

Interreg



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NEXT Poland – Ukraine

Strategic Environmental Assessment Report on the Interreg NEXT Poland – Ukraine 2021-2027 Programme

Updated Report prepared by Atmoterm S.A. for the Interreg NEXT Programme Poland-Belarus-Ukraine 2021-2027 (December 2021)

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TABLE OF LIST OF TERMS AND ABBREVIATIONS USED IN THE STUDY

Abbreviation	Full name / Description
CO ₂	carbon dioxide
CR	extremely endangered species
DNSH	DNSH - do no significant harm principle
LIP	Large Infrastructure Projects (8 projects proposed for financing in the Programme under the non-competitive procedure, the assumptions of which are known at the stage of preparation of the Projection)
The Birds Directive	Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds
Habitats Directive	Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora
EEA	European Environment Agency
Emerald	a network of nature conservation areas - the equivalent of the Natura 2000 network outside the EU
EN	Very high-risk, highly endangered species at risk of extinction
GDOŚ	General Directorate for Environmental Protection (Poland)
GIOŚ	Chief Inspectorate of Environmental Protection (Poland)
GIS	Chief Sanitary Inspectorate (Poland)
CSO	Central Statistical Office (Poland)
JCWP	surface water bodies
JCWpd	groundwater bodies
Natura 2000	network of protected areas within the EU
NO _x	oxides of nitrogen
NT	lower risk but near threat species
NUTS	classification of territorial units for statistical purposes
RES	renewable energy sources
OW	Programme support area
PLB	special bird protection areas
PLH	special areas of habitat protection
PM _{2.5}	dust with an aerodynamic diameter of up to 2.5 µm
PM ₁₀	dust with an aerodynamic diameter of up to 10 µm
PN	national park
Programme	Interreg NEXT Poland – Ukraine 2021-2027 Programme
Relic	a plant or animal organism that in the past had a wider geographical range, but now lives in a much reduced area
SDF	standard data form
SO ₂	sulphur dioxide
Taxonomy	Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020.
Technical criteria	Commission Delegated Regulation (EU) 2021/2139 of 4 June 2021.
Environment Act (pol. Ustawa OoŚ)	Act of 3 October 2008 on providing information on the environment and its protection, public participation in environmental protection and environmental impact assessments
GI	green infrastructure

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1. INTRODUCTION

This SEA Report was developed as part of the procedure for the strategic environmental impact assessment for the update of the Interreg NEXT Poland – Ukraine 2021-2027 Programme (hereinafter referred to as the Programme). Originally, the trilateral Cross-Border Cooperation Programme Poland-Belarus-Ukraine 2021-2027 was a continuation of successful cross-border cooperation between these three countries from 2004 to 2022. Since February 2022, cooperation with Belarus has been suspended due to Belarus's involvement in Russia's military aggression against Ukraine. Poland and Ukraine decided to continue bilateral cooperation within the joint Programme.

The update concerns the version of the Interreg NEXT Poland – Ukraine 2021-2027 Programme from August 2023 and includes the following changes:

- Suspension of cooperation with Belarus, resulting in a change in the support area and the name of the Programme from "Cross-Border Cooperation Programme Interreg Poland-Belarus-Ukraine 2021-2027" to "Interreg NEXT Poland – Ukraine 2021-2027";
- Addition of a specific objective RSO2.6 to the Programme: "Promoting the transition to a circular and resource efficient economy" (Priority 1: Environment). This objective is to be implemented through the Small Projects Fund, supporting initiatives and actions related to Promoting the transition to a circular and resource efficient economy;
- Addition of a specific objective RSO3.2: "Developing and enhancing sustainable, climate resilient, intelligent and intermodal national, regional and local mobility, including improved access to TEN-T and cross-border mobility" (Priority 6: Accessibility). Actions under this objective aim to increase cross-border mobility within the EU-Ukraine solidarity lines. Infrastructure-related intentions such as the reconstruction and modernization of roads and railways may be implemented under this objective, realized through Large Infrastructure Projects (LIP);
- Clarification of information in the specific objective ISO6.3: "Build up mutual trust, in particular by encouraging people-to-people actions" indicating that actions will be implemented through the Small Projects Fund;
- Addition of information in the specific objective ISO7.4: "Other actions for a safer and secure Europe" (Priority 5: Borders), stating that projects should also focus on the development and modernization of border crossings and other infrastructure directly related to the EU-Ukraine solidarity lines initiative;
- Addition of other minor changes (information) related to the administration of the Programme itself and having no impact on the environment, such as the creation of regional contact points to support beneficiaries;
- Update of the LIP List. The following changes are planned as part of the update:
 - Removal of a project related to the construction of cycling infrastructure (project No. 2 on the LIP list). In place of the removed project, a project called "Joint development of accessible and flexible healthcare for elderly and disabled patients in Białystok and Volyn" is proposed;
 - Addition of project No. 8, titled "Increasing the capacity of the Hrebenne-Rawa Ruska road border crossing and improving conditions for travelers crossing the border at the Budomierz-Hruszew road border crossing";

The examination of the indicative LIPs listed in the Program does not impose an obligation for their approval and does not prejudice the position of the participating countries in future selection processes. In the case of considering the selection of LIP 8, an environmental impact assessment for individual project components will be necessary. As of the finalization of the SEA Report, this project has not been approved for funding.

- Changes to the Programme budget and reallocation of funds between priorities.

Regarding the identified scope of changes, it should be emphasized that they are minor, and the vast majority of the Programme remains unchanged compared to the version for which the SEA Report of the Cross-Border Cooperation Programme Interreg Poland-Belarus-Ukraine 2021-2027 was prepared.

In accordance with the position of the General Director of Environmental Protection (GDOŚ), the basis for preparing the update of the SEA Report should be a clearly defined and separated scope of the planned Programme change. GDOŚ also emphasized that the subject of the strategic environmental impact assessment should be the project of Programme changes, not the entire document containing planned modifications. It was decided that it is justified to develop and make available to the public a unified SEA Report that would differ from the original version by analyzing only new, previously unassessed elements.

In summary, the purpose of this document is to update the Strategic Environmental Assessment Report for the Cross-Border Cooperation Programme Poland-Belarus-Ukraine 2021-2027, prepared by Atmoterm S.A. in 2021 (hereinafter referred to as the previous SEA Report).

1.1. THE AIM OF THE SEA REPORT

The purpose of updating the Strategic Environmental Assessment Report (SEA Report) for the Interreg NEXT Poland – Ukraine 2021-2027 Programme is to review and assess potential environmental impacts resulting from the implementation of objectives and actions specified in the new version of the Programme. This update is necessary because the original Report, developed in 2021, pertained to the Cross-Border Cooperation Programme Poland-Belarus-Ukraine 2021-2027 – whose scope changed due to the suspension of cooperation with Belarus.

Specifically, the objective is a comprehensive analysis of potential impacts on individual environmental elements, in accordance with applicable regulations and agreements outlined in the updated Programme of actions. The development of the SEA Report constitutes a component of the strategic environmental impact assessment.

1.2. PROBLEMS, UNCERTAINTIES AND LACK OF INFORMATION

In the course of preparing the SEA Report, difficulties were encountered in obtaining certain information presenting in an equivalent, comprehensive and up-to-date manner the state of the environment in Poland and Ukraine, which are the starting point for analyses. This is particularly true for water assessment and nature monitoring. There is still a problem with nature assessment, the lack of a complete inventory of species and habitats in protected areas, and the lack of a concept for a coherent system of avifauna migration corridors.

In order to eliminate these problems, various data sources have been used to present as much as possible reliable and up-to-date information.

Another area of uncertainty arising in the preparation of the SEA Report is the high degree of generality of the Programme (apart from the listed projects). For many measures and projects the characteristics and locations are missing. In these situations, assessments of their impacts had to be based on typical solutions and general assessment.

The different procedure for carrying out strategic assessments in cooperating countries is also a problem.

The SEA Report takes into account the above mentioned conditions and the assessments presented in it refer to the support areas proposed within the Programme. More detailed analyses and assessments of the impact on particular components of the environment may be carried out only after the final location of the projects, method of execution and technology have been determined at the stage of obtaining a decision on environmental conditions and a permit for execution of a given project.

1.3. INFORMATION ON THE METHODS USED TO PREPARE THE SEA REPORT

After determining the scope of the Report update for the Programme, as derived from regulations regarding strategic assessments, agreements with the relevant environmental assessment authorities in Poland and Ukraine, as well as Guidelines on integrating climate change and biodiversity issues into strategic assessments¹, along with other materials and personal experiences, it was decided that the Programme would be developed in the following key stages:

- Analysis of the Program and preliminary assessment of its environmental impact, identifying projects that could potentially and always significantly impact the environment.
- Analysis of the environmental status concerning the potential impact of the Programme.
- Assessment of the environmental impact of projects covered by the Programme.
- Formulation of conclusions and recommendations resulting from the analyses.

In the first stage of the analysis, the basic structure of the Programme was examined. General formulations of support areas were used to draw conclusions about specific actions that could be supported by the Programme, specifying their potential environmental impact. These actions were grouped based on similar environmental impacts, and an initial screening was conducted regarding potential significant negative environmental impacts.

The results are presented in subsection 5.4, where similar types of projects and impacts are synthetically grouped. Reference is made to the relevant political and specific objectives of the Programme, enabling cross-referencing with the relevant parts of the Programme. This table, serving as a systematization of projects eligible for support, will also be the starting point for further analyses within the SEA Report.

In the Programme analysis, internal coherence, compliance with global and EU strategic documents, and alignment with the strategic documents of Poland and Ukraine were assessed. The goal was to determine to what extent the Program aligns with the objectives of these documents.

Positive effects of Programme implementation were also evaluated, mainly in terms of environmental protection and sustainable development. Conclusions from these analyses were utilized in further work on the SEA Report.

The analysis of the current environmental state was the second fundamental starting point for the assessment. Areas of potential support in the field of environmental protection were primarily considered from the perspective of needs, as well as areas of potential impact from Programme implementation .

The synthetic assessment included an evaluation of the state, observed trends (both in terms of state and pressure – considering possible cumulative impacts), actions taken on a national scale and their consequences, in accordance with applicable regulations (e.g., air quality standards), and conclusions regarding the most important issues (considering potential impacts of Program implementation and the selection of criteria for assessing these impacts).

Independent assessments of the cumulative impact of the entire Programme on individual environmental elements were conducted, indicating preventive actions (limiting negative impacts) or, if necessary, compensatory actions (subsection 5.7). In the environmental impact analyses, the possibility of cumulative impacts from projects included in the Program, as well as other known projects planned for implementation, was considered. The feasibility and potential for alternative solutions were also assessed (Chapter 6). The consequences of non-implementation of the Program were also evaluated (subsection 5.1). For prompt response, methods of analyzing the effects of Program implementation were presented (Chapter 8). The starting point for this was the current environmental monitoring system at the national and regional levels. Previous Reports for strategic documents in Poland, covering similar projects in areas such as water management, were

¹ Guidance on integration Climate Change and Biodiversity into Strategic Environmental Assessment, European Commission 2013

used in the Programme development. In specific cases, environmental programs for specific projects and already issued environmental decisions were also utilized.

Considering the approach outlined above, the proposed structure of the Programme was introduced, subsequently used to present the SEA Report.

2. LEGAL BASIS AND AGREEMENT ON THE SCOPE OF THE SEA REPORT

As agreed, the strategic environmental impact assessment of the Programme will be carried out by the Programme Managing Authority (Polish Ministry of Funds and Regional Policy) through the Joint Programme Secretariat (Centre for European Projects) with the participation of the relevant competent authorities of Ukraine according to the provisions of Polish law, to which relevant provisions of EU law have been transposed. The scope of execution of the environmental impact assessment is defined in the Act on providing information about the environment and its protection, public participation in the environmental protection and assessments of the environmental impact² (hereinafter: the EIA Act), which transposed the provisions of Directive 2001/42/EC on the assessment of the effects of certain plans and programs on the environment. In accordance with Article 54 (1) of the EIA Act, the scope of the previous SEA Report and its level of detail were agreed with the competent environmental assessment bodies in Poland and Ukraine. The original Strategic Environmental Assessment was carried out in accordance with the agreed scope, which was confirmed by obtaining the opinions of the competent authorities.

At the stage of proceeding with the update of the Projection, the scope and degree of detail was again agreed with the competent authorities in Poland. Comments and recommendations of GDOŚ and GIS are included in the table below.

Table 1 Comments and recommendations of the authorities competent for environmental impact assessments formulated at the stage of updating the Prognosis

Institution		Content of the opinion on the scope of the SEA Report
PL GDOŚ	1a.1	Regarding the content of the upcoming environmental impact assessment Report, it should be emphasized that it must be based on a clearly defined and distinguished scope of the planned changes to the Programme—irrespective of its final scope. In this case, the subject of the strategic environmental assessment is the draft amendment to the Programme, rather than a draft of the entire document, which will include the planned modifications. Documents, considering the need for public participation, should be prepared in Polish.
		The SEA Report should meet the requirements specified in Article 51(2) and Article 52(1) and (2) of the EIA Act. Different levels of analysis detail can be applied in the SEA Report, depending on how the Programme's individual actions and projects are framed. The document should describe the state of the environment in a manner enabling the determination of the types and scale of predicted impacts and identifying changes caused by the implementation of the Programme that may occur in the future. The description of the state of the environment should be adapted to the location of the planned activities, to the extent that the site document indicates their implementation (even in general terms).

² Journal of Laws from 2023, item 1094, with later amendments

1a.3	Based on the identified state of the environment and the specificity of the activities and projects included in the draft Programme amendment, anticipated significant environmental impacts should be identified.
1a.4	Direct, indirect, secondary, and cumulative effects should be included in the analyses, regardless of their duration. Positive and negative impacts on the environment, including people, animals, plants, land surface, water, and climate, should be assessed, taking into account the relationship between the elements of the environment and the impacts on these elements. To analyze the cumulative environmental impact of the activities envisaged in the Programme amendment and other projects implemented or planned but not included in this document, the content of the adopted version of the Programme, as well as other plans, policies, strategies, etc., providing for actions in similar thematic and spatial areas, should be taken into account. If the draft Programme amendment provides for specific projects for which an environmental Impact Report has already been drawn up or a decision on environmental conditions has already been issued, it will be reasonable to take into account the information from these documents in the SEA Report . In the absence of the above-mentioned Programme or decision, it will be appropriate to apply analyses adequate to the level of detail objectively available.
1a.5	It is also necessary to propose courses of action and solutions aimed at preventing, reducing, or possibly naturally compensating for negative impacts on the environment resulting from the implementation of the draft document. An analysis should also be made of alternatives to the proposed project.
1a.6	The projection should present proposals concerning methods of monitoring the effects of the implementation of tasks resulting from the document, making it possible to determine whether the scale and scope of their impact on the environment, including on the objects of protection of Natura 2000 areas, have been properly assessed, and to assess the effectiveness of the proposed minimizing measures. It should be emphasized that the indicators for tracking the progress of the implementation of the measures resulting from the proposed amendment of the Programme should not be equated with a system for monitoring the environmental impact resulting from its implementation.
1a.7	Regarding the specificity of certain elements of the SEA Report , it is necessary to underline the necessity of determining the impact of the implementation on the condition and functioning of the areas subject to protection under the Nature Conservation Act of 16 April 2004 (Journal of Laws of 2023, item 1336), particularly on the objectives and subject of protection of Natura 2000 areas and the integrity of those areas. During the analyses concerning Natura 2000 areas, apart from indicating the nature of the impacts, it is also necessary to determine their intensity, i.e., to indicate whether they are significant. The necessity to determine the intensity of the impacts also refers to other elements of the environment. In the case of the identification of a significant negative impact on Natura 2000 areas within the meaning of Article 3(1)(17) of the Act on Environmental Protection or the impossibility to exclude such impact, pursuant to Article 55(2) of the Act on Environmental Protection, the draft document may not be adopted if the strategic environmental impact assessment shows that its implementation may have a significant negative impact on Natura 2000 areas, and all the conditions referred to in Article 34 of the Act on Environmental Protection are not jointly fulfilled. Pursuant to the aforementioned provision, the implementation of a document that may have a significant negative impact on Natura 2000 areas may be authorized if it is supported by necessary requirements of overriding public

		interest, including those of a social or economic nature. The above premise may be recognized only in the absence of alternative solutions and ensuring the performance of natural compensation necessary to guarantee the coherence and proper functioning of the Natura 2000 network. When significant negative impacts concern priority habitats and species, the overriding public interest refers only to protecting human health and life, ensuring public safety, and obtaining beneficial consequences of primary importance for the natural environment. Where the adoption of a document that may have a significant negative impact on priority habitats and species results from other necessary imperative requirements of overriding public interest, the opinion of the European Commission is required before the adoption of the document. Bearing in mind the provisions cited above, where a significant negative impact on Natura 2000 sites is identified, the SEA Report should clearly demonstrate and justify the existence of a listed premises.
	1a.8	In case of the necessity to apply environmental compensation, it should concern those actions that are connected with remedying the negative impact on the environment, especially on the objectives and subject of protection of Natura 2000 areas. Hence, it is important to indicate which subjects of protection may be affected by a significant negative impact and to propose relevant compensation actions. It is inappropriate to move the analysis in this regard to the stage of issuing the decision on environmental conditions for specific projects or to the Natura 2000 impact assessment procedure.
	1a.9	Given the location of the study area, the possibility of significant environmental impacts of the implementation of the provisions of cross-border nature.
	1a.10	It is advisable to present the location of the planned measures on maps, against the background of the spatial use and the important and protected elements of the environment. The relevance of the spatial depiction concerns all other phenomena identified as important, of spatial nature, and the interaction of these phenomena.
	1a.11	In preparing the SEA Report, the concerns outlined in the opinion of the General of the Director of Environmental Protection issued in the framework of the strategic environmental assessment for the core part of the above-mentioned cross-border Cooperation Programme (letter of 28 July 2021, ref: DOOŚ-TSOOŚ.410.8.2021.TW). for the core part of the above-mentioned cross-border Cooperation Programme (letter of 28 July 2021, ref: DOOŚ-TSOOŚ.410.8.2021.TW).
PL GIS	2a.1	This version of the draft Programme, submitted to the Chief Sanitary Inspectorate, is a study document setting a framework for the subsequent implementation of projects likely to have a significant impact on the environment but does not have the character of an implementation—it does not indicate a list of planned investments and their location.
	2a.2	The environmental impact assessment for the draft Cross Border Cooperation Programme NEXT Poland - Ukraine 2021-2027 should be drawn up in accordance with Article 51(2) and Article 52(1) and (2) of the Act of 3 October 2008 on Making Available Information on the Environment and its Protection, Public Participation in Environmental Protection and Environmental Impact Assessments and should include a qualitative and quantitative assessment of the impact of the implementation of the Programme's provisions on individual environmental components.

2a.3	<p>The SEA Report should include a robust assessment of the impact on human health, particularly in aspects:</p> <ul style="list-style-type: none"> • Exposure to noise, vibration, and air pollution, • The risks to water intakes and sources of water intended for human consumption, taking into account the protection zones of these intakes, • Threats to groundwater, particularly the Main Groundwater Reservoirs located in the country (orders, prohibitions, and restrictions related to the protection of water resources should be taken into account), • Compliance with permissible noise levels in acoustically protected areas, especially in the areas of residential buildings/habitats, buildings associated with the permanent or temporary residence of children and young people (educational facilities), and recreational and leisure areas, • Ensure appropriate ambient air quality standards.
2a.4	<p>The environmental impact assessment should refer to the full version of the projected document and cover all planned activities likely to have a significant impact on the environment during both the implementation and operational phases.</p>
2a.5	<p>If, at a later stage, the draft document is expanded to include additional provisions relevant to the adequacy of the Strategic Environmental Impact Assessment, they should also be taken into account in the SEA Report.</p>
2a.6	<p>In the event of identifying the risk of negative impacts on the health and life of people associated with the implementation of activities outlined in the Program, it is necessary, in the environmental impact assessment for the Program project, to specifically address possible methods of their effective elimination or maximum reduction of the envisaged potential negative impacts of the planned investment on health, living conditions, and quality of life of people (particularly in terms of ensuring adequate water quality for human consumption and limiting exposure to noise, vibrations, and air pollution).</p>
2a.7	<p>It should be noted that, in accordance with the wording of Article 3(2) of the Act of October 3, 2008, on making information about the environment and its protection available, public participation in environmental protection, and environmental impact assessments, it should be emphasized that whenever in the Act there is mention of an impact on the environment, it is also understood to include an impact on human health.</p>

3. OBJECTIVES AND ACTIONS PROPOSED IN THE PROGRAMME

The Interreg NEXT Poland – Ukraine 2021-2027 Programme is one of the European Territorial Cooperation (ETC) Programmes to be implemented in the 2021-2027 perspective. The current boundaries of the support area are determined based on NUTS 3 units in Poland and oblasts in Ukraine.

- In Poland, it includes the following sub-regions: Białystok, Łomża, Suwałki, Ostrów Mazowiecka, Siedlce, Biała Podlaska, Lublin, Puławy, Chełm-Zamość, Przemyśl, Rzeszów, Tarnobrzeg, and Krosno.
- In Ukraine, the support area encompasses the following oblasts: Volyn oblast, Lviv oblast, Zakarpattia oblast, Rivne oblast, Ternopil oblast, and Ivano-Frankivsk oblast.

The total support area covers approximately 177,128 km², with 57% in Ukraine and 43% in Poland.

The Programme will pursue the following policy objectives and specific Interreg goals:

- A more ecological, low-emission transition to a net-zero and resilient Europe by promoting a clean and fair energy transition, green and blue investments, a circular economy, climate change mitigation and adaptation, risk prevention and management, and sustainable urban mobility.
- A more social and socially inclusive Europe, implementing the European Pillar of Social Rights.
- Improved management of cooperation (Interreg).
- A safer and better-protected Europe (Interreg).
- A more connected Europe through increased mobility.

The support area is illustrated in the accompanying figure.



Figure 1 Support area of the Interreg NEXT Programme Poland - Ukraine 2021-2027 against the background of NUTS³ regions and oblasts.

The following table presents selected detailed objectives along with indications of actions and initiatives to be undertaken within the framework of these objectives, along with a specification of their scope. For the purpose of updating the Programme and SEA Report, the first column includes information on whether changes have been introduced in the updated Programme (new elements of the Programme are also highlighted in a different font color).

Table 2 Priorities, specific objectives and actions/initiatives covered by the Programme

Specific objective	Initiatives implemented under the objective	Expected scope of the initiative
Priority 1. Environment		
RSO2.4. Promoting climate change adaptation and disaster risk prevention and resilience, taking into account eco-system based approaches	Joint promotion and implementation of activities related to climate change resilience - natural disasters and wildfires.	Actions aimed at adapting to climate change, preventing natural disasters such as storms, droughts, and wildfires, and managing risk in this area. This includes the development and implementation of strategies, solutions, programs, and innovative projects related to increasing awareness and protecting the population. This can involve the creation of building systems, infrastructure, and the purchase of equipment for disaster management purposes.
	Collaborative actions aimed at preventing risks and other local threats and natural disasters caused by anthropogenic activities. These actions strengthen resilience to the consequences of anthropogenic disasters, such as industrial accidents, and involve risk management in this area. This may also include joint training for law enforcement and rescue services.	Actions to enhance resilience to the effects of anthropogenic disasters, such as industrial accidents, and to manage the risks in this regard. This can involve joint training for uniformed services and rescue teams to better prepare for and respond to such emergencies.
RSO2.5. Promowanie dostępu do wody i zrównoważonej gospodarki wodnej	Joint actions aimed at the protection and improvement of water resources and sustainable water management.	Actions related to the development of strategies, solutions, programs, and innovative projects that will enable actions in the protection of water resources and promote sustainable water management in the Program's area
		Projects aimed at reducing water consumption in households and

³ Own elaboration

Specific objective	Initiatives implemented under the objective	Expected scope of the initiative
		collecting rainwater for use in gardening and cleaning.
	Joint actions aimed at the development of sewage infrastructure and improvement of wastewater management.	Projects aimed at supporting the rational management of water resources. Implementation of innovative projects in the field of wastewater treatment.
	Joint actions aimed at improving the public water supply network	Projects related to the provision of water for human consumption (infrastructure for extraction, treatment, storage, and distribution, measures for efficiency, drinking water supply).
RSO2.7. Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution.	Joint actions for the protection, regeneration, and sustainable use of valuable nature-protected areas, with a particular focus on transboundary areas.	Projects related to protected areas aimed at their protection, regeneration, and protection against harmful anthropogenic activities.
	Common actions for the protection of biodiversity and the development of green infrastructure.	Projects aimed at strengthening existing biodiversity through proper nature conservation approaches, including the reduction of the impact of illegal landfills and air and water pollution. Additionally, projects to develop green infrastructure will be supported to provide ecological, economic, and social benefits.
RSO2.6. Promoting the transition to a circular and resource efficient economy.	Joint initiatives to improve household waste management and the processing of residual waste, as well as promoting innovative solutions related to transitioning to a circular economy.	Small-scale projects focused on innovative environmental solutions and infrastructure, aimed at raising awareness and engaging the public in the concept of proper waste management.
	Promoting rational waste management (minimizing waste generation, promoting segregation, increasing recycling and reuse) and raising awareness of environmental challenges.	Projects related to promoting circular economy solutions. Projects focused on promoting an eco-friendly lifestyle, monitoring, assessing, preventing, and resolving common issues within local communities related to waste

Specific objective	Initiatives implemented under the objective	Expected scope of the initiative
		management and environmental protection.
Priority 2. Health		
RSO4.5. Ensuring equal access to health care and fostering resilience of health systems, including primary care and promoting the transition from institutional to family-based and community-based care.	Improving the accessibility and development of diagnostic and preventive infrastructure in various fields of medicine.	<p>Supporting healthcare infrastructure to provide residents of the Programme area with better access to medical services. Projects may include:</p> <p>Purchasing equipment and devices for medical services, including those with facilities for people with disabilities.</p> <p>Renovating and expanding medical facilities that provide preventive and diagnostic services.</p> <p>Improving the efficiency of medical appointments and implementing other measures to streamline the healthcare system.</p> <p>Establishing a joint cross-border offering of healthcare facilities providing preventive and diagnostic services.</p>
	Joint actions aimed at improving access to specialist medicine, particularly in the fields of cardiology and oncology, as well as emergency medicine (developing healthcare infrastructure, acquiring new medical equipment for healthcare facilities), including emergency medicine.	Projects may include the purchase of equipment, renovation, expansion, or renovation of facilities providing specialized healthcare services, support for improving the efficiency and resilience of existing systems. Creating a joint cross-border offer of care facilities providing services in prevention and diagnostics.
	Joint actions aimed at improving access to long-term care, especially the development of infrastructure for geriatric care, palliative care, and hospice care.	Projects in the field of organizing courses and training, promoting related professions, and increasing the availability of care services for economically disadvantaged and excluded individuals. Projects may also include support for medical universities in purchasing equipment or creating study programs related to medicine.

Specific objective	Initiatives implemented under the objective	Expected scope of the initiative
	Joint actions aimed at preventing the occurrence and consequences of crisis events, such as epidemics or armed conflicts, with particular emphasis on local phenomena.	Projects aimed at preventing the occurrence and consequences of undesirable phenomena, such as by developing and implementing strategies, action plans, solutions, innovative programs, and projects. These projects also involve finding solutions to the issue of volunteerism in rescue operations and developing cross-border rescue procedures.
	Joint actions aimed at the development of digitization in healthcare (including the development of telemedicine).	Projects related to the digitization of healthcare services.
	Joint actions aimed at improving the qualifications and effectiveness of medical and rescue personnel.	Investments in necessary equipment and infrastructure. Organizing joint meetings for the exchange of best practices, training, workshops, or conferences.
Priority 3. Tourism		
RSO4.6. Enhancing the role of culture and sustainable tourism in economic development, social inclusion and social innovation.	Joint actions aimed at the protection, development, and promotion of cultural heritage and cultural services, including the development of tourism infrastructure.	Projects in the following areas: Renovation of existing cultural heritage sites, as well as improving accessibility to existing historical and cultural heritage sites, e.g., for people with disabilities. Support for local initiatives. Establishment of long-term, cross-border cooperation between institutions focusing on particularly valuable cultural heritage sites.
	Joint actions aimed at promoting natural heritage and ecotourism, including the development of tourist infrastructure.	Projects in the following areas: Supporting nature conservation and the tourism industry. Organizing events to promote the natural heritage of the Program area. Establishing long-term, cross-border cooperation between institutions

Specific objective	Initiatives implemented under the objective	Expected scope of the initiative
		involved in the conservation, development, and promotion of natural heritage and ecotourism. Developing cycling infrastructure.
	Joint actions aimed at adapting skills and professional qualifications in the field of tourism to the needs of the tourism market and the changes occurring within it.	Courses, training, or workshops on establishing and promoting a business in the tourism industry and effective management of it. Cross-border actions promoting and creating common tourist products, including tourist routes (e.g., hiking, trekking, cycling, water routes, etc.) to enhance the attractiveness of the border region and provide tourist facilities in the border area.
Priority 4. Cooperation		
ISO6.2 Enhance efficient public administration by promoting legal and administrative cooperation and cooperation between citizens, civil society actors and institutions, in particular, with a view to resolving legal and other obstacles in border regions.	Effective and efficient functioning of public administration, including the implementation of common actions to support the development of this area.	Taking common actions such as: Promoting cross-border legal and administrative cooperation at two levels - between institutions and between citizens and institutions. Increasing and improving the quality of cross-border cooperation among entities in the area covered by the Programme. Improving access to information about legal, tax, and formal conditions related to economic and public activities in the area covered by the Program, promoting common actions contributing to the sustainable development of private and public entities.
ISO6.3 Build up mutual trust, in particular by encouraging people-to-people actions.	Integration of residents of the Program area in the field of arts and culture. Cross-border cooperation in the field of education.	Events and initiatives encouraging collaborative efforts between administrations, institutions, and non-governmental organizations on both sides of the border.

Specific objective	Initiatives implemented under the objective	Expected scope of the initiative
	<p>Joint grassroots initiatives related to the environment and climate change.</p> <p>Integration initiatives and capacity building in the field of healthcare and safety.</p>	
Priority 5. Borders		
<p>ISO7.4 Other actions for a safer and secure Europe</p>	<p>The following common activities are primarily envisaged:</p> <ul style="list-style-type: none"> • Joint training of border, customs, and other related services involved in border crossings (including phytosanitary and veterinary services) and services ensuring security in the border area. • Equipping customs, border, phytosanitary, veterinary services, and services ensuring security in the border area. • Improvement of services at existing border crossings. • Promotion of the creation of pedestrian and cycling border crossings to support cross-border tourism development. • Actions related to border tightening, including prevention and combating of illegal migration. • Securing borders beyond border crossings, e.g., by creating an innovative border surveillance system using modern technologies (sensors, cameras, radars, drones, etc.). • Border crossing infrastructure, including phytosanitary infrastructure, as well as infrastructure adjacent to border 	<p>Investment and infrastructure projects, including soft elements such as training, related to the development and modernization of border crossings.</p>

Specific objective	Initiatives implemented under the objective	Expected scope of the initiative
	crossings necessary to support the EU-Ukraine Solidarity lines initiative.	
ISO7.4 Other actions for a safer and secure Europe.		
RSO3.2 Developing and enhancing sustainable, climate resilient, intelligent and intermodal national, regional and local mobility, including improved access to TEN-T and cross-border mobility.	Improvement of the quality of cross-border road infrastructure, including aspects of sustainable transportation. Improvement of the quality of cross-border railway infrastructure, including aspects of sustainable transportation.	Infrastructure projects primarily in the field of road, railway, and logistics infrastructure.

In addition, the Programme will implement strategic projects from the LIP list. These projects have only an approximate scope at the moment. Each project is referred to in the table below, together with a brief description of the initiatives planned under the project. The figure shows schematically the location of the projects on the LIP list⁴.

Table 3 List of Large Infrastructure Projects covered by the Programme.

LIP Name	Brief Description of the Initiative
LIP 1 The Carpathian narrow-gauge railways – a journey in the footsteps of the Carpathian Forest railways	The project includes the expansion of a railway hangar in Majdan, Poland, to create a tourist service point with a recreational area and an educational tree canopy walkway. Additionally, the project plans to offer railbike rides on the Bieszczady Forest Railway (Poland) between Majdan and Dołżyca. In Ukraine, in the town of Vyhoda, a narrow-gauge railway museum will be established, and cycling and hiking trails along the narrow-gauge railway route in Vyhoda will be developed. The project also supports soft initiatives such as cross-border workshops, joint study visits, and promotion to create a cohesive tourism offering and cultural events.
LIP 2 Joint development of accessible and resilient health care for elderly and disabled patients of Bialystok and Volyn hospitals	The project focuses on the modernization of medical infrastructure and enhancement of medical staff competencies. Infrastructure-wise, the project includes renovations and the acquisition of modern equipment for the Internal Medicine, Diabetology, Endocrinology, and Rheumatology Ward in Białystok Hospital. Similar works are planned for the Orthopedics, Traumatology, and Surgery Ward in Volyn Hospital, adapting the space to the needs of the elderly and disabled. Soft project activities include educational actions such as conferences, training, workshops, and the development of treatment methodologies to enhance healthcare for the elderly and disabled.

⁴ The examination of the indicative LIPs mentioned in the Program does not impose an obligation to approve them and does not prejudice the position of the participating countries in future selection processes. In the case of considering the selection of LIP 8, an environmental impact assessment will be necessary regarding the individual project components. As of the finalization of the SEA report, this project has not been approved for financing.

<p>LIP 3 Environmental safety – creation of a Ukrainian-Polish forest fire management network in the Carpathian region.</p>	<p>The project includes the following activities: - Polish-Ukrainian cooperation in creating instructions for responding to cross-border forest fires. - Implementation of a GIS system for rapid detection and extinguishing of forest fires. - Expansion of rescue infrastructure and modernization of rescue bases, including the Fire Safety Center in Ivano-Frankivsk, as well as reconstruction of units in the Zakarpattia and Brzozów regions. - Investment in specialized equipment and vehicles to facilitate rescue operations in difficult terrain. - Implementation of training programs for rescue services, including practical and theoretical exercises. - Organization of educational campaigns and public events promoting safety and environmental protection in border regions.</p>
<p>LIP 4 Sustainable Water Management: a Way to Revitalise Western Ukraine and Eastern Poland</p>	<p>The project includes the following activities: - Cross-border cooperation: organizing training, seminars, and Polish-Ukrainian meetings to exchange knowledge and experience in water resource management. Conducting research on the impact of illegal structures on eutrophication and pollution of lakes and rivers, with the development of strategies for improving water balance and environmental protection. - Construction and Reconstruction of Water Supply and Sewage Systems: Actions include expanding and modernizing water supply and sewage systems, including the construction of new water treatment plants and sewage networks in Pulmo. Reconstruction of the existing sewage network and the construction of pumping stations in Shatsk. Establishment of water stations in Rivne, Rivne Raion, Hoshcha Raion, and the reconstruction of wastewater treatment plants in Kvasyliv. Modernization of water and sewage infrastructure in Svaliava and the expansion of networks to improve local resident service. Construction of water and sewage systems in the Zbiornik Ternopil area with additional installations for eco-biotechnological water treatment. Construction of a sewage network in Lipina Nowa and Zawoda with accompanying infrastructure improvements. Improving wastewater treatment processes at the Skierbieszów wastewater treatment plant, along with expanding the plant to serve previously unconnected areas to the sewage network. These actions aim to improve municipal infrastructure, enhance residents' quality of life, and protect the environment in the project areas.</p>
<p>LIP 5 A joint initiative of The Dr. Józef Psarski Mazovian Specialist Hospital in Ostrołęka as increasing the availability of health-care services through construction landing pads for rescue helicopters and purchase, delivery and assembly of lifting equipment</p>	<p>The project includes the following activities: - Construction of Helipads and Elevator Installation: A new helipad will be constructed at the Dr. Józef Psarski Hospital in Ostrołęka, and fast elevators for patients and rescue services will be installed. - Modernization of the Angiography Room: The Lwów Hospital will acquire modern angiographic equipment for the cardiosurgery department, enabling more procedures and improving the quality of medical services. - Educational and Promotional Activities: The project plans to organize conferences, workshops, study visits, and informational campaigns to exchange knowledge and experience between hospitals, develop common procedures, and promote the project and cross-border cooperation among local communities and medical staff.</p>
<p>LIP 6 Development of palliative, geriatric and treatment care, and also improving the quality of medical services for cancer</p>	<p>The project includes the following activities: - Establishment of Palliative Care Unit: The project involves the reconstruction of a municipal hospital building in Lviv, including the addition of a fourth floor and the construction of a staircase with an elevator. Specialized medical equipment will be purchased, and personnel will be trained in equipment operation. - Establishment of a Hospice for Cancer Patients:</p>

<p>patients in hospitals of Lviv, Ternopil and Krosno</p>	<p>Tarnopol Regional Cancer Hospital will build bunkers for modern radiotherapeutic systems, renovate and adapt rooms for a hospice ward, and provide staff training. - Adaptation of Premises for Care and Treatment: Krosno's John Paul II Hospital will undergo renovation and construction work, equipment procurement, and staff training. Additionally, the project includes soft actions: - Development and Implementation of a Polish-Ukrainian Transborder Program for Palliative, Geriatric, and Rehabilitation Care, including organizing cross-border conferences, initiating a joint palliative and geriatric care development program, exchanging experiences, and training specialists. - Promotional and Informational Activities: These include radio and internet campaigns, installation of informational signs, publication of an informational brochure in three languages, marking vehicles purchased under the project, and creating project tabs on official websites of beneficiaries.</p>
<p>LIP 7 Creation of Cross-Border Centers for Preventive Examinations in Lubelskie and Volyn Regions</p>	<p>Infrastructure activities within this project include the expansion and modernization of Preventive Research and Rehabilitation Centers in Lublin and Lutsk. The scope of work includes the acquisition of modern medical equipment, the adaptation of premises, and the expansion of health-related infrastructure to improve the quality and accessibility of healthcare services in the region. Soft project activities focus on developing medical staff competencies through a series of training sessions, developing comprehensive preventive programs for women's health and spine and musculoskeletal disorders in children. Additionally, awareness-raising and health promotion campaigns and conferences promoting health safety and prevention are being implemented to strengthen health prevention in the cross-border area.</p>
<p>LIP 8 Increasing the throughput capacity of the Hrebenne-Rawa Ruska road border crossing point and improving the conditions for travelers crossing the border at the Budomierz – Hruszew road border crossing point</p>	<p>This project includes two main infrastructure tasks. At the Hrebenne-Rawa Ruska border crossing, the construction of a cargo terminal in Hrebenne with necessary infrastructure is planned, including project documentation preparation and the construction of a 2.8 km access road to the terminal on the Ukrainian side. Additionally, the Budomierz-Hruszew border crossing will have a passenger waiting room built, improving comfort and waiting conditions for bus travelers. The project also includes accompanying actions such as coordination between project beneficiaries, information exchange, sharing best practices, and promotional activities to inform about the project's goals and progress.</p>

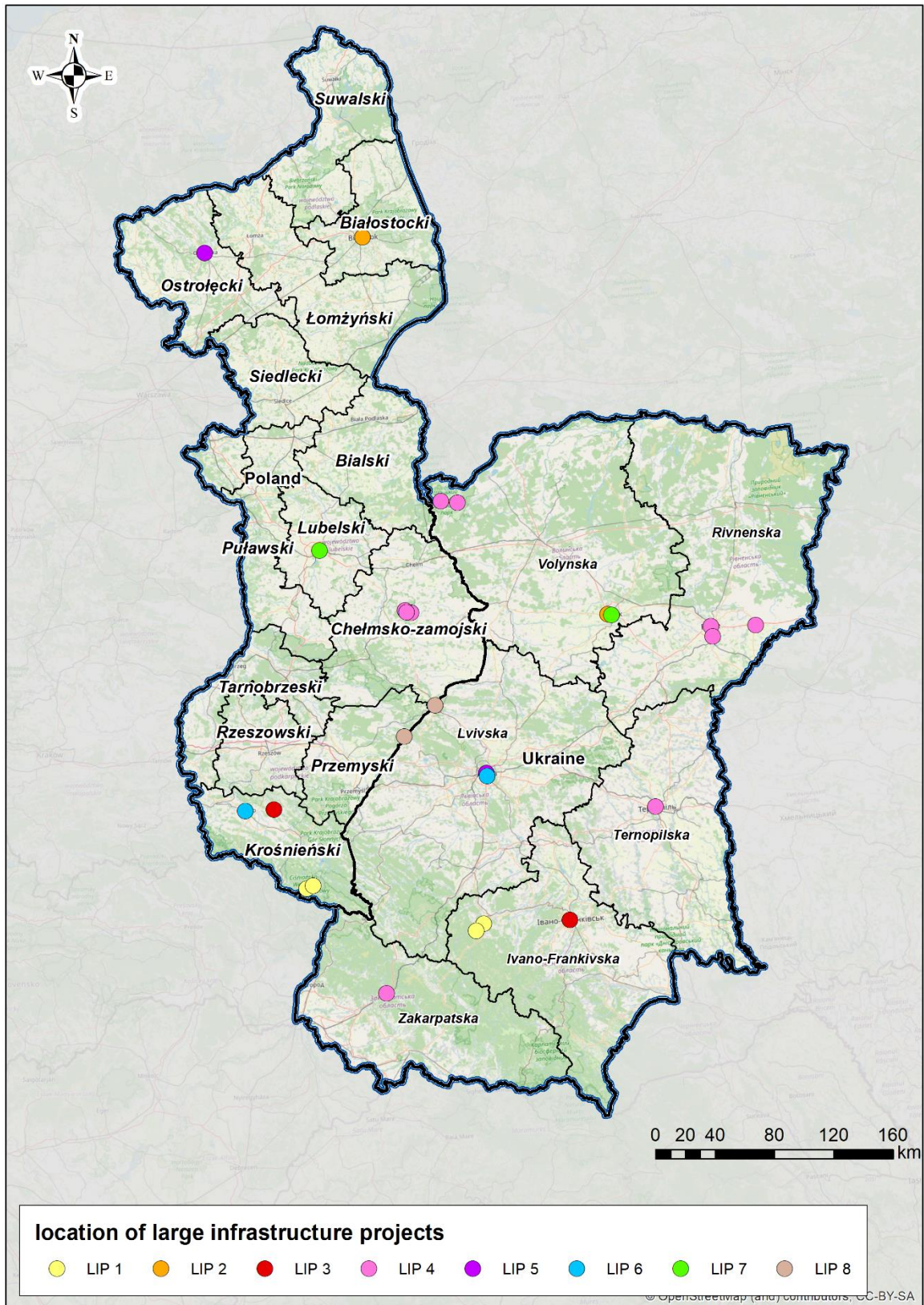


Figure 2 Approximate locations of LIPs against NUTS⁵ units and districts.

4. ANALYSIS OF THE STATE OF THE ENVIRONMENT IN THE PROGRAMME AREAS

Challenges related to environmental protection and sustainable development currently facing Europe have their roots in global challenges addressed for decades. They are increasingly shaped by ambitious, long-term visions, and goals. Union policy in the environmental field during the preparation of the previous SEA Report was guided by three thematic priority areas outlined in the 7th EAP:

- Protection, conservation, and improvement of the natural capital of the European Union;
- Transformation of the EU into a resource-efficient, green, and competitive low-emission economy; and
- Protection of EU citizens from environmentally related issues and threats to health and quality of life.

The current 7th Environment Action Programme (7.EAP) has been replaced by the 8th Environment Action Programme (8.EAP) through the decision of the European Parliament and the Council 2022/5916 on the General Union Environment Action Programme to 2030. It emphasizes the role of priorities set in the European Green Deal and the necessity of applying the "do no significant harm" principle. The challenges outlined in the 8.EAP are associated with accelerating the transition to a regenerative economy, with priorities covering six thematic objectives related to: (a) rapidly and predictably reducing greenhouse gas emissions while enhancing their absorption, (b) adapting to and strengthening resilience to climate change, (c) striving for a regenerative economy model and accelerating the transition to a circular economy, (d) aiming for a pollution-free environment and protection of citizens' health and well-being, (e) protecting, preserving, and restoring biological diversity and strengthening natural capital, and (f) promoting environmental sustainability aspects and significantly reducing major environmental and climate pressures related to production and consumption in energy, industry, buildings and infrastructure, transportation, and the food system.

Moreover, in recent years, the European Union has adopted several strategic legal frameworks focused on the transformation of the EU economy and individual systems (e.g., energy, transportation) to ensure prosperity and fair treatment while simultaneously protecting ecosystems. These frameworks complement the Sustainable Development Goals developed by the United Nations (UN), emphasizing the need for transformative changes considering the interdependencies between social, economic, and environmental goals.

Factors affecting human health and quality of life, such as noise, air pollution, and climate change, persist. The acceleration of climate change is likely to increase threats, including heatwaves, wildfires, floods, and changes in the occurrence and seasonality of infectious diseases. Moreover, environmental threats to health do not affect everyone equally, and there are significant local and regional differences in Europe regarding society's vulnerability and exposure to such threats. Overall, the SEA Report regarding the reduction of environmental threats to human health and quality of life is uncertain. Systemic health threats are complex, and the knowledge base on this subject contains significant gaps and uncertainties.

Considering the long-term vision of Europe and complementary policy goals, Europe is not making sufficient progress in addressing environmental protection challenges. The assumptions of policies are more effective in reducing environmental impacts than in protecting biodiversity, ecosystems, and human health and quality of life. Despite successes in managing environmental protection in Europe, persistent problems remain, and forecast for Europe's environment in the coming decades are discouraging. Europe has achieved its goals in establishing protected land and sea areas, and some species have been restored. However, most other objectives are unlikely to be achieved. Spatial planning has improved, but there is still a continued increase in landscape fragmentation, leading to the destruction of natural habitats and biodiversity. Air pollution continues to impact biodiversity and ecosystems, with 62% of the area occupied by European ecosystems being exposed to excessive nitrogen compound concentrations causing eutrophication. Increased climate change impacts on ecosystems

⁵ Own elaboration

⁶ Journal of Laws, UE.L.2022.114.22

and biodiversity, biodiversity loss, overexploitation of resources, and the emission of harmful substances due to activities related to agriculture, fishing, transportation, industry, and energy production are expected⁷. Europe has had some success in protecting citizens from environmental threats to health and quality of life. For example, the overall quality of drinking water and water in bathing areas in Europe is high.

Current trends and forecasts until 2030 indicate negative trends or achievements in several environmental protection issues:

- Protection and conservation of the natural potential of commonly occurring bird species,
- State of ecosystems and biodiversity in seas,
- Impact on marine ecosystems,
- Urbanization and land use for agriculture and forestry,
- Soil condition,
- Chemical pollution and its impact on ecosystems,
- Climate change and its impact on ecosystems,
- Exposure of the population to noise in the environment and its impact on human health,
- Chemical pollution and threats to human health and quality of life,
- Threats to society related to climate change.

In summary, the analysis in the SOER 2020 emphasizes the constant and urgent nature, as well as the scale of the challenges facing Europe. The implementation of the vision of sustainable development for the EU by 2050 is still possible but will require a change in actions, both in terms of their nature and level of ambition. This means strengthening adopted policy tools and using them in new innovative management solutions. Based on the information in the Programme, several significant areas where action should be taken to make transformations possible have been identified.

Clusters of factors influencing environmental protection trends in Europe include:

- Growing and migrating global population,
- Diversification of values, lifestyles, and management methods,
- Changes in power in the global economy and geopolitical landscape,
- Climate change and environmental degradation worldwide,
- Growing scarcity and global competition for resources,
- Acceleration of technological changes and convergence.

Global use of material resources increased tenfold from 1900-2009 (Krausmann et al., 2009). In recent years, it has continued to rise, with forecasts suggesting a doubling of demand by 2060 (IRP, 2019). This raises concerns about access to key primary and secondary resources and poses a challenge for material-based economies from foreign markets.

Similarly, global demand for land is expected to remain high, as by 2050, the world would need 25-100% more food, depending on socio-economic and technical assumptions (Hunter et al., 2017). Increased demand for biofuels is also expected (OECD/FAO, 2018), and the combined effects of climate change and soil degradation will increasingly impact agriculture (UNCCD, 2017).

Global water demand is projected to increase by 55% by 2050, assuming the continuation of current policies and socio-economic trends (OECD, 2012).

The transformation towards a green European economy will ensure long-term environmental sustainability in Europe and its neighborhood. In this context, a change in attitudes will be important. Institutions responsible for

⁷ Environment of Europe 2020, State and forecast, Synthesis, EEA 2020. <https://www.eea.europa.eu/soer/2020>

legislation, entrepreneurs, and residents could collectively participate more widely in managing natural capital and ecosystem services. This way, new and innovative ways of resource-efficient use could be created, along with a fair fiscal reform. Through education and various types of social media, residents could engage in solving global issues, such as maintaining the average global temperature increase below 2°C.

Approaching the environmental assessment at the level of the Programme area, it is essential to consider the aforementioned environmental problems and challenges. The Programme area is characterized by rich environmental resources, high biodiversity, and the diverse landscape's valuable features. The rich cultural heritage of the region on both the Ukrainian and Polish sides is also worth emphasizing. The Programme area is one of Europe's most valuable natural regions. Therefore, it is justified to shape development priorities in a way that does not pose threats to its natural resources or disrupt the balance between human activity and environmental protection needs.

The environmental state analysis in the Programme area, focusing on its individual elements, was conducted to identify the most crucial environmental issues, including the most vulnerable elements and factors causing adverse environmental changes. These analyses will provide a basis for both influencing the Programme's potential to address existing problems and threats and, on the other hand, assessing possible negative impacts of the Programme on the environment. The results will also be used to formulate conclusions regarding the selection criteria for projects to be implemented under the Programme.

To formulate conclusions in the above-defined scope, the following were analyzed:

- Available Programmes on the environmental state in Polish provinces: Podlaskie⁸, Podkarpackie⁹, and Lubelskie¹⁰, as well as the GIOŚ Programme on the environmental state in Poland¹¹, GUS data, SEA Reports for strategic and operational Programmes covering the analyzed area, and other available materials,
- On the Ukrainian side: The Programme on the State of the Environment in Ukraine and regions, the State Statistics Service of Ukraine, development plans, data published on the websites of the Ministry of Environment of Ukraine and the Ministry of Community and Territory Development of Ukraine, and other available sources.

