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STRATEGIC ENVIRONMENTAL ASSESSMENT REPORT

on the draft

INTERREG CROSS-BORDER COOPERATION PROGRAMME

POLAND-BELARUS-UKRAINE 2021-2027

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ATMOTERM S.A.		
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LIST OF TERMS AND ABBREVIATIONS USED IN THE REPORT

Birds Directive Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds

CBC Programme PL-BY-UA 2021-2027 – Interreg Cross-border Cooperation Programme Poland-Belarus-Ukraine 2021-2027

CO_2 carbon dioxide

CR Critically Endangered, a species considered to be facing an extremely high risk of extinction in the wild

EEA European Environment Agency

EIA Act the Act of 3 October 2008 on the provision of information about the environment and its protection, public participation in environmental protection and environmental impact assessment (consolidated text, Journal of Laws of 2020, item 283, as amended)

Emerald Network – Areas of Special Conservation Interest, Emerald Network is equivalent for NATURA 2000 for not EU Member State

EN Endangered, species which have been categorized as very likely to become extinct in the near future

Natura 2000 is a network of nature protection areas in the territory of the European Union

Environmental Liability Directive - Directive 2004/35/EC of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage

GDOŚ (GDEP) General Directorate for Environmental Protection (Poland)

GIOŚ (CIEP) Chief Inspectorate for Environmental Protection (Poland)

GIS (CSI) Chief Sanitary Inspectorate (Poland)

GUS (CSO) Central Statistical Office (Poland)

Habitats Directive - Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

JCWP groundwater bodies

LIPs Large Infrastructure Projects (10 projects proposed to be financed under the Programme in a non-competitive mode, the assumptions of which are known at the stage of developing the Environmental Report)

MPC maximum permissible concentrationPLB06

NA National Authority

NO_2 nitrogen dioxides

NP National Park

NT Near Threatened, a species which have been considered threatened with extinction in the near future, although it does not currently qualify for the threatened status

NUTS	Nomenclature of Territorial Units for Statistics
PLB (SPA)	special protection areas
PLC	sites where Special Protection Areas for Bird overlapping with Special Areas of Conservation
PLH (SAC)	special areas of conservation
PM10	particulate matter with an aerodynamic diameter of up to 10 µm
PM2,5	particulate matter with an aerodynamic diameter of up to 2.5 µm
RAMSAR	Ramsar Convention on Wetlands, an international network of diverse types of wetlands sites, recognized as vital for a country, global biological diversity and important for sustaining life (special for birds)
RES	renewable energy sources
SAC	Special Area of Conservation
SDF	Standard Data Form
SEA Directive	Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment
SO_2	sulphur dioxide
SPA	Special Protection Areas for Birds
VU	Vulnerable, these are the species whose population has declined to levels from where it is likely to move into the endangered category in the near future if the negative factors continue to operate such species.

A NON-TECHNICAL SUMMARY

Introduction

The aim of the Environmental Report on the draft Interreg Cross-border Cooperation Programme Poland-Belarus-Ukraine 2021-2027 is to assess the potential and actual effects of the draft Programme on the environment. In particular, in accordance with the applicable rules and arrangements, the aim is a comprehensive analysis of the potential impact on specific elements of the environment (as provided for in the Programme actions), assessment of the potential occurrence of cumulative impacts, as well as the analysis of the applicability of alternative solutions, and the need to introduce compensatory measures.

The Cross-border Cooperation Programme Poland-Belarus-Ukraine 2021-2027 (hereinafter referred to as the Programme) is one of the European Territorial Cooperation (ETC) programmes implemented in the 2021-2027 perspective. The Programme Area is determined on the basis of NUTS 3 units (subregions) in Poland and oblast division in Ukraine and Belarus:

- In Poland it covers the following subregions: Białostocki, Łomżyński, Suwalski, Ostrołęcki, Siedlecki, Bialski, Lubelski, Puławski, Chełmsko-Zamojski, Przemyski, Rzeszowski, Tarnobrzeski, Krośnieński,
- In Belarus, the Programme Area covers: Grodno, Brest, Gomel and Minsk oblasts (excluding the city of Minsk),
- In Ukraine, the Programme Area includes the following Oblasts: Volyn, Lviv, Zakarpattya, Rivne, Ternopil and Ivano-Frankivsk Oblast.

The Programme's objective is to support and promote integrated regional development in neighbouring border regions, including regions at the external borders of the European Union.

It should be emphasised that the Programme will also contribute to the implementation of environmental policy objectives in the cooperating countries and to solving existing problems in this respect. It will also meet the objectives set out in strategic documents on a global, EU and cooperating countries level and will affect the achievement of the main goal which is to achieve climate neutrality.

Actions under the Programme will address the following policy objectives and the specific objectives of the Interreg Programme as defined in the relevant EU regulations:

- **Policy objective 2 –** A greener, low-carbon transitioning towards a net zero carbon economy and resilient Europe…
- **Policy objective 4 –** A more social and inclusive Europe…
- **Interreg specific objective 1** – A better cooperation governance.

Within the above policy objectives, the following specific objectives will be pursued:

- Promoting climate change adaptation and disaster risk prevention and resilience, taking into account eco-system based approaches;
- Promoting access to water and sustainable water management;
- Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution;

- 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;
- Enhancing the role of culture and sustainable tourism in economic development, social inclusion and social innovation;
- Enhancing 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;
- Building up mutual trust, in particular by encouraging people-to-people actions.

Legal basis and scope

The strategic environmental impact assessment of the Cross-border Cooperation Programme Poland-Belarus-Ukraine will be carried out by the Managing Authority of the Programme (Ministry of Development Funds and Regional Policy of the Republic of Poland), through the Joint Technical Secretariat (Center of European Projects) with the participation of the relevant authorities of Belarus and Ukraine in accordance with the provisions of Polish law to which relevant provisions of the EU law have been transposed. However, the strategic assessment procedure will also take into account the requirements of the Belarusian and Ukrainian legislation, in particular in terms of public participation in defining the Scoping Report and its opinion.

In view of the above, the Environmental Report has been prepared on the basis of the Polish Act on the provision of information about the environment and its protection, public participation in environmental protection and environmental impact assessment[1] (hereafter referred to as the EIA Act), expanding its scope as indicated by the competent authorities of Belarus and Ukraine.

In compliance with legislation and agreements, impact on all elements of the environment was analysed when drawing up the Environmental Report, including among others impact on: humans, fauna, flora, water, air, land surface, landscape, climate, natural resources, heritage objects, and material assets, taking into consideration the relationships between those elements of the environment and between the impacts on those elements, identifying the degree and the type of impact. In particular, the Report analyses impact of the Programme on protected areas, including Natura 2000 network and Emerald areas.

Analysis of the state of the environment in the Programme area

The key issues and environmental hazards in the Programme area were identified based on the available materials (mainly reports on the state of the environment in Poland, Belarus and Ukraine). The current state of the environment was also identified. On the one hand, it should serve such a formation of the Programme to maximise its use in order to improve the state of the environment. On the other hand, it should serve such a formation of the Programme to enable environmental impact assessment and identification of any significant negative impacts, and to propose measures that will minimise this impact, indicate alternative and possible compensating actions. This analysis was also used to determine criteria for selecting projects to be funded under the Programme.

The analysis of the environment covered all its elements, in particular: nature and biodiversity, climate change, natural resources, waste and land surface, quality of air, water and soil, impact on human health, flood and drought prevention issues and heritage objects.

[1] Consolidated text, Journal of Laws of 2020, item 283, as amended

A problem encountered in assessing the state of the environment in the Programme Area was accessing equivalent material, as there are different systems for monitoring and reporting on the state of the environment in the countries participating in the Programme.

Generally, it can be concluded that in terms of natural and landscape values the Programme Area belongs to the most valuable regions in the countries participating in the Programme, with a large share of Natura 2000 and Emerald areas, national and landscape parks, and biosphere reserves. It is also rich in terms of the number of heritage objects.

However, there are serious problems for the environment such as: loss, fragmentation and change of habitats, degradation of landscape features, increasing influence of weather events associated with climate change, waste management problems, excessive air pollution (especially in areas of cities), problems with exposure of population to noise, pollution of surface waters and threats to groundwater, water management problems (floods and droughts), landslide risk. Negative events occur at different scales in the parts belonging to the countries participating in the Programme.

The Environmental Report

The analyses included detailed assessment of possible impact that all support areas envisaged within the Programme may have on particular elements of the environment, including: humans, fauna, flora, water, air, land surface, landscape, climate, natural resources, heritage objects and material assets. The assessment was based on previously developed evaluation criteria that take into account the condition of the environment and its major problems, the possible negative impact and description of projects that can be supported by the Programme, as well as the goals of the strategic documents of the EU and the countries participating in the Programme.

Detailed analyses have been performed for each project type that was identified as potential that is likely to be implemented under the Programme.

It should be emphasised that, given the general nature of the Programme, the presented hypothetical impacts can be shown only in a general way, and the specific impacts will depend on the location and characteristics of projects proposed for funding under the Programme.

In general, it was stated that the Programme as a whole will have a positive impact on the environment, nevertheless, some undertakings that may be implemented under the Programme may have a negative impact. However, there are possibilities of minimising these impacts or eliminating them altogether, which was indicated in the Environmental Report.

The majority of measures provided for in the Programme will have a positive impact on the environment. In this respect first of all the measures concerning the mitigation of negative effects of climate change, creation of small retention facilities, protection of naturally valuable areas, increasing the role of culture and tourism in sustainable development etc. should be mentioned. Cooperation activities will also be important, especially in the field of environmental protection.

The most significant negative environmental impacts of the Programme may occur in the scope of implementation of projects connected with construction of water intakes, water supply systems, sewage systems and wastewater treatment plants. They can relate especially to impacts on biodiversity, fauna, flora and may affect the integrity of the protected areas. On the other hand, however, these actions may contribute to the development of the region and the related improvement of living conditions.

Assessment of the cumulative impacts

Cumulative effects of the analysed Programme are defined as changes in the environment caused by the influence of actions proposed in the Programme in conjunction with other existing effects and impacts of projects to be implemented in the future, also under other programmes.

The analysis of the impacts that the Programme is likely to have on the environment, and that can be combined with other effects is presented in the sheets of the in-depth analysis constituting an appendix to the Report.
The problem is that the Programme is general in nature and does not specify all the projects that can be supported, both in terms of their characteristics and location. In this situation we can only assume the accumulation of interactions is possible if projects are located within the existing or planned in the future cumulative impact areas of the existing and/or planned infrastructure.
GIS software was used to identify possible areas of cumulative impacts. By applying maps of varying content, sites of potential accumulation of effects have been identified. It was performed with the use of materials in the form of policies and programmes at national, regional and sectoral levels. Sites of potential accumulation of effects on the Programme and other activities outside the Programme are shown on the map set out in the Report.

Analysis of the potential cross-border impact

As part of the works on the Environmental Report, the possibility of occurrence of environmental impacts in the cross-border aspect was analysed, both in terms of impacts between the countries participating in the Programme and the cross-border impact of the Programme on the neighbouring countries. Identification of the nature and scale of possible cross-border impacts is extremely difficult due to very general formulation of most of the support areas and lack of indication of the location of individual potential projects, except large infrastructure projects (LIPs) that can receive financial support for implementation. In the course of works on the Environmental Report, all types of projects included in the Programme were analysed.

The projects eligible for support under the Programme that may have a cross-border impact on the environment include, first of all, investments in the field of water and waste water management. As part of the study, projects specified in the Programme as LIPs (with specified locations and characteristics) as well as potential projects (regular and small projects) whose location and characteristics were not specified were analysed in detail from the point of view of the above mentioned considerations.

On the basis of the analyses, no possible negative cross-border impacts on the environment were found for both individual LIPs and potential projects implemented within the entire Programme and its individual objectives.

However, except known LIPs, for the remaining projects their characteristic and location is not known their potential types were used in a hypothetical way, only after their location and type has been identified, it is possible to determine precisely the type and potential scope of environmental impact and to assess their cross-border impact. As only projects which may have a significant impact on the environment may be affected, an EIA report will have to be carried out for such projects in accordance with the requirements of the Directive and national legislation. In these reports, an analysis of cross-border impact will also be carried out, in which such impact will be identified. However, on the basis of current analyses, identification of such impacts is unlikely.

Description of the studies

A number of detailed studies were carried out to determine the impact of the Programme implementation on particular elements of the environment and its overall influence on the implementation of the sustainable development policy. The scope of these studies resulted from the identified research problems and indications from the competent authorities of Poland, Belarus and Ukraine.

They concerned, first of all, the assessment of the Programme from the point of view of complementarity, compliance with sustainable development principles, adequacy with regard to the needs (especially in the field of environmental protection), minimisation of negative impacts, appropriate project selection criteria, compliance with national and EU policy objectives, effectiveness of the proposed actions, synergy of actions, etc.

Assessment of the effects in the absence of implementation of the Programme and the benefits of its implementation

If the Programme is abandoned, its contribution to and support for the implementation of the objectives of the strategic papers of Poland, Belarus, Ukraine, the European Union as well as global documents aiming at the improvement of the environment, reduction and adaptation to climate change as well as enhancement of co-operation in the region will not be achieved.

Without the Programme support, the pace of achieving these goals would depend on the resources available. As the funds are limited, the Programme will contribute to their more rapid achievement, and in some cases to the realisation of activities, which would not have been realised without the Programme.

Presentation of alternatives

Taking into account that the Programme is of a general nature and that only LIPs have a location, as well as the fact that it was agreed with the parties involved in it, it was not possible to present an alternative version of the Programme that could have a less negative impact on the environment. In this situation, the Environmental Report presents the locations of protected areas, their protection objectives, as well as the places of possible accumulation of impacts. This provides an opportunity for approximate assessment of the possibility of applying alternatives at the stage of selection of specific projects for implementation and their design in order to eliminate or reduce their negative environmental impact in the indicated areas. These indications could be used in the selection of projects or their variants at the stage of Programme implementation.

At present, only the following alternative option can be considered in relation to the currently proposed version of the Programme - modification of the Programme in the direction of increasing the allocation of funds for activities in the field of mitigation of negative effects of climate change and protection of nature-value areas, because, as it results from the analyses, the needs in this respect are justified by high natural values of the region; also there are important environmental issues in the region, which require actions. However, it should be taken into account that the Programme was jointly formulated and its amendment would have to be accepted by all parties to the Programme, which is doubtful. Moreover, the Programme covers many elements of cooperation in the region and not only the environmental area. Besides, as presented in the Environmental Report, its impact on the environment is generally limited. It also seems that the draft Programme adequately considers the allocation of funds in relation to the needs of the region.

Proposed methods of evaluating the effects of the Programme implementation

In the implementation of the Programme it is important to control the process and to evaluate the effects of the tasks covered by the financial support. Therefore, it is necessary to develop proposals for methods of analysis which will make it possible to evaluate the implementation process and to control the achievement of the objectives set out in the Programme, inter alia, by monitoring the environmental effects achieved and the changes in the state of the environment. The Programme provides a general framework for cross-border cooperation. Only LIPs have precise locations. Moreover, it should be noted that it has limited possibilities of influencing the solution of problems in environmental protection due to its limited financial scope. In this situation, it was proposed that the assessment will be based on official reports on the state of the environment published annually at regional and national level, data from the state environmental monitoring, statistical data and results of monitoring of individual investments supported by the Programme (if such monitoring is required).

If there is a deterioration of the environment in any area, it is proposed that a detailed analysis should be carried out to ascertain whether the changes are not due to the thematic objectives and investment priorities set out in the Programme.

Conclusions and recommendations

On the basis of analyses, within the framework of preparing the Environmental Report on the Cross-border Cooperation Programme Poland-Belarus-Ukraine 2021-2027 the following conclusions can be formulated:

- It is assessed that the Programme, as a whole, will have a positive impact on the environment and help solve a number of issues concerning the state of the environment[2] in the region. Nevertheless, some of the supported areas, especially as regards water and wastewater management, may have significant negative impact on the environment or its individual components. Specific conclusions in this regard are presented in relevant sections of the Report. It should be noted, however, that it is possible to shape the planned projects in such a way as to eliminate, reduce or compensate for these impacts.
- As the draft Programme is formulated at a very general level, without specifying all the projects (location and characteristics) that can be supported, the Environmental Report can only indicate those sample projects which may have a significant negative impact on the environment, and which at the stage of preparing the investment will have to be subject to a detailed assessment, in accordance with the relevant regulations in force in the countries participating in the Programme.
- Bearing in mind the objectives and scope of the Programme, at the stage of development of this Environmental Report no significant negative impact on Natura 2000 and Emerald areas, including their integrity and coherence, was identified. It should be noted, however, that only 10 projects (LIPs) to be supported under the Programme were specified in detail. Therefore, a significant negative impact on Natura 2000 and Emerald areas cannot be ruled out in the case of individual investments, which can only be assessed at the design stage.
- The assessment of the environmental benefits resulting from the implementation of the Programme shows its great significance in solving the environmental problems of the region as well as the support in financing the environmental actions. Without the implementation of the

[2] in accordance of the Environmental Protection Act

Programme, the activities for the benefit of environmental protection would have to be significantly limited due to insufficient funds available for this purpose.

- On the basis of the analysis of the objectives of the EU strategic documents, it is concluded that the Programme implements the objectives of these documents, and in particular the objectives set out in the European Green Deal Strategy.
- Similarly, the analysis of the objectives of the strategic documents of Poland, Belarus and Ukraine showed that the Programme, in general, fulfils these objectives.
- On the basis of the analyses, no possible negative cross-border impacts on the environment were found for both individual projects and the entire Programme. However, as for some of the measures covered by the Programme, except LIPs, no specific projects (location and characteristics) were identified, but their potential were used in a hypothetical way, only after their location and type have been identified, it is possible to determine precisely the type and potential scope of environmental impact and to assess their cross-border impact. As only projects which may have a significant impact on the environment may be affected, an EIA report will have to be carried out for such projects in accordance with the requirements of the Directive and national legislation. However, on the basis of current analyses, identification of such impacts is unlikely.
- In order to limit negative impacts of the Programme on the environment, the principles of monitoring the effects of Programme implementation and a number of recommendations were proposed to reduce negative impacts of particular sample of projects that may be supported under the Programme or possible alternative solutions (in case of in-depth analyses of particular measures). Implementation of these recommendations will contribute to reduction of the negative impact on the environment.

1. INTRODUCTION

1.1. THE PURPOSE OF THE REPORT

The aim of the Environmental Report on the draft Cross-border Cooperation Programme Poland-Belarus-Ukraine 2021-2027 is to assess the potential and actual effects of the draft Programme on the environment. In particular, in accordance with the applicable rules and arrangements, the aim is a comprehensive analysis of the potential impact on specific elements of the environment (as provided for in the Programme actions), assessment of the potential occurrence of cumulative impacts, as well as the analysis of the applicability of alternative solutions, and the need to introduce compensatory measures. Development of the Environmental Report is a part of the Strategic Environmental Assessment (SEA).

1.2. CONTEXT

The Cross-border Cooperation Programme Poland-Belarus-Ukraine 2021-2027 (hereinafter referred to as the Programme) is one of the European Territorial Cooperation (ETC) programmes implemented in the 2021-2027 perspective. The Programme Area is determined on the basis of NUTS 3 units (subregions) in Poland and oblast division in Ukraine and Belarus.

- In Poland it covers the following subregions: Białostocki, Łomżyński, Suwalski, Ostrołęcki, Siedlecki, Bialski, Lubelski, Puławski, Chełmsko-Zamojski, Przemyski, Rzeszowski, Tarnobrzeski, Krośnieński,

- In Belarus, the Programme Area covers: Grodno, Brest, Gomel and Minsk Oblasts (excluding the city of Minsk),
- In Ukraine, the support area includes the following oblasts: Volyn, Lviv, Zakarpattya, Rivne, Ternopil and Ivano-Frankivsk Oblast.

In total, the Programme Area covers approximately 316,300 km^2. Its largest part is located in Belarus (44%), and the rest in Ukraine (32%) and Poland (24%).

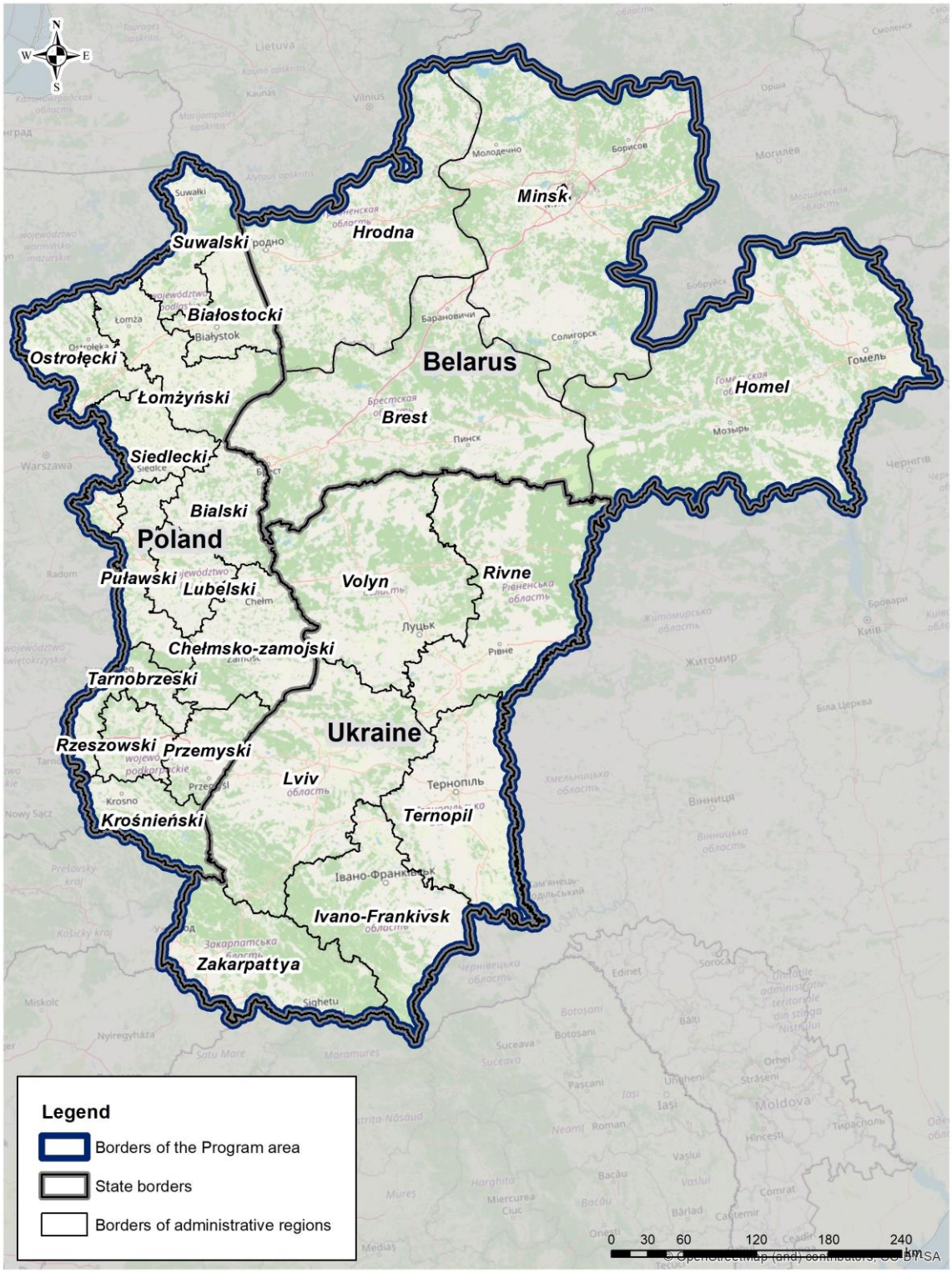

Figure 1. Programme Area of the Cross-border Cooperation Programme Poland-Belarus-Ukraine 2021-2027 compared to NUTS regions[3] and oblasts.

[3] Own work

It should be emphasised that the Programme will contribute to the implementation of environmental policy objectives in the cooperating countries and to solving existing problems in this respect. It will also meet the objectives set out in strategic documents on a global, EU and cooperating countries level and will affect the achievement of the main goal which is to achieve climate neutrality.

1.3. PROBLEMS, UNCERTAINTIES AND LACK OF INFORMATION

The development of this Report encountered difficulties in obtaining certain information presenting in an equivalent, comprehensive and up-to-date manner the condition of the environment in Poland, Belarus and Ukraine, which constitute the starting point for the analyses. In particular, it concerns water assessment and nature monitoring. Still a problem was the natural valorisation, complete inventory of species and habitats in protected areas and the lack of a concept of a coherent system of avifauna migration corridors.

In order to eliminate these problems, various data sources were used to present the most reliable and up-to-date information possible.

Another area of uncertainty arising in the process of preparing the Environmental Report is the high level of generality of the Programme (apart from the listed projects). Many activities and projects lack their characteristics and locations. In these situations, the assessments of their impacts had to be based on typical solutions and general assessment.

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

The Report takes into account the above conditions, and the presented assessment relates to areas of support proposed under the Programme. More detailed analyses and assessments of the impact on particular environmental components may be carried out only after the final determination of the project location, execution method and technology, at the stage of obtaining decisions on environmental conditions and permits for execution of a given project.

1.4. INFORMATION ON THE METHODS APPLIED IN THE ENVIRONMENTAL REPORT

Having determined the Programme's Scoping Report, which resulted from the regulations on strategic assessments, arrangements with the competent environmental assessment bodies in Poland, Belarus and Ukraine, as well as guidelines contained in the Terms of Reference, Guidance on Integration of Climate Change and Biodiversity Issues in Strategic Assessments[4] and other materials, and own experience, it was assumed that the Environmental Report would be carried out in the following basic stages:

- Analysis of the Programme and preliminary assessment of its impact on the environment and identification of projects likely to have a potentially and always significant impact on the environment;
- Analysis of the state of the environment from the point of view of the possible impact of the Programme;
- The Environmental Report for projects covered by the Programme;
- Formulation of conclusions and recommendations resulting from the analyses.

The analysis of the draft Programme at the first stage covered the basic structure of the Programme, on the basis of which conclusions were drawn from the general formulation of the support areas with respect to

[4] Guidance on integration Climate Change and Biodiversity into Strategic Environmental Assessment, European Commission 2013.

specific measures which could be supported by the Programme in order to specify their possible environmental impact. These measures were grouped from the point of view of similar environmental impact and at the same time a first preliminary screening for possible significant negative environmental impact was carried out.

The results are presented in sub-section 5.4 where projects similar in terms of types and impacts are synthetically grouped. They are referenced to the relevant policy objectives and specific objectives of the Programme. This makes it possible to refer to the relevant parts of the Programme. This table, which is a systematisation of projects (possible to be supported), will also be a starting point for further analyses carried out within the framework of the Environmental Report.

As part of the Programme analysis, the following analyses were also carried out: internal coherence, compliance with strategic documents on a global and EU scale, and compliance with strategic documents of Poland, Belarus and Ukraine. The aim of these analyses was to determine to what extent the draft Programme realises objectives of these documents and is consistent with them.

These analyses also included assessment of positive effects of Programme implementation, mainly from the point of view of environmental protection and sustainable development. Conclusions from these analyses were used for further works on the Environmental Report.

The analysis of the current state of the environment was the second basic element for the assessment. The analysis covered first of all areas of possible support in the field of environmental protection from the point of view of needs and areas of possible impact of the Programme implementation.

The general approach, obviously modified depending on the specificity of a given element of the environment, was a synthetic assessment of: the condition, recorded trends of changes (both the condition and pressure - from the point of view of possible accumulation of impacts), actions taken on a national scale and their effects, compliance with the applicable regulations (e.g. in terms of air quality) and conclusions concerning the most important problems (taking into account possible impacts of the Programme implementation and selection of criteria for assessment of these impacts).

Another stage consisted in detailed analyses of the impact of particular groups of projects to be supported by the Programme on particular elements of the environment. The starting point for the analyses was the establishment of assessment criteria. This was done on the basis of analyses of the state of the environment and key problems, legal requirements, conclusions from analyses of strategic documents and analyses related to evaluation questions.

The results of the analyses are presented in detailed analysis sheets, which constitute Appendix 2 to the Environmental Report. Their systematics is consistent with Table 11 presented in sub-section 5.4. In addition, the detailed analysis sheets provide references to the policy objectives and specific objectives of the Programme, which will provide orientation in relation to the draft document. Among other things, these analyses used GIS tools to confront specific support areas with the current state of environmental protection (e.g. by overlaying maps of communication projects with maps of protected areas).

The results of detailed analyses were synthetically presented in the matrix of relations of the areas of intervention proposed in the Programme and the impact on particular elements of the environment. Independently, analyses of the total impact of the entire Programme on individual elements of the environment were carried out, and preventive (limiting the negative impact) or possibly compensatory measures were indicated (sub-section 5.7).

When carrying out the environmental impact analyses, the possibility of cumulative impacts of the projects included in the Programme as well as other known projects planned for implementation was taken into account.

As a result of the above analyses, the advisability and feasibility of alternatives were considered (section 6). Effects in the absence of the Programme were also assessed (section 5.1).

In order to react as quickly as possible, methods of evaluating the effects of the Programme implementation were presented (section 8). The starting point for this was the current environmental monitoring system existing at the national and regional level.

