spatial and urban plans (strategic assessments) and technical project documentation (impact assessments, integrated permits, etc.) for individual projects. The procedure must be carried out before the approval of mining projects, with the inclusion of the local community and relevant stakeholders in the decision-making process.
4. Implementation of "green" technologies in mining: use of electric and hybrid machines in mining processes to reduce emissions from internal combustion engines; recycling and reuse of waste materials instead of extensive exploitation of new mineral resources; and development of energy storage technologies to efficiently use renewable energy sources in mining and industrial facilities.

5. Development of a circular economy in mining by using waste materials in the production of new products and reducing dependence on primary resource exploitation.
6. If the preparation of spatial and project documentation determines it necessary, a monitoring station network may be defined in a specific area due to potential pollution during mine construction, exploitation phases, mineral processing facilities, as well as at mining/industrial waste dumps.
7. It is necessary to build and strengthen institutional capacities at the regional and local levels through improved institutional coordination at horizontal and vertical levels, expansion of monitoring, and further development of an integrated pollutant register (national registry of pollution sources).
8. Establish social protection measures through communication and cooperation with local communities. Ensure transparent information for the local population about the scope of exploration, potential risks, benefits, and the measures being taken to protect the environment and space.
9. Carry out remediation of polluted mining-energy locations, which includes: conducting decontamination and remediation of contaminated sites, reclamation and remediation of areas most damaged by mineral exploitation, and rehabilitation and remediation of polluted watercourses (e.g., treatment of ash ponds, landfills, tailings ponds, as well as wastewater, with humic acids).
10. Strengthen the human and material capacities of environmental protection services, provide continuous education and public information on the work, measures, activities, and projects in the mining sector, as well as improve the environmental reporting system, communication, and dissemination.

Protective measures included in the Mineral Resources Management Strategy

Implementation of environmental protection guidelines and responsible mining requires integrating various approaches and technologies. The following measures represent concrete steps that mining companies and relevant institutions should take to ensure sustainable mineral resource management with minimal negative environmental impacts:

1. **Conducting Environmental Impact Assessments and Strategic Environmental Assessments.** Comprehensive environmental impact assessment - before allowing any mining activity, all strategies, plans, and programs in the mining sector must undergo a Strategic Environmental Assessment. According to the Environmental Impact Assessment Law, mining projects must undergo an Environmental Impact Assessment; Public consultations - transparency in public consultations so that local communities and stakeholders can express their opinions and concerns. This helps identify potential issues and increases the project's legitimacy.
2. **Water resource management.** Reducing water consumption - mining companies should implement technologies and practices that reduce water use, including water recycling and using less water in extraction and processing; Pollution control - introduce strict measures to prevent the discharge of pollutants into water bodies. This may include building wastewater treatment plants (WWTP) and continuous water quality monitoring.
3. **Waste management.** Waste minimization - apply technologies and procedures that minimize the amount of waste generated; Safe waste disposal - ensure mining waste is disposed of safely to minimize soil and water contamination risks; Recycling and reuse - promote the recycling of mining waste and the reuse of secondary raw materials.
4. **Air pollution control.** Emission reduction - implement technologies to reduce harmful gas and particle emissions into the atmosphere. This may include filtration systems, wet dust suppression methods, and greenhouse gas reduction technologies; Air quality

monitoring - establish systems for continuous air quality monitoring around mining facilities and local communities to quickly identify and address potential pollution.

5. **Biodiversity protection.** Habitat preservation - plan mining activities to minimize impacts on natural habitats. Avoid mineral exploitation in ecologically sensitive areas and create protected zones; Ecosystem restoration - after mining activities end, implement ecosystem restoration programs. This includes returning land to its original state and creating new habitats for endangered species.
6. **Energy efficiency and use of renewable energy sources.** Improving energy efficiency - implement technologies that improve the energy efficiency of mining facilities and processes, including using energy-efficient equipment and optimizing operations; Use of renewables - promote the use of renewable energy sources such as solar and wind to reduce dependence on fossil fuels and lower the carbon footprint.
7. **Social responsibility and inclusiveness.** Engaging local communities - actively involve local communities in planning and implementing mining projects. This includes hiring local workers, investing in local infrastructure, and supporting community development; Transparency and accountability - ensure transparency at all stages of mining development, including the availability of information on environmental and social impacts. Companies should be accountable for their actions and regularly report on their progress toward sustainable goals.
8. **Technological innovation.** Application of advanced technologies - invest in research, development, and implementation of new technologies that can reduce the environmental impacts of mineral extraction; Exchange of best practices - encourage collaboration and the exchange of best practices between mining companies, research institutions, and government agencies to improve responsible mining methods and approaches.

Protection Measures for the Exploitation of Energy Mineral Resources

The exploitation of energy mineral resources (coal, oil, natural gas) is specific by its nature. This specificity stems from its functional connection with the accompanying energy sector, for which exploitation is a prerequisite for existence, i.e., functioning. From this standpoint, the key challenges regarding air pollution and the responses to them are primarily based on the potential negative impacts on the environment, which are characteristic of the energy sector.

Key environmental challenges include:

- **Air pollution:** Suspended particles that contribute to air quality deterioration and public health issues.
- **Water contamination:** Leachate from mines, wells, and preparation plants may contain heavy metals, organic pollutants, and radioactive substances.
- **Soil degradation:** Surface and underground coal exploitation leads to erosion, decreased soil fertility, contamination with heavy metals, ecosystem degradation, and biodiversity loss.
- **Generation of mining waste:** Large quantities of tailings require adequate management to prevent long-term pollution.

Air protection measures:

- Implementation of modern emission reduction technologies: To reduce air pollution, thermal power plants must apply advanced filtration technologies. The use of electrostatic filters reduces the concentration of suspended particles (PM10 and PM2.5) by more than 90%, while wet scrubbers effectively remove sulfur dioxide (SO_2) from exhaust gases.
- Use of cleaner fuels: Replacing coal with natural gas in power plants can lead to a 50% reduction in CO_2 emissions.

- Improving energy efficiency: Optimizing industrial processes and introducing modern energy management systems contribute to more efficient use of fossil fuels, reducing energy consumption and harmful gas emissions.
- Development of alternative energy sources: Gradual transition from fossil fuels to renewable energy sources, such as wind turbines, solar panels, and geothermal energy, significantly reduces air pollution and CO_2 emissions.
- Emission monitoring and measurement: Continuous monitoring and the application of sensor systems for air quality tracking enable early detection of limit exceedances and timely measures for their reduction.
- Development of carbon capture and storage (CCS) technologies: These technologies allow the reduction of CO_2 emissions from industrial facilities. By applying these technologies, CO_2 emissions can be reduced by 85-90%, contributing to climate change mitigation.