The synthesis of the analysis is presented below concerning specific environmental areas according to the EEA systematics to facilitate reference to European trends presented in the SOER 2020 Programme¹².

4.1. AIR

In the area of the anticipated support, air quality does not meet the norm values for the content of PM10 and PM2.5 particles, as well as benzo(a)pyrene in the air. The most significant issue is air quality concerning the number of days exceeding the permissible PM10 particle values on the Polish and Ukrainian sides.

Poland¹³

The main source of air pollution in the supported area is anthropogenic emissions from the municipal and household sector (surface emission), transportation (linear emission), and industrial activities (point emission). A significant contribution to substance concentrations in the Podlaskie, Lubelskie, and Podkarpackie voivodeships also comes from the influx of pollutants from other parts of Poland. The substances with the greatest

⁸ Environmental State in the podlaskie Voivodeship Report, GIOŚ Białystok, 2020

⁹ Environmental State in the podkarpackie Voivodeship Report, GIOŚ Rzeszów, 2020

¹⁰ Environmental State in the lubelskie Voivodeship Report, GIOŚ Lublin, 2020

¹¹ Environmental Status in Poland. Signals 2019, GIOŚ, Environmental Monitoring Library, 2020

¹² Environment in Europe 2020, Status and EIR, Synthesis, EEA 2020
<http://www.eea.europa.eu/soer/synthesis/translations/srodowisko-europy-2020>

¹³ Report on the Environmental Status of the Podkarpackie Voivodeship. Report 2022; Report on the Environmental Status of the Lubelskie Voivodeship. Report 2022; Report on the Environmental Status of the Podlaskie Voivodeship. Report 2022; Annual Air Quality Assessments GIOŚ 2022

contribution to pollution emissions are suspended particles and nitrogen oxides. Other pollutants emitted from industrial facilities depend on the type of production and technology used. However, according to environmental Programmes for the voivodeships covered by the support area, surface sources related to the municipal and household sector, especially for PM_{2.5}, PM₁₀, and benzo(a)pyrene, have the highest share in emission concentrations.

Annual assessments of air quality on the Polish side for the Podlaskie, Lubelskie, and Podkarpackie voivodeships indicate areas of exceedance of permissible or target values. In the years 2016-2022, low sulfur dioxide (SO₂) concentration values were recorded in the Lubelskie, Podlaskie, and Podkarpackie voivodeships, ranging from 1 µg/m³ to 9 µg/m³ at measurement stations in the support area.

The annual average concentrations of nitrogen dioxide (NO₂) from 2016 to 2022 were significantly below the permissible level. In the largest cities in the area, they ranged from 4 µg/m³ to 33 µg/m³, constituting 10% to 82.5% of the permissible level.

From 2016 to 2022, the annual average concentrations of PM₁₀ particles measured in the largest cities of the Podkarpackie, Podlaskie, and Lubelskie voivodeships were high but did not exceed the permissible values. The main air quality issue is compliance with the 24-hour PM₁₀ particle concentration standard, especially in winter. In the years 2016-2018, most stations experienced exceedances of the permissible frequency of 35 days per calendar year (for 50 µg/m³). Exceedances occur in the autumn-winter period due to increased pollution emissions from municipal sources (individual heating boilers, fireplaces, etc.). Regarding the number of exceedances of the daily PM₁₀ particle value, a constant trend cannot be determined, as it depends largely on meteorological conditions such as temperature, wind speed, and precipitation. In the years 2016-2022, the highest number of exceedances of the daily standard occurred in Dębica in the Podkarpackie voivodeship (from 47 to 74 exceedances per year). In the Podlaskie voivodeship, exceedances occurred only in Łomża from 2016, and in the Lubelskie voivodeship, there were no exceedances in any city from 2019. In the Podkarpackie voivodeship, no exceedances occurred in 2022, while in 2021, exceedances were recorded in Dębica, Rzeszów, and Mielec. This indicates a significant improvement in air quality in the last year, mainly due to changes in meteorological conditions.

The annual average concentrations of PM_{2.5} particles from 2016 to 2022 in the Lubelskie voivodeship ranged from 14 µg/m³ to 27 µg/m³, i.e., up to 135% of the permissible level, which has been 20 µg/m³ since 2020. The highest values exceeding the permissible level were recorded in Lublin, Biała Podlaska, and Zamość. In the Podlaskie voivodeship, the highest concentrations, and thus exceedances of the permissible level, occurred in Łomża, while at other measurement stations, concentrations did not exceed 20 µg/m³. In the Podkarpackie voivodeship, the annual average concentrations of PM_{2.5} in 2021 exceeded permissible values in many cities, but in 2022, no exceedances occurred. Since 2019, air quality has significantly improved, influenced also by meteorological conditions in the remaining area covered by support in the Programme.

In terms of PM₁₀ and PM_{2.5} emissions, in addition to industrial dust emissions, so-called low emissions significantly affect them. These are pollutants from household furnaces, mainly old and inefficient stoves and boilers. Corrective actions implemented on the Polish side for many years have contributed to changes in concentration levels in recent years. However, the most significant air quality problem is the emission of benzo(a)pyrene resulting from the combustion of solid fuels in old devices. The results obtained from measurements conducted from 2016 to 2022 show high values of the annual average benzo(a)pyrene concentration. Among the Podkarpackie cities covered by measurements, the highest air pollution with benzo(a)pyrene occurred in Dębica, where annual average concentrations ranged from 370% to 910% of the target level. In the Lubelskie voivodeship, the highest exceedance occurred in 2021 in Biała Podlaska, reaching 5.2 ng/m³, with a target norm of 1 ng/m³. Since 2019, there has been a steady downward trend in benzo(a)pyrene concentrations in suspended PM₁₀ dust, which is associated with a decrease in air pollution with suspended

particles. However, episodes of high concentrations still occur due to the variability of local meteorological conditions.

Despite a constant improvement in air quality in the Polish part of the support area, exceedances of substance norms such as PM₁₀, PM_{2.5}, and benzo(a)pyrene may still occur, especially due to the tightening of the PM_{2.5} standard since 2020.

Ukraine

The problem of air pollution is significant throughout Ukraine, not only in the area covered by the support Programme. The contribution to emissions from the energy and mining industry, as well as transportation, is substantial. The main pollutants released into the air include carbon oxides, nitrogen oxides, sulfur oxides, ammonia, phenols, benzo(a)pyrene, and formaldehyde. However, the pace of implementing modern technologies and emission-limiting installations is insufficient to achieve improvement.

Since February 2022, Ukraine has been experiencing Russian military aggression, significantly impacting air pollution levels. Due to wartime activities, the number of cities and stations where air quality measurements are conducted has decreased. The armed conflict contributes to the emission of significant amounts of particles and gases into the atmosphere, generated by explosions and fires. These substances are then dispersed by continental air masses over the western part of Ukraine, affecting the concentration of harmful substances. Therefore, measurements conducted in recent years do not fully reflect normal operating conditions of the Ukrainian economy. Considering these circumstances, data on air quality before the start of Russia's aggression against Ukraine were used for the Ukrainian area covered by the Programme.

In 2018, the total emissions of pollutants in the supported area of Ukraine were 356.5 thousand tons, while in 2019, it was 322.2 thousand tons. These figures represent approximately 13% and 14% of the total emissions for Ukraine, respectively.

According to measurements by the Ukrainian Central Geophysical Observatory, the average concentration of suspended particulate matter in the air of Ukrainian cities was 120 µg/m³, reaching peak values of 1800 µg/m³ in 2016. In Kyiv, the average daily values of suspended particulate matter range from 100 to 200 µg/m³. Pollution with PM_{2.5} particles in Kyiv, Kharkiv, and Lviv indicates values often higher than the maximum permissible level according to European standards (25 µg/m³).

There is no systematic monitoring of PM₁₀ and PM_{2.5} pollution in Ukraine, following the implementation of the requirements of Directive 2008/50/EC. Therefore, official data on the average annual values of PM₁₀ and PM_{2.5} are not available. In reality, air pollution is recorded in real-time as part of some non-governmental initiatives. From such data, the range of daily fluctuations is quite wide, from 20 to 1450 µg/m³ for PM₁₀ and from 5 to 300 µg/m³ for PM_{2.5}, but the lack of a series of observations does not allow for considering trends.

According to Programmes from the Ukrainian Central Geophysical Observatory, there are two cross-border pollution monitoring stations in the Programme area (village of Svitiyaz, Volyn oblast, and village of Szabelnia, Lviv oblast). Here, in 2018-2019, the average annual concentrations of sulfur dioxide and nitrogen dioxide were not exceeded, but in some cases, maximum permissible concentrations of nitrogen dioxide were exceeded (0.5 and 2.2% of samples, respectively).

The total level of air pollution in Ukrainian cities according to the API (Air Pollution Index, including PM₁₀ and PM_{2.5}) in 2019 was 8.2 (high), slightly higher than in 2018 (7.6). Specifically, in the Programme area, the highest API value was recorded in Lutsk (7.7), Rivne (7.5), Lviv (7.1), moderately high in Uzhgorod (6.4), low in Ternopil (4.0), and Ivano-Frankivsk (3.9).

It should be noted that the air quality in the Programme area is slightly better than in other, especially industrial, regions of eastern Ukraine. Until the Russian aggression against Ukraine, the main trend of the previous 10 years

was stabilization, with occasional small reductions in emissions. However, actions are still necessary for further improvement in air quality.

Data from Ukrainian measurement stations indicate that air quality and trends in its changes in the Ukrainian and Polish parts of the support area are similar. Still, there is difficulty in precisely comparing data due to differences in air quality monitoring systems on the Ukrainian side. However, exceedances are still recorded at measurement stations, as indicated in the table below.

Table 4 Levels of concentrations of PM10 and PM2.5 in the air at measuring stations located in the Programme area¹⁴.

Location of stations		Station code	PM10 annual average concentration [$\mu\text{g}/\text{m}^3$].		PM10 number of days with exceeding of 24-hour PM10 standard [days].		PM2.5 annual average concentration [$\mu\text{g}/\text{m}^3$].	
			2021	2022	2021	2022	2021	2022
POLAND	Lublin Citizen	LbLubObywatele	28	25	30	23	24	20
	Biała Podlaska	LbBiaPodOrze	28	27	34	28	22	19
	Chelm	LbChelPolan	25	20	26	10	19	15
	Kraśnik	LbKrasKoszar	26	24	27	11	-	-
	Pulawy	LbPulaKarpin	23	-	18	-	-	-
	Zamosc	LbZamoHrubie	26	23	25	14	20	17
	Janów Lubelski	LbJanowLubOkMOB	-	27	-	34	-	22
	Radzyń Podlaski	LbRadzPodSit	27	24	26	17	-	-
	Białystok	PdBialWarsza	25	21	22	12	17	14
	Lomza	PdLomSikorsk	31	27	41	32	25	20
	Suwałki	PdSuwPulaskp	20	17	13	9	14	12
	Augustów	PdAugustowUz	22	20	14	8	18	16
	Grajewo	PdGrajewoWPoMOB	25	21	22	21	19	16
	Ostrołęka	MzOstroHalle	24	22	19	17	-	-
	Siedlce	MzSiedKonars	26	25	24	22	20	17
	Jaroslaw	PkJarosPruch	28	23	30	16	21	16
	Rymanow-Zdrój	PkRymZdrPark	16	15	3	0	10	8
	Rzeszów	PkRzeszPilsu	34	33	62	30	25	20
	Debica	PkDebiGrottg	32	27	55	26	22	19
	Przemyśl	PkPrzemGrunw	24	21	34	15	20	12
	Krosno	PkKrosKletow	26	22	26	17	16	13
	Mielec	PkMielBierna	32	28	46	31	22	16
	Sanok	PkSanoSadowa	23	21	19	12	-	-
	Tarnobrzeg	PkTarnDabrow	26	23	28	10	-	-
	Stalowa Wola	PkStWolWoPol	25	22	19	11	-	-
	Nisko	PkNiskoSkla	27	23	26	13	21	17
Iwonicz-Zdrój	PkIwonZdrRab	17	16	1	0	-	-	
Jaslo	PkJasloSikor	24	20	27	15	18	13	

¹⁴ Based on the measurements results from GIOŚ (Chief Inspectorate for Environmental Protection) annual air quality assessment for the years 2021 and 2022, as well as the modeling results within the Copernicus project <https://www.regional.atmosphere.copernicus.eu>.

Location of stations		Station code	PM10 annual average concentration [$\mu\text{g}/\text{m}^3$].		PM10 number of days with exceedance of daily standard PM10 dust [days]		PM2.5 annual average concentration [$\mu\text{g}/\text{m}^3$].	
			2018	2019	2018	2019	2018	2019
UKRAINE	Ternopil	Modelling	14	-	14	-	12	-
	Lviv	Modelling	16	-	16	-	13	-
	Lutsk	Modelling	14	-	14	-	11	-
	Ivano-Frankivsk	Modelling	15	-	16	-	13	-
	Uzhgorod	Modelling	17	-	17	-	14	-
	Mukachevo	Modelling	14	-	14	-	12	-
	Rivne	-	16	-	15	-	13	-
	Kowel	-	14	-	14	-	12	-

There is a systematic improvement in air quality in the area in question in terms of particulate concentrations in ambient air, although the area is still prone to exceedances of pollutant concentrations, particularly in areas of urban development.

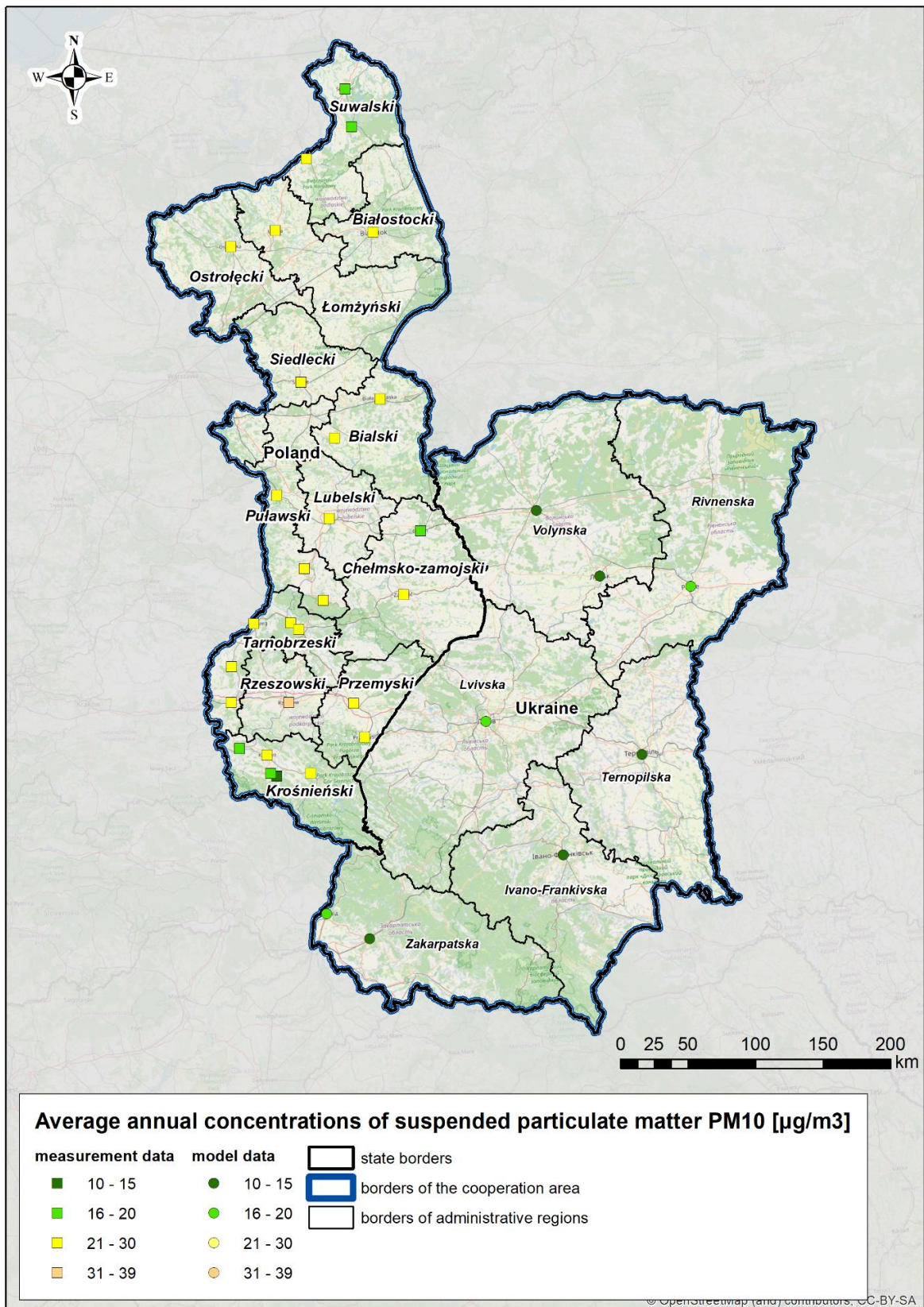


Figure 3 2019 mean annual concentrations of PM10 in the Programme area¹⁵.

¹⁵ Own compilation based on the results of the annual air quality assessment in the Podlaskie, Podkarpackie, Mazowieckie, and Lubelskie voivodeships, GIOŚ (Chief Inspectorate for Environmental Protection), and <https://www.regional.atmosphere.copernicus.eu>

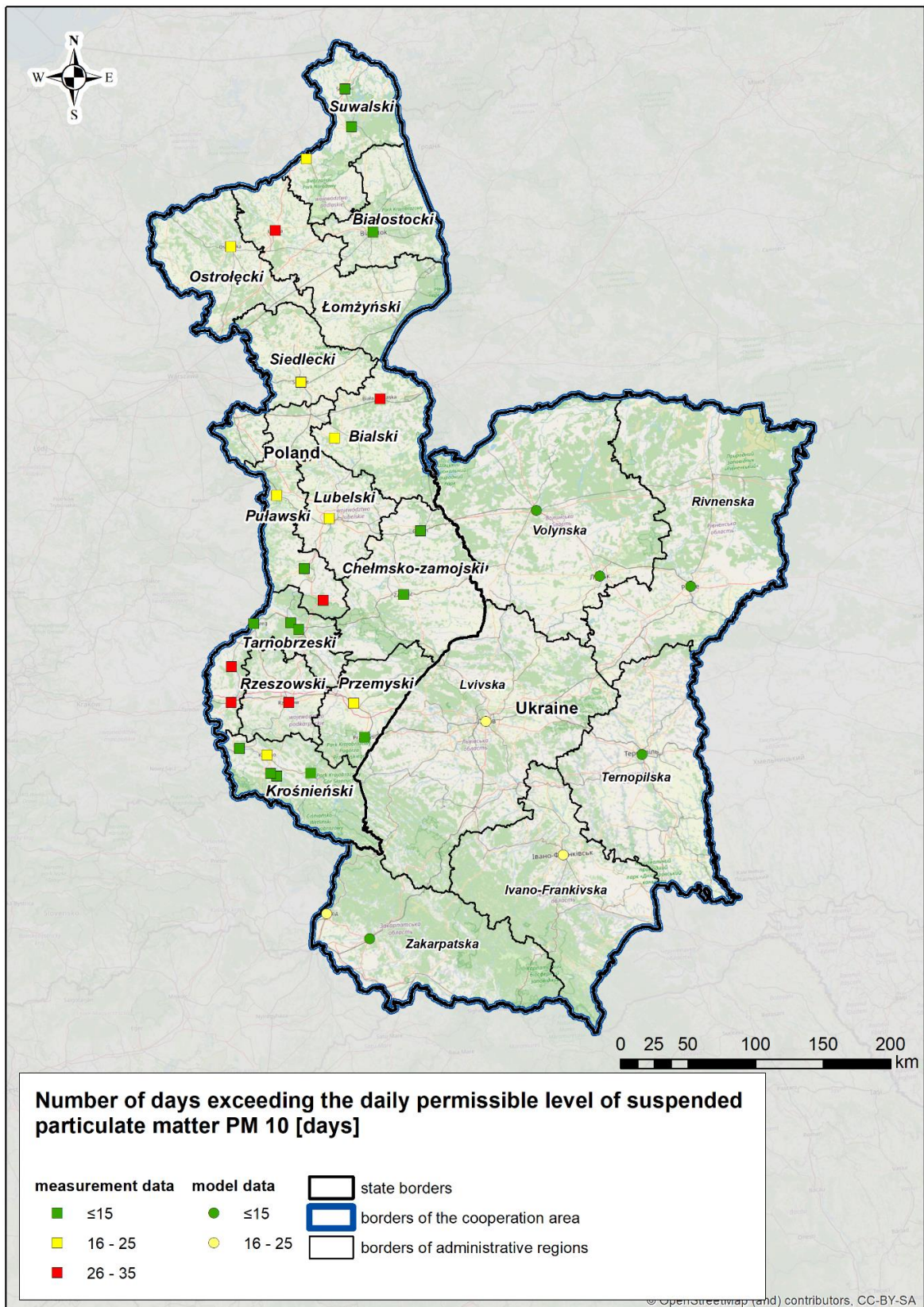


Figure 4 Number of days with exceedances of the PM₁₀ daily standard in 2019 in the Programme area¹⁶.

¹⁶ Own compilation based on the results of the annual air quality assessment in the Podlaskie, Podkarpackie, Mazowieckie, and Lubelskie voivodeships, GIOŚ (Chief Inspectorate for Environmental Protection), and <https://www.regional.atmosphere.copernicus.eu>

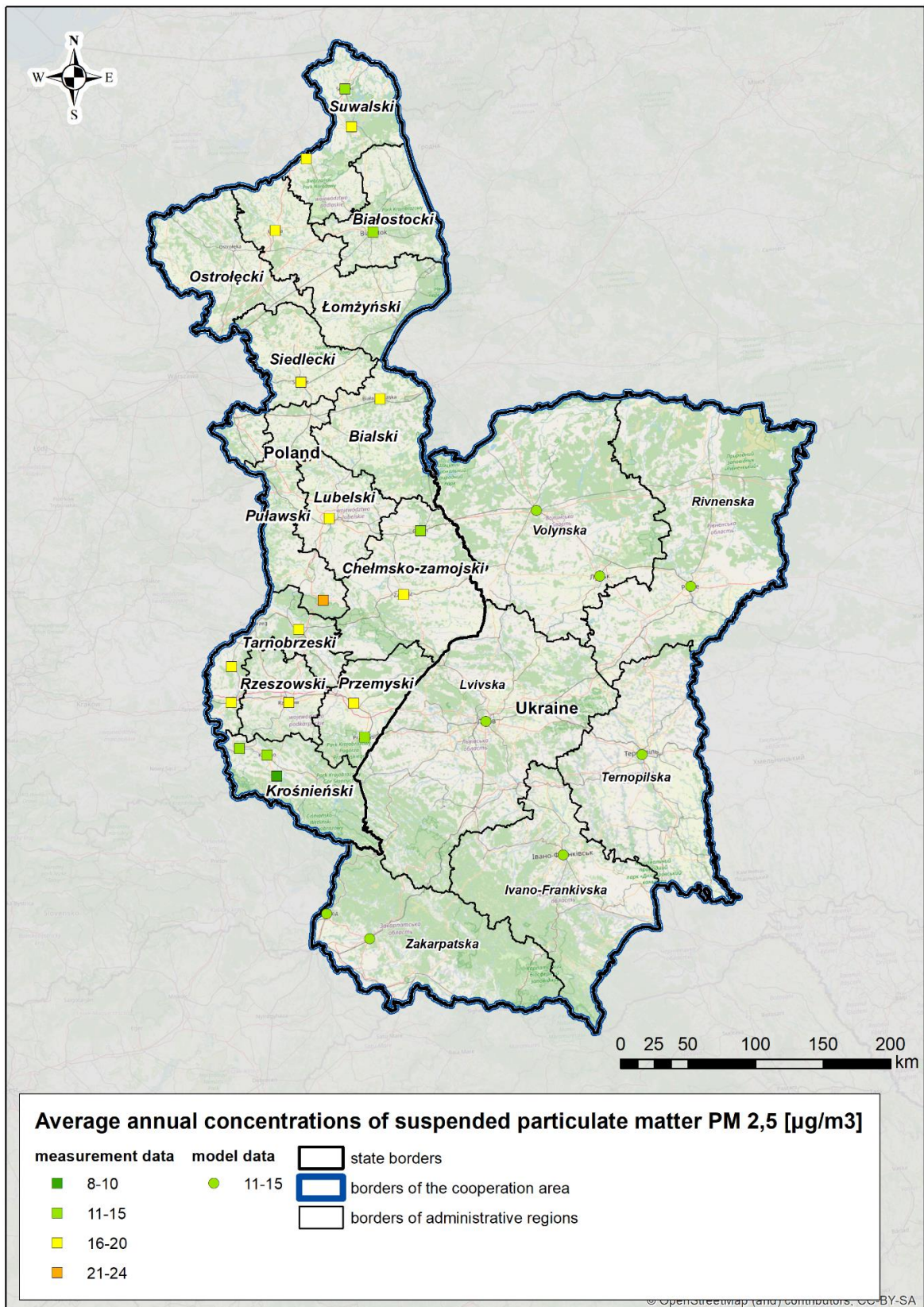


Figure 5 Average annual concentrations of PM2.5 in 2019 in the Programme area¹⁷.

SUMMARY

Air quality in the supported area is not a significant issue concerning the planned investments within the Programme. However, special attention should be paid to sources emitting benzo(a)pyrene and suspended particles, as there are areas exceeding permissible and target values.

4.2. NATURE, BIODIVERSITY AND SOIL

4.2.1. NATURE, BIODIVERSITY

The area covered by the Programme is highly valuable in terms of nature and landscape, encompassing parts of mountain ranges within the Carpathians. The distribution of protected areas in the region covered by the Programme is indicated on the map below. Legal nature protection includes the protection of plant, animal, and fungal species to ensure the survival and proper conservation status of wild flora, fauna, and fungi, as well as their habitats. Species protection aims to ensure the survival and proper conservation status of rare, endemic, vulnerable, and endangered species occurring naturally in the country, as well as those protected under international agreements, both of which the two countries are parties to, including their habitats and breeding grounds, and the preservation of species and genetic diversity¹⁸.

The quality of the natural environment in the cross-border area is a key aspect of the high quality of life for residents, also determining its attractiveness for tourism. Among the transboundary areas with special natural and cultural values covered by the Programme, the following should be mentioned from north to south: the complex of forests surrounding the Augustowski Canal (Augustowska, Grodzieńska, and Dajnowska), Białowieża Forest, Podlaskie Lowlands, Włodawa Polesie, Dubieńskie Depression, Roztocze, the San River Przemyśl Bend, and the Bieszczady Mountains along with the foothills. On the Polish-Belarusian border, there is the Białowieża Forest, covering extensive forested areas. Another important element of the transboundary ecosystem is the Bug River Valley. For environmental cooperation on the Polish-Ukrainian border, the following areas are also important: Western Polesie, Roztocze, and the Eastern Beskids. They constitute a coherent area in terms of nature and culture, and at the same time, they represent an important tourist potential for both countries.

The area covered by the Programme is also characterized by uneven spatial distribution of protected areas. The share of legally protected areas in individual countries varies, ranging from 8% in the Lviv Oblast to 75% in the Krosno subregion. Poland is characterized by a high share of protected areas throughout the entire area covered by the Programme, reaching almost 75%. While in Ukrainian oblasts, it is significantly lower, ranging from 8% to 16%. Although these values are lower for Ukraine, in recent years, there has been a trend towards creating new protected areas. The main actions taken aim to increase the area of existing national parks and create new ones.

Many ecologically important corridors with international significance pass through the area covered by the Programme: (1) the Southern Corridor (Kpd) from the Bieszczady Mountains to the Rudki Forests, passing through the Przemyśl and Dynów Foothills, the Beskid Wyspowy, and (2) the Carpathian Corridor (KK) running through the Bieszczady, Beskid Niski and Sądecki, Pieniny to the Tatra Mountains. Throughout its length, it connects with parts of the Carpathians on the Ukrainian side.

¹⁷ Own compilation based on the results of the annual air quality assessment in the Podlaskie, Podkarpackie, Mazowieckie, and Lubelskie voivodeships, GIOŚ (Chief Inspectorate for Environmental Protection), and <https://www.regional.atmosphere.copernicus.eu>

¹⁸ M. Dworak, Ochrona gatunkowa roślin, zwierząt i grzybów

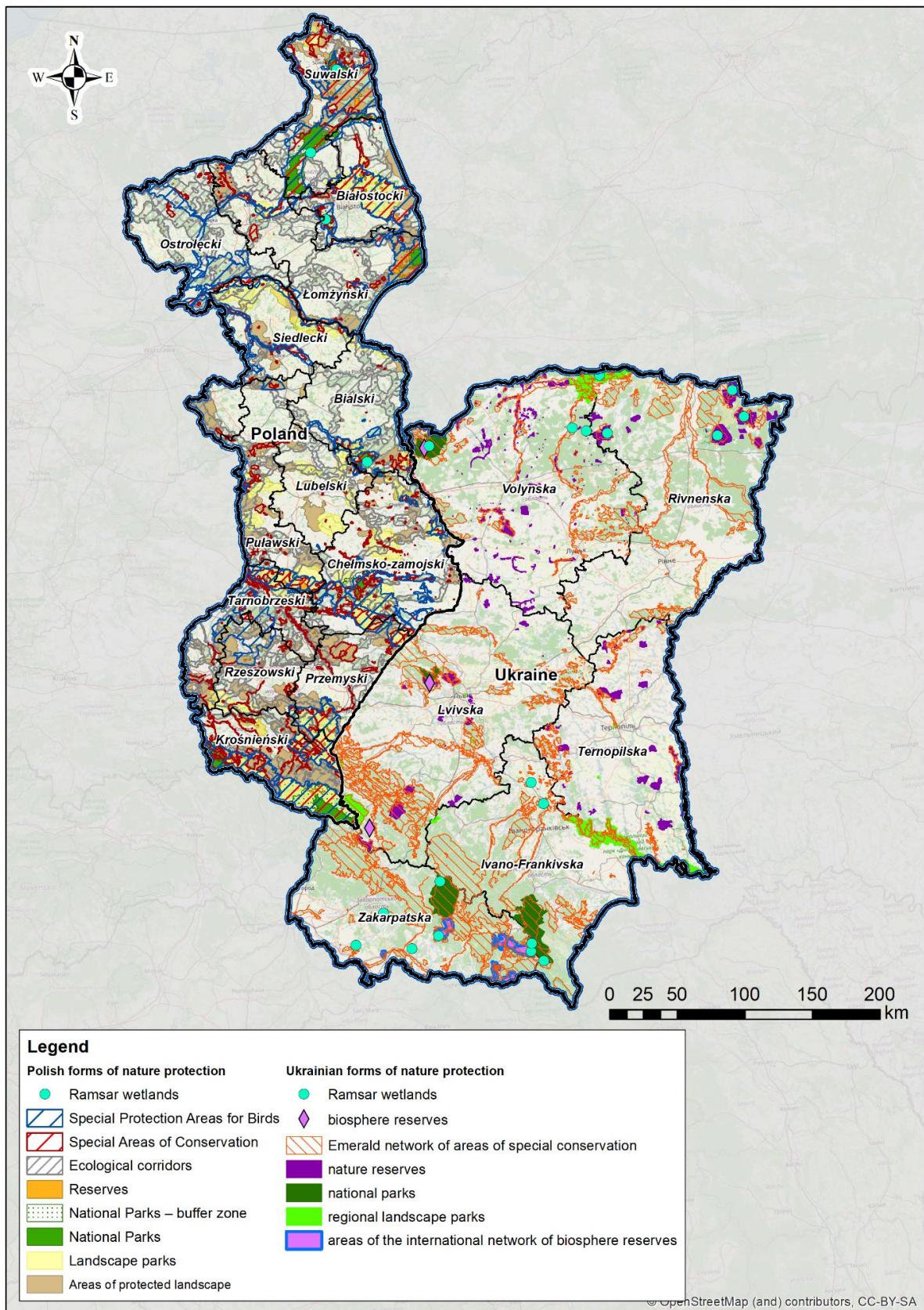


Figure 6 Nature protection in the Programme area without Natura 2000 sites and biosphere reserves (on the Polish side)¹⁹.

A variety of nature protection forms are located within the Programme implementation area. The table below provides a collective characteristic of objects covered by specific forms of protection. It is important to emphasize that the definitions of individual forms of nature protection differ in each of the countries participating in the Programme and can be interconnected. Different forms of protection may also coexist within the same area. Therefore, an attempt has been made in the table to categorize them into similar forms of nature protection, which may not correspond to their original names.

Table 5 Forms of nature protection (excluding species protection of plants, animals and fungi)²⁰

Forms of nature protection	Number and area of protected sites in the support area [km] ²			
	EN	UA	EN	UA
National parks	8	20 ²¹	1 564,39	4 365,1
Nature reserves	318	5	513,33	622,1
Landscape parks	28	21	6 930,47	2116,1
Protected landscape areas	69	-	14 291,64	-
Natura 2000 sites	233	-	27 099,06	-
Natural monuments	5 491	1402		76.2
Documentation sites	33	-	25,177	-
Ecological uses	945	-		-
Nature and landscape complexes	20	-		-
Biosphere reserves	4	1	6 383,97	-
RAMSAR areas	4	7	914,26	1 286,9

Biodiversity. Various factors play a significant role in maintaining biodiversity, especially in mountainous areas, including natural conditions, land use practices (including agriculture), subsidies for various agricultural sectors, including agri-environmental ones, and for areas covered by Natura 2000, as well as climate change and lifestyle trends. Thanks to relatively small farm sizes, the region has managed to preserve local crop diversity and traditional breeds to a large extent .

Forests in the climatic conditions of the Programme area play a significant role in maintaining biological balance. The forest area on the Polish side is approximately 1,920 km², with a forest cover of 30.8%. On the Ukrainian side, the forest area is approximately 3,781.4 km², with a forest cover of 36.8%.

The main tree species in the Carpathians on the Polish and Ukrainian sides are spruce, fir, and beech. The virgin beech forests in the region are unique in Europe. Forested areas in the region are characterized by high biological diversity and have a unique role in climate regulation and a powerful potential for ecosystem services.

In particular, the potential of forest products (mushrooms, berries) is a significant factor providing additional income and employment for the local population.

¹⁹ Own analysis based on <http://geoserwis.gdos.gov.pl>

²⁰ Own compilation based on data from the Chief Inspectorate for Environmental Protection (GDOŚ) <http://crfop.gdos.gov.pl> and consulted with experts from Ukraine

²¹ <https://www.nationalparks.in.ua/pryrodni-parky/> (National parks of Ukraine), <https://www.google.com/maps/d/viewer?mid=1KeD07qEYVE1rUzuDCQkbaJuQZsKDWdM&ll=50.324422731417584%2C25.165011473272322&z=8>, <https://zakon.rada.gov.ua/laws/show/526/2020#Text>

On the Ukrainian side, in the Volyn and Rivne Oblasts, pine is most commonly found on their northern territories. Birch, alder, poplar, and willow are also present. In the southern parts of these regions, as well as in the Lviv, Ivano-Frankivsk, and Ternopil Oblasts, oak, hornbeam, ash, maple, and lime occupy quite large areas. The largest share of forests and wooded areas is found in the Zakarpattia Oblast.

Poland

The high proportion of protected areas in Poland is primarily due to the diverse terrain, transitional climate, and geological and soil variability. Within the Programme implementation area on the Polish side, there are 8 national parks: Wigierski NP, Biebrza NP, Narwiański NP, Białowieża NP, Poleski NP, Roztoczański NP, Magurski NP, and Bieszczadzki NP; 30 landscape parks, approximately 318 nature reserves, and various forms of conservational nature protection, such as protected landscape areas (69), documentation sites (33), ecological utilities (945), natural and landscape complexes (20), and natural monuments (5,491). Additionally, Białowieża NP, Łuknajno Lake, Western Polesie, and Eastern Carpathians have been recognized by UNESCO as Biosphere Reserves due to their natural uniqueness. Białowieża NP is also part of UNESCO's World Heritage. Białowieża NP, along with Bieszczady NP, has been honored with a diploma from the Council of Europe. Some wetland areas within the Programme implementation area, due to their internationally significant natural values, are also protected under the Ramsar Convention, including Wigierski NP, Biebrza NP, Narwiański NP, Poleski NP, Dolina Rospudy, and Łuknajno Lake.

National parks and landscape parks²² cover a total of approximately 8,494 km² on the Polish side. The Natura2000 habitat areas cover about 10,802.8 km², or about 14% of the Polish territory, while Natura 2000 bird areas cover about 16,296.2 km². Within the analyzed area of this document in the Polish part, there are approximately 233 Natura 2000 sites, with some areas located on the Programme's border. The Natura 2000 network in the Polish part includes all 8 national parks mentioned earlier, fully or partially protected as Special Areas of Conservation (SAC) and Special Protection Areas (SPA) within the European Natura 2000 network.

It is important to note that ecosystems in the Polish and Ukrainian parts of the Programme area interpenetrate, and formal borders have no significance in the functioning of ecosystems.

Among the most threatened plant species (according to the Polish Red Book of Plants) are: *Allium ursinum*, *Consolida regalis*, *Platanthera bifolia*, *Epipactis atrorubens*, and *Saxifraga paniculata*. Extremely endangered animal species (according to the Polish Red Book of Animals) include: *Bonasa bonasia*, *Mergus albellus*, *Botaurus stellaris*, *Haliaeetus albicilla*, *Elaphe quatuorlineata*, and *Zamenis longissimus*.

The analyzed area covered by the Programme in Poland includes the following SAC areas: PLB 200006 Biebrza Basin, PLB 280008 Pisz Forest, PLB 280007 Napiwodzko-Ramudzka Forest, PLB 200001 Narew Basin, PLB 200002 Augustów Forest, PLB 200003 Knyszyn Forest, PLB 140014 Lower Narew Valley, PLB 140005 Omulwia and Płodownica Valleys, PLB 140007 White Forest, PLB 140001 Polesie, PLB 140004 Middle Vistula Valley, PLB 140006 Lesser Poland Vistula Gorge, PLB 060015 Podedworze Reservoir, PLB 060014 Mosty-Zahajki Site, PLB 060001 Bubnów Bog, PLB 060020 Nielisz Reservoir, PLB 060013 Upper Łabuńka Valley, PLB 060012 Roztocze, PLB 060017 Upper Huczwa Basin, PLB 060021 Sołokija Valley, PLB 060018 Szyszła Valley, PLB 180005 Sandomierz Forest, PLB 180003 Salty Mountains, PLB 140001 Lower Bug Valley, PLB 140002 Liwiec Valley, PLB 060003 Middle Bug Valley, PLB 060006 Parczew Forests, PLB 060004 Tyśmienica Valley, PLB 060002 Chełm Peat Bogs, PLB 060007 Strzeleckie Forests, PLB 060008 Solska Forest, PLB 060005 Janowskie Forests, and PLB 180001 Przemyśl Foothills.

The analyzed area covered by the Programme also includes the following SPA areas: PLH 200003 Suwałki Refuge, PLH 200001 Jeleniewo, PLH 200004 Wigry Refuge, PLH 200008 Biebrza Valley, PLH 200002 Narwia Marshes, PLH 200014 Brzeski Fortifications Shelters, PLH 140013 Lucynów-Mostowiec Dunes, PLH 00005 Augustów Refuge,

²² It should be noted that the formal-legal statutes of national and landscape parks differ on both sides of the border

PLH 060015 Nałęczów Plateau, PLH 060005 Middle Wieprz Valley, PLH 060021 Świdnik, PLH 060007 Gościeradów, PLH 060031 Janowskie Forests Sites, PLH 140011 Nadbużański Refuge, PLB 140001 Lower Bug Valley, PLH 140007 Kantor Stary, PLH 060001 Chmiel, PLH 060012 Olszanka, PLH 060013 Poleska Refuge, PLH 060054 Opole Lubelskie, PLH 060055 Puławy, PLH 060053 Terespol, PLH 060018 Stawska Góra, PLH 060024 Sobowice Peat Bog, PLH 060004 Dobryń, PLH 060039 Dobużek, PLH 060003 Debry, PLH 060042 Szyszła Valley, PLH 060044 Niedzieliska, PLH 060025 Sieniocha Valley, PLH 060020 Senderki Mines, PLH 060035 Western Bug Valley, PLH 140004 Seroczyn Forests, PLH 060002 Czarny Las, PLH 060061 Orłów Forest, PLH 060008 Hubale, PLH 060059 Drewniki, PLH 060010 Kąty, PLH 060011 Krowie Bagno, PLH 060019 Uściwierskie Lakes, PLH 060058 Woliczka Valley, PLH 060006 Gliniska, PLH 060027 Grabowiec Pastures, PLH 060016 Popówka, PLH 060017 Central Roztocze, PLH 060023 Chełm Peat Bogs, PLH 060014 Meadows near Huczwa, PLH 180006 Kołacznia, PLH 060022 Święty Roch, PLH 060026 Wodny Dół, PLH 060028 Zarośle, PLH 060029 Żurawce, PLH 180017 Horyniec, PLH 180008 Fort Salis Soglio, PLH 180001 Magura Refuge, PLH 120033 Bednarka, PLH 180016 Rymanów, PLH 180018 Trzciana, PLH 180009 Węglówka Mines, PLH 180011 Jasiołka, PLH 180015 Łysa Góra.

Additionally, within the boundaries of the area covered by the Programme, there are 4 Special Protection Areas (PLC) where the borders of bird areas (PLB) overlap with the borders of habitat areas (PLH). These include: PLC 200004 Białowieża Forest, PLC 200002 Upper Narew Valley Refuge, PLC 200003 Breakthrough Valley of the Narew, and PLC 180001 Bieszczady.

Białowieża National Park is the oldest reserve in Europe. The Białowieża Forest consists of preserved primeval forest areas, where many trees are 200-300 years old, and some oaks are even 600 years old. The forest is known for the world's largest wild bison herd. This species was hunted to near extinction in the early 20th century but survived in some zoos, allowing for reintroduction. Wolves, deer, moose, and wild boars are also part of the national park's fauna. Many areas of the park retain the natural vegetation communities. The most characteristic and schematic layout is the arrangement of forest communities in the valleys of watercourses.

In Biebrza National Park, there are several valuable habitat areas. Over 40% of the park's area is occupied by hydric habitats. Among natural communities, non-forest communities include sedge meadows, moss communities, and reed beds, while forest communities include alder forests, birch forests, and swampy pine forests. The aquatic ecosystems are represented by the Biebrza River and its tributaries, as well as numerous oxbow lakes. The Biebrza River, along with its permanently or periodically connected backwaters, creates excellent conditions for the development of ichthyofauna. So far, 38 fish species have been recorded in the Biebrza and its tributaries, including the exceptionally rare Ukrainian spined loach. The species composition of the Biebrza River basin's ichthyofauna differs from that found in other lowland rivers in Poland. Cyprinid fish from the phytophilous reproductive group, such as roach, bleak, pike, perch, ide, and ruffe, dominate here. Three species—roach, pike, and ruffe—exhibit the highest occurrence stability (over 80%) throughout the entire park. The most significant threats to many ecosystems and their natural values in the park are land drainage and the abandonment of extensive use of marsh meadows and cattle grazing by the local population. Roads passing through wetland ecosystems, often poorly designed and constructed in the past, also pose a problem. There is a conflict between the requirements of wetland protection (maintaining habitat continuity and wetting) and the function of the road (adequate strength and durability, hence drainage).

Wetlands, peat bogs, and marshes within the Programme area are a significant element of protected areas. These areas are also protected under the Ramsar Convention. In the Polish part, most such areas are found in the Podlaskie Voivodeship, including the Biebrza Marshes, Czerwone Bagno, Rospuda Valley, and the High Marsh Reserve. Wetland areas play a crucial role in ecosystems, including water storage and improving water quality. Their role in ensuring resilience to drought is particularly important. They protect against floods and the effects of heavy rainfall. These areas maintain genetic, biocenotic, and ecosystem diversity, playing a key role in the life cycles of many species and in annual migration patterns.

The Rospuda Valley contains a peatland area, including low and high peat bogs, primarily transitional (soligenous) peat bogs with natural, unaffected by human activities, water conditions. Soligenous peat bogs, covered by moss

communities of the Scheuchzerio-Caricetea nigrae class, occupy an area of over 100 ha in the Rospuda Valley and constitute the most valuable natural habitat of this area. In such areas, there are extensive plant communities dependent on water, such as reed beds, bog mosses, manna grass meadows, and sedges. The Rospuda Valley is protected due to the presence of rare plant and animal species. There are, for example, 20 representatives of the orchid family, which are under strict legal protection, including the only occurrence of *Epipactis atrorubens* in Poland, and one of the few locations of the *Dactylorhiza incarnata* subsp. *ochroleuca* orchid. Additionally, the valley is home to other orchids, such as *Platanthera bifolia*.

Similar peat bogs are also found in the Lubelskie Voivodeship: the peat bog near Lake Czarne and the Sobowice peat bog. Most of the Black Lake Reserve is occupied by a high peat bog of the continental type with characteristic dwarf pines and birches.

Ukraine

In Ukraine, there are 663 protected areas and objects of national importance, including 20 national parks, 5 biosphere reserves, and 21 landscape parks. The total area is 4085.862 km² (6.77%). The percentage of protected areas within the Programme area is 11.1%, which is higher than the national average in Ukraine. In the Ukrainian part of the Programme area, there are 20 national parks: Verkhovynsky, Khalytsky, Hutsulshchyna, Carpathian, Syniohora (Ivano-Frankivsk Oblast); Boykivshchyna, Beskydy Korolivski, Northern Podillya, Beskydy Skolski, Yavorivsky (Lviv Oblast); Derman-Ostrog, Noble (Rivne Oblast); Dniester Canyon, Krzemieniec Mountains (Ternopil Oblast); Enchanted Land, Synevir, Uzhansky (Zakarpattia Oblast); Pripjat-Stokhid, Shatsky, Cumanska Forest (Volyn Oblast)²³, and several areas with high conservation status. It is important to note that the Ukrainian categorization does not correspond to the IUCN classification used by the EU and Poland, leading to the inability to directly compare between countries. Therefore, the Bern Convention Committee decided to establish an ecological network of areas of special conservation interest (ASCI), the so-called Emerald Network. The creation of the Emerald Network is expected to have a positive impact on the protection of endangered species and their natural habitats²⁴. The Emerald Network is the equivalent of the Natura 2000 network in countries that are not members of the European Union. Special attention is given to nature conservation forms in the immediate vicinity of the Polish borders: Nadsansky Landscape Park, Roztochya Strict Nature Reserve, Yavoriv National Park, Uzhansky National Nature Park and Nadsansky Regional Landscape Park in Ukraine (respectively in Zakarpattia and Lviv Oblasts) are part of the East Carpathians Biosphere Reserve. Roztochya Nature Reserve, Yavoriv National Nature Park, and Roztochya Regional Landscape Park (Lviv Oblast) are part of the Roztochya Biosphere Reserve. Shatsky National Park is part of the "Polesie Zachodnie" Biosphere Reserve.

4.2.2. SOILS

Soils serve many crucial and essential functions for the existence of humans and ecosystems. They are a source of food, biomass, raw materials, provide a natural habitat for numerous organisms, accumulate genetic resources, and act as a storage, filter, and transformer of various substances such as water, nutrients, and carbon. To enable the fulfillment of these functions, it is crucial to ensure their appropriate quality.

The map below presents the basic characteristics of soils in the Programme area. A significant portion of the soils is susceptible to erosion caused by wind and water. Given this serious threat to soil structure, it becomes crucial to take preventive actions. Among the main factors contributing to erosion are inappropriate land improvement practices, the elimination of field boundaries due to the consolidation of smaller farms, removal of hedgerows, shrubs, and intra-field tree stands, excessive deforestation, overly intensive animal grazing, improperly located

²³ <https://www.nationalparks.in.ua/pryrodni-parky/> (National parks of Ukraine), <https://www.google.com/maps/d/viewer?mid=1KeD07qEYVEI1rUzuDCQkbaJuQZsKDWDm&ll=50.324422731417584%2C25.165011473272322&z=8>, <https://zakon.rada.gov.ua/laws/show/526/2020#Text>

²⁴ Areas of Special Conservation Interest – ASCI, <https://www.biodiversity-z.org/content/areas-of-special-conservation-interest-emerald-network-asci>

roads, cultivation on steep slopes, and along them, which promotes surface runoff. Most of these factors also have a negative impact on biodiversity, providing an additional incentive for conservation efforts, especially in agriculturally used area.