When working on the Environmental Report, previous environmental reports for strategic documents in Poland were used, which covered similar undertakings, e.g. in the field of water management. In particular cases, environmental reports for specific projects and environmental decisions that have already been issued were also used.

Taking into account the above approach, the structure of the Environmental Report was proposed, and was then used to present the Environmental Report on the Programme.

The following major guidelines and materials were used to prepare the Environmental Report:

- European Commission Guidance on Integrating Climate Change and Biodiversity into Strategic Environmental Assessment, European Commission 2013;
- Handbook on Strategic Environmental Assessment for Cohesion Policy 2007-2013 (translation of the GRDP handbook) Ministry of the Environment;
- The environmental reports for sectoral strategies as well as programmes and strategies that may be relevant to the document under development, in some cases also environmental reports and decisions for projects that are at an advanced stage of development;
- The EC guidance on issues related to strategic environmental assessment, Natura 2000 sites, the Water Framework Directive and the preparation of investments taking into account climate change, preparation for these changes and resistance to natural disasters;
- Guides from national environmental authorities related to strategic environmental assessments for Natura 2000 sites and the preparation of investments taking into account climate change, preparation for these changes and resistance to natural disasters;
- Results of research work available in the area of environmental protection and condition;
- Other specialised materials depending on the projects analysed, including publications.

The full methodology for the preparation of the Environmental Report is presented in the Methodological Report prepared in accordance with the requirements of the ToR, prior to the commencement of work on the Environmental Report.

2. LEGAL BASIS AND AGREEMENTS RELATING TO THE SCOPING REPORT

As agreed, the strategic environmental impact assessment of the Cross-border Cooperation Programme Poland-Belarus-Ukraine will be carried out by the Managing Authority of the Programme (Ministry of Development Funds and Regional Policy of the Republic of Poland), through the Joint Technical Secretariat (Center of European Projects) with the participation of the relevant authorities of Belarus and Ukraine in accordance with the provisions of Polish law to which relevant provisions of the EU law have been transposed. However, the strategic assessment procedure will also take into account the requirements of

the Belarusian and Ukrainian legislation, in particular in terms of public participation in defining the Scoping Report and its opinion.

The scope of carrying out the Environmental Report is defined in the Act on the provision of information on the environment and its protection, public participation in environmental protection and environmental impact assessments[5] (hereinafter referred to as: the Environmental Protection Act), to which the provisions of Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment were transposed.

In accordance with the aforementioned regulations, the Environmental Report will include, among others:

- an outline of the contents, main objectives of the draft document, and links to other relevant documents,
- information on the methods applied in the Environmental Report,
- proposals relating to the anticipated methods of analysing effects of the implementation of the draft document, and the frequency of analysis performance,
- information about the possible cross-border impact on the environment,
- a non-technical summary;

moreover, it will determine, analyse and evaluate:

- the current state of the environment and the likely evolution thereof without implementation of the draft document,
- the environmental characteristics of areas likely to be significantly affected,
- the existing environmental problems which are relevant to the draft document including, in particular, those relating to any areas protected under the Nature Conservation Act of 16 April 2004[6],
- the environmental protection objectives, established at international, community or domestic level, which are relevant to the draft document, and the way those objectives and any environmental considerations have been taken into account during the preparation of the document,
- the likely significant effects (including direct, indirect, secondary, cumulative, short-, medium- and long-term permanent and temporary, positive and negative effects) on the purposes and the subject of protection of Natura 2000 sites and the integrity of this area, as well as the effects on the environment, in particular on: biodiversity, population, fauna, flora, water, air, soil, landscape, climate, natural resources, heritage objects, material assets, taking into account the interrelationship between these elements of the environment and between the effects on these elements;

and present:

- solutions envisaged to prevent, reduce or offset any significant adverse effects on the environment which may result from the implementation of the draft document, in particular on the purposes and the subject of protection of Natura 2000 sites and the integrity of this area,
- taking into account the objectives and the geographical scope of the document, the objectives and subject of protection of Natura 2000 sites and the integrity of the area - alternatives to the solutions contained in the draft document, together with reasons for their choice and a description

[5] Consolidated text, Journal of Laws of 2021, item 247, as amended

[6] Consolidated text, Journal of Laws of 2021 r. item 1098, as amended

of evaluation methods leading to this choice or explanation for the absence of alternative solutions, including any difficulties encountered due to technical deficiencies or gaps in modern knowledge.

Pursuant to Art. 54 (1) of the EIA Act, the scope of the Environmental Report and its level of detail were agreed with the competent environmental assessment bodies in Poland, Belarus and Ukraine. The relevant indications of those authorities are presented in the table below.

Table 1. Comments and recommendations of the authorities competent for environmental impact assessments.

Institution name	No.	Content of comments
PL GDOŚ (GDEP)	1.1	It is worth pointing out that some of the measures will aim at improving the state of the environment, but their implementation, which can be determined with great probability on the basis of the submitted assumptions to the CBC Programme PL-BU-UA 2021-2027, will be carried out, among others, with the use of measures qualified as likely to have a significant impact on the environment.
	1.2	The basic requirements concerning the Report, which should be included in the prepared study, are contained in Article 51, paragraph 2 and Article 52, paragraphs 1 and 2 of the EIA Act. It should be noted that it is acceptable to use different levels of detailed analyses in the Report, depending on the way in which particular measures and undertakings are included.
	1.3	The Report should describe the state of the environment in a way that makes it possible to determine the types and scale of predicted impacts and to identify changes caused by the implementation of the CBC Programme PL-BU-UA 2021-2027 that may occur in the future. The description of the state of the environment should be adjusted to the location of the planned measures, provided that the places of their implementation are indicated in the document (even in a general manner).
	1.4	On the basis of the identified state of the environment and the specificity of the activities and undertakings included in the CBC Programme PL-BU-UA 2021-2027, the anticipated significant impact on the environment should be determined. The analyses should cover direct, indirect, secondary and cumulative effects, regardless of their duration. According to the above mentioned regulation, positive and negative impact on the environment should be assessed, including on people, animals, plants, land surface, water and climate, taking into account the relations between the elements of the environment and between the impacts on these elements. In order to analyse the cumulative environmental impact of the activities envisaged in the CBC PBU and other projects implemented or planned to be implemented, and not included in this document, the content of other plans, policies, strategies, etc., providing for activities in similar thematic and spatial areas, should be taken into account.
	1.5	In the event that the CBC Programme PL-BU-UA 2021-2027 foresees specific projects for which a report on the environmental impact of the project has already been prepared or a decision on environmental conditions has been issued, it will be reasonable to include in the Report information from those documents. In the absence of the above-mentioned report or decision, it will be appropriate to apply analyses adequate to the level of detail of objectively available information.
	1.6	It is also necessary to propose courses of action and solutions aimed at preventing, limiting or possibly compensating for negative environmental impacts that may result from the implementation of the draft document. An in-depth analysis of alternative solutions to the proposed intentions should also be carried out. At this point it should be

Institution name	No.	Content of comments
		noted that the so-called zero variant, consisting in not implementing the project, cannot be treated as one of the implementation options.
	1.7	The Report should present proposals for methods of monitoring the effects of the implementation of the tasks arising from the document, which would make it possible, among other things, to determine whether the scale and extent of their impact on the environment, including on the objects of protection of Natura 2000 sites, has been properly assessed, and to assess the effectiveness of the proposed mitigation measures. It should be stressed that the indicators used to monitor the progress of the implementation of the CBC Programme PL-BU-UA 2021-2027 should not be equated with the system for monitoring the environmental impact resulting from the implementation of this document.
	1.8	Referring to the specificity of certain elements of the Report, the necessity of determining the impact of the implementation of the CBC Programme PL-BU-UA 2021-2027 on the condition and functioning of the areas subject to protection under the Act of 16 April 2004 on Nature Conservation (Journal of Laws of 2020, item 55, as amended), and in particular on the objectives and subject of protection of Natura 2000 sites and the integrity of these areas, should be stressed. In the course of analyses concerning Natura 2000 sites, apart from indicating the nature of impacts, it is also necessary to determine their intensity, i.e. to indicate whether they are significant (the need to determine the intensity of impacts also applies to other elements of the environment). In the case of identification of a significant negative impact on Natura 2000 sites within the meaning of Article 3.1.17 of the EIA Act, or if it is not possible to exclude this impact, pursuant to Article 55.2 of the EIA Act, the draft document cannot be adopted if the strategic environmental impact assessment shows that its implementation may have a significant negative impact on Natura 2000 sites, and not all conditions referred to in Article 34 of the Nature Conservation Act are met jointly. According to the said provision, the implementation of a document which may have a significant negative impact on Natura 2000 sites may be allowed if it is supported by the necessary requirements of an overriding public interest, including those of a social or economic nature. The above premise may be accepted only in the absence of alternative solutions and when providing environmental compensation necessary to ensure the coherence and proper functioning of the Natura 2000 network. Where a significant negative impact concerns priority habitats and species, the overriding public interest refers only to: protection of human health and life, ensuring universal safety and obtaining favourable consequences of primary importance for the natural environment. Where the adoption of a document which may have a significant negative impact on priority habitats and species results from other necessary requirements of overriding public interest, an opinion of the European Commission is required before the document is adopted. Bearing in mind the provisions cited above, if a significant negative impact on Natura 2000 sites is found, the Report should clearly demonstrate and justify the existence of the aforementioned premises.
	1.9	If there is a need to apply natural compensation, it should concern those measures which are connected with the repair of negative impact on the environment, especially on the objectives and subject of protection of Natura 2000 sites. It is therefore important to indicate which subjects of protection may be significantly affected and to propose appropriate compensation measures. It is not appropriate to transfer the analysis in this respect to the stage of issuing a decision on environmental conditions for specific projects or to the procedure for assessing the impact of a project on a Natura

Institution name	No.	Content of comments
		2000 site.
	1.10	Due to the location of the area covered by the study, it is necessary to examine and justify the possibility that the implementation of the CBC PBU provisions may cause significant environmental impacts of cross-border nature.
	1.11	It is recommended to present the location of planned activities on maps, against the background of forms of space use and important and protected elements of the environment. The validity of the spatial depiction refers to all other phenomena identified as important, of spatial nature and the interaction of these phenomena. The European Commission's guidelines for integrating climate change and biodiversity into strategic environmental assessment should also be taken into account when developing the Report.
	1.12	With regard to the future content of the CBC PBU, it would be advisable to include in this document the selection criteria for promoting projects with the lowest environmental impact.
PL GIS	2.1	The Strategic environmental assessment report on the draft Cross-border Cooperation Programme Poland-Belarus-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 the provision of information about the environment and its protection, public participation in environmental protection and environmental impact assessment, and include a qualitative and quantitative assessment of the impact of the implementation of the Programme on the individual components of the environment, and within the scope of competence of the Chief Sanitary Inspectorate provide a reliable assessment of the impact on human health, in particular in terms of: – exposure to noise, vibrations and air pollution, – threats to intakes and sources of water intended for human consumption, taking into account the areas of safeguard zones of these intakes, – threats to groundwater, in particular the Major Groundwater Reservoirs located in the country (orders, prohibitions and restrictions connected with the protection of water resources should be taken into account), – maintaining permissible noise levels in acoustically protected areas, in particular in the areas of residential buildings/human habitats, buildings connected with permanent or temporary residence of children and young people (educational facilities) and recreational and leisure areas, – ensuring appropriate ambient air quality standards.
	2.2	It would be advisable to consider including in this document, within the scope of possible health risks, issues relating to protection from EMF electromagnetic radiation.
	2.3	The Strategic environmental report should refer to the full version of the draft document and cover all planned measures likely to have a significant impact on the environment both at the implementation and exploitation stage. If at a later stage the draft document is extended by additional provisions relevant for the adequacy of the strategic environmental impact assessment, they should also be included in the Environmental Report.
	2.4	Moreover, if a risk of negative impact on human health and life, connected with implementation of measures envisaged in the Programme, is identified, the environmental report on the draft Programme should particularly refer to possible methods of their effective elimination or maximum reduction.

	2.5	In addition, pursuant to the wording of Article 3(2) of the Act of 3 October 2008 on the provision of information about the environment and its protection, public participation in environmental protection and environmental impact assessment, it should be emphasised that whenever the Act refers to environmental impact, it is also understood as impact on human health.
BY MNR&EP[7]	3.1	Acceptance of the proposed scope.
UA NA[8]	4.1	In recent years, the scope of environmental reporting has been widened, and information on social aspects can be a part of the document. Maybe in our case the information on training and education of personnel in the field of ecology should be included into the report.

3. OBJECTIVES AND MEASURES PROPOSED IN THE PROGRAMME

The Programme will pursue the policy objectives set out below and the objectives of the Interreg Programme, as detailed in the relevant EU regulations:

- **Policy objective 2** - A greener, low-carbon transitioning towards a net zero carbon economy and resilient Europe…
- **Policy objective 4** - A more social and inclusive Europe…
- **Interreg specific objective 1 -** A better cooperation governance.

The Programme envisages the implementation of the objectives and measures presented in the table below.

Table 2. The objectives and measures of the Programme

Selected policy objectives or selected specific objectives for Interreg	Selected specific objective	Actions
Policy objective 2: A greener, low-carbon transitioning towards a net zero carbon economy and resilient Europe…	2.1 Promoting climate change adaptation, and disaster risk prevention and resilience, taking into account eco-system based approaches	1. Joint promotion and implementation of activities related to a low-carbon economy and resilience to climate change. 2. Joint actions in the field of adaptation and protection against floods, inundations, droughts, desertification, erosion and risk management regarding this area. 3. Joint actions in the field of adaptation and protection against fire, natural disasters and other local threats as well as the risk management regarding this area. 4. Joint actions aimed at prevention and management of risks related to anthropogenic activities.

[7] Ministry of Natural Resources and Environmental Protection of Belarus

8 Central executive authorities in the field of environmental protection and human health

Selected policy objectives or selected specific objectives for Interreg	Selected specific objective	Actions
	2.2 Promoting access to water and sustainable water management	1. Joint actions aimed at protection and improvement of water resources' condition. 2. Joint actions aimed at development of sewage infrastructure and improving wastewater management. 3. Joint promotional and educational actions related to sustainable water management.
	2.3 Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution	1. Joint actions aimed at protection, regeneration and sustainable use of valuable natural areas, with particular emphasis on cross-border areas. 2. Joint promotional and educational actions expanding knowledge of residents about nature protection and raising awareness of natural valuable areas. 3. Joint actions aimed at protection of nature and biodiversity and development of green infrastructure. 4. Joint actions aimed at monitoring the condition of the environment, as well as identifying and improving the condition of areas with exceeded environmental quality standards.
Policy objective 4: A more social and inclusive Europe…	4.1 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	1. Joint actions improving access and infrastructure development of diagnostic and prophylactic tools and resources in various areas of medicine. 2. Joint actions improving access to specialist medicine, in particular medicine related to cardiovascular diseases, cancer (development of health infrastructure, support for the equipment of healthcare facilities) and emergency medicine. 3. Joint actions improving access to long-term care, especially infrastructure development for geriatric and palliative care. 4. Joint actions preventing the occurrence and effects of adverse events such as epidemics (with particular emphasis on local phenomena). 5. Joint actions aimed at development of digitization in health care (including the development of telemedicine). 6. Joint actions improving the qualifications of medical and rescue personnel.
	4.2 Enhancing the role of culture and sustainable tourism in economic development, social inclusion and social innovation	1. Joint actions aimed at protection, development and promotion of cultural heritage and services in the field of culture, including development of tourist infrastructure. 2. Joint actions aimed at protection, infrastructure development and promotion of natural heritage

Selected policy objectives or selected specific objectives for Interreg	Selected specific objective	Actions
		and ecotourism. 3. Joint actions aimed at adaptation of skills and professional qualifications in the field of tourism to the needs of the tourism market and changes within.
Interreg specific objective 1. A better cooperation governance	I.1.1 Enhancing 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	1. Increasing and improving the quality of cross-border cooperation between entities in the Programme Area. 2. Improving the access to information on legal, fiscal and formal conditions related to e.g. running a business in each countries of the Programme Area, stimulating economic ties, supporting clusters or promoting jointly operating organizations of entrepreneurs and organizing joint ventures, which may result in the economic development of the support area. 3. Support in the implementation of consulting services assistance to entities applying for additional financial resources (e.g. by helping in creating business plans, drawing up contracts, filling out applications etc.). 4. The creation of open data banks regarding the Programme Area, including statistics on the socio-economic, environmental situation and prospects for sustainable development of the area, changes taking place and available investment areas, which may result in the economic development of the support area. 5. Promoting cooperation between border services, customs services and other services related to the operation of border crossings (including phytosanitary and veterinary services) by common trainings and improving the quality of service on border crossings, including purchase of necessary equipment.
	I.1.2 Building up mutual trust, in particular by encouraging people-to-people actions	1. Joint bottom-up initiatives for the integration of the inhabitants of the Programme Area, including promotion of volunteering. 2. Integrating residents through cross-border events related to environment, art, culture and heritage of the Programme Area. 3. Joint actions aimed at supporting local initiatives and leadership. 4. Cross-border cooperation of educational facilities including integration and educational activities. 5. Cross-border transfer of innovative solutions aimed at undertaking and strengthening further

Selected policy objectives or selected specific objectives for Interreg	Selected specific objective	Actions
		cooperation between research and scientific centres.

The Programme is connected with and will contribute to the implementation of global, EU and national objectives of Poland, Belarus and Ukraine in the field of sustainable development, including environmental protection and climate change. A detailed analysis of the compliance of the Programme with the objectives of these documents is included in sub-section 5.2.

4. ANALYSIS OF THE ENVIRONMENTAL CONDITION IN THE AREAS COVERED BY THE PROGRAMME

The environmental and sustainability challenges that Europe is currently facing have their roots in global solutions that have been in place for decades. Together with the clearer nature and scale of global environmental and climate challenges, they have changed the environmental acquis. They are increasingly shaped by ambitious, long-term visions and objectives. The EU's environmental policy is set out in three thematic priority areas included in the 7th EAP:

- to protect, conserve and enhance the European Union's natural capital,
- to turn the EU into a resource-efficient, green and competitive low-carbon economy, and
- to safeguard the EU citizens from environment-related pressures and risks to health and well-being.

In addition, in recent years, the European Union has adopted a number of strategic legal frameworks focused on transforming the EU economy and individual systems (e.g. energy, transport) in such a way as to ensure prosperity and fair treatment while protecting ecosystems. This framework complements the United Nations (UN) Sustainability Objectives, which justify the need for transformative changes taking into account the interrelationship between social, economic and environmental objectives.

Noise, air pollution and climate change continue to affect human health and quality of life. The acceleration of climate change is likely to increase risks. Heat waves, forest fires, floods and changes in the incidence and seasonality of infectious diseases may have such effects. Moreover, environmental health risks do not affect everyone in the same way.

There are significant local and regional differences across Europe in terms of the vulnerability and exposure of the population to such risks. In general, the outlook for reducing environmental risks to human health and quality of life is uncertain. Systemic threats to health are complex, and the knowledge base on this topic contains significant gaps and uncertainties.

Given Europe's long-term vision and complementary policy objectives, Europe is not making sufficient progress in meeting environmental challenges. The rationale behind SOER 2020's assessment of recent trends and forecasts is clear: the policy assumptions are more effective in reducing environmental impacts than in protecting biodiversity and ecosystems as well as human health and quality of life. Despite the

successes of the European way of managing environmental protection, permanent problems do not disappear, and the outlook for Europe's environment in the coming decades is discouraging. However, Europe has achieved its objectives in terms of the designation of terrestrial and marine protected areas, and some species have been restored. However, most of the other objectives are unlikely to be achieved. However, the European Union still has a long way to go to achieve good ecological status for all water bodies by 2020. Spatial planning has improved, but there is a further increase in landscape fragmentation leading to the destruction of natural habitats and biodiversity. Air pollution continues to affect biodiversity and ecosystems, and 62% of the area occupied by European ecosystems is exposed to excessive concentrations of nitrogen compounds causing their eutrophication. The impact of climate change on ecosystems and biodiversity and the loss of biodiversity, overexploitation of resources and emissions of harmful substances from activities related to agriculture, fisheries, transport, industry and energy production are projected to increase. [9]

Europe has had some success in protecting citizens from environmental threats to human health and quality of life. For example, the quality of drinking and bathing water in Europe is generally high.

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

- Protection and preservation of the natural capital of common bird species,
- The state of ecosystems and biodiversity in the seas,
- Impact and influence on marine ecosystems,
- Urbanisation 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 environmental noise and its impact on human health,
- Chemical pollution and threats to human health and quality of life,
- Threats to society posed by climate change.

In conclusion, the SOER 2020 analysis highlights the permanent and urgent nature and scale of the challenges facing Europe. It is still possible to achieve the EU's vision for sustainable development by 2050, but it will require a change in the nature and level of ambition of the actions. This means both strengthening the policy tools adopted and using them in new innovative management solutions. On the basis of the information contained in the report, several important areas have been identified where action needs to be taken to make the transition possible.

Clusters of drivers of environmental change in Europe include:

- A growing and migrating global population,
- Diversifying values, lifestyles and governance approaches,
- Power shifts in the global economy and geopolitical landscape,
- Climate change and environmental degradation worldwide,
- Increasing scarcity and global competition for resources,
- Accelerating technological change and convergence.

[9] The European environment 2020, State and outlook, Synthesis, EEA 2020 https://www.eea.europa.eu/soer/2020

Global use of material resources increased tenfold between 1900 and 2009 (Krausmann et al., 2009). It has continued to increase in recent years with projections suggesting a doubling of demand by 2060 (IRP, 2019). This raises concerns about access to key primary and secondary raw materials and poses a challenge for economies that are dependent on materials from international markets.

Likewise, global demand for land is projected to continue, in particular since 25-100% more food would be required globally by 2050, depending on socio-economic and technical assumptions (Hunter et al., 2017). Demand for biofuels is also expected to rise (OECD/FAO, 2018), and agriculture is projected to be increasingly compromised by the combined effects of climate change and soil degradation (UNCCD, 2017).

Similarly, global demand for water is projected to rise by 55% until 2050, assuming a continuation of current policies and socio-economic trends (OECD, 2012).

Transformation towards a greener European economy will ensure the long-term environmental sustainability of Europe and its neighbourhood. In this context, shifts in attitudes will be important. Together, regulators, businesses and citizens could participate more widely in managing natural capital and ecosystem services. In this way, new and innovative ways to use resources efficiently can be created and equitable fiscal reforms designed. Using education and various social media, citizens can be engaged in tackling global issues such as meeting the 2°C climate target.

When approaching the assessment of the state of the environment at the level of the Programme Area, it is worth noting the above-mentioned issues and challenges.

The Programme Area is characterised by rich environmental resources, high biodiversity and a very diverse landscape. The rich cultural heritage of the region is also worth highlighting, both on the Ukrainian, Belarusian and Polish sides. The Programme Area is one of the most valuable natural regions in Europe. Hence, it is justified to shape development priorities in such a way as not to create threats to its natural resources or disturb the balance between human activity and the needs of environmental protection.

The purpose of the analysis of the state of the environment in the area covered by the Programme is (based on the environmental assessment, and in terms of individual elements of the environment, with particular emphasis on those elements which may be affected by the implementation of the Programme) to identify the most important environmental issues, including the most sensitive elements of the environment and drivers of adverse effects in the environment. Analyses of the state of the environment will provide a basis for the possibility of the Programme to influence solving of existing problems and threats, and on the other hand, to evaluate possible negative impact of the Programme on the environment. The results will also be used to draw conclusions as to the criteria for selection of projects to be implemented under the Programme.

In order to formulate conclusions within the above mentioned scope, the analysis included:

- available on the Polish side: reports on the state of the environment in the voivodeships: Podlaskie[10], Podkarpackie[11] and Lubelskie[12] and the CIEP (GIOŚ) report on the state of the

10 State of the environment in the Podlaskie Voivodeship Report 2020, GIOŚ (CIEP) Białystok, 2020.

11 State of the environment in the Podkarpackie Voivodeship Report 2020, GIOŚ (CIEP) Rzeszów, 2020.

12 State of the environment in the Lubelskie Voivodeship Report 2020, GIOŚ (CIEP) Lublin, 2020.

environment in Poland[13], CSO data, forecasts made so far for strategic and operational programmes covering the area under analysis and other available materials,

- on the Ukrainian side: Report on the state of the environment of Ukraine and regions, State Statistic Service of Ukraine, development plans, data published on the websites of the Ministry of Environment of Ukraine, Ministry for Communities and Territories Development of Ukraine and other available materials,
- on the Belarusian side: National Report on the state of environment of the Republic of Belarus, statistical compilations on environmental protection, results of observations of the National Environmental Monitoring System of the Republic of Belarus, data published on the websites of the Ministry of Natural Resources Use and Environmental Protection and the National Statistical Committee of the Republic of Belarus[14], natural resource inventories, and other available materials.

The synthesis of the analysis is presented below in relation to specific areas of environmental protection in accordance with the EEA scheme, in order to make it easier to refer to the European trends from the 2020 SOER report. [15]

4.1. AMBIENT AIR

In the area of envisaged support, air quality does not comply with the limit values and target values for PM10 and PM2.5 and benzo(a)pyrene in the air. The biggest problem is the air quality in the number of days with exceedance of the PM10 limit value on the Polish and Ukrainian sides.

Poland[16]

The main source of air pollution in the area covered by the Programme is anthropogenic emission from the municipal and housing sector (surface emission), from communication (line emission) and from industrial activities (point emission). The influx of pollutants from the rest of Poland also has a significant share in the concentrations of substances in the area of Podlaskie, Lubelskie, Podkarpackie voivodeships. The substances with the highest share in pollutant emissions include: suspended dusts and nitrogen oxides. The remaining pollutants emitted from industrial plants result from the type of production and the technology used. However, according to the reports on the state of the environment for the voivodeships included in IA, the greatest share in the emission balance is from surface sources related to the municipal-housing sector, especially for PM2.5, PM10 and benzo (a) pyrene.

Annual air quality assessments for the area of the Podlaskie, Lubelskie and Podkarpackie voivodeships indicate the occurrence in areas of exceedances of the limit or target values. In the years 2013-2019, low sulfur dioxide concentrations were recorded in the Lubelskie, Podlaskie and Podkarpackie voivodeships. Average annual concentrations of SO2 at the stations in the largest cities of the supported area ranged from 3 µg / m^3 to 9 µg / m^3.

13 State of the environment in Poland. Signals 2019, Environmental Monitoring Library, Warsaw 2020

14 https://www.minpriroda.gov.by/en/

15 The European Environment 2020, State and Outlook, Synthesis, EEA 2020

16 Report on the state of the environment in the Podkarpackie Voivodeship. 2020 Report; Report on the state of the environment in the Lubelskie Voivodeship. 2020 Report; Report on the state of the environment in Podlaskie Voivodeship. 2020 Report; annual air quality assessments of CIEP 2020

The values of annual average nitrogen dioxide concentrations in 2013-2019 showed values significantly below the permissible level. In the largest cities of the area, they ranged from 10 µg / m^3 to 23 µg / m^3 and accounted for 25% to 58% of the permissible level.

In the period from 2013 to 2019, the average annual concentrations of PM10 suspended dust measured in the largest cities of Podlaskie and Lubelskie were high, but did not exceed the limit value. In the Podkarpackie Voivodeship, however, the limit value for the average annual concentration in 2013 and 2015 was exceeded. The greatest problems in air quality are caused by the compliance with the norm of 24-hour concentration of PM10 dust, especially in winter. In 2013-2018, most stations exceeded the permissible frequency of exceedances of 35 days in a calendar year (for 50 µg / m^3). The exceedances apply to the autumn and winter period due to the increased emission of pollutants from municipal sources (individual heating boilers, fireplaces, etc.). In the case of the number of exceedances of the permissible daily value for PM10 dust, no constant trend can be determined, as this number depends largely on meteorological conditions, such as temperature, wind force and precipitation. In the years 2013-2019, the most days with the daily norm was exceeded in Jarosław in the Podkarpackie Voivodeship (from 58 to 98 exceedances per year). There have been no exceedances in Podlaskie Voivodeship since 2016. In 2019, there were no exceedances in the Lubelskie and Podlaskie voivodeships, while in the Podkarpackie Voivodeship, the exceedance occurred only at one station in Dębica, which proves a significant improvement in air quality this year, mainly due to changes in meteorological conditions.

The average annual concentrations of PM2.5 in the years 2013-2019 in the Lubelskie voivodeship ranged from 19 µg / m^3 to 28 µg / m^3, i.e. up to 112% of the permissible level of 25 µg / m^3. The highest values exceeding the permissible level were recorded in Lublin, Biała Podlaska and Chełm. In these voivodeships, the highest concentrations, and at the same time the permissible level was exceeded, were in Łomża, while at other measuring stations the concentrations did not exceed 25 µg / m^3. In the Podkarpackie Voivodeship, the annual average concentrations of PM2.5 in 2018 did not exceed the limit value, but often accounted for 100% of this value, while in 2019 it was exceeded in Dębica. In 2019, air quality improved significantly, which was affected by meteorological conditions in the Programme Area.