Water protection measures:

- Installation of wastewater treatment plants: Modern purification technologies, such as reverse osmosis, ultrafiltration, biological processes, and chemical treatments, allow the removal of heavy metals, toxic organic compounds, and radioactive elements from mining wastewater. These plants must be an obligatory part of all mining complexes.
- Control of leachate from waste dumps: Tailings and mining waste dumps often release contaminated leachate containing arsenic, mercury, lead, and other toxic substances. Therefore, it is necessary to build drainage systems that prevent these substances from entering watercourses.
- Application of acid mine drainage treatment technologies: Acid mine drainage results from the oxidation of sulfide ores leading to the formation of sulfuric acid. These waters can significantly degrade aquatic ecosystems. The use of alkaline neutralizers (lime, sodium hydroxide) and biological treatments with sulfate-reducing bacteria can help stabilize pH values.
- Use of recycled water in industrial processes: To reduce freshwater consumption, mining companies should adopt water circulation systems that enable water reuse in flotation, cooling, and ore-washing processes.
- Protection of watercourses and ecosystems: It is necessary to introduce protective zones around water resources in mining areas to prevent the direct discharge of untreated wastewater into rivers and lakes. This includes creating artificial wetlands and natural filters that allow additional water purification before entering watercourses.
- Continuous monitoring and water quality analysis: Modern sensor systems and laboratory tests should become standard practice to ensure that pollution is immediately identified and prevented. These measures must be mandatory for all mining operations to preserve the cleanliness of water resources.

Soil protection measures:

- Application of bioremediation techniques: Bioremediation involves the use of microorganisms, plants, and other natural processes to remove toxic substances from the soil. For example, planting plants that accumulate heavy metals (phytoremediation) can help reduce lead, cadmium, and arsenic contamination in the soil.
- Reclamation of surface mines and dumps: Depressions created by surface exploitation should be reclaimed using engineering methods such as backfilling the mined-out space with overburden and tailings, and leveling the terrain. Afterward, the application of plant species that stabilize the soil prevents further erosion.
- Controlled exploitation and minimization of surface disturbances: The use of modern methods of mineral resource exploitation, such as selective mining and underground mining with minimal surface impact, reduces the degree of soil damage.

- Prevention of mining dust dispersion: During the exploitation and transport of mineral resources, large amounts of dust can contaminate the soil. Water spraying, the installation of vegetative barriers, and the use of protective covers can significantly reduce the spread of pollutant particles.
- Protection of natural ecosystems: Mining operations often affect local flora and fauna, especially in sensitive areas. It is necessary to provide ecological corridors and protective belts to preserve biodiversity.
- Soil quality monitoring: Continuous soil analysis for the presence of toxic elements allows timely remediation and prevention measures. The use of sensor technologies and soil sampling in mining activity zones provides insight into the level of contamination and the effectiveness of remediation measures.

Waste management:

- Application of circular economy principles: Recycling of tailings for the production of construction materials reduces waste amounts.
- Storage of mining waste in safe dumps: The use of geomembranes and drainage systems prevents the leakage of hazardous substances into the environment.
- Continuous monitoring of dumps: Regular inspections can prevent long-term environmental problems.

Protection measures during the exploration of energy mineral raw materials

Soil protection measures:

- Application of minimal invasion drilling techniques: use of portable platforms and smaller exploratory rigs to reduce surface degradation; use of environmentally friendly drilling fluids that do not lead to soil contamination; limiting the size of work areas and using temporary access roads to minimize soil disturbances.
- Land reclamation after completion of works: removal of temporary structures and restoration of the terrain to its original condition; planting of native plant species and supporting natural regeneration; soil stabilization to prevent erosion after equipment removal.

Water protection measures:

- Use of environmentally friendly fluids and wastewater control: application of non-toxic drilling fluids and their proper recycling; prevention of fluid and waste discharge into watercourses and underground reservoirs; continuous water quality monitoring during exploration activities.

Air protection measures:

- Reduction of dust and gas emissions: wetting work surfaces to reduce dust lift-off; maintaining vehicles and equipment in optimal condition to reduce emissions; installing local monitoring stations to track air quality.

Noise and vibration protection measures:

- Technical measures to reduce noise: use of low-noise drills and application of mufflers on machines; installation of temporary sound barriers around exploration drilling sites near inhabited areas; maintenance and regular equipment checks to reduce vibration levels.
- Operational measures to reduce impact: limiting working hours to avoid disturbing residents; applying methods that do not use explosive techniques; conducting continuous noise and vibration measurements during exploration activities.

Biodiversity Conservation Measures:

- Protection of natural habitats: limiting work in sensitive ecosystems and near protected areas; applying temporary protection zones around drilling sites to reduce impacts on wildlife; conducting an environmental assessment before starting exploration works to identify key ecosystems and species to be protected.
- Minimizing impacts on fauna and flora: adjusting the dynamics and intensity of works during local species' migration and breeding periods; preserving vegetation near work sites to reduce loss of natural habitats; applying light and sound signaling to prevent negative impacts on wildlife.
- Post-exploration rehabilitation: returning the terrain to its previous state by removing temporary installations and infrastructure; reforestation and planting of native plant species to restore ecosystems; controlling potentially invasive species that could threaten the local ecosystem and implementing measures for their removal; monitoring biodiversity before, during, and after exploration activities to assess long-term effects and apply corrective measures on time.

Protection Measures for the Exploitation of Metallic and Non-Metallic Mineral Resources

The exploitation of metallic and non-metallic mineral raw materials can pose a significant environmental risk, so it is necessary to apply effective environmental protection measures at all stages of the process, from exploration and exploitation to mineral processing and waste disposal. The key environmental protection challenges are reflected in:

- **Air pollution**: generation of dust, as well as gases (CO, CO_2, NO_x, etc.) originating from mining machinery operations.
- **Water contamination**: mine wastewater contains heavy metals, sulfates, and cyanides that can threaten aquatic ecosystems.
- **Land degradation:** surface and underground mining lead to loss of fertile soil and erosion.
- **Generation of mining waste**: large amounts of tailings and toxic materials require proper management.
- **Loss of biodiversity**: destruction of natural habitats and forest ecosystems affects fauna and flora in mining regions.

Air protection measures:

- Reduction of emissions from smelters: installation of electrostatic filters and wet scrubbers to remove particles and toxic gases; use of low-emission technologies for metal smelting.
- Dust control: spraying water on open pits and waste dumps; use of enclosed transport systems; greening of dumps to prevent dust spread.
- Air quality monitoring: continuous monitoring of heavy metal concentrations and suspended particles (PM10, PM2.5); installation of automated emission monitoring systems at mining facilities.

Water protection measures:

- Water treatment before discharge into ecosystems: use of mechanical, chemical, and biological methods to remove heavy metals, cyanides, and sulfates; recycling water within mining facilities to reduce the need for fresh water.
- Control of leachate from tailings: application of impermeable geomembranes and water collection and filtration systems; use of natural filters such as wetland systems for natural water purification.
- Water quality monitoring: installation of detectors for early contamination detection in underground and surface waters; regular sampling and testing of water near mines.

Soil protection measures:

- Reclamation of surface mines: after completion of exploitation, apply afforestation and greening to restore biodiversity; engineering stabilization of terrain to prevent landslides.
- Bioremediation: use of microorganisms and plants to remove toxic substances from soil; use of mineral additives to neutralize acid water from mining areas.
- Soil monitoring: continuous sampling and analysis of soil around mines to prevent contamination spread; use of satellite and drone technologies to monitor land degradation.