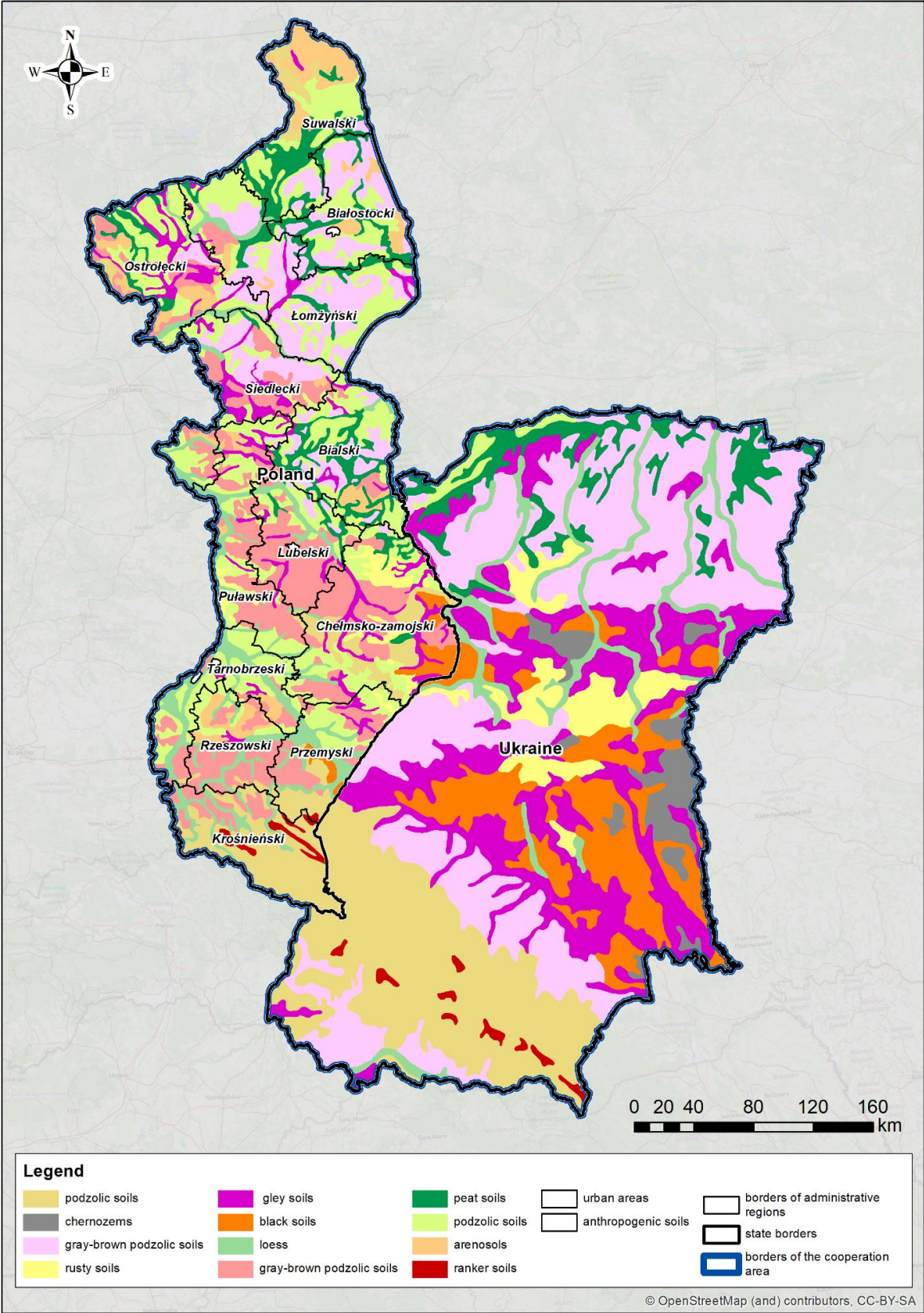


Figure 7 Soil types in the Programme area²⁵.

Poland

In the Lublin region, the following types and distinct types of soils are encountered:

- Loamy-podzolic soils,
- Brown soils,
- Chernozem soils,
- Black earth soils,
- Podzols,
- Muck soils,
- Swamp soils.

Loamy-podzolic soils dominate on moraine and fluvio-glacial formations in the lowlands of Lublin, as well as on a significant portion of upland loess. Brown soils occur in some areas on loamy sands and moraine clays, but their main distribution is limited to the loess region. The only parent rock for "Lublin" chernozem soils is loess. "Lublin" black earth soils are not clearly associated with any type of surface rock or substrate. Most swamp soils are developed on lowland peat bogs, with very few found in upland and intermediate peat bogs in the Lublin region²⁶.

The largest area of Podlasie is covered by leached podzols and brown leached soils, followed by true brown soils. These soils have formed on post-glacial deposits such as glacial tills and loamy sands. In sandy field plains, rusty leached and leached loamy soils have developed. In the valleys of the Narew and Biebrza rivers, as well as on the Kurpie Plain, the largest areas in the province have hydrogenic soils - swamp and peat soils²⁷.

Soil acidification in Poland is one of the most important factors limiting crop production. It is influenced by both climatic and soil conditions, as well as human activities. In the Podkarpackie Voivodeship, 41 to 60% of soils are acidic, while in the Podlaskie and Lubelskie Voivodeships, it ranges from 21 to 30%. The proportion of very acidic and acidic soils, where soil pH limits the selection and size of crop yields, accounts for about 58% of arable land, ranging from 30 to over 80% at the regional level. This makes Poland the only country in Europe where soil acidification of agricultural land is of such significant concern. Additionally, strong human impact, primarily through the use of fertilizers and the removal of basic cations with the harvest, contributes to further soil acidification. The use of physiologically acidic fertilizers, with inadequate doses of lime fertilizers, poses a particularly dangerous threat, as their consumption deviates from actual needs. The total content of macro- and microelements available to plants in the soil is referred to as soil fertility²⁸.

Ukraine

In the western part of Ukraine, various soil types are present, including brown soils, podzolic soils, and leached soils. These soils have developed on the substrate of coniferous, deciduous, and mixed forests. In Polesie, coniferous forests and podzolic soils predominate, along with extensive wetlands and associated swamp soils. In the Carpathians and Zakarpattia, deciduous and mixed forests dominate, accompanied by brown and leached soils. The remaining areas of the country are nearly devoid of forests. The land use structure in the Programme area (Ukrainian side) shows a high proportion of forests and forested areas (36.9%), more than twice the Ukrainian average. Simultaneously, the share of agricultural land (52.3%) in the region is significantly smaller than the national average. Ternopil Oblast is the only exception, where these indicators are close to the national average.

The diversity of natural conditions has led to a variety of soils in the region. In the Ukrainian Carpathians' mountainous areas (Zakarpattia, Ivano-Frankivsk, Lviv), mountain-forest brown soils prevail, consisting of

²⁶ http://ssa.ptg.sggw.pl/files/artykuly/1954_03/1954_tom_3/tom_3_131-134.pdf

²⁷ <https://www.zielonewrota.pl/>

²⁸ Environmental Protection Report 2019, Central Statistical Office (GUS)

gravelly mountain brown soils and their gravelly variations. Forest meadow and meadow soils are less common. In the plains of Zakarpattia, leached loamy podzolic soils and their gleic variations dominate. In Zakarpattia, Ivano-Frankivsk, and Lviv oblasts, there are also small areas covered with leached brown podzolic soils and their surface variations.

In the northern parts of Volyn and Rivne, podzolic soils are most common: meadow-podzolic-sandy and clayey-sandy; weakly leached; moderately leached soddy soils in combination with peat bogs and swampy ones; clayey soddy soils have developed primarily on sands, loamy sands, and clays, in combination with low-humus sands. Meadow, meadow-swampy, and swampy soils, peat bogs, and mires also occur. Further south, including in Lviv Oblast, light gray and gray podzolic soils, dark gray leached podzolic soils, and leached chernozems are found. Lviv Oblast also has moderately and strongly leached surface-gley soddy soils and meadow soils.

In Ternopil Oblast, typical chernozems with low or negligible organic matter content, leached chernozems, light gray podzolic soils, and light gray and gray podzolic soils are common. Chernozem soils are also present. Overall, Ternopil Oblast has the most fertile soils in the Programme area (on the Ukrainian side). Environmental challenges include wind and water erosion, as well as pesticide residues in the soil.

4.2.3. SUMMARY

Biodiversity is the foundation of ecosystem functioning. Ecosystems, due to their diversity, perform many crucial functions used daily by humans. Over time, human requirements for the environment have changed, especially over the past few decades. The latest trends indicate an increased demand for organic crops and other plant products, the need for wood, climate change mitigation, regulation of water flow in rivers and wetlands, and an increased demand for recreational and tourist services in most ecosystems.

Considering the unique natural values of the Programme area, it is essential to consider the threats and problems that may affect nature and biological diversity in the context of potential investments carried out under the Programme. All investments must be conducted while adhering to the highest standards of habitat protection, protection of the fauna and flora of protected areas, or even bypassing these areas (especially those under strict protection).

The most significant threats and problems identified during the diagnosis of the current state of the natural environment, based on nature monitoring conducted by the State Environmental Monitoring in Poland (GIOŚ), are presented in the table below.

Table 6 Main drivers of change in nature and impact on biodiversity

Changes in the environment nature	Factors of change
Loss of non-forest and wetland habitats for birds, including the most endangered ones (adjoining water and wetland ecosystems).	<ul style="list-style-type: none"> • inadequate drainage management; • over-fertilisation; • abandonment of agricultural use (grazing, mowing); • inadequate hydraulic engineering; • regulation of rivers and streams; • expansion of transport infrastructure; • urbanisation and tourism pressure on habitat areas
Habitat fragmentation, including disruption of ecological corridors	<ul style="list-style-type: none"> • expansion of transport infrastructure; • pressure from tourism and urbanisation; • regulation of rivers and mountain streams

Disturbance of species composition natural habitats	<ul style="list-style-type: none"> • dehumidification; • environmentally destructive and transformative investments (road, rail, hydraulic engineering); • introduction of alien and invasive species; • climate change, including high temperatures, changing hydrological conditions and other factors in the environment; • the development of tourism and communications contributing to the spread of alien species
Secondary succession of non-forest habitats	<ul style="list-style-type: none"> • abandonment use of agricultural use, in particular abandonment of use of grassland
Qualitative and quantitative changes natural habitats as a result of eutrophication of waters	<ul style="list-style-type: none"> • over-fertilisation and use of plant protection products, lack of adequate wastewater treatment systems
Mechanical destruction of rare plants and natural habitats	<ul style="list-style-type: none"> • development of tourism and recreation
Degradation of values landscape	<ul style="list-style-type: none"> • development of communication and tourism infrastructure, urbanisation

The above changes are further compounded by climatic variations, mainly manifested as floods, hurricanes, and droughts, requiring the preparation of appropriate response measures and a long-term strategy. The Programme identifies actions, particularly in the field of water and sewage management, the implementation of which may potentially have a negative impact on the state of species and natural habitats, especially in areas with hydric values such as wetlands, peat bogs, etc., through their fragmentation, mechanical destruction, and degradation of natural values. However, the extent of impact will depend on the location, specificity, and manner of project implementation, especially investment projects such as sewage treatment or the construction of small retention facilities. Significant impact can be expected in the case of investments carried out near environmentally valuable areas, as well as investments indirectly affecting the condition of habitats and species through other environmental components. This impact will undergo further analysis as part of developing the SEA Report .

Failure to implement actions related to nature protection specified in the Programme may, in turn, affect the lack of progress in halting negative trends in nature conservation. Some of the investments under the Programme are aimed precisely at the protection, regeneration, and sustainable use of environmentally valuable areas, as well as sustainable tourism in a cross-border context.

4.3. CLIMATE CHANGES

4.3.1. INTRODUCTION

Climate change will increasingly impact the magnitude of emerging natural threats. Another factor following climate change is the development of infrastructure (human civilization), which unfortunately often occurs in a chaotic, unplanned manner with many serious mistakes, consequently making the natural environment more susceptible to threats from weather-related factors.

In Europe and worldwide, the effects of climate change are becoming more noticeable. The average global temperature, currently about 0.8°C above pre-industrial levels, continues to rise. Natural precipitation processes and patterns are changing, glaciers are melting, and sea levels are rising.

Poland

The climate in Poland is characterized by significant weather variability and considerable seasonal variations over consecutive years. Average annual air temperatures range from just above 5°C to nearly 9°C. The duration of

seasons varies regionally: summer lasts from 60–70 days in the northern part of Poland to 100 days in the southeast, in the central, western, and southwestern parts; winter lasts from 10–40 days by the sea and in the west to 3–4 months in the northeast, and even up to 6 months in the Tatra Mountains.

In most of Poland, a decreasing trend in the number of frosty and very frosty days (days with maximum daily temperature $\leq 0^{\circ}\text{C}$ and days with maximum temperature $\leq -10^{\circ}\text{C}$, respectively) is observed. Only small increases in the number of frosty days were noted in areas supported by Poland. Across the predominant area, the length of frosty periods shows a slight upward trend, with the longest lasting over 20 days occurring in the northeastern part of the country, beyond the Outer Western Carpathians (OW), while decreases were observed only in the mountains.

The temperature increase by about $0.7\text{--}0.9^{\circ}\text{C}$, as a result of warming, in terms of radiation intensity W/m^2 , yields a value of 1.6. Recent studies demonstrate that climate change is reflected in the variability of solar conditions in Poland. The annual variation in average sunshine hours in Poland ranges from about 1400 to 1700 hours per year. The effects of warming are also evident in the intensified occurrence of extreme weather events in Poland²⁹. Maps of the risk of droughts, hurricane winds, tornadoes, hail, and other selected dangerous meteorological phenomena are being prepared. In addition to physical protection against these phenomena—retention basins, dry polders, flood embankments, etc.—crisis management systems enabling a rapid response and proper action by emergency services are crucial. In border areas, ensuring cooperation among emergency services from neighboring countries—police, fire brigades, and emergency medical services—is therefore essential.

To avoid the most serious threats associated with climate change, especially large-scale irreversible effects, as agreed under the Climate Convention, global warming should be limited to a maximum of 2°C above pre-industrial levels. During the last decade (2002-2011), the average land surface temperature in Europe was about 1.3°C above pre-industrial levels, indicating that temperature increases in Europe are occurring more rapidly compared to the global average. Increased frequency of certain extreme weather events, more frequent heatwaves, forest fires, and droughts have been observed. There is an expected increase in atmospheric precipitation and floods, as well as a higher risk of coastal erosion. A greater number of such events will likely lead to an increase in the scale of natural disasters, resulting in significant economic losses and public health issues, including an increased number of casualties.

However, there are differences between national crisis management systems that hinder cross-border cooperation. Differences include regulations and competencies related to population protection and disaster management. There are also variations in decision-making competencies regarding the delegation of emergency services for rescue operations beyond the country's borders.

Climate change is of particular significance in the context of changes in nature, which must adapt to new conditions. Climate change is a significant driver of evolution and has a major impact on shaping biodiversity. Concurrently with climate change, the distribution ranges of many plants will change, species migration will occur, and existing ecosystems will undergo transformations. Recent studies from the University of Agriculture in Krakow indicate changes resulting from climate change even in resilient species like common spruce. Common spruce is a species particularly vulnerable to future climate changes as it prefers cool and humid habitats associated with a continental climate. Current changes are causing numerous diebacks of spruce stands in Poland. Spruce is harmed not only by rising average temperatures but also by the associated decline in groundwater levels due to droughts, as these trees have a shallow root system. Similar effects may occur with other more sensitive species of animals and plants in the areas covered by the Programme³⁰.

²⁹ <http://klimada.mos.gov.pl/zmiany-klimatu-w-polsce/tendencje-zmian-klimatu/>

³⁰ <https://naukawpolsce.pl/>

Ukraine

Ukraine has been a party to the United Nations Framework Convention on Climate Change and the Kyoto Protocol since 1996. However, for quite some time, the legal framework has contained several gaps related to certain mechanisms and actions for climate change adaptation. For instance, the Concept for the Implementation of the State Policy on Climate Change until 2030 was adopted only at the end of 2016, the action plan for its implementation by the end of 2017, and the Low-Emission Development Strategy of Ukraine until 2050 in mid-2018.

Experts emphasize the sensitivity of regions and industries to climate change. Since the beginning of the 21st century, there has been a significant increase in air temperatures in Ukraine (average for the years 1991–2016 +8.8°C; average for the years 2007–2016 +9.4°C). Adverse phenomena such as sudden weather changes, an increase in the frequency and intensity of dangerous natural events in both warm seasons (storms, squalls, hail, prolonged heatwaves) and cold seasons (snowfall, ice), an increase in the frequency and intensity of droughts, and the expansion of affected areas, as well as changes in the mid-annual distribution of river runoff in Ukraine, are observed.

Consequently, there are significant implications for human health, agriculture, water supply, as well as consequences such as changes in the boundaries of natural zones, soil degradation, the appearance of invasive species, reduced vitality, and resilience of forests.

In the area covered by the Programme, an increase in atmospheric precipitation and intensified flooding is particularly noticeable. However, the increase in average air temperature is less pronounced than across Ukraine as a whole.

The State Emergency Service, along with regional units, is responsible for special measures to protect the population and territories from crisis situations. In 2019, the Programme area experienced 26 natural disasters, including those related to rapid increases in water levels due to atmospheric precipitation. In 2020, adverse weather conditions and heavy rainfall in the Zakarpattia, Chernivtsi, Ivano-Frankivsk, Lviv, and Ternopil regions in Ukraine caused a rapid rise in water levels in rivers and the flooding of territories. Poor weather affected 300 settlements.

4.3.2. COMMON CLIMATE CHANGE ISSUES

Agriculture

Changing climatic conditions can lead to both favorable and harmful effects in the agricultural sector. It is expected that elevated temperatures will extend the growing season in the northern part of the area, and crops suitable for cultivation only in the south may potentially become profitable in the north. At the same time, forecasts indicate a slight increase in precipitation in summer and winter, but a likely decrease in water supply in spring, which could negatively impact crop productivity. The greatest threat to agricultural production may be changes in the frequency and intensity of droughts and heatwaves, which are expected to intensify, causing growing stress in agricultural production. In dry years, yields of cereals and legumes may decrease by 10 to 20%, and in strong drought years, even by 30 to 40%. Adverse effects of warming in agriculture are also associated with an increase in the frequency and duration of winter thaws and the associated increased likelihood of damage to winter crops. Additional threats include an increased probability of invasive pests and an increased likelihood of fires.

Forestry

The impact of climate change on the forestry sector is uncertain, but negative effects are likely to outweigh positive ones. While increased growth may occur due to longer growing seasons, forests are likely to be

threatened by an increase in the number of pests and pathogens due to warmer weather, increased risk of fire due to drier and warmer conditions, and increased stress caused by drought.

Water Resources

As a result of the increase in winter temperatures, we can observe changes in river discharge, which increases in winter months due to more intense snowmelt. In contrast, during the summer, especially in the warmer southern region, water discharge may decrease due to higher temperatures. Increased evapotranspiration and potential reductions in total precipitation can lead to lower river flows in the summer season. At the same time, we can expect lower levels of spring floods. These changes have far-reaching, negative consequences for unique aquatic and semi-aquatic ecosystems, exposing them to degradation. Moreover, the variability in flow patterns may contribute to the transfer of pollutants from agricultural fields to water bodies. Although the total amount of precipitation may remain relatively constant, it is expected that its intensity and frequency may change, increasing the risk of floods and negatively affecting water quality.

A challenge is the increasingly frequent heavy rains and intense storms, where the permeability of stormwater drainage becomes a problem, leading to urban flooding, especially in areas that are mostly paved. Urban areas must address these new challenges and adapt their infrastructure to the advancing climate changes by constructing small retention, blue, and green infrastructure to reduce the impact of droughts and floods in cities.

Urban Challenges

The challenge lies in the increasingly frequent torrential rains and intense storms, where the permeability of rainwater drainage systems becomes a problem, leading to flooding in cities, where a larger part is hardened terrain. Urban areas must address these new issues and adapt their infrastructure to advancing climate change, through the construction of small retention, blue, and green infrastructure to reduce the impact of droughts and floods in cities.

Energy

While warmer winters may reduce heating costs for buildings, higher temperatures, as well as increased frequency and intensity of droughts and heatwaves, may lead to higher demand for cooling in warmer months and additionally burden the system. Moreover, changes in climatic conditions that may increase the demand for energy or damage aging energy infrastructure can pose a greater burden on energy security.

Health

Changing climatic conditions can lead to increased burdens on the health sector through an increase in crisis situations, worsening living conditions, and the spread of infectious diseases. Changing climatic conditions particularly affect individuals with chronic diseases such as diabetes, asthma, malnutrition, and cardiovascular diseases, as well as the elderly and those with lower incomes. The negative health effects of climate change are most severe for particularly vulnerable groups, especially the elderly, disabled, children, individuals with low incomes, and the homeless.

SUMMARY

In the course of work on the Strategic Adaptation Plan for sectors and areas sensitive to climate change until 2020 with a perspective until 2030³¹, possible damages caused by weather phenomena for the most vulnerable sectors have been specified.

³¹ http://www.mos.gov.pl/g2/big/2013_03/e436258f57966ff3703b84123f642e81.pdf

Table 7 weather and climate phenomena causing social and economic damage³².

Sector	Agriculture, diversity biological, resources water	Forestry	Health, community local	Infrastructure
Injurious phenomenon	<ul style="list-style-type: none"> • flooding • hurricane • lightning • drought • adverse winter effects • spring frosts • torrential rain (causing flooding, landslides) • hail 	<ul style="list-style-type: none"> • flooding • strong winds (hurricane, tornado) • drought • flooding and landslides (caused by torrential rain) • snowstorm, heavy snowfall • lightning 	<ul style="list-style-type: none"> • heat waves • cold waves • extreme events causing psychosocial damage (flooding, strong winds, hail) 	<ul style="list-style-type: none"> • flooding • flooding • hurricane • discharges atmospheric • hailstones

The effects listed in the table can be further supplemented by additional tropospheric ozone pollution resulting from heatwaves and its significant health effects, as well as the negative impact of temperature rise on the survival of many species.

With the increase in temperature, the phenomenon of eutrophication of inland waters will intensify, posing increased threats to life and health due to thermal stresses and increased air pollution (e.g., ozone). There will be an increased demand for electrical energy in the summer season. The cooling conditions for thermal power plants will deteriorate, potentially causing energy production limitations and other phenomena detailed in the Strategic Adaptation Plan for sectors and areas sensitive to climate change until 2020 with a perspective until 2030³³.

The direct cause of climate change is energy production based on fossil fuels (coal, oil, gas), transportation, and related emissions of a significant amount of greenhouse gases into the atmosphere. These gases, remaining in the atmosphere, contribute to the greenhouse effect, causing an increase in the average global temperature. In the Poland-Ukraine cross-border region, the source of greenhouse gas emissions is the consumption of a considerable amount of hard coal and lignite in the energy sector, both industrial and municipal sectors.

Given the difficulties in reaching a global agreement on limiting greenhouse gas emissions and the upward trend in emissions, it cannot be expected that greenhouse gas emissions will be reduced to a level that would halt climate change in the foreseeable future. In this situation, adapting to these changes becomes a priority, especially in Poland, which, compared to many other countries, is less prepared to minimize the effects of current weather phenomena (floods, low water retention, etc.).

From a climate perspective, among the most important actions that could be implemented within the Programme include:

- Supporting all activities for climate change adaptation, as we already incur significant losses due to climatic events,

³² Strategic Adaptation Plan for Sectors and Areas Sensitive to Climate Change by 2020 with a Perspective to 2030, by E. Siwiec (IOŚ-PIB)

³³ a.a.

- Supporting the development of renewable energy sources to not only fulfill the obligations of countries under Directive 2009/28/EC on the promotion of the use of energy from renewable sources but also to exceed the specified shares in production for various reasons (such as the positive impact on public health through the elimination of high-emission coal combustion and others). This could be considered, for example, in the modernization of cultural and tourist heritage facilities,
- Supporting all activities to increase energy efficiency, both on the energy consumption and production sides, Supporting actions to reduce greenhouse gas emissions to curb global climate change.

The above-mentioned directions of action should be reflected in the criteria for assessing the impact of actions specified in the Programme.

4.4. RESOURCES AND WASTE

Natural Resources

Environmental resources enable the proper functioning of humans and determine the quality of their lives. Economic development in European countries is closely linked to the utilization of natural resources.

Poland

The majority of medicinal waters are found in localities clustered in the southern part of Poland, encompassing the Carpathians along with the Carpathian Foredeep. Over 50% of the total number of health resorts and localities with medicinal waters in Poland are located here.

In 2019, medicinal waters were used for balneotherapeutic purposes in health resorts with deposits, for bottling purposes in bottling plants located in Nałęczów, Polańczyk, Rymanów-Zdrój, and for the production of spa products such as salts and medicinal brines (Lubatówka – Iwonicz-Zdrój deposit), pharmaceuticals, and cosmetics (Iwonicz-Zdrój, Rymanów-Zdrój).

Thermal water: Thermal waters include underground waters with a temperature of at least 20°C at the outlet. Considering their use, thermal waters are exploited for district heating and recreational purposes. Thermal waters in Poland are found in a significant part of the Polish Lowland in extensive basins of regional importance, as well as in the Carpathians and their foothills. In the Carpathians, thermal waters are found mainly in Cretaceous, Paleogene, and Neogene formations, as well as in the Devonian and Triassic formations of the Podhale Basin, characterized by a small surface area and significant tectonic involvement³⁴.

Natural gas deposits have been documented in the foothills of the Carpathians, with small gas reserves also occurring in small deposits in the Carpathian region. Prospective conventional natural gas resources, according to the Prospective Balance of Poland's Mineral Resources, are associated with oil and gas-bearing formations: in the Carpathian Foothills and in the Carpathians (Miocene along with the substratum in the Carpathian Foredeep – about 57.1 billion m³, Carpathian flysch along with its substratum – about 30.6 billion m³). Long-term exploration prospects are associated with the western and eastern parts of the Carpathians and the Carpathian Foothills.

In Poland in 2019, 87 oil deposits were documented, including 29 in the Carpathians and 12 in their foothills (in the Carpathian Foredeep). The resources of the Carpathian Foothills and the Carpathians play a subordinate role (3.6% and 3.0% of national resources, respectively). The deposits in the Carpathians and their foothills have a long history, being the region of the world's oldest oil mining. Currently, the resources of these deposits are being depleted.

³⁴ Mineral Resources Balance in Poland as of December 31, 2019, by PIG PIB

The natural resources of the Lublin Voivodeship include deposits of mineral resources: coal, oil, and natural gas, classified as basic minerals, as well as carbonate raw materials: marls, chalk, limestones, and loams, classified as common minerals (loess, clays, muds), and natural aggregates: sands.

To date, no shale gas deposits have been documented, yet the Lublin Voivodeship is considered one of the most promising areas for such deposits.

Rock mineral resources in the Podlaskie Voivodeship are associated with Quaternary sediments and are extracted using open-pit methods. The resources of sand, gravel, and natural aggregate are particularly large. Additionally, deposits of dump clay, pond and loamy clays, lake chalk, peat, and mud deposits are found in the Augustów and Suwałki regions. The region also has mineral resources associated with older geological sediments, including:

- ilmenite-magnetite ore deposits (Udryń, Jeleniewo, Szurpiły),
- radioactive elements (Rajska region),
- rare earth elements.

In Poland, natural sand and gravel deposits are mostly of Quaternary age, only secondarily belonging to older formations: Pliocene, Miocene, and Lias. In the Carpathian region, gravel and sand-gravel deposits, mainly composed of flysch rocks, constitute the main raw material base.

Ukraine

Ukraine possesses extremely rich natural resources. The most important among them are deposits of bituminous and brown coal (Lviv-Volyn Basin) and metal ores: iron, manganese, titanium, mercury, aluminum, and nickel. Among other resources, the largest deposits are sulfur, potassium, rock salt, phosphorites, kaolin, graphite, nepheline (for soda production), and alunite (for potassium production).

The more significant deposits of natural gas and crude oil are located in the Subcarpathian region (Podkarpacie). However, oil extraction covers only about 10%, and natural gas about 20% of the country's demand. Deposits of natural wax are found near Boryslav. In Podkarpacie, there are deposits of rock salt and potassium salts.

The main part of the mineral resources in the area covered by the Programme is concentrated in the Ukrainian Carpathian regions (Zakarpattia, Lviv, Ivano-Frankivsk).

Especially the Zakarpattia region produces natural gas, brown coal, rock salt, zeolite, perlite, kaolin, bentonite clays, marble, tuff, andesite, dolomite, construction sand, bricks, roofing materials, limestone. One of the world's largest deposits of zeolite was discovered here. The region is the sole supplier of perlite raw materials in Ukraine.

The key minerals in the Ivano-Frankivsk region include oil and gas, potassium salts, raw materials for cement production, underground fresh and mineral waters, and building materials.

In terms of resources and economic significance, the minerals in the Lviv region include fossil fuels (natural gas, gas condensate, oil, coal, peat) and non-metallic minerals (potassium salts, magnesium, sulfur, limestone, cement raw materials, gypsum, clay), clays, sands, sand and gravel mixtures, sandstones, as well as ozokerite and sapropel.

In the Rivne region, deposits of amber were explored, with industrial reserves exceeding 400 tons. This indirectly led to illegal amber mining, causing significant environmental damage.

Ukraine is rich in mineral water sources. Excellent healing waters are found near Lviv (Truskavets) and in other spa resorts (Vinnytsia, Zhytomyr, Bila Tserkva, Poltava, Kharkiv).

Especially in Zakarpattia, there are known to be over 600 mineral springs, ranking first in Ukraine in terms of the quality and quantity of mineral waters. The region has almost all types of the world's most famous mineral

waters: bicarbonate-sodium, bicarbonate-sulfate, calcium-magnesium, sulfide, belonging to three types of mineralization. In total, 62 deposits have been developed.

In the Lviv region, significant reserves of mineral waters are concentrated. There are about 60 deposits with balance reserves of 5.4 thousand cubic meters per day, of which 21 deposits are in operation. The most well-known are the springs in Morsyn, Truskavets, and Velyko-Lubenske, as well as Niemirowske and Sklo. Medicinal muds were extracted from the Velyko-Lubenske deposit.

Waste

Below are the main needs and problems regarding the protection of resources and waste management that should be applied in the area covered by the Programme:

- Limiting the use of resources in favor of waste utilization,
- Protection against infrastructure development in documented strategic deposits, enabling the use of these resources in the future,
- Increasing the effectiveness of activities to prevent waste generation,
- Raising the selective waste collection rate,
- Increasing the recovery of industrial waste,
- Improving the quality of recyclable waste,
- Solving problems related to the management of increasing amounts of sewage sludge,
- Increasing the processing capacity of waste-to-energy plants,
- Reducing the amount of waste subject to landfilling and eliminating biodegradable waste from landfills.

Poland

Like all regions in Poland, the border area struggles with waste management issues. In Poland, an average of about 355 kg of municipal waste per capita was generated in 2022. The highest amount per capita occurred in the city of Rzeszów – 406 kg, while the lowest was in the Brzozów county in the Podkarpackie Voivodeship – 141 kg of waste per capita. The amount of municipal waste earmarked for composting has been increasing year by year – with an average growth of 21% over the last two years in the Programme-covered voivodeships. On the other hand, the amount of waste designated for recycling has decreased by an average of 2%³⁵. In total, on the Polish side of the Programme implementation in 2022, 1.4 million tons of municipal waste were collected. Of these, 24.7% underwent recycling, 12.2% were collected for composting or fermentation, 30.4% were collected for thermal treatment with energy recovery, and the rest, about 33%, were subjected to disposal through landfilling. In 2022, an average of 42.8% of waste was selectively collected in relation to the total municipal waste generated, with this share reaching 46.7% in households.

Statistical data for Poland indicate that less municipal waste is processed compared to the EU average. Poland (as a country) recycles 40.3% of waste, which is below the EU average of 49.6%³⁶.

Ukraine

In Ukraine, the recycling rate averages 6% (EU average is 49.6%). Generally, the following trends are typical for the waste management system in Ukraine:

- Accumulation of waste in both industry and households,
- Improper disposal and neutralization of hazardous waste,
- Disposal of household waste without considering possible hazardous consequences,

³⁵ GUS data, Bank Danych Lokalnych

³⁶ <https://www.europarl.europa.eu>. Waste Management in EU, 2021.

- Inadequate use of waste as secondary raw material,
- Ineffectiveness of implemented economic instruments in waste management.

Therefore, in 2019, 441,516.5 thousand tons of industrial waste were generated, and the total amount of accumulated waste was 15,398,649.4 thousand tons. Annual quantities of disposal and incineration are negligible - 108,024.1 and 1,059.0 thousand tons, respectively. The share of the area covered by the Programme (Ukraine) in the total amount of industrial waste generated in 2019 is less than 2%, or 7,442.5 thousand tons, of which 5,486 thousand tons were processed during the year. The amount of household waste collected in Ukraine in 2019 was 52,920,120.5 m³, with just over 6% of the total volume being processed, and the rest was transported to specially equipped landfills. The area covered by the Programme accounts for over 18% of the waste generated. Regarding selective waste collection, in 2019, it was carried out in 1,462 settlements in Ukraine, which is 281 more settlements than in 2018.

Among the regions covered by the Programme, the largest share of settlements implementing selective waste collection is in Zakarpattia (19.7%, the highest in Ukraine). In Volyn, this share is 8.3%, in Ivano-Frankivsk - 8.1%, in Lviv - 7.3%, in Rivne - 6.9%, in Ternopil - 18.7%. At the same time, the dynamics remain unstable, and in some regions, especially in Zakarpattia and Ivano-Frankivsk, the indicator has worsened compared to 2018.

SUMMARY

Table 8 Summary of environmental quality problems together with drivers of change in these problems³⁷.

ENVIRONMENTAL QUALITY ISSUES	DRIVERS OF CHANGE
Increasing amount of waste in the environment	Increased consumption of goods, insufficient segregation and recovery of raw materials from municipal waste
Amount of waste deposited in the environment	<ul style="list-style-type: none"> • Excessively high levels of landfilled waste in relation to segregated and treated recycling, import of waste from abroad • Occurrence of wild dumps • Waste deposited in forest areas
Large amount of biodegradable waste landfilled	Improper separation of waste
Low recycling rate of waste	Limited demand for waste, lack of proper segregation

4.5. ENVIRONMENT, HEALTH AND QUALITY OF LIFE

Environmental State and Trends of Variability

In the last decade, Poland has made significant progress in environmental protection, reducing the dependence of economic growth on environmental pressure. Ukraine is also working towards improving environmental quality. Further reduction of resource use and the emission of substances and energy into the environment remains a challenge in implementing sustainable development principles in the economy and strengthening efficiency trends.

A high priority in environmental protection has been given to restoring water purity. The National Programme for Municipal Wastewater Treatment, adapted to EU directives (mainly the Framework Water Directive), envisions the construction of 116 wastewater treatment plants and 14,661 km of sewage networks by 2021. Simultaneously, the modernization of 1,010 treatment plants and 3,506 km of networks is expected. Between

³⁷ Own analysis based on the current state of environment

2000 and 2018, 834 municipal wastewater treatment plants were added, and the number of plants with increased reduction of nitrogen and phosphorus compounds increased by 389.

However, air and water quality remains insufficient. Particularly challenging is the situation in cities exposed to excessively high levels of certain air pollutants in the Podkarpackie Voivodeship. The most significant health consequences result from exposure to dust and ozone in the air, leading to a shortened life expectancy, acute and chronic respiratory diseases, and cardiovascular diseases.

Environmental noise trends in Poland indicate an increase in the threat of traffic noise, coupled with a limitation in the growth and occurrence of decreasing trends in industrial noise. The increase in traffic noise in recent years is mainly associated with the rapid growth in the number of vehicles in Poland.

Ozone Air Pollution

The level of ozone concentration depends primarily on meteorological conditions (intensity of sunlight, air temperature) and the degree of pollution by ozone and its precursors. Ozone air pollution is measured by indicators relating ozone concentrations to various time scales. The commonly used indicator is the number of exceedances of the 120 µg/m³ value for daily maxima of 8-hour concentrations within a year, with an allowable limit of 25 exceedances. Ozone exceedances negatively impact biodiversity and were not observed in the Podkarpackie, Lubelskie, and Podlaskie Voivodeships between 2018 and 2022³⁸.

Noise and Radiation

The primary threat affecting the soundscape in Poland and Ukraine is the impact of transportation noise. Road traffic noise poses a threat primarily in urbanized areas. In most cities, there are exceedances of permissible levels of environmental noise. For higher and the highest noise levels, after an increase in the number of such cases until the end of the 1990s, a slow decline has been recorded. Analyses indicate a gradual, although sometimes significant (especially concerning main routes), reduction in the population's exposure to noise emitted by railway traffic. The main reasons for this are reduced traffic intensity, revitalization of many railway sections, and a systematic, albeit slow, replacement of rolling stock with less noisy alternatives. Aircraft noise in the areas surrounding airports is an acoustic phenomenon that is burdensome for the environment. A systematic increase in noise from air traffic can be expected primarily in connection with the growth of civil aviation of small aircraft (with a mass of up to 5 tons).

4.6. WATER RESOURCES, FLOOD AND DROUGHT PROTECTION, AND WATER MANAGEMENT ISSUES

Poland

The average water resources in Poland amount to approximately 60 billion m³, and during dry periods, this level may drop even below 40 billion m³. Surface water resources in Poland exhibit significant temporal and territorial variability, leading to periodic surpluses and deficits of water in rivers. Retention reservoirs are characterized by low capacity, which collectively does not exceed 6% of the annual outflow volume of water from the country, providing insufficient protection against periodic water surpluses or deficits. This results in difficulties in water supply in some regions of the country, particularly in the southern part, where water-demanding industries, demographic processes, and specific geographic and hydrographic conditions contribute to water deficits.

The key rivers in the Polish part of the Programme area are the Vistula, Bug, and San. The surface waters of the Podlaskie Voivodeship are located in five water regions: the Narew, Bug, Central Vistula, Neman, and Łyna and Węgorapa. The Lublin Voivodeship entirely covers the Vistula River basin. The water network of the voivodeship

³⁸ Following the GIOŚ report 'Air Quality Assessment in Zones in Poland for the year 2022

consists of 227 homogeneous parts of river surface waters (JCWP RW), of which 208 are in a natural state, and the remaining 19 are artificial (SCW) and strongly modified (SZCW) water parts. Additionally, one reservoir (JCWP RWr) and 23 lakes (JCWP LW) represent surface inland waters. According to the Water Law of July 20, 2017, these JCWP areas are assigned to the Upper-Eastern Vistula, Central Vistula, and Bug water regions.

Evaluations of lakes in 2022 were conducted based on the regulations for classifying the condition of homogeneous parts of surface waters and environmental quality standards for priority substances. The condition of JCWP was considered good if the ecological status/potential was at least good, and simultaneously, the chemical status was good. In other cases, the condition of JCWP was determined as poor.

The characteristics of individual watershed areas were determined based on the Water Management Plans, with plans developed in 2022 and effective from 2023. Establishing typologies is a fundamental step towards assessing and classifying the ecological status of waters. Due to the diversity of natural environmental conditions influencing the presence of aquatic organisms, it is necessary to identify different water types, characterized by distinct biological features under undisturbed conditions, serving as a reference for assessing deviations in the ecological status of waters.

For the Dniester River watershed, the environmental objective for riverine JCWP concerning the chemical status is good chemical status³⁹. The environmental objective for riverine JCWP concerning hydromorphological elements requires achieving values: $HIR \geq 0.715$ (for channels with a channel width ≤ 30 m) ≥ 0.613 (for channels with a channel width > 30 m). To achieve environmental objectives, it is essential to facilitate the free migration of aquatic organisms by maintaining the Q_{50} flow and preserving or restoring the ecological continuity of watercourses. The river corridor dredging plan should focus on key species, priority waters, and stages of dredging. Based on the literature, JCWP important for the migration of diadromous fish were identified, where the maintenance of hydromorphological continuity is necessary.

For JCWPd intended for water supply for human consumption, an additional environmental objective has been assigned, aiming to maintain constant values of physicochemical indicators of water intended for consumption, in accordance with quality standards specified in the Regulation of the Minister of Health dated December 11, 2017, and the Drinking Water Directive 98/83/EC. Waters at risk of deterioration should be protected by establishing a protection zone based on local law. Protection zones should address the causes threatening water quality to prevent its deterioration. In the Dniester River watershed, no areas were designated for the protection of commercially important aquatic species, recreational (including bathing) purposes, or areas susceptible to eutrophication caused by pollution from municipal sources⁴⁰.

For the Niemen River Basin in the Podlaskie Voivodeship, environmental objectives have also been defined in the Protection Plan. In the Niemen River Basin, there are no JCWP designated for water intake for human consumption. For JCWPd intended for water supply for human consumption, an additional environmental objective has been assigned, aiming to maintain constant values of physicochemical indicators of water intended for consumption, meeting the quality standards specified in the Regulation of the Minister of Health dated December 11, 2017, and the Drinking Water Directive 98/83/EC. For Natura 2000 areas, the goal is to achieve the proper conservation status of individual habitats and species. This means maintaining water conditions necessary to achieve or maintain the proper conservation status for habitats in the habitat area and for birds in the bird area. For national parks, the goal is to preserve biological diversity, the proper state of natural resources and components of nature, restore distorted natural habitats, plant and animal habitats, and fungi. In landscape

³⁹ For certain indicators of the chemical status (benzo(a)pyrene(w), benzo(g,h,i)perylene(w), fluoranthene(w), tributyltin compounds(w)), the Strwiąż Water Basin has been granted a relaxed objective under derogations 4(4) and 4(5) of the RDW.

⁴⁰ Regulation of the Minister of Infrastructure of December 2, 2022, regarding the Water Management Plan for the Neman River Basin Area (Journal of Laws 2023, item 114)

parks, it is essential to preserve the natural values under conditions of sustainable development. For nature reserves and protected landscape areas, the goal is individually defined in the act creating the given area.

Groundwater is the primary, and in most of the Lublin Voivodeship, the only source of water supply for drinking, economic, and industrial purposes. Two large groundwater basins are located in the voivodeship (the Lublin Basin and the Mazovian Basin).

The Lublin region has undergone significant transformations of its original water conditions due to extensive drainage operations and mining development. The major investment is the Wieprz-Krzna drainage system consisting of the main channel, smaller water distribution channels, retention reservoirs, and drainage ditch networks. Its operation has led to a considerable change in the directions and dynamics of water outflow, as well as the conditions for water retention. The drainage process between the Vistula and Bug rivers has caused the disappearance of sources and upper sections of watercourses on the Lublin Upland, the reduction of the extent or disappearance of permanent marshes, transforming them into periodic wetlands (Michalczyk Z. and Wilgat T., 1998, Pichla A. and Jakimiuk S., 2014)⁴¹.

The water quality in the Podlaskie Voivodeship is influenced by various pressures related to water intake, discharge of municipal and industrial sewage into water bodies, surface runoff (including from agriculture and rural areas), improper waste management, handling of rainwater and snowmelt, hydromorphological changes, and pollution associated with tourism and recreation development. Due to the agricultural nature of the voivodeship, agriculture, including large-scale cattle farming and wastewater management in rural areas, is considered a significant cause of pollution, including eutrophication, of surface waters. In 2018, according to the Central Statistical Office (GUS), the exploitable groundwater resources in the Podlaskie Voivodeship were estimated at 689.6 million m³, constituting only 3.8% of the national resources. According to data from 2020, the status of exploitable resources was 79,078.97 m³/h, representing one of the smallest values of determined exploitable resources in the country. The increase in resource utilization compared to the previous year (an increase of 80.97 m³/h) is minimal, indicating a small growth in water intake pressure⁴². Extracted waters, due to their high quality, serve as the primary source of water for consumption and industrial purposes⁴³.

The assessment of hydromorphological status in the Podkarpackie Voivodeship indicated that the majority of monitored watercourses in the voivodeship have a very good or good hydromorphological status (they are either unaltered or have undergone minor transformations). The classification results of the ecological status and potential of homogeneous parts of river surface waters in the Podkarpackie Voivodeship according to the Water Framework Directive (IIaPGW) showed that out of 205 JCWP RW, 88.78% were in an overall poor condition, and for 11.21%, the lack of data prevented a determination of their condition.

The primary influence on the quality of surface waters comes from wastewater management. In 2018, 73,181 dam³ of wastewater were discharged into water or soil in the Lublin Voivodeship. Of this quantity, 99.23% of the sewage was treated, with 55.25% subjected to treatment with enhanced nutrient removal. Agricultural pollution is the dominant source of diffuse pollution in the Lublin Voivodeship. Potential threats to water quality include the intensity of soil use combined with improper application of artificial and organic fertilizers, as well as large-scale animal production. The widespread use of natural and artificial fertilizers leads to increased nutrient loading in waters.

In 2018, the total volume of industrial and municipal sewage requiring treatment, discharged into water or soil in the Podlaskie Voivodeship, was 41.5 million m³, constituting 1.9% of all sewage generated in Poland (source:

⁴¹ https://www.gios.gov.pl/images/dokumenty/pms/raporty/stan_srodowiska_2020_lubelskie.pdf

⁴² <https://www.pgi.gov.pl/psh/materialy-informacyjne-psh/bilans-zasobow-eksploatacyjnych-podziemnych-polski/8788-ow-eksploatacyjnych-wod-podziemnych-polski-wg-stanu-na-dzien-31-grudnia-2020-r/file.html>

⁴³ Environmental Status in the Podlaskie Voivodeship Report 2020, GIOŚ

GUS). Other sources of diffuse pollution include industrial runoff from areas without sewerage systems, seepage from inadequately secured municipal landfills, and sewage from areas not covered by a collective sewerage system, such as scattered rural and recreational developments, where domestic sewage is collected in non-flow-through tanks and then transported to collection points near treatment plants or pre-treated in on-site sewage treatment plants.

The volume of treated municipal sewage in the Podkarpackie Voivodeship increased to nearly 62 million m³ in 2018. The volume of untreated sewage in the voivodeship has been small and has remained at around 1 million m³ for several years. The rivers most burdened with sewage in the voivodeship are the Wisłok, Wisłoka, and San.

The average annual outflow of surface waters from Poland, including inflows from abroad, from 2000 to 2018, was 58.6 km³. In 2020⁴⁴, it was 57.2 km³, and in 2021⁴⁵, it was 54.3 km³. In the Polish part of the Programme area, according to statistical data, less water is being used for economic and population needs.

Surface waters are the main source of water supply for the economy in Poland. In 2021, their intake was 7.5 km³, covering 81% of needs. Surface waters were mainly used for production purposes in industry. Groundwater intake was 1.7 km³, higher than in 2020 by 18 hm³. Due to their significantly better quality compared to surface waters, groundwater was primarily used for supplying water for human consumption, with approximately 1.5 km³ used for this purpose in 2021.

Regarding wastewater management, Poland has a sewage treatment plant usage rate of 75% of the population⁴⁶.

The state of waters determines the quality of life for people and the proper functioning of ecosystems, both aquatic and terrestrial. The challenge for achieving and maintaining good water quality is to limit the impact of various sectors of the economy and human activities. One of the most significant problems is the excessive load of biogenic substances in waters (nitrogen and phosphorus). They enter the waters mainly due to runoff from agriculturally used areas but also from scattered rural and recreational development, deposition of total nitrogen and phosphorus from the atmosphere, and pollution from sewage and households not connected to a collective sewerage system. Although nitrates and phosphates are essential for biological life in waters, their excess can lead to undesirable effects, including water eutrophication.

Ukraine

The major rivers flowing through the Ukrainian part of the support area are: Tisza, Prut, Bug, San, Dniester, and Pripjat. Tisza, the largest tributary of the Danube, is an international watercourse originating from Zakarpattia.

Water extraction from natural sources across Ukraine in 2017 amounted to 9,224 million m³, with a total wastewater discharge of 4,921 million m³. In the southern and southeastern parts of Ukraine, the annual river runoff decreases by 30-50%. There is an increasing risk of drought, as well as the frequency and magnitude of extreme floods. The sectors most vulnerable to these changes are agriculture in the south and industry and households in the south and southeast. Water quality in surface waters worsens in the south and southeast.

The Dnieper is the main river in Ukraine, filling reservoirs used for various purposes. When these reservoirs lack sufficient water, priorities are established, distinguishing four levels:

- Zone of full supply: All consumers receive water without restrictions.
- Economic consumption zone: All water consumers receive water according to standards, with restrictions on auxiliary needs.

⁴⁴ Analizy statystyczne. Ochrona Środowiska 2022. Publikacja GUS luty 2023 r.

⁴⁵ <https://energa.pl/zielone-pojecie/ekologia/jaki-jest-stan-polskich-wod.html>

⁴⁶ Analizy statystyczne. Ochrona Środowiska 2022. Publikacja GUS luty 2023 r.

- Strict water savings zone: When reservoirs are lowered below the navigational flow level by no more than 1 m, restrictions are introduced for irrigation systems and auxiliary industrial needs. River transport is limited to a navigational depth of 2.6 m, and ecological permeability may be restricted to 300 m³/s for short periods.
- Restriction zone for all consumers: To meet the needs of residents, water supply restrictions are established.

In climate change scenarios leading to reduced Dnieper water discharges, the quality of surface waters may worsen. Therefore, considering the current high level of Dnieper water pollution, it is recommended to use groundwater levels in the near future to meet drinking water needs.

The overall region has relatively better water quality indicators in Ukraine. Freshwater consumption in the region is significantly lower than the Ukrainian average, amounting to 423 million m³. The highest water consumption is in the Lviv and Rivne regions, with 122 and 96 million m³, respectively. The lowest consumption occurs in the Ternopil and Zakarpattia regions - 40 and 30 million m³.

The annual volume of circulating water in the region is 6,571 million m³. Out of this, 4,242 million m³ belongs to the Rivne region, and 1,889 million m³ to the Ivano-Frankivsk region. Such significant quantities are associated with water use in the cooling systems of nuclear and thermal power plants located in these areas. The total discharge of polluted wastewater is 56 million m³.

A significant problem affecting the state of water resources in the region is the low level of housing equipped with water supply and sewage systems. For the entire region, these figures are 59.2% and 56.1%, respectively, but the situation is usually worse in rural areas.

Natural Phenomena

The Programme area lies in a moderate climate zone, usually not plagued by major natural disasters. However, it is still susceptible to natural phenomena, which can take the form of disasters. The main ones include floods, droughts, storms, and forest fires. In the event of natural disasters, a crisis situation arises, usually requiring public services intervention.

The Programme area is influenced by changing meteorological conditions, being alternately influenced by the Atlantic and continental climates. This causes significant diversity in hydrological conditions. The morphological terrain features, coverage, and utilization contribute to diverse water relationships. Therefore, some regions experience periodic water deficits, while others are prone to floods, especially in mountainous watersheds with sudden water increases.

Drought is also a result of neglecting water retention activities. The reasons for the decreasing retention capacity of individual watersheds and water resources can be found in faulty water system management, operational neglect, and degradation of water infrastructure. Unfortunately, compared to other parts of Europe, water resources in the Programme area are lower than the European average.

Atmospheric drought (related to excessive water evaporation compared to rainfall) is accompanied by hydrological drought. This involves reduced or even disappearing flows in streams. As a result, there is less water in lakes and reservoirs, surface soil layers dry up, and groundwater levels decrease. Scientific studies also indicate a correlation between global climate changes and worsening water issues.