The volume of PM10 and PM2.5 emissions, in addition to dust emissions from industry, is significantly influenced by the so-called low emissions, i.e. pollution from home furnaces, mainly old and ineffective stoves and boilers. The remedial actions carried out for many years on the Polish side have resulted in changes in the concentration levels in recent years. However, the greatest air quality problem is the emission of benzo (a) pyrene from burning solid fuels in old appliances. The measurement results obtained in the years 2013-2018 show high values of the annual average concentration of benzo (a) pyrene. Among the Subcarpathian cities covered by the measurements, the greatest air pollution with benzo (a) pyrene was found in Dębica, where average annual concentrations accounted for 710-910% of the target level. In the Lubelskie Voivodeship, the highest exceedance occurred in 2015 in Biała Podlaska and amounted to 5.4 ng / m^3, with the target standard being 1 ng / m^3.

Despite the constant improvement of air quality in the Polish part of the supported area, the exceedances of the standards for substances such as PM10 dust, PM2.5 dust and benzo (a) pyrene may still occur, especially due to the tightening of the standard for PM2.5 from 2020.

Ukraine

The problem of air pollution is formidable throughout Ukraine and within the Programme Area. The contribution of the energy and mining industries, as well as automobiles is significant. The main pollutants

are oxides of carbon, nitrogen, sulphur dioxide, ammonia, phenols, formaldehyde, benzopyrene. However, the pace of new technologies introduction and installation of necessary equipment is rather slow.

In 2018 the total amount of pollutant emissions in regions of Ukraine was 356,5 thousand tons, and in 2019 – 322,2 thousand tons. Emissions took about 14% and 13% of Ukraine's total emission, respectively.

According to measurements carried out by the Ukrainian Central Geophysical Observatory, the average value of suspended solids (TSP) in the air of Ukrainian cities was 120 μg/m^3, and peak values reached 1800 μg/m^3 in 2016. In the city of Kiev the average daily TSP values range from 100 to 200 μg/m^3. PM2.5 pollution in the cities of Kyiv, Kharkiv and Lviv often indicates values higher than the maximum permissible level according to European standards (25 μg/m^3).

There is no systematic monitoring of PM10 and PM2.5 pollution in Ukraine, in accordance with the implementation of the requirements of Directive 2008/50/EC. Thus to date, official data on the average annual values of PM10 and PM2.5 are not available. In fact, air pollution is recorded in real time in the framework of some non-governmental initiatives. Such data show the range of daily fluctuations is quite wide, from 20 to 1450 μg /m^3 for PM10 and from 5 to 300 μg/m^3 for PM2.5, but the lack of series of observations does not allow considering trends.

Due to the reports of the Ukrainian Central Geophysical Observatory there are two monitoring stations for transboundary transfer of pollutants in the Programme Area (Svitiaz village, Volyn Oblast and Shabelnya village, Lviv Oblast). Here, during 2018-2019, the average annual concentrations of sulphur dioxide and nitrogen dioxide were not exceeded, but in some cases the 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 PM2.5) in 2019 was 8.2 (high), which is slightly more than in 2018 (7.6). In particular, in the Programme Area, the highest API's value was in Lutsk (7.7), Rivne (7.5), Lviv (7.1), quite high – in Uzhgorod (6.4), low - in Ternopil (4.0) and Ivano-Frankivsk (3.9).

It should be noted that the air quality within the Programme Area is slightly higher than in other, especially industrial regions of Eastern Ukraine. The main trend over the last 10 years is stabilization, sometimes a slight reduction in emissions, but measures to improve air quality are still needed.

Belarus

In the Belarusian part of the Programme Area concentrations of PM10 in ambient air are controlled in Minsk and oblast capitals – Brest, Gomel and Grodno. Concentrations of PM2.5 are controlled in Minsk and Zhlobin – a city with a metallurgical industry. Air quality is assessed in accordance with established national methodology and the requirements of the Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.

The results of observations on the atmospheric air monitoring network show that the state of atmospheric air in most industrial centres is generally satisfactory. Annual average concentrations of PM10 in Minsk, Brest, Gomel and Grodno do not exceed the limit value. The number of days with exceedance of the daily PM10 standard exceeded the target value only in Gomel in 2018 – 56 days versus 35 allowed.

Annual average concentrations of PM2.5 in Zhlobin exceed the limit value – 1.3 times in 2018 and 1.7 times in 2019. In Minsk annual average concentrations of PM2.5 in 2018–2019 were at the level of MPC. In Zhlobin

the number of days with exceedance of the daily PM2.5 standard in 2019 reached 134 and exceeded the target value.

In general, PM10 and PM2.5, as well as formaldehyde and ground level ozone, are the main "problematic" pollutants that determine urban air quality in Belarus. According to the data of long-term observations, it is possible to distinguish a "classic" period when the proportion of days with concentrations of PM above the quality standard increases: this is spring period, preferably March and April. The reason for such increase is the lack of precipitation, dust raised from non-turfed areas, as well as anthropogenic sources of emissions – fuel combustion with mobile and stationary sources, industrial processes, abrasion of the roadway by mobile sources, tire wear.

In contrast to the concentrations of PM10 in ambient air in Belarusian cities, which are remaining more or less low and stable in recent years, concentrations of PM2.5 in Zhlobin are increasing: the annual average concentration has increased 2.5 times from 2015 to 2019 (from 10 to 25 µg/m^3).

Data from Ukrainian measurement stations indicate a situation, in this respect, similar to that in the Polish part of the eligible area, but it is hard to fully compare because of the Ukrainian monitoring system is different than in Poland. However, measuring stations continue to record exceedances according to the results indicated in the table below.

Table 3. The amount of PM10 and PM2.5 concentrations in the air at measuring stations located in the Programme Area in 2018 and 2019[17].

Location of the station		Station code	PM10 annual average concentration [µg/m^3]		PM10 number of days with exceedance of the daily PM10 standard [days].		PM2.5 annual average concentration [µg/m^3]	
			2018	2019	2018	2019	2018	2019
POLISH side	Lublin Obywatelska	LbLubObywate	34	26	46	23	24	20
	Biała Podlaska	LbBiaPodOrze	30	27	41	24	23	20
	Chełm	LbChelPolan	32	24	42	16	23	18
	Kraśnik	LbKrasKoszar	28	25	33	22	-	-
	Puławy	LbPulaKarpin	27	23	32	11	-	-
	Zamość	LbZamoHrubie	31	26	42	26	23	18

[17] Based on the results of CIEP measurements from the annual air quality assessment for 2018 and 2019, and the National Statistical Committee of the Republic of Belarus (https://www.belstat.gov.by/en/ofitsialnaya-statistika/macroeconomy-and-environment/) and modeling results under the Copernicus project https://www.regional.atmosphere.copernicus.eu

Location of the station		Station code	PM10 annual average concentration [µg/m³]		PM10 number of days with exceedance of the daily PM10 standard [days].		PM2.5 annual average concentration [µg/m³]	
			2018	2019	2018	2019	2018	2019
	Białystok	PdBialWarsza	24	21	17	8	19	16
	Łomża	PdLomSikorsk	28	24	34	15	29	21
	Suwałki	PdSuwPulaskp	10	20	24	7	15	12
	Jarosław	PL0554A	39	27	76	33	-	23
	Iwonicz Zdrój	PkIwonZdrRab	23	18	16	7	-	-
	Rzeszów	PkRzeszPilsu	-	22	-	7	-	20
	Rymanów Zdrój	PL0678A	22	17	10	7	19	15
	Przemyśl	PL0594A	32	24	52	21	25	19
	Krosno	PL0413A	31	27	39	26	25	20
	Rzeszów	PL0495A	31	24	47	29	23	17
	Sanok	PL0555A	30	24	40	24	-	
BELARUSIAN side	Minsk	Measurement	12	13	3	2		
	Homel	Measurement	29	29	56	33		
	Brest	Measurement	20	16	6	4		
	Hrodna	Measurement	23	20	10	10	15	
	Kobrin	Modelling	14		14		12	
UKRAINIAN side	Rivne	Modelling	16		15		13	
	Ternopil	Modelling	14		14		12	
	Lviv	Modelling	16		16		13	

Location of the station		Station code	PM10 annual average concentration [µg/m³]		PM10 number of days with exceedance of the daily PM10 standard [days].		PM2.5 annual average concentration [µg/m³]	
			2018	2019	2018	2019	2018	2019
	Lutsk	Modelling	14		14		11	
	Ivano-Frankivsk	Modelling	15		16		13	
	Uzhorod	Modelling	17		17		14	
	Mukacheve	Modelling	14		14		12	

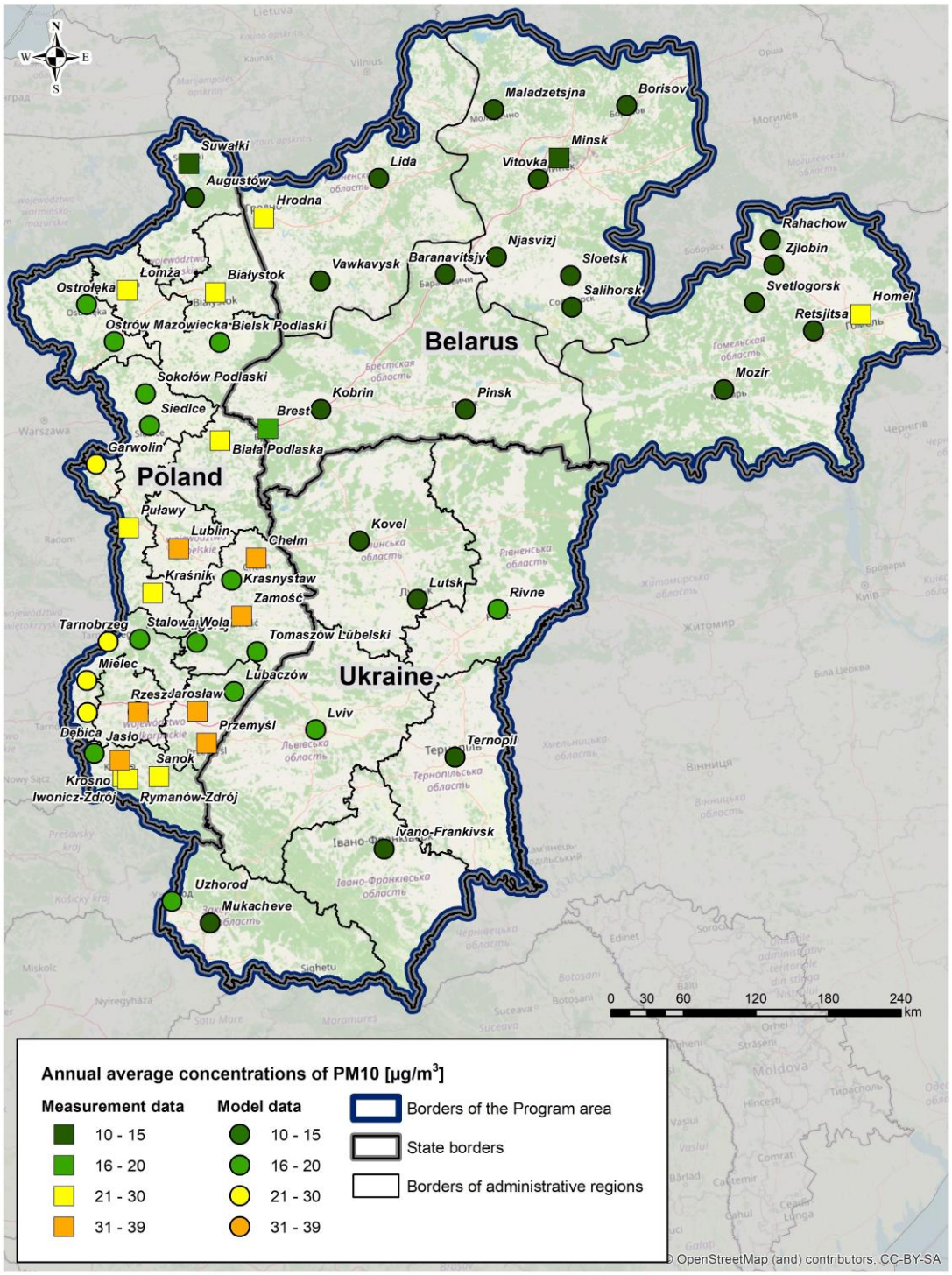

Figure 2. Annual average concentration of PM10 in 2019 in the Programme Area[18]

[18] Own elaboration based on the results of annual air quality assessment in Podlaskie, Podkarpackie and Lubelskie voivodeships, CIEP (GIOŚ) and National Statistical Committee of the Republic of Belarus and https://www.regional.atmosphere.copernicus.eu

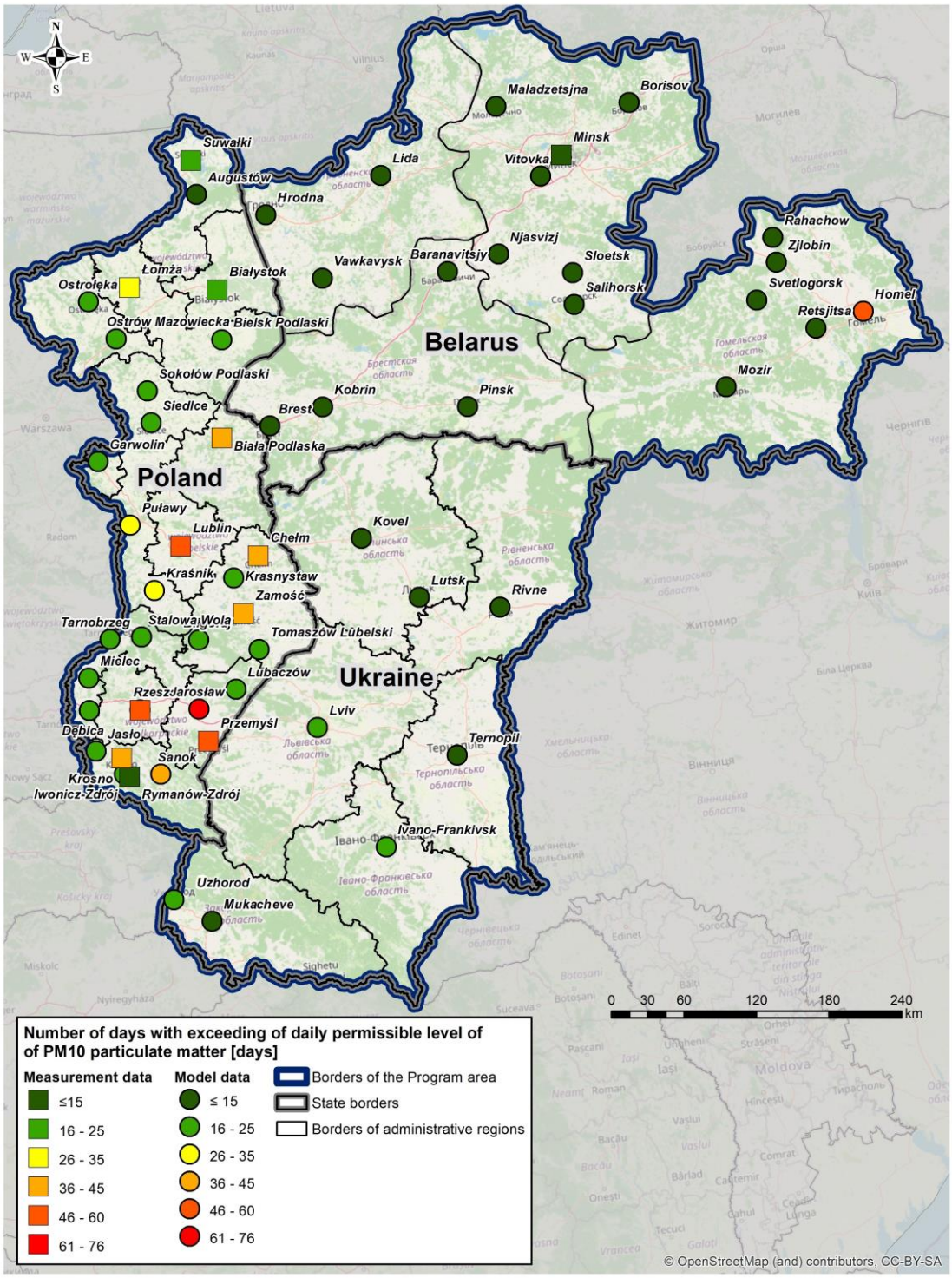

Figure 3. Number of days with PM10 exceeding the daily standard in 2019 within the Programme Area[19].

[19] Own elaboration based on the results of annual air quality assessment in Podlaskie, Podkarpackie and Lubelskie voivodeships, CIEP (GIOŚ) and National Statistical Committee of the Republic of Belarus and https://www.regional.atmosphere.copernicus.eu

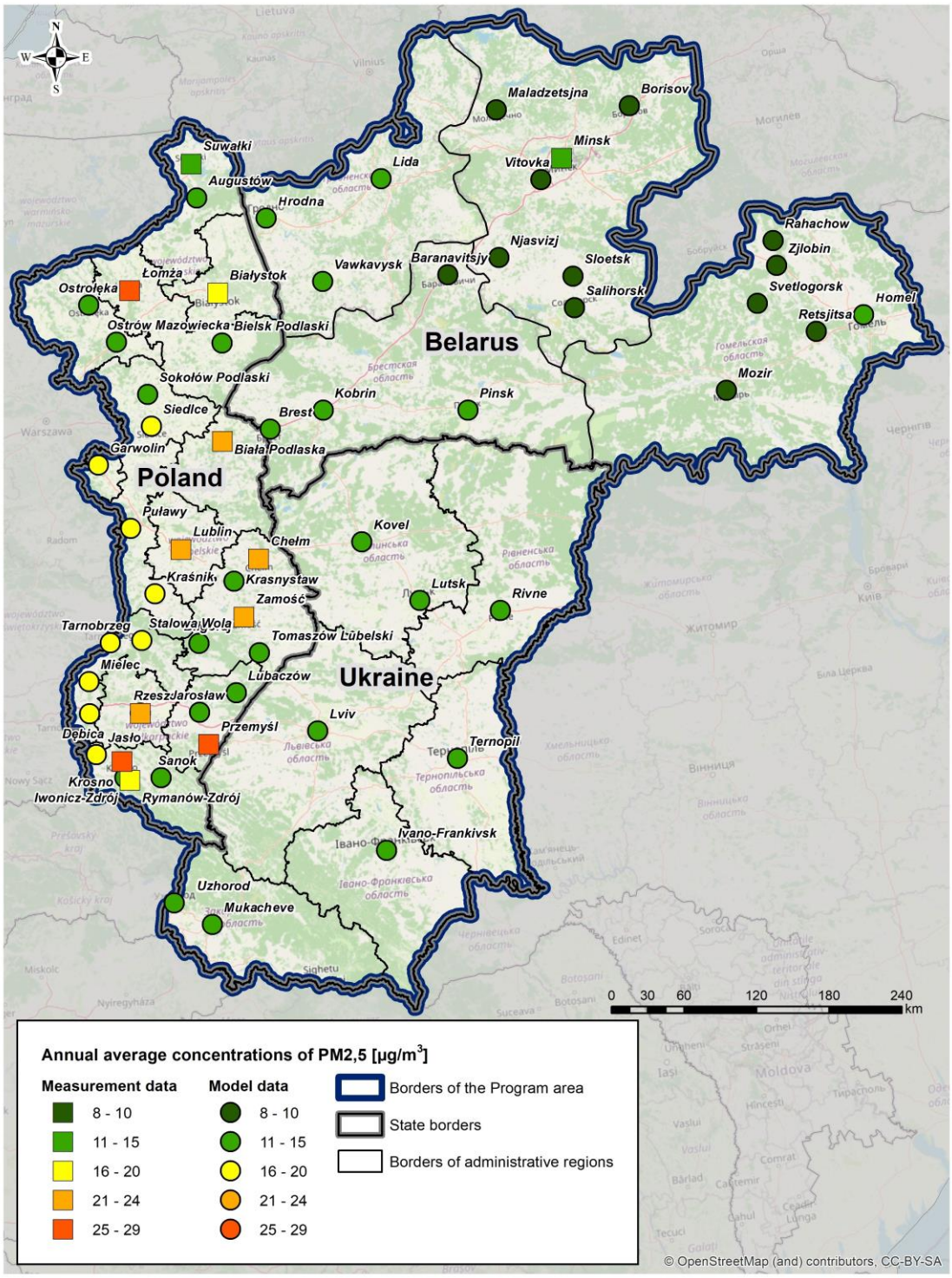

Figure 4. Annual average concentration of PM2.5 in 2019 in the Programme Area[20].

[20] Own elaboration based on the results of annual air quality assessment in Podlaskie, Podkarpackie and Lubelskie voivodeships, CIEP (GIOŚ) and National Statistical Committee of the Republic of Belarus and https://www.regional.atmosphere.copernicus.eu

SUMMARY

Air quality in the Programme area is not a significant problem in the context of planned investments under the Programme. However, special attention should be paid to the emission sources of benzo (a) pyrene and particulate matter, as there are areas of exceedance of the limit and target values.

4.2. NATURE AND BIODIVERSITY

The Programme Area is very valuable in terms of nature and landscape. It includes parts of the mountain ranges which belong to the Carpathians. The map presented in the figure below shows the distribution of protected areas in the region covered by the Programme.

A legal form of nature conservation is also the protection of species of plants, animals and fungi in order to ensure the survival and proper state of protection of wild plants, animals and fungi and their habitats. Species protection aims to ensure the survival and favourable conservation status of wild species of plants, animals and fungi that are rare, endemic, vulnerable and endangered and protected under the provisions of international agreements to which both countries are parties. This also refers to habitats and refuges of those species. Species protection also aims to preserve species and genetic diversity[21].

The environmental quality of a cross-border area is a key aspect of its inhabitants' quality of life and also determines its attractiveness for tourists. Among the cross-border areas with special natural and cultural values covered by the Programme implementation, the following should be listed successively from the north: the primeval forests surrounding the Augustów Canal (Augustów, Grodno and Dainava), the Białowieża Primeval Forest, Pobuże Podlaskie, Polesie Włodawskie, Dubienka Depression, Roztocze, Przemyśl bend of the San River and Bieszczady Mountains with its foothills. On the Polish-Belarusian border, there is the Białowieża Primeval Forest, covering vast areas of woodland. Its major part (58%) is located in Belarus. Another important element of the cross-border ecosystem is the Bug River Valley, which is a border river for all three countries involved in the Programme. The following are also important for cooperation in the field of environmental protection in the Polish-Ukrainian borderland: Western Polesie, Roztocze and Eastern Beskids. They constitute a coherent natural and cultural area and at the same time an important tourist potential of these countries.

The Programme Area is also characterised by an uneven spatial distribution of protected areas. The share of legally protected areas varies from country to country and ranges from 8% in Lviv Oblast to 75% in Krosno subregion. Poland is characterised by a high share of protected areas in the whole Programme Area reaching almost 75%. While in Ukrainian and Belarusian regions it is much lower and remains at the level of about 15% (not exceeding this value - in Ukraine it varies from 8% to 16% and in Belarus from 7% to 15%). Although in the case of Ukraine these values are the lowest, over the recent years a trend towards creation of new protected areas can be observed. Despite their small size, some Belarusian protected areas are extremely important for the conservation of many endangered bird species: aquatic warbler, greater spotted eagle, great snipe, corncrake and black-tailed godwit (limosa limosa). Main actions taken aim to enlarge the area of already existing national parks, as well as to create new ones.

Many ecological corridors of international importance cross the Programme Area: (1) the Southern Corridor (KPd) from the Bieszczady Mountains to the Ruda Forests; it passes through the Przemyskie and Dynowskie Foothills, Island Beskids, and (2) the Carpathian Corridor (KK) runs through the Bieszczady Mountains, Low

[21] M. Dworak, Protection of species of plants, animals and fungi

Beskids and Beskid Sądecki, Pieniny Mountains up to the Tatra Mountains. It connects with parts of the Carpathian Mountains lying on the Ukrainian side.

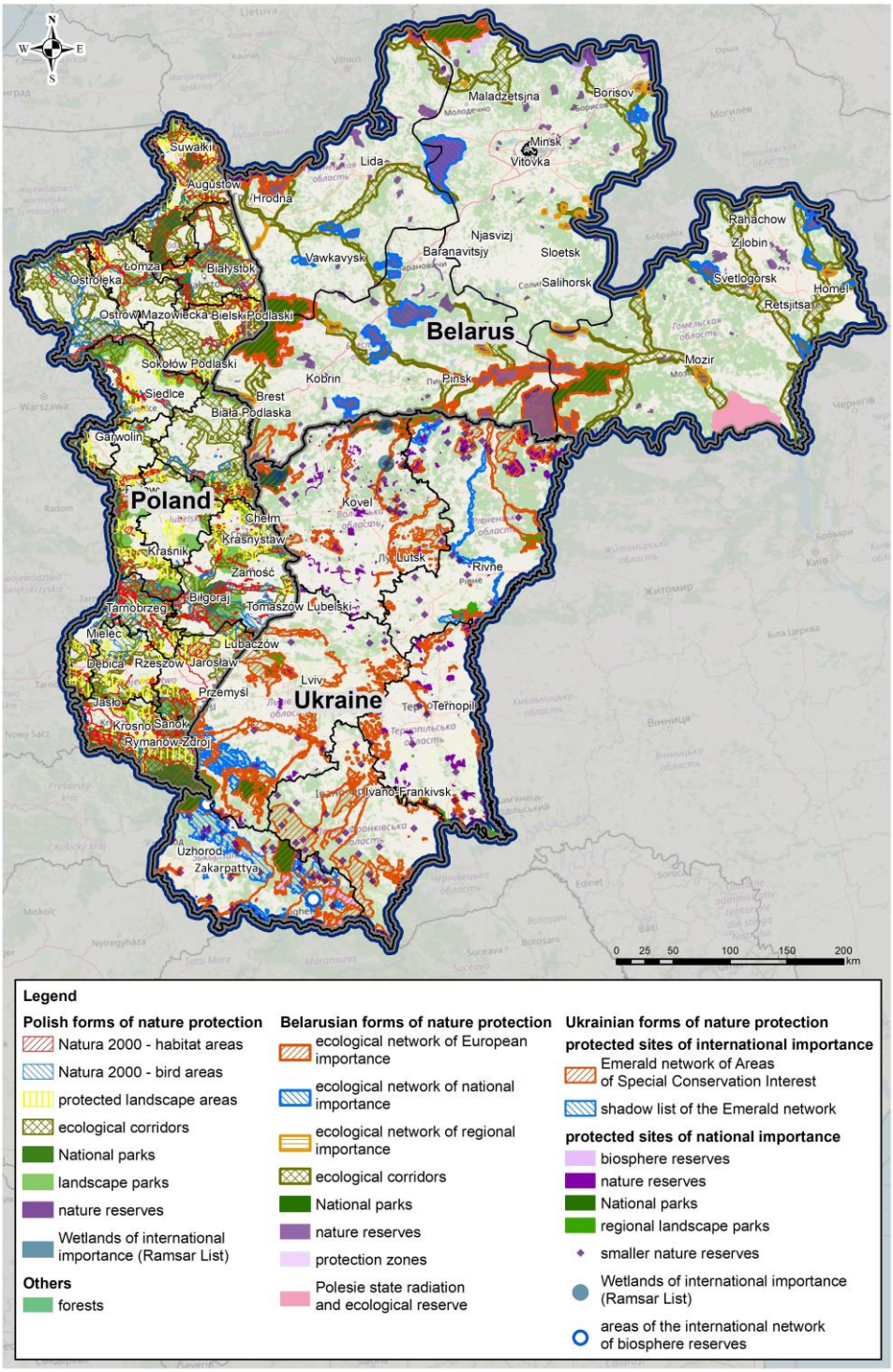

Figure 5. Nature protection in the Programme eligible area without Natura 2000 areas and Biosphere Reserves (on the Polish side) [22]

[22]Source: Own work based on data from http://geoserwis.gdos.gov.pl

A number of forms of nature protection are located in the Programme Area. The table below presents a summary description of the objects covered by individual forms of protection. It should be emphasized that the definitions of individual forms of nature protection differ in each country participating in the Programme and they can also be connected to each other and different forms of protection occur in the same area. Therefore, in the table, an attempt has been made to classify them in similar forms of nature protection, which may not correspond to their original names.

Table 4. Forms of nature protection (apart from species protection of plants, animals and fungi) [Source: Own study based on GDOŚ (GDEP) data http://crfop.gdos.gov.pl*]* [23]

No.	Forms of nature conservation	Number of protected objects in the area of CBC PL-BY-UA 2021-2027			Surface area of protected objects in the area of CBC PL-BY-UA 2021-2027 [km^2]		
		PL	BY	UA	PL	BY	UA
1.	National parks	8	3	20[24]	1 564,39	3 666,43	4 365.1
2.	Nature Reserves	318	224	5	513,33	10 763	622.1
3.	Landscape parks	28	-	21	6 930,47	-	2 116.1
4.	Protected landscape areas	69	-	-	14 291,64	-	-
5.	Natura 2000 sites	233	-	-	27 099,06	-	-
6.	Monuments of nature	5491	593	1402	-	94	76.2
7.	Documentation sites	33	-	-	25.177	-	-
8.	Ecological lands	945	-	-		-	-
9.	Nature and landscape complexes	20	-	-		-	-
10.	Biosphere reserves	4	1	1	6 383,97	580,4	-
11	RAMSAR sites	4	16	7	914,26	5202,25	1 286,9

Poland

The high proportion of protected areas in Poland is mainly due to varied topography, transitional climate and geological and soil variability. In the Programme Area on the Polish side there are 8 national parks: Wigry NP, Biebrza NP, Narew NP, Białowieża NP, Polesie NP, Roztocze NP, Magura NP and Bieszczady NP; 30 landscape parks, about 318 nature reserves and many forms of nature conservation, such as: protected landscape areas (69), documentation sites (33), ecological utilities (945), nature and landscape complexes

[23] Own study based on GDOŚ data http://crfop.gdos.gov.pl and consulted by experts from Belarus and Ukraine

[24] https://www.nationalparks.in.ua/pryrodni-parky/ (National parks of Ukraine), https://www.google.com/maps/d/viewer?mid=1KeD07qEYVEl1rUzuDCQkbaJuQZsKDWdM&ll=50.324422731417584%2C25.165011473272322&z=8, https://zakon.rada.gov.ua/laws/show/526/2020#Text.