Waste management:

- Safe tailings storage: construction of controlled landfills with systems to prevent leakage of toxic substances; installation of barriers and geomembranes to protect groundwater.
- Mining waste disposed in landfills must be characterized in a way that ensures the long-term physical and chemical stability of the landfill structure and prevents major accidents.
- Recycling of mining waste: reuse of tailings in the construction industry and concrete production; extraction of secondary metals from mining waste to reduce the need for new exploitation.
- Landfill monitoring: continuous monitoring of landfills to prevent leaks and terrain destabilization; use of smart sensor systems for automatic detection of problems in waste storage

Protection Measures for Exploration of Metallic Mineral Raw Materials

Soil protection measures:

- Application of minimally invasive exploration methods: Use of geophysical survey techniques (e.g., magnetometry, seismic surveys, electrical tomography) before drilling operations to reduce the need for excavation; placing protective mats under equipment to prevent soil compaction and contamination from chemical and oil spills; limiting work zones with physical barriers to preserve the natural landscape and prevent land degradation; and using light transportation and temporary roads to minimize negative soil impact and prevent disruption of soil structure.
- Remediation and reclamation: Removal of all exploration traces after work completion, including restoring the soil to its original condition and leveling the terrain; applying bioengineering methods to stabilize soil (planting species that prevent erosion and help restore the natural ecosystem); proper storage and management of ore samples to prevent soil contamination with heavy metals; and continuous soil quality monitoring in the exploration area to identify possible consequences and the need for additional remediation measures.

Water protection measures:

- Reducing the risk of contamination of groundwater and surface water: Strict control of well fluids to prevent the penetration of toxic substances into watercourses and underground reservoirs; the use of recirculation systems for well fluids to reduce water consumption and eliminate pollution; and the implementation of double or lined pipes in wells to prevent the penetration of contaminants into aquifers.

Air protection measures:

- Reduction of dust and gas emissions: Using systems to moisten work surfaces to reduce dust during exploration; using modern filters to reduce airborne suspended particles from drilling systems; optimizing transport routes and using environmentally friendly fuels to reduce gas emissions from vehicles and equipment.

Noise and vibration reduction measures:

- Technical measures to reduce noise: Using low-noise equipment and installing mufflers on machines and engines; installing sound barriers around exploration sites near settlements; and using electric or hybrid machines when possible to lower noise levels.

Biodiversity Conservation Measures:

- Protection of ecosystems and natural habitats: Planning exploration work during periods of lower biodiversity risk (outside breeding and migration seasons); avoiding exploration in sensitive ecological areas such as wetlands, and areas with endangered species; and creating protective buffer zones around exploration sites to reduce impact on plant and animal life.
- Minimizing exploration impact on biodiversity: Restricting machinery movement to prevent disturbance to natural ecosystems; applying techniques that reduce light and noise pollution to minimize wildlife stress; and maintaining vegetation corridors that allow free movement of animal species.
- Rehabilitation and biodiversity monitoring: After exploration work, implementing site rehabilitation by removing equipment and infrastructure; restoring vegetation by planting native species to return the ecosystem to its previous state; and long-term biodiversity monitoring in the exploration area to track the impacts of activities and apply corrective measures if needed.

Protection measures during exploration of non-metallic mineral raw materials

Soil protection measures:

- Limiting topsoil excavation: During exploration, it is necessary to use minimally invasive techniques such as shallow drilling and optimal sampling methods or surface sampling to minimize soil structure disturbance. Regular site monitoring during work can help prevent erosion.
- Retention of the fertile soil layer: When removing the fertile soil layer, it should be carefully separated from other layers, stored in specially designated, weather-protected locations, and safeguarded against erosion. After the exploration is completed, the fertile layer should be returned to its original place to enable effective reclamation.
- Minimization of the use of explosives: Explosives should be used only when alternative exploration methods are impractical or impossible. Continuous monitoring of vibrations and noise levels is required, along with implementing damping measures to reduce impacts on surrounding ecosystems and communities.

Water protection measures:

- Reduction of particulate matter leaching into watercourses: It is mandatory to use sedimentation ponds and filtration systems to treat wastewater generated during exploration, especially when dealing with clays, kaolin, and gypsum, which easily form fine suspensions.
- Fluoride and Sulfate Pollution Control: When exploring fluorite and evaporite deposits, regular sampling and analysis of surface waters for fluoride and sulfate content are necessary. If needed, chemical water treatment systems should be installed before discharge into the environment.
- Control of groundwater infiltration: Drilling fluids must be environmentally friendly and chemically inert to reduce the risk of aquifer contamination. Mandatory control of borehole construction integrity is also required.

Air protection measures:

- Reducing dust emissions when exploring carbonate rocks: Regularly spraying the work surface with water and using protective barriers can significantly reduce dust emissions. Using enclosed transport systems and covering materials during transport is recommended.
- Prevention of the spread of fine particles of clay and kaolin: Work areas and transport routes must be regularly moistened or covered with protective material to prevent the dispersion of fine particles by wind.

Biodiversity Conservation Measures:

- Protection of wetlands and coastal ecosystems: When exploring near wetlands or shores, clearly defined and strictly respected exclusion zones must be established to prevent the physical destruction of habitats. Regular ecological monitoring should be conducted to allow timely responses to any changes.
- Avoidance of exploration near nature reserves: Exploration planning must include consultations with local ecologists and biologists to identify critical habitats or species requiring special protection. If exploration is unavoidable, special protective measures should be introduced to reduce the impact on local flora and fauna.

Protection Measures for Exploration of Strategic Mineral Resources

Water protection measures:

- Ensure isolation of exploration boreholes: Use special protective materials (cementing, bentonite clay) to prevent pollutants from penetrating groundwater.
- Establish continuous monitoring of surface and groundwater quality: Install piezometers and regularly sample water to analyze chemical parameters (pH, heavy metals, total suspended solids, organic matter).
- Ensure proper storage and handling of hazardous materials: Provide employee training, label storage areas, and use waterproof containers and secondary protective barriers.
- Wastewater management: Application of closed systems for their collection and treatment (settling tanks, purifiers), before release to the recipient or recirculation.

Soil protection measures:

- Carefully plan access road routes and exploration platform locations to minimize vegetation removal and disturbance of natural habitats.
- Apply geotextiles, gravel layers, or other protective materials to reduce erosion and maintain soil stability.
- Rehabilitate exploration sites immediately after work completion by thoroughly removing all types of waste, backfilling boreholes with inert materials, and implementing reclamation and revegetation with native plant species.
- Conduct regular soil sampling before, during, and after exploration activities to detect potential contamination early, especially for heavy metals and petroleum products.
- Apply measures to control spills and leaks of potentially polluting substances (container vessels, protective liners).

Air protection measures:

- Apply technical solutions to reduce dust emissions, such as wetting roads, work surfaces, and materials, and using enclosed systems for material handling.
- Regularly service and maintain exploration machinery, vehicles, and transport equipment, including exhaust gas emissions control.
- Limit vehicle speeds within exploration areas to reduce dust emissions.

- Establish air quality monitoring at exploration sites by measuring dust concentration (PM10, PM2.5), gases (SO_2, NOx, CO), and other potentially harmful substances.
- Inform employees about proper work procedures to reduce air pollutant emissions.