Climate changes in the support area (regardless of their causes) will increasingly impact the occurrence of disasters. Another factor after climate changes is the development of infrastructure (human civilization), which unfortunately often occurs chaotically, without proper planning, with many serious mistakes, thereby increasing the vulnerability of the natural environment to weather-related threats.

Droughts, like floods, occur in the supported areas, with a frequency of about twenty times per 100 years, causing a decrease in groundwater levels and the state of water in rivers and streams. To prevent water deficits, it is necessary to increase water retention capabilities.

Floods, as sudden natural phenomena, occur regularly, and the flood risk depends on population density, valley and floodplain land use, as well as communication and technical infrastructure. In the supported areas, river floods occur several times a year, and on average, every 10 years, floods take the form of a major natural disaster. The greatest threat comes from the Vistula, Bug, Narew, Niemen, Berezina, Dnieper, Pripyat, and Dniester basins. Continuous rainfall causes floodplain floods, which are the most significant threat. Additionally, intense summer storms result in flash floods.

About 80% of all dangerous events occur in the warm period of the year (frosts, squalls, heavy rains, hail) when convective activity is observed (May-November). Their impact is particularly noticeable in the case of wind-related phenomena. These include strong winds, squalls, tornadoes. A significant number of dangerous phenomena associated with atmospheric precipitation occur in the warm period: heavy rain, prolonged rain, torrential rain, hail. Since 1974, there have been more thunderstorms, squalls, ice storms, fewer frosts, and snowfalls.

The number of freezing winters has decreased, while the number of warm ones has increased. Among dangerous meteorological phenomena, frosts and periods of drought should be distinguished (since 1992, their frequency has increased). Since 1989, heatwaves have been occurring more frequently. In the last quarter-century, the number of hot days with a maximum air temperature $\geq 25^{\circ}\text{C}$ has increased.

There is a tendency to extend the frost-free period. Compared to the years 1951-1990, the repeatability of years with spring and autumn frosts has decreased. An exception is the Homyel region, where the frequency of spring frosts increased in May. In autumn, during the warming period, most stations record a decrease in the frequency of frosts in September, mainly in the third decade of October.

The temperature rise in the first months of spring leads to earlier snowmelt and a rise in air temperature above 0°C . On average, during the last warming period (1989-2016), this transformation occurred 10-15 days earlier than the long-term average. The growing season started a decade earlier, and its duration has correspondingly increased.

SUMMARY

Water resources are a particular environmental asset that is important for both the economy, the population, and nature. The state of the water environment in the Programme support area is crucial due to the presence of valuable natural areas and planned investments in this area as part of the Programme.

Adverse factors that may affect the water environment include:

- Drought and negative water balance caused by climate change, excessive water consumption, lack of proper natural and artificial water retention, improper water management leading to the diversion of water outside the watershed, river channel modifications, and agricultural intensification.
- Pollution of drinking water, which may result from the infiltration of pollutants from industry, agriculture, and municipal management into surface waters, especially in areas without sanitary sewage systems. This includes the lack of proper protection of water intake zones and inadequate treatment of wastewater flowing into surface waters.
- Over-exploitation through excessive water intake beyond the capacity for water resource replenishment, infrastructural gaps, low retention, and deepening climate changes, including increasingly frequent droughts.

- Eutrophication of surface waters related to surface runoff in river basins, the rise in air temperature leading to favorable conditions for intensifying the process and increasing the concentration of solutions in surface waters, drainage systems that alter the retention of the watershed area by accelerated drainage of rainwater. These changes lead to the disappearance of wetland areas and accelerate the eutrophication process by increasing the outflow of biogenic substances into surface waters.
- Surface water pollution resulting from the use of mineral fertilizers in agriculture, improper use of natural fertilizers, lack of protection of surface waters from local and point source pollution. Also, pollution from road transport, including industrial activities, such as food production, is a problem. The lack of sanitary sewage systems and discharges of domestic wastewater from municipal management (sewage treatment plants) is a particularly significant issue.

In the conditions of such extensive protected areas, hydromorphological changes caused by transverse and longitudinal construction of watercourses, embankments, drainage, new watercourses, and artificial reservoirs, as well as construction along the banks of watercourses, also play a crucial role.

All of these threats must be taken into account in planned investments to minimize their impact on the quality of the water environment.

4.7. MONUMENTS

Within the area covered by the Programme, numerous cultural heritage sites of regional, national, and international significance can be found. They hold significant importance for the cultural heritage of the countries participating in the Programme. They are presented on the map below.

In the support area of the Cross-Border Cooperation Programme Poland - Ukraine, there are several monuments also belonging to the UNESCO World Heritage List:

- On the Polish side: Białowieża Forest, Old Town in Zamość, wooden churches in the Carpathian region in Poland;
- On the Ukrainian side: the historical center of Lviv, wooden churches in the Carpathian region in Ukraine.

The list of cultural heritage objects on the Polish side also includes:

- Historical monuments – for example: Łańcut – castle and park complex, Leżajsk – Bernardine Monastery complex, Zamość – historic city complex within the 19th-century fortifications, Kozłówka – palace and park complex, castle and tower in Kazimierz Dolny, historical architectural and urban complex of Lublin city, Bohoniki and Kruszyniany – mosques and minarets, Augustów Canal – waterway;
- Cultural parks – for example: Cultural Park of the Old Town Ensemble, Dominican Monastery Ensemble in Jarosław;
- Other important monuments – Museum of Oil and Gas Industry named after I. Łukasiewicz and the world's oldest oil mine (Bóbrka, Krosno County), Greek Catholic church dedicated to the Nativity of the Most Holy Mother of God in Chotyniec (Jarosław County), Renaissance castle built around 1580 in Krasiczyn (Przemyśl County), the oldest Polish health resort in Iwonicz Zdrój (Krosno County), Franciscan Monastery complex in Krosno, and numerous monuments in Przemyśl, Rzeszów, mosques, Branicki Palace Ensemble, and Tykocin hillfort. The support area of the Programme includes numerous castles and palaces from various epochs, such as Kamieniec Castle in Odrzykoń, Przecław, Baranów Sandomierski, Sanok, Sobień, Fredrów, Janowiec, and palaces in Puławy, Sieniawa, and Zarzecze.

Among nearly one and a half thousand architectural monuments, some of the most valuable are the few Gothic churches in this area: in Piotrawin near Wisła, Kraśnik, and the Gothic-Renaissance Church in Chodel, as well as the castle church in Kodnia. A cohesive group of monuments includes churches of the so-called "Lublin Renaissance," partly rebuilt from Gothic temples. In addition to the outstanding temples of the new style in

Zamość and Lublin, churches by J. Wolff (Czemierniki, Łęczna, Turobin, Uchanie) and the related Church in Gołębie are of great importance. Few brick manor houses from the 18th century have survived, for example, in Hrubieszów and Oszczów, while wooden ones can be found in the Lublin Village Museum (manor from Żyrzyn), Jagodne, and Siedliszcze.

The Programme's support area is home to numerous museums, such as the Glass Heritage Center in Krosno, the Museum of Oil and Gas Industry in Bóbrka containing many technological monuments related to oil exploitation in this area.

In Ukraine, the cultural heritage of the area covered by the Programme is significant and includes thousands of places and monuments. Castles, especially Brodowski, Dobromilski (ruins), Żółkiew, Złoczewski, Lvowski, Oleski, Świrski, Starosilski, Podgórdki, Pomorianski, Uzhhorodski, Mukachevski "Palanok," Chinadijiwski, Newitski, Seredhiwanski, Korolewski, and Chustki are an important part of the cultural heritage. Some of them are in poor condition, as well as churches like the Nativity of the Virgin Mary Monastery in Zahoriv Novyi.

There are also historical and cultural reserves, historical settlements, archaeological and architectural sites. The largest number of objects is in the Lviv region (8543), of which 816 are of national importance.

4.8. SUMMARY

The main environmental issues and threats identified in this chapter primarily concern:

- Preservation of natural resources in terms of biodiversity and the conservation of nature in the least altered state possible,
- Air pollution and greenhouse gas emissions contributing to climate change,
- Appropriate water management and the restoration of proper surface water quality are also significant. In fewer instances, groundwater quality is a concern as well.
- Waste management poses challenges for the Local Government Unit (LGU). To improve the situation in this regard, considering joint waste management across several counties, including those on both sides of the border, should be contemplated.

Table 9 Main environmental quality problems in the Programme area.

Environmental quality issues	Factors of change
Air	
Exceedances of normative values PM10, PM2.5 occurring in cities in the Programme area	Emissions from individual heat sources, individual waste incineration, traffic emissions
Exposure of large numbers of urban residents (including sensitive groups) to above-normal concentrations of air pollutants causing serious health effects	Dense housing, outdated heating systems, socio-economic problem of switching to cleaner forms of heat generation
Noise	
Exceedances of the permissible environmental noise levels are found in most cities	Sources of transport noise emissions (heavy traffic, , less so railways)
Water	

Exceedances of the limit for nitrates in drinking water	Nitrate infiltration from agricultural fields into the soil and then into waters surface and groundwater
Drought and negative water balance	Excessive abstractions, hydro-meteorological conditions, including those caused by climate change, lack of sufficient water retention.
Area water pollution surface	Mineral fertiliser use in agriculture, inappropriate use of natural fertilisers, lack of protection of surface water from area pollution. Pollution is also a problem
Environmental quality issues	Factors of change
	caused by road transport, particularly possible leakage of petroleum substances from faulty vehicles entering rainwater run-off from roads.
Inadequate water management and supply to the population	Insufficient coverage of rural areas with water supply networks especially in Ukraine.
Poor condition of most river and lake waters	Nutrient loading from agricultural and municipal sources, heated water and mine water discharges.
Extreme phenomena	
Increased flood risk	The risk of flooding relates to blockage, precipitation flooding (especially in urban areas - in the case of insufficiently efficient rainwater systems) and flooding caused by the passage of surges in river valleys.
Increasing frequency of droughts	The frequency of droughts is likely to increase due to climate change. The negative effects of drought are exacerbated by the lack of systemic water retention.
High temperatures, heavy rainfall and low water levels	As a result of the flooding of meadows, wastelands and peat bogs caused by very heavy rainfall and the lack of or low flow in watercourses, accumulated organic matter rots. This seeps out of the catchment area, triggers anaerobic processes in the surface water and a decrease in dissolved oxygen in the water, which can result in fish die-offs.
Ground surface	
Acidification of soils, low fertility chemical and biological soil, erosion soil weathering and water	Intensive farming using large amounts of resources chemicals for both fertilisation and plant protection
Amount of waste deposited in the environment	Too high levels of landfilled waste relative to separated and recycled waste, import of waste from abroad

Given diagnosis can be used to assess the potential impact on the Programme's environment and minimize any potential negative influence. On one hand, the Programme should contribute to the protection and improvement of the environment, while on the other hand, it should minimize its negative impact through preventive, alternative, and potentially compensatory solutions.

Among the key objectives related to the natural environment and climate change, it is essential to mention: further protection and restoration of proper conditions for species and habitats, maintaining the connectivity of ecological corridors, and improving air quality, including reducing emissions from household combustion sources.

One of the tools contributing to such a focus of actions within the Programme should be the criteria for selecting projects for implementation, taking into account the previously identified issues.

5. ENVIRONMENTAL IMPACT ASSESSMENT

5.1. ENVIRONMENTAL IMPACT IF THE PROGRAMME IS ABANDONED

Generally, in the case of abandoning the implementation of the Programme, its contribution and support towards achieving the goals of strategic documents for Poland, Ukraine, the EU, and global initiatives aimed at improving the state of the environment will not be obtained. These objectives will still be pursued but at a pace dictated by the available resources. Since these resources are limited, the Programme will expedite their attainment, and in some cases, it will enable the implementation of actions that would not occur without the Programme.

The table below outlines the negative aspects of abandoning the Programme from the perspective of its impact on the environment.

Table 10 Negative aspects of opting out of the Programme in relation to specific areas of Programme intervention

Area of intervention	Negative environmental aspects if the Programme is abandoned
Specific objective RSO2.4 Promoting climate change adaptation and disaster risk prevention and resilience, taking into account eco-system based approaches	
<ul style="list-style-type: none"> - Develop and implement strategies, solutions, programs and infrastructure projects to enhance the preparedness and adaptive capacity of the population in the Programme area, - Development and implementation of strategies, solutions, programs related to the enhancement of civil protection, including through the construction of emergency management systems and infrastructure, - Develop and implement strategies, solutions, programs and innovative projects to increase awareness and protect people, including the construction of disaster protection and risk management systems and infrastructure and the purchase of equipment, - Implementation of projects related to strengthening resilience to the effects of anthropogenic disasters. 	<ul style="list-style-type: none"> -the lack of a systemic and comprehensive approach, in the area of cooperation to address climate change, -less protection against disasters - natural disasters related to climate change in the form of floods and droughts, including the safety of people and the protection of property, -less protection from forest fires, -less security in water supply drinking water, including during periods of floods and droughts, - less progress in raising public awareness of climate change adaptation, - lack of progress in implementing disaster resilience strengthening projects.
Specific objective RSO2.5 Promoting access to water and sustainable water management	
<ul style="list-style-type: none"> - Water management support, e.g. in the form of developing strategies, solutions, programs and innovative projects, - Construction of small retention facilities, - Projects to promote the rational management of water resources, - Implementation of innovative wastewater treatment projects, - Promoting sustainable water management through the development of strategies, solutions, 	<ul style="list-style-type: none"> - lack of a systemic and comprehensive approach, in the area of cooperation, to solving water management problems, - less protection against disasters - natural disasters related to climate change in the form of floods and droughts, including the safety of people and the protection of property, - less security in drinking water supply, including during periods of floods and droughts, - no improvement in water efficiency;

<p>Programmes and innovative projects, as well as promotional campaigns and educational activities.</p>	<ul style="list-style-type: none"> - failure to improve the functioning of aquatic and water-dependent ecosystems, including their services, - no improvement in surface or groundwater quality, - lack of improvement in the comfort of residents, in the form of connections to the sewage system.
<p>Specific objective RSO2.7 Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution.</p>	
<ul style="list-style-type: none"> - Protected area projects undertaken to protect, regenerate and safeguard them from harmful anthropogenic activities, - Educational projects and information campaigns to raise environmental awareness and knowledge, 	<ul style="list-style-type: none"> - Limited progress in protecting, regenerating and safeguarding protected areas from harmful anthropogenic activities, - limited increase in environmental awareness regarding the protection of natural resources,
<p>Area of intervention</p>	<p>Negative environmental aspects if the Programme is abandoned</p>
<ul style="list-style-type: none"> - Projects to enhance existing biodiversity through appropriate conservation approaches. Projects for joint monitoring of the state of the environment. 	<ul style="list-style-type: none"> - lack of progress in enhancing existing biodiversity, - lack of progress in reducing negative human impacts on nature, e.g. illegal dumping and air pollution, - lack of progress in monitoring the changes in nature being made.
<p>Specific objective RSO2.6 Promoting the transition to a circular and resource efficient economy</p>	
<ul style="list-style-type: none"> - Joint initiatives to improve household waste management and waste treatment and promote innovative solutions related to the transition to a circular economy - Promoting rational waste management (minimising generation, promoting segregation, increasing recycling and reuse) and raising awareness of the challenges of environmental issues. 	<ul style="list-style-type: none"> - slowing down the transition to a circular economy - poorer results in improving household waste management, including the possibility of poorer indicators for waste minimisation, separation efficiency - weaker results in raising awareness of the inhabitants of the assisted area regarding waste management and resource conservation (fewer people covered by educational actions)
<p>Specific objective RSO4.5. Ensuring equal access to health care and fostering resilience of health systems, including primary care and promoting the transition from institutional to family-based and community-based care.</p>	
<ul style="list-style-type: none"> - Diagnostic and prevention infrastructure projects, which may include: - purchase of equipment, reconstruction, expansion, renovation of facilities providing preventive, diagnostic services, including introducing facilities for persons with disabilities, - improvement of the efficiency of admissions, a also other measures to improve the system, - common-cross-border offer of care facilities providing preventive and diagnostic services, 	<ul style="list-style-type: none"> - failure to achieve additional improvement in health residents of the Programme area, - failure to obtain funding for additional development of diagnostic and preventive infrastructure and specialised medicine, - failure to improve health care procedures, - poorer preparedness for emergencies, including disasters,

<ul style="list-style-type: none"> - Specialised medicine projects, particularly relating to cardiovascular systems and cancer, which may include: as above, - Projects to organise courses and training, promote related professions and increase the availability of care services for economically disadvantaged and excluded people, - Projects aimed at preventing the occurrence and impact of undesirable phenomena, e.g. through the development and implementation of strategies, action plans, solutions, innovative Programmes and projects, as well as the development of solutions to the problem of voluntary rescue and the development of cross-border rescue procedures, Healthcare IT projects, - Organisation of joint meetings to exchange good internships, training courses, workshops or conferences. 	<ul style="list-style-type: none"> - less use of the potential of IT in improving the health service, - failure to realise the potential of cooperation.
<p>Specific objective RSO4.6 Enhancing the role of culture and sustainable tourism in economic development, social inclusion and social innovation</p>	
<ul style="list-style-type: none"> - Projects to promote tourism development e.g. in the form of training or workshops on how to set up and effectively manage a business in the tourism industry and marketing of services, 	<ul style="list-style-type: none"> - less use of tourism potential Programme area, - lesser extent of renovation of existing heritage sites,
<p>Area of intervention</p>	<p>Negative environmental aspects if the Programme is abandoned</p>
<ul style="list-style-type: none"> - Projects for: - creation of new and renovation of existing cultural heritage sites, enabling them to be preserved for future generations, and increasing the accessibility of existing historical and cultural heritage sites, e.g. for people with disabilities, - support for local initiatives, - establishment of long-term cross-border cooperation between institutions dealing with particularly valuable cultural heritage sites, - Projects supporting nature conservation and support tourism industry, - Courses, training or workshops on setting up, promoting and effectively managing a business in the tourism industry. 	<ul style="list-style-type: none"> - under-utilisation of the relationship between cultural development and environmental protection, - failure to exploit the potential of cooperation in heritage conservation, - failure to use an integrated approach to environmental protection and tourism development.
<p>Specific objective:</p> <ul style="list-style-type: none"> - ISO6.2 Enhance efficient public administration by promoting legal and administrative cooperation and cooperation between citizens, civil society actors and institutions, in particular, with a view to resolving legal and other obstacles in border regions - ISO6.3 Build up mutual trust, in particular by encouraging people-to-people actions 	

<ul style="list-style-type: none"> - Projects to increase the efficiency of public administration by promoting legal and administrative cooperation and cooperation between citizens and institutions, particularly with a view to eliminating legal obstacles and other barriers in border regions, - Building mutual trust by supporting activities facilitating people-to-people contacts. 	<p>failure to make more progress in improving administration,</p> <p>less progress in building interpersonal trust,</p> <p>less use of local initiatives,</p> <p>under-utilisation of the potential for cooperation in education and human relations development including young people.</p>
<p>Specific objective ISO7.4 Other actions for a safer and secure Europe</p>	
<ul style="list-style-type: none"> - joint training for border, customs and other services related to border crossings (including phytosanitary and veterinary services) and border security; - equipment for customs, border, phytosanitary and veterinary services and services providing security in the border area; - improving services at existing border crossings; - promoting the creation of pedestrian and cycle border crossings for the development of cross-border tourism; - border sealing activities, by preventing and combating illegal migration; - securing borders beyond border crossing points, e.g. by developing an innovative border surveillance system using modern technology (sensors, cameras, radars, drones, etc.); - infrastructure for border crossings, including, inter alia, phytosanitary infrastructure, as well as infrastructure adjacent to border crossings necessary to support the EU-Ukraine solidarity lines initiative. 	<ul style="list-style-type: none"> - a reduction in the scale of the fight against crime - no solution to the problem of long waits for borders and related congestion
<p>Area of intervention</p>	<p>Negative environmental aspects if the Programme is abandoned</p>
<p>Specific objective RSO3.2 Developing and enhancing sustainable, climate resilient, intelligent and intermodal national, regional and local mobility, including improved access to TEN-T and cross-border mobility</p>	
<ul style="list-style-type: none"> - Improving cross-border road infrastructure, including sustainable transport aspects - Improving cross-border rail infrastructure, including sustainable transport aspects 	<ul style="list-style-type: none"> - no improvement in the quality of transport infrastructure as a result, existing environmental impacts will remain unchanged. On the other hand, there will be no impacts associated with the construction of new infrastructure.

In summary, it can be stated that the lack of implementation of the Programme will have a negative impact on the environment. While avoiding the negative impact of some of its elements on certain environmental aspects, the failure to implement the Programme may have the following potential negative consequences for the environment:

- Environmental degradation due to the lack of adequate protection of areas against adverse weather phenomena and their consequences.
- Increased vulnerability to the effects of climate change, including more frequent occurrences of floods, droughts, hurricanes, etc., due to the absence of actions to improve safety.
- Progressive degradation of areas associated with the lack of counteraction to the effects of drought.

- Slowed progress in achieving a good state of water due to insufficient support for highly efficient wastewater treatment systems.
- Deterioration of in-situ and ex-situ protection of endangered species and natural habitats.
- Reduction of the permeability of terrestrial and aquatic ecological corridors crucial for biodiversity protection and adaptation to climate change.
- Progressive increase in the surface area of degraded and transformed areas.
- Lack of progress in combating forest fires.
- Lack of progress in health protection, including the improvement of the emergency response system and the prevention of extraordinary threats.

The analysis of the aforementioned consequences of not implementing the Programme may lead to the conclusion that the failure to realize the supported investments in the document may only result in negative consequences for the environment. Nevertheless, it is crucial to emphasize that the most significant and profound effects may occur in the social and economic spheres. The failure to implement proposed actions directly related to improving the quality of life for residents and communities, especially in terms of regional safety improvement, may lead to a general deterioration of the natural environment. The ongoing increase in environmental awareness within society, coupled with the simultaneous increase in legal requirements regarding the environment that individual citizens feel (such as fees for municipal waste disposal, bans on certain fuels, or restrictions on vehicle traffic), may cause various adverse sociological and social phenomena among the populations of cities and regions.

Also, the failure to implement the designated investment actions in the Programme related to the construction of environmental and technical infrastructure may have negative consequences for the economy and the environment, manifesting as increased unemployment, a reduction in the number of jobs, and pollution of water, soil, and air. In conclusion, it can be stated that bringing the goals outlined in the Programme to fruition is beneficial from the perspective of the natural environment and human health.

5.2. ANALYSIS AND EVALUATION OF THE STATE OF THE ENVIRONMENT IN THE AREAS COVERED BY THE ANTICIPATED SIGNIFICANT IMPACT AND THE EXISTING PROBLEMS FROM THE POINT OF VIEW OF THE IMPLEMENTATION OF THE DRAFT DOCUMENT, IN PARTICULAR CONCERNING THE AREAS SUBJECT TO PROTECTION UNDER THE ACT OF 16 APRIL 2004. ON NATURE CONSERVATION⁴⁷

The analyzed area covered by the Programme is one of the most valuable natural regions in Europe, characterized by unique natural resources, both ecologically and scenically. These resources are challenging to find in other parts of Europe, resulting in exceptional environmental and landscape diversity. Currently, the creation of transboundary protected areas is a popular and often-used method to promote tourism in national parks and more effectively manage these areas. "Transboundary" refers to crossing state borders, operating beyond them. It is essential to emphasize that the mere existence of two protected areas on both sides of the border does not automatically make them a transboundary area. Some level of cooperation, mutual dependence, and collaboration must be established between these units, even at the lowest level⁴⁸.

Ecological corridors are fundamental tools for preserving ecological connectivity on a large spatial scale. The primary role attributed to ecological corridors is to facilitate the movement of organisms between habitat patches at the local scale and significantly distant biogeographic regions. This function is crucial due to human-induced habitat and population fragmentation. The key functions of ecological corridors include:

⁴⁷ Consolidated text of the Journal of Laws of 2021, item 1098, as amended

⁴⁸ B. Kawałko, 2011, Wybrane problemy polsko-ukraińskiej współpracy transgranicznej, Barometr Regionalny No. 2(24).

- Reducing the isolation of individual habitat patches and facilitating the movement of organisms between them, thereby increasing the likelihood of colonization of isolated patches.
- Enhancing gene flow between subpopulations to prevent the loss of genetic diversity and counteract inbreeding depression.
- Reducing mortality, especially among young individuals displaced from suitable habitat patches due to territorial behaviors.

The ability to move between habitat patches is the most commonly defined function of ecological corridors. In most cases, attention is paid to the dispersion of animals through linear structures of both natural and anthropogenic origin. In the former case, these structures may include natural watercourses and their valleys, forested areas, and mountain ranges. Anthropogenic forms commonly mentioned in the literature include artificial watercourses, afforestation, alleys, as well as special devices such as wildlife crossings. In practice, the role of connectors is often limited to vertebrate animals (amphibians, reptiles, and mammals).

Connectivity can be achieved through structures that enable effective movement of individuals or diaspores between habitat patches where a particular species finds suitable conditions for its development. Due to the diverse biology of species, the structure and size of such corridors can vary significantly even within the same taxonomic group, depending on dispersal capabilities. Species with limited dispersal abilities, including most fish and dragonflies, require a continuous spatial structure of ecological corridors. Species with high dispersal abilities can move by utilizing non-continuous habitat patches. Such a structure of an ecological corridor is referred to as mosaic or "stepping-stones." This applies to birds and most mammals. Notably, there is diversity among species with similar ecology. For example, while the wolf (*Canis lupus*) can move freely between forest complexes over tens of kilometers, the lynx (*Lynx lynx*) prefers landscapes where forested areas are not separated by large open spaces.

Ecological corridors also ensure the integrity of the national network of protected areas, including Natura 2000 areas, by enabling the movement of organisms between habitats. To maintain the cohesion of the Natura 2000 network, it is crucial to ensure connectivity between areas, not only at the national level but also from the perspective of network coherence at the continental level.

It is essential to highlight that, on a European and even global scale, the nature within the Programme area is a significant component of Europe's natural heritage. It possesses above-average natural values, understood both ecologically and scenically, exceptionally rare and highly esteemed, serving as unique resources for biological (habitat, species, genetic) and landscape diversity. This is primarily due to diverse terrain, transitional climate, geological and soil variability, all while lacking natural geographical barriers. The biodiversity of Poland is shaped mainly by extensive areas of forests and wetlands, as well as extensively used agricultural areas that still maintain habitat mosaic and associated ecotones, providing suitable conditions for the existence of many plant and animal species with different requirements. It is worth noting that the highly valuable natural areas, found mainly in the northern and southern parts of the Programme area, are strongly associated with the landscape and nature protection system in Poland. This includes the continuation of the lakeland zone from the Augustów Primeval Forest through the Elk Lakeland westward, as well as the southwest belt through the Biebrza and Narew Valleys.

The Programme does not analyze potential impacts on the entire range of nature conservation categories. Given the vast area (encompassing two countries) and the richness of nature conservation forms, which differ in protection principles between countries, this is a challenging and, in some cases, impossible task. Therefore, the Environmental Impact Assessment of the Programme and its impact on biodiversity and natural values focus on identifying the most valuable and endangered species (significant from both national and EU legal perspectives) and maintaining their internal integrity within specific areas, as well as externally connecting them with other protected areas and serving as ecological corridors.

Population parameters (floral and faunal) show significant regional variability within the Programme area, reaching the highest values in the regions of the Białowieża, Augustów, and Carpathian Forests, as well as in the valleys of the Bug, Narew, Biebrza, and Dniester. Particularly valuable are hydrophilic and xerothermic flora.

Larger mammal species have relatively large territorial requirements. It can be assumed that the larger the animal, the more extensive the territory it needs, and the ranges of predators are larger than those of herbivores. Animal movement is necessary for the proper functioning of subpopulations. Migrations enable genetic exchange and the satisfaction of the basic needs of individual individuals. Three types (reasons) of animal movement can be distinguished: (1) daily wanderings within the personal range associated with satisfying various needs (such as resting, feeding), (2) seasonal migrations related to changes in food availability or safety and reproductive behaviors, and (3) migrations of adult or young individuals in search of new settling areas and partners for reproduction. The issue of animal movement is relatively important for large migrating and rare mammals such as the lynx (*Lynx lynx*) and wolf (*Canis lupus*). The death of even one representative of these species is a significant loss in terms of their population due to the low population numbers in each country. This issue also applies to populations of other large mammals exhibiting migration tendencies over significant areas, such as bison (*Bison bonasus*) and brown bears (*Ursus arctos*), as well as representatives of hoofed mammals: wild boar (*Sus scrofa*), roe deer (*Capreolus capreolus*), red deer (*Cervus elaphus*), moose (*Alces alces*), and fallow deer (*Dama dama*). The Eastern Carpathians have been considered the richest habitat for brown bears in Europe since ancient times. This species is also very numerous in Ukraine. Among other large predatory mammals inhabiting the discussed area, we can mention the wildcat (*Felis silvestris*) in the Carpathians, the badger (*Meles meles*), the otter (*Lutra lutra*), and the pine marten (*Martes martes*).

From the perspective of Programme implementation, particular attention should be paid to the care of populations of rare and endangered species with extensive spatial requirements, such as large predatory mammals. This requires close cooperation between countries sharing a common transboundary population. Within the European Union, these principles are regulated by the Habitat Directive, and guidelines for the management of large carnivore populations in Europe have been developed on behalf of the European Commission. Any action taken by one country regarding its portion of the population affects the viability of the species' population in neighboring countries, especially if it leads to a significant reduction in its number and range⁴⁹. The wolf population in Poland is connected and dependent on the populations of this predator in Lithuania, Belarus, Russia, Ukraine, and Slovakia. Unfortunately, this species is not protected by any of Poland's eastern and southern neighbors, resulting in the protected population serving as a source for "replenishing losses" caused by hunting or extermination in neighboring countries. This has a significant impact on the state and dynamics of the population size of this species in Poland.

For the European bison, the majority of the population is found in the Białowieża Forest, with approximately 717 individuals on the Polish side. They also occur in Ukraine in the Beskid Skole National Park (33 bison). There are plans to establish additional transboundary populations in the Lower Oder Landscape Park, Romincka Forest, and Augustów Primeval Forest. In many places where transboundary bison populations currently exist or are planned, their potential shared ranges are divided by anthropogenic barriers such as border fences in Ukraine⁵⁰. Therefore, the primary challenge in establishing functional populations is the elimination of these barriers or the creation of connections that allow animal movement. The benefits of creating transboundary bison populations include:

- A larger area of available ranges, enabling the maintenance of a larger population.
- The possibility of mitigating the isolation of individual herds.
- Possible problems related to the functioning of transboundary populations include:

⁴⁹ Guidelines for Population Level Management Plans for Large Carnivores Contract nr. 070501/2005/424162/MAR/B2

⁵⁰ Perzanowski K. 2017. Wisents in transboundary populations – a Chance or a problem?. TEKA Commission of Protection and Formation of Natural Environment 14: 87-94.

- Difficulty in managing the population due to the different status of the bison in individual countries.
- Complex accounting of the costs of herd care and maintenance.
- Compensation for potential damages.
- The possibility of transmitting infectious diseases not present in the territory of one of the neighboring countries.

Therefore, the creation of transboundary bison populations is highly desirable in terms of the potential expansion of their range and increasing the effective population size of the species. The effectiveness of these initiatives will depend on the possibility of establishing permanent interstate agreements and ensuring routine cooperation. It is crucial to establish a unified status for the species in Europe, or at least among EU member states.

The analyzed area covered by the Programme is one of the most valuable natural regions in Europe, characterized by unique natural resources, both ecologically and scenically. These resources are challenging to find in other parts of Europe, resulting in exceptional environmental and landscape diversity. Currently, the creation of transboundary protected areas is a popular and often-used method to promote tourism in national parks and more effectively manage these areas. "Transboundary" refers to crossing state borders, operating beyond them. It is essential to emphasize that the mere existence of two protected areas on both sides of the border does not automatically make them a transboundary area. Some level of cooperation, mutual dependence, and collaboration must be established between these units, even at the lowest level.

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- The possibility of mitigating the isolation of individual herds.
- Possible problems related to the functioning of transboundary populations include:
- Difficulty in managing the population due to the different status of the bison in individual countries.
- Complex accounting of the costs of herd care and maintenance.
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- The possibility of transmitting infectious diseases not present in the territory of one of the neighboring countries.

Therefore, the creation of transboundary bison populations is highly desirable in terms of the potential expansion of their range and increasing the effective population size of the species. The effectiveness of these initiatives will depend on the possibility of establishing permanent interstate agreements and ensuring routine cooperation. It is crucial to establish a unified status for the species in Europe, or at least among EU member states.

Among the existing problems from the perspective of implementing the Programme, the Przemysł Foothills, reaching to the border with Ukraine, can be indicated. For many years, unsuccessful efforts have been made to establish another national park in Poland in this area, and the expansion of conservation protection areas causes various social conflicts involving local communities, environmental organizations, and administration.

Another significant problem for the support area is the conflict in the Białowieża Forest, which concerns the expansion of the national park area.

To the mentioned problems, the lack of a comprehensive approach to spatial planning should be added. This is due, among other things, to the lack of coherent and legally enforceable spatial policies of municipalities (lack of comprehensive spatial development plans, provisions of the Study not binding for building conditions decisions) and the implementation of "minimalist" spatial planning practices (minimizing the costs of planning studies, introducing point changes that do not create organized space but only respond to investment needs). Another significant threat to the preservation of the natural and cultural values of the Carpathians is the lack of adaptation of land use and development methods to natural, cultural, and landscape values, resulting in the progressive fragmentation of natural systems and the degradation of cultural landscapes. The increasing abandonment of agricultural activities and the loosening of settlements result in the dispersion of buildings, thus degrading the landscape values of Carpathian villages and towns in the Carpathians. Low awareness of the economic and natural consequences of introducing land use methods inconsistent with natural conditions, as well as the

underestimation of natural conditions in the planning process (relying on outdated eco-physiographic studies), results in the disruption of connections between areas with high biological diversity (local ecological corridors and nodal areas), a reduction in the surface area of areas with high biological diversity, and the interruption of animal migration routes, especially in forested ridges, open areas, and river valleys.

Green infrastructure (GI) offers opportunities for supporting the resolution of environmental issues (including the preservation of ecological connectivity), society, and the economy. Although the term "green infrastructure" does not appear in Polish legislation, there are tools that enable actions for its development⁵¹. The use of a strategic approach in shaping GI places particular emphasis on individual initiatives and projects at the local level. This allows for the involvement of various stakeholder groups and joint decision-making on local spatial development priorities in an integrated and cooperation-based manner. The result may include the development of new regional development programs aimed at revitalizing degraded areas or incorporating ecological connections, thereby spatially connecting natural areas located within a given municipality, county, or province. Considering GI in planning processes supports regional development in natural, economic, and social contexts. It contributes to improving the quality of ecosystem services and supports environmentally friendly, extensive land use. Additionally, it is essential to emphasize that Natura 2000 Network areas are a central element of European green infrastructure, covering many European natural and semi-natural ecosystems and biodiversity, providing legal and organizational frameworks that can contribute to the long-term efficiency and profitability of investments in green infrastructure.

Among the existing problems that are significant from the perspective of implementing the proposed document, problems arising from the quality of the natural environment should be mentioned. These include air quality (mainly its pollution), noise, the quality of surface and groundwater, extreme phenomena, and hydrotechnical devices^{52,53,54}.

Air pollution harms human health and the environment. High concentrations of pollutants (exceeding normative values of PM₁₀, PM_{2.5} dust, benzo(a)pyrene) negatively affect human well-being and pose serious health risks. The harmful impact of pollutants on ecosystems is also not insignificant. Therefore, emission reduction remains a significant factor influencing air quality. Air pollution can be a problem both locally and globally. Pollutant emissions released in one country can be transported in the atmosphere over long distances, contributing to worsening air quality in other distant regions. Air pollution consists of gaseous and particulate substances released into the atmosphere as a result of anthropogenic activities. They enter the environment through various emissions: vehicle exhaust, power plants, industrial plants, waste disposal sites, gravel mining, transport, or raw material handling. Coal is still the primary source of energy in the national economy, and its combustion causes emissions of gaseous pollutants (sulfur dioxide, carbon oxides, and nitrogen oxides), particulate matter, and polycyclic aromatic hydrocarbons, with the latter two currently being the most significant problem. Dust, nitrogen dioxide, and ground-level ozone are now widely recognized as pollutants with the greatest impact on health. Long-term exposure to these pollutants causes various effects, from respiratory and circulatory diseases to premature death. Increasing concern is raised by the problem of air pollution with benzo(a)pyrene – a highly carcinogenic substance occurring in concentrations exceeding established norms in urban areas, especially in central and eastern Europe.

Noise is a stress-inducing factor and is a significant threat to public health. It is one of the most noticeable environmental hazards. As an environmental pollutant, it is a factor that significantly affects the quality of living and recreational conditions for humans and the existence of animals in a given area. It also negatively affects the

⁵¹ Interreg CE 2019. Green Infrastructure Handbook. Conceptual and Theoretical Foundations, Terms, and Definitions. Shortened Polish Version

⁵² GIOŚ 2020. State of the Environment in the Podlaskie Voivodeship. Report 2020. GIOŚ Białystok

⁵³ GIOŚ 2020. State of the Environment in the Podlaskie Voivodeship. Report 2020. GIOŚ Lublin

⁵⁴ GIOŚ 2020. State of the Environment in the Podlaskie Voivodeship. Report 2020. GIOŚ Rzeszów

quality of nature by reducing or losing the value of protected, recreational, or spa areas. The main sources of noise causing increased acoustic nuisance in the environment include: road traffic, railway, industrial plants, and air traffic noise. The acoustic climate of the area covered by the implementation of the Programme is primarily shaped by traffic noise (mainly road and, to a small extent, railway and air traffic) and industrial noise. The main causes of above-norm noise in the vicinity of roads include: large traffic volumes and poor technical condition of vehicles; significant share of trucks in traffic; excessive vehicle speeds; type and technical condition of road surfaces; dynamic growth of international and national air traffic; lack of proper hierarchy of the road network and the problem of regulating accessibility – still a large part of national roads passes through towns in the vicinity of dense residential buildings, transferring both external traffic (including transit traffic of trucks) and local traffic; ineffective urban planning and lack of clear provisions in spatial planning regulations taking into account noise criteria – as a result, there is uncontrolled building development along Z, G, and GP roads by residential buildings, close proximity of buildings to the street, and lack of acoustic zoning (the first line of development from the street should have a non-residential function).

The quality of surface and groundwater in the areas covered by the implementation of the Programme is the result of pressures related to water intake, discharge of municipal and industrial wastewater into water bodies, runoff from areas (including agricultural and rural areas, which can ultimately lead to the risk of exceeding the permissible nitrate content in drinking water), improper waste management, handling of rainfall and snowmelt, hydromorphological changes, and pollution associated with the development of tourism and recreation. Additionally, in the Podlaskie Voivodeship, due to the agricultural nature of the region, agriculture (large-scale cattle farming and sewage management in rural areas) should be particularly taken into account as a cause of pollution, including eutrophication of surface waters. Pollution of drinking water may result mainly from the lack of proper protection of water intake zones and inadequate sewage treatment flowing into surface waters.

Extreme phenomena and hydrotechnical devices. Climate change, low surface and reservoir retention, construction of surfaces with impermeable objects/surfaces (including roads), and accelerating surface runoff, insufficient efficiency of sewage systems can lead to an increased risk of flooding. Urban floods and related extensive losses, largely resulting from intense rainfall and the inability to drain water, caused by the inefficiency of sewage systems, as well as the construction of impermeable objects and surfaces, are becoming increasingly common. Most likely, due to climate change, periods of extremely dry weather occur more and more frequently, and the negative effects are additionally deepened by the lack of systemic water retention.

Land surface pollution, related, among other things, to the excessive proportion of stored waste compared to segregated and recycled waste, as well as the import of waste from abroad. This phenomenon also results from increased consumption of goods and insufficient segregation and recovery of raw materials from municipal waste. As a consequence, increasing soil pollution leads to the creation of degraded areas that require revitalization and reclamation.

The main factors threatening biodiversity are: loss and fragmentation of habitats through the creation of monocultures, occurrence and creation of new migratory barriers; excessive exploitation and improper use of natural resources, e.g., disruption of the balance in forest ecosystems through intensive forest management; pollution, e.g., the use of pesticides affecting insect populations such as bees; the influence of invasive alien species and climate change.

Climate change leading to an increase in the average annual air temperature, changes in the structure of atmospheric precipitation (more violent storms), and an increase in the frequency of extreme events. Annual rainfall totals do not undergo fundamental changes, but there is an uneven character of rainfall (long periods without rain, interrupted by sudden and heavy rainfall), which consequently leads to broadly defined water deficits. Damage to forest ecosystems, agriculture, and the migration of species, as a result of strong winds, and even incidentally accompanying tornadoes and lightning.

Please note that translation may involve some interpretation, and for legal or official documents, consulting with a professional translator is advisable.

CONCLUSIONS

Considering the fact that nature does not respect national borders, the EU has adopted rigorous legal solutions applicable throughout its territory to protect the most important habitats and species threatened with extinction. The Birds and Habitats Directives are the main instruments of EU policy aimed at halting the loss of biological diversity.

Given that a significant portion of the territory of Poland included in the Programme is covered by the Natura 2000 network, and Ukraine is part of the Emerald network, there is no doubt that nature conservation management in these areas should focus on close cooperation with all stakeholders and the business sector. This is essential for ensuring stable management of the areas in the long term. Through such an approach, the aforementioned Natura 2000 network will fully "support" the principles of sustainable development. Its goal is not to stop economic activities but to define the framework within which they should be carried out to protect the biological diversity of Europe.

It should be emphasized that the implementation of the Programme may impact environmentally sensitive areas primarily on a temporary basis. The most significant potential impact on environmentally sensitive areas comes from infrastructure projects related to the construction or reconstruction of buildings, among other things. However, this impact will be of a short-term nature and will subside after the completion of the projects outlined in the Programme.

Some actions carried out as part of the Programme, especially infrastructure projects related to construction works, have been implemented worldwide for decades. Therefore, in the context of their environmental impacts, they are well-researched and do not generate impacts that are hitherto unknown or insufficiently investigated. Their environmental impacts are also similar to those generated by projects in other industries related to infrastructure construction. Thus, there are no fundamental deficiencies in technology or gaps in modern knowledge, both during their implementation and operation.

Nevertheless, each of the actions mentioned in the Programme will be implemented in specific local conditions, generating more or less significant impacts. When making decisions about the location of a particular investment, its reconstruction, or expansion, it is necessary to take into account:

- the presence of important, large, undivided habitat areas;
- the routes of ecological corridors of various ranks and ecological significance;
- the species of plants and animals present in specific locations;
- the routes of traditional and seasonal animal movements and migrations.

A comprehensive environmental impact assessment will consist of individual procedures for coordinating major projects in accordance with the principles of Environmental Impact Assessment procedures in each country.

5.3. ANALYSIS OF THE ENVIRONMENTAL PROTECTION OBJECTIVES SET AT INTERNATIONAL LEVEL,

The aim of the analysis is to assess the connections and compliance of the Program with global, EU, and national environmental goals formulated in strategic documents. The assessment was carried out through the lens of current environmental and climate challenges outlined in international, EU, and national (Poland and Ukraine) documents. From the perspective of the Forecast, it is crucial that the Program is designed to contribute to the faster achievement of environmental and climate goals while not supporting actions with negative feedback loops. In the original Forecast, an expert analysis of compliance with documents at the global, EU, and national

levels (Poland and Ukraine) was conducted. Using the same methodological approach, the updated Forecast analyzed the compatibility of changes (new specific goals and actions) introduced in the Program. However, in the updated Forecast, Annex 1 was omitted, leaving a summary of the assessments in the Forecast's content. Current sustainable development and environmental protection goals have been formulated in the UN document "Transforming our World: The 2030 Agenda for Sustainable Development" (Agenda 2030). Agenda 2030 includes 17 Sustainable Development Goals (SDGs). It is currently the most up-to-date action program defining the sustainable development paradigm at the global level. According to the Agenda, contemporary modernization efforts should focus on: eliminating poverty in all its forms, eradicating hunger and ensuring food security, ensuring healthy living conditions, ensuring equal access to quality education, achieving gender equality, ensuring access to clean water and sustainable water and sanitation systems, ensuring access to sustainable and modern energy, supporting sustainable, open, and balanced economic growth, full and productive employment, and decent work for all; building disaster-resistant infrastructure, promoting innovation, reducing inequality within and between countries, building safe and sustainable cities and human settlements, ensuring sustainable consumption and production patterns, taking urgent action to combat climate change and its impacts, sustainable use of oceans, seas, and marine resources, protecting and sustainably using terrestrial ecosystems, sustainable forest management, combating desertification, halting and reversing land degradation and biodiversity loss, promoting peaceful and inclusive societies for sustainable development, ensuring access to justice for all, and building effective, accountable, and inclusive institutions at all levels. Sustainable development should have a global character and be implemented through global cooperation and partnership. The assessment of the Program's compliance with the principles of sustainable development also relates to the 6 priorities of the European Commission for 2019-2024. In particular, the European Green Deal, which is defined by the EC as a plan for a sustainable EU economy, with its primary goal being to turn climate and environmental challenges into opportunities in all policy areas, as well as ensuring that the transformation is fair and socially inclusive. The assessment was guided by the horizontal principle of "do no significant harm" included in Regulation (EU) No 2020/852 (taxonomy regulation). The analyses conducted unequivocally indicate that the Program's assumptions are consistent with maintaining a harmonious balance between society, the economy, and the environment. The Program's alignment with SDGs is evident in the field of climate (SDG13), and its implementation will support tasks aimed at enhancing adaptive capacity and resilience to climate-related threats and natural disasters. The implementation of activities outlined in Priority 1 - Environment will have a positive impact on challenges related to clean water and sanitation (SDG6), transitioning to a circular economy (SDG13), maintaining ecological potential and biodiversity protection (SDG 15), as well as responsible resource management associated with promoting a rational waste management economy (SDG12). SDGs related to social capital are reflected in Priority 2 - Health, Priority 4 - Cooperation, and Priority 5 - Borders. In this case, ensuring access to healthcare (availability of preventive and specialist medicine) aligns with promoting good health and well-being (SDG 3). Support for building a safer and better-protected Europe supports the implementation of SDG 16. Actions focused on the development of cross-border tourism projects will support the local economy (SDG 8). Projects under Priority 4 (aimed at improving cooperation at various levels) support the implementation of SDG 17 - building partnerships for the implementation of sustainable development. Additionally, the bottom-up approach to formulating Program assumptions deserves emphasis. Such a combination of objectives and participatory programming aligns with the strategic challenges of sustainable development expressed in the documents Europe 2020 and Agenda 2030. The introduction of the general non-discrimination principle, applicable to all programs co-financed from EU funds, ensures the Program's consistency with gender equality goals (SG5). The analysis of the Program's connections to environmental protection goals at the community and national levels takes into account the role of the Program as a program defining intervention areas and principles of financial support for the development of the cross-border region with EU funds. Given that the Program organizes space for EU funds expenditure, the analysis of connections with environmental protection goals, especially those established at the EU level, was particularly considered. The implementation of the Program should strengthen, and at a minimum, should not weaken, the achievement of environmental protection goals set out in EU policies and strategies, as well as directly resulting from the EU cohesion policy for 2021-2027. At the same time, the Program should demonstrate synergy and enable the achievement of environmental protection goals arising from national

conditions, which have been specified, in particular, in the Environmental Policy of the State 2030 for Poland and in the Law on Basic Principles (Strategy) of the State Environmental Policy of Ukraine until 2030. The most important current EU documents setting environmental protection goals are:

- European Green Deal,
- VIII. General EU Environmental Action Programme until 2030,
- Regulation on Taxonomy.

The environmental protection goals formulated in these documents are convergent and relate to adaptation and strengthening resilience to climate change and ambitious climate goals, greenhouse gas emissions reduction, energy security, transition to a circular economy model, promotion of sustainable production and consumption, energy and resource savings, pollution control and prevention, acceleration of the transition to sustainable and smart mobility, protection and restoration of biodiversity and ecosystems, strengthening natural capital, creating a fair, healthy, and environmentally friendly food system. The assessment of the Program's provisions carried out in the light of EU environmental goals expressed in the above-mentioned documents does not show contradictions. The actions envisaged to support Priority 1 directly contribute to achieving EU environmental protection goals. The implementation of the Program will support the implementation of objectives related to climate change adaptation, which will contribute to better environmental care in tourism development activities and will result in improved environmental awareness of society. The Program includes the possibility of financing actions for the protection, regeneration, and sustainable use of valuable natural areas, actions related to promoting the circular economy and rational waste management, as well as improvement in water and sewage management. These actions clearly demonstrate direct compliance with current environmental challenges. Positive effects should be sought in the formulation of specific competition requirements, emphasizing the need to use solutions that are conducive to nature and protect the climate and the environment. In Poland, environmental policy and environmental protection goals at the national level are defined in the Strategy for Responsible Development until 2020 (with a perspective until 2030), the goals of which related to environmental protection are specified and implemented through the provisions of the Environmental Policy of the State 2030 (PEP). National climate challenges have been formulated in the Strategic Adaptation Plan for Sectors and Areas Vulnerable to Climate Change until 2020 with a perspective until 2030 (SPA). Ukraine integrates sustainable development goals and environmental goals into the Development Strategy of Ukraine until 2030. The country's development challenges integrate aspects related to a clean, safe, and high-quality environment with the goal of building an economy based on a pro-environment approach. Environmental and climate goals have been operationalized in the following documents:

- The Concept of Implementing the State Climate Policy until 2030,
- The National Waste Management Strategy in Ukraine until 2030,
- The Low-Emission Development Strategy of Ukraine until 2050,
- The Decree of the President of Ukraine "On Sustainable Development Goals of Ukraine until 2030,"
- The Law on Basic Principles of the State Environmental Policy (Strategy) of Ukraine until 2030 (equivalent to the Environmental Policy of the State in Poland).