(20) and nature monuments (5,491). Additionally, Białowieża NP, Łuknajno Lake, Western Polesie and Eastern Carpathians due to their natural uniqueness were recognised by UNESCO as Biosphere Reserves, and Białowieża NP is also a UNESCO World Heritage Site. The Białowieża NP together with the Bieszczady NP were honoured with a diploma awarded by the Council of Europe. Some of the wetlands included in the Programme due to their natural values of international importance, are also protected under the Ramsar Convention, such as Wigry NP, Biebrza NP, Narew NP, Polesie NP, Rospuda Valley and Łuknajno Lake.

On the Polish side, national and landscape parks[25] cover a total of about 8,494 km^2, which constitutes approx. 2.7% of the entire Programme Area and 11.2% of the Polish part of the area. The Natura 2000 habitat areas cover about 10,802.8 km^2 which is about 14% of the Polish territory, while the Natura 2000 bird areas cover about 16,296.2 km^2. There are about 233 Natura 2000 sites within the Polish part of the area, some of which are located on the border of the Programme. The Natura 2000 network in the Polish part of the area includes all 8 national parks mentioned above, which in whole or in part are protected under the European Natura 2000 network as Special Areas of Conservation (SACs) and Special Protection Areas of Birds (SPAs).

It should be stressed that the ecosystems existing in the Polish, Ukrainian and Belarusian part of the Programme Area permeate one another and the formal boundaries are not important for the functioning of the ecosystems.

The most endangered plant species (according to the Polish Red Book of Plants) include: round-headed leek (Allium rotundum), candle larkspur (Delphinium elatum), hastate orach (Atriplex calotheca), Laserpitium archangelica, alpine saxifraga (Saxifraga nivalis). Extremely endangered animal species (according to the Polish Red Book of Animals) include: capercaillie, wigeon, ruff, greater spotted eagle, short-toed snake eagle and Aesculapian snake.

The analysed area covered by the Programme in Poland includes the following SPAs: PLB 200006 Biebrzańska Refuge , PLB 280008 Piska Forest, PLB 280007 Napiwodzko-Ramudzka Fores , PLB 200001 Narew River Swampy Valley , PLB 200002 Augustów Forest, PLB 200003 Knyszyn Forest, PLB 140014 Lower Narw Valley, PLB 140005 Dolina Omulw and Płodownica Valley, PLB 140007 Wite Forest, PLB 140001 Polesie, PLB 140004 Middle Vistula Valley, PLB 140006 Breakthrough of the Vistula in Małopolska, PLB 060015 Podedworze Water Reservoir, PLB 060014 Mosty-Zahajki Sacred spot , PLB 060001 Bubnów Swamp, PLB 060020 Nielisz Water Reservoir, PLB 060013 Upper Łabuńka Valley, PLB 060012 Roztocze, PLB 060017 Upper Huczwa catchment area, PLB 060021 Sołokija Valley, PLB 060018 Szyszła Valley, PLB 180005 Sandomierska Forest, PLB 180003 Słonne Montains, PLB 140001 Upper Bug Valley, PLB 140002 Liwiec Valley, PLB 060003 Middle Bug Valley, PLB 060006 Parczew Forest, PLB 060004 Tyśmienica Valley, PLB 060002 Chelm's carbonate peat bogs, PLB 060007 Strzelce Forest, PLB 060008 Solska Forest, PLB 060005 Janów Forest and PLB 180001 Przemyskie Foothills.

The analysed area covered by the Programme includes the following SACs: PLH 20000 Suwalska Refuge , PLH 200001 Jeleniewo, PLH 200004 Wigierska Refuge, PLH 200008 Biebrza Valley, PLH 200002 Narew marshes, PLH 200014 Shelters of the Brest Fortifications Region, PLH 140013 Lucynowsko-Mostowieckie Dunes, PLH 00005 Augustowska Forest, PLH 060015 The Nałęczów Plateau, PLH 060005 Middle Wieprz Valley, PLH 060021 Świdnik, PLH 060007 Gościeradów, PLH 060031 Uroczyska Lasów Janowskich, PLH 140011 Nadbużańska Refuge, PLB 140001 Lower Bug Valley, PLH 140007 Kantor Stary, PLH 060001 Chmiel, PLH

[25] It should be noted that the formal and legal statutes of national and landscape parks differ on both sides of the border.

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 Adits in Senderki, PLH 060035 Westowołyńska Valley of the Bug, PLH 140004 Dąbrowy Seroczyńskie, PLH 060002 Czarny Las, PLH 060061 LasOrłowski, PLH 060008 Hubale, PLH 060059 Drewniki, PLH 060010 Kąty, PLH 060011 Krowie Bagno, PLH 060019 Suśle Wzgórza, PLH 060009 Uściwierskie Lakes, PLH 060058 Wolica Valley, PLH 060006 Gliniska, PLH 060027 Wygon Grabowiecki, PLH 060016 Popówka, PLH 060017 Roztocze Środkowe, PLH 060023 Chełm peat bogs, PLH 060014 Pastures by the Huczwa river, 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 Magurska Refuge, PLH 120033 Bednarka, PLH 180016 Rymanów, PLH 180018 Trzciana, PLH 180009 Adit in Węglówka, PLH 180011 Jasiołka, PLH 180015 Łysa Góra.

Additionally, within the Programme Area there are 4 PLC areas where the boundaries of the PLB bird areas coincide with those of the PLH habitat areas. These include: PLC 200004 Białowieża Primeval Forest, PLC 200002 Refuge in the Upper Narew Valley, PLC200003 Narew Ravine Valley and PLC 180001 Bieszczady Mountains.

Bialowieża National Park, located on the border between Poland and Belarus, is the oldest reserve in Europe. The Bialowieża Primeval Forest lies on the border of Brest and Grodno Oblasts (covers an area of 1,501 km^2) and extends westwards, also across the border to the territory of Poland, and 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 famous for the world's largest wild herd of the European bison. This species was hunted to total extinction in the early 20th century, but survived in some zoos and thus was able to be reintroduced to the wilderness. Wolves, deers, elks and wild boars are also found in the fauna of the national park. In many places in the Park the natural cover of plant communities has been preserved. The most characteristic and schematic is the arrangement of forest communities in the valleys of watercourses.

Biebrza National Park has a number of very valuable habitat areas. Over 40% of the park's area is covered by hydrogenic habitats. Natural communities are dominated by (non-forest): sedges, mosses and rushes, as well as (forest): alder, birch and swamp forests. Aquatic ecosystems are represented by the Biebrza River with its tributaries and numerous oxbow lakes. The Biebrza River and its oxbow lakes, which are permanently or periodically connected to the mainstream, create perfect conditions for the development of ichthyofauna. So far, 38 fish species have been recorded in the Biebrza River and its tributaries, including the rare Ukrainian brook lamprey. The species composition of ichtyofauna in the Biebrza River basin differs from that observed in other lowland rivers in Poland. It is dominated by carp fish from the phytophilous reproductive group, i.e., roach, bleak, pike, rudd, weatherfish and spined loach. The highest index of stability of occurrence (over 80%) is characterized by 3 species: roach, pike and burbot. In the scale of the whole Park the most important are two factors threatening the existence of many ecosystems and their natural values: drainage of the area and abandonment of extensive use of marshy meadows and cattle grazing by local people. A certain problem is also the roads leading through the wetland ecosystems, often in the past inadequately designed and constructed. There is a contradiction between requirements of wetland protection (preservation of habitat continuity and its humidity) and road function - (adequate strength and durability, thus drainage).

Wetlands, peat bogs and swamps in the Programme Area are a significant element of protected areas. These areas are also protected under the Ramsar Convention. In Poland the largest number of such areas can be found in Podlaskie Voivodeship, e.g. Biebrza Marshes, Red Marsh (Czerwone Bagno), Rospuda Valley and

High Marsh (Wysokie Bagno) Nature Reserve. Wetlands are of great importance for ecosystems by, among other things, storing water and improving its quality. Their role in drought resistance is especially important. They protect from floods and effects of heavy rains. These sites maintain genetic, biocenotic and ecosystem diversity, play a key role in the life cycles of many species and in annual migration patterns.

In the territory of the Rospuda Valley there is a peatland area formed, among others, by low and raised peat bogs, but above all by flow (soligenic) transitional bogs with natural water relations unchanged by man. Soligenous bogs, overgrown by mosslands of the class Scheuchzerio-Caricetea nigrae, cover an area of over 100 ha in the Rospuda Valley and are the most valuable natural habitat of the area. In this kind of terrain there are significant areas of water-dependent vegetation such as: reed rushes, reed canary grass rushes, manna grass rushes, sedge rushes. The Rospuda Valley is under protection due to the occurrence of rare plant and animal species. There are, among others, 20 representatives of the orchid family, which is under strict legal protection, including the only Polish locality of the musk orchid, a plant listed in the Polish Red Book of Plants, and one of several localities of the yellow-flowered early marsh-orchid subspecies. In addition, there are other orchids in the valley, such as the broad-leaved marsh orchid.

Similar peat bogs are also present in the Lubelskie Voivodeship: the Black Lake peat bog and the Sobowice peat bog. Most of the area of the Black Lake Reserve (Rezerwat Jezioro Czarne) is occupied by continental type raised peat bog with characteristic dwarf pines and birches.

Special attention should be paid to plant and animal species listed in the Polish Red Book of Plants and the Polish Red Book of Animals with respect to their category of threat, which are summarised in**Błąd! Nie można odnaleźć źródła odwołania.** the table below.

Table 5.[26] [27] Vertebrate species listed in the Red List of Birds of Poland and in the Polish Red Book of Animals (CR - critically endangered species, EN - species of a very high risk, highly endangered species, VU - high risk species, species vulnerable to extinction, NT - lower risk but near endangered species).

Polish name	Latin name	Threat category
Eurasian Wigeon	Mareca penelope	CR
Northern Pintail	Anas acuta	CR
Black-tailed Godwit	Limosa limosa	CR
Ruff	Calidris pugnax	CR
Wood Sandpiper	Tringa glareola	CR
Short-toed Snake Eagle	Circaetus gallicus	CR
Greater Spotted Eagle	Clanga clanga	CR

[26] Wilk T., Chodkiewicz T., Sikora A., Chylarecki P., Kuczyński L. 2020. Red list of Polish birds. OTOP, Brands.

[27] Głowaciński Z. (ed.) 2002. The Polish Red Book of Animals. Vertebrates. State Agricultural and Forest Publishing House, Warsaw.

Polish name	Latin name	Threat category
European Roller	Coracias garrulus	CR
Lesser Grey Shrike	Lanius minor	CR
Aesculapian Snake	Zamenis longissimus	CR
Common Ringed Plover	Charadrius hiaticula	EN
Northern Lapwing	Vanellus vanellus	EN
Eurasian Curlew	Numenius arquata	EN
Great Snipe	Gallinago media	EN
Golden Eagle	Aquila chrysaetos	EN
Short-eared Owl	Asio flammeus	EN
Great Gray Owl	Strix nebulosa	EN
Redwing	Turdus iliacus	EN
Geoffroy's Bat	Myotis emarginatus	EN
Lesser Horseshoe Bat	Rhinolophus hipposideros	EN
Southern Birch Nouse	Sicista subtilis	EN
Speckled Ground Squirrel	Spermophilus suslicus	EN
European Pond Turtle	Emys orbicularis	EN
European Wildcat	Felis silvestris	EN
European Bison	Bison bonasus	EN
Common Pochard	Aythya ferina	VU
Ferruginous Duck	Aythya nyroca	VU
Garganey	Spatula querquedula	VU
Northern Shoveler	Spatula clypeata	VU
Common Quail	Coturnix coturnix	VU
Western Capercaillie	Tetrao urogallus	VU
Red-necked Grebe	Podiceps grisegena	VU

Polish name	Latin name	Threat category
European Turtle-dove	Streptopelia turtur	VU
Corncrake	Crex crex	VU
Common Snipe	Gallinago gallinago	VU
Little Tern	Sternula albifrons	VU
Black Tern	Chlidonias niger	VU
White-winged Black Tern	Chlidonias leucopterus	VU
Montagu's Harrier	Circus pygargus	VU
Rook	Corvus frugilegus	VU
Aquatic Warbler	Acrocephalus paludicola	VU
Tawny Pipit	Anthus campestris	VU
Ortolan	Emberiza hortulana	VU
Leisler's Bat	Nyctalus leisleri	VU
Smooth Snake	Coronella austriaca	VU
Whooper Swan	Cygnus cygnus	NT
Tufted Duck	Aythya fuligula	NT
Common Redshank	Tringa totanus	NT
Eurasian Bittern	Botaurus stellaris	NT
Black Kite	Milvus migrans	NT
Boreal Owl	Aegolius funereus	NT
Eurasian Eagle-owl	Bubo bubo	NT
Eurasian Three-toed Woodpecker	Picoides tridactylus	NT
Thrush Nightingale	Luscinia luscinia	NT
European Pied Flycatcher	Ficedula hypoleuca	NT
Whinchat	Saxicola rubetra	NT
Alpine Accentor	Prunella collaris	NT

Polish name	Latin name	Threat category
Water Pipit	Anthus spinoletta	NT
Citrine Wagtail	Motacilla citreola	NT
Forest Dormouse	Dryomys nitedula	NT
Northern Bat	Eptesicus nilssonii	NT
Brown Bear	Ursus arctos	NT
Bechstein's Bat	Myotis bechsteinii	NT
Edible Dormouse	Glis glis	NT
Laxmann's Shrew	Sorex caecutiens	NT
Lynx	Lynx lynx	NT
Steppe Polecat	Mustela eversmanii	NT
Gray Wolf	Canis lupus	NT
Agile Frog	Rana dalmatina	NT

Belarus

In the Belarusian part of the eligible area there are 3 national parks: Belovezhskaya Pushcha NP, Narachanski NP, and the Pripyatski NP, as well as one site included in the UNESCO World Network of Biosphere Reserves Berezinsky Biosphere Reserve. Due to its natural uniqueness, the reserve was included in the List of wetlands of international importance (Ramsar List), the European Network of Biosphere Reserves and Wetland Link International. The Berezinsky Reserve received the European Diploma of Protected Areas and became a partner of the European Wildlife Society. Worth mentioning are also Zvanets and Sporovsky reserves, where almost half of the world's population of the globally threatened bird species - the aquatic warbler – nests.

The system of nature protected areas of the Programme Area in Belarus includes 1 biosphere nature reserve also, 71 nature reserves of national significance, 153 local nature reserves and 593 nature monuments. Total area of nature protected areas is 14 109 km^2 or 10% of Belarusian part of the Programme Area.

The protected natural areas in Belarus constitute a part of the pan-European ecological network, thereby facilitating the diversity of fauna and flora. 95 natural territories in Brest, Gomel, Grodno and Minsk regioons with an area of 17753.5 km^2 are included into the Emerald sites (12.8% of Belarusian part of the Programme Area).

The Berezinskiy Nature Reserve, the Belovezhskaya Pushcha National Park and the Pribuzskoye Polesie Reserve (literally Polesie along the River Bug) have been recognized by UNESCO as Biosphere Reserves. A significant part of the Programme Area belongs to the natural region of Polesie, which is important from the

point of view of the biological diversity of the region. It is also important for regulating the water relations of all three participating countries, as well as the economy and culture of local communities. The West Polesie Transboundary Biosphere Reserve, which straddles three countries (Belarus, Poland and Ukraine), arose out of the Pribuzskoye Polesie biosphere reserve. The Belovezhskaya Pushcha National Park features on the UNESCO World Heritage List. Some of the reserves are used by birds during migration and are included on the list of Wetlands of International Importance (Ramsar sites).

The Berezinskiy Biosphere Nature Reserve lies on the border of the Programme Area – it share its territory between Minsk and Vitebsk Oblasts. Reserve was created to preserve large-scale forest-marshes in their natural condition. Such areas used to be common in the zone of mixed forests in Eastern Europe.

The Belovezhskaya Pushcha National Park is the oldest reserve in Europe. Belovezhskaya Pushcha is situated on the border of Brest and Grodno Oblasts (covers the territory of 1501 km^2) and extends westward also across the border to the territory of Poland and consists of preserved primeval forest areas where many of the trees are 200–300 years old and some oaks are up to 600 years old. The forest is famous for the world's largest wild-ranging herd of the European bison. This species was hunted to complete extinction by the early XX century, but it survived in some zoos and thus could be reintroduced in the wilderness. Wolves, deer, elk and wild boar appear also in the national park's fauna.

The Narochansky National Park is situated on the border of Minsk, Grodno and Vitebsk Oblasts. The territory of the park covers 871 km^2 and, apart from protected land (8.4%), includes a sanatorium and the economic zone. The park includes 36 natural landmarks of national and local significance. Particularly valuable natural complexes are located here. These are reserves: Blue Lakes (landscape complex), Cheremshitsy and Shvakshty (hydrological complexes), the Cherevki Peninsula (geological complex), Nekasetsky, Rudakovo and Pasynski (biological complexes). The largest health resort area of Belarus is located in the park. It unites 11 sanatoria and health centers.

Pripyatsky National Park with an area of 880 km^2 in Gomel Oblast is one of the most popular tourist attractions in Belarus. It has the international status of the key ornithological territory. It is home to 256 species of birds (79% of all the birds in Belarus), including 65 species in the Red Book of Belarus. The Pripyat River valey is Europe's largest migration streambed of migratory birds.

The Polesie Radiation-Ecological Reserve (with an area of 2172 km^2) is not included in the system of nature protected areas of Belarus. It is situated in the south-east of the country, near the border with Ukraine. The area was exposed to radioactive contamination at the time of the Chernobyl disaster. It is a large nature reserve and a unique scientific testing ground for the study of the dynamics of the post-anthropogenic restoration of natural ecosystems.[28]

Ukraine

In Ukraine there are 663 protected areas and objects of national importance, including 20 national parks, 5 biosphere reserves, 21 landscape parks, Total protected area - 4,085.862 km^2 (6.77%).

[28] https://brestnatura.org/en/
https://www.wildlife.by/
https://rm.coe.int/updated-list-of-officially-adopted-emerald-sites-2020/1680a080d5
https://www.coe.int/en/web/bern-convention/home
https://www.belstat.gov.by

The percentage of protected areas in the Programme Area is 11.1%, which is higher than the average in Ukraine. There are 20 national parks in the Ukrainian part of the Programme Area: Verkhovynskyi, Halytskyi, Hutsulshchyna, Karpatskyi, Synyogora (Ivano-Frankivsk Oblast); Boykivshchyna, Korolivski Beskydy, Pivnichne Podillya, Skolivski Beskydy, Yavorovsky (Lviv Oblast); Dermansko-Ostrozkyy, Nobelskyi (Rivne Oblast); Dnistrovskyi kanyon, Kremenetski hory (Ternopil Oblast); Zacharovanyi kray, Synevyr, Uzhanskyi (Zakarpattya Oblast); Pripyat-Stokhid, Shatskyi, Tsumanska pushcha (Volyn Oblast)[29] and a dozen or so areas with a high conservation status, it should be emphasized that the Ukrainian categorization does not correspond to the IUCN classification used by the EU and Poland, which consequently leads to the lack of direct comparison between countries. Therefore, the Committee of the Bern Convention decided to create an ecological network of areas of special importance (Areas os Special Conservation Interest - ASCI), the so-called the Emerald network. Creating the Emerald network is expected to positively influence the protection of endangered species and their natural habitats[30]. The Emerald network is the equivalent of the Natura 2000 network in countries that are not members of the European Union (Belarus and Ukraine). Particularly noteworthy are the forms of nature protection in the immediate vicinity of Poland's borders: the Nadsansky Landscape Park, the Strict Roztocze Reserve, and the Yavorovsky National Park.

Uzhansky National Nature Park and Gansky Regional Landscape Park in Ukraine (respectively in Zakarpattya and Lviv Oblasts) are part of the Eastern Carpathians Biosphere Reserve. Roztochchya Nature Reserve, Yavorovsky National Nature Park and Ravske Roztochchya Regional Landscape Park (Lviv Oblast) are part of the Roztochchya Biosphere Reserve. Shatsky National Park is a part of the Biosphere Reserve “Western Polissya”.

Ecological corridors play a very important role in maintaining biodiversity – they provide suitable conditions for movement, shelter and access to food for animals. This is particularly important in view of the fragmentation of the natural environment which occurs as a consequence of human activity and soil transformation.

It should be noted that many ecological corridors of international importance run through the Programme Area:

- The Southern Corridor from the Bieszczady Mountains to the Ruda Forests. It passes through the Przemyśl and Dynów Piedmont, the Islands Beskids, the Gorce Mountains, the Maków Beskids;
- The Carpathian Corridor runs through the Bieszczady Mountains, the Low Beskid (Beskid Niski) and Beskid Sądecki, the Pieniny Mountains up to the Tatras. It connects with parts of the Carpathian Mountains lying on the Ukrainian side.

FORESTS

Biodiversity natural conditions, land use (including agricultural use), the level of subsidies for various agricultural sectors, including agro-environmental and Natura 2000 sites, as well as climate change and lifestyle trends are of great importance for the maintenance of biodiversity, especially in mountain areas.

[29] https://www.nationalparks.in.ua/pryrodni-parky/ (National parks of Ukraine), https://www.google.com/maps/d/viewer?mid=1KeD07qEYVEl1rUzuDCQkbaJuQZsKDWdM&ll=50.324422731417584%2C25.165011473272322&z=8, https://zakon.rada.gov.ua/laws/show/526/2020#Text

[30] Areas of Special Conservation Interest – ASCI, https://www.biodiversitya-z.org/content/areas-of-special-conservation-interest-emerald-network-asci

Due to the relatively small size of farms, the region has managed to preserve the local diversity of crops and traditional breeds to a relatively large extent[31].

Forests in the climatic conditions of the Programme Area have an important function in ensuring biological balance. The area of forests in Poland is around 1 920 km^2. The forest cover amounts to 30.8% (on the Polish side).

On the Ukrainian side, the forest area is about 3 781.4 km^2. The forest cover amounts to 36.8% (on the Ukrainian side).

On the Belarusian side, the forest area is about 55 080 km^2. The forest cover amounts to 40% (on the Belarusian side). For the different regions the forest cover of the territory varies from 35.7 (Grodno region) to 46.6% (Gomel region). Forests are mainly represented by pine, broad-leaved pine and black alder forests. To a lesser extent – birch, spruce and oak forests.

The main forest species within the Polish and Ukrainian Carpathians are spruce, fir, beech. Beech virgin forests of the region are unique in Europe. The forest areas of the region are characterized by a high level of biodiversity. They have a unique climate regulation function, a powerful potential of ecosystem services.

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

In Volyn and Rivne Oblasts, within their northern territories, the most common species are pine. There are also birch, alder, poplar, willow. In the south of these regions, as well as in Lviv, Ivano-Frankivsk and Ternopil Oblasts, quite large areas are occupied by oak, hornbeam, ash, maple, linden.

The largest share of forests and wooded areas is within Zakarpattya Oblast.

SOILS

Soils have many functions that are very important and necessary for the existence of humans and ecosystem functions. They constitute a source of food, biomass and resources. They are a natural habitat for many organisms, accumulate genetic resources, as well as store, filter and transform many substances (water, nutrients and carbon). In order to enable performance of the above functions, it is very important to ensure their proper quality.

A significant proportion of soils are exposed to wind and water erosion. Due to the serious exposure of soil surfaces to erosion, it is important to prevent it. The most important factors leading to the formation of erosion processes include improperly conducted drainage systems, elimination of copper in the process of combining small farms, removal of hedges, shrubs and woodlots, deforestation, too intensive grazing of animals, poor location of roads, cultivation of steep slopes and mid-slope valleys, and cultivation along the slope. Most of these factors affect biodiversity, and that should further motivate to counteract these events in land areas used for agricultural purposes.

The map below shows the basic characteristics of soils in the Programme Area.

[31] EEA 2010. *The European Environment 2010, State and Outlook. Synthesis.* European Environment Agency, Copenhagen.

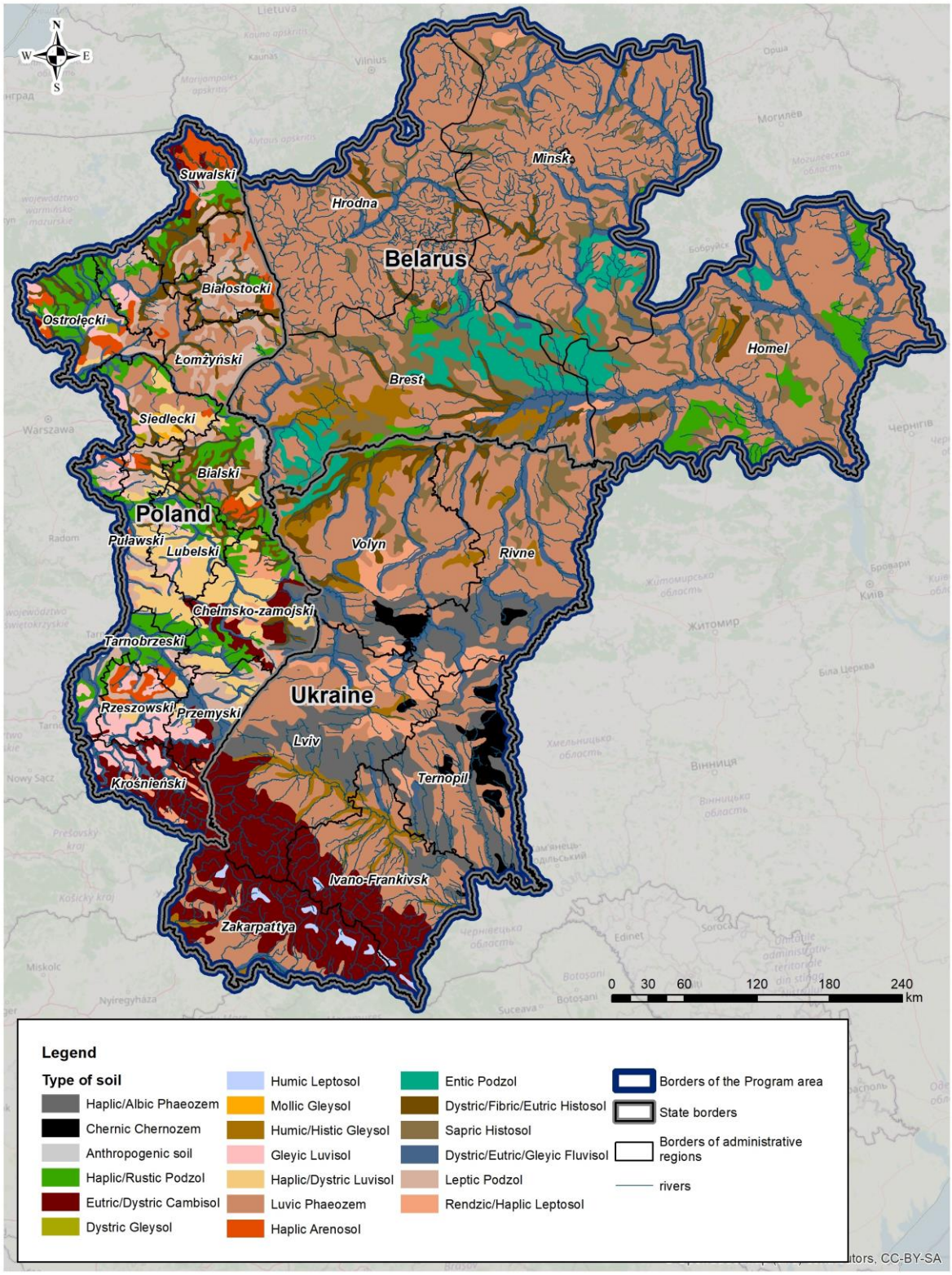

Figure 6. Soil types in the Programme Area[32].

[32] Own work based on data from the European Soil Database http://eusoils.jrc.ec.europa.eu

Poland

In the Lublin region, we find the following types and separate types of soil:

- sod-podzolic soils,
- brown soils,
- chernozems,
- black lands,
- rendzinas,
- mady soils,
- marsh soils.

Turf-podzolic soils are the dominant type of soil in the moraine and fluvioglacial formations of the Lublin lowlands, and in a significant part of upland loess. Brown soils occur in places on clay sands and moraine loams, but their main ranges are limited to the loess area. Loess is the only parent rock of the Lublin chernozem. The black earths of "Lublin" are not clearly associated with any kind of surface rock or substrate. Most of the marsh soils are developed on lowland peat bogs. There are very few upland and intermediate bogs in the Lublin region[33].