Noise and vibration protection measures:

- Use equipment with minimal noise and vibration levels, and regularly maintain equipment to reduce the intensity of emitted sounds and vibrations.
- Define permissible exploration activity times, especially avoiding work at night and on weekends.
- Install protective barriers where needed to reduce noise effects on residential areas and wildlife.
- Conduct regular monitoring of noise and vibration levels using specialized measuring equipment and respond promptly to deviations from allowed limits.
- Inform residents about work schedules that may cause increased noise or vibrations, and apply additional measures to reduce public disturbance.

Biodiversity conservation measures:

- Conduct detailed biological assessment before starting work to identify protected and endangered species and their habitats.
- Avoid conducting exploration in sensitive ecological zones or near habitats of endangered or rare species.
- Establish clearly defined migration corridors or alternative access routes to minimize animal disturbance and preserve habitat continuity.
- During work, carry out periodic ecological inspections to assess the activities' impact on local fauna and flora.
- Ensure site restoration to its original state through reclamation and use of native plant species, enabling restoration and conservation of local biodiversity.

Measures for the protection of natural and cultural resources:

- Biodiversity protection: Avoid or minimize activities near protected areas, biologically sensitive zones, or habitats of rare species.
- Landscape and cultural heritage protection: Mandatory prior survey for the presence of cultural or archaeological sites in the exploration area, and collaboration with heritage conservation experts.

5. Guidelines for developing strategic environmental assessments at lower hierarchical levels and environmental impact assessments of projects

According to Article 16 of the Law on Strategic Environmental Assessment, the Strategic Environmental Assessment Report contains elaborate guidelines for plans or programs at lower hierarchical levels. These include defining the need for preparing strategic environmental assessments and project environmental impact assessments, as well as determining environmental protection aspects and other matters relevant to the environmental impact assessment of lower-level plans and programs.

Based on the Law on Environmental Protection, the Law on Strategic Environmental Impact Assessment, and the Law on Environmental Impact Assessment, during the implementation of the Strategy for the Management of Mineral and Other Geological Resources, it is necessary to prepare both strategic environmental assessments and environmental impact studies.

Applying the criteria contained in Annex I of the Law on Strategic Environmental Impact Assessment, it is proposed to prepare:

- Strategic environmental impact assessments for planning documents of mineral deposits and other geological resources;
- Strategic environmental impact assessments for planning documents that designate areas reserved for the exploitation of mineral resources;
- Strategic environmental impact assessments for planning documents that consider the area of exploration and/or exploitation of strategic metallic mineral resources (copper, gold, lead, zinc, silver, and lithium);
- Strategic environmental impact assessments for planning documents related to major mining facilities (open-pit mines, mineral processing industries, oil and gas exploitation fields, etc.).

Furthermore, a strategic environmental assessment is required for urban plans if the area includes two or more projects for which an Environmental Impact Study is mandatory, or if their spatial impact exceeds the local level, or where cumulative and synergistic impacts may occur.

At the level of preparing project-technical documentation for individual facilities and activities planned under the Strategy, an Environmental Impact Study may be required under the provisions of the Law on Environmental Impact Assessment ("Official Gazette of RS," No. 135/04 and 36/09). The project developer, according to Article 8 of this Law, is obliged to submit a Request to the competent environmental authority to determine the need for preparing an Environmental Impact Study for individual projects, according to the Law on Environmental Protection ("Official Gazette of RS," No. 135/04, 36/09, 72/09 – 43/11 – Constitutional Court, 14/16, 76/18, and 95/18 – other law), the Rulebook on the Contents of the Environmental Impact Study ("Official Gazette of RS," No. 69/05), and the Regulation on Establishing the List of Projects for Which an Environmental Impact Assessment Is Mandatory and the List of Projects for Which an Environmental Impact Assessment May Be Required ("Official Gazette of RS," No. 114/08).

The preparation of an Environmental Impact Study is mandatory for projects located in: mining activity and oil and gas exploitation zones, production-industrial activity zones, mining/industrial waste disposal zones, and significant groundwater exploitation zones.

The Environmental Impact Study is also mandatory for activities and facilities requiring an integrated permit according to the Regulation on the Types of Activities and Facilities for Which an Integrated Permit Is Issued ("Official Gazette of RS," No. 84/05).

The procedure for strategic environmental assessment and environmental impact assessment must be conducted before the approval of mining projects, with the involvement of the local community and relevant stakeholders in the decision-making process.

6. Environmental Monitoring Program During Strategy Implementation

Environmental condition monitoring program – monitoring is an essential prerequisite for achieving the goals in the field of environmental and nature protection, i.e., the objectives of the SEA (Strategic Environmental Assessment) during the implementation of the Mineral Resources Management Strategy. The task of monitoring is to show changes in the environment that may result from the implementation of the Strategy, to propose possible measures for reducing or mitigating negative effects if they occur, and to collect baseline information on the quality of elements for environmental status reports and other strategic and planning documents that require SEA preparation.

According to Article 17 of the Law on Strategic Environmental Assessment, the environmental condition monitoring program during Strategy implementation includes:

- description of the plan and program objectives;
- indicators for environmental condition monitoring;
- rights and responsibilities of competent authorities; and
- procedures in case of accidental (emergency) situations.

According to the Law on Environmental Protection ("Official Gazette of RS" nos. 135/04, 36/09, 72/09, 43/11 - Constitutional Court decision, 14/16, 76/18, 95/18), the Republic, autonomous province, or local self-government unit, within their legal competences, ensure continuous control and monitoring of the environmental condition according to this and special laws.

The Government of the Republic of Serbia adopts the monitoring program for two years at the national level, while local self-government units adopt environmental condition monitoring programs for their territories, which must be harmonized with the previously mentioned government program.

The Law on Strategic Environmental Assessment establishes the obligation to define the environmental condition monitoring program during the implementation of the plan/program for which the SEA is conducted. It also allows this program to be an integral part of the existing monitoring program provided by the competent environmental authority

6.1. Description of the Strategy's Objective

A description of the objectives of the Mineral Resources Management Strategy, both general and specific, is elaborated in the chapter "Baseline for Strategic Environmental Assessment" in the introductory part of the SEA Report.

The vision defines an active geological and mining sector that is globally competitive, ensures raw material supply, supports regional development, promotes responsible use of natural resources, complies with environmental standards, and continuously strengthens the key competencies and capacities of the workforce.

The general goal of the Strategy for managing mineral and other geological resources of the Republic of Serbia is defined as the sustainable management of exploration and exploitation to secure the country's current and future needs for mineral raw materials, and the expansion of the mineral base by intensifying activities related to prospecting, exploration, and proving mineral and other geological resources.

Achieving the general goal should result from the implementation of individual measures defined within the specific objectives related to geological exploration, mining, environmental protection, economy, intensified use of so-called technogenic raw materials, and other areas. Based on the analysis of the current situation and projections of basic and applied geological exploration, the specific objective can be defined as:

1. Integrated sustainable management of mineral and other resources with continuous process innovation and the enhancement of state and corporate control in geological exploration and mining processes, including health and safety.
2. Ensuring access to mineral raw materials and other geological resources, and enhancing international cooperation in this field.
3. Prospecting, exploration, and geological documentation of resources and mineral deposits and other geological resources

4. Ensuring favorable legal conditions for the development, modernization, and investment in geological exploration and sustainable mining with a service-oriented approach.
5. Strategic spatial protection of mineral deposits and other geological resources
6. Ensuring access to and exploitation of technogenic raw materials and supporting the development of the circular economy.
7. Expanding knowledge and continuously strengthening the key competencies and capabilities of the professional staff, along with broad public education.
8. Sustainable mining industry with incentives for joint infrastructure investments, research, innovation, and control of environmental degradation.