The assessment of the Priorities and specific actions included in the Program in terms of environmental protection goals formulated in the documents shaping environmental policy in Poland and Ukraine did not reveal contradictions or mutual weakening. The implementation of the Program is expected to have a range of positive effects, also in the field of environmental and climate goals. Despite not identifying areas of the Program conflicting with the environmental protection goals of the analyzed strategic documents, it must be noted that the implementation of some projects potentially included in the Program may be associated with potentially negative environmental impacts. In such cases, detailed analyses will be necessary as part of the environmental impact assessment procedure. After conducting these analyses, recommendations may be formulated regarding the adaptation of these projects to environmental goals, including new and currently being prepared ones.

5.4. ANALYSIS AND ASSESSMENT OF ANTICIPATED SIGNIFICANT ENVIRONMENTAL IMPACTS

As part of the work, environmental impact assessment criteria were identified on the basis of:

- the state of the environment and the main problems identified;
- legal requirements for the activities planned under the Programme;
- the types of projects identified that may have a significant impact on the environment;
- conclusions from analyses of strategic documents.

The impact assessment criteria adopted for each environmental element are set out in the table below.

Table 11 Selected criteria for evaluating the impact of the Programme on particular elements of the environment⁵⁵.

Elements to be examined environments	Evaluation criteria
Diversity biological	<ul style="list-style-type: none"> - Impact on the diversity of living organisms found in ecosystems, within species and between species, and ecosystem diversity
Animals	<ul style="list-style-type: none"> - Impact on species, particularly protected and endangered species.
Plants	<ul style="list-style-type: none"> - Impact on natural habitats and protected and endangered plant species.
Integrity of areas protected	<ul style="list-style-type: none"> - Impact on the maintenance of the coherence of protected areas (coherence of structural and functional factors determining the sustainable persistence of species populations and habitats nature) and on the permeability of ecological corridors in general.
Water	<ul style="list-style-type: none"> - Impact on surface and groundwater resources. - Impact on surface and groundwater status. - Impact on land drainage. - Impact on increased risk of flooding, floods, landslides and drought.
Air	<ul style="list-style-type: none"> - Impact on air quality, including PM10/PM2.5, particularly in areas of overruns.
People	<ul style="list-style-type: none"> - Impact on the occurrence of exceedances of air quality standards, noise, drinking water, soil pollution. - Sensitivity to the possibility of failure.
Ground surface	<ul style="list-style-type: none"> - Impact on landform and land use, land movement and soils, including during construction and decommissioning. - Impact on permanent change of landforms due to the introduction of anthropogenic landforms, the creation of new opencast mines, the making of embankments, cuts, etc. - Impact on land stabilisation and protection against landslide processes.
Landscape	<ul style="list-style-type: none"> - -Impact on landscape values.
Climate	<ul style="list-style-type: none"> - Effect in terms of reduced CO2 emissions. - Impact on increasing energy efficiency. - Impact on adaptation to climate change (extreme events).
Resources natural	<ul style="list-style-type: none"> - Impact on increased consumption of raw materials used during the construction phase.
Monuments	<ul style="list-style-type: none"> - Impact on the preservation of good condition of historic buildings. - Impact of ongoing construction works on the technical condition of monuments located in the vicinity.

⁵⁵ Own analysis based on Atmoterm's SA report

	<ul style="list-style-type: none"> - Impact of the location of the new development on the exposure of the monument which is a local dominant feature - spatial.
Material goods	<ul style="list-style-type: none"> - Impact on the value of property (land and buildings) due to the presence or proximity of the proposed development. - The impact on the value of buildings of any works and activities that may affect their technical condition both during construction and operation. - Impact on business values as a result of the projects included in the Programme.

Additional criteria for evaluation included horizontal analyses in terms of considering aspects of sustainable development, eco-innovation, and green and circular economy, as well as taking into account the dependencies between environmental elements and their interactions.

It should be noted that the assessments in detailed analyses are of a review nature, meaning that the absence of significantly negative impacts in a specific intervention area does not imply a priori that none of the projects implemented in that area will significantly negatively affect environmental elements, including Natura 2000 areas. Only the assessment of a specific project (investment project), specifying its location, can determine a significant negative impact or its absence. However, such an assessment applies only to a specific project and is not synonymous with a statement about the occurrence of such an impact in relation to the entire Programme.

5.4.1. IMPACT ON BIODIVERSITY, PLANTS, AND ANIMALS, INCLUDING NATURA 2000 AREAS AND THEIR INTEGRITY, INCLUDING ECOLOGICAL CORRIDORS

In the Programme, apart from LIP (Detailed Plan of Investments), the locations of planned projects were not specified. Since the location is crucial for evaluating natural values, the assessment of the impact on individual ecosystem elements and their integrity was conducted at a high level of generality, without considering spatial conflicts within individual forms of nature protection, but assuming the precautionary principle and striving to take into account all possible and hypothetical impacts of planned investments in this assessment.

In terms of assessing the impact on biodiversity, the document under preparation indicates issues and threats that should be considered when selecting and implementing projects, primarily when deciding on the project's location. The goal is to minimize the impact on natural resources. It is also crucial to ensure that the projects align with national regulations, primarily the Nature Conservation Act and related EU directives (especially the "Birds" and "Habitats" directives).

5.4.1.1. Impact on Biodiversity

The main factors directly negatively affecting biodiversity are:

- Loss and fragmentation of habitats,
- Excessive exploitation and improper use of natural resources,
- Pollution,
- Impact of invasive alien species, and
- Climate change.

In Europe, Natura 2000 areas are the main tool for protecting biodiversity. However, biodiversity conservation is also carried out outside these areas through the protection of species and habitats, and in Poland, through other spatial forms of nature protection and environmental regulations. The need to consider biodiversity in environmental impact assessments arises from Polish legal regulations and is emphasized by the Directive 2014/52/EU amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment. The EU Biodiversity Strategy for 2030 states that environmental impact

assessments should focus not only on minimizing the impact of projects but also on ensuring "*no net loss*" of natural values and restoring biodiversity⁵⁶.

One of the factors directly affecting biodiversity is the loss and fragmentation of habitats. The fragmentation not only significantly reduces the overall adaptive capacity of the population but can also lead to the formation of metapopulations consisting of small subpopulations in contact with each other through individual exchange. The main condition for the survival of a metapopulation is the preservation of ecological connectivity, i.e., the ability to exchange individuals and gene flow. When ecological connectivity between patches is preserved, the metapopulation functions correctly, and even small environmental fragments are inhabited by animals.

The assessment of the impact of the Programme on biodiversity and natural values is based on a risk analysis of the occurrence of negative effects on species (plants and animals) and natural habitats. This includes maintaining their internal integrity within individual areas and external integrity with other protected areas, including ecological corridors. Considering the nature of planned projects and their locations (e.g., in urban areas or within existing facilities and transformed areas), the assessment also takes into account impacts beyond legally designated nature forms.

At the time of developing the Programme, for projects without precise locations specified (inability to precisely determine their direct impact on specific forms of nature protection), potential effects and impacts on nature were described. A detailed analysis of the impact and resulting locational limitations will depend on the environmental impact assessment conducted during the project design stage.

5.4.1.2. Impact on Habitats and Flora

The identification of the Programme's provisions' impact on the flora of areas subject to activities indicates that the location of investments and the area occupied by construction are the main determinants of potential negative impacts on habitats and plants. They can lead to habitat fragmentation, occupation of plant sites, including protected ones, and the removal of trees and shrubs that, besides their floristic value, provide essential habitats for insects, birds, and bats.

Some activities, especially those related to infrastructure, which involve construction works, can lead to the transformation of the terrain (especially when occupying large areas, e.g., construction and expansion of infrastructure elements), the movement of earth and aggregates on construction sites, their storage, the need to build and provide accompanying infrastructure (access roads), terrain disturbance by heavy equipment, and pruning of shrubs and tree stands. Due to construction activities, there is a significant risk of lowering groundwater levels and disturbing their flow within aquifers. Moreover, there is a possibility of contaminant penetration into water and soil and directly into habitats. In connection with construction activities, there is a significant risk of lowering groundwater levels and disturbing their flow within aquifers. Moreover, there is a possibility of contaminant penetration into water and soil and directly into habitats.

The inconveniences, identified threats, and pressures on habitats and plants of areas subject to activities will be associated with the following phenomena:

- Runoff of polluted rainwater from roads and tracks,
- Increased levels of soil pollution with heavy metals,
- Increased air pollution levels and increased toxicity (dioxins, hydrocarbons),
- Acidification of precipitation (pollutants from exhaust gases falling with rain on habitat patches),
- Littering,

⁵⁶ European Commission 2020. EU Biodiversity Strategy for 2030. Bringing nature back into our lives.

- Increased human penetration of the area,
- Risk of contaminant penetration into water during infrastructure construction,
- Invasive species penetration.

It should be emphasized that the potentially generated negative impacts on the creation of new investments can be limited by the proper choice of the location variant and the subsequent application of appropriate mitigating measures. Furthermore, the occurrence of the mentioned potential negative impact on natural habitats can be determined during the environmental impact assessment of individual investments, following the update of information on habitats and conducting field inventory. Based on this, appropriate actions minimizing the damage and nature compensation can be planned.

5.4.1.3. Impact on Animals

Mammals

The most significant negative impacts identified concerning the impact on animal species are related to habitat occupation due to the creation of new linear infrastructure elements. This will lead to a reduction in the food base, occupation of breeding sites, as well as collisions with migration routes. Therefore, proper recognition of species and their needs before selecting the location of investments and minimizing negative impacts from the project implementation phase are crucial.

During the operational phase, the most unfavorable impacts will be related to the occurrence or intensity of the barrier effect. Large mammals requiring significant territories will be particularly endangered. The main threats include:

- Creating barriers to animal movement,
- Restricting access to the food base,
- Collisions with vehicles on inland water routes causing increased mortality,
- Disturbance due to excessive noise.

In the "SEA Report of the Effects of Implementing the National Road Construction Programme for the Years 2014-2023," strong negative impacts on large mammals with significant roaming distances were identified. The primary concern will be the substantial negative influence on the populations of large mammals that exhibit significant roaming distances, including bears, lynxes, wolves, bison, elk, deer, roe deer, wild boars. Negative impacts and collisions of routes with migration corridors of these mammals were primarily identified in southern Poland (Carpathian Corridor CC [pol. Korytarz Karpacki KK])⁵⁷. However, disturbances in the ability to move freely will occur only sporadically in the areas where permanent structures are being created. Other mammal species will not be significantly exposed to adverse effects. In the case of small mammal species with short-distance migrations and movements, the possibility of significant impact on their populations has been ruled out.

Since the Programme does not include the construction of roads but only bicycle paths, their impact on animals will be minor, unless the construction of bicycle paths is accompanied by road construction as part of other projects. However, if bicycle paths are built along existing roads, their additional impact will be minimal. Other mammal species will not be significantly exposed to negative effects. For small species with short-distance migrations and movements, the possibility of significant impact on their populations at the national or Programme level has been ruled out.

⁵⁷ <https://www.korytarze.pl>

The SEA Report also analyzed the impact on bats. The conclusions indicate that despite the occurrence of individual strong potential impacts, it will not be significant considering the scale of Programme implementation, after the application of appropriate minimizing actions (use of appropriate protections, lighting, etc.).

Birds

Impact on birds, especially Natura 2000 protected areas, is possible during the construction phase. This relates to potential changes in water conditions that may affect habitat quality. Soil interference and placing permanent structures alter water permeability and movement within aquifers. Earthworks on hydric soils may lead to periodic drying and mineralization, affecting the physicochemical properties. This, in turn, limits the development of insects, essential for bird food. Construction activities during the breeding season can disturb nesting biology in specific locations, including the destruction of nesting and foraging sites, as well as noise emission and disturbance from machine and human traffic. Technical facility construction will create access roads, some of which will remain for ongoing maintenance. Their construction and use also impose pressure on habitats by reducing nest site availability and foraging bases. Direct collisions with vehicles are also possible.

The exploitation of planned infrastructure in this document may cause impacts such as:

- Change in nesting sites
- Necessity to change migration routes
- Habitat fragmentation, leading to population weakening due to a deteriorating food base and the need to lengthen flight routes to feeding areas (significant energy expenditure)
- Increased mortality due to collisions with vehicles and tall infrastructure objects accompanying road and rail transport infrastructure
- Disturbance

For investments most affecting bird species, the exact scale of projects is unknown, so it cannot be unequivocally stated to what extent they will impact national bird populations. With the application of appropriate minimizing actions and by choosing, during the environmental impact assessment, a location variant considering the needs of bird species, negative impacts on their populations can be minimized. It is also important to conduct post-implementation monitoring to optimize actions reducing negative impacts or introduce compensatory solutions.

Amphibians and reptiles

Amphibians and reptiles are particularly vulnerable to pollution of water and soil. Potential negative (but short-term) impacts on amphibians will occur wherever terrain conditions favor their presence, typically in reservoirs, watercourses, wetlands, areas with stagnant post-rainwater, and even excavations where water can accumulate. Their limited mobility prevents populations from moving large distances from construction projects. Therefore, to reduce the risk of local population loss, minimizing actions should be implemented during the planning phase. During construction, it is essential to secure construction sites and emerging areas dangerous to amphibians and reptiles (e.g., wells, excavations) and create alternative breeding sites (small retention basins).

The most significant threats include:

- elimination of habitats, especially aquatic and terrestrial
- changes in water conditions leading to the disappearance of breeding reservoirs
- interruption of animal migration routes and disruption of migration paths by access roads
- presence of numerous "local ecological traps" accompanying transportation infrastructure, e.g., drainage wells, settling tanks, inflow wells, etc.
- contamination of water reservoirs and watercourses, especially with oil substances from construction machinery.

Therefore, protective measures are necessary (amphibian protection is a legal obligation, as all amphibian species are protected by national law).

Fish

No significant negative impacts on fish species were found for the planned investments. Any short-term negative impact on this group of animals may be related to the possible penetration of pollutants into surface waters from construction sites. The assessment of the degree of impact on this group and the determination of minimizing actions should take place after recognizing local conditions in a given location. However, general minimizing actions to preserve the mobility, reproduction, and feeding of fish species include the use of fish passages and alternative habitats.

Invertebrates

The planned Programme investments will potentially occupy the habitats of protected invertebrate species, including insects. However, it is not anticipated that there will be a significant negative impact on national populations. Negative impacts may have a local scope and concern specific locations. At this stage, it is not possible to estimate the real impact of investments on invertebrate species because they inhabit small areas or occur on individual trees or habitat patches. It is crucial to conduct a detailed survey of their occurrence in the field and protection needs. The impact on individual populations should be considered during the environmental impact assessment when minimizing actions for specific invertebrate species can be taken into account.

5.4.1.4. Impact on Natura 2000 areas

At the stage of developing this Programme, investments indicated at a general level, without specifying exact locations or implementation conditions, were not unequivocally identified as causing significant negative impacts on Natura 2000 areas. Due to the high level of generality in the analyzed document, attention was focused on projects whose potential implementation could potentially have a direct or indirect impact on Natura 2000 areas and their protection objects.

Due to the large areas occupied by Natura 2000 areas, a significant problem arising from the development of linear infrastructure elements such as bike paths or water supply networks is the issue of maintaining the coherence of the Natura 2000 network. The concept of the coherence of the Natura 2000 network applies to designated bird and habitat areas, forming the most important elements of the network, as well as connecting ecological corridors. However, it should be remembered that the mere course of the investment in a given area does not mean that the investment will have a negative impact on the protection objects of this area. During the investment, it is necessary to identify the conservation goals in individual Natura 2000 areas and identify potential and existing threats and, based on this, assess whether the investment will have a negative impact on the area and its integrity, as well as the coherence of the network. In Natura 2000 areas, there are no prohibitions regarding activities carried out, and the key is the protection goals and needs of individual protection objects.

At the stage of developing this Programme, potential locations of "nature collisions" and intersections of investments with Natura 2000 areas were indicated in spatial analyses. This part focused primarily on investments whose locations at the Programme stage were determined, and it was possible to indicate Natura 2000 areas to which they could potentially have a direct or indirect impact. Detailed results of the analysis were presented on the map (Figure 8). Potential negative impacts may concern projects related to infrastructure creation. It should be emphasized that the Nature Conservation Act prohibits the implementation of projects that may:

- deteriorate the state of natural habitats or habitats of plant and animal species for which protection has been designated in Natura 2000 areas (without introducing compensatory measures), or
- deteriorate the integrity of the Natura 2000 area or its connections with other areas, or

- have a negative impact on species for which protection has been designated in the Natura 2000 area.

According to current regulations, the implementation of a project that could significantly negatively impact Natura 2000 areas is possible if there are essential requirements of overriding public interest, including social or economic requirements. At the same time, the lack of alternative solutions or the justification of alternative solutions must be demonstrated. This condition can only be fulfilled in the absence of alternative solutions and ensuring the implementation of necessary nature conservation compensations to guarantee the coherence and proper functioning of the Natura 2000 network. In the case of significant negative impacts on priority habitat types and species, overriding public interest refers exclusively to the protection of human health and life, ensuring public safety, and achieving significant benefits for the natural environment.

For the purposes of this SEA Report, for projects for which approximate locations were indicated in documents accompanying the evaluated Programme and these projects were in close proximity to Natura 2000 areas, a preliminary analysis of the Natura 2000 area was carried out, with particular emphasis on entities for which this area was designated. Additionally, Standard Data Forms (SDFs) were analyzed, standardized throughout the European Union, containing detailed information about Natura 2000 areas, focusing on all Special Areas of Conservation (SAC) and Special Protection Areas (SPA) for which the analyzed Programme indicated possible proximity to natural areas.

Projects from the LIP list in close proximity to Natura 2000 areas: Potential proximity to Natura 2000 areas was identified only for the following projects:

- *LIP 4 Sustainable Water Management: a Way to Revitalise Western Ukraine and Eastern Poland*
- *LIP 1 The Carpathian narrow-gauge railways – a journey in the footsteps of the Carpathian Forest railways*
- *LIP 8 Increasing the throughput capacity of the Hrebenne-Rawa Ruska road border crossing point and improving the conditions for travelers crossing the border at the Budomierz – Hruszew road border crossing point.*

At the current planning stage, LIPs have a defined approximate scope and location. Based on this, however, the following Natura 2000 areas, located in the vicinity of the implemented LIP (location in the same municipality), can be defined: Middle Bug Valley (PLB060003); Orłowski Forest (PLH060061); Drewniki (PLH060059); Wolicy Valley (PLH060058); Sobiborskie Forests (PLH060043); Bugu Polesia (PLH060032); Bieszczady (PLC180001). Potential threats to protection objects located in the above-mentioned Natura 2000 areas, as specified in documentation for individual areas, include:

- PLB060003 Middle Bug Valley: scattered development; cultivation; disposal of household waste / recreational facility waste; fishing; trails, hiking trails, bicycle paths;
- PLH060061 Orłowski Forest: reduced fertility / genetic depression (inbreeding) in animals; cultivation; forest cutting;
- PLH060059 Drewniki: cultivation; fertilization / artificial fertilizers/; forest cutting; disposal of household waste / recreational facility waste; reduced fertility / genetic depression (inbreeding) in animals;
- PLH060058 Wolicy Valley: fishing; fires and fire extinguishing; modification of water functioning - in general; reduced fertility / genetic depression (inbreeding) in animals;
- PLH060043 Sobiborskie Forests: fishing; hunting; afforestation of open areas; eutrophication (natural); roads, highways; Other human activity interference and disruption; abandonment of pastoralism, Regulation (straightening) of riverbeds and changes in riverbed courses; use of biocides, hormones, and chemicals; disposal of household waste / recreational facility waste; hiking trails, bicycle paths; manual peat cutting; succession;

- PLH060032 Bugu Polesia: pollution of the Bug waters, afforestation projects of significant areas of meadows and lawns in the valley bottom, plans for recreational development of backwaters in areas adjacent to larger recreational villages.
- PLC180001 Bieszczady: fishing; roads, highways; forestry; power and telephone lines; abandonment of pastoralism, lack of grazing; trails, hiking trails, bicycle paths; cultivation; hunting; capture / removal of animals, and other forms of hunting, fishing, and collecting.

The figure below schematically shows the locations where LIP projects will be implemented against the background of protected areas. However, it should be emphasized once again that due to the ongoing war in Ukraine, both the location of projects and their scopes may change.

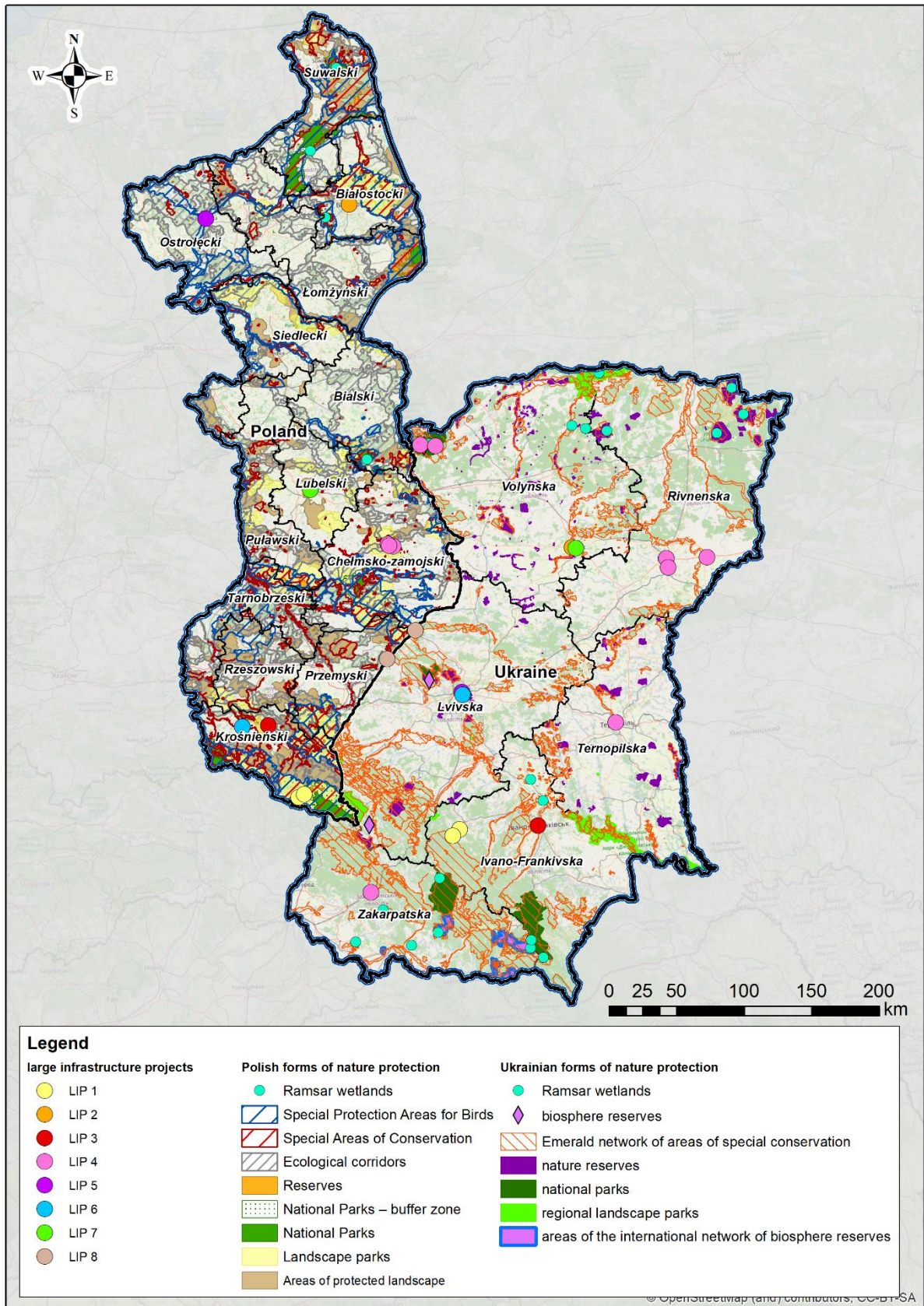


Figure 8 Approximate location of LIP-listed projects against protected areas

5.4.1.5. Impact on ecological corridors

Designation and protection of ecological corridors ensure the maintenance of functional connectivity in the current conditions of widespread environmental fragmentation. Ecological corridors are areas that allow the movement of individuals between habitats. Corridors are life paths that enable many species to exist despite unfavorable changes in the environment, and valuable European habitats still exhibit high biodiversity. The key functions of ecological corridors include:

- Reducing the degree of isolation of individual habitat patches and facilitating the movement of organisms between them, thereby increasing the likelihood of colonization of isolated patches.
- Increasing gene flow between subpopulations, preventing the loss of genetic diversity and counteracting inbreeding depression⁵⁸.
- Lowering mortality, especially among young individuals displaced from suitable habitat patches due to territorial behaviors.

The ability to move between habitat patches is the most commonly defined function of ecological corridors. In most cases, attention is paid to the dispersion of animals through linear structures of both natural and anthropogenic origin. In the first case, these may be natural watercourses and their valleys, forest areas, and mountain ranges. Anthropogenic forms mentioned most often in the literature include artificial watercourses, afforestation, avenues, and special facilities such as wildlife crossings. In practice, the role of connectors is further narrowed down to vertebrates (amphibians, reptiles, and mammals). A structure that allows effective movement of individuals or diaspora between habitat patches, where a specific species finds suitable conditions for its development, can serve as a guide. Due to the diverse biology of species, the structure and size of such ecological corridors can vary dramatically even within the same taxonomic group, depending on dispersal capabilities. Species with low dispersal abilities, such as most fish or dragonflies, require the spatial structure of ecological corridors to be continuous. Species with high dispersal abilities can move using non-continuous habitat patches. This type of ecological corridor structure is referred to as mosaic or 'stepping-stones,' and it applies to birds and most mammals. There is significant diversity among species with similar ecology. For example, while the wolf (*Canis lupus*) moves freely between forest complexes over distances of tens of kilometers, the lynx (*Lynx lynx*) prefers landscapes where forested areas are not separated by large open spaces.

Ecological corridors also ensure the integrity of the national network of protected areas, including Natura 2000 areas, as they allow the movement of organisms between habitats. To maintain the coherence of the Natura 2000 network, it is essential to ensure connectivity between areas, not only at the national level but also in terms of network coherence at the continental level.

The most significant threats that may disrupt ecological connectivity in the context of the proposed Programme include:

- The occurrence or intensity of a barrier effect resulting from the introduction of permanent physical barriers (fences, embankments, ditches, large areas transformed, e.g., roads, railways, power lines, wind turbines).
- Disturbance of animals due to the occurrence of above-normative noise during construction and operation.
- Changes in local systems (disappearance of small water bodies, drainage), which may pose a threat to the reproduction of amphibians.
- Logging of trees and shrubs, especially tree rows, hollow trees, as well as the introduction of lighting, which may adversely affect species feeding and migrating bats.

⁵⁸ Charlesworth D. 2003. Effects of inbreeding on the genetic diversity of populations. [Philosophical Transactions of The Royal Society Biological Sciences](#) : 358 (1434): 1051–1070.

- Pollution associated with transport routes.

The planned investments under the analyzed Programme will, depending on their location and type, indirectly or directly, short-term, medium-term, or long-term affect biological diversity, plants, and animals, including Natura 2000 areas and their integrity, as well as ecological corridors. The key factors determining the occurrence or absence of the direct impact of investments on nature are mainly the location and the way and timing of the implementation of the investment. The most significant impact in terms of potential direct impact on environmentally sensitive areas is associated with infrastructure projects related to water and sewage management, etc. However, this impact will be short-term and will subside after the completion of the projects planned in the Programme. Additionally, each implemented project will have assigned mitigating and compensatory measures (if necessary).

5.4.1.6. Impacts on biological diversity, plant and animal species, Natura 2000 areas, and ecological corridors – detailed approach

In the assessment of the impact of the planned Programme on biodiversity and natural values, the risk of a negative impact on species (plants and animals) and natural habitats was analyzed. This includes maintaining their integrity both within individual areas and externally with other protected areas, as well as serving as ecological corridors. Considering the nature of the planned projects and their locations (including urban areas and within existing facilities and transformed areas), the assessment also took into account impacts on areas beyond legal forms of nature protection. In the context of maintaining natural values and the continuity of ecological corridors, as well as considering the international scope of potential implementation, it is important to include an assessment of resources beyond protected areas.

Some of the proposed projects in the Programme are directly aimed at improving the functioning of ecosystems and the condition of habitats and species. Particularly positive impacts on natural resources and their connections will result from actions taken as part of the Specific objective: 2.3 Promoting nature protection, biodiversity, and the development of green infrastructure, especially in urban environments and pollution reduction. Improving the connectivity of ecological corridors, as well as implementing provisions of planning documents for nature protection, will significantly contribute to the functioning of ecosystems at the national and continental levels.

Actions related to environmental education will also complement the goal of preserving biodiversity. In many cases, the Programme's projects will positively impact natural resources indirectly or directly, such as improving water and sewage management to enhance water quality and associated habitats and species.

In the analysis of the impact on natural resources of projects for which specific investment locations were not indicated during the document preparation stage, it was not possible to provide precise information on the impact on specific protected areas and objects within them. Therefore, projects qualifying for the Programme should optimally consider the compromise between investors' and residents' needs and the natural resources in a given location, as well as choose options that minimally interfere with ecosystems. Projects should have appropriate environmental documentation according to applicable regulations, and if they describe the need for actions to minimize or compensate for negative impacts, these actions must be carried out.

For projects (potentially negatively impacting the environment) for which specific or approximate investment locations were indicated during the SEA Report preparation stage (LIP 4 "Sustainable Water Management: a Way to Revitalise Western Ukraine and Eastern Poland"), an analysis of the impact on individual environmental components was conducted.

- *Specific objective RSO2.4: Promoting climate change adaptation and disaster risk prevention and resilience, taking into account eco-system based approaches.*

Within the objective, initiatives for the development and implementation of strategies, solutions, Programmes, and infrastructure projects to increase adaptive capacity to climate change in the Programme area are supported. This includes protection against floods, droughts, fire prevention, and increased protection and resilience to the effects of anthropogenic disasters by building crisis management systems and infrastructure. Disseminating knowledge about the role and importance of green infrastructure (GI) in nature protection and for local development, as well as good practices regarding the participation of local groups in managing the space covered by the Programme and in Natura 2000 areas, will significantly contribute to the implementation of the EU biodiversity protection strategy and, thus, help prevent the loss of biodiversity and ecosystem service degradation and restore them to the greatest extent possible using GI. Considering GI in planning processes supports regional development in natural, economic, and social contexts. It contributes to improving the quality of ecosystem services and supports environmentally friendly, expansive land use. By increasing landscape values, positive impacts on tourism development and external promotion of the natural values covered by the Programme can also be achieved.

Some activities, especially those related to infrastructure, which are associated with construction work, may lead to the transformation of land surfaces, and their impact on nature components has been described in the introduction to this chapter.

For projects aiming to identify, monitor, and improve the condition of areas exceeding environmental quality standards, proper development and implementation of a monitoring system providing information on the environmental state are crucial. This allows prioritizing environmental protection, controlling and enforcing environmental law requirements. The most important aspects for the correct implementation of the monitoring task are:

- • cyclical conduct of research/measurement;
- • standardization of applied methods, equipment, and, above all, interpretation of results;
- • informing society, local government, governmental administration, non-governmental environmental organizations;
- • verification system of environmental policy based on results obtained from the environmental quality monitoring system.

The purpose of monitoring is to assess, through collecting, analyzing, and disseminating data on environmental quality and changes occurring in it, whether the environmental state is improving or deteriorating.

Within this objective, LIP 3 'Environmental Safety - creation of a Ukrainian-Polish forest fire management network in the Carpathian region' will be implemented. The project will be beneficial for nature components as it will impact forest protection against fires, thus preserving larger forest areas covered by the Programme. Establishing a forest fire management network in the Carpathian region will further enhance the protection and coordinated actions for the conservation of these valuable natural areas. Effective forest fire management will positively impact the preservation of biodiversity by preventing the degradation of ecosystems and effectively protecting plant and animal species.

- *Specific objective RSO2.5: Promoting access to water and sustainable water management.*

Within the objective, activities related to the implementation of projects aimed at protecting and improving water resources (including water management in the watershed, developing rainwater retention systems, and actions related to improving water quality) are planned. Actions related to the construction of water abstraction and storage infrastructure, impacting natural values, may occur during the construction phase and should not extend beyond the removal of trees and shrubs and the clearing of the construction area. In the case of sewage treatment systems and land reclamation of degraded areas, long-term positive effects on the animal and plant world can be expected. Possible negative impacts should be of a short-term nature and mainly related to the construction phase, not the operation.

Actions under the above Specific objective will indirectly or secondarily significantly support the state of natural habitats and species by limiting the penetration of pollutants into water and soil, significantly affecting the quality of surface and groundwater, determining the maintenance of sensitive water ecosystems and those dependent on water. The actions will also contribute to achieving the environmental goals of the JCW, detailed in subsection 4.6. Positive impacts will be felt in the longer term and will be permanent.

Within this objective, LIP 4 “Sustainable Water Management: a Way to Revitalise Western Ukraine and Eastern Poland” will be implemented. In close proximity to the areas where individual actions will be carried out, the following protected areas are located:

- protected landscape areas: Grabowiecko-Strzelecki Protected Landscape Area, Poleski Protected Landscape Area;
- reserves: Głębocka Dolina, Piaskowy, Pulemecki, Sominec, Bug, GAT, Rosiszny, Strumień Ossy, ornithological, Sierecki, Czystyliwski, Iszkowski, and local significance reserves;
- landscape parks: Skierbieszowski Landscape Park, Sobiborski Landscape Park, Zagrzeb Landscape Park;
- Emerald areas: Szacki, Sierecki;
- Ramsar areas: 'Szackie Lake';
- national park: Enchanted Land National Park; Szacki Nature National Park;
- ecological corridors: Polesie Ecological Corridor and the entire Bug Valley, considered a European-level ecological corridor; and
- Natura 2000 areas: PLH 060061 Las Orłowski, PLH 060059 Drewniki, PLH 060058 Dolina Wolicy, PLH 060043 Lasy Sobiborskie, PLH 060032 Poleska Dolina Bugu, PLB 060003 Dolina Środkowego Bugu.

A detailed characterization of protected areas in close proximity to LIP 4, including the subject of protection, has been included in the above chapters.

The planned construction of a water treatment and intake station, as well as a sewage treatment plant, the reconstruction of sewage treatment plants and water supply systems, will occupy land and change its use (occupying land, cutting down trees and shrubs, fragmenting the environment), but this area should not be large. Possible negative impacts may occur during the construction phase when greenhouse gas emissions from construction equipment may occur. Additionally, construction will impact the landscape, introducing new elements that may disturb it if not properly integrated into the surroundings. There may also be water pollution due to the use of construction equipment, which will directly affect environmental components. On the other hand, construction will be beneficial for people as it will improve water supply both in terms of quantity and quality. Improvements to the sewage and wastewater treatment system will also be advantageous. They will also contribute to achieving the environmental goals of the JCW described in subsection 4.6.

Access roads will be created during the construction of technical facilities, and some will remain after the completion of work for ongoing maintenance needs. There may also be animal disturbance due to above-normal noise during the construction phase. In the case of large mammals, the construction of the planned construction infrastructure and its use also involves pressure on habitats by reducing the availability of nesting niches and foraging bases. There may also be direct collisions with vehicles. For small mammal species with short-distance migrations and movements, the possibility of significant impact on their populations at the national or even Programme level has been excluded.

Potentially negative (but short-term) impacts on amphibians will occur wherever terrain conditions favor their occurrence, such as water bodies, wetlands, areas with stagnant water after rainfall, and even excavations where water can accumulate. However, this impact will be short-term and will diminish after the completion of the project planned in the Programme.

Due to the large areas occupied by Natura 2000 areas, preserving the coherence of the Natura 2000 network is crucial. The concept of the coherence of the Natura 2000 area network applies to designated bird and habitat areas, forming the most important links in the network, as well as connecting ecological corridors. However, it should be noted that the mere course of an investment in a given area does not mean that the investment will have a negative impact on the protected objects of that area. During the investment, it is necessary to recognize the protection goals in individual Natura 2000 areas and identify potential and existing threats. Based on this, assess whether the investment will negatively impact the area and its integrity, as well as network coherence. In Natura 2000 areas, there are no bans on activities, and the key is the protection goals and the needs of individual objects of protection.

There is no evidence of a significant negative impact on biodiversity, plants, and animals in protected areas and Natura 2000 areas. To ensure proper protection and minimize losses in natural resources, preventive, limiting, minimizing, and compensatory actions are indicated in section 5.7. It should be remembered that projects of a similar nature have been implemented worldwide for decades. Therefore, concerning the generated environmental impacts, they are very well researched and do not generate impacts not yet known or insufficiently studied. Their environmental impacts are also similar to the impacts generated by projects in other industries. There are no fundamental shortcomings in technology and gaps in contemporary knowledge, both in terms of implementation and operation.

- *Specific Objective RSO2.7. Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution.*

Within this objective, activities are planned in the following areas: protection, regeneration, and sustainable use of valuable natural areas, including protected areas; promotional and educational activities to expand residents' knowledge of nature protection and raise awareness of valuable natural areas; nature protection and biodiversity, and green infrastructure development; implementation of projects aimed at identifying, monitoring, and improving the state of areas exceeding environmental quality standards.

All projects in this area will have a positive impact on valuable natural areas, including Natura 2000 areas and biodiversity protection, as they will directly influence the preservation of biodiversity by raising ecological awareness. In turn, the EU biodiversity protection strategy will be implemented by disseminating knowledge about the role and importance of green infrastructure in nature protection and local development, as well as good practices regarding the involvement of local groups in the management of the areas covered by the Programme and in Natura 2000 areas, thereby contributing to halting the loss of biodiversity and the degradation of ecosystem services, and their restoration to the greatest extent possible using green infrastructure. Proper shaping of green infrastructure promotes the shaping of ecosystems and maintaining them in good condition. This allows their potential to provide economic and social benefits to be fully utilized. Additionally, using ecosystem services presented in the context of benefits that people derive from ecosystems will emphasize the contribution of natural systems to the overall well-being of humanity and thus justify the need for actions to preserve the natural environment in the most stable state possible. By protecting and responsibly using diverse natural resources, we gain rewards that would be much more expensive or even impossible to achieve by human efforts. Conversely, by often degrading and impoverishing this system in the name of apparent and immediate gains, we deprive ourselves of the goods and benefits it offers and often expose ourselves to additional and significant costs.

A comprehensive and integrated assessment of ecosystem functions and the availability of goods and services aims to increase human responsibility and awareness of sustainable use of natural resources. This is crucial, especially in the face of ongoing changes in the natural environment.

Projects in the monitoring area will contribute to a rapid response to potential negative changes in biodiversity and protected areas and will allow for preventive actions to prevent their deterioration. Projects covered by

these activities will indirectly have a positive impact on nature protection because they will increase society's knowledge, and thus their attitude towards the rational use of nature and care for it.

- *Specific Objective: RSO2.6. Promoting the transition to a circular and resource efficient economy.*

The Programme envisages supporting joint initiatives to improve waste management from households and the processing of residual waste. Additionally, innovative solutions related to the transition to a circular economy are promoted. These actions aim to promote rational waste management, contributing to raising awareness of environmental challenges.

The objective focuses on promoting resource efficiency and a circular economy, mainly through educational activities and raising social awareness, without implementing major infrastructure investments. Considering the small scale of activities and the limited financial scope of the Small Projects Fund, the risk of a negative impact on biodiversity, plant and animal species, Natura 2000 areas, and ecological corridors is marginal. These activities can bring environmental benefits, such as reducing pressure on ecosystems by reducing the amount of waste sent to landfills. In the longer term, changes in negative consumer attitudes can be expected, leading to a reduction in waste in areas covered by the Programme. Educational activities should also increase awareness of the environmental pressures associated with improper waste management, leading to a reduction in illegal dumping in unauthorized locations.

- *Specific Objective: RSO4.5 Ensuring equal access to health care and fostering resilience of health systems, including primary care and promoting the transition from institutional to family-based and community-based care.*

The Programme envisages supporting actions for: improving access and developing diagnostic-prophylactic infrastructure in various medical fields; improving access to specialist medical care, especially for cardiovascular diseases and cancer; supporting the equipment of healthcare facilities and emergency medicine; improving access to long-term care (especially geriatric and palliative care); preventing adverse events such as epidemics (with a focus on local phenomena); digitizing healthcare (including telemedicine development); upgrading the qualifications of medical and rescue personnel.

However, some actions, especially in the construction or expansion of healthcare infrastructure, may be related to construction work, leading to changes in the land surface (especially when occupying large areas, moving masses of soil and aggregate on construction sites, storing them, the need for the construction and provision of accompanying infrastructure, access roads, ground disturbance by heavy equipment, e.g., construction of hospitals or clinics). In connection with construction work, there may be a significant risk to the existence of many habitats by lowering the groundwater level and disturbing their flow within aquifers. Moreover, there is a possibility of pollution entering water and soil and directly into habitats. This will negatively affect nature but only during the construction and expansion phase, so these will be short-term activities largely dependent on location. However, a significant part of the projects covered by the Programme concerns improving access to medical specialist services (digitization development of healthcare, medical equipment). These types of activities do not involve major changes in land use or the construction of extensive infrastructure, which means that they will have a marginal impact on the natural environment.

In order to achieve This objective, the following Specific Objectives (LIP) will be implemented:

- *LIP 2: Joint development of accessible and resilient health care for elderly and disabled patients of Bialystok and Volyn hospitals*
- *LIP 5: A joint initiative of The Dr. Józef Psarski Mazovian Specialist Hospital in Ostrołęka as increasing the availability of health-care services through construction landing pads for rescue helicopters and purchase, delivery and assembly of lifting equipment.*

- *LIP 6: Development of palliative, geriatric and treatment care, and also improving the quality of medical services for cancer patients in hospitals of Lviv, Ternopil and Krosno.*
- *LIP 7: Creation of Cross-Border Centers for Preventive Examinations in Lubelskie and Volyn Regions .*

These projects mentioned above will not have an impact on biological diversity.

- *The specific objective is RSO4.6: Enhancing the role of culture and sustainable tourism in economic development, social inclusion and social innovation.*

Projects under this objective will focus on the protection, development of infrastructure, and promotion of public tourist values and related tourist services. This includes shaping integrated tourist offerings by entities in the Programme area, developing new infrastructure, and upgrading/modernizing existing routes. The projects will indirectly have a positive impact on biological diversity, plants, and animals, including Natura 2000 areas and integrity, particularly on ecological corridors. During their implementation, ecological awareness in society will be raised, affecting their attitude towards the rational use of natural resources.

However, during the implementation of some projects related to tourist infrastructure, depending on their location and nature, there may be indirect or direct, short-term impacts on biological diversity, plants, animals, including Natura 2000 areas and integrity, and ecological corridors. The main factors determining the occurrence of direct impacts on nature are mainly the location and the method and timing of project implementation.

Within this specific objective, LIP 1 "The Carpathian narrow-gauge railways – a journey in the footsteps of the Carpathian Forest railways" will be implemented. The project's impacts will align with the impacts indicated for this objective. During the project's implementation, there may be alterations to the land surface (especially when occupying large areas, e.g., during construction and expansion of infrastructure elements), which may lead to a decrease in groundwater levels or water pollution (due to the use of construction equipment), directly affecting natural components (impacts are outlined in the introduction to the chapter). A comprehensive environmental impact assessment should be conducted during the project design and the preparation of the environmental impact report.

- *The specific objective is ISO6.2: Enhance efficient public administration by promoting legal and administrative cooperation and cooperation between citizens, civil society actors and institutions, in particular, with a view to resolving legal and other obstacles in border regions.*

Projects under this objective will mainly focus on increasing and improving the quality of cross-border cooperation, improving access to information on legal, tax, and formal conditions related to business activities, stimulating economic ties, or promoting jointly operating business organizations, potentially leading to economic development in the support area. Support will be provided for advisory services for entities applying for additional financial resources.

The indirect implementation of this objective will contribute to improving ecological connectivity by maintaining the current range and/or creating new elements of green infrastructure within local/regional/transboundary initiatives carried out by administrative cooperation networks and between citizens and institutions, such as new green infrastructure elements. Interactive forms of communication between local communities (citizens) and authorities, nature conservation services, for the sustainable management of valuable natural areas, will facilitate the protection of nature in extensive ecosystems.

- *The specific objective is ISO6.3: Build up mutual trust, in particular by encouraging people-to-people actions.*

Projects under this objective will focus on supporting grassroots initiatives for the integration of support area residents, including the promotion of volunteering, organizing events for cross-border integration related to the environment, art, culture, and heritage. It will support local initiatives and leadership, educational cooperation

(e.g., through cross-border youth exchanges or the exchange of best practices in the support area) with a focus on integration, educational or research activities. These actions will not directly impact environmental components, but many of them may indirectly contribute to their beneficial effects by strengthening cross-border cooperation and contacts, also in the field of nature conservation (exchange of experiences and best practices).

- *Specific objective:ISO7.4: Other actions for a safer and secure Europe.*

The goal focuses primarily on increasing safety and improving border crossing between Poland and Ukraine. While the main objective is to improve the functioning of the border system, potential actions, such as the development of border crossing infrastructure and border protection infrastructure, may impact areas of high ecological value. The construction or modernization of infrastructure may lead to environmental interference. However, this will be limited to already functioning crossing areas – the possibility of new significant negative impacts on biological diversity will be minimal. In the case of infrastructure projects involving the sealing of borders, such as building fences, there may be a disruption of local ecological corridors. However, it should be emphasized that such actions are not explicitly stated in the Programme goal. On the contrary, modern methods of securing borders beyond border crossings, such as creating an innovative border surveillance system using modern technologies (sensors, cameras, radars, drones, etc.), are highlighted.

Non-investment activities, such as equipment purchases, experience exchange, or the creation of common procedures, have minimal potential for impacting biological diversity. Despite not being explicitly stated in the Programme goal, appropriately conducted experience exchange can contribute to a better understanding of the value of local and transboundary ecological corridors.

Within this objective, Specific Objective LIP 8 will be implemented: "Increasing the throughput capacity of the Hrebenne-Rawa Ruska road border crossing point and improving the conditions for travelers crossing the border at the Budomierz – Hruszew road border crossing point"

Tasks related to the Hrebenne-Rawa Ruska border crossing and Budomierz-Hruszew will be implemented under this project. The Hrebenne-Rawa Ruska border crossing is located in the Natura 2000 area of the Middle Bug Valley PLB060003 and in the Nadbużański Protected Landscape Area. On the Ukrainian side, within a distance of 10 km, no identified protected areas were found. Among the threats, according to the SDF (updated March 2022) for the Natura 2000 area of the Middle Bug Valley PLB060003, the following are mentioned: F02.03 – fishing; E01.03 – dispersed development; E03.01 - disposal of household waste / recreational facilities; D01.01 - paths, hiking trails, cycling routes; A01 – agriculture; cultivation. The task of building a freight terminal in Hrebenne and a access road to the terminal on the Ukrainian side does not accumulate identified threats for the specified area. The project documentation should take into account any prohibitions applicable to specific forms of nature protection, with particular emphasis on prohibitions applicable in the Nadbużański Protected Landscape Area.

The Budomierz-Hruszew border crossing is located outside protected areas. The nearest protected area is the Roztocze Protected Landscape Area (about 4.2 km away). The project involves the construction of a waiting room for travelers crossing the border by bus. Considering the distance of the protected areas from the planned investment location, no significant negative impacts are expected during the project implementation and the use of the constructed waiting room.

Other impacts of this project will be similar to those indicated for Specific Objective RSO3.2: Developing and enhancing sustainable, climate resilient, intelligent and intermodal national, regional and local mobility, including improved access to TEN-T and cross-border mobility. A comprehensive environmental impact assessment should be conducted during the design stage and the preparation of the environmental impact Assessment Report. Additionally, for this project, an analysis of compliance with the DNSH principle should be developed.

- *The specific objective is RSO3.2: Developing and enhancing sustainable, climate resilient, intelligent and intermodal national, regional and local mobility, including improved access to TEN-T and cross-border mobility.*

Objective RSO3.2 focuses on the development and strengthening of sustainable, climate-resistant, intelligent, and intermodal mobility. Achieving the goal may involve the reconstruction and modernization of roads and railway lines. In this area, there is a possibility of potential impacts on biological diversity, especially in the case of activities in environmentally valuable areas.

The greatest risk to biological diversity is the potential transformation of natural habitats and the fragmentation of areas by new or modernized transport infrastructure. Such actions can lead to disturbances in animal migration, loss of breeding sites, and a decrease in biodiversity.

Ecological corridors, which are crucial connections between isolated habitats, may be at risk due to the implementation of linear road and railway projects. However, considering the requirements for the construction of culverts and other remedial measures, it can be expected that the impact on these corridors will be minimized.

In the description of the goal, it is explicitly stated that supported activities will be in line with the principle of "do no significant harm." This means that projects defined as causing significant harm under the supplementary regulation of the European Parliament and Council (EU) 2020/852 establishing technical criteria for determining the conditions under which a given economic activity (...) does not cause serious harm to environmental objectives will not be allowed. This regulation defines the following types of activities:

- 6.14 Infrastructure for railway transport;
- 6.15 Infrastructure supporting low-emission road transport and public transport.

For these, the following conditions confirming compliance with the DNSH principle have been specified:

- An environmental impact assessment (EIA) or control procedure has been conducted in accordance with Directive 2011/92/EU;
- In the case of conducting an EIA, the required mitigating and compensatory measures are implemented for environmental protection purposes;
- Regarding areas/activities located in or near biodiversity-sensitive areas (including Natura 2000 protected areas, UNESCO World Heritage sites, and areas of fundamental importance for biodiversity protection), an appropriate habitat assessment has been conducted in relevant cases, and based on the conclusions of this assessment, necessary mitigating measures have been implemented.

Additionally, for road projects, the regulation introduces the following conditions:

- In relevant cases, maintaining vegetation along road transport infrastructure ensures the non-proliferation of invasive alien species;
- Introducing mitigating measures to avoid collisions with animals.