The largest area of Podlasie is covered by fallow and brown leached soils, followed by brown proper soils. These soils were formed on postglacial sediments such as tills or clay sands. On the other hand, in the flat areas of sandy outwash fields, rusty and podzolic soils have developed. In the valleys of the Narew, Biebrza and the Kurpiowska Plains there are the largest areas in the region with hydrogenic soils - marshy and muck[34].

Soil acidification in Poland is one of the most important factors limiting plant production. Both climatic and soil conditions and human activity contribute to it. In the Podkarpackie Voivodeship there are 41-60% of acidic soils, while in the Lubelskie and Podlaskie voivodeships there are 21-30%. The share of very acidic and acidic soils, where the pH is a limiting factor in the selection and size of plant yields, is about 58% of the arable land, ranging from 30 to over 80% in the scale of the voivodeships. This makes Poland the only country in Europe where the acidification of agricultural land is so large. In addition, strong human impact, consisting mainly in the use of fertilization and the removal of alkaline cations with the crop, contributes to additional deterioration of the soil pH. It is particularly dangerous to use physiologically acidic fertilisers with insufficient doses of calcium fertilisers, whose consumption deviates from actual needs. The total content of macro- and microelements available to plants in the soil is defined as the abundance of soil.[35]

Ukraine

In the western part of Ukraine, there are brown, podzolic and lessive soils. They were formed in the substrate of coniferous, deciduous and mixed forests. Coniferous forests and podzolic soils dominate in Polesie. There are also a lot of wetlands and associated marshy soils. In the Carpathians and Transcarpathia, deciduous forests as well as mixed forests with brown and lessive soils in the substrate are dominant. The rest of the country is almost forestless. Ukraine, of all neighbouring countries, has by far the lowest level of afforestation - only 16%.

[33] http://ssa.ptg.sggw.pl/files/artykuly/1954_03/1954_tom_3/tom_3_131-134.pdf
[34] https://www.zielonewrota.pl/
[35] Environmental Protection Report 2019 CSO Poland.

A particular problem concerning soil and the geological environment is its stability. Landslides are the most important geodynamic phenomenon threatening municipal buildings and transport infrastructure. They are an important factor influencing spatial development. Landslides occur mainly in sloping areas, built of flail formations of chalk and palaeogen and fine-grained (pelitic) neogen deposits. In the area covered by the Programme, these formations have numerous representations in the Podkarpackie Voivodeship. Apart from natural conditions, landslides may also be caused by human activity. Landslides are occur as a result of excavations and embankments. they are also formed around water reservoirs and mining excavations.

In the land use structure of the Programme Area (Ukrainian side), a high share of forests and wooded areas (36,9%) can be noted, which is more than twice the Ukrainian average. At the same time, the share of agricultural land (52,3%) in the region is much smaller than in Ukraine as a whole. The only exception is Ternopil Oblast, where the values of these indicators are close to the average in Ukraine.

The diversity of natural conditions has led to the diversity of soils in the region. Within the mountainous territories of the Ukrainian Carpathians (mountainous areas of Zakarpattya, Ivano-Frankivsk, Lviv Oblasts) brown mountain-forest soils predominate (mountain brown forest gravelly soils combined with their gleyed variations). To a lesser extent, there are sod-brown forest soil and mountain meadow soils. In the plains of Zakarpattya, podsolized sod-loamy soils and their gleyed variations predominate. Small areas are occupied by meadow soils. In Zakarpattya, Ivano-Frankivsk, Lviv Oblasts there are also small areas covered with podsolic brown soils and their surface variations species.

Within the northern parts of Volyn and Rivne Oblasts, the most common soils are sod-podzolic type: sod-weakly podzolic sandy and clayey-sandy; sod- weakly podzolic gleyed; sod-moderately podzolic gleyed soils in combination with bog and marsh; gleyed sod soils primarily developed on sand, clayey sand and sandy loam, in complex with sands of weak humus content.

There are also meadow, meadow-bog and swamp soils, peatland and peat-bog soils.

Further south, including Lviv Oblast, the soils consist of light gray and gray podzolized soils, dark gray podzolized soils, podzolized chernozems. In Lviv Oblast, sod- moderately- and strongly podzolic surface-gleyed soils, meadow soils are also widespread.

In Ternopil Oblast, typical chernozems with low or negligible humus content, podzolized chernozems, dark gray podzolized soils, light gray and gray podzolized soils. There are also meadow chernozem soils and meadow soils. In general, the Ternopil Oblast has the most fertile soils within the Programme area (Ukrainian side).

Significant environmental problems are wind and water erosion, as well as residual pesticides in soils.

Belarus

Belarusian soil cover is highly heterogeneous with a clear predominance of semi-hydromorphic soils (48.2% of agricultural lands) over automorphic (34.2%). Hydromorphic soils are about 17.6% of agricultural lands of the Belarusian part of Programme Area.

In the Belarusian part of the Programme Area about 33.8% of agricultural lands is covered by sod-podzolic soils, 30.3% are sod-podzolic boggy soils, 14% – sod and sod-carbonate boggy soils, 13.9% – peat-bog soils, 4% each – alluvial sod and sod boggy, as well as anthropogenically transformed soils. The fertility of the soils is mostly moderate. The conditions for biomass production vary significantly. The generally favourable agro-

ecological potential is limited principally by soil degradation processes, acidification, an extreme moisture regime and unfavourable changes in the biogeochemical cycles of elements.

The main soil degradation process is erosion. Eroded soils account for about 8.2% of arable lands of the Belarusian part of Programme Area (3223 km^2). Eroded soils are confined mainly to the hills. Deflation is a major danger in the southern part of Belarus, where sand and drained peat soils predominate. In Minsk Oblast eroded soils account for about 1306 km^2 (9.9% of arable lands), in Grodno Oblast – 1071 km^2 (13.4%), in Brest Oblast – 509 km^2 (6%) and in Gomel Oblast – 337 km^2 (4%).

Degradation of peat soils is a serious problem for Belarus. Drained degraded peat soils are formed in place of exhausted peat-bog soils because of deep drainage and irrational use of the soil cover in agriculture. The largest areas of degraded peat soils are concentrated in the Brest Oblast – 1044 km^2 or 7.6% of the total area of agricultural lands. They occupy a slightly smaller area in other Oblasts: Minsk – 838 km^2 (4.6% of agricultural lands), Gomel – 734 km^2 (5.7%) and Grodno – 244 km^2 (2%).

Permanent soil acidification is caused by washout with average losses of 300 kg/ha $CaCO_3$. Half a century of liming in Belarus has significantly reduced soil acidity but still less than 50% of soils requiring liming are covered by liming. In Grodno Oblast 11.8% of arable lands have a pH of less than 5.0, in Gomel Oblast – 9.3%, in Minsk Oblast – 9.2% and in Brest Oblast –8.4 %.[36]

SUMMARY

Biodiversity is the basis of the functioning of ecosystems. In turn, ecosystems, due to their variability, have many important functions used on a daily basis by man. Human requirements regarding the environment change in the course of time, which has been particularly noticeable over the past few years. The latest trends show an increase in demand for cereals and other plant products from organic farming, the demand for wood, the reduction of climate change, the regulation of water flows in rivers and wetlands, and an increase in demand for recreational and tourist services in most ecosystems.

Taking into account the useful natural values, whether it is necessary to take into account, should pay attention to the threats and problems related to and may be pedigree, what are the concepts in the city of origin. All investments are in compliance with the environmental protection status, protection of fauna and flora of the protected area, even bypassing these areas (especially strict protection).

The table below shows the key risks and problems identified during the diagnosis of the current state of the natural environment on the basis of environmental monitoring carried out by CIEP (GIOŚ) in Poland.

Table 6. The key drivers of changes in the nature affecting biodiversity

Changes in the natural environment	Drivers of change
Loss of non-forest and wetland birds habitats, including the most endangered (aquatic and marsh ecosystems).	• improper conduct of drainage systems; • overfertilisation; • abandonment of agricultural use (grazing, mowing); • inadequate hydraulic engineering structures; • regulation of rivers and streams; • development of the communication infrastructure; • urbanisation and tourist pressure on habitat areas

[36] *Belarus in Maps / Edited by David Karacsonyi, Karoly Kocsis, Zsolt Bottlik; Geographical Institute Research Centre for Astronomy and Earth Sciences, Hungarian Academy of Sciences. – Budapest, 2017. – 196 p*

Changes in the natural environment	Drivers of change
Fragmentation of habitats, including breaking down of ecological corridors	• development of the communication infrastructure; • tourist and urbanization pressure; • regulation of mountain rivers and streams
Distortion of composition of species in natural habitats	• drainage; • investments destructive and transformative for the environment (road, rail, hydrotechnical); • introduction of alien and invasive species; • climate change, including high temperatures, changing hydrological conditions and other environmental factors; • development of tourism and communication contribute to the spread of alien species
Secondary succession of non-forest habitats	• abandonement of agricultural use, especially the abandonment of meadow use
Qualitative and quantitative changes of natural habitats due to water eutrophication	• excessive fertilisation and use of plant protection products, the lack of appropriate treatment systems in the field of wastewater management
Mechanical damages to the rare plants and natural habitats	• development of tourism and recreation
Degradation of landscape features	• construction of communication and tourism infrastructure, urbanisation

The above changes are also compounded by climate change, manifested mainly as floods, hurricanes and droughts, which require the preparation of appropriate response measures and a long-term strategy.

The Programme indicates measures, especially in the field of waste water management, the implementation of which may potentially have a negative impact on the condition of species and natural habitats, especially in areas with hydrogenic values, such as wetlands, peat bogs, e.g. through their fragmentation, mechanical destruction and degradation of natural values. However, a lot will depend on the location, specificity and method of project implementation, especially investment projects such as wastewater treatment projects or the construction of small retention facilities. A significant impact may be expected in the case of investments carried out in the vicinity of areas of high natural value, but also in the case of investments indirectly affecting - through other environmental components - the condition of habitats and species. This impact will be subject to further analysis as part of the development of the Report.

Failure to implement actions related to nature protection specified in the Programme may, in turn, result in the lack of progress in stopping negative trends in the field of nature protection. Some of the investments under the Programme are aimed at the protection, regeneration and sustainable use of naturally valuable areas, as well as sustainable cross-border tourism.

4.3. CLIMATE CHANGE

Climate change will have an ever-increasing impact on the extent of emerging natural risks. Another factor after climate change is the development of infrastructure (human civilisation), which unfortunately often takes place in a chaotic, ill-considered manner, with many serious errors, with the result that the natural environment is more susceptible to threats from weather conditions.

Effects of climate change are becoming increasingly felt within Europe and across the world. The average global temperature, that currently stands at around 0.8°C above the pre-industrial levels, continues to grow.

Poland

The climate of Poland is characterized by high weather variability and a significant diversification of the course of the seasons in consecutive years. The values of the average annual air temperature range from just above 5°C to nearly 9°C. The duration of the seasons varies regionally: summer lasts from 60-70 days in the northern part of Poland to 100 days in the southeast, central, western and south-western parts; winter - from 10-40 days by the sea and in the west to 3-4 months in the northeast, and in the Tatra Mountains even up to 6 months.

In most parts of Poland, there are downward trends in the number of frosty and very frosty days (days with maximum daily temperature ≤0°C and days with maximum temperature ≤-10°C, respectively). Slight increases in the number of frosty days were observed only in the areas of the Polish eligible area. In the predominant area, the length of frost periods shows a slight upward trend, the longest ones lasted over 20 days and outside the mountains occurred in the north-eastern part of the country, i.e. outside the eligible area, while decreases were visible only in the mountains.

An increase in temperature by about 0.7-0.9°C as a result of warming, gives a value of 1.6 in a unit of radiation intensity W/m^2. Works carried out in recent years prove that climate change is reflected in the variability of solar conditions in Poland. The annual variation in the average amount of sunshine in Poland ranges from about 1400 to 1700 hours per year. The effects of warming are also visible in the intensification of the occurrence of extreme weather phenomena in Poland. For several selected dangerous meteorological phenomena, i.e. droughts, hurricanes winds, whirlwinds and hail, risk maps are prepared for their occurrence[37]. Apart from physical protection against these phenomena - retention reservoirs, dry polders, dikes, etc. - crisis management systems are important to enable quick response and proper operation of rescue services. In the case of the border area, it is therefore important to ensure the cooperation of rescue services of neighboring countries – the police, fire brigade and ambulance services, as well as other rescue services.

In order to avoid the most serious threats of climate change, especially irreversible effects on a large scale, as agreed under the Convention on Climate Change, global warming should be limited to a maximum of 2 °C above pre-industrial levels. Over the last decade (2002-2011), the European land surface temperature was on average 1.3 °C above the pre-industrial levels, which means that the temperature in Europe rises faster than the global average. A greater frequency has been reported of some extreme weather events together with more frequent heat waves, forest fires and droughts. Higher precipitation and floods are predicted together with an increased risk of coastal erosion. A larger number of such events will probably lead to an increase in the scale of natural disasters, which in turn will result in significant economic losses and problems related to public health; will also increase the number of fatalities.

However, there are differences between national crisis management systems, which hinder cross-border cooperation. These differences concern, among other things, regulations and competences in the area of civil protection and disaster management. There are also differences in the competence to make decisions on delegating emergency services to rescue operations outside the country.

Climate change is of particular importance in the context of changes in nature, which must adapt to new conditions. Climate change is an important driver of evolution and has a large impact on biodiversity. Simultaneously with climate change, the ranges of many plants will change, there will be migration of

[37] http://klimada.mos.gov.pl/zmiany-klimatu-w-polsce/tendencje-zmian-klimatu/

species and changes in existing ecosystems. Recent studies by the University of Agriculture in Krakow indicate changes resulting from climate change even in such resistant species as Norway spruce. Norway spruce is a species that is particularly vulnerable to future climate changes because it prefers cool and moist habitats and is associated with a continental climate. The current changes cause numerous dieback of spruce stands in Poland. Spruce trees are harmed not only by rising average temperatures, but also the lowering level of groundwater associated with droughts, because these trees have a shallow root system. The same may be the case with other more sensitive species of animals and plants in the Programme Area[38].

Ukraine

Ukraine has been a party to the UN Framework Convention on Climate Change and the Kyoto Protocol since 1996. At the same time, for a long time, the legal framework contained a range of gaps concerning certain mechanisms and actions for climate change adaptation. For instance the Concept for the implementation of state policy in the field of climate change for the period up to 2030 was adopted only at the end of 2016, Action plan for its implementation – at the end of 2017, Strategy of low-carbon development of Ukraine until 2050– in mid-2018.

At the same time, experts highlight the vulnerability of regions and industries to climate change – since the beginning of the XXI century there is an intensive increase in surface air temperature (average in 1991–2016 + 8.8°; average in 2007–2016 + 9.4° C) in Ukraine.

There are such adverse phenomena as: abrupt weather changes; increase in frequency and intensity of dangerous natural phenomena both in a warm (thunderstorms, squalls, hail, long hot periods) and in cold (snowfalls, ice) seasons; increasing the frequency and intensity of droughts and expanding the areas covered by them; changes in the intra-annual distribution of river runoff in Ukraine;

Therefore, there are significant impacts on human health, agriculture, water supply, as well as consequences such as changes in the boundaries of natural zones and land degradation, the emergence of invasive species, reduced viability and resilience of forests.

Regarding the Programme Area, the increase in precipitation and the increase of the intensity of floods are particularly noticeable, however the increase in average air temperature is less pronounced than in Ukraine as a whole.

The State Emergency Service with its regional divisions is responsible for specific measures to protect the population and territories from emergencies. During 2019, there were 26 natural emergencies in the Programme Area, including those related to sharp rises in water levels due to precipitation. In 2020, the deterioration of weather conditions and large volume of atmospheric precipitation in the Transcarpathian, Chernivtsi, Ivano-Frankivsk, Lviv and Ternopil Oblasts of Ukraine caused sharp rises in the water level of rivers and flooding of territories. Adverse weather affected 300 settlements.

Belarus

Belarus has a temperate-continental climate that is typical of central European countries. The land is mostly flat, not coastal, and relatively small, leading to a somewhat uniform climate within the country. The Belarusian Ridge, which includes the highest peak, Dzyarzhynskaya Nill, at 346 m, runs diagonally from west-southwest to east-northeast through the country. The country has distinct seasons, with cold winters and

[38] naukawpolsce.pap.pl

relatively warm, moist summers. In January, temperatures average from –4.5°C to 8°C, while the average temperature in July ranges from 17°C to 18.5°C with slightly warmer temperatures in the south compared to the north. Belarus' annual rainfall is 600-700 mm, of which 70% falls from April to October. The country also experiences between 75 and 125 days of snow each year. Studies suggest that negative effects related to climate change will be more pronounced in the south of Belarus, which has more agricultural land and has seen reduced rainfall in the summer months, than in the north.

Belarus faces significant climate change related threats. Temperatures, floods, droughts, and precipitation patterns have begun to diverge from historical patterns, which will impact multiple sectors. For example, rising temperatures (1.5-2°C by 2050) will likely increase the need for energy, placing an increased strain on the outdated electrical system as demand for cooling increases. Water, while abundant within Belarus, may deteriorate in quality due to increased flooding, extreme rain events, and changes in runoff patterns. Furthermore, changing rainfall patterns and flooding may alter the distribution of dangerous radionuclides, particularly in food and water resources, found in southern Belarus because of the 1986 Chernobyl accident. In a country with 40% forested land, rising temperatures are likely to change ecosystem function, forest composition, and certain species of trees, such as spruce, will suffer. Drought and increased temperatures could make forests more vulnerable to climate-related threats, such as disease outbreaks and forest fires. Climate change may also provide potential opportunities for Belarus. As temperatures warm, arable land may increase and expand northwards and forests may increase in size. However, the negative impacts of climate change appear to outweigh these potential benefits.

As part of the National Strategic Plan for Climate Change Adaptation for sensitive sectors and areas by 2020 and outlook 2030 the potential damages caused by weather phenomena were specified for the most vulnerable sectors.

The Belarus Government works closely with donors and international organizations to understand and address climate risks. The right of Belarusians to a healthy environment and compensation for damages caused by the violation of these rights is enshrined in the Constitution of the Republic of Belarus. In its Nationally Determined Contribution to the UN Framework Convention on Climate Change (UNFCCC), Belarus pledged to reduce greenhouse gas emissions by at least 28% of the 1990 level by 2030, excluding emissions and removals in the land use, land-use change and forestry sector. Additionally, Belarus is a signatory to the Aarhus Convention. The State Commission on Climate Change has been established to coordinate the work of the implementation of policy to mitigate climate change in Belarus, which is responsible for developing strategy in climate change negotiations. The Republic of Belarus is party to more than 20 international conventions and agreements on environmental protection issues[39].

COMMON CLIMATE CHANGE PROBLEMS

Agriculture production

Changing climatic conditions may lead to both beneficial and harmful impacts in the agriculture sector. Increased temperatures are expected to extend the length of the growing seasons in the northern part of the area, with crops only suitable for the south potentially becoming viable in the north. At the same time, projections suggest a slight increase in precipitation in summer and winter, yet a likely decrease in the water supply in the spring, which could negatively affect crop productivity. The biggest threat to agricultural

[39] CLIMATE RISK IN BELARUS: COUNTRY RISK PROFILE / A Global Knowledge Portal for Climate and Development Practitioners. – December 2018. – https://www.climatelinks.org/resources/climate-risk-profile-belarus

production may be changes in the frequency and intensity of drought and heat-waves, both of which are expected to increase resulting in increasing stress to agricultural production. In dry years, the yield of cereals and legumes can drop by 10 to 20% and in years of severe drought, yields may decrease by as much as 30 to 40%. Adverse effects on agriculture from warming temperatures are also associated with the increase in frequency and duration of winter thaws and the associated increase in the probability of damage to winter crops. Additional threats include an increased likelihood of pest outbreaks and increased likelihood of fire.

Forestry

The effects of climate change on the forestry sector are uncertain but negative impacts likely outweigh positive impacts. While there may be increased growth due to longer growing seasons, forests will likely be threatened with an increase in pests and pathogens due to warmer weather, increase risk of fire due to drier and hotter conditions and increased stress due to drought.

Water resources

There will be changes in runoff driven by shifts in river flow volumes due to increased winter temperatures. River runoff is to increase during winter months as a result of increased snowmelt. In summer, runoff may decrease due to increased evapotranspiration resulting from hotter temperatures, particularly in the warmer southern region. Also, as a result of evapotranspiration and decreased overall precipitation, river flows may decrease in summer months. In addition, spring flood levels will also decrease. Overall, this will have extremely negative consequences for unique semi-aquatic ecosystems. Changes in runoff patterns can introduce pollutants from farmlands and other areas to water resources. Precipitation, while likely to stay consistent in total amount, is expected to change in intensity and frequency, which could lead to an increase in flood frequency and a potential decrease in water quality.

The problem is the more and more frequent torrential rains and intense storms, which cause problems with the capacity of rainwater drainage systems and the occurrence of flooding in cities, where most of them are paved. This is becoming a more and more common problem in cities, which have to take into account new problems and adapt their infrastructure to the progressing climate change, by building small retention, blue and green infrastructure allowing to reduce the nuisance of drought and floods in cities.

Energy

While warmer winters are likely to reduce heating costs of buildings, increased temperatures, as well as increased frequency and intensity of droughts and heat waves, could result in greater cooling demands in warmer months and place additional strain on the system. Furthermore, increased frequency of flooding events could damage infrastructure already in need of maintenance or repair. Currently, renewable sources make up less than few percent of total energy and the institutional and technical capacity to develop these sources has yet to be built. Belarus, Ukraine and partly Poland is dependent on imported oil and gas, which it receives mostly from Russia. Shifts in climatic conditions that could increase energy demand or result in damage to aging energy infrastructure could thus result in greater strain on energy security. Belarus has opened its first nuclear power plant in 2020, which will produce 2,400 megawatts.

Health

Changing climate conditions may place an increased burden on the health sector through an increase in the number of emergencies, deterioration of living conditions and spread of infectious diseases, including encephalitis and other infections. Changing conditions are most likely to affect those with chronic diseases,

such as diabetes, asthma, malnutrition and cardiovascular diseases. The negative health impacts of climate change are most acute for vulnerable groups, particularly the elderly, disabled, children, people with low incomes and the homeless. For example, heat stress due to heat waves can increase mortality of those with chronic illness. Additionally, higher temperatures and potential flooding may lead to more exposure to water- diseases.

SUMMARY

It seems that climate change is inevitable, and changes in nature and human functioning are another element of evolution. However, all activities and investments carried out should take into account the lack of a negative impact on climate change, and thus greenhouse gas emissions, and include adaptation measures. This especially applies to infrastructure that is to adapt to climate change, so that it does not cause additional negative impacts. Small retention plays an important role in reducing the negative effects of drought. Maintaining a high water level in watercourses and reservoirs slows down the outflow of water from the valley in the spring. At the same time, the groundwater level is also rising in the surrounding areas, both in the valley and on the plateau. Most of the small retention measures are environmentally beneficial. However, if these activities are poorly designed or planned, they can also have detrimental effects on the environment. For example, building a new bend in a river bed or building a pond in a wetland may alter or disturb a valuable natural habitat, posing a threat to the flora and fauna that live there. In addition, the construction of a dam on a river that is a habitat for migrating fish can have negative effects as it will prevent them from migrating. Therefore, even small-scale projects require careful planning and environmental consideration before being implemented.

As part of the work on the Strategic Adaptation Plan for sectors and areas sensitive to climate change by 2020 with a perspective by 2030[40], possible damage caused by weather phenomena to the most sensitive sectors was specified.

Table 7. Weather and climatic events causing social and economic damages[41]

Sector	Agriculture, biodiversity, water resources	Forestry	Health, local community	Infrastructure
Harmful phenomenon	• flood • hurricane • lightning bolt (lightning) • drought • negative effects of wintering • spring frost • torrential rain (causing flooding, landslides) • hail	• flood • strong winds (hurricane, tornado) • drought • flooding and landslides (due to torrential rain) • cap of snow, intensive snowfalls • lightning	• heat waves • cold waves • extreme events causing psychosocial damages (flood, strong winds, hail)	• flood • flooding • hurricane • lightning • hail

[40] http://www.mos.gov.pl/g2/big/2013_03/e436258f57966ff3703b84123f642e81.pdf
[41] Strategic adaptation plan for sectors and areas sensitive to climate change until 2020 with a perspective until 2030, after E. Siwiec (IOŚ-PIB)

The effects listed in the table can be supplemented by additional tropospheric ozone pollution occurring as a result of heat waves and its significant effects on health and negative impact of the temperature rise on the survival of many species.

Eutrophication of inland waters will increase with the temperature growth, increasing threat to life and health as a result of thermal stress and increase of air pollution (such as ozone). Power demand will increase in the summer. The cooling conditions of thermal power plants will worsen, and that may cause limitation of energy production and other events described in the National Strategic Plan for Climate Change Adaptation for sensitive sectors and areas by 2020 and outlook 2030[42].

The direct cause of climate change is energy based on fossil fuels (coal, oil, gas), transport or industry and the associated release of huge amounts of greenhouse gases into the atmosphere. These gases, while remaining in the atmosphere, contribute to the greenhouse effect, causing the global average temperature to rise. In the eligible area Poland-Ukraine-Belarus, the source of greenhouse gas emissions is the consumption of a significant amount of hard coal and lignite in the energy sector, both industrial and municipal and household sectors.

Given the difficulties in coordination of a global agreement on reducing greenhouse gas emissions, and the emissions growth trend, it is impossible to count that in the foreseeable future greenhouse gas emissions will be reduced so as to curb climate change. In this situation, the priorities include possible adaptation to these changes, especially in Poland, which, in relation to many other countries, is less prepared to minimize the effects of current weather phenomena (floods, low water retention, etc.).

From the point of view of the range of climate issues, the most important measures that could be implemented under the Programme include:

- supporting all actions related to adaptation to climate change, because due, among other things, to the past, we are still suffering huge losses caused by climate phenomena;
- supporting the development of renewable energy sources in order to not only meet the obligations in relation to the Directive 2009/28/EC on the promotion of the use of energy from renewable sources but to exceed certain share in the production, because it is beneficial for many reasons (such as, for example positive impact on public health by eliminating high-emission combustion of coal and others). This could be taken into account eg, while modernising objects of cultural heritage and tourism;
- supporting all efforts to increase energy efficiency, in scope of energy use and production;
- supporting efforts to reduce greenhouse gas emissions to tackle climate change on a global scale.

The above mentioned courses of action should be reflected in the criteria for impact assessment of the actions set out in the Programme.

4.4. NATURAL RESOURCES AND WASTE MANAGEMENT

Natural Resources

Environmental resources enable proper functioning of the human and determine the quality of life. The current economic development in European countries is closely linked to the use of natural resources.

[42] Ibidem

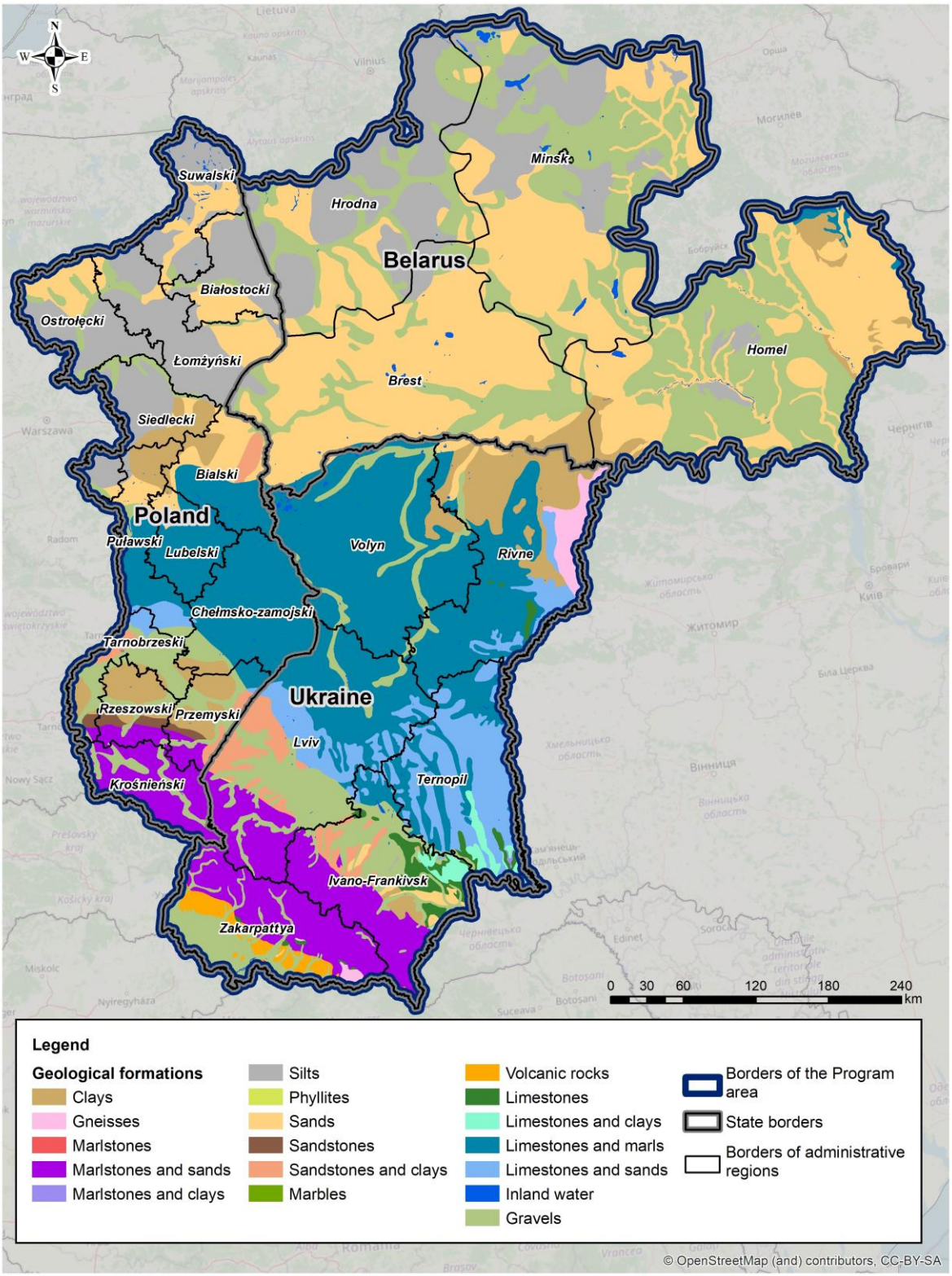

Figure 7. Surface geological formations in the area covered by the Programme.