The primary task of forming the Environmental Monitoring Program is to ensure, among other things, timely response and warning of potential negative processes, as well as a more complete insight into the state of environmental elements and determining the need for protective measures depending on the degree of threat and type of pollution.

Continuous monitoring of environmental quality and activities in space is necessary, creating the possibility for its rational management. This particularly applies to localities where mining activities and facilities are present or planned.

According to Article 69 of the Environmental Protection Law, the objectives of the Environmental Monitoring Program would be:

- ensuring monitoring,
- defining the content and method of conducting monitoring,
- designating authorized organizations for conducting monitoring,
- defining polluter monitoring,
- establishing an information system and defining data submission procedures, and
- introducing the obligation to report on the environmental condition according to the prescribed report content.

It is important to emphasize that monitoring is conducted by tracking indicator values, i.e., the state of the environment, with key monitoring areas being water, air, soil, noise, electromagnetic radiation, and natural values. Monitoring is an integral part of the unified environmental information system.

6.2. Indicators for Monitoring the State of the Environment

Monitoring is conducted through systematic measurement, testing, and assessment of environmental conditions and pollution indicators, which includes tracking natural factors, i.e., changes in the state and characteristics of the environment, including transboundary monitoring.

In addition to the above, it is particularly important to monitor the implementation of protection measures defined within the Strategic Environmental Assessment. Table 6.1 lists the indicators that provide information or describe phenomena in the field of the environment, categorized by the areas of the Strategic Assessment.

Table 6.1. Indicators in the field of the environment according to the areas of the SEA

SEA Area	Indicators
AIR	- Emissions of acidifying gases (NOx, NH_3 and SO_2), [kt/year]; - Frequency of exceedances of daily limit values of SO_2, NO_2, PM10 and O3 (number of days during the year); - Emission of primary suspended particles and secondary precursors of suspended particles.
WATER	- Serbian Water Quality Index (SWQI); - Emissions of pollutants from point sources into water bodies; - Change in water class quality, [%]; - Polluted (untreated) wastewater; - Lowering the level of groundwater, [m]; - Minimum and average flows in watercourses, [m^3/s].
LAND	- Change in forest land area due to mining activities, [%]; - Change in agricultural land area due to mining activities, [%]; - Share of degraded areas as a result of activities in the mining sector, [%]; - Surface subsidence of terrain, [ha].
NATURAL VALUES	- Increase in area under mining activities, [%]; - Management of contaminated sites; - Increase in areas under mining activities affecting bio(geo)diversity, [%]; - Area of protected natural areas affected by the activities of the mining sector, [ha].
CULTURAL AND HISTORICAL HERITAGE	- The number of protected immovable cultural assets that may be affected by the mining sector.
WASTE	- The total amount of waste generated in the mining sector, [t/year]; - The amount of waste extracted, collected, reused, and disposed of; - Quantities of specific waste streams in the mining sector, [t/ year]; - Landfills are wasted.
PUBLIC HEALTH	- Drinking water quality; - The percentage and number of the population exposed to increased air pollution; - Incidence of respiratory diseases, [%]; - The number of households potentially exposed to accident risks.
SOCIAL DEVELOPMENT	- A change in the number of people, [%]; - Number of displaced households as a result of activities in the mining sector; - The number of inhabitants exposed to the effects of mining activities; - Number of damaged objects (% of the total); - Number of buildings to be demolished and relocated (% of the total).
INSTITUTIONAL DEVELOPMENT	- Investments and current expenditures in environmental protection (thousands of dinars); - Development of an environmental management system; - Change the number of monitoring points.
ECONOMIC DEVELOPMENT	- Percentage of employees in the mining sector with income above the average RS, [%]; - Decrease in the number of unemployed as a result of employment in the mining sector, [%].
TECHNOLOGICAL DEVELOPMENT	- Number of development programs and technologies for environmental protection in the mining sector.

Criteria for determining the number and distribution of measuring points, the network of measuring locations, the scope and frequency of measurements, the classification of phenomena being monitored, work methodology, environmental pollution indicators, and their monitoring, as well as deadlines and methods for data submission, are set by the Government of the Republic of Serbia or polluters, based on special laws.

According to legal regulations, regular sampling, reading, or laboratory analysis of samples is conducted at specific time intervals, and based on defined limit values, the impact on environmental factors is determined, and if necessary, measures to reduce observed negative effects are defined.

Air quality monitoring is carried out through systematic measurement of pollutant concentrations in the air, monitoring and researching the impact of air quality on the environment, and reporting on the results of measurements, monitoring, and research. The goal of examining and monitoring air quality is to control and determine the degree of air pollution and identify pollution trends so that action can be taken on time to reduce harmful substances to a level that will not significantly impact environmental quality.

The Law on Air Protection ("Official Gazette of RS," No. 36/09, 10/13, and 26/21) and the Regulation on Conditions for Monitoring and Air Quality Requirements ("Official Gazette of RS," No. 11/10, 75/10, and 63/13) provide guidelines for research, monitoring, and determining the general state of air pollution in populated and unpopulated areas. Based on the conducted analyses, the condition and trends are determined, on which appropriate air protection measures are based.

Systematic measurements cover specific inorganic substances (sulfur dioxide, soot, suspended particles, nitrogen dioxide, ground-level ozone, carbon monoxide, hydrogen chloride, hydrogen fluoride, ammonia, and hydrogen sulfide), airborne deposited matter, heavy metals in suspended particles (cadmium, manganese, lead, mercury, copper), organic substances, and carcinogenic substances (arsenic, benzene, nickel, vinyl chloride). The regulation also prescribes the substances that define the state of ambient air quality, warnings and episodic pollution, sampling locations and frequency, as well as the limit values for the mentioned pollutants.

If necessary, environmental impact assessment studies for a specific facility must precisely define the locations of monitoring stations for observing air quality near mines, processing plants, industrial/mining waste landfills, and access roads. The monitoring should be conducted by the project investor.

Surface water quality monitoring is conducted under the Regulation on limit values of pollutants in surface and groundwater and sediment and deadlines for achieving them ("Official Gazette of RS," No. 50/2012), the Regulation on limit values of priority and priority hazardous substances polluting surface waters and deadlines for achieving them ("Official Gazette of RS," No. 24/2014), and the Rulebook on ecological and chemical status parameters of surface waters and chemical and quantitative status parameters of groundwater ("Official Gazette of RS," No. 74/2011).

The main document for water quality monitoring is the Annual Water Quality Monitoring Program, which is determined by government decree at the beginning of the calendar year for that year, based on Articles 108 and 109 of the Law on Waters ("Official Gazette of RS," No. 30/10, 93/12, 101/16, 95/18).