The implementation of road and railway infrastructure projects often involves some negative consequences for the environment. However, for Objective RSO3.2, a set of remedial measures has been applied. The Programme emphasizes the need to build culverts to facilitate the safe migration of animals and the use of environmentally friendly solutions. In summary, although Objective RSO3.2 has the potential risk of impacting biological diversity, plant and animal species, Natura 2000 areas, and ecological corridors, the applied remedial and pro-environmental approach in achieving This objective indicates a commitment to minimizing negative impacts on biological diversity.

5.4.2. IMPACTS ON PEOPLE

The areas of intervention foreseen within the analyzed Programme may have an impact on people – their health and quality of life. Humans are part of the environment, strongly influencing it, but also highly dependent on it. In most cases, when pressure on other environmental components decreases, there is also an indirect positive impact on people. Conversely, when pressure on the environment increases, negative impacts on people also arise. Human dependence on individual environmental components varies. People's resilience to disturbances in the environment is individual, component-dependent, and often subjective.

Below are the impacts on people of initiatives that may be covered by the Programme, according to specific objectives, actions, and projects.

- *Specific Objective: RSO2.4 Promoting climate change adaptation and disaster risk prevention and resilience, taking into account eco-system based approaches.*

Activities under this objective will focus on the protection, regeneration, and sustainable use of environmentally valuable areas, including Natura 2000 areas; promotion and education, expanding residents' knowledge of nature conservation and raising awareness of environmentally valuable areas; nature conservation and biodiversity protection, as well as the development of green infrastructure; projects aimed at identifying, monitoring, and improving the condition of areas exceeding environmental quality standards.

These actions can directly contribute to increasing people's safety and adaptation to ongoing climate change. They can also enhance knowledge and public awareness of possible climate changes, counteracting them, and the need to adapt to them.

However, some activities may be associated with construction works, potentially leading to air and noise pollution emissions and difficulties during implementation. From the analyzed Programme, it does not appear that these impacts will be significantly negative.

Within this objective, LIP 3 "Environmental safety – creation of a Ukrainian-Polish forest fire management network in the Carpathian region" will be implemented. The project will be beneficial for people as it will contribute to reducing fires in the cooperation area. The implementation will reduce losses of forest stands in forested areas, impacting their use by people, including for recreational purposes. Additionally, it will avoid air pollution, including greenhouse gas emissions resulting from fires, and increase safety, especially for people living near forested areas.

- *Specific Objective: RSO2.5 Promoting access to water and sustainable water management*

Activities under this objective include projects aimed at protecting and improving the state of water resources (including water management in the watershed, developing rainwater retention systems, actions related to improving water quality).

Projects supporting rational water management, such as building small retention facilities, can be positive for people by contributing to better recreational conditions, especially considering advancing climate change. Indirectly, they can affect the water balance by reducing runoff and storage, addressing flooding, depending on the nature of the project.

During construction, there may be inconveniences related to land use and emissions of noise and pollutants.

Projects related to wastewater management will also be implemented within This objective. They can be positive for people by contributing to the rational management of water, taking into account water resource protection and a prospective approach to providing people with safe drinking water.

In terms of wastewater treatment projects, short-term negative impacts on people may occur during construction, such as noise emissions, vibrations, dust emissions, and disruption of water relationships. From the Programme analysis, these impacts are not expected to be significantly negative.

LIP 4 "Sustainable Water Management: a Way to Revitalise Western Ukraine and Eastern Poland" will be implemented within This objective. The project will be beneficial for people as it will improve access to drinking water in terms of quantity and quality. The modernization of wastewater treatment plants can also reduce inconveniences for nearby residents in terms of odors.

- *Specific Objective: RSO2.7 Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution.*

Activities under this objective include protection, regeneration, and sustainable use of environmentally valuable areas, including Natura 2000 and Emerald areas; promotional and educational activities to expand residents' knowledge of nature conservation and raise awareness of environmentally valuable areas; nature conservation and biodiversity protection, and the development of green infrastructure; projects aimed at identifying, monitoring, and improving the condition of areas exceeding environmental quality standards.

All projects in this area will have a positive impact on people, indirectly influencing the preservation of the natural environment and its ecosystem services, on which humans depend. They will also be important for creating conditions for recreation in cities (if the projects are located there), which is significant in the face of advancing climate change and associated heatwaves. Indirectly, they can also influence reducing the speed of water runoff, which can be important for flood prevention.

- *Specific Objective: RSO2.6 Promoting the transition to a circular and resource efficient economy*

This objective focuses on educational activities and raising public awareness on issues related to the circular economy. These actions have a direct impact on people, mainly by contributing to an increase in their ecological awareness. Indirectly, they are also important for people's health. A circular economy, focused on resource efficiency, has the potential to reduce waste, indirectly improving the quality of other environmental components, including air, water, and soil in the support area.

Implementing the planned initiatives within this objective is also aimed at increasing the community's knowledge about resource efficiency and waste management, contributing to the formation of more responsible consumer attitudes. By promoting rational waste management, residents learn to understand the consequences of their daily behavior for the environment and can make decisions more favorable to the environment and themselves.

Actions implemented within the Small Projects Fund have the potential to increase the local community's engagement in environmental protection initiatives. Supported projects can contribute not only to strengthening the sense of community but also to improving residents' quality of life by creating a healthier and more sustainable environment. In summary, achieving This objective not only has the potential to improve the environment but also to shape the attitudes of residents, leading to greater environmental care and understanding of the benefits of a more sustainable lifestyle.

- *Specific Objective: RSO4.5 Ensuring equal access to health care and fostering resilience of health systems, including primary care and promoting the transition from institutional to family-based and community-based care.*

The Programme envisages support for actions under this objective: improving access and developing diagnostic and preventive infrastructure in various medical fields; improving access to specialized medical care, especially for cardiovascular diseases and cancers; supporting the equipment of healthcare facilities and emergency medicine; improving access to long-term care (especially geriatric and palliative care); preventing the occurrence

and consequences of undesirable phenomena such as epidemics (with particular emphasis on local phenomena); digitization development in healthcare (including telemedicine); raising the qualifications of medical and rescue personnel.

All these actions will have an extremely significant positive impact on people. They will contribute to reducing morbidity, increasing the efficiency and effectiveness of treatment, enhancing resilience to unforeseen events, and overall increasing the longevity of residents in the Programme area. They will also contribute to improving access to treatment and, therefore, improving the quality of life.

Nevertheless, the implementation of some projects, such as the construction of hospitals or other facilities, may, during the construction period, have a transient negative impact through the emission of air pollutants, noise, or construction-related disruptions. However, no significantly negative impacts have been identified from the analyzed Programme.

Within this objective, the following LIPs will be implemented:

- *LIP 2: Joint development of accessible and resilient health care for elderly and disabled patients of Bialystok and Volyn hospitals.*
- *LIP 5: A joint initiative of The Dr. Józef Psarski Mazovian Specialist Hospital in Ostrołęka as increasing the availability of health-care services through construction landing pads for rescue helicopters and purchase, delivery and assembly of lifting equipment.*
- *LIP 6: Development of palliative, geriatric and treatment care, and also improving the quality of medical services for cancer patients in hospitals of Lviv, Ternopil and Krosno.*
- *LIP 7: Creation of Cross-Border Centers for Preventive Examinations in Lubelskie and Volyn Regions.*

In summary, the Programme's objectives and initiatives encompass a comprehensive approach to addressing environmental and human-related challenges. The outlined projects aim to balance environmental protection, sustainable development, and improved quality of life for the residents in the targeted regions. The identified potential negative impacts are acknowledged and addressed with mitigation measures, emphasizing the overall positive outcomes expected from the Programme's implementation.

- *Specific Objective: RSO4.6 Enhancing the role of culture and sustainable tourism in economic development, social inclusion and social innovation*

Projects under this objective will focus on the protection, development, and promotion of public tourist values and related tourist services. This includes shaping an integrated tourist offer by entities from the Programme area, developing new infrastructure, and improving/modernizing existing routes. Other aspects involve protecting, developing, and promoting culture and its heritage, as well as services in the field of culture. Additionally, initiatives aim at protecting, developing, and promoting natural heritage and ecotourism, supporting the adaptation of tourism-related skills and professional qualifications to the needs of the tourism market through training related to establishing, running, and promoting tourist activities.

Projects encompassed by these activities will positively impact people by increasing their knowledge, including environmental awareness, creating opportunities for recreation and the development of interests, which can indirectly contribute to the preservation of environmental resources.

Regarding conservation projects involving the modernization, adaptation, or reconstruction of cultural heritage objects, if implemented within the Programme, they are expected to have similar positive effects.

It should be noted that these projects will contribute to the region's intellectual and economic development, influencing the residents' quality of life and creating new job opportunities. However, during construction, there may be inconveniences for people due to noise emissions and air pollution.

Within this objective, LIP 1 "The Carpathian narrow-gauge railways – a journey in the footsteps of the Carpathian Forest railways" will be implemented. The project includes the reconstruction and adaptation of a building for tourist services (Majdan); the construction of a tourist path and an educational footbridge from Majdan station to the nearest hill with a viewpoint; the renovation of the narrow-gauge railway route from Majdan to Dożyca station (3 km) to enable the movement of bicycle vehicles on the tracks; the construction/reconstruction of Vyhoda station and the creation of a railway heritage museum. The project's impacts on people will be similar to those specified above.

- *Specific Objective: ISO6.2 Enhance efficient public administration by promoting legal and administrative cooperation and cooperation between citizens, civil society actors and institutions, in particular, with a view to resolving legal and other obstacles in border regions*

Projects under this objective will mainly focus on increasing and improving the quality of cross-border cooperation, improving access to information on legal, tax, and formal conditions related to conducting business in each country covered by the Programme. This aims to stimulate economic ties or promote jointly acting entrepreneurial organizations, potentially resulting in the economic development of the support area. Additionally, support will be provided for advisory services for entities applying for additional financial resources.

It can be assessed that these projects will be neutral from an environmental perspective, but their positive impact on regional development, including the well-being of people, should be noted.

- *Specific Objective: ISO6.3 Build up mutual trust, in particular by encouraging people-to-people actions.*

Projects will focus on supporting grassroots initiatives for the integration of support area residents. This includes promoting volunteerism, organizing events for cross-border integration related to the environment, arts, culture, and heritage; supporting local initiatives and leadership; supporting the activities of educational institutions in cross-border cooperation (e.g., through cross-border youth exchanges or sharing best practices in the support area) with a focus on integration and educational or research activities.

In principle, they will not directly impact the environment, but many of them may indirectly benefit people by strengthening cross-border cooperation and relations, including in the environmental field.

- *Specific Objective: ISO7.4 Other actions for a safer and secure Europe*

Actions aimed at increasing safety at border crossings, through better equipping customs and border guard services and joint training, will directly contribute to improving the safety of residents in border areas and travelers. Shorter waiting times for crossing the border increase the comfort of travelers. The introduction of more effective methods for monitoring and preventing illegal migration should increase security in both border regions and both countries.

The expansion and modernization of border crossing infrastructure are crucial for ensuring the smooth flow of people and goods. Improvements in infrastructure, including the introduction of pedestrian and bicycle border crossings, increase accessibility and convenience for crossing the border, attracting more tourists and stimulating the local economy.

Increased cooperation and experience exchange between Poland and Ukraine can lead to improved relations between border communities. Improved procedures at border crossings, including phytosanitary and veterinary services, will provide better protection against the potential transmission of diseases by people, animals, or agricultural products. Tighter control and more effective monitoring of border crossings will help prevent the spread of infectious diseases, essential for public health protection in both countries.

No negative impacts on people associated with the implementation of the objectives of This objective have been identified.

LIP 8 "Increasing the throughput capacity of the Hrebenne-Rawa Ruska road border crossing point and improving the conditions for travelers crossing the border at the Budomierz – Hruszew road border crossing point" will be implemented within this objective. The impacts of this project will be consistent with the impacts indicated for the specific objective. The project will benefit travelers by reducing waiting times for crossing the border, but at the same time, it may cause periodic disruptions during construction. Long-term socio-economic benefits are expected from better connections between Poland and Ukraine.

- *Specific Objective: RSO3.2 Developing and enhancing sustainable, climate resilient, intelligent and intermodal national, regional and local mobility, including improved access to TEN-T and cross-border mobility.*

Achieving the goal of RSO3.2 will contribute to improving the accessibility and quality of transport services, which, in turn, should translate into increased mobility of society and, consequently, better access to employment, education, and other public services.

During the implementation of investments related to the construction or modernization of transport infrastructure, temporary inconveniences may occur, such as increased noise, disruptions in traffic flow, or other inconveniences related to construction work.

Additionally, modernized roads and railway lines, as well as improved signage and infrastructure at border crossings, can significantly improve the safety of travelers and residents of border areas.

It is worth emphasizing that, within the description of the objective, it is explicitly stated that the supported activities will adhere to the principle of "do no significant harm." This means that projects identified as causing significant harm under the supplementary regulation (EU) 2020/852, establishing technical criteria for determining conditions under which a specific economic activity does not cause significant harm to environmental objectives, cannot be implemented. The regulation defines specific types of activities, including:

6.14 Infrastructure for railway transport.

6.15 Infrastructure supporting low-emission road transport and public transport.

For such investments, detailed criteria have been established, including those related to preventing pollution and controlling it concerning the use and presence of chemicals, reducing the risk of using products harmful to human life and health within the projects. The regulation also sets detailed requirements for adapting projects to climate change, considering both the resilience of the built infrastructure and its impact on increasing threats to neighboring areas.

Taking these assumptions into account, it can be assumed that implementing the goal of RSO3.2 will result in benefits for the population of border areas. Although some temporary inconveniences may occur, the long-term positive effects for local communities and both countries are expected to be significant.

5.4.3. IMPACTS ON WATER

As a rule, EU law prohibits the implementation of projects that may worsen the condition of waters and their ecological functions. The actions envisaged within the basic areas of intervention of the Programme comply with

these requirements, and any possible negative environmental impacts are either transitional or will be compensated by significant and necessary benefits for other elements of the environment or the economy.

Below are presented the impacts on waters of projects that may be covered by the Programme, according to specific objectives, actions, and projects.

- *Specific Objective: RSO2.4 Promoting climate change adaptation and disaster risk prevention and resilience, taking into account eco-system based approaches..*

Within this objective, activities will be carried out in the field of: protection, regeneration, and sustainable use of environmentally valuable areas, including Natura 2000 areas; promotion and education, expanding residents' knowledge about nature conservation and raising awareness of environmentally valuable areas; nature and biodiversity conservation, as well as the development of green infrastructure; projects aimed at identifying, monitoring, and improving the state of areas exceeding environmental quality standards.

These actions may support initiatives related to the development and implementation of strategies, solutions, Programmes, and infrastructure projects to increase adaptive capacity to climate change in the Programme area. This includes enhancing protection and resilience against the effects of anthropogenic disasters, by building systems and crisis management infrastructure and increasing public awareness.

All these initiatives will be positive for the aquatic environment, indirectly contributing to the adaptation of aquatic ecosystems to climate change. They will also contribute to raising knowledge and public awareness of water resources and their ecosystems.

Some adaptive actions may involve additional retention, which will be beneficial for water resources, flood protection, and the aquatic environment. However, certain infrastructure-related activities, particularly construction works, may be associated with temporary water pollution during construction. Temporary groundwater level lowering may also be necessary, causing disruptions to water-dependent ecosystems. However, these changes will be short-lived, and the analysis indicates that they will not significantly impact the waters.

Within this objective, LIP 3 "Environmental safety – creation of a Ukrainian-Polish forest fire management network in the Carpathian region" will be implemented. The project will benefit water resources by influencing forest fire protection, thereby preserving larger forest areas, which play a role in regulating water conditions.

- *Specific Objective: RSO2.5 Promoting access to water and sustainable water management.*

This objective includes activities related to the implementation of projects aimed at protecting and improving the state of water resources (including water management in the watershed, developing rainwater retention systems, and actions related to improving water quality).

Projects supporting the development of strategies, solutions, programs, and innovative projects will positively impact the systemic improvement of water management in the Programme area. This includes water resources, their quality, and aquatic ecosystem services. Actions to increase retention will be beneficial for water resources in terms of increasing water availability, delaying water flow (related to flood protection), and benefiting the aquatic environment.

Critical for water protection will be initiatives related to innovative projects in wastewater treatment. These projects will reduce the amount of pollutants discharged into surface and groundwater, leading to an improvement in water quality and the achievement of environmental goals. This will be significant for both aquatic ecosystems and the quality of water abstracted for consumption. However, redirecting sewage from traditional receivers to treatment plants discharging treated effluents into rivers may impact the river's water

quality, but overall, it will be beneficial for the aquatic environment. The management of sewage sludge may pose challenges, though.

According to existing regulations, such projects will undergo an individual environmental impact assessment, as they may significantly affect the environment.

During the implementation of these types of projects, negative, short-term impacts on waters are possible, associated with the construction process, such as a temporary decrease in groundwater levels or pollution resulting from leaks of petroleum products from construction equipment or runoff of suspended soils.

Within this objective, LIP 4 "Sustainable Water Management: a Way to Revitalise Western Ukraine and Eastern Poland" will be implemented. Water supply activities will benefit people by improving the quantity and quality of drinking water. However, they may affect water resource utilization from specific sources. Simultaneously, it may lead to the cessation of using local, individual water sources upstream, which can be beneficial for water relations near these sources. However, there is a risk that, along with water supply, there will be insufficient development of sewage collection systems, negatively impacting groundwater resources beyond the reach of the built sewers. On the other hand, sewage system actions and wastewater treatment improvements will be beneficial, positively affecting the quality of treated effluents discharged into waters. Each project element should be thoroughly examined for its water impact during the investment project design phase. It is recommended to conduct a detailed analysis of compliance with the DNSH principle for the criteria specified in the industry description: "Water Supply, Wastewater, and Waste Management, and Remediation" technical qualification criteria.

- *Specific Objective: RSO2.7 Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution.*

Within this objective, activities include: protection, regeneration, and sustainable use of environmentally valuable areas, including Natura 2000 and Emerald areas; promotional and educational activities expanding residents' knowledge of nature conservation and raising awareness of environmentally valuable areas; nature and biodiversity conservation, as well as the development of green infrastructure; implementation of projects aimed at identifying, monitoring, and improving the state of areas exceeding environmental quality standards.

All projects in this area will have a positive impact on waters, indirectly influencing the preservation of the aquatic environment and its ecosystem services, which humans depend on. Projects related to monitoring will allow for faster response to potential negative changes in water quality and the implementation of preventive actions.

- *Specific Objective: RSO2.6. Promoting the transition to a circular and resource efficient economy.*

The implementation of this objective may indirectly affect the protection of inland and groundwater. By managing waste more effectively and promoting innovative recycling solutions, the risk of pollutants entering the water environment will decrease. Cross-border initiatives increase the potential for positive impacts on aquatic ecosystems in the region, promoting ecological practices and environmental responsibility. While the actions are not directly focused on waters, introducing such activities can bring long-term benefits to water quality. Due to the small scale of the activities under this objective, no direct impacts on waters are identified.

- *Specific Objective: RSO4.5 Ensuring equal access to health care and fostering resilience of health systems, including primary care and promoting the transition from institutional to family-based and community-based care.*

The Programme includes support for activities under this objective, such as improving access and developing diagnostic-preventive infrastructure in various medical fields, improving access to specialized medical care, supporting the equipment of healthcare facilities, and emergency medicine. Improving access to long-term care

(especially geriatric and palliative care) and preventing the occurrence and consequences of undesirable phenomena such as epidemics (with particular emphasis on local phenomena); digitization development in healthcare (including telemedicine development); raising qualifications of medical and rescue personnel.

All activities in this area will be neutral for waters. However, some, related to construction or renovations of healthcare infrastructure, may, during construction, negatively impact the aquatic environment through the temporary lowering of groundwater levels or the emission of pollutants resulting from the use of construction equipment. However, these will be insignificant impacts

As part of This objective, the following LIPs will be implemented:

- *LIP 2: Joint development of accessible and resilient health care for elderly and disabled patients of Bialystok and Volyn hospitals.*
- *LIP 5: A joint initiative of The Dr. Józef Psarski Mazovian Specialist Hospital in Ostrołęka as increasing the availability of health-care services through construction landing pads for rescue helicopters and purchase, delivery and assembly of lifting equipment.*
- *LIP 6: Development of palliative, geriatric and treatment care, and also improving the quality of medical services for cancer patients in hospitals of Lviv, Ternopil and Krosno.*
- *LIP 7: Creation of Cross-Border Centers for Preventive Examinations in Lubelskie and Volyn Regions*

For the above projects, no significant negative impacts on water are identified.

- *Specific Objective: RSO4.6 Enhancing the role of culture and sustainable tourism in economic development, social inclusion and social innovations*

Projects within this objective will focus on the protection, development, and promotion of public tourist values and related tourist services. This includes shaping an integrated tourist offer by entities in the Programme area, new infrastructure, and improving/modernizing existing routes; protecting, developing, and promoting culture and its heritage, as well as cultural services; protecting, developing, and promoting natural heritage and ecotourism; supporting the adaptation of tourism skills and professional qualifications to the needs of the tourism market. These projects will indirectly have a positive impact on water by raising society's knowledge, affecting their attitude toward the rational use of water, and environmental conservation.

However, during the implementation of some tourism infrastructure projects, there may be a temporary lowering of groundwater levels or water pollution due to the use of construction equipment.

LIP 1 " The Carpathian narrow-gauge railways – a journey in the footsteps of the Carpathian Forest railways" will be implemented within this objective. The project's effects will align with those indicated for the Specific objective.

- *Specific Objective: ISO6.2 Enhance efficient public administration by promoting legal and administrative cooperation and cooperation between citizens, civil society actors and institutions, in particular, with a view to resolving legal and other obstacles in border regions.*

Projects within this objective will mainly focus on improving the quality of cross-border cooperation, access to information on legal, tax, and formal conditions related to economic activities. This may involve stimulating economic ties or promoting jointly operating business organizations, potentially leading to economic development in the support area. While these projects are generally considered neutral regarding water impact, they may indirectly influence rational water management.

- *Specific Objective: ISO6.3 Build up mutual trust, in particular by encouraging people-to-people actions.*

Projects will involve supporting grassroots initiatives for the integration of residents in the support area, including promoting volunteering and organizing events for cross-border integration related to the environment, art, culture, and heritage. These projects are not expected to have a direct impact on water, but they may indirectly benefit water management by strengthening cross-border cooperation.

The projects will involve supporting grassroots initiatives for the integration of residents in the support area, including promoting volunteerism, organizing events for cross-border integration of residents related to the environment, art, culture, and heritage; supporting local initiatives and leadership; supporting the activities of educational institutions in the field of cross-border cooperation (e.g., through cross-border youth exchange or sharing best practices in the support area) with a focus on integration and educational or research activities; supporting the transfer of innovative solutions to foster further collaboration between research and scientific centers.

In principle, they will not directly impact water, but many of them may indirectly be beneficial through strengthening cross-border cooperation and contacts, including in the field of water management.

- *Specific Objective: ISO7.4 Other actions for a safer and secure Europe*

The implementation of ISO7.4, focusing on actions related to border and people's safety, does not pertain to the protection of the water environment. However, some actions may indirectly affect the quality and quantity of waters.

In some cases, the modernization and expansion of border crossing infrastructure may lead to an increase in impermeable surfaces, which, in turn, may affect increased runoff of rainwater. Given the large number of vehicles, uncontrolled runoff of rainwater from parking areas and roads directly into the receiver could pose a risk of negative impacts. The goal description lacks information on significant expansion of border crossing areas. However, it mentions infrastructure adjacent to border crossings, which may include buildings and parking lots. The description also indicates investments in phytosanitary infrastructure – likely meaning the construction of new buildings with modern laboratory equipment, which will improve the quality of cargo transport services between the two countries. All construction works should be carried out with due consideration for the protection of surface and groundwater. Introducing new procedures at border crossings, such as phytosanitary and veterinary controls, can contribute to better water protection against potential pollution. Preventing the spread of diseases through people, animals, or agricultural products can reduce the risk of introducing pathogens or other substances that could negatively affect water quality.

In summary, it is crucial to consider environmental aspects in the implementation of This objective to minimize potential negative impacts and maximize benefits for the water environment.

Within this objective, LIP 8 "Increasing the throughput capacity of the Hrebenne-Rawa Ruska road border crossing point and improving the conditions for travelers crossing the border at the Budomierz – Hruszew road border crossing point" will be implemented. Generally, the impacts of this project will align with those indicated for the specific objective RSO3.2. The construction of access roads or terminals may impact local water systems. Changes in surface water flow or potential pollution associated with construction pose a risk to water quality in the region. A comprehensive environmental impact assessment should be conducted at the project design stage, including compliance analysis with the DNSH principle.

- *Specific Objective: RSO3.2 Developing and enhancing sustainable, climate resilient, intelligent and intermodal national, regional and local mobility, including improved access to TEN-T and cross-border mobility.*

The goal RSO3.2, focusing on the development of sustainable, climate-resilient, smart, and intermodal mobility, may have various implications for water resources related to the construction and modernization of roads and

railways. Such investments can impact the quality of surface and groundwater, the amount of water available in a given location, as well as water ecosystems and water-dependent ecosystems.

One of the main threats is the potential pollution of water resulting from construction and operational activities. Improperly conducted construction work can lead to the release of oils, fuels, chemicals, or construction materials into surface and groundwater. Additionally, potential interference with natural watercourses may cause hydrological disturbances, affecting local ecosystems and water availability. Disturbances in soil structure can lead to increased erosion and surface runoff.

However, actions related to the modernization of transport infrastructure do not necessarily mean only negative impacts on the water environment. Properly planned and executed work can incorporate environmentally friendly technologies, such as rainwater management systems, which reduce the risk of water pollution.

Moreover, within the description of the goal, it is explicitly stated that supported activities will be in line with the "do no significant harm" principle. This means that projects identified as causing significant harm under the supplementary regulation of the European Parliament and Council (EU) 2020/852, establishing technical qualification criteria for determining the conditions under which a given economic activity (...) does not cause significant harm to (...) environmental objectives, cannot be implemented. The regulation defines the following types of activities:

- 6.14 Infrastructure for railway transport;
- 6.15 Infrastructure supporting low-emission road transport and public transport.

Conditions confirming compliance with the DNSH principle have been identified for them:

- Identified and considered the risk of environmental degradation related to maintaining water quality and avoiding water deficits to achieve good water status and good ecological potential, as defined in Article 2 points 22 and 23 of Regulation (EU) 2020/852, in accordance with Directive 2000/60/EC, and in the developed management plan for the use and protection of waters for potentially exposed uniform (exposed uniform) parts of waters, in agreement with relevant stakeholders.
- In the case where an environmental impact assessment is carried out in accordance with Directive 2011/92/EC and includes an assessment of the impact on water in accordance with Directive 2000/60/EC, no additional assessment of the impact on water status is required, provided that identified risks have been considered.

Therefore, while the implementation of objective RSO3.2 carries certain risks for the quality and quantity of waters, appropriate planning, technologies, and remedies can significantly minimize these risks. Keeping this in mind, it can be expected that with the right approach, the impact of objective RSO3.2 on water will be limited.

5.4.4. IMPACTS ON THE AIR

Air, is a critical natural resource for humans, plants, and animals. Good air quality is essential for protecting not only human health and natural capital but also the environment. Most pollutants are released due to human activities in sectors such as transportation, agriculture, manufacturing and energy use, industry, or waste management. Air pollution is one of the environmental problems that affect most of Europe. Emissions of pollutants such as particulate matter (PM10 and PM2.5), benzo(a)pyrene, ozone, or nitrogen dioxide (NO₂) contribute to air pollution. Air pollution affects the health of humans, vegetation, and ecosystems, with particulate matter (PM), nitrogen dioxide (NO₂), and ground-level ozone (O₃) posing the greatest threats. The main sources of pollution emissions are the transport sector and the municipal sector, while industry has a significant impact mainly in industrial areas and over long distances. Due to the significant impact of air quality on human health and the environment, it is important to take actions that limit pollutant emissions into the air.

The impacts on air quality of projects that may be covered by the Programme are presented below, according to specific objectives, activities, and projects.

- *Specific objective: RSO2.4 Promoting climate change adaptation and disaster risk prevention and resilience, taking into account eco-system based approaches.*

Actions will be carried out in the field of protecting, regenerating, and sustainably using environmentally valuable areas, including Natura 2000 areas; promoting education to increase residents' knowledge about nature protection and awareness of environmentally valuable areas; protecting nature and biodiversity, and developing green infrastructure; projects aimed at identifying, monitoring, and improving the state of areas exceeding environmental quality standards.

Within these activities, projects aiming to develop and implement strategies, solutions, programs, and infrastructural projects may be supported. These projects will include elements of ecological education to raise awareness about the use of low-emission heating systems, environmental protection, and crisis management, as well as increasing public awareness of air quality standards. The implementation of appropriate air quality monitoring methods is necessary in the Programme area to diagnose the air quality and develop methods for its protection in the future. These projects, with a focus on all environmental components, especially air quality, will contribute to reducing the impact of pollutants on nature and humans, increasing safety, and raising knowledge and social awareness about possible actions to eliminate air emissions, not only greenhouse gases but also other pollutants, and the impact of poor air quality on health and life.

The development of green infrastructure will positively impact air quality in critical areas, especially in urban areas, due to the purifying effect of greenery, particularly in urban areas.

Joint actions to prevent threats caused by human activities, such as industrial accidents, and risk management in this area will have a positive impact on air quality, ultimately reducing the amount of pollutants entering the air from industry, especially in the event of accidents. However, some actions may be related to construction work, which may result in the emission of pollutants during construction activities, machine operation, and transportation. In this case, potential short-term negative impacts on air quality may occur.

Within this objective, LIP 3 "Environmental safety – creation of a Ukrainian-Polish forest fire management network in the Carpathian region" will be implemented. The project will be beneficial in reducing pollutant emissions as it will contribute to preventing forest fires and limiting their effects. It should be emphasized that pollution emissions during forest fires are one of the major sources of long-distance emissions, i.e., acting beyond the Programme area. Reducing the area of forests will also reduce air pollution absorption. Therefore, the project will have a positive impact on air quality.

- *Specific objective: RSO2.5 Promoting access to water and sustainable water management.*

As part of the objective, activities are planned for the implementation of projects aimed at the protection and improvement of water resources (including water management in the basin, the development of rainwater retention systems, actions related to water quality improvement).

Within these activities, projects will be implemented to support the development of strategies, solutions, programs, and innovative projects. These activities will be positive from the perspective of people as they will allow for a rational approach to water management, considering the protection of water resources and a forward-looking approach to providing drinking water to people, without negatively impacting air quality during their operation.

Among these activities, support for the construction of small retention facilities is possible. During the construction of these reservoirs, there may be a short-term, temporally limited emission of pollutants resulting

from construction work and the operation of construction equipment. The emission will be localized to the area directly related to the investment and will be eliminated upon the completion of the investment.

The next set of actions covered by this objective will include projects related to sewage management. Similar to the projects mentioned earlier, they will serve to protect the quality of water resources, and their operation will not have a negative impact on air quality. Investments related to the construction of sewage treatment infrastructure will result in emissions to the air during construction, including construction work, material transportation, and machinery operations. However, the potential negative impact is local and temporary, making the overall environmental impact more favorable than the temporary air quality impact during construction.

Under this objective, LIP 4 "Sustainable Water Management: a Way to Revitalise Western Ukraine and Eastern Poland" will be implemented. During the operational phase of the investment, it will not have an impact on air quality in the area where it operates. However, the potential for negative impacts is possible during the project's implementation phase. During the construction of water supply networks in the designated locations, earthworks will be carried out, and facilities that are part of the system will be built, resulting in emissions of pollutants. The sources of pollution will include construction work, heavy material and resource transportation, as well as the operation of construction equipment. This impact will be temporally limited to the construction period, and efforts to minimize the negative impact on air quality, particularly in areas that may potentially exceed normative substance concentration limits, are possible.

- *Specific objective: RSO2.7 Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution.*

Under this objective, activities are planned in the field of: protecting, regenerating, and sustainably using environmentally valuable areas, including Natura 2000 and Emerald areas; implementing promotional and educational activities to expand residents' knowledge about nature conservation and raise awareness of environmentally valuable areas; nature and biodiversity protection and green infrastructure development; implementing projects aimed at identifying, monitoring, and improving the condition of areas exceeding environmental quality standards. All projects in this area will have a positive impact on people because they will indirectly contribute to the preservation of the natural environment, including the preservation of its ecosystem services on which humans depend. They will also be important for creating conditions for recreation in cities (if the projects are located there), which is crucial in the face of ongoing climate change and associated heatwaves. They may also indirectly contribute to reducing water flow velocity, which may be important for flood prevention. Monitoring projects will allow for faster response to potential negative changes in the natural environment and the implementation of preventive measures.

There are no anticipated negative impacts of these actions on the air.

- *Specific objective: RSO2.6 Promoting a healthy lifestyle and preventing health risk factors.*

Within this specific objective, there is a strong emphasis on promoting an eco-friendly lifestyle, increasing engagement in the transition to a circular economy, and supporting solutions for better resource and waste management. By introducing initiatives focused on eco-friendly living and transitioning to a circular economy, it is possible to achieve indirect positive impacts on air quality. Reducing waste generation and improving waste segregation, as well as enhancing recycling efficiency, will contribute to reducing greenhouse gas emissions and other air pollutants associated with waste disposal and management processes.

Supporting innovative solutions related to the transition to a circular economy and raising public awareness of environmental challenges can bring benefits such as reduced resource and energy consumption, which will, in

turn, lead to a reduction in air pollutant emissions. Furthermore, promoting responsible waste management, including waste minimization, will help reduce the amount of waste going to landfills.

Initiatives aimed at promoting an eco-friendly lifestyle and monitoring and assessing air quality will have a direct impact on improving air quality in the areas covered by the Program. These actions will contribute to increasing knowledge and public awareness of air quality issues, which may lead to greater involvement of local communities in efforts to improve air quality.

No negative impacts on air quality are anticipated from these activities.

- *Specific objective: RSO2.7 Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution.*

This specific objective includes activities related to the protection, regeneration, and sustainable use of natural areas of value, including Natura 2000 and Emerald areas; promotional and educational efforts to enhance residents' knowledge of nature conservation and raise awareness about ecologically valuable areas; nature and biodiversity conservation, as well as the development of green infrastructure; and projects aimed at identifying, monitoring, and improving the state of areas exceeding environmental quality standards.

All projects within this scope will have a positive impact on people as they will indirectly contribute to the preservation of the natural environment and its ecosystem services, which humans depend on. They will also be significant for creating conditions for recreation in cities (if the projects are located there), which is essential in the face of advancing climate change and associated heatwaves. Additionally, they may indirectly influence reducing water runoff speed, which can be important for flood prevention. Monitoring projects, on the other hand, will enable quicker responses to potential negative changes in the natural environment and the implementation of preventive measures.

- *Specific objective: RSO4.5 Ensuring equal access to health care and fostering resilience of health systems, including primary care and promoting the transition from institutional to family-based and community-based care.*

The Programme envisages support for activities under this objective: improving access and developing diagnostic-preventive infrastructure in various medical fields; improving access to specialized medicine, especially cardiovascular diseases and cancer; supporting the equipment of healthcare facilities and emergency medicine; improving access to long-term care (especially geriatric and palliative care); preventing adverse effects such as epidemics (with a particular focus on local phenomena); digitizing healthcare (including telemedicine development); raising the qualifications of medical and rescue personnel. In principle, the proposed actions will not impact air quality. However, they may be positive indirectly from the perspective of the health protection of people exposed to air pollution. This is particularly relevant in industrial areas, where the emission of specific substances that may negatively affect people can occur. Health and life prevention actions may indirectly lead to activities that eliminate threats related to the emission of pollutants.

However, the implementation of some projects, involving the construction of hospitals or other facilities, may, during the construction phase, lead to the emission of pollutants from construction activities, material transport, and construction equipment operation.

Projects under this objective will include the following LIPs:

- *LIP 2 Joint development of accessible and resilient health care for elderly and disabled patients of Bialystok and Volyn hospitals*

- *LIP 5 A joint initiative of The Dr. Józef Psarski Mazovian Specialist Hospital in Ostrołęka as increasing the availability of health-care services through construction landing pads for rescue helicopters and purchase, delivery and assembly of lifting equipment.*
- *LIP 6 Development of palliative, geriatric and treatment care, and also improving the quality of medical services for cancer patients in hospitals of Lviv, Ternopil and Krosno*
- *LIP 7 Creation of Cross-Border Centers for Preventive Examinations in Lubelskie and Volyn Regions.*

The above-mentioned projects will not directly impact air quality. However, their impact may be indirect by ensuring the health of the population living in areas covered by the projects. Early prevention of diseases caused by poor air quality can contribute to actions to eliminate harmful effects from local sources of emissions, especially regarding suspended particles. Additionally, there may be indirect positive effects through the introduction of modernizations in healthcare facilities that bring energy savings and modern solutions in medical transport.

These projects will not have a fundamental impact on air quality during operation, but they may be associated with the emission of pollutants and impact on air quality during implementation, if it is related to construction work.

- *Specific objective: RSO4.6 Enhancing the role of culture and sustainable tourism in economic development, social inclusion and social innovations.*

Projects under this objective will include: protection, development, and promotion of public tourist values and related tourist services, e.g., by shaping an integrated tourist offer by entities from the Programme area, new infrastructure, and improvement/modernization of existing routes; protection, development, and promotion of culture and its heritage, as well as cultural services; protection, development, and promotion of natural heritage and ecotourism; support for adapting skills and professional qualifications in tourism to the needs of the tourism market and changes within it, e.g., through training related to establishing, running, and promoting tourism activities. Projects covered by these activities will positively impact people's awareness and indirectly increase pro-environmental behaviors leading to a reduction in emissions of pollutants. Air quality is one of the elements indicating the tourist and spa values of areas; therefore, tourism development can indirectly affect ensuring these environmental values. The introduction of ecotourism also positively affects air quality due to the use of ecological solutions protecting the environment, reducing the use of combustion fuels causing significant emissions. During the implementation of conservation projects involving the modernization, adaptation, and reconstruction of cultural heritage and tourism facilities, emissions of pollutants may occur locally and in the short term, depending on the scope of work and the equipment used.

Under this objective, LIP 1 "The Carpathian narrow-gauge railways – a journey in the footsteps of the Carpathian Forest railways" will be implemented. The project involves the reconstruction and adaptation of the Majdan station building for tourism purposes, the construction of a tourist path and an educational footbridge from the Majdan station to the nearest hill with a viewpoint. Additionally, the renovation of the narrow-gauge railway track from the Majdan station to the Dożyca station (3 km) is planned to enable the movement of vehicles on the tracks and the construction/reconstruction of the Wygoda station with the creation of a railway heritage museum. The impact of these activities on air quality will be related to the construction work during project implementation. However, this impact will be short-term and temporally limited to the implementation phase. Additionally, the creation of the railway is the creation of a new source of emissions, but if low-emission or emission-free sources are used for the railway's propulsion, it will minimize the impact on air quality. Therefore, it can be assumed that there will be no negative impact on air quality during the operational phase.

- *Specific objective: ISO6.2 Enhance efficient public administration by promoting legal and administrative cooperation and cooperation between citizens, civil society actors and institutions, in particular, with a view to resolving legal and other obstacles in border regions.*

- *Specific objective: ISO6.3 Build up mutual trust, in particular by encouraging people-to-people actions.*

Projects that will be implemented under the above objectives will have positive, indirect impacts on air quality as they will influence the optimization of management, including the environment, and in terms of reducing air pollution emissions and promoting pro-environmental solutions.

- *Specific objective: ISO7.4 Other actions for a safer and secure Europe.*

The implementation of objective ISO7.4, aimed at improving border and people's safety, may have indirect effects on the atmosphere. The modernization and expansion of border crossing infrastructure, especially if it involves expanding access roads or parking lots, may lead to increased emissions of vehicle exhaust, especially in the case of traffic jams and long waits at the border crossing. Therefore, it is important to consider environmental aspects in the planning and implementation process of modernization. On the other hand, one of the key aspects of this objective will be to improve traffic at border crossings. Consequently, it is expected to reduce the waiting time for vehicles, which directly translates into a reduction in the number of engines running during prolonged stops, traffic jams, or during the heating or cooling of vehicles. Such optimization of the border crossing process can significantly reduce emissions of exhaust fumes and air pollutants in areas with high traffic intensity. In summary, the implementation of the objective has the potential for a positive impact on air quality, especially if environmental aspects are taken into account in the planning and implementation of actions.

Under this objective, LIP 8 "Increasing the throughput capacity of the Hrebenne-Rawa Ruska road border crossing point and improving the conditions for travelers crossing the border at the Budomierz – Hruszew road border crossing point" will be implemented. In principle, the impact of this project will be consistent with the impacts indicated for the specific objective RSO3.2. Construction works may lead to a temporary increase in dust and other pollutant emissions. In the long term, smoother traffic flow can contribute to reducing greenhouse gas emissions and other pollutants associated with transport.

- *Specific objective: RSO3.2 Developing and enhancing sustainable, climate resilient, intelligent and intermodal national, regional and local mobility, including improved access to TEN-T and cross-border mobility.*

The development and strengthening of sustainable, climate-resilient, intelligent, and intermodal national, regional, and local mobility undoubtedly bring many benefits to cross-border and local mobility. However, the implementation of this objective, especially in the context of road construction and modernization, has consequences for air quality - both positive and negative.

The reconstruction and modernization of roads can, in the short term, lead to an increase in emissions related to construction work and the use of heavy equipment. In the long term, it is assumed that effective road infrastructure will contribute to reducing emissions by enabling the relocation of pollutants outside built-up areas. It is worth emphasizing that roads outside urban areas have been prioritized. However, more attractive road infrastructure can attract more vehicles, which may lead to increased emissions of exhaust fumes. In the context of railway infrastructure, it should be noted that it is characterized by greater efficiency in terms of CO₂ emissions per unit of transported cargo or passenger than road transport. Although actions for railways have the potential to contribute to sustainable mobility, the scale of railway investments provided for in the Programme compared to road investments seems to be insufficient. The risk of negative environmental impact is limited by environmental protection and sustainable development clauses included in the objective description. These clauses minimize the risk of unforeseen environmental effects, including air quality.

Monitoring the impact of projects and the "do no significant harm" principle ensure that initiatives with potentially harmful effects on the environment will not be funded. In summary, the implementation of the specific objective RSO3.2 offers many benefits in terms of mobility and safety but also poses challenges for air

quality. Key will be closely monitoring the impact of actions and readiness to introduce mitigating measures in case of negative effects.

5.4.5. IMPACTS ON THE GROUND SURFACE AND LANDSCAPE

The impact of human activities on the land surface through changes in land use is a widespread and multidimensional phenomenon, often significantly altering its structure. This affects the potential for land use and leads to transformations in the landscape, frequently resulting in its physical degradation. This is associated with changes in soil structure, erosion, and the transformation of agricultural and forested lands into urban or industrial areas. Another form of land surface degradation is chemical degradation, resulting from soil acidification, salinization, and the accumulation of pollutants.

Regarding the impact on the landscape, it is essential to emphasize that human activities alter the landscape, causing it to lose its ability for self-regulation. Therefore, it also requires protection, like other environmental components. It should be noted, however, that the perception of the landscape is subjective and depends on the aesthetic sensitivity of observers. Changes in the landscape are often perceived particularly negatively when the landscape was minimally altered by human activity before.

The areas of intervention planned within the analyzed Programme will affect land surfaces and landscapes depending on the type and location of the undertaking.

- *Specific Objective: RSO2.4 Promoting climate change adaptation and disaster risk prevention and resilience, taking into account eco-system based approaches.*

Within this objective, activities will focus on the protection, regeneration, and sustainable use of environmentally valuable areas, including Natura 2000 areas. This involves promoting education to increase residents' knowledge about nature conservation and raising awareness of environmentally valuable areas. Additionally, it covers the protection of nature and biological diversity, as well as the development of green infrastructure. Projects aim to identify, monitor, and improve the condition of areas exceeding environmental quality standards.

These actions may support initiatives in developing and implementing strategies, solutions, Programmes, and infrastructure projects to increase adaptive capacity to climate change in the Programme area. This includes enhancing protection and resilience to the effects of anthropogenic disasters through the construction of crisis management systems and infrastructure, as well as increasing public awareness.

All these initiatives will be positive for preserving land surfaces and resilience to climate change. They will also be beneficial for the landscape as they contribute to the preservation of existing landscapes, although some actions related to climate change adaptation infrastructure may lead to landscape transformations and changes in land surfaces. However, these actions should not be negative or only to a minimal extent.

Some activities, especially those related to infrastructure, may involve construction work, leading to periodic transformations of land surfaces and the landscape during the construction process.

Within this objective, LIP 3 "Environmental safety – creation of a Ukrainian-Polish forest fire management network in the Carpathian region" will be implemented. The project will be beneficial for land surfaces and the landscape as it will contribute to forest fire protection, thereby preserving larger forested areas that play significant roles for both people and nature.

- *Specific Objective: RSO2.5 Promoting access to water and sustainable water management*

Within this objective, activities are planned to implement projects aimed at protecting and improving water resources (including water management in river basins, developing rainwater retention systems, and actions related to improving water quality). Projects supporting the development of strategies, solutions, Programmes, and innovative projects will positively impact the systematic improvement of land surface and landscape

protection. Actions related to increasing water retention will be beneficial for land surface protection by generally reducing the runoff of rainwater and its associated effects (e.g., erosion). They will also be favorable from a landscape perspective, although they may transform it, often into a more diverse and natural landscape, such as in the restoration of wetland areas. On the other hand, initiatives involving innovative projects in municipal wastewater treatment will lead to permanent transformations of land surfaces by creating new facilities on previously used areas, affecting both human and natural landscapes. Therefore, when locating such projects, isolated areas with relatively minimal impacts, including on the landscape, should be chosen.

According to existing regulations, such projects will undergo individual environmental impact assessments as they may significantly impact the environment. Additionally, during the implementation of such projects, there may be additional short-term impacts on land and landscape, such as excavations and construction, which should be reduced after project completion.

As part of This objective, LIP 4 "Sustainable Water Management: a Way to Revitalise Western Ukraine and Eastern Poland" will be implemented. Since water supply and sewerage networks will be underground, they should not permanently affect the transformation of land surfaces and landscapes, except during the construction period. However, the construction of water treatment stations and intakes, as well as sewage treatment plants, will occupy land and change its use, although the surface area should not be large. Their construction will impact the landscape as they will be new objects in the landscape, and careful integration is necessary to avoid negative interventions in the natural landscape.

- *Specific Objective: RSO2.7 Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution.*

This objective involves activities related to the protection, regeneration, and sustainable use of environmentally valuable areas, including Natura 2000 and Emerald areas. It also includes promotional and educational actions to enhance residents' knowledge of nature conservation and awareness of environmentally valuable areas. Projects aimed at identifying, monitoring, and improving areas exceeding environmental quality standards will have a positive impact on land surface and landscape protection.

- *Specific Objective: RSO2.6 Promoting the transition to a circular and resource efficient economy*

The implementation of This objective involves increasing community engagement in a circular economy. The goal will be achieved through the Small Projects Fund. There are significantly positive effects on land surface and landscape by supporting initiatives focused on an ecological lifestyle and rational waste management. Promoting innovative infrastructure solutions also aims to improve local environmental conditions. Funding through the Small Projects Fund excludes the establishment of large, significantly impactful waste management facilities. Socially, achieving This objective can contribute to reducing the occurrence of illegal landfills that degrade the landscape. Cross-border initiatives related to technology transfer and efficient resource management can lead to the implementation of modern, sustainable land management methods that are less invasive to the landscape.

Supporting grassroots initiatives can also result in the implementation of local projects aimed at revitalizing degraded areas, contributing to landscape renewal and protection. The introduction of circular economy practices will have a long-term positive impact on land surface, ensuring better utilization and minimizing negative landscape impacts.

- *Specific Objective: RSO4.5 Ensuring equal access to health care and fostering resilience of health systems, including primary care and promoting the transition from institutional to family-based and community-based care.*

This Programme aims to support actions for improving access and developing diagnostic-preventive infrastructure in various medical fields, enhancing access to specialized medicine (especially cardiovascular

diseases and cancer), supporting healthcare facilities and emergency medicine equipment, improving access to long-term care (especially geriatric and palliative care), preventing adverse events such as epidemics, developing digitization in healthcare (including telemedicine), and enhancing the qualifications of medical and rescue personnel.

All actions in this area will generally be neutral regarding land surface and landscape. However, some construction or renovation activities related to healthcare infrastructure may negatively impact land surface transformations. Since these activities are related to existing facilities, the effects will be minimal in terms of occupying additional land. Similarly, regarding the impact on the landscape, if the design of new and modernized facilities is architecturally appropriate, the impact on the landscape can be positive or, at the very least, neutral.

Within this objective, the following Large Infrastructure Projects will be implemented:

- *LIP 2 Joint development of accessible and resilient health care for elderly and disabled patients of Bialystok and Volyn hospitals.*
- *LIP 5 A joint initiative of The Dr. Józef Psarski Mazovian Specialist Hospital in Ostrołęka as increasing the availability of health-care services through construction landing pads for rescue helicopters and purchase, delivery and assembly of lifting equipment.*
- *LIP 6 Development of palliative, geriatric and treatment care, and also improving the quality of medical services for cancer patients in hospitals of Lviv, Ternopil and Krosno.*
- *LIP 7 Creation of Cross-Border Centers for Preventive Examinations in Lubelskie and Volyn Regions.*

The above-mentioned projects, in principle, will not have an impact on land surfaces and landscapes. However, the implementation of some projects, particularly those involving construction work on hospitals or other healthcare facilities, may lead to the occupation of additional land. Nevertheless, these areas will be relatively small and accompanying existing developments. In terms of landscape, they may have only a positive impact, as renovations will also include facades.