Poland

The majority of therapeutic waters occur in the towns and villages grouped in the southern part of Poland, including the Carpathian eligible area together with the Carpathian Foredeep. Over 50% of the total number of health resorts and places with curative waters in Poland are located here.

In 2019, curative waters were used for balneotherapeutic purposes in deposit spas, for bottling purposes in water bottling plants located in: Nałęczów, Polańczyk, Rymanów-Zdrój, as well as for the production of spa products such as salts and medicinal brines (Lubatówka - Iwonicz-Zdrój deposit), pharmaceutical preparations and cosmetics (Iwonicz-Zdrój, Rymanów-Zdrój).

Thermal waters include groundwater with a temperature of at least 20°C at the outflow. Taking into account the way the water is used, thermal water includes water used for heating and recreation purposes. Thermal waters in Poland are found in a significant part of the Polish Lowland within the large reservoirs of regional importance, as well as in the Carpathians and their foreland. In the Carpathians thermal waters occur especially in Cretaceous, Paleogene and Neogene formations and also in Devonian and Triassic deposits of Podhale Trough, which is a mountainous basin characterized by small area and strong tectonic influence[43].

Gas fields have been documented on the Carpathian Foreland, minor resources occur also in small deposits within the Carpathian Mountains. The prospective resources of the conventional natural gas, according to 'The balance of prospective mineral resources of Poland', are connected with the oil-gas-bearing formations occurring: on the Carpathian Foreland and in the Carpathian Mountains (the Miocene together with its basement in the Carpathian Foredeep – about 57.1 million m^3, the Carpathian flysch together with its basement – about 30.6 billion m^3). The long-term prospective outlooks are connected with the western and eastern part of the Carpathian Mountains and the Carpathian Foreland.

In Poland, in 2019, there were 87 documented oil fields, including 29 fields in the Carpathian Mountains, and 12 on their foreland (in the Carpathian Foreland). The resources of the Carpathian Foreland of the Carpathian Mountains play a subordinate role (constitute 3.6% of the national resources, respectively). Fields in the Carpathians and their foreland have a long history, it is a region of the world's oldest oil mining. At present, the resources of these deposits are almost depleted.

The natural resources of the Lubelskie Voivodeship are deposits of mineral resources: hard coal, crude oil and natural gas, classified as basic minerals, as well as carbonate resources: marls, chalk, limestones and rocks, clay: aggregates and peat classified as common minerals (loess, loam, loams), and from natural aggregates: sands. To date, no shale gas deposits have been documented, yet the Lublin Province is considered one of the most promising areas of this type of deposits.

Rock mineral resources in Podlaskie Voivodeship are associated with Quaternary sediments and are mined using opencast methods. The resources of sand, gravel and natural aggregate are particularly large.

Moreover, in the Voivodeship there are deposits of toll clay, stagnant and muddy loam, lake chalk, peat, and in the region of Augustów and Supraśl, mud deposits. There are also minerals related to older geological sediments in the Voivodeship. Those are:

- ilmenite-magnetite ore deposits (Udzyny, Jeleniewo, Szurpiły regions),
- radioactive elements (Rajska region),

[43] Balance of raw material resources in Poland as of 31.12.2019, PGI – NRI

- rare earth elements.

The bulk of Polish natural sand and gravel deposits are of the Quaternary age. The share of deposits of the older formations: the Pliocene, Miocene and Liassic in the age is subordinate. In the Carpathian region the raw material basis comprises mainly gravelly and sandy-gravelly deposits occurring on flood-plain terraces as well as valley side terraces rising above flood plains. The Carpathian deposits are characterized by a predominance of the flysch rocks.

Ukraine

Ukraine has an extremely rich resource of raw materials. The most important of these are deposits of hard coal and lignite (the Lviv-Volyn Basin) and metal ores: iron, manganese, titanium, mercury, aluminium and nickel. Among other raw materials, the largest are deposits of sulphur, potassium, rock salt, phosphate, kaolin, graphite, nepheline (for the production of soda) and alumite (for the production of potassium).

More important natural gas and oil fields are located in the region of Subcarpathia. However, oil production covers only around 10%, and natural gas 20% of domestic demand. Deposits of natural earth wax are located near Borislav. In the Subcarpathian region there are deposits of rock salt and potassium salts.

The main part of the Programme Area mineral resources is concentrated in the regions of the Ukrainian Carpathians (Zakarpattya, Lviv, Ivano-Frankivsk).

Particularly Zakarpattya produces natural gas, brown coal, rock salt, zeolite, perlite, kaolin, bentonite clays, marble, tuff, andesite, dolomite, construction sand, brick and tile raw materials, limestone. One of the world's largest deposits of zeolite have been explored here. The region is the only supplier of perlite raw materials in Ukraine.

The most important minerals in Ivano-Frankivsk Oblast are: oil and gas, potassium salts, raw materials for cement production, underground fresh and mineral waters, building materials.

Among the minerals of Lviv Oblast in terms of reserves and economic importance are combustible (natural gas, gas condensate, oil, coal, peat) and non-metallic minerals (potassium, magnesium salts, sulphur, limestone, cement raw materials, gypsum, clay, loams, sands, sand-gravel mixture, sandstones), as well as ozokerite, sapropel.

In the Rivne Oblast, amber deposits have been explored, the industrial reserves of which amount to more than 400 tons. Indirectly it caused illegal amber mining which leads to significant damage to the environment.

Ukraine is rich in mineral water sources. Excellent curative waters are found in the vicinity of Lviv (Truskavets) and in other health resorts (Vinnitsa, Zhytomyr, Bialya Cerkiev, Poltava, Kharkiv).

In particular, more than 600 mineral springs are known in the Zakarpattya Oblast. It ranks first in Ukraine in terms of quality and quantity of mineral waters. The region has almost all type of the world's most famous mineral waters: sodium bicarbonate, bicarbonate sulphite, calcium-magnesium, sulphide which belong to the three types of mineralization. A total of 62 deposits have been developed.

Significant mineral water resources are concentrated in the Lviv Oblast. They are represented by about 60 deposits with balance reserves of 5.4 thousand m^3 / day, of which 21 fields are exploited. The most famous

are Morshyn, Truskavets and Velyko-Lyubensky springs, as well as Nemyrivske and Shklo. Therapeutic peat muds have been explored at the Velykolyubynskoye deposit.

Belarus

Belarusian part of Programme Area is located on the East European Plain. It is characterized by a crystalline rock basement, which has been covered by several thousand meters of sediments. Major tectonic structures of this basement, so called anteclises (large uplifted structures), sineclises (large depressions) and troughs influence the thickness of the sediment.

The sedimentary cover consists of the strata of the Upper Proterozoic and all the geological systems of the Palaeozic, Mesozoic and Cenozoic. Palaeozic formations include Cambrian, Ordovician and Silurian complexes, which comprise mostly sandstone and clay as well as carbonate strata. The Mesozoic formation also presents all systems. Jurassic formations consisting of limestone, sandstone, clay and other marine sediments are common in the west, east and south-east of Belarus. Cenozoic formations are also widespread. Palaeogene deposits (sandstone, marl and, rarely, clay) are to be found in the Prypiac Trough, the Podlasie Brest Depression, the Palessie Saddle and on the southern slopes of the Belarusian Anteclise. Quaternary strata (sands, sandy loams, loams) cover the deposits of older systems and form the surface relief.

The thickness of Quaternary deposits is around 70–80 m but in some places is as much as 300 m. The deposits of three glacial horizons account for up to 90% of the Quaternary strata.

The most important mineral resources of Belarus – potassium, rock salt and some oil. Resources of potassium and salt are globally significant. Belarus is the world 3rd largest potassium producer. The main source of raw materials for the potash industry in Belarus is the Starobinskoye deposit. The detailed explored Petrikovskoye field is being prepared for development. The Starobinskoye field, located in the northwestern part of the Pripyat trough, has four potash horizons, of which the first, second and third are mined. The annual production of sylvinites is over 32 million tons.

Rock salt resources belonging to the Devonian salt strata of the Pripyat trough are practically inexhaustible. Explored three deposits in the upper salt deposits – Mozyr, Starobinskoye and Davydovskoye. The first two are being exploited. At the Mozyr deposit the annual production of table salt is 300–370 thousand tons. At the Starobinskoye deposit, in parallel with the extraction of potash salts, 550–600 thousand tons of edible and technical salt are produced per year.

More than 80 oil fields have been discovered in the southeastern part of Belarus (Pripyat trough). Gas condensate and gas deposits have been identified at two fields. The largest oil deposits are Rechitskoe, Ostashkovichskoe and Vishanskoe. Now Belarus produces 1.6-1.7 million tons of oil per year.

Oil shales are widespread in the post-salt Devonian strata of the Pripyat trough. The predicted resources of oil shale in the Pripyat shale basin to a depth of 300 m are 5.5 billion tons. Two deposits have been identified – Turovskoe and Lyubanskoe. Oil shale of Belarus is characterized by high ash content (75–80%). Their industrial development can be economically justified either on condition of complete utilization of all oil shale products, including ash, or when introducing technologies for their processing without extracting to the surface.

Brown coals are common in the Pripyat Trough. The Zhitkovichskoe, Brinevskoe, Lelchitskoe and Tonezhskoe deposits have been identified. The largest of them is Zhitkovichi (reserves of about 70 million tons). Despite

the difficult hydrogeological conditions on the basis of this deposit it is possible to build a lignite quarry with a capacity of 2 million tons per year. However, the development of the deposit is difficult due to its location in the green zone of Zhitkovichi.

Raw materials for the production of building materials are an important mineral resource for Belarus. This group of minerals includes sands, sand and gravel material, clays and clayey rocks, carbonate rocks, gypsum and anhydrite, natural building and facing stone. Deposits are found in most regions of the country. In the Gomel and Brest Oblasts there are four deposits of molding sand and four deposits of glass sand, suitable for the production of window and container glass, have been explored. In the southern part of Belarus there are deposits of natural building stone (granites, granodiorites, diorites, migmatites, etc.). The Mikashevichi (Brest Oblast) and Glushkevichi (Gomel Oblast) deposits produce 6–8 million cubic meters of building stone annually.

Therapeutical underground waters are confined to the sedimentary cover and crystalline basement. Their composition is mostly chloride, sulfate-chloride and chloride-sulfate. Many sanatoriums were created on the basis of numerous wells, factories for bottling are operating in all regions. Bromine and iodine-bromine waters are used in the sanatorium “Berestye” in Brest Oblast. The “Radon” sanatorium operates on the basis of one of the radon waters deposit in the Grodno Oblast. Highly organic mineral waters with low salinity and a high concentration of humic substances were found in the Jurassic deposits near Mozyr. They are used to treat pathologies of the gastrointestinal tract, urinary tract, metabolic disorders. Weakly boric, ferruginous, hydrogen sulphide waters have been identified but not widely used.

In Belarus there are resources of thermal waters (over 20°C). In the Pripyat trough the temperature of groundwater at a depth of 2000 m usually varies from 30 to 60°C and at a depth of 3000 m – from 45 to 85°C. In the Rechitsa District of the Gomel Oblast at a depth of 4700 m a temperature of 138°C was recorded. The main reason hindering the use of the geothermal energy of the Pripyat trough is the formation of salt plugs in the wells when the thermal brines of very high salinity are raised from a great depth. In the Podlaska-Brest depression underground waters with low mineralization and a temperature of 30°C are deposited at a considerable depth. In the suburbs of Brest on the basis of a well with a depth of about 1.5 km in 2011 with the use of heat pumps, a geothermal station with a capacity of 1 MW.

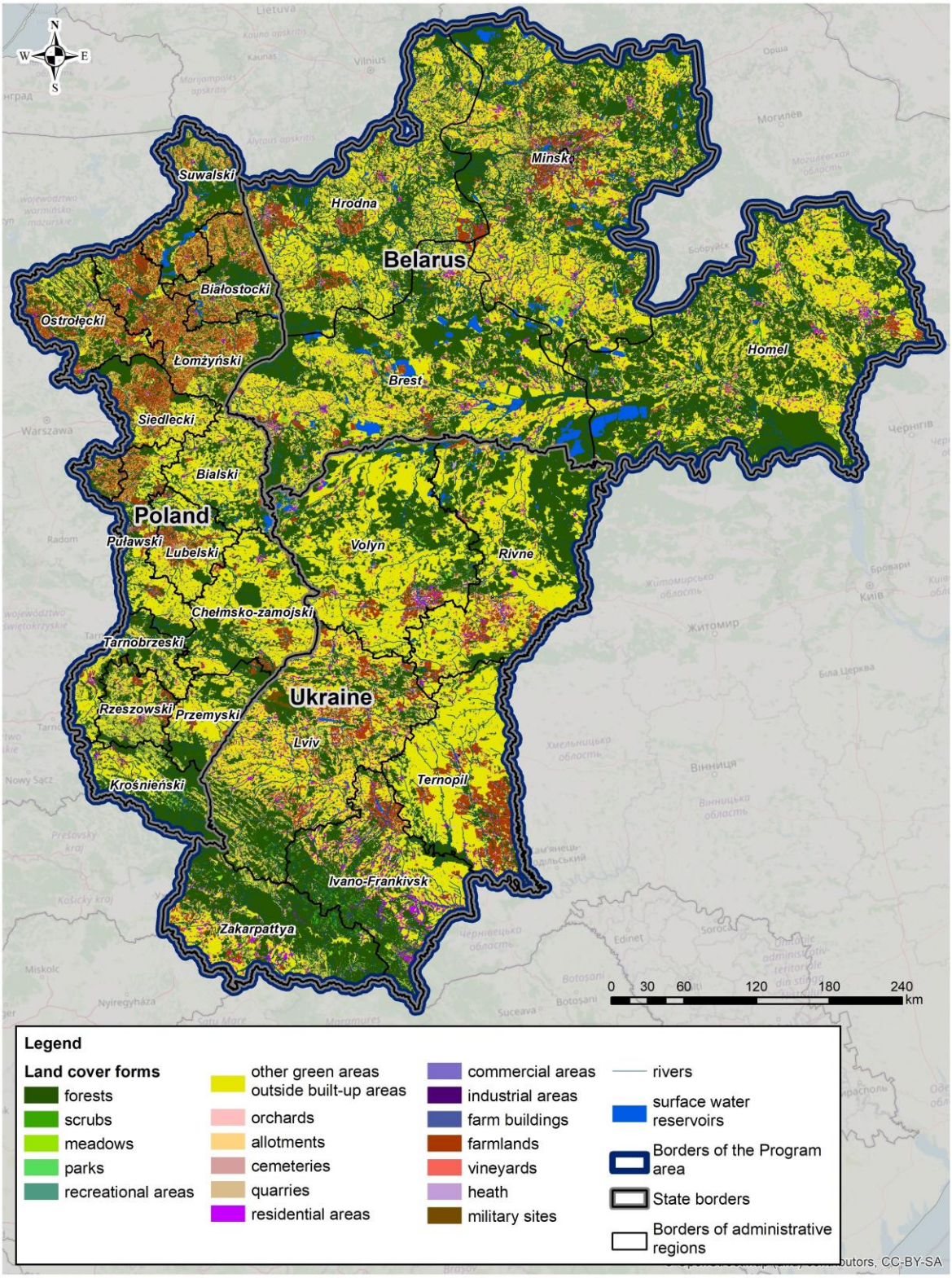

Figure 8. Land cover structure in the area covered by the Programme.

Waste

In recent years, there has been a steady increase in the amount of resources used and waste generated. Studies report process of resource depletion, and thus waste is more and more treated as a source of raw materials. This is why the EU is taking action to 'decouple' economic growth from the use of resources and the generation of waste, as well as to reduce pressure on the environment. Efforts are being made to implement sustainable consumption and production patterns.

The most important objective of waste management should be to separate the link between economic growth and waste generation and to use waste instead of raw materials. The European Union establishes a legal framework to control the entire life cycle of waste. Undertaken activities can be grouped into two main phases:

- waste prevention,
- waste management,

Waste management should adopt the following waste hierarchy:

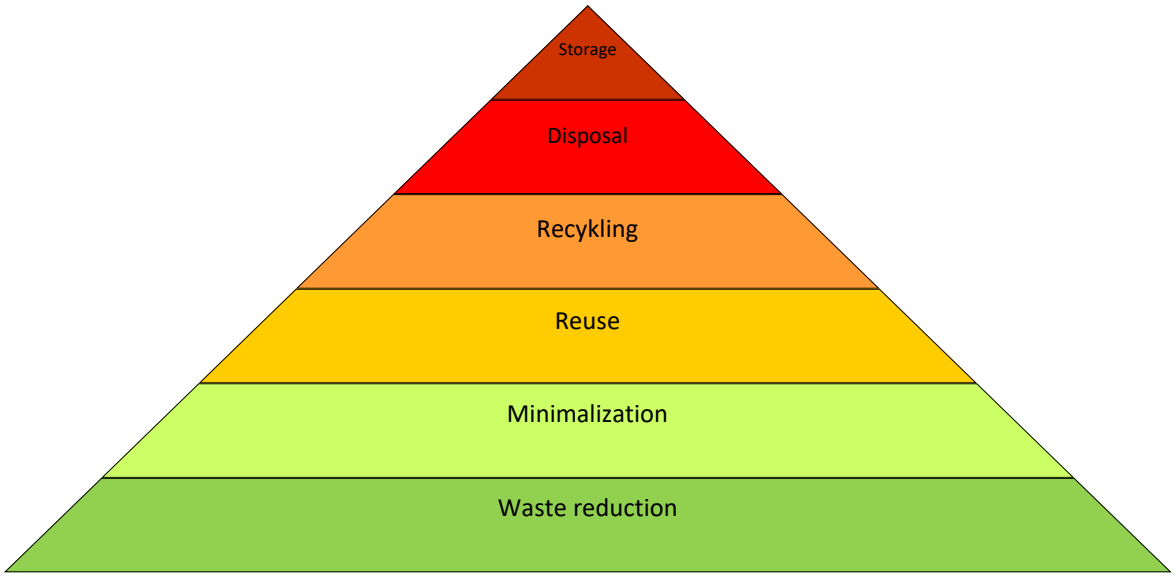

Figure 9 Waste hierarchy. [44]

The main needs and problems in the area of resource protection and waste management that should be applied in the Programme Area are presented below:

- reducing the use of resources for the benefit of waste,
- protection against infrastructural development of documented strategic deposits, which will enable the use of these resources in the future,
- increasing the effectiveness of waste prevention activities,

[44] Strategy 'Energy security and the environment'. Outlook 2020, the Ministry of Economy and Ministry of Environment in Poland

- increasing the rate of selective waste collection,
- increasing the recovery of industrial waste,
- improving the quality of recycled waste,
- solving problems related to the management of the increasing amount of sewage sludge,
- increasing the capacity of thermal waste treatment plants,
- reducing the amount of waste to be landfilled and eliminating biodegradable waste from landfilling.

Poland

Like all regions of Poland, the border area is facing problems related to waste management. In Poland, on average, about 287 kg of municipal waste was produced per capita in 2019. The largest amount of waste per capita was generated in the city of Rzeszów - 450 kg, while the smallest in the Brzozowski county in the Podkarpackie Voivodeship - 140 kg of waste per capita. The amount of municipal waste for composting is increasing year by year - an average increase of 26% over the last two years in the voivodeships covered by the Programme. The amount of waste intended for recycling is also growing - by 12% on average[45]. In total, 1.3 million tonnes of municipal waste were collected on the Polish side of the Programme Area in 2019. Of these, 21% were recycled, 7.2% were collected for composting or fermentation, 29.4% were collected for incineration with energy recovery, and the rest, about 41%, was disposed of by landfilling. On average, in 2019, an average of 36.5% of waste was collected selectively in relation to the total generated municipal waste, with the share in households reaching 41%.

The statistics for Poland show that less municipal waste is being treated than the EU average. Poland recycles 34% of its waste, which is below the EU average of 45.8%[46]. In terms of electronic waste recycling, all countries are above the EU average.

Ukraine

In Ukraine, the recycling rate is in average 6%. In general, for the waste management system in Ukraine are typical the following trends:

- waste accumulation of in both the industrial and household sectors
- improper utilization and disposal of hazardous waste;
- disposal of household waste without taking into account possible dangerous consequences;
- inadequate level of waste's use as a secondary raw material;
- inefficiency of implemented economic instruments in the field of waste management.

Thus, 441 516.5 thousand tons of industrial waste was generated in 2019, and the total amount of accumulated waste amounted to 15 398 649.4 thousand tons. The annual volumes of utilization and incineration are insignificant – 108 024.1 and 1 059.0 thousand tons respectively. The share of the Programme Area (Ukraine) in total amount of industrial waste generated in 2019 is less than 2% or 7 442.5 thousand tons, with 5 486 thousand tons were processed during the year.

The volume of household waste collected in 2019 amounted to 52 920.120 thousand m^3 in Ukraine, with only slightly more than 6% of the total volume processed, the rest transported to a specially equipped dump. The Programme Area on the Ukrainian part accounts for more than 18% of waste generated.

[45] CSO data, Local Data Bank
[46] https://www.europarl.europa.eu Waste management in the EU: Facts and Figures - Data for 2017

Regarding separate waste collection, in 2019 in Ukraine it was carried out in 1 462 settlements, which is 281 settlements more than in 2018.

Among the regions of the Programme Area, the highest share of settlements in which separate collection is introduced is in Transcarpathian (19.7%, the highest in Ukraine). In Volyn this share is 8.3%, in Ivano-Frankivsk – 8.1%, Lviv – 7.3%, Rivne – 6.9%, in Ternopil – 18.7%. At the same time, the dynamics remains unstable and in some oblasts, in particular in Transcarpathian and Ivano-Frankivsk, the indicator has deteriorated compared to 2018.

Belarus

Municipal waste includes consumer and industrial waste included in the list of waste and defined as municipal waste, the disposal of which is organised by local enforcement and administrative bodies.

In 2019 the total amount of municipal solid waste on the Belarusian part of the Programme Area reached 2898 thousand tonnes; 676 thousand tonnes from this amount (23.4%) were recovered, 2221 thousand tonnes (76.6%) – deposited. The share of recovered municipal solid waste in the total number of municipal solid waste was the highest in the Brest Oblast – 30.5%, the minimal – in Minsk Oblast – 17.3%.

In relation to one resident, the generation of solid municipal waste in average was 400 kg per capita and varied from 438 kg per capita in Grodno Oblast to 369 kg per capita in Minsk Oblast.

The generation of industrial solid waste in four Oblasts of Belarus and Minsk city 2019 was about 55903 thousand tonnes, only 25.7% of them were recovered. Of individual regions, the largest volume of industrial solid waste generation was typical for the Minsk Oblast – 43 616 thousand tonnes – because of the formation of waste from potassium production.

In 2017 the Strategy for the Management of Solid Municipal Waste and Secondary Material Resources in the Republic of Belarus for the Period until 2035 was approved. The purpose of the Strategy is to determine the main directions for minimizing the harmful effects of solid municipal waste on human health, the environment and the rational use of natural resources by preventing the generation of waste, the maximum possible extraction of secondary resources contained in waste, their use as additional sources of raw materials for the production of products as well as energy use in the form of refuse derived fuel, thermal and electric energy. Work is underway to optimize the network of landfills and mini-landfills for solid municipal waste, to introduce new technologies for waste processing and disposal.

SUMMARY

Table 8. List of environmental quality problems along with the factors of change of these problems[47]

The environmental quality problem	Factors of change
Increasing amount of waste in the environment	Increased consumption of goods, insufficient level of segregation and recovery of raw materials from municipal waste

[47] Own study based on the analysis of the state of the environment

The environmental quality problem	Factors of change
The amount of waste deposited in the environment	• Too high levels of landfilled waste in relation to segregated and recycled waste, import of waste from abroad • Occurrence of wild landfills • Waste deposited in forest areas
A large amount of biodegradable waste is stored in landfills	Incorrect segregation of waste
Low waste recycling rate	Limited waste demand, no proper segregation

4.5. Environment, Health and Quality of Life

The state of the environment and trends of variability

Over the last decade, Poland has made great progress in environmental protection, reducing the dependence of economic growth on environmental pressure. Belarus and Ukraine are also working towards improving the quality of the environment. Further reduction in the use of resources and the reduction of emissions of substances and energy to the environment continue to pose a challenge in the process of implementing the principles of sustainable development in the economy and strengthening pro-efficiency trends.

EU membership places numerous obligations on environmental standards. Some of these requirements are overachieved, for example with regard to greenhouse gas emissions. In 2017, Poland achieved a 28% reduction in greenhouse gas emissions expressed in carbon dioxide equivalent compared to the base year level, including carbon dioxide emissions by approx. 29%, methane by 35%, and nitrous oxide by 29%.

High priority in the area of environmental protection has been given to restoring water purity. The National Programme of Municipal Wastewater Treatment, adjusted to the requirements of EU directives (mainly the Water Framework Directive), provides for 116 wastewater treatment plants and 14,661 km of sewerage network to be built by 2021, while at the same time 1010 wastewater treatment plants and 3506 km of network are to be modernized. Between 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, the quality of air and water remains insufficient. Particularly difficult is the situation of the urban population exposed to excessively high levels of certain air pollutants in Podkarpackie Voivodeship. The most serious health consequences resulting from exposure to the presence of particulate matter and ozone in the air, which is associated with the shortening of life expectancy, acute and chronic respiratory diseases and cardiovascular diseases.

Environmental noise trends in Poland indicate increased risk of traffic noise on the one hand, and growth reduction on the other together with the occurrence of decline in industrial noise trends. Growth trends of traffic noise relate primarily to road noise and aviation noise. The increase in road noise pollution in recent years is mainly related to the rapid growth of the number of vehicles in Poland.

Air pollution by ozone

The level of ozone concentration at a given time and place depends mainly on meteorological conditions (solar radiation intensity, air temperature) and also on the degree of pollution with ozone and ozone precursors of the air flowing into the area under consideration. The degree of ozone air pollution is measured by ozone concentration indicators related to different time scales. A commonly used indicator is the annual number of exceedances of 120 µg/m^3 by daily maxima from 8-hour concentrations, with the permissible number of exceedances being 25. The target concentration of ground-level ozone was exceeded in 2018 at many measurement stations throughout Poland. In Podkarpackie, Lubelskie and Podlaskie voivodeships there were no ozone exceedances.

Exceedances of the ozone standards (from the point of view of the impact on plants) recorded throughout the Programme Area also have a negative impact on biodiversity.

The ozone content of the atmosphere layer affects the ozone hole. Measurements of the ozone content in the atmosphere layers indicate that during the year there are significant changes in the amount and spatial distribution of ozone in the atmosphere - the "ozone hole" is usually the smallest in the spring months and the largest in the autumn.

Source: data of the Inspection for Environmental Protection and the Institute of Meteorology and Water Management IEP-NRI.

Figure 10. Monthly averages of total ozone content in the atmosphere

Noise and radiation

The main threat to the acoustic climate in Poland, Ukraine and Belarus, as well as in other EU countries, is the impact of traffic noise. Traffic noise is a threat primarily in urban areas. Exceedances of environmental

noise limits are observed in most cities. In the case of high and highest levels, after the increase in the number of such cases by the end of the 1990s, their number began to decline slowly. Analyses indicate a slow, although in some cases significant (especially in relation to main lines), reduction of the exposure of the population to noise emitted by rail traffic. The main reasons involve reduction in traffic, revitalisation of many sections of railway lines and systematic, albeit slow, replacement of rolling stock with a less noisy one.

Aircraft noise in areas surrounding airports is an acoustic event harmful to the environment. A systematic increase in air traffic noise can be expected mainly due to the growth of civil aviation of small aircraft (up to 5 tonnes).

One of the most important environmental problems of Belarus – radioactive contamination of the territory due to the explosion at the Chernobyl nuclear power plant in 1986. About 48.8 thousand km^2 of land in Belarus – 23.5% of its total area – was exposed to radioactive pollution. The contaminated areas are home to 13% of Belarus's population. Almost a half of the people affected live in the city of Gomel. The Chernobyl disaster affected a larger geographical area than any previous industrial accident and had ecological, demographic, social and economic consequences for Belarus.

Since the accident at the Chernobyl nuclear power plant, the radiation situation on the territory of Belarus has improved. In radioactively contaminated areas there is a monotonous decrease in radiation doses due to natural physical processes (radioactive decay of radionuclides, horizontal and vertical migration, processes of weathering, water and air transport), human economic activities and protective measures.