For surface waters, monitoring includes: volume, water levels, and flows to the level significant for ecological and chemical status and ecological potential, as well as parameters of ecological and chemical status and ecological potential. The program is implemented by the Republic Hydrometeorological Service and the Environmental Protection Agency.

According to Article 74 of the Law on Waters, legal entities engaged in water supply must install devices and ensure continuous and systematic recording of water quantities and testing of water quality at water intake points, undertake measures to ensure the sanitary safety of drinking water and take measures to ensure the technical functionality of devices.

As part of the Strategy implementation, it is necessary to establish the obligation to expand the network of observation points and define responsibilities for implementing additional water status monitoring obligations.

Through environmental impact assessment studies, which will be prepared for specific facilities at the level of technical (project) documentation, monitoring obligations will be prescribed at key locations such as processing plants, mines, mining/industrial waste landfills, and associated infrastructure. The monitoring should be conducted by the project investor.

Monitoring of groundwater quality is carried out according to the Regulation on limit values of pollutants in surface and groundwater and sediments and deadlines for their achievement ("Official Gazette of RS," No. 50/12) and the Regulation on limit values of pollutants, harmful and hazardous substances in soil ("Official Gazette of RS," No. 30/18 and 64/19). The mentioned Annual Water Status Monitoring Program also applies to groundwater monitoring, which includes levels and control of chemical and quantitative status. Groundwater monitoring should provide information on the quality of groundwater in the impact zones of ash dumps, tailings, overburden disposal sites, and waste landfills from energy and mining facilities, and define and implement necessary protective measures.

For monitoring groundwater beneath mining/industrial waste landfills, wells (boreholes) should be installed reaching the aquifer surface to monitor specific environmental parameters along the landfill perimeter. By monitoring collected groundwater samples, it is possible to detect, at an early stage, any potential leachate impact from the landfill on groundwater.

Monitoring of wastewater quality is carried out according to the Regulation on limit values of pollutant emissions into water and deadlines for their achievement ("Official Gazette of RS," No. 67/2011, 48/2012, and 1/2016) and the Rulebook on the manner and conditions for measuring the quantity and testing the quality of wastewater and the content of reports on performed measurements ("Official Gazette of RS," No. 33/2016). Wastewater treatment is conducted to levels that meet emission limit values or to levels that do not impair the environmental quality standards of the recipient, according to regulations governing limit values of pollutants in surface and groundwater, as well as priority, hazardous, and other pollutants.

Soil quality monitoring is conducted according to the Law on Soil Protection ("Official Gazette of RS," No. 112/15) and the Regulation on limit values of pollutants, harmful and hazardous substances in soil ("Official Gazette of RS," No. 30/18 and 64/19). Agricultural land monitoring is conducted under the Law on Agricultural Land ("Official Gazette of RS," No. 62/06, 65/08, 41/09, 112/15, 80/17, and 95/18) and the Rulebook on conditions for testing hazardous and harmful substances in agricultural soil and irrigation water ("Official Gazette of RS," No. 20/23), relating to testing the amounts of hazardous and harmful substances in such soil and irrigation water. Monitoring soil conditions concerning erosion processes, especially washing and accumulation of material by water action, is an important tool for the successful protection of agricultural, forest, and other land.

The impact of underground mining works on the terrain and ground subsidence will be monitored using subsidence monitoring equipment installed both on the surface and underground. Program-based monitoring is important for predicting ground subsidence and ensuring the safety of people and infrastructure systems.

Noise monitoring is performed by systematically measuring, assessing, or calculating certain noise indicators according to the Law on Environmental Noise Protection ("Official Gazette of RS," No. 36/09, 88/10, and 96/21), the Rulebook on noise measurement methods, content, and scope of environmental noise measurement reports ("Official Gazette of RS," No. 139/22), and the Regulation on noise indicators, limit values, methods for assessing noise indicators, disturbance, and harmful effects of noise in the environment ("Official Gazette of RS," No. 75/10). Noise monitoring data are part of the unified environmental information system according to the law governing environmental protection.

Based on specific data, at the technical (design) documentation level, environmental impact assessment studies will establish the investor's obligation to locate monitoring stations to observe noise levels in the given area.

Monitoring of natural resources and values is carried out according to the provisions of the Law on Nature Protection ("Official Gazette of RS," No. 36/09, 88/10, 91/10, 14/16, 95/18, and 71/21) and its related bylaws. The main goal is to establish a system for monitoring the state of biodiversity, i.e., natural habitats and populations of wild plant and animal species, primarily sensitive habitats and rare, endangered species, but also to monitor the condition and changes in landscapes and geodiversity sites. This monitoring is under the responsibility of the Institute for Nature Conservation of Serbia and the Environmental Protection Agency, based on medium-term and annual nature protection programs.

6.3. Rights and Obligations of Competent Authorities

When it comes to the rights and obligations of competent authorities regarding environmental monitoring, they are derived from the Law on Environmental Protection, specifically Articles 69–78 of this Law. According to these articles, the rights and obligations of competent authorities are as follows:

1. The Republic of Serbia, the autonomous province, and local self-government units, within their legally defined competencies, ensure continuous control and monitoring of environmental status, as well as financial resources for implementing these activities.
2. The executive government adopts a monitoring program for two years.
3. The local self-government unit adopts a monitoring program for its territory, which must comply with the Government's program.
4. The Republic and local self-government units provide financial resources for conducting monitoring.
5. The Government determines the criteria for defining the number and layout of measuring points, the measuring network, scope and frequency of measurements, classification of phenomena to be monitored, working methodology and pollution indicators, deadlines, and data delivery methods.
6. Monitoring can only be performed by an authorized organization. The Ministry prescribes the detailed conditions an authorized organization must meet and designates the authorized organization after obtaining the consent of the minister responsible for the relevant area.
7. The Government determines the types of emissions and other phenomena subject to polluter monitoring, the methodology of measurement, sampling methods, recording procedures, and deadlines for data delivery and retention.
8. State authorities, organizations, local self-government units, authorized organizations, and polluters are obliged to deliver monitoring data to the Environmental Protection Agency in the prescribed manner.

9. The Government further prescribes the content and method of maintaining the information system, methodology, structure, common bases, categories, and levels of data collection, as well as the content of information that must be regularly and mandatorily reported to the public.
10. The Environmental Protection Agency maintains the information system.
11. The Minister prescribes the methodology for compiling the integrated polluter register, as well as the type, methods, classification, and deadlines for data delivery.
12. The Government submits an annual report to the National Assembly on the state of the environment in the Republic.
13. The competent local self-government authority submits a report every two years to the local assembly on the state of the environment in its territory.
14. Environmental status reports are published in the official gazettes of the Republic and local self-government units.

State authorities, local self-government authorities, and authorized and other organizations are obliged to regularly, timely, completely, and objectively inform the public about the state of the environment, the phenomena monitored under emission and immission monitoring, as well as warning measures or pollution developments that may pose a danger to life and human health.

6.4. Procedure in Case of Unexpected Negative Impacts

In addition to numerous expected positive effects on society and the environment, as well as the challenges accompanying the implementation of such a complex national framework document in the field of mineral resource management, there is also a possibility of negative environmental impacts or effects on certain environmental elements and factors. The strategic assessment has indicated that during the construction of facilities and necessary infrastructure, negative environmental impacts may occur, meaning there is a risk and likelihood of unexpected negative environmental impacts arising from the implementation of certain activities and projects envisioned by the Strategy.