- *Specific Objective: RSO4.6 Enhancing the role of culture and sustainable tourism in economic development, social inclusion and social innovation*

Within this objective, projects will focus on protecting, developing, and promoting public tourist values and related tourist services. This includes shaping integrated tourist offers by entities from the Programme area, developing new infrastructure, and improving/modernizing existing routes. It also involves protecting, developing, and promoting cultural heritage and services in the cultural sector, as well as the protection, development, and promotion of natural heritage and ecotourism. Support will be provided to adapt skills and professional qualifications in tourism to the needs of the tourism market. Projects under these activities should not have a negative impact on land surfaces and landscapes, although some renovated and modernized objects may occupy additional land. However, the impact on the landscape may be positive, as the modernized or renovated objects will also have renovated facades.

During construction work, temporary disruptions to the landscape and transformations in the construction environment may occur. The positive effect of promoting tourism and cultural heritage should indirectly contribute to raising social awareness and respect for cultural and environmental heritage.

As part of This objective, LIP 1 "The Carpathian narrow-gauge railways – a journey in the footsteps of the Carpathian Forest railways" will be implemented. Projects under these actions will indirectly have a positive impact on land surfaces and landscapes, as they will raise society's level of knowledge and promote rational environmental management.

However, during the implementation of some projects related to tourist infrastructure, temporary transformations of land surfaces due to excavations and soil movement may occur, causing disturbances in the landscape.

- *Specific Objective: ISO6.2 Enhance efficient public administration by promoting legal and administrative cooperation and cooperation between citizens, civil society actors and institutions, in particular, with a view to resolving legal and other obstacles in border regions.*

Projects within this objective will mainly focus on increasing and improving the quality of cross-border cooperation, improving access to information on legal, tax, and formal conditions related to business activities, stimulating economic ties, or promoting jointly operating entrepreneurial organizations, which may result in the economic development of the support area. Support will also be provided for advisory services for entities applying for additional financial resources.

It can be assessed that these projects will be neutral in terms of their impact on land surfaces and landscapes. However, they may indirectly affect rational environmental management, including land surfaces and landscapes.

- *Specific Objective: ISO6.3 Build up mutual trust, in particular by encouraging people-to-people actions.*

Projects will involve supporting grassroots initiatives for the integration of support area residents, including promoting volunteering and organizing events for cross-border integration related to the environment, arts, culture, and heritage. They will also support local initiatives and leadership, educational cooperation between schools, and educational or research activities.

- *Specific Objective: ISO7.4 Other actions for a safer and secure Europe*

The modernization and expansion of border crossing infrastructure may lead to changes in land use and land surfaces, especially if it involves the construction of new roads, parking lots, or buildings. These changes may replace green or agricultural areas with technical infrastructure, directly affecting the local landscape.

It's essential to emphasize that any construction activities may lead to temporary disruptions to the landscape, especially in border areas with unique landscape and natural values. Therefore, key considerations during project planning and implementation should focus on minimizing the impact on the landscape and land surfaces.

A positive aspect may be the opportunity to improve the aesthetics of border areas through modern and aesthetic infrastructure projects that consider the character of the region.

In the context of land protection, it is also important to ensure proper waste management and minimize the impact of investments on the soil, especially in the case of activities involving digging into the ground.

As part of This objective, LIP 8 "Increasing the throughput capacity of the Hrebenne-Rawa Ruska road border crossing point and improving the conditions for travelers crossing the border at the Budomierz – Hruszew road border crossing point" will be implemented. The impacts of this project align with those indicated for Specific Objective RSO3.2. The project's implementation will lead to changes in the landscape, especially in the construction areas. Soil degradation may also occur in places directly affected by construction activities.

- *Specific Objective: RSO3.2 Developing and enhancing sustainable, climate resilient, intelligent and intermodal national, regional and local mobility, including improved access to TEN-T and cross-border mobility.*

Assessing the impact of the implementation of Specific Objective RSO3.2 on land surfaces and landscapes, it is essential to consider primarily the effects of planned intentions. The goal is to improve the quality of transport

infrastructure, both road and rail, between Poland and Ukraine. These actions aim to strengthen cross-border connections, especially within the EU-Ukraine solidarity lines, contributing to increased safety and the efficiency of people and goods flow.

Rebuilding and modernizing roads may directly impact land surfaces since it often involves allocating additional areas for new infrastructure. However, support will mainly focus on existing roads and corridors, limiting the risk of additional, significant interference with the landscape. Moreover, these actions also aim to improve aspects of sustainable transport, including reducing the environmental impact of transportation, demonstrating the significance of these issues and a commitment to minimizing the Programme's negative impact on the environment.

Similarly, concerning railway infrastructure, investments primarily aim to modernize existing infrastructure. While the reconstruction of railway lines may entail some changes in the landscape, it is anticipated that the long-term improvement of railway connections between urban centers and tourist attractions will contribute to the region's development and increased tourist appeal. The greater role of tourism in local development will lead to greater care for landscape values.

It is crucial that these activities include a range of clauses and conditions designed to protect the environment. Supported actions must also comply with the principle of "do no significant harm," and projects that could cause serious harm to EU environmental goals will not qualify for funding.

5.4.6. IMPACTS ON NATURAL RESOURCES

Natural resources form the basis of the functioning of every European and global economy and have an impact on the quality of our lives. These resources include not only raw materials such as fuels, minerals, and metals but also food, soil, water, air, biomass, and ecosystems. The demand for resources continues to grow, and it is expected that if current trends persist, the world's population will increase by 30% by 2050, reaching around 9 billion, significantly increasing the demand for natural resources. Various forecasts predict that the depletion of some resources may occur by the 2050s at the current rate of development. In this situation, rational resource management and conservation become fundamental developmental challenges, both from the perspective of individual countries and on a global scale. The solution lies in the complete transformation of the economy into a circular economy (closed-loop system).

During the construction of projects covered by all directions of the Programme, primarily rock resources will be used, but also metals, including steel, and other fossil products. Among the rock resources, aggregate resources such as sands and gravels will be used. It is important, in this context, that eco-design principles, considering the need for a transition to a closed-loop system, are applied in the design of projects planned to be supported by the Programme.

The document presents the impacts on the resources of projects that may be covered by the Programme, according to specific objectives, actions, and projects.

- *Specific objective: RSO2.4 Promoting climate change adaptation and disaster risk prevention and resilience, taking into account eco-system based approaches.*

Within this objective, activities will be carried out in the field of the protection, regeneration, and sustainable use of valuable natural areas, including Natura 2000 areas; promotion and education to expand residents' knowledge of nature conservation and raise awareness of environmentally valuable areas; nature and biodiversity conservation and the development of green infrastructure; projects aimed at identifying, monitoring, and improving the condition of areas exceeding environmental quality standards.

In the context of these activities, projects related to the development and implementation of strategies, solutions, programs, and infrastructure projects will be supported to increase the adaptive capacity of the

population in the Programme area, enhance its protection and resilience to the effects of anthropogenic disasters by building crisis protection and management systems and raising social awareness.

All these projects will have a positive impact on natural resources. Actions related to the development of strategies and programs and their implementation will influence more rational resource use. Similarly, actions to increase knowledge and environmental awareness of society will also have an impact.

Actions to increase adaptive capacity and resilience to disasters will also positively affect the conservation of natural resources and secure them in the face of advancing climate change. This will be crucial for preserving ecosystem services that humans depend on.

However, some actions may be related to construction work, which may entail a demand for construction resources.

Within this objective, LIP 3 "Environmental safety – creation of a Ukrainian-Polish forest fire management network in the Carpathian region" will be implemented. The project will be beneficial because it will reduce fires in the cooperation area, leading to a decrease in natural resource losses in forest areas.

- *Specific objective: RSO2.5 Promoting access to water and sustainable water management*

Within this objective, activities are planned to implement projects aimed at protecting and improving the state of water resources (including water management in the watershed, developing rainwater retention systems, and actions related to improving water quality).

Within these activities, projects supporting the development of strategies, solutions, Programmes, and innovative projects will be implemented. These actions will be positive from the perspective of natural resource protection, as they will allow for a rational approach to water management, taking into account the protection of water resources and a forward-looking approach to providing water for consumption.

Among these activities, support for the construction of small retention facilities is possible. These projects will be positive because they will not only increase water resources but also contribute to the reduction of negative effects of natural phenomena such as floods (by limiting and delaying the flow of rainwater and reducing its rapid runoff causing soil erosion) and droughts (by storing water).

In general, the construction of such facilities will not result in the use of construction raw materials but will mainly involve earthmoving.

Other activities covered by this objective will be sewage management projects. Among them, there will be projects to support the rational management of water, which will be beneficial for the efficient use of water resources necessary for consumption and industry, as well as securing water resources against pollution.

As part of the goal's implementation, innovative wastewater treatment projects will also be implemented, which will positively affect the protection of the quality of surface and groundwater resources.

During the implementation of such projects, the use of construction raw materials will be necessary.

Within this objective, LIP 4 "Sustainable Water Management: a Way to Revitalise Western Ukraine and Eastern Poland" will be implemented. The construction will be beneficial for people as it will improve the supply of drinking water in terms of quantity and quality. However, it may be associated with an increased demand for water and depletion of its resources. Building materials will also be used in construction. However, due to the scope of the investment, it can be expected that the construction will have a limited impact on the environment, and its effects will be mitigated by the positive aspects of the investment.

- *Specific objective: RSO2.7 Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution.*

Within this objective, activities are planned to implement projects aimed at protecting and improving the state of biodiversity. These include projects aimed at protecting and preserving valuable natural areas, including Natura 2000 areas; activities related to the protection of biodiversity through the development of green infrastructure; activities aimed at identifying, monitoring, and improving the condition of areas exceeding environmental quality standards; projects related to the regeneration and sustainable use of valuable natural areas and biodiversity.

The implementation of projects under this objective will have a positive impact on natural resources. Actions related to the development of strategies and programs and their implementation will influence more rational resource use. Similarly, actions to increase knowledge and environmental awareness of society will also have an impact.

- *Specific objective: RSO2.6 Promoting the transition to a circular and resource efficient economy*

This specific objective focuses on increasing the engagement of the Programme area residents in cross-border cooperation to transition to a circular and resource-efficient economy. The implementation of this objective will have a direct and indirect impact on the natural resources of the region. Activities promoting an ecological lifestyle and rational waste management will contribute to increased use of secondary raw materials and reduced consumption of primary resources, thereby alleviating pressure on natural resources. The use of innovative solutions in recycling and resource reuse will also positively impact their rational utilization.

While some projects may require the use of natural resources, the overall philosophy of the Programme aims to promote sustainable and responsible resource use, minimizing any negative effects on natural resources.

- *Specific objective: RSO4.5 Ensuring equal access to health care and fostering resilience of health systems, including primary care and promoting the transition from institutional to family-based and community-based care.*

This objective involves supporting actions to improve access to diagnostic and preventive healthcare infrastructure, especially in the fields of cardiology and oncology. It also aims to enhance long-term care, preventive measures against adverse phenomena such as epidemics, and the digitalization of healthcare. These actions will significantly benefit people by reducing morbidity, improving treatment effectiveness, enhancing resilience to unforeseen events, and ultimately increasing the life expectancy of Programme area residents.

While certain healthcare-related projects may increase the demand for resources and building materials, the overall positive impact on human resources justifies their implementation.

However, the implementation of certain projects, particularly in the scope of construction work on hospitals or other facilities, may increase the demand for raw materials and construction materials.

Within this objective, the following Specific objectives (LIP) will be pursued:

- *LIP 2: Joint development of accessible and resilient health care for elderly and disabled patients of Białystok and Volyn hospitals.*
- *LIP 5: A joint initiative of The Dr. Józef Psarski Mazovian Specialist Hospital in Ostrołęka as increasing the availability of health-care services through construction landing pads for rescue helicopters and purchase, delivery and assembly of lifting equipment.*
- *LIP 6: Development of palliative, geriatric and treatment care, and also improving the quality of medical services for cancer patients in hospitals of Lviv, Ternopil and Krosno.*

- *LIP 7: Creation of Cross-Border Centers for Preventive Examinations in Lubelskie and Volyn Regions.*

All these projects will not significantly impact natural resources. Their only influence will be related to the consumption of raw materials and construction materials during the construction phase.

- *Specific objective: RSO4.6 Enhancing the role of culture and sustainable tourism in economic development, social inclusion and social innovation*

Projects under this objective will focus on the protection, development, and promotion of public tourist values and related services. The projects aim to integrate tourist offerings, develop infrastructure, and enhance or modernize existing routes. These actions will positively impact people by increasing their knowledge, including environmental awareness, indirectly contributing to the preservation of natural resources. Conservation projects involving the modernization, adaptation, or reconstruction of cultural heritage objects, if conducted within the Programme, will have similar positive significance. The use of resources and building materials for these projects is expected to have a minimal impact on overall resource consumption in this area.

- *Specific objective: ISO6.2 Enhance efficient public administration by promoting legal and administrative cooperation and cooperation between citizens, civil society actors and institutions, in particular, with a view to resolving legal and other obstacles in border regions.*

Projects under this objective will mainly focus on improving cross-border cooperation and access to legal, tax, and formal information. While these projects may have minimal direct impact on natural resources, their successful implementation may indirectly contribute to positive outcomes by fostering economic development and cooperation in the support area.

- *Specific objective: ISO6.3 Build up mutual trust, in particular by encouraging people-to-people actions.*

Projects under this objective will support grassroots initiatives for integrating area residents, promoting volunteerism, organizing events for cross-border integration related to the environment, art, culture, and heritage. While these projects may not directly impact natural resources, they can indirectly benefit environmental conservation efforts by fostering collaboration and educational activities.

- *Specific objective: ISO7.4 Other actions for a safer and secure Europe*

Infrastructure modernization and expansion of border crossings, especially elements like parking or buildings, will require the exploitation of natural resources such as sand, gravel, or stone. This extraction can have consequences for the environment, leading to changes in landscapes, reduced resource availability, and potential disruption of local ecosystems.

Additionally, developing infrastructure may contribute to increased water and energy consumption. Implementation of energy-efficient technologies and the use of renewable energy sources are crucial to minimizing the environmental impact.

In summary, while the primary focus of objective ISO7.4 is on safety, it also has environmental aspects that cannot be overlooked. Careful planning and consideration of these aspects in activities related to this objective will help minimize potential negative effects on natural resources and harness potential benefits.

- *Specific objective: RSO3.2 Developing and enhancing sustainable, climate resilient, intelligent and intermodal national, regional and local mobility, including improved access to TEN-T and cross-border mobility.*

Projects aimed at improving cross-border road and rail infrastructure to enhance sustainable transport will involve significant use of natural resources. The construction phase of these projects will necessitate the

consumption of substantial amounts of rock materials, such as sand, gravel, metals including steel, and other fossil-based products.

To mitigate the impact on natural resources, the recommended approach is to apply eco-design principles, emphasizing a closed-loop economy. This approach enables the design of roads and railways for long-term use, minimizing waste and utilizing secondary materials or materials with lower environmental impact.

It is essential to highlight that, as outlined in the objective description, supported actions must adhere to the principle of "do no significant harm." This means that projects identified as causing significant harm, as per the supplementary Regulation (EU) 2020/852, will not be eligible for implementation. This regulation defines specific types of activities,

- (6.14) Infrastructure for railway transport;
- (6.15) Infrastructure supporting low-emission road transport and public transport

Detailed criteria have been established for these activities, emphasizing that at least 70% (by mass) of non-hazardous construction and demolition waste generated on-site should be ready for reuse, recycling, and other material recovery processes.

Therefore, thorough planning, application of eco-design principles, and adherence to the "do no significant harm" principle will significantly limit the consumption of natural resources in the projects carried out under this objective

5.4.7. CLIMATE IMPACTS

The emission of greenhouse gases, such as carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O), contributes to the greenhouse effect and the phenomenon of global warming, which ultimately leads to climate change. It is important to emphasize that, from the perspective of assessing the impact of greenhouse gas emissions on the greenhouse effect, emissions accompanying electricity production and those originating from fuel combustion in vehicle engines will have equal significance. In other words, the source of this emission does not matter. Climate changes already have, and will continue to have in the future, a significant impact, both direct and indirect, on society by affecting water, soil, air, and biodiversity⁵⁹. The main sources of greenhouse gas emissions are the energy and transportation sectors. As climate changes progress, and we increasingly feel their effects, it is important to take actions to mitigate and adapt to them.

Below are presented the climate impacts of projects that may be covered by the Programme, according to Specific objectives, activities, and projects.

- *Specific objective: RSO2.4 Promoting climate change adaptation and disaster risk prevention and resilience, taking into account eco-system based approaches.*

Activities will be carried out within This objective in the areas of protecting, regenerating, and sustainably using environmentally valuable areas, including Natura 2000 areas; promoting education to expand residents' knowledge about nature protection and raising awareness about environmentally valuable areas; protecting nature and biodiversity and developing green infrastructure; projects aimed at identifying, monitoring, and improving the state of areas exceeding environmental quality standards.

Within these activities, projects supporting the development and implementation of strategies, solutions, Programmes, and infrastructure projects will be supported to increase the adaptive capacity of the population

⁵⁹ KLIMADA: Climate change adaptation. <http://klimada.mos.gov.pl/zmiany-klimatu-w-polsce/konsekwencje-zmian-klimatu/>

in the Programme area, enhance its protection and resilience to the effects of anthropogenic disasters through the construction of crisis management systems and infrastructure, and raise social awareness.

These projects will contribute to adapting to climate change by reducing its impact on nature and humans, increasing safety. They will also contribute to raising knowledge and social awareness of possible climate changes, counteracting them, and the need to adapt to them. Thus, they will influence people's behavior in reducing greenhouse gas emissions. Developed strategies and Programmes will positively affect a more rational and systematic approach to actions aimed at reducing greenhouse gas emissions and adapting to climate change.

However, some activities may be related to construction work, which may result in greenhouse gas emissions from construction equipment.

As part of This objective, LIP 3 "Environmental safety – creation of a Ukrainian-Polish forest fire management network in the Carpathian region" will be implemented. This project will be beneficial in terms of reducing greenhouse gas emissions because it will contribute to preventing forest fires and limiting their impact. It should be emphasized that greenhouse gas emissions during forest fires are one of the major factors in climate change. Reducing the forest area will also reduce carbon dioxide absorption.

- *Specific objective: RSO2.5 Promoting access to water and sustainable water management*

Within this objective, activities are planned to implement projects aimed at protecting and improving water resources (including water management in the watershed, developing rainwater retention systems, actions related to improving water quality).

Within these activities, projects will be implemented to support the development of strategies, solutions, programs, and innovative projects. These actions will be positive for people as they will allow a rational choice of the right approach to water management, taking into account the protection of water resources and a prospective approach to supplying water for consumption, also considering climate changes.

Among these activities, support for the construction of small retention facilities is possible. This will impact the retention of water flow and the resulting damage, which is essential in view of the increasing natural phenomena due to climate change (erosion, floods, landslides, etc.). Additionally, the created retention will also contribute to better conservation of water resources, crucial for both water-dependent ecosystems and people. This is important considering the predicted shortages of these resources and combating drought.

However, during construction, there may be greenhouse gas emissions from construction equipment.

Projects in the field of wastewater management will be the next activities covered by goal 2.2. Like the projects mentioned above, they will serve to protect the quality of water resources, which is important in view of advancing climate change and depleting resources.

As part of This objective, LIP 4 "Sustainable Water Management: a Way to Revitalise Western Ukraine and Eastern Poland" will be implemented. The construction will be beneficial for people, especially in terms of water supply in the context of climate change.

- *Specific objective: RSO2.7 Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution.*

Within this objective, activities are planned in the areas of protecting, regenerating, and sustainably using environmentally valuable areas, including Natura 2000 and Emerald areas; promotional and educational activities to expand residents' knowledge about nature protection and raise awareness of environmentally valuable areas; nature and biodiversity protection and green infrastructure development; implementation of

projects aimed at identifying, monitoring, and improving the state of areas exceeding environmental quality standards.

These projects will have similar positive, indirect effects on the climate. In the context of advancing climate change and the associated rise in temperature, they may be significant in adapting ecosystems to changing conditions. Projects in the field of monitoring will allow for faster response to potential negative changes in nature and the implementation of preventive measures.

- *Specific objective: RSO2.6 Promoting the transition to a closed-loop and resource-efficient economy*

Achieving This objective related to transitioning to a closed-loop and resource-efficient economy will indirectly have a positive impact on the region's climate.

Promoting an ecological lifestyle and increasing resource management efficiency by raising awareness among area residents will contribute to reducing greenhouse gas emissions. Reducing waste production, increasing recycling, and reusing raw materials will lead to a reduction in energy consumption and emissions associated with production and processing processes. Moreover, minimizing waste generation will reduce the need for landfilling, which, in turn, may reduce methane emissions – a greenhouse gas with a much higher warming potential than carbon dioxide.

Innovative solutions and environmentally friendly small-scale infrastructure will contribute to local emission reduction. For example, promoting low-emission technologies, renewable energy sources, or energy efficiency solutions will impact the reduction of fossil fuel consumption in the region.

Raising public awareness of environmental challenges and promoting rational waste management can reduce the individual carbon footprint of residents, which will have a beneficial impact on the region's climate on a macro scale.

However, it is worth noting that the implementation of some initiatives may be associated with a temporary increase in greenhouse gas emissions, for example, due to the construction of infrastructure or the implementation of new technologies. Nevertheless, in the long term, such actions will be beneficial for mitigating climate change.

- *Specific Objective: RSO4.5 Ensuring equal access to health care and fostering resilience of health systems, including primary care and promoting the transition from institutional to family-based and community-based care.*

The Programme aims to support activities for improving access and developing diagnostic-preventive infrastructure in various medical fields, enhancing access to specialized medicine, supporting the equipment of healthcare facilities, and emergency medicine. It also aims to improve access to long-term care (especially geriatric and palliative care), prevent adverse events such as epidemics (with a focus on local phenomena), develop digitization in healthcare (including telemedicine development), enhance the qualifications of medical and rescue personnel.

In principle, the proposed actions will not have an impact on climate, but they may be indirectly positive in terms of increasing people's resilience to climate change, especially in preventing local climate-related phenomena. However, the implementation of some projects, involving the construction of hospitals or other facilities, may cause greenhouse gas emissions during the construction period.

The following Large Infrastructure Projects will be implemented as part of this objective:

- *LIP 2 Joint development of accessible and resilient health care for elderly and disabled patients of Bialystok and Volyn hospitals*

- *LIP 5 A joint initiative of The Dr. Józef Psarski Mazovian Specialist Hospital in Ostrołęka as increasing the availability of health-care services through construction landing pads for rescue helicopters and purchase, delivery and assembly of lifting equipment.*
- *LIP 6 Development of palliative, geriatric and treatment care, and also improving the quality of medical services for cancer patients in hospitals of Lviv, Ternopil and Krosno*
- *LIP 7 Creation of Cross-Border Centers for Preventive Examinations in Lubelskie and Volyn Regions*

These projects will not fundamentally impact the climate but may have positive indirect effects on increasing people's resilience to climate change, particularly in addressing local climate-related phenomena. Nevertheless, the implementation of some projects, especially construction work on hospitals or other facilities, may result in greenhouse gas emissions from construction equipment.

- *Specific Objective: RSO4.6 Enhancing the role of culture and sustainable tourism in economic development, social inclusion and social innovations.*

Projects under this objective will focus on protecting, developing, and promoting public tourist values and related tourist services, supporting the integrated tourist offer by shaping it through entities within the Programme area, new infrastructure, and improving/modernizing existing routes. This includes the protection, development, and promotion of culture and its heritage, as well as services in the field of culture, the protection, development, and promotion of natural heritage and ecotourism, and support for adapting skills and professional qualifications in tourism to the needs of the tourism market through training related to the establishment, operation, and promotion of tourist activities.

Projects covered by these activities will positively impact people's awareness, indirectly reducing greenhouse gas emissions and adopting actions for climate change. During the implementation of conservation projects involving the modernization, adaptation, and reconstruction of cultural and tourism heritage objects, greenhouse gas emissions may occur depending on the scope of work and equipment used.

Under this objective, LIP 1 "The Carpathian narrow-gauge railways – a journey in the footsteps of the Carpathian Forest railways" will be implemented. The project includes the reconstruction and adaptation of the Majdan station building for tourist purposes, the construction of a tourist path and educational footbridge from the Majdan station to the nearest hill with a viewing platform, the renovation of the narrow-gauge railway track from the Majdan station to the Dożyca station (3 km) to enable the movement of bicycle vehicles on the tracks, and the construction/reconstruction of the Vyhoda station to create a railway heritage museum. The climate impact of this project will be similar to those mentioned above, provided that low or non-emissive sources are used to power the railway.

- *Specific Objective: ISO6.2 Enhance efficient public administration by promoting legal and administrative cooperation and cooperation between citizens, civil society actors and institutions, in particular, with a view to resolving legal and other obstacles in border regions.*
- *Specific Objective: ISO6.3 Build up mutual trust, in particular by encouraging people-to-people actions.*

Projects implemented under these objectives will have positive, indirect impacts on the climate, influencing optimization of management, including the environment, as well as reducing greenhouse gas emissions and adapting to climate change.

The projects that will be implemented within the mentioned objectives will have positive, indirect impacts on the climate. They will influence the optimization of management, including the environment, as well as the reduction of greenhouse gas emissions and adaptation to climate change

- *Specific Objective: ISO7.4 Other actions for a safer and secure Europe.*

Assessing the impact of ISO7.4 on climate, several key aspects can be noted that can affect climate change both positively and negatively. Modernization and expansion of border crossing infrastructure, especially if it involves expanding access roads or parking lots, may be associated with emissions related to construction work. However, in the medium and long term, the improvement of border crossing infrastructure has significant potential to reduce vehicle emissions due to more efficient traffic flow and shorter waiting times. The construction and installation of new buildings and related technological devices may be associated with increased energy consumption, indirectly affecting greenhouse gas emissions. Therefore, it is crucial to use energy-efficient technologies and, where possible, renewable energy sources. Given climate change, future border infrastructures should be designed to be resilient to extreme weather conditions such as heatwaves and cold spells or intense storms and rainfall. In summary, positive effects can be achieved by optimizing traffic, reducing waiting times at borders, and using environmentally friendly technologies.

LIP 8 "Increasing the throughput capacity of the Hrebenne-Rawa Ruska road border crossing point and improving the conditions for travelers crossing the border at the Budomierz – Hruszew road border crossing point" will be implemented under this objective. The project's impacts will align with those indicated for specific objective RSO3.2. A full environmental impact assessment should be conducted during the project design and environmental impact Assessment Report preparation. In the short term, construction activities may lead to increased CO₂ emissions. In the long term, a positive impact on the climate is expected due to more efficient vehicle flow, which may result in lower fuel consumption. For this project, an individual compliance analysis with the DNSH principle, especially for climate change adaptation, should be developed.

- *Specific Objective: RSO3.2 Developing and enhancing sustainable, climate resilient, intelligent and intermodal national, regional and local mobility, including improved access to TEN-T and cross-border mobility.*

Specific objective RSO3.2 focuses on developing and strengthening sustainable, climate-resilient, intelligent, and intermodal national, regional, and local mobility. The key issue is to improve access to the TEN-T network and cross-border mobility, especially in the context of EU-Ukraine cross-border connections.

On the one hand, road and railway modernization can contribute to reducing greenhouse gas emissions by improving traffic flow and reducing travel time, leading to a reduction in fuel consumption by vehicles. These actions emphasize aspects of sustainable transport, indicating a conscious approach to environmental issues. For example, improving the quality of cross-border road infrastructure assumes support for environmentally friendly projects, such as reducing the environmental impact of transport or building wildlife crossings.

On the other hand, road construction and modernization can also contribute to the increased attractiveness of cars as a means of transport compared to public transportation, indirectly leading to increased greenhouse gas emissions, especially considering that the transport sector is one of the main sources of emissions. In addition, actions focusing on improving the quality of cross-border railway infrastructure, including intermodal infrastructure, can potentially lead to a reduction in greenhouse gas emissions, as rail transport is more energy-efficient and emits less CO₂ per passenger/kilometer or ton/kilometer compared to road transport. Additionally, focusing on railway freight transport can contribute to a reduction in the number of heavy trucks on the roads, positively impacting the environment. In terms of climate change adaptation, actions related to creating infrastructure resilient to extreme weather events, which will become more common due to global warming, play a crucial role.

It is worth emphasizing that in the description of the objective, it is clearly stated that supported activities will be in line with the principle of "do no significant harm." This means that projects identified as causing significant harm in accordance with the supplementary Regulation (EU) 2020/852 establishing technical criteria for determining conditions under which economic activities do not cause significant harm to (...) environmental objectives cannot be implemented. This regulation defines the following types of activities:

- 6.14 Infrastructure for railway transport;
- 6.15 Infrastructure supporting low-emission road transport and public transport. For these activities, the regulation regarding not causing significant harm concerning adaptation to climate change specifies detailed criteria (Annex A to the regulation).

The regulation emphasizes that, considering climate change and adaptation challenges, transport-related activities must be aware of risks and prepared for expected effects of extreme weather conditions. Criteria related to climate change adaptation, as specified in Annex A, focus on a detailed assessment of climate risk. All projects implemented under this objective, both in road and railway infrastructure, will have to undergo scrutiny to identify key physical climate risks throughout the life cycle of the planned infrastructure. The climate risk assessment will have to be adapted to the scale of the project and the expected period of its operation. Annex A specifies that all climate projections and impact assessments must be based on best practices, current scientific knowledge, and available guidelines (including the latest Programmes from the Intergovernmental Panel on Climate Change and other reliable sources of information).

Also, for projects aimed at improving infrastructure, effective adaptive measures must be implemented to minimize identified climate risks. For new projects, these measures must be incorporated at the design and construction stages. It is essential to note that implemented adaptive measures should not negatively impact other adaptive actions or the resilience of other entities or the environment. They should also be consistent with local adaptation strategies (if available) and, where possible, based on environmentally friendly solutions. All projects to be implemented under the described objective will have to consider these aspects in their approach and planning.

In summary, as demonstrated, specific objective RSO3.2 has little potential to contribute to an increase in greenhouse gas emissions. It will not negatively impact the need for climate change adaptation. At the same time, it should be emphasized that the objective description places a strong emphasis on sustainable and pro-environmental actions

5.4.8. IMPACTS ON MONUMENTS

The term "heritage" should be understood as any product of human activity that is evidence of its past, possessing historical, scientific, artistic, or emotional value. This can include buildings, including industrial ones, urban complexes, landscapes, etc. Archaeological monuments, both discovered and undiscovered on land and underwater, should not be excluded from the analysis.

The implementation of any investments must consider the presence of heritage objects in space, as they are protected by relevant Polish and Ukrainian laws (in Poland, these matters are regulated by the Act of July 23, 2003, on the protection of monuments and care for monuments⁶⁰).

There are four forms of heritage protection:

- Registration in the heritage register.
- Recognition as a historical monument.
- Creation of a cultural park.
- Establishment of protection in local spatial development plans or locational decisions.

During the selection of the exact location for an investment, the position of heritage objects (including archaeological sites) must be taken into account, and efforts should be made to minimize any potential negative

⁶⁰Journal of Laws of 2003, No. 162, item 1568, as amended

impact of construction work on their preservation. Cultural landscapes, historic layouts such as parks, tree alleys, and urban arrangements should also be considered.

Below, possible impacts on heritage are presented concerning Specific objectives, activities, and projects.

- *Specific objective: RSO2.4 Promoting climate change adaptation and disaster risk prevention and resilience, taking into account eco-system based approaches.*

Activities within this objective will focus on the protection, regeneration, and sustainable use of environmentally valuable areas, including Natura 2000 areas; promotion and education to expand residents' knowledge of nature protection and raise awareness of environmentally valuable areas; nature and biodiversity protection and the development of green infrastructure; projects for the identification, monitoring, and improvement of areas exceeding environmental quality standards.

These actions should generally not negatively affect heritage, except during the construction phase, where certain objects may be impacted. In such cases, indirect negative effects may be related to air pollution and generated vibrations. Positive effects may be associated with climate change adaptation work and water retention projects, protecting heritage from potential damage caused by climate-related natural phenomena.

- *Specific objective: RSO2.5 Promoting access to water and sustainable water management.*

This objective involves projects aimed at protecting and improving water resources (including water management in river basins, developing rainwater retention systems, actions related to improving water quality). These actions will be generally neutral towards heritage, although in some cases, they may protect heritage in the event of natural phenomena associated with climate change.

Within this objective, LIP 4 "*Sustainable Water Management: a Way to Revitalise Western Ukraine and Eastern Poland*" will be implemented. The completed project will not affect heritage, but during construction, there may be negative impacts such as air pollution and vibrations.

- *Specific objective: RSO2.7 Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution.*

Actions within this objective include protection, regeneration, and sustainable use of environmentally valuable areas, including Natura 2000 and Emerald areas; promotional and educational activities to expand residents' knowledge of nature protection and raise awareness of environmentally valuable areas; nature and biodiversity protection and the development of green infrastructure; projects for the identification, monitoring, and improvement of areas exceeding environmental quality standards.

These actions should be generally neutral to heritage, although indirect positive impacts may be identified, resulting from the protection of natural areas, which, especially in urban areas, can lead to increased water retention and absorption of air pollutants, further limiting negative impacts on heritage.

- *Specific objective: RSO2.6 Promoting the transition to a circular and resource efficient economy.*

The implementation of actions aimed at transitioning to a circular and resource-efficient economy does not show a direct connection to heritage impact. However, indirectly, all positive impacts on the environment (air, climate) are linked to positive impacts on immovable heritage.

- *Specific objective: RSO4.5 Ensuring equal access to health care and fostering resilience of health systems, including primary care and promoting the transition from institutional to family-based and community-based care.*

The Programme envisages support for actions within this objective: improving access and developing diagnostic-preventive infrastructure in various medical fields; improving access to specialized medicine, especially for cardiovascular diseases and cancers; supporting the equipment of healthcare facilities and emergency medicine; improving access to long-term care (especially geriatric and palliative care); preventing unwanted phenomena such as epidemics (with a focus on local phenomena); digitizing healthcare (including telemedicine development); raising the qualifications of medical and rescue personnel.

Actions in this area will be neutral from the perspective of heritage impact. However, if they involve the modernization of heritage objects, they may have positive significance.

Within this objective, the following Large Infrastructure Projects will be implemented:

- *LIP 2 Joint development of accessible and resilient health care for elderly and disabled patients of Bialystok and Volyn hospitals.*
- *LIP 5 A joint initiative of The Dr. Józef Psarski Mazovian Specialist Hospital in Ostrołęka as increasing the availability of health-care services through construction landing pads for rescue helicopters and purchase, delivery and assembly of lifting equipment.*
- *LIP 6 Development of palliative, geriatric and treatment care, and also improving the quality of medical services for cancer patients in hospitals of Lviv, Ternopil and Krosno.*
- *LIP 7 Creation of Cross-Border Centers for Preventive Examinations in Lubelskie and Volyn Regions.*

All these projects will not affect existing heritage objects because no heritage objects have been identified as part of them.

- *Specific objective: RSO4.6 Enhancing the role of culture and sustainable tourism in economic development, social inclusion and social innovations.*

Within this objective, projects will be implemented related to the protection, development, and promotion of public tourist values and related tourist services. This includes shaping an integrated tourist offer, new infrastructure, and improving/modernizing existing routes; protection, development, and promotion of culture and its heritage and services in the field of culture; protection, development, and promotion of natural heritage and eco-tourism; support for adapting skills and professional qualifications in tourism to the needs of the tourism market and changes within it, e.g., through training related to establishing, running, and promoting tourist activities.

Projects covered by these activities will generally have a positive impact on people's awareness, indirectly affecting the respect for cultural values and heritage protection.

The positive significance can be attributed to the implementation of projects involving the reconstruction, modernization, and adaptation of cultural heritage objects.

As part of This objective, the implementation of LIP 1 "The Carpathian narrow-gauge railways – a journey in the footsteps of the Carpathian Forest railways" will take place. All activities under this project will indirectly and positively impact the preservation of cultural heritage by popularizing monuments and increasing awareness of their protection. Some of these actions, such as the reconstruction of forts or Carpathian railway objects, will directly lead to their restoration or adaptation for other purposes, securing them for the future. During the realization of these projects, attention should be paid to adhering to the principles of conserving cultural heritage.

- *Specific objective: ISO6.2 Enhance efficient public administration by promoting legal and administrative cooperation and cooperation between citizens, civil society actors and institutions, in particular, with a view to resolving legal and other obstacles in border regions.*

- *Specific objective: ISO6.3 Build up mutual trust, in particular by encouraging people-to-people actions.*

Projects carried out under these objectives will not directly affect monuments, but their indirect impact will be positive by fostering closer cooperation, especially in the field of cultural heritage protection.

- *Specific objective: ISO7.4 Other actions for a safer and secure Europe.*

The implementation of objective ISO7.4, focusing on improving border security, may have limited direct impact on monuments. Primarily, if these actions are related to the expansion or modernization of infrastructure in areas of historical or cultural value, a detailed consideration and analysis of their impact on these monuments would be necessary. For example, if the expansion of border crossings were to occur near areas with historic architecture or other culturally significant places, it could affect their integrity, aesthetic values, and historical significance. In such a case, actions should be carefully planned to minimize potential damage and disruptions.

On the other hand, if the planned activities concern the modernization of historical objects, they could bring benefits through conservation and renovation of these objects. Support for appropriate technologies and conservation practices can positively impact the preservation of cultural heritage.

Enhanced and effective border control can significantly reduce illegal trade in items of historical, cultural, or artistic value. Such actions not only protect the national heritage of individual countries but also contribute to the global preservation of cultural heritage. In this context, achieving This objective can indirectly contribute to securing and protecting monuments from illegal export and sale.

In summary, actions related to border security are generally neutral in terms of their impact on monuments. However, it is crucial to consider potential effects in areas of historical or cultural significance and apply appropriate practices to protect these values.

Within this objective, LIP 8 "Increasing the throughput capacity of the Hrebenne-Rawa Ruska road border crossing point and improving the conditions for travelers crossing the border at the Budomierz – Hruszew road border crossing point" will be implemented. The effects of this project will align with those indicated for the Specific objective RSO3.2. During the strategic assessment phase, no work near areas of historical value is identified. However, a comprehensive environmental impact assessment should be conducted during the design and preparation of the environmental impact Assessment Report. It is crucial to conduct thorough research and consultations to avoid negative impacts on the cultural heritage of the region.

- *Specific objective: RSO3.2 Developing and enhancing sustainable, climate resilient, intelligent and intermodal national, regional and local mobility, including improved access to TEN-T and cross-border mobility.*

The implementation of the Specific objective RSO3.2, involving the expansion and modernization of road and rail infrastructure, has the potential to impact areas of archaeological or cultural value. Vibrations from transportation, especially heavy-duty vehicles, can affect the structures of monuments and archaeological sites, especially those located in the immediate vicinity of new or modernized roads. Vibrations can accelerate erosion processes and cause damage to building structures.

The construction and modernization of roads and railways in regions with rich cultural and archaeological history carry the risk of negative impacts on monuments. However, it is essential to emphasize that actions carried out under this Specific objective should consider environmentally friendly solutions, including impacts on monuments and archaeological areas. The goal may also positively impact both monuments and culturally valuable areas by redirecting traffic away from built-up areas and reducing the influence of external factors on their preservation.

The planned implementation of activities to improve the quality of railway infrastructure has a lower potential impact on monuments compared to road infrastructure, due to limited earthworks and smaller vibrations. Nevertheless, support for the reconstruction and modernization of railway lines also requires caution in areas of cultural and archaeological significance.

Considering the conditions outlined in the Programme, indicating that projects will be monitored for environmental impact and will not qualify for co-financing in the case of potentially significant negative impact, it can be expected that the impact on monuments will be minimized.

In conclusion, although the implementation of the Specific objective RSO3.2 has the potential to impact areas of archaeological or cultural value, the proposed precautions and conditions for implementing actions indicate a minimization of this impact.

5.4.9. IMPACTS ON MATERIAL ASSETS

On material goods, we include, among others, all construction objects, including those for public use, as well as private property, residential buildings, houses, various types of infrastructure (e.g., roads, railways, energy, tourism), and others created by human activity or used for conducting activities. Implementation of projects and actions specified in the Programme can cause both positive and negative impacts. Positive impacts are usually indirect and are influenced by:

- Accessibility of energy (electricity and heat), gas, water, etc.;
- Accessibility of transportation infrastructure (roads, railways);
- Accessibility of public transportation;
- Creation of entrepreneurship development areas;
- Accessibility of commercial, recreational, and tourist infrastructure;
- Job creation in the vicinity.

Potentially negative impacts on material goods result from:

- Violation of private property;
- Necessity to demolish existing construction objects;
- Exclusion of land properties from their previous use;
- Loss of income sources for current owners and users;
- Permanent exclusion of areas from forestry or agricultural use;
- Deterioration of soil conditions, e.g., due to drainage;
- Interruption of continuity of secondary roads (e.g., local, forest, agricultural);
- Location near nuisance-emitting objects causing air pollution, odors, noise, and vibrations, as well as changing landscape perceptions.

The assessment of some actions is highly subjective. An example of this is the creation of low-emission zones and areas of restricted use. Such a zone may cause an increase or decrease in the value of properties located in or near it, depending on the location and purpose of the areas, as well as subjective evaluations. Therefore, the impact of implementing a specific action can be simultaneously positive or negative.

Negative impacts during project implementation, due to their limited duration, generally do not affect changes in material values. Below are the impacts of projects that may be covered by the Programme, according to specific objectives.

Note: Large projects mentioned in the assessment of other impacts (above) will influence changes in material values, as described below, in relation to specific objectives within which they will be implemented.

- *Specific Objective: RSO2.4 Promoting climate change adaptation and disaster risk prevention and resilience, taking into account eco-system based approaches.*

Actions will be carried out within the objective related to the protection, regeneration, and sustainable use of environmentally valuable areas, including Natura 2000 areas; promotion and education expanding residents' knowledge of nature protection and awareness of environmentally valuable areas; nature and biodiversity protection and development of green infrastructure; projects aimed at identifying, monitoring, and improving the state of areas exceeding environmental quality standards.

These actions can positively and negatively impact material goods. Positive impacts will affect objects and areas that have been secured against the effects of climate change, while negative impacts may be related to occupying or locating new objects that could be burdensome or disrupt the landscape.

- *Specific Objective: RSO2.5 Promoting access to water and sustainable water management.*

The objective includes activities related to the implementation of projects aimed at protecting and improving the state of water resources (including water management in the watershed, development of rainwater retention systems, actions related to improving water quality).

All projects in this area are expected to generally have a positive impact on material goods in terms of increasing water resources and their protection, or creating attractive places. Particularly positive impacts may concern areas that gain access to water supply and sewage disposal. However, in some cases, when objects related to the implementation will occupy or be burdensome, or disturb the landscape, they may negatively impact the value of plots and houses located nearby.

- *Specific Objective: RSO2.7 Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution.*

The objective includes actions related to the protection, regeneration, and sustainable use of environmentally valuable areas, including Natura 2000 and Emerald areas; promotional and educational activities expanding residents' knowledge of nature protection and raising awareness of environmentally valuable areas; nature and biodiversity protection and the development of green infrastructure; projects aimed at identifying, monitoring, and improving the state of areas exceeding environmental quality standards.

Projects under this objective will generally have a positive impact on material values because they will increase the attractiveness of areas located nearby, although with exceptions, e.g., regarding additionally occupied areas or areas with imposed building or use restrictions. The assessment will depend on the type and location of the project.

- *Specific Objective: RSO2.6 Promoting the transition to a closed-loop and resource-efficient economy.*

Implementation of the objectives of This objective can have a positive impact on the economy of the cross-border region.

The creation of a Small Projects Fund, supporting ecological initiatives, and the equitable distribution of funds between beneficiaries from Poland and Ukraine can contribute to the sustainable development of both countries. Activities focusing on innovative waste management solutions, rational management, and promotion of an ecological lifestyle can lead to the creation of new jobs and savings for households, also by reducing the amount of generated waste and the costs associated with its disposal. Indirectly, this can also contribute to the increased value of local properties through improved quality of life and the environment in the areas where the goal is implemented. Support for beneficiaries in the form of grants is crucial for launching local initiatives and projects. Increased investment in ecological infrastructure, such as recycling systems or closed-loop technologies, can

bring long-term material benefits to the region. However, the actually achieved benefits will strongly depend on the quality, effectiveness, and implementation of projects funded within this objective.

- *Specific Objective: RSO4.5 Ensuring equal access to health care and fostering resilience of health systems, including primary care and promoting the transition from institutional to family-based and community-based care.*

The Programme envisages support for activities under this objective, such as improving access and developing diagnostic-preventive infrastructure in various medical fields; improving access to specialist medical care, especially for cardiovascular diseases and cancers; support for the equipment of healthcare facilities and emergency medicine; improving access to long-term care (especially geriatric and palliative care); preventing the occurrence and consequences of undesirable phenomena such as epidemics (with particular emphasis on local phenomena); digitization development in healthcare (including telemedicine development); upgrading the qualifications of medical and rescue personnel.

All these actions will be positive in terms of the impact on material values, especially for hospitals and healthcare facilities being modernized and equipped, as well as the values of services they provide.

- *Specific Objective: RSO4.6 Enhancing the role of culture and sustainable tourism in economic development, social inclusion and social innovation.*

Projects within the objective will include activities related to the protection, development of infrastructure, and promotion of public tourist values and related tourist services, e.g., by shaping an integrated tourist offer by entities from the Programme area, new infrastructure, and improving/modernizing existing routes; protection, development, and promotion of culture and its heritage and services in the field of culture; protection, development, and promotion of natural heritage and ecotourism; support for adapting skills and professional qualifications in tourism to the needs of the tourism market and changes within it, e.g., through training related to establishing, conducting, and promoting tourism activities.

Projects covered by these activities will generally be neutral in relation to changes in material values, although some projects may make the area more attractive, potentially increasing the value of properties located nearby, as well as developing services in this region. The value of objects subjected to modernization, renovation, and adaptation will also increase.

- *Specific Objectives: ISO6.2 Enhance efficient public administration by promoting legal and administrative cooperation and cooperation between citizens, civil society actors and institutions, in particular, with a view to resolving legal and other obstacles in border regions.*
- *Specific Objectives: ISO6.3 Build up mutual trust, in particular by encouraging people-to-people actions.*

Projects implemented under the above objectives will not affect changes in material values, although effective area management and cooperation will contribute to raising its attractiveness.

- *Specific Objective: ISO7.4 Other actions for a safer and secure Europe.*

The implementation of the ISO7.4 objective, aimed at modernizing and expanding border crossing infrastructure, has relatively small potential to impact material goods.

Improving the functioning of border crossings can contribute to the increased value of properties in their vicinity, thanks to the increased attractiveness of these areas. On the other hand, certain types of expanded infrastructure, such as large-area parking lots for trucks, may reduce the attractiveness of adjacent areas. This may also involve conflicts related to possible expropriation of necessary areas for expansion. There is also a slight

risk that construction activities may expose existing material goods to the risk of damage or destruction. However, considering that these projects will be mainly implemented in the vicinity of existing crossings, the described impacts have a low probability of occurrence and will depend closely on the location and scale and nature of the work.

Improved border crossings can also contribute to increased tourist traffic. Thanks to better accessibility and shorter waiting times at borders, border areas may become more attractive to tourists, leading to increased investment in tourist infrastructure and local economic development. Additionally, increased safety in border areas, thanks to better control and modern infrastructure, may attract tourists and investors to these regions.

- *Specific Objective: RSO3.2 Developing and enhancing sustainable, climate resilient, intelligent and intermodal national, regional and local mobility, including improved access to TEN-T and cross-border mobility.*

Implementation of the specific objective RSO3.2 will have an impact on the development of sustainable, intelligent, and intermodal mobility in the cross-border area between Poland and Ukraine. Actions related to This objective can bring several material benefits, both for public and private entities.

Improving road and rail infrastructure will contribute to increased efficiency, safety, and comfort of transport in both countries. Public goods such as roads, bridges, railway stations, or other elements of infrastructure will become more modern, functional, and adapted to the needs of modern society. This, in turn, will have an impact on increasing the value of goods belonging to public entities, as investments in new or modernized infrastructure always translate into an increase in its market value.

On the other hand, emissions from transport, such as vibrations, noise, or air pollution, can affect the value of real estate along modernized roads and railway lines. Although improved transport accessibility is generally positive for land and property values, the direct vicinity of major transportation arteries may negatively affect the value of real estate due to increased noise and pollution emissions.

The increased tourist attractiveness of the region thanks to better cross-border communication, as well as the better flow of goods across the border and the reduction of bottlenecks in road traffic, will be beneficial for businesses involved in cross-border trade. The introduction of new or upgraded intermodal connections and railway stations and stops will also positively impact the value of real estate in their vicinity.

Investments in road and rail infrastructure, taking into account environmental needs, pedestrians, and cyclists, will contribute to improving the quality of life for residents. In the longer term, these actions will increase the value of material goods for both public and private entities, positively impacting the economic development of the region.

5.4.10. CUMULATIVE IMPACTS

Cumulative impacts are defined as the changes to the environment brought by the impact of the proposed activities in combination with other impacts presented in the space and impacts resulting from the implementation of strategic documents foreseen for future implementation.

To a large extent, the draft Programme is of a general nature and does not specify in detail the specific projects to be supported, neither in terms of technical characteristics nor location. In this situation the possibility of cumulation of their environmental impacts cannot be specifically assessed. It can only be assumed that a cumulation of impacts is likely if they are located within already existing or foreseen future impacts from existing and planned infrastructure. In contrast, with regard to the LIPs for which a general characterisation is given, the assessment could be based on the existing conditions at the location. The table below shows the results of the analyses of the possible cumulative environmental impacts of both the measures formulated in general terms in the Programme and the major projects.