Zones of radioactive contamination include territories with soils characterized by a density of contamination with Cesium-137 (^{137}Cs) over 37 kBq/m^2 (> 1 Ci/km^2) or Strontium-90 (^{90}Sr) over 5.55 kBq/m^2 (> 0.15 Ci/km^2) or Plutonium -238,239,240 ($^{238,239,240}Pu$) more than 0.37 kBq/m^2 (> 0.01 Ci/km^2). On such territories the average annual effective exposure dose to the population should not exceed (above the level of natural and technogenic background) 1 mSv.

In general, over the last 35-year period the area of agricultural land contaminated with ^{137}Cs decreased from 1866.0 to 825.4 thousand hectares. The share of radiation-contaminated lands is 9.96% of the total area of agricultural land in Belarus. Agricultural production is carried out on 14.99 thousand hectares of land with a high density of ^{137}Cs contamination – from 555 to 1480 kBq/m^2 (15–40 Ci/km^2). About 60% of agricultural land contaminated with ^{137}Cs is concentrated in Gomel Oblast.

Land contamination with ^{90}Sr is more local than ^{137}Cs. Of the total area of land contaminated with ^{90}Sr 96.3% is concentrated in Gomel Oblast. Agricultural production is carried out on 278.99 thousand hectares with a ^{90}Sr contamination density of more than 0.15 Ci/km^2.

At present 2022 settlements in Belarus are situated in zones of radioactive contamination. Among them in Gomel region – 1133, in Brest Oblast – 94, in Minsk Oblast – 69 and in Grodno Oblast – 66.

Despite the gradual improvement of the radiation situation on the territory of Belarus the threat of the spread of radiation with atmospheric transport of aerosols during fires, with agricultural products grown in contaminated areas remains. A large number of settlements in contaminated areas are associated with the risk of harvesting contaminated forest products, primarily mushrooms and berries.

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

Poland

The average water resources in Poland are around 60 billion m^3, and in dry seasons this level may even fall below 40 billion m^3. Surface water resources in Poland are characterised by great temporal and spatial variability, which results in periodic surpluses and deficits of water in rivers. The retention reservoirs are characterised by a small capacity, which altogether does not exceed 6% of the annual runoff of water from the country, which does not provide sufficient protection against periodic surpluses or deficits of water. This results in difficulties in water supply in some parts of the country. In the south of Poland in particular, the water-intensive industry and development of demographic processes, as well as natural geographic and hydrographic conditions lead to the occurrence of serious water deficiencies.

The most important rivers in the Polish part of the area are: Vistula, Bug and San. The surface waters of Podlaskie Voivodeship are located in five water regions: Narew, Bug, Middle Vistula, Niemen, Łyna and Węgorapa. Lubelskie Voivodeship covers the Vistula river basin in its entirety. The water network of the Voivodeship consists of 352 surface water bodies (jcwp) - river water bodies (196 natural surface water bodies, 156 artificial and strongly modified surface water bodies), including one dammed reservoir, whose catchments, according to the Act of 20 July 2017 The Water Law is assigned to the following water regions: Upper-Eastern Vistula, Middle Vistula and Bug.

The assessments of the lakes examined in 2018 were carried out on the basis of the existing regulations on classification method for water bodies of surface waters and environmental quality standards for priority substances. The status of the surface water bodies was determined as good if the ecological status/potential was at least good and at the same time the chemical status was good. In all other cases, the surface water bodies were considered to be poor.

Based on the Water Management Plans, the characteristics of each river basin district have been defined. Currently, plans developed in 2016 are available, while their update is currently at the consultation stage and will be completed in 2021. The development of typologies is a fundamental step in determining the assessment and classification of the ecological status of waters. Due to the diversity of natural environmental conditions that affect the occurrence of aquatic organisms, it is necessary to separate different types of waters that, under conditions undisturbed by human activities, are characterised by distinct biological features and will provide a benchmark for determining the degree of deviation when assessing the ecological status of waters.

For the designated Dniester river basin the environmental objective for the river surface water bodies in terms of chemical status is good chemical status. The environmental objective for surface water bodies of rivers in terms of hydromorphological elements is a good status of these elements (2^{nd} class). In the case of the monitored water bodies which, according to the results of the status assessment carried out by the Chief Inspectorate for Environmental Protection, achieve very good ecological status, the environmental objective is to maintain the hydromorphological assessment parameters at the Class 1 level.

To achieve the environmental objectives, it is important to allow free migration of aquatic organisms by maintaining or restoring the ecological continuity of watercourses. The river corridor restoration plan should focus on key species, priority waters and stages of restoration. On the basis of the literature, we have identified surface water bodies important for the migration of bi-environmental fish, where it is necessary to maintain hydromorphological continuity.

An additional environmental objective has been assigned for the groundwater bodies abstracted for the purpose of supplying drinking water to the population. The objective is to maintain stable values of physicochemical indices of drinking water in order to prevent the necessity to modify the water treatment processes or the necessity to introduce groundwater treatment at groundwater intakes. Waters at risk of deterioration should be protected by establishing a protection zone of the intake based on a local legal act. Protection zones should be an area directed to the causes threatening the deterioration of water condition, so that the water quality does not deteriorate. The following areas have not been designated in the Dniester river basin: intended for protection of aquatic animal species of economic importance; intended for recreation, including bathing; sensitive to eutrophication caused by pollution from municipal sources.

For the area of the Nemunas River Basin in Podlaskie Voivodeship, environmental objectives have also been set in the Protection Plan. In the Nemunas river basin there are no surface water bodies which are designated for abstraction of water intended for human consumption. An additional environmental objective has been assigned for the groundwater bodies abstracted for the purpose of supplying drinking water to the population. The objective is to maintain stable values of physicochemical indices of drinking water in order to prevent the necessity to modify the water treatment processes or the necessity to introduce groundwater treatment at groundwater intakes. For Natura 2000 sites, the objective is the proper conservation status of individual habitats and natural species. This means preservation of water conditions necessary to achieve or maintain a favourable conservation status in the Natura 2000 area for habitats in the habitat area and birds in the bird area. For a national park, the objective is to preserve biodiversity, proper condition of natural resources and components, and to restore distorted natural habitats, as well as habitats of plants, animals and fungi. For a landscape park the objective is to preserve the natural values under conditions of sustainable development. For a nature reserve and a protected landscape area the objective is defined individually. In the Nemunas river basin no areas exposed to pollution with nitrogen compounds from agricultural sources have been designated[48].

For the Vistula river basin included in the area covered by the Programme the environmental objectives are similar to those indicated above. For some river sections additional objectives related to migration of aquatic organisms on watercourse sections were indicated. The environmental objective is good chemical and quantitative status, identified by parameters characterising good chemical and quantitative status. For the groundwater bodies that were identified as being at risk and in poor status according to the 2012 status assessment, a preliminary inclusion procedure, i.e. determination of deviations from the environmental objectives, was performed. For Natura 2000 sites, the objective is the proper conservation status of individual habitats and natural species. This means preservation of water conditions which are necessary to achieve or maintain a favourable conservation status in the Natura 2000 area for habitats in the habitat area - and birds in the bird area. For a national park, the objective is to preserve biodiversity, proper condition of natural resources and components, and to restore distorted natural habitats, as well as habitats of plants, animals and fungi. For a landscape park the objective is to preserve the natural values under conditions of sustainable development. For a nature reserve and a protected landscape area, the objective is specified individually in the act creating the area.

[48] Regulation of the Council of Ministers of 18 October 2016 on the adoption of the Flood Risk Management Plan for the Nemunas river basin Journal of Laws, item 1915

Groundwater is the basic, and in most of the Lubelskie Voivodeship, the only source of water supply for drinking, economic and industrial purposes. There are two large groundwater reservoirs (Lublin Basin and Masovian Basin) in the region.

Lubelskie Voivodeship is an area with a large transformation of the original water relations as a result of extensive drainage and mining development. The largest investment is the drainage system of the Wieprz-Krzna Canal consisting of the main canal and smaller water distribution channels, retention reservoirs and a network of drainage ditches. As a result of its operation, there has been a significant change in directions and dynamics of water runoff and water retention conditions. The process of drainage of the Vistula and Bug river basins resulted in the disappearance of the springs and upper sections of the watercourses in the Lublin Upland, the reduction of the range or disappearance of permanent wetlands and their transformation into periodical wetlands (Michalczyk Z. and Wilgat T., 1998, Pichla A. and Jakimiuk S., 2014)[49].

The quality of water in the Podlaskie Voivodeship is a result of pressures related to water intake, discharging municipal and industrial wastewater into waters, area run-off (including from agriculture and rural areas), improper waste management, handling of rainwater and snowmelt, hydromorphological changes and pollution related to the development of tourism and recreation. Due to the agricultural nature of the Voivodeship, it is estimated that it is agriculture, including large-scale cattle breeding and sewage management in rural areas, that should be particularly taken into account as a cause of pollution, including eutrophication, of surface water. In 2018, according to the GUS29 data, the groundwater exploitation resources in the Podlaskie Voivodeship were estimated at 689.6 million m^3, which constituted only 3.8% of the national resources. The water taken, due to its high quality, constitutes the main source of water supply for drinking and industrial purposes[50].

The assessment of the hydromorphological status in Podkarpackie Voivodeship showed that most of the monitored watercourses of the Voivodeship are in a very good and good hydromorphological condition (they are not transformed or low transformed). The results of the classification of the condition and ecological potential of river surface water bodies in Podkarpackie Voivodeship in 2018 showed that only 2% of waters are in good condition, 19% are in moderate condition and 4% are considered to be in poor condition. For 132 river surface water bodies situated in the Vistula river basin (including 2 dammed reservoirs) and 1 river surface water body situated in the Dniester river basin, poor status was determined.

Surface water quality is primarily influenced by wastewater management. In 2018, 73,181 thousand m^3 of sewage was discharged from the Lubelskie Voivodeship to water or land. From this amount, 99.23% of the sewage was treated, 55.25% of which was treated with increased removal of nutrients. The dominant non-point (territorial) pollution in the Lubelskie Voivodeship is pollution originating from agricultural production. The following may pose a threat to water quality: intensity of soil use combined with inappropriate use of artificial and organic fertilisers and large-scale animal production. Wide use of natural and artificial fertilizers leads to an increased load of water with biogenic compounds. In 2018, the total amount of industrial and municipal wastewater requiring treatment, discharged to water or soil, was 41.5 million m^3 in the Podlaskie Voivodeship, which accounted for 1.9% of all wastewater produced in Poland (source: CSO). Other sources of area pollution are: industrial outflows from areas without sewage systems, leachate waters from unprotected municipal landfills and sewage from areas not covered by the collective sewage system - from dispersed rural and holiday home development, where domestic sewage is collected in non-outflowing

[49] https://www.gios.gov.pl/images/dokumenty/pms/raporty/stan_srodowiska_2020_lubelskie.pdf
[50] State of the environment in the Podlaskie Voivodeship Report 2020, GIOŚ (CIEP)

tanks and then exported to catchment points at sewage treatment plants, or treated in domestic sewage treatment plants.

In the Podkarpackie Voivodeship, the amount of treated municipal wastewater increased and in 2018 amounted to nearly 62 million m^3. The amount of untreated wastewater in the Voivodeship is small and has remained for several years at the level of around 1 million m^3. The following rivers have the highest sewage load in the Voivodeship: Wisłok, Wisłoka and San.

The average annual outflow of surface water from the territory of Poland including inflows from abroad in the period 2000-2018 was 58.6 km^3. This gives an annual water resource of 1.4 thousand m^3 per capita, while in most European countries freshwater resources are above 5 thousand m^3 per capita.

According to statistical data, in the area of the Polish part of the Programme, less and less water is used for the needs of the economy and population. Water use in agriculture and forestry: until 2018 – water used to irrigate agricultural and forest land as well as to fill and replenish fish ponds; since 2019 – water used to fill and replenish fish ponds. The biggest drop over the last three years has been in the industrial sector - 30% compared to 2018.

The water used in the operation of the water supply network is consumed in a greater amount in 2019 than in 2018 by about 2%.

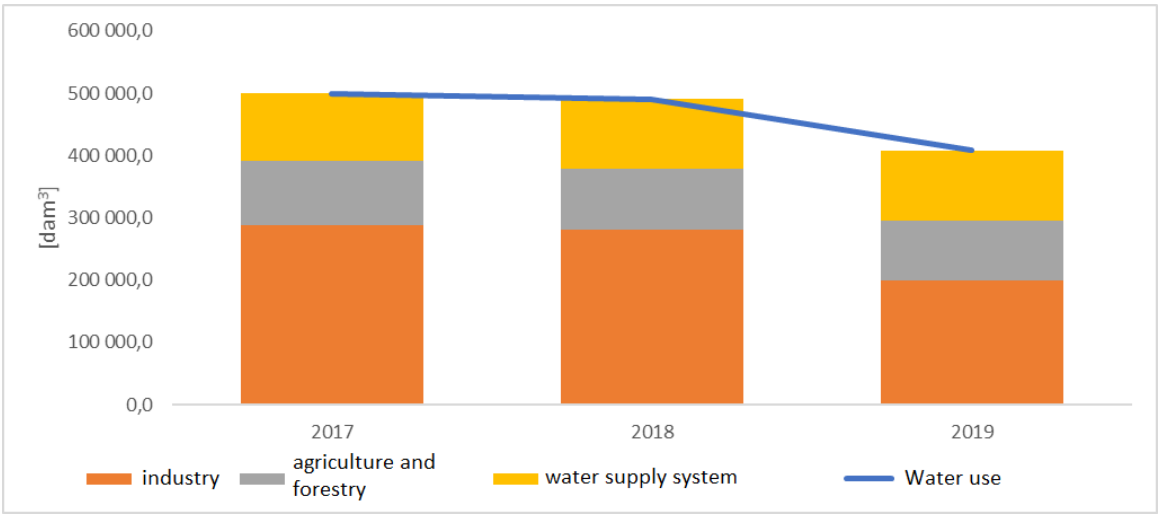

Figure 11. Water consumption for the needs of national economy and population during the year [51]

The main source of water supply for the economy in Poland is surface water. Its abstraction in 2018 amounted to 8.1 km^3 and covered 82% of needs. Surface water was used mainly for industrial production purposes. The groundwater withdrawal amounted to 1.8 km^3 and was similar to that in 2017. As water of much better quality than surface water, it was mainly used to supply the population with water for drinking. For this purpose, approximately 1.6 km^3 of groundwater was used in 2018.

As regards wastewater management, Poland has a ratio of 74% of population connected to wastewater treatment plants[52].

[51] Local Data Bank of the CSO
[52] The state of the environment in Poland in 2019, GIOŚ (CIEP)

The water status determines the quality of human life and the proper functioning of ecosystems (both aquatic and terrestrial). The challenge for achieving and maintaining good water status is to reduce the impact of pressure from various sectors of the economy and human pressure. One of the most important problems is the excessive load of biogenic substances in waters (nitrogen and phosphorus). They enter the waters mainly as a result of runoff from areas used for agriculture, but also from dispersed rural and recreational built-up area, the deposition of total nitrogen and phosphorus from the atmosphere, as well as from pollution from sewage and households not connected to the collective sewage system. Although nitrates and phosphates determine biological life in water, their excess can lead to undesirable effects, such as eutrophication.

The quality of water resources is also a problem. The quality of surface water in a large part of the eligible area is not satisfactory. However, groundwater maps show that the quality of groundwater is good in most of the area. However, there are areas where groundwater quality is assessed as poor[53].

Ukraine

The larger rivers flowing through the Ukrainian part of the eligible area are: Tisza, Prut, Bug, San, Dniester and Pripyat. The Tisza River, the largest tributary of the Danube, is an international watercourse that originates in Transcarpathia.

Water intake from natural sources throughout the territory of Ukraine in 2017 amounted to 9224 million m^3 of water, with a total wastewater discharge of 4921 million m^3.

In the southern and southeastern part of Ukraine, the annual river runoff falls by 30-50%. Both the risk of drought and the frequency and magnitude of extreme floods are increasing. The sectors most vulnerable to these changes are agriculture in the south and industry and households in the south and southeast. Surface water quality is deteriorating in the south and southeast.

The Dnieper is the main river of Ukraine. The river fills water reservoirs that are used for several interests. When there is not enough water in these reservoirs, priorities are made. Four levels are distinguished:

1. Zone of full provision. All consumers are provided with water without restrictions.
2. Zone of economic consumption. All water consumers are provided with water in accordance with norms. Restrictions of auxiliary needs are introduced.
3. Zone of strict water saving, when water reservoirs are being drawn down below navigation drawdown level not more than 1 m. Restriction for irrigation systems and for auxiliary needs of industry are introduced. River transportation is restricted to a navigation depth of 2.6 m. Ecological passing may be curtailed to 300 m^3/s for short periods. Upon that everyday inspection of water quality is established.
4. Zone of all consumers' restriction. To provide for needs of inhabitants, limits and schedules for strict water supply are established.

Under climate change scenarios that lead to decreased Dnieper water discharge, the quality of surface waters may deteriorate. Therefore, bearing in mind the present high level of Dnieper water contamination,

[53] Socio-economic analysis of the eligible area

underground deep water horizons are recommended for near future water use to meet the demands for drinking water.

In general, the region is characterized by relatively better water quality indicators in Ukraine. The use of fresh water in the region is much lower than the average in Ukraine and amounts to 423 million m^3. Most water is consumed in Lviv and Rivne Oblasts, 122 and 96 million m^3, respectively. The lowest consumption is in Ternopil and Zakarpattya Oblasts - 40 and 30, million m^3.

The annual volume of circulating water in the region is 6571 million m^3. Of this amount 4242 million m^3 falls on Rivne Oblast, 1889 million m^3 - Ivano-Frankivsk Oblast. Such significant volumes are related to the use of water in the cooling systems of nuclear and thermal power plants located in these areas.

The total discharge of polluted wastewater is 56 million m^3.

A serious problem affecting the state of water resources in the region is the low level of housing equipment with water mains and sewerage systems. For the region as a whole, these figures are 59.2% and 56.1%, respectively, but usually it is worse in rural areas.

Belarus

Renewable fresh water resources of the Republic of Belarus are represented by river runoff and groundwater, the volume of which is formed in natural conditions due to precipitation in the country (local runoff) as well as the inflow of river and groundwater from neighboring countries. The Republic of Belarus is supplied with water resources sufficiently to meet the current and future consumption needs. Belarus has around 20,800 rivers, 10,800 lakes, 153 water reservoirs and 1,500 pounds. The total length of rivers is 90,600 km. Rivers belong to the basins of Black Sea (Dnieper, Sozh, Pripyat) and Baltic Sea (Western Dvina, Neman, Vilia, Western Bug).

The main source of the country's surface water resources are medium and large rivers, the volume of water runoff of which in medium-water years does not exceed 57,900 million m^3 per year. In high-water years the total river runoff increases to 92,400 million m^3 and in low-water (95% supply) decreases to 37,200 million m^3 per year. The rivers of the Black Sea basin account for 55% of the total annual runoff, the Baltic Sea basin – 45%. Most of the river runoff (34 km^3 or 59%) is formed within the country (local runoff), the bulk of which (73%) is formed in the catchments of the Western Dvina, Neman, Dnieper and its tributaries – Berezina and Sozh. The inflow of water from the territories of neighboring countries (Russia and Ukraine) is 41% or 23.9 km^3 per year. A significant part of the transit flow comes through the Dnieper (32%), Pripyat (31%) and the Western Dvina (28%).

Natural resources of fresh groundwater are 15,900 million m^3 per year, forecasted – 18,100 million m^3 per year. The distribution of water resources throughout the country is very uneven due to the nature of the relief, the power of the aeration zone, the lithological composition of the cover and water-bearing rocks. At the level of the country's administrative regions the Minsk Oblast stands out in terms of the amount of natural resources, the Brest Oblast is the least provided. Among the river basins, the largest amount of water resources is found in the drainage basin of the Dnieper (including Pripyat), the smallest in the drainage basin of the Western Bug.

The sufficiency of water resources in world practice is assessed using the specific indicator of water availability. The provision of water resources per capita in Belarus is close to the European average – 6.1

thousand m^3 per capita per year but at the same time significantly higher than in neighboring countries – Poland (1.7 thousand m^3 per capita) and Ukraine (4.1 thousand m^3 per capita).

An uneven distribution and quality of water resources is the most essential problem for Belarus. Unequal water supply to the population and territories, varying levels of intensity of agricultural and industrial production and water needs directly related to them as well as current approaches to ownership in the water laws of the neighbouring states impart a unique nature to the problem of shared use of transboundary waters. In terms of water management, the possible transformation of hydrographs of low-water years is most critical of all, especially if the entire amount of forecasted annual flow reduction will fall onto the summer-autumn low-water period.

The water supply industry provides water to the public for various purposes such as domestic use and drinking, agriculture, industry and many other sectors.

Belarus has been investing in renewing and expanding the water supply network in recent years. It was estimated that in 2019 96.1% of Belarusian citizens were connected to the water supply system (in 2005 – 78.9%). In addition, there is also declining trend in water losses during transport. Although in 2001, around 125 million m^3 was lost in the water supply network, this volume decreased to 42 million m^3 in 2019.

In 2019 the indicator of specific water consumption in Belarus amounted to 153 L/person/day, which a little bit higher than the level of water consumption in most European countries (120–150 L/person/day). In the range of the European indicator is and specific consumption in the administrative regions of the country, the only exception was Minsk – 227 L/person/day.

The amount of wastewater discharged into surface water bodies of Belarus in 2019 amounted to 1019.3 million m^3. In Brest Oblast – 147.5 million m^3, in Gomel Oblast – 143.0 million m^3, in Grodno Oblast – 111.9 million m^3, in Minsk Oblast – 154.4 million m^3 and in Minsk city – 209.3 million m^3. About 67.6% of discharged wastewater were treated. About 94.8% of population is connected to wastewater treatment plants.

According to the observation data of 2019, the surface water bodies exposed to the most anthropogenic load include the following river sections: Svisloch near settlement Korolishchevichi, Loshitsa within the city of Minsk, Plissa near the city of Zhodino (Dnieper river basin); Mukhavets near the town of Kobrin, Western Bug, Lesnaya Pravaya near the settlement Kamenyuki, Rudavka (basin of the Western Bug river); Yaselda below and above the city of Bereza, Moroch near the settlement. Yaskovichi, Lva, Goryn (basin of the Pripyat river); Usha below the town of Molodechno (basin of the Neman River), as well as Lake White and reservoir Bialowieza Forest. The overwhelming majority of surface water bodies covered by observations in 2019 corresponded to excellent and good hydrochemical status.

Nevertheless, the analysis of long-term series of hydrochemical data indicates that for most river basins the problem of biogenic pollution (by nitrogen and phosphorus compounds) and pollution with difficult-to-oxidize organic substances remains urgent. The main sources of pollutants entering surface water bodies are industrial and municipal wastewaters, surface runoff from livestock farms, non-canalized areas and agricultural lands.

Natural disasters

The Programme Area lies in a temperate climate zone, not usually plagued by major natural disasters, but is nevertheless exposed to natural phenomena which can take the form of a cataclysm. The most important of

these are floods, droughts, but also storms and forest fires. When natural disasters, we are talking about a crisis situation, which usually requires the intervention of public services.

The Programme Area is under the influence of changing meteorological conditions being under the changing influence of the Atlantic and continental climate. This results in a wide variety of hydrological conditions. The morphology of the area as well as its cover and use is also varied, which affects the diversity of water relations. Therefore, in some regions there are periodic water deficits and, on the other hand, other regions are exposed to flooding, especially mountain catchments with sudden water rises.

The phenomenon of drought is also due, among other things, to negligence in water retention activities, and the reasons for the decline in the retention of individual catchments and water resources should be sought in faulty management of water systems, operational negligence and degradation of water infrastructure. Unfortunately, in comparison with other European regions, water resources in the Programme Area are small, and the average annual rainfall is much lower than the European average. The phenomenon of atmospheric drought (associated with excessive evaporation of water in relation to the amount of precipitation) is accompanied by the so-called hydrological drought, which consists in the fact that flows in watercourses decrease or even disappear. As a result, the amount of water in lakes and water reservoirs decreases, the surface layers of soil dry up and the groundwater level decreases. Scientific research also points to a correlation between global climate change and the deepening Fwater problems.

Climate change in the eligible area (regardless of its causes) will have an increasing impact on the extent of emerging disasters. Another factor after climate change is the development of infrastructure (human civilisation), which unfortunately often takes place in a chaotic, ill-considered manner, with many serious errors, with the result that the natural environment is more susceptible to threats from weather conditions.

Droughts, like floods, occur in the voivodeships covered by the support, and their frequency is around twenty times per 100 years, causing a reduction in groundwater level and water levels in rivers and streams. In order to prevent water deficits, it is necessary to increase the water retention capacity.

Floods, as a natural phenomenon with a rapid course, occur on a fairly regular basis, and the degree of flood risk depends on: population density, the use of valleys and floodplains as well as communication and technical infrastructure. In the eligible area, raised water stages occur even several times a year, and on average every 10 years floods take the form of a major natural disaster. The greatest threats are in the Vistula, Bug, Narew, Niemen, Berezyna, Dniepr, Pripyat and Dniester river basins. Continuous rainfall causes rainfall and overbank floods, which are the greatest threat. In addition, the violent summer rains result in rainfall and flush floods.

In Belarus from 9 to 30 dangerous meteorological phenomena are registered annually. Most of them are local. However, such phenomena as frost, strong winds, heavy rains, heavy snowfalls, extreme fire hazard in some years cover a significant part of the country. A similar frequency of dangerous natural phenomena occurs in Ukraine and Poland.

Approximately 80% of all cases of dangerous phenomena occur during the warm period of the year (frosts, squalls, heavy showers, hail), when active convective activity is noted (May–November). Its influence is especially pronounced for a group of phenomena associated with wind. These are strong winds, squalls, tornadoes. A significant number of dangerous phenomena associated with precipitation during the warm period: heavy rain, prolonged rain, downpour, hail. Since 1974, the greatest number of rainstorms, squalls, glaze ice has been recorded, less frost and snowstorms.

The number of cold winters has decreased, while the number of warm ones has increased. From dangerous and unfavorable meteorological phenomena, frosts and dry periods should be distinguished (since 1992 their frequency has increased). Since 1989 heat waves have recurred more frequently. Over the last quarter of a century, the number of hot days with a maximum air temperature of ≥ 25°C has increased.

There is a trend towards an increase in the duration of the frost-free period, especially in the northern and western parts of the country. In comparison with 1951–1990 the recurrence of years with spring and autumn frosts decreased. An exception is the Gomel Oblast, where the frequency of spring frosts in May increased. In autumn, during the warming period, at most stations, a decrease in the frequency of frosts is recorded in September–the third decade of October.

An increase in temperature in the first spring months leads to an earlier melting of the snow cover and a transition of the air temperature through 0°C towards an increase. On average, over the period of the last warming (1989–2016), this transition occurred 10–15 days earlier than the long-term average values. The growing season began a decade earlier, and its duration increased accordingly.

SUMMARY

Water resources are a special environmental resource which is important for the economy, population and nature. The state of the water environment quality in the Programme Area is important due to the presence of valuable natural areas and also due to the planned investments in this respect within the Programme.

Adverse factors that may affect the aquatic environment include:

- Drought and negative water balance caused by climate change, excessive water abstraction, lack of adequate water retention (both natural and artificial), improper water management resulting in water diversion outside catchment areas, transformation of river beds and intensification of agriculture;
- Pollution of drinking water which may be caused by pollutants from industry, agriculture and municipal economy getting into surface waters, especially in areas where there is no sanitary sewage system, lack of proper protection of water intake areas and lack of proper treatment of sewage flowing into surface waters;
- Over-exploitation through excessive water intake in comparison to the possibility of restoration of water resources, infrastructure gaps, low retention, and worsening climate change including increasing frequency of droughts;
- Eutrophisation of surface waters which is related to surface run-off in river catchments, increase in air temperature which results in an increase in favourable conditions for the intensification of the process and an increase in concentration of solutions in surface waters, land reclamation which leads to a change in the retention of the catchment area by accelerated discharge of rainwater. These changes lead to the disappearance of wetlands and accelerate the eutrophication process by increasing the outflow of nutrients to surface waters;
- Pollution of surface waters resulting from consumption of mineral fertilisers in agriculture, improper use of natural fertilisers, lack of protection of surface waters from area and point source pollution. The problem is also pollution caused by road transport, also from industry, including food production, etc. A particularly important problem is the lack of sanitary sewage systems and discharges of domestic sewage from the municipal economy (sewage treatment plants).

Under the conditions of such extensive protected areas, hydromorphological changes caused by transverse and longitudinal development of watercourses, emerging embankments, land reclamation, new waterways and artificial water reservoirs, as well as development of watercourse banks are also important.

All these threats must be addressed in the planned investments in order to limit their impact on the quality of the aquatic environment.

4.7. HERITAGE OBJECTS

The Programme eligible area includes numerous heritage objects of regional, national and international significance. They are essential to the cultural heritage of the countries participating in the Programme.

In the area covered by the Cross-border Cooperation Programme Poland-Belarus-Ukraine, there are a number of heritage sites from the UNESCO World Heritage List.