In the event of unexpected negative environmental impacts resulting from the implementation of the defined activities in the Strategy that could lead to major environmental consequences, it is necessary to act promptly according to applicable legal regulations. The effects of unexpected negative impacts are prevented, minimized, and eliminated through preventive measures, preparedness measures, technical protection measures, elimination of root causes, remediation measures, etc. In the risk management process, the actions of responsible authorities, services, and entities according to the methodology for preparing and content of disaster risk assessments and protection and rescue plans are mandatory. In this regard, continuous environmental and risk monitoring is implied.

7. Overview of the Methodology Used in the Preparation of the Strategic Impact Assessment

7.1. Methodology for Strategic Assessment

The content of the Strategic Environmental Assessment and the methodological framework for its preparation and procedures are defined by the Law on Strategic Environmental Assessment and the Law on Environmental Protection. For the preparation of the Strategic Environmental Assessment in this specific case, a methodology based on multicriteria expert evaluation of activities and measures was applied, concerning the defined goals of the Strategic Environmental Assessment and the corresponding indicators, as the basis for assessing the potential of the area for further sustainable development.

The Mineral Resource Management Strategy has analyzed and defined the goals to be achieved, as well as the measures to be taken to ensure a modern, productive, and environmentally acceptable mining sector that will provide a secure and reliable supply of raw materials to the energy and industrial sectors. Concerning the defined goals, activities, and measures in the Strategy, specific objectives of the Strategic Environmental Assessment were set, and indicators were defined for evaluating the impact of activities and projects on environmental elements, socio-economic development, and the institutional framework.

Figure 7.1 presents a flowchart of the implementation of the Strategic Environmental Assessment, that is, the sequence of necessary steps in its implementation.

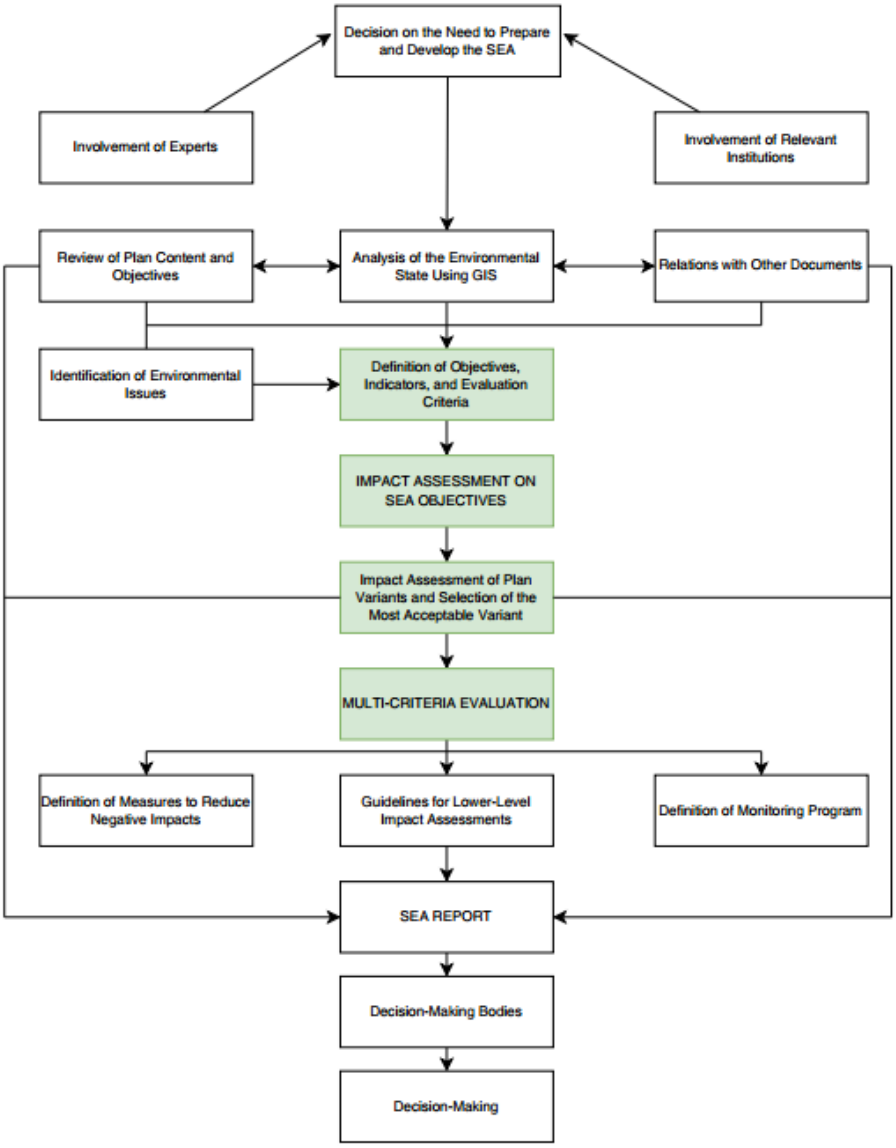

Figure 7.1. *Strategic Environmental Assessment Flow Chart*

When discussing the methodological framework, the Strategic Environmental Assessment (SEA) report was prepared by first analyzing the baseline conditions according to the Law on Strategic Environmental Assessment, with particular attention to the current state of the environment in the Republic of Serbia. Special focus was given to environmental elements in areas with major mining sector systems. Afterward, an evaluation of activities and measures was conducted against the defined objectives and indicators. Based on the evaluation results, guidelines (measures) were defined for environmental protection and environmental monitoring during the implementation of the Strategy for the Management of Mineral and Other Geological Resources.

7.2. Challenges Encountered in Preparing the Strategic Environmental Assessment

Certain difficulties during the SEA preparation arose from the unavailability of data for analyzing the current environmental state. Existing available data published by relevant state institutions in the form of annual reports were outdated, referring to periods a year or more prior, and did not cover all ecological parameters that would contribute to a more comprehensive environmental assessment.

A systemic problem, which does not apply only to this SEA but to all strategic assessments prepared for plans, programs, and strategies, is the lack of an indicator system for environmental assessment that would suit the strategic planning process meaning one that could be reliably used during the SEA process. A similar situation exists regarding the criteria for evaluating selected indicators.

8. Overview of the Decision-Making Process

Considering the strategic framework of the document and the significance of the potential impacts of the proposed Mineral Resource Management Strategy on the environment, human health, and socio-economic development, it is of utmost importance to ensure adequate and transparent involvement of all stakeholders in the decision-making process, beyond the current practice of merely holding a formal public debate on the Strategy proposal.

The Ministry of Mining and Energy established a Working Group responsible for monitoring and participating in the process of developing the Mineral and Other Geological Resources Management Strategy of the Republic of Serbia for the period 2025–2040, with projections to 2050, as well as the Strategic Environmental Assessment (SEA) for that document. Consultations and discussions during the preparation of these documents were conducted through meetings between the Strategy and SEA developers, representatives of the Ministry of Mining and Energy, and other interested stakeholders, and during Working Group meetings.