Table 12 Potential for cumulative impacts in the implementation of the Programme's specific objectives

Action	Potential for occurrence negative impacts cumulative
RSO2.4. Promoting climate change adaptation and prevention disaster risk and resilience, taking into account approaches ecosystem-based	Positive environmental actions should not be cumulative negative impacts
RSO2.5. Promoting access to water and sustainable water management	Possible cumulation of impacts, depending on location, when treated effluent is discharged to one receiving body from other wastewater treatment plants.
RSO2.7. Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution.	Environmentally positive actions do not should result in the accumulation of negative impacts
RSO2.6. Promote the transition to a circular economy and resource-efficient.	Positive environmental actions should not have cumulative negative impacts
RSO4.5. Ensuring equal access to health care and fostering resilience of health systems, including primary care and promoting the transition from institutional to family-based and community-based care.	No
RSO4.6. Enhancing the role of culture and sustainable tourism in economic development, social inclusion and social innovation.	Projects may result in increased tourism and cumulative negative impacts of tourists on the environment
ISO6.2 Enhance efficient public administration by promoting legal and administrative cooperation and cooperation between citizens, civil society actors and institutions, in particular, with a view to resolving legal and other obstacles in border regions.	No
ISO6.3 Build up mutual trust, in particular by encouraging people-to-people actions.	No
ISO7.4 Other actions for a safer and secure Europe.	No
RSO3.2 Developing and enhancing sustainable, climate resilient, intelligent and intermodal national, regional and local mobility, including improved access to TEN-T and cross-border mobility.	Road and rail projects implemented in the area of ISO impacts 7.4.
LIP 1 The Carpathian narrow-gauge railways – a journey in the footsteps of the Carpathian Forest railways	Projects can increase tourism and cumulate negative impacts of tourists on the environment
Action	
LIP 2 Joint development of accessible and resilient health care for elderly and disabled patients of Bialystok and Volyn hospitals	Potential for occurrence negative impacts cumulative

LIP 3 Environmental safety – creation of a Ukrainian-Polish forest fire management network in the Carpathian region.	No
LIP 4 Sustainable Water Management: a Way to Revitalise Western Ukraine and Eastern Poland.	Possible cumulative impact with other tasks requiring construction work at the same time
LIP 5 A joint initiative of The Dr. Józef Psarski Mazovian Specialist Hospital in Ostrołęka as increasing the availability of health-care services through construction landing pads for rescue helicopters and purchase, delivery and assembly of lifting equipment.	No
LIP 6 Development of palliative, geriatric and treatment care, and also improving the quality of medical services for cancer patients in hospitals of Lviv, Ternopil and Krosno.	No
LIP 7 Creation of Cross-Border Centers for Preventive Examinations in Lubelskie and Volyn Regions.	No
LIP 8 Increasing the throughput capacity of the Hrebenne-Rawa Ruska road border crossing point and improving the conditions for travelers crossing the border at the Budomierz – Hruszew road border crossing point	Possible cumulative impact with other tasks requiring construction work at the same time and similar location.

The analyses were carried out taking into account existing and planned infrastructure as well as existing protected areas. Available material was used, including the national strategic documents listed in chapter 5.3.

5.5. ANALYSIS AND EVALUATION OF THE INTERACTION WITH THE ENVIRONMENTAL IMPACT ASSESSMENTS OF OTHER DOCUMENTS RELATED TO THE PROGRAMME

In the work on the Environmental Impact Report of the Programme, analyses and findings from previously developed SEA Reports for strategic documents containing actions related to the Programme were taken into account. Specifically, documents and SEA Report for the following were examined:

On the Polish side:

- Strategy for Responsible Development,
- Security of Energy and the Environment Strategy,
- National Strategy for Regional Development 2030,
- State Environmental Policy,
- Sustainable Development Strategy for Transport,
- Strategic Adaptation Plan for Climate-Sensitive Sectors and Areas,
- Existing strategic documents at the regional and local levels.

On the Ukrainian side:

- Ukraine Development Strategy until 2030 - aiming to achieve a European standard of living and a worthy position for Ukraine globally,
- Basic principles (strategy) of the State Environmental Policy of Ukraine until 2030,
- State Programme for the Development of the Ukrainian Carpathians for 2020-2022,
- Decree on the Sustainable Development Goals of Ukraine until 2030 (Presidential Decree),
- National Strategy for Regional Development 2021-2027,
- National Transport Strategy of Ukraine until 2030,
- Concept for the implementation of the state policy on climate change until 2030,
- Concept for combating land degradation and desertification,
- National Waste Management Strategy in Ukraine until 2030,

- Low-Emission Development Strategy for Ukraine until 2050,
- Existing strategic documents at the regional and local levels.

The analysis of these documents and the SEA Reports made for them aimed to identify:

- main goals and key examples of projects envisaged for implementation within the documents under environmental impact assessment,
- main types of impacts, including cumulative and transboundary impacts,
- indicated preventive, limiting, or compensatory measures for negative environmental impacts,
- proposed indicators for monitoring the effects of implementing the provisions of the document undergoing a strategic environmental impact assessment.

The information contained in these documents was used to analyze the environmental impact and significantly contributed to the assessment of impacts on people, natural elements, and water. A review of the provisions and recommendations in the mentioned documents indicates a mostly consistent typology of impacts in many studies, including:

- • landscape and habitat fragmentation; creating barriers and narrowing the area available for moving animals,
- • deforestation, changes in land use structure,
- • changes in water relations (drainage, irrigation of land),
- • soil degradation as a result of water and wind erosion, industrial processes, and poor waste management,
- • impact on water balance and flood risk,
- • intensified surface runoff,
- • emissions of gas and particulate pollutants,
- • noise emissions,
- • increased anthropogenic pressure in areas adjacent to investments.

In the group of identified cumulative impacts, there were:

- • increased pressure on the values and features of nature,
- • pressure on the natural features of the landscape,
- • increased "barrier effect," hindering the free movement of animals.

The analyses also pointed out certain positive aspects of implementing the intentions indicated in the planning documents and the Programme, including environmental protection, biodiversity conservation, reduction of air pollution emissions, including greenhouse gases, thereby reducing the negative impact of air pollution on human health and the environment. Significantly, efforts were concentrated on climate change adaptation and mitigating the effects of natural disasters, including floods.

This SEA Report also analyzed actions to minimize negative environmental impact, as indicated in the SEA Reports mentioned above, which were used to complement the developed recommendations. Among them, afforestation, flood management, the organization of water and sewage networks in mountain settlements, and activities aimed at raising ecological awareness were considered.

Some of the aforementioned strategic documents emphasize that solving environmental problems is complex and often conflicts with economic and social issues. Therefore, more attention should be paid to the development of a classification and methods for the economic assessment of ecosystem services of terrestrial and aquatic ecosystems. The use of economic assessment of ecosystem services fulfills the goal of sustainable development 15.9 and can be used to justify the effectiveness of investments in environmental management and to make optimal managerial decisions. This applies especially to projects related to particularly protected areas, spa areas, cultural and natural heritage sites.

Ensuring environmental safety involves transitioning to rational models of consumption and production. Therefore, priority should be given to the development of high-tech industries, improving the ecological safety of territories through the optimization of the location of production facilities and the preservation of natural complexes. Sustainable agriculture, optimization of the structure of agricultural lands, organic farming, rational use of peatlands, and the improvement of accelerated restoration technologies for degraded ecological systems such as peat bogs are important aspects in ensuring environmental safety.

5.6. INFORMATION ON THE POSSIBLE TRANSBOUNDARY ENVIRONMENTAL IMPACT OF THE PROGRAMME

The procedures for assessing the environmental impact in a transboundary context are defined by the Convention on Environmental Impact Assessment in a Transboundary Context, known as the Espoo Convention⁶¹, which has been detailed in the Polish Environmental Protection Law. According to Article 104 of the Convention, "in the event of the possibility of significant transboundary environmental impact originating from the territory of the Republic of Poland due to the implementation of policies, strategies, plans, or programs, a procedure concerning transboundary environmental impact is conducted." The basis for conducting a transboundary assessment is the identification of the potential for significant negative impact resulting from the implementation of any of the actions specified in the Programme or at the request of the concerned party. In the course of the SEA Report preparation, the possibility of environmental impacts in a transboundary aspect was assessed, understood as the impact of projects specified in the Programme on neighboring countries and between countries participating in the Programme.

The potential transboundary impact of actions depends primarily on:

- the location of projects,
- the nature of planned investments,
- the extent of the impact of proposed projects during implementation, operation, and in the event of potential accidents.

Among the projects eligible for support under the Programme that may have transboundary environmental impacts are primarily investments in water management and investments related to the reconstruction and modernization of transport infrastructure. In the course of the work, a detailed analysis was conducted, considering both the Detailed Project Information (LIP) known at the stage of Programme preparation (with specified locations and characteristics) and potential projects whose location and characteristics have not been determined.

Based on the analyses, no potential negative transboundary impacts on the environment were identified for individual projects or the entire Programme. Nevertheless, because, apart from LIP, specific projects (locations and characteristics) were not determined for some Programme activities, and a hypothetical scope of their activities was used, it is only after indicating their location and type that a precise determination of the type and potential scope of environmental impact will be possible, and an assessment of transboundary impacts can be made. Since this concerns only projects that may significantly impact the environment, for such projects, in accordance with the requirements of the directive and national regulations, an environmental impact Assessment Report will be required. These Programmes should also include an analysis of transboundary impacts, within which such impact will be identified. However, based on current analyses, identifying such an impact is unlikely.

5.7. SOLUTIONS TO PREVENT, REDUCE OR COMPENSATE FOR NEGATIVE ENVIRONMENTAL IMPACTS THAT MAY RESULT FROM THE IMPLEMENTATION OF THE PROGRAMME

⁶¹ Journal of Laws UE. 1991, pos. 1110

Potential negative impacts of projects implemented under the Programme can be reduced by applying appropriate recommendations in administrative-organizational and technical areas. Based on the conducted analyses of the environmental status, issues, and challenges, the most important recommendations that projects undertaken by investors should meet can be identified.

Adherence to these recommendations should contribute to ensuring that projects implemented under the Programme are environmentally friendly, aimed at minimizing impacts on the environment and human health or projects that positively influence the environment.

The recommendations are systematized as general ones related to formal-legal, planning-strategic, technical-technological, social, health, natural, and environmental management requirements. They also relate to specific priority directions of the Programme.

Many of these recommendations are obvious and commonly applied; however, they are all listed for completeness and to enable non-specialists in each field to understand the comprehensive approach to the strategic assessment of the Programme.

Formal-legal recommendations:

- Conducting a preliminary assessment (screening) for projects classified as potentially significant for the environment or Natura 2000 areas.
- Assessing compliance with environmental quality standards during the project's implementation and after its completion.
- Analyzing compliance with emission standards in case of environmental emissions.

Planning-strategic recommendations:

- Analyzing compliance with existing (at the time of project assessment) national strategies and Programmes related to environmental protection.
- Analyzing compliance with existing (at the time of project assessment) spatial development plans.
- For projects related to water use and potential impacts on water quality, analyzing compliance with water management plans in river basins.
- For projects related to water use and potential impacts on water quality, conducting an analysis of compliance with the conditions of water use in the water region or watershed (if applicable at the time of project assessment).
- For projects located in flood-prone areas, assessing their impact on increasing flood risk and susceptibility to flooding.
- For projects related to air pollution emissions, analyzing compliance with air protection Programmes for areas where air quality standards are exceeded.

Technical-technological recommendations:

- Applying the best available techniques, especially when the project involves the construction or modernization of installations significantly affecting the environment as a whole.
- Promoting the use of eco-innovations that reduce negative environmental impacts.
- Using solutions that ensure energy and resource efficiency, including water conservation.
- Applying low- or zero-waste technologies.
- Adhering to the waste management hierarchy and preventing waste generation according to the principles of a closed-loop economy.
- Implementing appropriate wastewater and waste management methods, particularly ensuring their proper condition and composition before being discharged into the environment.

- For projects significantly affecting nature or reducing watershed retention, applying appropriate compensatory solutions.
- For construction-related projects, using construction technologies that minimize the occupied area, employ non-invasive earthwork methods, reduce local environmental impact, pollen, noise, and the potential for water pollution.

Social and health recommendations:

- Providing comprehensive information to the public about the project's environmental impact during and after its implementation.
- Engaging in pre-investment dialogue, minimizing ecological-social conflicts related to project implementation.
- Limiting the size of the population exposed to harmful environmental factors (air pollution, noise) generated by the project.
- Implementing good practices and actions to limit environmental emissions during construction activities.

Natural recommendations:

- Minimizing disturbances in ecosystems (e.g., cutting ecological corridors, ecosystem fragmentation).
- Avoiding interference and transformations of Natura 2000 habitats most threatened by biodiversity loss at the EU level, such as coastal habitats, wetlands, and meadow areas.
- Preserving landscape values in projects that may cause natural-landscape conflicts (considering the exposure of historical objects).
- Considering the need for natural compensation in justified cases.
- Considering the need for pre and post-project monitoring for activities conflicting with the needs of species and habitats protection.

Environmental management recommendations:

- Adopting adequate environmental monitoring methods covering: baseline, implementation, operation, and decommissioning.
- Applying a systematic approach to environmental management during the construction and operation of facilities and infrastructure.
- Properly identifying environmental aspects related to the construction and operation of the above-mentioned facilities and infrastructure.
- Applying the principle of continuous reduction of environmental and human health impacts in facilities and processes, following environmental management principles.

Given the potential impacts of projects implemented under the Programme on specific environmental elements, it is assumed that recommendations for individual project groups will be implemented from the perspective of minimizing their environmental impact. However, it should be noted that the nature of the Programme is general, and therefore, the recommendations may seem general and widely known. Nonetheless, it is considered valuable to present them as a starting point for defining criteria for selecting solutions. In general, these recommendations can be considered as principles of eco-design. Below are the recommendations for specific activities covered by the Programme to minimize impacts, especially on nature and other environmental elements.

5.7.1. BIODIVERSITY SOLUTIONS, ANIMALS, PLANTS AND ECOLOGICAL CORRIDORS

In the practice of nature conservation, the creation of transboundary protected areas is not a new phenomenon but has undoubtedly gained popularity in recent years. This trend aligns perfectly with regional integration processes, which are present in almost every region globally. It is not only an opportunity to enhance the

effectiveness of management in vast ecosystem areas but also a chance to achieve additional benefits, such as promoting tourism or supporting international cooperation⁶². This phenomenon also fits well into the changing approach to nature conservation: from protecting isolated areas to landscape protection – areas interconnected in a network with ecological corridors. The establishment of transboundary areas excellently complements this vision.

To preserve biodiversity, it is crucial to conserve primarily rare species and natural habitats while maintaining the integrity of individual areas both internally and externally with other protected areas and ecological corridors. Natura 2000 is more than a network of protected nature reserves; it is based on the recognition that humans are an integral part of nature, and that humans and nature function best in a symbiotic relationship. The network's goal is not to systematically exclude economic activities from its scope but rather to establish parameters under which such activities can be undertaken while simultaneously protecting valuable species and habitats in the given area.

It is essential to emphasize that ecosystems existing in the Polish and Ukrainian parts of the area covered by the Programme mutually interpenetrate, and formal boundaries are irrelevant to the functioning of ecosystems. In the case of species with large ranges, such as brown bear, wolf, lynx, and bison, regional populations of these animals often extend beyond national borders. In such circumstances, it is challenging for one member state to manage and ensure the protection of its large predators without coordinated and convergent actions taken by its neighbors. Therefore, it is crucial for neighboring member states, on the border where populations of large predators (subpopulations) occur, to develop integrated management plans for these populations.

Therefore, preventing, limiting, or compensating for environmental impacts that may result from the implementation of the Programme should be primarily associated with the appropriate, least ecologically harmful determination of the course of each investment. According to the Nature Conservation Act (Article 34)⁶³, compensatory measures can only be implemented if significant negative impacts on the Natura 2000 area or its integrity have been identified, there is no alternative solution, and the overriding public interest of the investment has been proven. All ways of avoiding and minimizing the impact of the investment have been exhausted, and it should be proportionate to the scale of the damages. When considering the location of compensatory actions, it is essential to ensure the fulfillment of the following conditions:

- The restored area must be located beyond the range of influence (but as close as possible to the area affected by the impacts).
- In the same biogeographic region, ensuring that it can fulfill the same functions.
- The structures and processes of the restored area should be as similar as possible to the previous conditions.

Introduced compensatory measures must not threaten other Natura 2000 areas – compensations cannot be implemented within their boundaries at the expense of their own conservation goals.

When making decisions about the location of a specific investment, its reconstruction, or expansion, the following factors should be considered:

- Where important, large, undivided habitat areas are located.
- The course of ecological corridors of various ranks and ecological significance.
- The species of plants and animals present in specific locations.
- The routes of traditional and seasonal animal migrations.

⁶² Dudek A. 2014. „Transgraniczne obszary chronione – problemy i możliwości współpracy”. *Prace i Studia Geograficzne* 54: 139-147.

⁶³ The Act of April 16, 2004, on Nature Protection, consolidated text: *Journal of Laws of 2023*, item 1336, as amended.

Solutions minimizing impacts in this regard should be precisely defined during the preparation of an environmental impact Assessment Report for individual investments (if required). Below are the main tasks and commonly used measures to reduce the negative impact (if any) on natural components:

- Conducting a natural inventory of the area before commencing the investment.
- Adapting the timing of work to protective periods for animal reproduction, as well as phenological periods for natural habitats.
- Limiting the occupation of the area to minimize interference with habitats from Annex I of the Habitats Directive and habitats of protected species.
- Providing nature supervision during the construction phase.
- Using solutions allowing for the maximum naturalization of shore reinforcements, embankments, passages, and culverts.
- Minimizing tree and shrub cutting.
- Fencing the construction site to protect reptiles and amphibians.
- Implementing compensatory measures, such as relocating valuable specimens of plant species to another suitable location under appropriate supervision.
- Securing the construction site against the infiltration of pollutants into water and soil.
- Protecting root systems during earthworks.
- Minimizing vibrations.
- Ensuring the openness of migratory corridors for bats by maintaining rows of trees and shrubs.
- Creating alternative breeding sites (small retention reservoirs) for birds.

Among mammal species, special attention should be paid to rare bat species. However, even if isolated potential impacts occur as part of the Programme implementation, they will not be significant given the scale of the Programme. After applying appropriate minimizing actions (using proper protections, minimizing noise intensity) during construction, it does not differ in its nature from any other construction project (road, residential, or industrial). Deterrent actions leading to leaving foraging or flight routes (especially in spring and summer concerning resident bats) and the effect of a barrier on migratory routes are poorly understood⁶⁴. A significant problem for bats, whose food consists of insects attracted by light, is the use of illuminating lamps on construction sites. This issue mainly concerns all species of pipistrelles (*Eptesicus sp.*), particularly the common pipistrelle (*P. pipistrellus*), and the noctule bat (*Nyctalus noctula*). To reduce the adverse effect of attracting bats to the construction/reconstruction/expansion area, the lighting used should be as unobtrusive as possible, have a warm color, and be directed only towards the element it is intended to illuminate. It is also essential to ensure that the duration of lighting is adjusted to the season, and the light source should be protected/enclosed to avoid creating an "ecological trap" for insects. The issue of the impact of lighting on bats may only apply during the spring-summer-autumn period. In winter, when nights are longest, and consequently, the necessary lighting time for objects is longer, both bats and hibernating insects stay in their shelters. Occasionally, however, flights may occur within the complex between individual hibernation sites. In the case of bat population protection, compensatory actions should be planned in the long term, and they should be chosen to genuinely compensate for the lost locations. As part of such actions, proposals should be made to adapt underground facilities, located away from planned investments, for hibernation and mating activities associated with foraging (swarming), providing alternative places for bats⁶⁵. On the other hand, lost summer shelters in tree hollows are best compensated by placing nest boxes in neighboring forests or old tree stands.

To reduce the potential risk of the loss of local populations of amphibians and reptiles, minimizing actions should already be implemented during the planning stage. During construction work, it is essential to secure

⁶⁴ Entwistle A. 2001. Habitat Management for Bats. Red. Joint Nature Conservation Committee.

⁶⁵ Charlesworth D. 2003. Effects of inbreeding on the genetic diversity of populations. [Philosophical Transactions of The Royal Society Biological Sciences](#) : 358 (1434): 1051–1070.

construction sites and emerging areas hazardous to amphibians and reptiles (manholes, excavations), as well as creating alternative breeding sites (small retention reservoirs).

Undoubtedly, one of the essential solutions for preserving biological diversity (plants, animals, and ecological connectivity) within the implemented Cross-Border Cooperation Programme is raising public ecological awareness of how important it is to preserve biological diversity for maintaining the quality of the natural environment and ensuring the sustainability of natural processes. An informed attitude of people characterized by responsibility for the state of the natural environment with which they coexist should be based on reliable knowledge and determination to preserve it in the least changed state. The indicator of ecological awareness is respect for nature, adherence to nature conservation principles, and counteracting environmental threats. Ecological knowledge, i.e., understanding the dependencies and laws governing nature, allows for its effective protection.

From the general environmental challenges, the emphasis has been placed on those related to the need to maintain a high level of ecological diversity. This primarily concerns the protection and restoration of the proper state of species and habitats, the maintenance of ecological connectivity (ecological corridor system), and the restoration of proper water and air quality. It was pointed out that abandoning the implementation of the Programme would mean weakening the achievement of environmental protection goals in the broader context of perceiving this issue. The non-implementation of the Programme will contribute to the perpetuation of negative trends in the environment.

It has been stated that the planned road infrastructure projects, by improving the efficiency of the border road network, are also environmentally beneficial, as they will improve land accessibility and reduce transportation costs. Due to the scale of financial resources and much broader goals than just environmental protection, the Programme is not expected to solve numerous environmental problems in the region. It should be seen as a step in the right direction.

It was noted that some actions covered by the implementation of the Programme, especially infrastructure projects related to construction works, have been carried out worldwide for decades. Therefore, in the context of the generated environmental impacts, they are very well-researched and do not generate impacts that are hitherto unknown or inadequately studied. Their environmental impacts are also similar to the impacts generated by projects in other industries related to the construction of infrastructure. There are no fundamental deficiencies in technology, and there are no gaps in contemporary knowledge, both during their implementation and operation. Nevertheless, each of the projects listed in the Programme, when implemented in specific local conditions, generates more or less significant impacts, and a full environmental impact assessment will consist of individual procedures for coordinating larger projects in accordance with the principles of EIA procedures in each country.

Table 13 Ways of prevention, reduction and compensation of negative impacts on biodiversity, plants, animals and Natura 2000 areas of projects likely to have negative impact on the environment, which may be implemented under the Programme

Phase	Ways of preventing, reducing and compensating for negative impacts, actions alternative
	<p>Types of projects:</p> <ul style="list-style-type: none"> • Adaptation of urban areas to climate change • Construction, reconstruction or renovation of water facilities and associated infrastructure to reduce the effects of floods or droughts • Small retention systems
implementation	<ul style="list-style-type: none"> - a wildlife inventory of the site prior to the project (if any required); - taking landscape protection into account when planning and implementing investments; - In the case of small retention facilities, attention should be paid to the habitat needs of the site; - habitats that have lost their natural capacity should be restored first retention; - to limit land occupation in order to interfere as little as possible with Habitats Directive Annex habitats and the habitats of protected species; - adapting the timing of the work to the animal's breeding periods; - use of compensatory measures - e.g. relocation of valuable specimens of species plants to another favourable location under appropriate supervision; - where possible, removal of the soil layer to protect it from contamination and its reuse; - securing the construction site to protect reptiles and amphibians; - ensuring the permeability of migration corridors for bats; - securing the work area against the infiltration of pollutants into water and soil; - use of compensatory measures - e.g. relocation of valuable specimens of plant species to another favourable location under appropriate supervision; - carrying out construction work in a manner compatible with water protection (including the Water Framework Directive) and outside the animal breeding season; - keeping tree and shrub felling to a minimum; - carrying out tree felling works outside the bird breeding season taking into account the need for pre- and post-implementation monitoring for projects conflicting with the needs of species and habitat protection;
operation	<ul style="list-style-type: none"> - Conducting environmental monitoring (if required). - Maintaining the cleanliness of the project areas, including regular cleaning in case of any irregularities.
	<p>Types of projects:</p> <ul style="list-style-type: none"> • Construction and modernisation of infrastructure necessary for the intake, treatment, storage and distribution of drinking water, including those related to adaptation to climate change • Waste water treatment plants • Sewerage • LIP 4 Sustainable Water Management: a Way to Revitalise Western Ukraine and Eastern Poland
implementation	<ul style="list-style-type: none"> - to conduct new installations in a way that prevents (or minimises) the crossing and fragmentation of valuable natural structures, including protected areas and areas of high natural value not covered by protection; - carrying out construction work in a way that protects water; - fencing off the construction site to protect reptiles and amphibians;
Phase	Ways of preventing, reducing and compensating for negative impacts, actions

	alternative
	<ul style="list-style-type: none"> - adapting the timing of work to the breeding periods of the animals, and also phenological periods in the case of natural habitats; - efficient execution of the works and minimising the zone of direct interference with the environment in order to reduce the time and extent of possible negative impacts on the environment; - limit construction work and land transformation to what is necessary minimum, removal of the soil layer and turf to protect it from contamination and reuse, or the use of jacking technology in the case of sewer networks; - where flushing and pressure testing with water is required, to verify that no treatment of used water is required before discharge into the environment; - keeping tree and shrub felling to a minimum; - ensuring that trees are protected from possible damage during the works construction; - the use of compensatory measures - e.g. moving valuable specimens of plant species to another favourable location under appropriate supervision;
operation	<ul style="list-style-type: none"> - implementation of a monitoring system for the sewerage network and, in the case of installation, a failure prevention system;
Types of projects:	
<ul style="list-style-type: none"> • Tourism projects • LIP 1 The Carpathian narrow-gauge railways – a journey in the footsteps of the Carpathian Forest railways • LIP 8 Increasing the throughput capacity of the Hrebenne-Rawa Ruska road border crossing point and improving the conditions for travelers crossing the border at the Budomierz – Hruszew road border crossing point. 	
implementation	<ul style="list-style-type: none"> - a wildlife inventory of the site prior to the project (if any required); - securing the construction site to protect reptiles and amphibians; - securing the worksite against the infiltration of pollutants into water and soil; - adapting the timing of work to the breeding periods of the animals, and also phenological periods in the case of natural habitats; - the use of compensatory measures - e.g. moving valuable specimens of plant species to another favourable location under appropriate supervision; - limit construction work and land transformation to what is necessary minimum; - keeping tree and shrub felling to a minimum; - the use of barriers and nets to protect particularly valuable habitats; - planning the works in such a way as to minimise the destruction of vegetation, making new plantings, restoring damaged green areas in the vicinity of the project; - ensuring the permeability of animal migration corridors;
operation	<ul style="list-style-type: none"> - for a tourism project: <ul style="list-style-type: none"> - periodic cleaning of areas along the cycle path and the railway track - narrow-gauge railway, increased number of toilets and litter bins; - educational activities (e.g. installation of information boards) to inform about appropriate behaviour;

5.7.2. WAYS OF PREVENTING AND LIMITING NEGATIVE ENVIRONMENTAL IMPACTS IN TERMS OF OTHER ELEMENTS OF THE ENVIRONMENT (APART FROM NATURE)

Below are presented ways to prevent and limit the negative impacts of projects that may be supported within the Programme on other environmental elements, apart from nature, which has been discussed in more detail above. Since the Programme is of a general nature and only some projects have a general location, the recommendations below are also general and refer to possible types of projects that may be supported within it.

In terms of water impact

In the field of water impact, as a result of the implementation of activities included in the Programme, negative impacts on the water environment may occur. Therefore, the following measures to limit or compensate for potential negative impacts during implementation and operation are proposed:

- Application of solutions ensuring water savings for each investment,
- Protection against the migration of pollutants into waters that may arise as a result of ongoing modernization and construction works,
- Ensuring special care for the construction equipment used to avoid leaks of operational fluids into the substrate,
- Implementation of protections for fuel tanks and fuel distribution areas,
- At the construction project stage, conducting simulations determining the actual thickness of the fourth-order aquifer, lithological variability, as well as considering periodic reduction of the water-bearing layer and exploitation of the nearest groundwater intakes.

Detailed methods of preventing and limiting the impact on water should be determined during the environmental impact analysis of specific types of projects.

In terms of air and climate impacts

The introduction of measures to minimise air and climate protection in the investments planned under the Programme will involve the application of solutions both at the stage of implementation and later operation. At the implementation stage, impacts will be short-term and will end after the construction period. Impacts during operation will be more noticeable than during the implementation phase, but the mitigation that can be proposed at the SEA Report stage is limited. On the basis of the impact analysis carried out in this SEA Report, the following solutions to minimise the negative impacts can be proposed:

- cleaning the wheels of vehicles before they leave the construction site for the road to reduce secondary air pollutant uplift,
- use of appropriate techniques to reduce emissions into the air (use of machinery,
- low-emission vehicles and equipment),
- management of green areas along vehicular routes, including the use of green belts
- isolation with a width of 10-20 m using evergreen species,
- the protection of greenery, particularly urban greenery,
- favouring low-carbon solutions, e.g. for transport,
- the application of BAT for ongoing projects.

In terms of the impact on land, geological resources, and soil

Negative effects will primarily concern projects that influence the transformation of land and occupy areas. These impacts will occur during both the construction and later during the operation of the built facilities. Below are proposed considerations for minimizing negative impacts:

- Minimizing the zone of direct intervention of construction works to the greatest extent possible.
- Reducing the area designated for construction facilities and securing storage and parking areas against emergency fuel and oil leaks.
- Proper preparation of neutralizing materials in case of potential leaks or failures during both the implementation and operation phases.
- Adequate preparation of sealed areas for the temporary collection of waste generated during demolition and construction activities.
- Guiding construction machinery and vehicles along strictly defined access roads.
- Proper storage of contaminated soils, soil layers, and humus.
- Reclamation of degraded areas during ongoing works.
- Utilizing the protected topsoil layer during construction.
- Using protective greenery along routes adjacent to soils designated for cultivation.
- Applying technologies to limit the range of conducted dewatering.
- Equipping asphalt and concrete roads, as well as areas, with devices for capturing pollutants from runoff and meltwater.

In terms of the impact on people

The proposed minimizing actions below can to some extent reduce negative effects on health and safety:

- Proper execution of construction works to eliminate excessive emission of bothersome pollutants, noise, and vibrations.
- Efficient space management.
- Using road surfaces that limit acoustic nuisance, employing green belts along roads, and, as a last resort, using acoustic screens.
- Modernizing road surfaces and eliminating critical points on roads.
- Equipping roads with alarm systems enabling a quick response to accidents and their consequences.
- Securing areas, where possible, against wildlife intrusion onto the road.
- Optimizing the operation of traffic lights

In terms of the impact on the landscape

Considering the negative impact on the landscape of some planned projects and actions, it is essential to take into account the introduced changes to the landscape. This is especially important regarding the conditions specified in landscape protection areas such as landscape parks and landscape protection areas, taking into account the limitations indicated in the documents establishing these areas, as well as the protection goals of each. The following solutions are proposed to limit the negative impact on the landscape of projects implemented within the Programme:

- Incorporating visual separation of the transportation route/accompanying object from cultural heritage sites in the construction project by using landscape barriers such as embankments, earthworks, or isolating greenery to protect exposure values.
- Considering the use of massive, wall-like sound barriers outside areas with dense residential development. In such cases, their integration into the transformed landscape should also be taken into account.
- Regulating waste management procedures before the start of construction work.
- Ensuring the highest possible proportion of waste subjected to recovery in the total amount of generated waste and maximizing the amount of waste recovered at the source.

In terms of the impact on monuments and material assets

Minimizing the impact of projects carried out within the Programme on material assets and monuments can be achieved by:

- Conducting a variant analysis and selecting the optimal location for the investment, as well as the appropriate choice of technology and safeguards at the stage of the technical-economic-environmental study, which includes an environmental impact Assessment Report.
- Applying measures to limit vibration impact on nearby heritage sites during construction works.
- Carrying out construction work in a way that minimizes the impact of emitted air pollutants on monuments.
- Avoiding the obstruction of monuments by new investments and not hindering access to them.

6. ALTERNATIVES TO THE SOLUTIONS CONTAINED IN THE PROGRAMME

According to the provisions of the EIA Directive, the SEA Report should present alternative solutions to those contained in the proposed document, taking into account the objectives and geographical scope of the document, the objectives, and the subject of protection of the Natura 2000 area, as well as the integrity of this area. Alternative solutions should include a justification for their selection and a description of the methods used to assess leading to this choice or an explanation of the lack of alternative solutions, including indications of difficulties arising from deficiencies in technology or gaps in contemporary knowledge.

Considering the Programme's general nature, the fact that only LIPs have a general location, and the agreement of the parties participating in it, there was no possibility to present an alternative version of the Programme that could have less negative impact on the environment. In this situation, the SEA Report presented the locations of protected areas, their protection objectives, as well as places of possible cumulative impacts. This provides an opportunity for an approximate assessment of the chances of applying alternative options at the stage of selecting specific projects for implementation and their design to eliminate or reduce their negative impact on the environment in the specified areas. These indications can be used in choosing projects or their variants during the Programme's implementation.

Currently, only the following alternative option can be considered in relation to the currently proposed version of the Programme - changing the Programme towards increasing the allocation of funds for activities related to mitigating the negative effects of climate change and protecting environmentally valuable areas. As the analysis shows, the needs in this area are justified by the region's significant natural values, as well as important environmental issues that require action. However, it must be taken into account that the Programme has been jointly formulated, and any changes would require the approval of all parties involved in the Programme, which is doubtful. Moreover, the Programme encompasses many elements of regional cooperation, not just environmental issues. Furthermore, as presented in the SEA Report, its overall environmental impact is minimal. It also seems that the Programme's project effectively considers the allocation of funds in relation to the region's needs.

7. METHODS FORESEEN FOR ANALYSING THE EFFECTS OF THE PROGRAMME IMPLEMENTATION

The implementation of the Programme requires monitoring the progress of this process and assessing the effects of implementing tasks covered by financial support within individual intervention areas. Therefore, it is essential to develop proposals for analysis methods that will enable the evaluation of the implementation process and control the achievement of objectives set in the Programme. This includes monitoring the ecological effects and changes in the environmental state. However, the Programme is developed at a high level of generality and, apart from LIP, does not specify all supported projects or their specific locations. Additionally, it has limited capabilities to address environmental protection issues and negative impacts due to specific financial and material constraints.

Furthermore, other investments resulting from different Programmes and activities are implemented in the Programme area in all participating countries. Thus, it is proposed to monitor its environmental impact on two levels and based on the following data sources:

- monitoring changes in the burden on individual environmental components through pollutant emissions, i.e., environmental pressure⁶⁶, based on data related to the implementation of selected Programme projects, associated with investments in sewage treatment, sewage systems, small retention, or infrastructure.
- monitoring changes in the environment based on the analysis of measurement results obtained within regional and national monitoring in individual countries. However, it should be noted that participating countries have different environmental monitoring systems in terms of monitored elements and assessment periods, which are often incomparable.

As other investments will also be implemented in the Programme area, monitoring changes resulting from Programme implementation should cover the area/watershed affected by the implementation of projects supported under the Programme, provided that relevant data are available. In cases of deteriorating environmental conditions, an analysis of causes and determining whether it results from Programme implementation should be conducted in this regard.

Additionally, it is crucial to note that within the Programme, a variety of investments classified as projects that may significantly impact the environment, either always or potentially, will be implemented. Therefore, they will be subject to environmental impact assessment procedures for specific projects (EIA), indicating the need to monitor the effects of these individual projects.

Since comparable data from individual countries may not always be available, it is also advisable to use assessments made by the European Environment Agency in monitoring the effects of Programme implementation and refer to the indicators presented in the assessment of the environmental state in Chapter 4.

The proposed indicators for assessing the effects of Programme implementation are included in the table below. Some of the indicators presented will result from the implementation of projects under the Programme, while others are indicators determined within regional and national monitoring systems.

Table 14 Proposed indicators for monitoring the effects of the Programme

Indicator	Unit measures	Data source
Surface area of new or upgraded green infrastructure	ha	Implementation Programme's projects
Population additionally connected to sewage treatment plants mechanical-biological	number	Implementation Programme's projects
Additional small retention capacity	m ³	Implementation Programme's projects
Number of area protection projects implemented protected including biodiversity	number	Implementation Programme's projects
Number of water bodies where quality improvement/deterioration has occurred, in	number	National or regional monitoring + implementation Programme's projects

⁶⁶ According to the DPSIR model (driving forces - pressures - state - impact - response)

of the catchment area covered by the projects of the Programme (if such data will be available)		
Number of protected areas where projects were implemented on their conservation and protection of biodiversity	number	National or regional monitoring + implementation Programme's projects

In the event of documented negative environmental impacts resulting from the implementation of the Program's objectives, for the purpose of monitoring them and potentially introducing mitigation measures, consideration should be given to conducting an "on-going" evaluation of the environmental impacts of implemented projects. The evaluation should examine all infrastructure projects listed in the Regulation of the Council of Ministers of September 10, 2019, regarding undertakings significantly affecting the environment (Journal of Laws, item 1839, as amended), within a specific thematic area where documented negative environmental impacts have been recorded, and which have signed grant agreements at the time of the evaluation. Subsequently, based on declared indicators and expert assessment, the scale and directions of expected environmental changes should be determined. In case significant negative impacts or trends in environmental indicators are identified, proposed changes to the Program or the selection system.

The body responsible for developing the evaluation and the associated monitoring of the effects of program activities will be the Program Managing Institution.

8. CONCLUSIONS

The analysis of the environmental impact of the INTERREG NEXT Poland-Ukraine 2021-2027 Programme leads to the following conclusions:

- The Programme, as a whole, is expected to have a positive impact on the environment and contribute to addressing various environmental issues in the region. However, some areas of support may negatively affect specific environmental elements. Detailed conclusions in this regard are provided in the relevant sections of the SEA Report . It should be noted that it is possible to shape planned projects to significantly eliminate, reduce, or compensate for the impacts.
- Since the Programme is formulated at a very general level without specifying all the projects' details (locations and characteristics) that may be supported, the SEA Report only provides examples of projects that may significantly negatively impact the environment. These projects will undergo a detailed assessment during the preparation stage in accordance with the regulations in the participating countries of the Programme.
The analysis of these projects allows us to exclude the possibility of significant negative impacts on Natura 2000 and Emerald areas. However, in line with the precautionary principle, both these projects and individual projects submitted in the competitive selection process should undergo detailed verification and assessment during the project design phase and when obtaining the necessary permits for implementation. In the event that the analysis identifies a risk of significant negative impacts on Natura 2000 areas or the Emerald network, it is advisable to refrain from funding and implementing such a project.
- The assessment of environmental benefits resulting from the implementation of the Programme indicates its significant importance in solving regional environmental issues and supporting environmental actions financially. Without the Programme implementation, environmental protection actions would have to be significantly limited due to insufficient funds allocated for this purpose.
- Based on the analysis of the strategic objectives of EU documents, it is stated that the Programme achieves these objectives, especially those defined in the European Green Deal.

- Similarly, the analysis of the strategic objectives of Poland and Ukraine's documents has shown that the Programme generally achieves these objectives.
- No possible negative transboundary environmental impacts have been identified for individual projects or the entire Programme.
- To reduce the negative environmental impacts of the Programme, principles for monitoring the effects of Programme implementation have been proposed, along with a series of recommendations to reduce the negative impacts of individual project examples supported by the Programme or alternative solutions (for in-depth analyses of specific actions). Implementing these recommendations will help reduce the negative environmental impact.
- According to Article 9(4) of the Regulation (EU) 2021/1060 of the European Parliament and of the Council of June 24, 2021, establishing common provisions for the European Regional Development Fund, the European Social Fund Plus, the Cohesion Fund, the Just Transition Fund, the European Maritime, Fisheries and Aquaculture Fund, and financial rules for those and for the Asylum and Migration Fund, the Internal Security Fund, and the Instrument for Financial Support for Border Management and Visa Policy (hereinafter the general regulation), the Fund's goals are implemented in accordance with the goal of promoting sustainable development, as defined in Article 11 of the Treaty on the Functioning of the European Union (TFEU), taking into account the UN Sustainable Development Goals, the Paris Agreement, and the "do no significant harm" principle. Although compliance with the "do no significant harm" principle is assessed and guaranteed at the Programme level, it is suggested to individually examine each infrastructure project listed in Annex I and II of Directive 2011/92/EU (i.e., projects that can always or potentially have a significant impact on the environment). This approach fundamentally ensures that implemented projects will not pose a threat to the environment.

9. SUMMARY IN NON-SPECIALIST LANGUAGE

Introduction

The aim of developing the Interreg NEXT Poland-Ukraine 2021-2027 Programme SEA Report (hereinafter the Programme) is to assess the potential and actual environmental impact of implementing the Programme. Specifically, the goal is a comprehensive analysis of the possible impact on individual elements of the environment, in accordance with applicable regulations and agreements, as foreseen in the Programme's actions. This includes evaluating the potential for cumulative impacts, analyzing the possibilities of alternative solutions, and identifying the need for any compensatory actions.

The Programme is one of the European Territorial Cooperation (ETC) Programmes, which will be implemented in the perspective of 2021-2027. The boundaries of the support area were determined based on the division into NUTS 3 units in Poland and regions in Ukraine.

- In Poland, it covers the following sub-regions: białostocki, łomżyński, suwalski, ostrołęcki, siedlecki, bialski, lubelski, puławski, chełmsko-zamojski, przemyski, rzeszowski, tarnobrzesci, krośnieński;
- In Ukraine, the Volyn, Lviv, Zakarpattia, Rivne, Ternopil and Ivano-Frankivsk oblasts are included in the support area.

Legal basis and scope

The strategic environmental impact assessment of the Programme will be conducted by the Programme Managing Institution (Polish Ministry of Funds and Regional Policy) through the Programme Joint Secretariat (European Project Centre), with the participation of relevant authorities in Ukraine in accordance with Polish law, which has transposed the relevant regulations of EU law.

In this context, the preparation of the SEA Report is based on the Polish Act on Access to Environmental Information and its Protection, Public Participation in Environmental Protection, and Environmental Impact Assessment⁶⁷ (hereinafter referred to as the "Environmental Law Act"), expanding the scope in accordance with the indications of the relevant Ukrainian authorities.

Analysis of the state of the environment in the Programme region

An analysis of the environmental condition encompassed all its elements, particularly focusing on nature and biodiversity, climate change, natural resources, waste and land surface, air quality, water, soil, impact on human health, flood protection, drought prevention, and historical monuments.

A challenge encountered in the assessment of the environmental condition within the Programme area was reaching equivalent materials, as participating countries have different environmental monitoring and programming systems.

In a general assessment, it can be stated that in terms of natural and landscape values, the Programme area is among the most valuable regions in the participating countries. It includes a significant proportion of Natura 2000 and Emerald areas, national and landscape parks, as well as biosphere reserves. The area is also rich in historical monuments. However, there are serious environmental issues, including habitat loss, fragmentation, and changes, degradation of landscape values, increasing impacts of weather events related to climate change, waste management issues, air pollution exceeding norms (especially in urban areas), noise exposure to the population, surface water pollution, threats to groundwater, water management challenges (floods and droughts), and landslide risks. Negative phenomena occur to varying degrees in parts belonging to the countries participating in the Programme.

Environmental Impact Assessment

As part of the analysis, the potential impacts of all support areas envisaged by the Programme on various environmental elements were assessed in detail, including people, animals, plants, water, air, land surface, landscape, climate, natural resources, monuments, and material goods. The evaluation used established impact assessment criteria that consider the state and major environmental issues, possible negative impacts, and the characteristics of projects that may be supported by the Programme, as well as the goals of EU strategic documents and the participating countries in the Programme.

Overall, it was concluded that the Programme as a whole will have a positive impact on the environment; however, some projects that could be implemented within it may have negative impacts. Nevertheless, there are possibilities to minimize or eliminate these impacts, as indicated in the SEA Report .

Most actions envisaged in the Programme will have a positive impact on the environment. Notably, actions related to mitigating the negative effects of climate change, creating small retention facilities, securing environmentally valuable areas, increasing the role of culture and tourism in sustainable development, etc., fall within this scope. Cooperation activities, especially in the field of environmental protection, will also be significant.

The cumulative impacts of the analyzed Programme are defined as changes in the environment caused by the proposed actions in combination with other existing impacts in the space and impacts of projects planned for the future, also within other Programmes.

A challenge is that the Programme is general in nature, and not all projects eligible for support are specified in terms of both their characteristics and locations. In this situation, it can only be assumed that the accumulation

⁶⁷ Journal of Laws, 2023, i.n.1094 with subsequent amendments

of impacts is probable if they are located within already existing or anticipated future accumulations of impacts from existing and/or planned infrastructure.

The issue arises from the fact that the Programme has a general nature, and it does not specify all possible projects that can be supported in terms of their characteristics and locations. It can only be assumed that cumulative impacts are likely if they are located within the existing or future impacts from existing and planned infrastructure. However, at the stage of preparing the SEA Report, such accumulations were not identified.

Analysis of the possibility of transboundary impact

Based on the analyses, no potential negative transboundary environmental impacts were identified for individual Priority Axes (LIPs), potential types of projects carried out within specific objectives, or the entire Programme.

However, since specific projects (locations and characteristics) were not determined for the remaining actions covered by the Programme, and hypothetical descriptions of their types were used, only after indicating their locations and characteristics will it be possible to precisely determine the type and potential scope of their environmental impact. Furthermore, an assessment of their transboundary impacts can be made. This applies only to projects that could significantly impact the environment. For such projects, in accordance with directive requirements and national regulations, an environmental impact Assessment Report will be necessary. These Programmes should also include an analysis of transboundary impacts, through which such impacts will be identified. However, based on current analyses, identifying such impacts is unlikely.

Assessment of the impacts in the absence of the Programme and the benefits of its implementation

In the event of abandoning the implementation of the Programme, the contributions and support for achieving the goals of strategic documents of Poland, Ukraine, the European Union, and global initiatives aimed at improving the state of the environment, mitigating climate change and adapting to it, as well as strengthening cooperation in the region, would not be obtained. Without the support of the Programme, the pace of achieving these objectives would be dependent on the available resources. Since resources are limited, the Programme would contribute to their faster attainment, and in some cases, enable the implementation of actions that would not be possible without the Programme.

Presentation of alternative options

Considering that the updated Programme predominantly has a positive impact on the environment, and its provisions are of a general nature, and given that only for Priority Axes (LIP) is the approximate scope already known, and also taking into account the agreements between the parties of the Programme, there was no justification for presenting an alternative version of the Programme that could have a less negative impact on the environment.

Proposed methods for evaluating the effects of the Programme

During the implementation of the Programme, it is crucial to have control over the progress of this process and assess the effects of the tasks covered by financial support. Therefore, it is necessary to develop proposals for analysis methods that enable the evaluation of the implementation process and the monitoring of the Programme's goals, including through the monitoring of achieved ecological effects and changes in the environmental state. The Programme establishes general frameworks for cross-border cooperation, with specific actions outlined for planned Priority Axes (LIP). However, it is important to note that the Programme has limited influence on solving environmental protection issues due to its financial constraints. In this situation, it is proposed that official environmental state Programmes published annually at the regional and national levels, data from state environmental monitoring, statistical data, and the results of monitoring individual investments supported by the Programme (if such monitoring is required) serve as the basis for assessments.

If there is any deterioration in the environmental condition in any area, it is proposed to conduct a detailed analysis to determine whether the changes are not occurring due to the implementation of thematic goals and investment priorities specified in the Programme.

Conclusions and recommendations

Based on the analyses conducted within the development of the SEA Report of the Programme, the following conclusions can be formulated:

- The Programme, as a whole, is estimated to have a positive impact on the environment and contribute to solving various environmental issues in the region. However, certain areas of support may negatively affect specific environmental elements. Detailed conclusions in this regard are presented in the respective sections of the SEA Report. It should be noted that it is possible to shape planned projects in a way that significantly eliminates, reduces, or compensates for the impacts.
- Since the Programme is formulated at a very general level without specifying all the projects' details (locations and characteristics) that may be supported, the SEA Report only provides examples of projects that may significantly negatively impact the environment. These projects will undergo a detailed assessment during the preparation stage in accordance with the regulations in the participating countries of the Programme.

The analysis of these projects allows us to exclude the possibility of significant negative impacts on Natura 2000 and Emerald areas. However, in line with the precautionary principle, both these projects and individual projects submitted in the competitive selection process should undergo detailed verification and assessment during the project design phase and when obtaining the necessary permits for implementation. In the event that the analysis identifies a risk of significant negative impacts on Natura 2000 areas or the Emerald network, it is advisable to refrain from funding and implementing such a project.

- The assessment of environmental benefits resulting from the implementation of the Programme indicates its significant importance in solving regional environmental issues and supporting environmental actions financially. Without the Programme implementation, environmental protection actions would have to be significantly limited due to insufficient funds allocated for this purpose.
- Based on the analysis of the strategic objectives of EU documents, it is stated that the Programme achieves these objectives, especially those defined in the European Green Deal.
- Similarly, the analysis of the strategic objectives of Poland and Ukraine's documents has shown that the Programme generally achieves these objectives. No possible negative transboundary environmental impacts have been identified for individual projects or the entire Programme.
- To reduce the negative environmental impacts of the Programme, principles for monitoring the effects of Programme implementation have been proposed, along with a series of recommendations to reduce the negative impacts of individual project examples supported by the Programme or alternative solutions (for in-depth analyses of specific actions). Implementing these recommendations will help reduce the negative environmental impact.

According to Article 9(4) of the Regulation (EU) 2021/1060 of the European Parliament and of the Council of June 24, 2021, establishing common provisions for the European Regional Development Fund, the European Social Fund Plus, the Cohesion Fund, the Just Transition Fund, the European Maritime, Fisheries and Aquaculture Fund, and financial rules for those and for the Asylum and Migration Fund, the Internal Security Fund, and the Instrument for Financial Support for Border Management and Visa Policy (hereinafter the general regulation), the Fund's goals are implemented in accordance with the goal of promoting sustainable development, as defined in Article 11 of the Treaty on the Functioning of the European Union (TFEU), taking into account the UN Sustainable Development Goals, the Paris Agreement, and the "do no significant harm" principle. Although compliance with the "do no significant harm" principle is assessed and guaranteed at the Programme level, it is suggested to individually examine each infrastructure project listed in Annex I and II of Directive 2011/92/EU

(i.e., projects that can always or potentially have a significant impact on the environment). This approach fundamentally ensures that implemented projects will not pose a threat to the environment.

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