Article 18 of the Law on Strategic Environmental Assessment defines the participation of interested authorities and organizations, which can provide their opinions within 30 days. Before submitting a request for approval of the SEA Report, the authority responsible for preparing the Strategy (Ministry of Mining and Energy) ensures public participation in the consideration of the SEA Report by informing about the manner and deadlines for access to the report content, the submission of opinions, as well as the time and place of the public debate according to the Law.

The participation of competent authorities and organizations is ensured in writing and through presentations and consultations. The participation of the interested public is ensured through public media and during public presentations and discussions of the SEA, and all remarks and comments are also submitted in writing.

The Ministry of Mining and Energy prepares a Report on the Participation of Interested Authorities, Organizations, and the Public, which includes all opinions on the SEA, as well as the opinions expressed during the public review and debate. The SEA Report, along with the report on expert opinions and the public debate, is submitted to the competent environmental authority (Ministry of Environmental Protection of the Republic of Serbia) for assessment. Based on the assessment, the Ministry of Environmental Protection approves the SEA Report within 30 days from the date of receipt of the assessment request.

After collecting and processing all opinions, the Ministry of Mining and Energy submits the draft Strategy, together with the SEA Report, to the competent authority (Government of the Republic of Serbia) for further action.

9. Conclusions of the Strategic Environmental Assessment Report

The Strategic Environmental Assessment (SEA) is an instrument meant to integrate the objectives and principles of sustainable development into the Mineral and Other Geological Resources Management Strategy while recognizing the need to avoid or limit negative impacts on the environment and the socio-economic development of the Republic of Serbia. Environmental pollution caused by the exploitation of mineral resources in Serbia results from multiple factors related to technological, organizational, and regulatory shortcomings.

The Mineral and Other Geological Resources Management Strategy is a socially, economically, and ecologically justified and necessary activity aimed at realistically achievable goals for the organization, management, and protection of Serbia's mineral and geological resources. The Strategy comprehensively analyzes the state of all mineral resources available to Serbia and seeks to assess the current and define the future position of the state regarding the development and use of its mineral-resource potential. The Strategy should show how to best manage mineral resources for maximum economic growth and minimal environmental harm.

The goal of drafting the Strategic Environmental Assessment Report was to evaluate the significant impacts of the Strategy's activities and measures on environmental quality and socio-economic development, as well as to prescribe guidelines for reducing negative impacts.

The SEA Report analyzed the current state of the environment, the significance and characteristics of the Strategy, assessed the characteristics of planned activities and measures and addressed other environmental protection issues. A strategic approach was predominantly applied, assessing trends that may arise from activities in the mining sector.

Within the SEA, 14 specific objectives and 37 indicators were defined to assess the Strategy's sustainability. The selection of objectives and indicators supports the approach used in preparing the SEA Reports for most public policy documents developed in the previous period.

The choice of indicators was aligned with the planning concept and predictions about possible environmental impacts. In addition, the specific objectives were used to evaluate planned activities and measures, while the indicators were used to monitor environmental conditions during the implementation of the Strategy.

In the multi-criteria evaluation process, 26 priority activities and measures were assessed and grouped into eight segments (specific objectives) as structured in the Strategy. The evaluation considered criteria such as impact magnitude, spatial scope, and likelihood of impacts. Matrices were formed to conduct a multi-criteria evaluation of the defined priority activities and measures against the specific objectives and indicators. An assessment of possible cumulative and synergistic effects of the priority activities and measures was then performed.

The evaluation results indicated that implementing the Strategy would generate several strategically significant positive implications (primarily related to waste management) and potentially several negative impacts (mainly linked to the exploitation of strategic mineral resources) on environmental elements. When technical information and technological specifications of mining activities, facilities, and infrastructure become available at a more detailed level, environmental impacts and appropriate environmental protection measures will be reviewed.

Given the comprehensive nature of the Strategy and the large number of development activities and measures across all mining sectors, protection measures have been proposed to prevent and limit negative environmental impacts. Some activities and measures will be implemented through planning documents, others through project documentation or direct implementation, allowing flexibility to adapt protection measures depending on the specific development project and prevailing conditions.

Based on the environmental protection objectives and criteria defined in public policy documents and spatial plans, and taking into account the inherited state of the environment as well as economic and spatial development projections, it is necessary to apply complex spatial, technical-technological, urban-ecological, organizational, and other protection measures during Strategy implementation. Additional support for the effectiveness of the defined strategic protection measures is provided through a system of environmental monitoring, implemented via systematic measurement, testing, and evaluation of environmental conditions and pollution indicators.

Due to the complexity of the Strategy, to eliminate or minimize negative impacts from the exploration and exploitation of mineral deposits on environmental quality, the SEA defined a larger number of guidelines than is usual in such documents. General protection measures were defined (10 measures); protection measures for exploration of energy mineral resources (9 measures) and their exploitation (23 measures); protection measures for exploration of metallic mineral resources (8 measures), non-metallic mineral resources (10 measures), and strategic mineral resources (26 measures); as well as protection measures for the exploitation of metallic and non-metallic minerals (13 measures). In addition to these, the Strategy contains 16 groups of measures that mining companies and relevant institutions should implement to ensure sustainable mineral resource management with minimal negative environmental impacts.

These protection measures provide a starting point for environmental protection during the implementation of the Mineral Resources Management Strategy. While they do not guarantee absolute protection of environmental elements in areas where activities may trigger spatial conflicts, they establish a framework for decision-making based on a series of procedures that can identify and quantify expected environmental changes if such activities are carried out.

The SEA points out certain risks. One risk is the unchanged level of coal production, as projected in the Energy Development Strategy, which could impose additional environmental burdens and cause land degradation.

When programming and planning activities for implementing the Mineral Resources Management Strategy, a preventive approach to environmental and natural resource protection, and particularly to public health preservation, is mandatory. This must comply with principles and widely accepted protection instruments (such as strategic assessments, environmental impact assessments, integrated permits, waste management plans, etc.), legal norms, and environmental protection standards, along with regular inspection oversight, transparency in decision-making, and the application of modern and innovative (BAT) technologies in the mining sector.

The applied methodological approach in developing the SEA was based on defining sustainable development objectives and indicators and conducting a multi-criteria qualitative expert evaluation of the priority activities and measures defined in the Strategy, relative to the SEA's objectives and indicators.

Considering that the SEA is not a direct implementation tool but rather serves to inform decisions on future development, the SEA Report highlighted environmental trends that can be expected as a result (positive impacts) or consequence (negative impacts) of implementing the Mineral Resources Management Strategy. In doing so, it fulfilled its role in guiding appropriate decisions regarding environmental protection, and socio-economic, and spatial development.

In summary, it can be concluded that the Strategy represents a framework for the sustainable development of the mining sector in the Republic of Serbia and that, apart from the inevitable consequences associated with exploration and exploitation of mineral resources, a number of the activities and measures defined in the Strategy will contribute to improving environmental quality compared to current conditions and trends. In this context, it is essential that in areas operating under specific mining designations, the defined environmental protection measures and the provisions of this SEA Report are consistently implemented, making the Strategy considered acceptable under such conditions.