- On the Polish side - Białowieża Primeval Forest, the Old Town in Zamość, wooden churches in the Carpathian region;
- On the Ukrainian side - the historical center of Lviv, wooden churches in the Carpathian Mountains;
- On the Belarusian side - the Białowieża Primeval Forest, the Mir castle complex, the Radziwiłł castle in Niasviž.

The list of historic objects on the Polish side also includes:

- Historical monuments - for example: Łańcut - Castle and park complex, Leżajsk - Monastery complex of the Bernardine Fathers, Zamość - historical complex of the city within the range of the 19th century fortifications, Kozłówka - palace and park complex, castle and tower Kazimierz Dolny, Historical architectural and urban complex of the city of Lublin, Bohoniki and Kruszyniany - mosques and miseries, Augustów Canal - waterway,
- Cultural parks - for example: the cultural park of the Old Town complex of the Dominican Fathers in Jarosław,
- Other important heritage sites - the Museum of the oil and gas industry and the oldest oil mine in the world (Bóbrka), the Greek Catholic Church of the Nativity of the Holy Mother of God in Chotyniec, a renaissance castle erected around 1580 in Krasiczyn, the oldest Polish spa in Iwonicz Zdrój, the Franciscan monastery complex in Krosno, and numerous monuments in Przemyśl, Rzeszów, mosques, the Branicki Palace Complex, stronghold in Tykocin. In the Programme Area there are a number of castles and palaces from different eras. These include: castles (for example, Kamieniec Castle in Odrzykoń, Przesław, Baranów Sandomierski, Sanok, Sobień, Fredrów, Janowiec) and palaces: in Puławy, Sieniawa and Zarzecze.

Among almost one and a half thousand historic architectural objects, the most valuable are the few Gothic churches in this area: in Piotrawin nad Wisłą (Piotrawin upon the Vistula River), Kraśnik, and the Gothic-Renaissance church in Chodło and the Orthodox castle church in Kodeń. The churches of the so-called "Lublin Renaissance", partly rebuilt from Gothic temples, form a stylistically compact group of monuments. Apart from the most outstanding new-style churches in Zamość and Lublin, the churches of J.Wolff (Czemierniki, Łęczna, Turobin, Uchanie), as well as the related church in Gołębie, constitute a very important group. Few brick mansions from the 18th century have been preserved in Hrubieszów and Oszczów, and wooden ones in the Museum of the Lublin Village (mansion from Żyrzyn), Jagodne and Siedliszcz.

There are numerous museums in the Programme area, e.g. the Glass Heritage Centre in Krosno. In Bóbrka near Krosno there is a Museum of Oil and Gas Industry containing many technical heritage objects connected with oil exploitation in this area.

Within Ukraine, the cultural heritage of the Programme Area is also significant and includes thousands of sites and monuments. An important part of the cultural heritage are castles, in particular Brodivsky, Dobromilsky (ruins), Zhovkva, Zolochivsky, Lvivsky, Olesky, Svirsky, Starosilsky, Pidhoretsky, Pomoryansky, Uzhhorodsky, Mukachevsky "Palanok", Chinadiyivsky, Nevytsy, Serednyansky, Kvasivsky, Vynohradivsky, Korolivsky, Khustsky. Some of them are in poor condition and also churches such as the Monastery of Our Lady in Zachorow Nowe.

There are also historical and cultural reserves, historical settlements, archeological and architectural sites.

The largest number of sites are presented in Lviv Oblast (8543), of which 816 are of national importance.

In the Belarusian part of the Programme Area there are 3305 objects of historical and cultural heritage. 13 of them are of worldwide importance, 40 – international importance, 461 – national importance and 2791 are of local importance. Objects of historical and cultural heritage are represented by monuments of architecture and urban development, archaeological and historical monuments, objects of monumental art.

The heritage objects of worldwide importance are:

- several points of the Struve Geodetic Arc (XIX century),
- complex of fortifications of the Brest Fortress (XIX–XX century),
- Trinity Church in Chernavchitsy (XVI century),
- Kamenets tower (XIII century),
- palace and park ensemble in Gomel (XVIII–XIX centuries),
- Borisoglebskaya (Kalozhskaya) Church in Grodno (XII century),
- Augustow Channel (XIX–XX century),
- defense-type churches in Synkovichi (XV–XVI century) and Murovanka (XVI century),
- Mir Castle Complex (XVI–XX centuries),
- palace and park ensemble and complex of the Jesuit monastery in Nesvizh (XVI–XIX centuries).

The heritage objects of international importance are:

- memorial complex, system of forts and fortifications of the Brest Fortress (XIX–XX centuries),
- ancient settlement of Berestye (XI–XIV centuries),
- Kossovsky palace and park ensemble (XVIII–XIX centuries),
- Trinity Church in Volchin (XVIII century),
- complex of the Franciscan monastery in Pinsk (XVI–XVIII centuries),
- archaeological complex "Yurovichi" (25th millennium BC, X–XI centuries),
- town hall and Preobrazhenskaya Church in Chechersk (XVIII century),
- historical buildings and complex of the Old Castle in Grodno (XI–XX centuries),
- tower clock of the church in Grodno (XVI century),
- complex of the Nikolaevsky church in Mir (XVI–XVII centuries),
- castle in Lida (XIV century),

- complexes of the Franciscan monastery and Borisoglebsky monastery, Nikolaevskaya church of the Dominican monastery, a church, the remains of the castle and memorable places of A. Mickiewicz in Novogrudok (XIII–XX centuries),
- the ensemble of the Sviato-Uspensky Monastery in Zhirovichi (XVII–XIX centuries),
- remains of the castle in Krevo (XIV century),
- church at the Dominican monastery in Kletsk (XVII century),
- memorial complex "Khatyn" (1968–1969),
- the Preobrazhenskaya Church in Zaslavl (XVI–XVII centuries),
- place of execution of victims of political repression in the 1930–1940s in the Kurapaty,
- complex of the Bernardine monastery in Budslav (XVIII century),
- park complex "Alba" in Nesvizh (XVII–XVIII centuries),
- town hall, Slutsk Arc, craftsman's house in Nesvizh (XVI–XVIII centuries),
- historical center of Minsk (XI–XX centuries),
- Kalvariyskoye cemetery in Minsk (XVIII century),
- ensemble of the Independence Avenue in Minsk (1940–1950s),
- building of the National Academic Bolshoi Opera and Ballet Theater in Minsk (1935–1937).

4.8. SUMMARY

The main environmental problems and risks identified in this chapter are mainly related to the following:

- Preserving natural resources in terms of biodiversity and taking care to preserve nature in its least altered state.
- Air pollution and greenhouse gas emissions that are responsible for climate change.
- It is also important to manage water properly and to restore the proper quality of surface water and, although in fewer cases, groundwater.
- The Programme Area also suffers from waste management problems. In order to improve the situation in this respect, joint waste management should be considered within several counties, including between counties located on both sides of the border.

Table 9. The key issues related to environmental quality in the Programme area.

Environmental quality issue	Drivers of change
Air	
Exceedances of normative values of PM10, PM2,5, which occur in most cities of the Programme Area	Emissions from individual heat sources, individual waste incineration, traffic emission
Exposure of a large number of city dwellers (including vulnerable groups) to excessive concentrations of air pollutants with serious health effects	Densely built-up area, outdated heating systems, socio-economic problem of transition to cleaner forms of heat generation
Noise	

Environmental quality issue	Drivers of change
Exceedances of environmental noise limits are observed in most cities	Sources of traffic noise emission (heavy car traffic, less frequently rail)
Increasing impact of air traffic noise	Dynamic growth in international air traffic
Water	
Exceedances of limits of nitrates in drinking water	Penetration of nitrates from agricultural fields into the soil, and then into surface water and groundwater
Drought and negative water balance	Excessive intake, hydrometeorological conditions, including those caused by climate change, lack of sufficient water retention
Non-point pollution (area-source pollution) of surface water.	Use of mineral fertilisers in agriculture, inappropriate use of natural fertilisers, and lack of protection of surface water against non-point pollution (area-source pollution). Pollution caused by road transport is also a problem, especially possible leaks of oil-derived substances from defective vehicles entering rainwater running off the roads
Insufficient water management and water supply to the population	Too low coverage of rural areas with water supply networks, especially in Ukraine and Belarus
The poor condition of most river waters and lakes.	Contamination with agricultural and municipal biogenic substances, hot water and mine water discharges
Extreme phenomena	
Increase of flood risk	The risk of flooding is related to jam flood, rainfall flood (especially in urban areas - in the case of insufficiently efficient rainwater drainage) and flooding caused by flood wave passing the river valleys
The increasing frequency of droughts	The frequency of droughts is likely to increase due to climate change. The negative effects of the drought are exacerbated by the lack of water retention system
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 or low flow in the watercourses, the accumulated organic matter putrificates. It escapes from the catchment area, causes anaerobic processes in the surface water and a decrease in the dissolved oxygen content in the water, which may result in the death of the fish
Soil	
Soil acidification, low chemical and biological soil fertility, wind and water erosion	Intensive farming using large quantities of chemicals for both fertilisation and plant protection

Environmental quality issue	Drivers of change
Amount of waste deposited in the environment	Excessive levels of landfilled waste in relation to separated and recycled waste, import of waste from abroad

The diagnosis made may be used to assess the possible environmental impact of the Programme and to minimise the possible negative impact. The Programme should, on the one hand, contribute to the protection and improvement of the environment and, on the other hand, minimise its negative impact through preventive, alternative and possibly compensatory solutions.

The major environmental and climate change objectives include: further protection and restoration of species and habitats, maintaining the connectivity of ecological corridors and improving air quality, including reduction of pollutant emissions from household furnaces.

One of the tools contributing to such targeting should be the criteria for selecting projects for implementation taking into account the above-identified problems.

5. THE ENVIRONMENTAL REPORT

5.1. ENVIRONMENTAL IMPACT IF THE PROGRAMME IS ABANDONED

Generally speaking, in case of withdrawal from the implementation of the Programme, its contribution to and support for the achievement of the objectives of the strategic documents of Poland, Belarus, Ukraine, the EU and global documents aiming, among others, at the improvement of the state of the environment will not be achieved. These objectives will be implemented, but at a rate which the available funds allow. As the funds are limited, the Programme will influence their faster achievement and in some cases will allow to carry out the actions which would not be realized without the Programme.

The table below shows negative aspects of abandoning the Programme from the point of view of environmental impact.

Table 10. Negative aspects of withdrawal from the Programme in relation to particular areas of Project intervention

Field of intervention	Negative environmental aspects in case of abandonment of the Programme
Specific objective 2.1 Promoting climate change adaptation and disaster risk prevention and resilience, taking into account eco-system based approaches	
• Developing and implementing strategies, solutions, programmes and infrastructural projects to increase the readiness and adaptability of population in the Programme Area, • Developing and implementing strategies, solutions, programmes and related to raising enter and protection of the population, including by building systems and infrastructure for disaster management,	• lack of a systemic and comprehensive approach in the area of cooperation to address climate change issues, • less protection against natural disasters related to climate change in the form of floods and droughts, including human safety and the protection of property, • lower protection from forest firesless security in the supply of drinking water, also during

Field of intervention	Negative environmental aspects in case of abandonment of the Programme
• Developing and implementing strategies, solutions, programmes and innovative projects related to raising awareness and protection of the population, including by building systems and infrastructure for disaster management, • Implementation of projects to strengthen resistance to the effects of anthropogenic disasters and purchase of equipment.	periods of flood and drought, • less progress in raising public awareness of climate change adaptation, • lack of progress in implementing projects related to strengthening disaster resilience.
Specific objective 2.2 Promoting access to water and sustainable water management	
• Support in the field of water management, e.g. in the form of developing strategies, solutions, programmes and innovative projects, • Construction of small retention facilities, • Projects in the field of supporting rational management of water resources, • Implementation of innovative projects in the field of wastewater treatment, • Promoting sustainable water management in the form of developing strategies, solutions, programmes and innovative projects, as well as promotional campaigns and educational activities.	• lack of a systemic and comprehensive approach in the area of cooperation to address water management issues, • less protection against natural disasters related to climate change in the form of floods and droughts, including human safety and the protection of property, • less security in the supply of drinking water, also during periods of flood and drought, • failure to improve water management efficiency, • failure to improve the functioning of aquatic and water-dependent ecosystems, including their services, • lack of improvement in surface water and groundwater quality, • no improvement in the comfort of residents in the form of connections to the sewage system.
Specific objective 2.3 Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution	
• Projects concerning protected areas undertaken to protect, regenerate and safeguard them from harmful anthropogenic activities, • Educational projects and information campaigns aimed at increasing the environmental awareness and level of knowledge, • Projects to enhance existing biodiversity through appropriate approach to nature protection,	• Limited progress in protection, regeneration and conservation of protected areas against harmful anthropogenic effects, • limited increase in environmental awareness regarding the protection of natural resources, • no progress in enhancing the existing biodiversity, • lack of progress in reducing negative human

Field of intervention	Negative environmental aspects in case of abandonment of the Programme
• Joint monitoring projects.	impact on nature, e.g. illegal landfills and air pollution, • no progress in monitoring the changes made to nature.
Specific objective 4.1 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	
• Diagnostic and prophylactic infrastructure projects, which may include: - purchase of equipment, reconstruction, expansion, renovation of facilities providing services in the field of prevention, diagnosis, including introducing facilities for persons with disabilities, • improvement of the efficiency of admissions, as well as other activities improving the system, - joint cross-border offer of care facilities providing services in the field of prevention and diagnosis, • Projects in the field of specialised medicine, in particular 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 people in economic disadvantage and excluded people, • Projects aimed at preventing the occurrence and consequences of unpredictable adverse events, e.g. through the development and implementation of strategies, action plans, solutions, innovative programmes and projects, as well as working out solutions to the issue of volunteering in rescue services and the development of cross-border rescue procedures, • Projects in the field of digitization in health care, • Organisation of joint meetings to exchange good practices, training, workshops or conferences.	• failure to obtain additional improvement in the health condition of the inhabitants of the area covered by the Programme, • failure to obtain funding for additional development of diagnostic and prophylactic infrastructure and specialised medicine, • failure to improve health care procedures, • worse preparation for emergency situations, including disasters, • less use of the IT potential in improving health services, • failure to exploit the potential for cooperation.
Specific objective 4.2 Increasing the role of culture and sustainable tourism in economic development, social inclusion and social innovation	
• Projects promoting tourism development, e.g. in the form of trainings or workshops on how to set up a business in the tourism industry and manage	• less use of the tourist potential of the Programme Area,

Field of intervention	Negative environmental aspects in case of abandonment of the Programme
it effectively, and marketing of services, • Projects relating to: - restoration of existing cultural heritage sites, enabling their preservation for future generations, as well as 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 supporting the tourism industry, • Courses, trainings or workshops on setting up, promoting and effectively managing a business in the tourism sector.	• lesser extent of renovation of existing cultural heritage sites, • incomplete use of the relationship between cultural development and environmental protection, • failure to exploit the potential of cooperation in protecting cultural heritage, • failure to use an integrated approach to environmental protection and tourism development.
Interreg specific objective 1: A better cooperation governance	
• Projects in the field of increasing the efficiency of public administration by promoting legal and administrative cooperation as well as cooperation between citizens and institutions, in particular to eliminate legal obstacles and other barriers in border regions, • Creating mutual trust by encouraging actions to facilitate people–to–people contacts.	• failure to make more progress in improving administration, • less progress in building trust among the people, • less use of local initiatives, • failure to use the potential of cooperation in the field of education and development of human contacts, including youths.

In conclusion, it can be stated that the lack of Programme implementation will have a negative impact on the environment. Although a negative impact on some elements of the environment will be avoided, the lack of Programme implementation may have the following potential negative effects on the environment:

- Environmental degradation caused by the lack of adequate protection of areas against adverse weather events and their consequences;
- Increasing vulnerability to the effects of climate change, including more frequent floods and droughts, hurricanes, and similar phenomena, through lack of action to improve safety;
- Progressive land degradation caused by the lack of drought impact prevention;
- Slow-paced process of achieving good status of all waters due to insufficient support for highly efficient wastewater treatment;
- Deterioration of the in-situ and ex-situ conservation of endangered species and habitats;
- Decreased permeability of terrestrial and aquatic wildlife corridors important for biodiversity conservation and climate change adaptation;
- Progressive increase of degraded and transformed areas;

- Lack of progress in combating forest fires;
- Lack of progress in health care, including improvements in the emergency system and preventing extraordinary threats.

Analysis of the above mentioned effects of non-implementation of the Programme may lead to the conclusion, that the failure to complete investments supported in the document can only cause negative effects to the environment, however, it should be emphasised, that the most important and the most profound effects may occur in the social and economic sphere. Failure to implement the proposed actions, which are directly related to the improvement of the quality of life of residents and the community, particularly in terms of improving regional safety, can lead to general deterioration of the natural environment. Progressing increase of ecological awareness of the society with the corresponding increase of the legal requirements related to the environment, the effects of which are felt by individual citizens (e.g. fees for municipal waste management, prohibitions on the use of fuels or traffic restrictions) can cause a variety of adverse sociological and social events among societies, cities and regions.

Also, the non-implementation of investment activities envisaged in the Programme related to the construction of environmental and technical infrastructure can result in negative consequences for the economy and the environment, manifested by increased unemployment, reduced work places, pollution of water, soil and air. In conclusion, it can be said, that achieving goals described in the Programme is favourable to both the environment and human health.

5.2. ANALYSIS AND ASSESSMENT 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 REGARDING THE AREAS SUBJECT TO PROTECTION UNDER THE NATURE CONSERVATION ACT OF 16 APRIL 2004[54]

The analysed area under the Programme is one of the most valuable natural regions in Europe with exceptional natural resources, both in terms of ecology and landscape, which are difficult to find in other parts of Europe, and which determines the unique diversity of the environment and landscape. The creation of cross-border protected areas is currently a popular and frequently used method to promote tourism in national parks and to manage these areas more effectively. The term 'cross-border' (transboundary) should be understood as crossing the borders of countries, functioning beyond their borders. It should be stressed that the mere existence of two protected areas on both sides of a border does not automatically make them a cross-border area. Some level of cooperation, interdependence and collaboration, even at the lowest level, must be established between these units[55].

Ecological corridors are a basic tool for protecting ecological connectivity on a large spatial scale. The main role attributed to ecological corridors is to allow the movement of organisms between habitat patches on a local scale and between widely separated biogeographical regions. This function is particularly important due to the fragmentation of habitats and populations generated by human activity. 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 colonisation of isolated patches;

[54] Consolidated text, Journal of Laws of 2021, item 1098, as amended.
[55] B. Kawałko, 2011, *Selected problems of Polish-Ukrainian cross-border cooperation*, Regional Barometer No. 2(24).

- increasing gene flow between subpopulations preventing loss of genetic diversity and counteracting inbreeding depression;
- reduction of mortality, especially of juveniles pushed out of patches of favourable habitats due to territorial behaviour.

The ability to move between patches of habitats is the most frequently 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 can be natural watercourses and their valleys, forest areas, mountain ranges. The anthropogenic forms mentioned most often in the literature are artificial watercourses, woodlots, avenues and special devices such as animal crossings. In practice, the function of the connector is narrowed down to vertebrate animals only (amphibians, reptiles and mammals). The role of the guide can be played by such a structure that allows for the effective movement of individuals or diasporas between patches of habitats in which a specific species finds suitable conditions for its development. Due to the diverse biology of species, the structure and size of such corridors may vary dramatically even within the same systematic group. It depends, among others from dispersion possibilities. Species with low dispersal abilities and most fish or dragonflies require that the spatial structure of ecological corridors is continuous. Species with high dispersal capacity may move through discontinuous patches of habitat. Such an ecological corridor structure is referred to as a mosaic - 'stepping-stones'. This applies to birds and most mammals. The diversity among species with similar ecology is significant. For example, while the wolf (Canis lupus) moves freely between forest complexes at distances of tens of kilometres, the lynx (Lynx lynx) prefers a landscape where forest areas are not separated by large open areas.

Ecological corridors also ensure the integrity of the national network of protected areas, including NATURA 2000 sites, as they allow for the movement of organisms between habitats. In order to maintain the coherence of the Natura 2000 network, it is important to ensure permeability between areas, not only in the national aspect, but also from the point of view of network coherence at the continental level.

It should be emphasised that on the European and even global scale the nature located in the Polish part of the Programme Area constitutes an important component of Europe's natural heritage. It is characterised by above-average natural values (it means that elements of the environment in these areas are characterised by above-average features), has ecological and landscape values, is extremely rare, is particularly valued, being at the same time unique resources of biological diversity (both habitat, species, genetic and landscape). This is mainly due to the varied topography, the transitional climate, geological and soil variability with the simultaneous lack of natural geographical barriers. Poland's biodiversity is shaped, first and foremost, by the relatively large area of forests and wetlands, as well as extensively utilised agricultural areas, which still retain a mosaic of habitats and the associated number of ecotones, creating favourable conditions for the existence of many plant and animal species with different requirements. It should be noted that these areas of very high natural values, only in the northern and southern parts, are strongly connected with the landscape and nature protection system in Poland. This includes the continuation of the lake district zone from the Augustów Primeval Forest through the Elk Lake District and further west, as well as the south-western continuation through the valley of the Biebrza and Narew rivers. In addition, the border between Belarus and Ukraine in the neighbourhood of Poland also runs through areas of high natural value such as Western Polesie and the neighbourhood of the Shatsky NP.

The Programme does not analyse potential impacts on the whole range of categories of nature conservation. With such an extensive area (covering three countries) and a wealth of nature protection forms, differing in protection principles between the countries, this task is much more difficult or even

impossible. Therefore, the Environmental Report on the Programme and the impact of its implementation on biodiversity and natural values was based on specification of the most valuable and endangered species (significant from the point of view of both national and EU law), as well as maintenance of their integrity both internal, within particular areas, and external with other protected areas and ecological corridors.

Larger mammal species have quite large territorial requirements. It can be assumed that the larger the animal, the larger the territory it needs, and that the territories of carnivores are larger than those of herbivores. The movement of animals is necessary for the proper functioning of subpopulations. Migration allows genetic exchange and the satisfaction of basic needs of individuals. We can distinguish three types (causes) of animal movement: (1) daily migrations within an individual's areal associated with the satisfaction of various needs (e.g. resting, feeding), (2) seasonal migrations associated with changes in the availability of food or safety, as well as reproductive behaviour, (3) migrations of adults or juveniles in search of new places to settle and reproductive partners. The problem of movement is relatively important from the point of view of large migrating and rare mammals such as Eurasian lynx (Lynx lynx), gray wolf (Canis lupus). The death of even one representative of these species is a serious loss in the scale of their populations due to the low number of national populations. The problem will also concern populations of other large mammals which tend to migrate over large areas. We are talking about European bison (Bison bonasus) and brown bear (Ursus arctos) and representatives of ungulates: wild boar (Sus scrofa), roe deer (Capreolus capreolus), red deer (Cervus elaphus), Eurasian elk (Alces alces) and fallow deer (Dama dama). Since ancient times, the Eastern Carpathians have been considered to be the richest refuge of the brown bear in Europe. This species is also very numerous in Ukraine, and in the Berezinsky Biosphere Reserve (Belarus) it accounts for one third of the Belarusian population. Other large mammal carnivores inhabiting the area include the European wildcat (Felis silvestris) in the Carpathians, European badger (Meles meles), Eurasian otter (Lutra lutra) and European pine marten (Martes martes).

From the point of view of the Programme implementation, the care for populations of rare and endangered species, which have such enormous spatial requirements as large carnivores, requires close cooperation between countries sharing a common cross-border population. Within the European Union, these rules are regulated by the Habitats Directive and the Guidelines for population level management plans for large carnivores in Europe, prepared at the request of the European Commission. Any action taken by one country on its part of the population has an impact on the viability of the population of a given species in a neighbouring country.[56] Especially if those actions lead to a significant decrease in the number and range of that species. The wolf population in Poland is interconnected and closely dependent on the populations of this predator in Lithuania and Belarus as well as in Russia, Ukraine and Slovakia. Unfortunately, the species is not protected in any of Poland's eastern and southern neighbours. As a result, protected population is a source of 'replenishing losses' resulting from the shooting or extermination of wolves in the neighbouring countries. It has a significant impact on the condition and dynamics of the population of this species in Poland.[57]

In the case of the European bison population, the largest bison population is located in the Białowieża Primeval Forest; in the Polish part approximately 717 and in the Belarusian -.480. They are also in Ukraine in the Skole Beskids National Park (33 bisons); and in Slovakia in the Połoniny National Park (27 individuals). Further cross-border populations are planned in the Lower Odra Landscape Park, Romincka Primeval Forest and Augustów Primeval Forest. In many places, where cross-border populations of the European bison

[56] Guidelines for Population Level Management Plans for Large Carnivores Contract No. 070501/2005/424162/MAR/B2
[57] Pierużek-Nowak S. 2010. Opinion on the 'Plan for the management of wolf population in the Republic of Belarus'. Let's protect our native nature 66 (5): 323-327.

currently exist or are planned, their potential common areas are divided by barriers of anthropogenic origin such as border fences in Ukraine and Belarus[58]. The main problem in establishing functional populations will therefore be the elimination of these barriers or creation of connections enabling the movement of animals. The benefits of creating cross-border populations are as follows:

- larger area of available areas, the possibility of maintaining a larger population,
- the possibility of mitigating the isolation of individual herds.

In contrast, possible issues related to the functioning of cross-border populations are:

- difficult population management resulting from the different status of the European bison in individual countries,
- complicated settlement of the costs of herd care and maintenance,
- compensation of possible damages,
- the possibility of transmitting infectious diseases not present on the territory of one of the neighbouring countries.

Therefore, the establishment of cross-border populations of the European bison is highly desirable in the context of the possibility of extending its range and increasing the effective number of the species. The effectiveness of these initiatives will depend on the possibility of permanent interstate agreements and ensuring routine cooperation. It is very important to establish a uniform status of the species in Europe, at least in the EU member states.

Among the existing problems from the point of view of the Programme implementation one should also mention the Białowieża Primeval Forest. The continuing conflict concerns the need to increase the protection status of this area (on the Belarusian side) and to extend the national park (on the Polish side). To a lesser extent it concerns the Przemyskie Foothills, reaching the border with Ukraine, where for many years efforts to establish another national park in Poland have been underway, so far still unsuccessful, and where the extension of the conservation protection areas causes various social conflicts with the participation of local society, ecological organisations and administration.

The above-mentioned problems include the effects of spatial planning, which largely influence the occurrence, intensity or mitigation of problems. This problem is very strongly outlined in the Carpathians. At present, spatial management and governance in the Carpathians is associated with numerous issues. There is a lack of a comprehensive approach to spatial planning. This results, inter alia, from the lack of a coherent and legally enforced spatial policy of municipalities (lack of comprehensive spatial development plans, provisions of the Study as non-binding for decisions on development conditions) and from the 'minimalist' spatial planning practice (minimisation of costs of planning studies, introduction of point changes, which do not create a well-organised space, but only respond to investment needs). Another important threat to the preservation of natural and cultural values of the Carpathians is the lack of adjustment of the ways of use and development to the natural, cultural and landscape values and the resulting progressive fragmentation of the natural systems and degradation of the cultural landscapes. Increasingly frequent abandonment of agricultural activities and loosening of settlement results in dispersed development and thus degradation of landscape values of the Carpathian villages and towns. Low awareness of the economic and environmental effects associated with the introduction of development methods incompatible with the natural conditions

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

and underestimation of the natural conditions in the planning process (basing on outdated ecophysiographic studies) results in breaking the links between areas of high biodiversity (local ecological corridors and core areas), reduction of areas of high biodiversity and interruption of animal migration routes, especially within forested ridges, open areas and river valleys.

Possibilities of support in solving problems concerning the environment (including maintenance of ecological connectivity), society and economy are offered by green infrastructure (GI). Although the term 'green infrastructure' does not appear in Polish legislation, there are tools enabling actions for its development.[59] The use of a strategic approach in the shaping of GI places particular emphasis on individual initiatives and projects on a local scale. This allows for the inclusion of different stakeholder groups and joint decision making on local land use priorities in an integrated and mutually cooperative manner. This can result, for example, in the development of new regional development programmes aimed at the rehabilitation of degraded areas or the consideration of ecological connections and thus the spatial linking of natural areas located within a municipality, county or voivodeship. Including GI in planning processes supports regional development in the natural, economic and social context. It helps to improve the quality of the ecosystem services provided and supports environmentally friendly, extensive land use. In addition, it is important to emphasise that Natura 2000 areas are at the heart of European green infrastructure, as they include many of Europe's natural and semi-natural ecosystems and biodiversity, and provide a legal and organisational framework that can contribute to the long-term effectiveness and viability of green infrastructure investments.

Among the existing problems, significant from the point of view of the implementation of the draft document, the problems resulting from the quality of the natural environment should be mentioned. These include: air quality (mainly its pollution); noise; quality of surface and underground water; extreme phenomena and hydrotechnical facilities; pollution of land surface; threat to biodiversity and climate change[60,61,62].

Air pollution harms human health and the environment. High concentrations of pollutants (exceedances of normative values of PM10, PM2.5, benzo(a)pyrene and NO_2) negatively affect human well-being and pose serious health risks. The harmful impact of pollutants on ecosystems is also not without significance. Therefore, emissions reduction remains an important factor affecting air quality. Air pollution can be both a local and a global problem. Pollutant emissions released in one country can be transported over long distances in the atmosphere, contributing to the deterioration of air quality in other, remote areas. Air pollution consists of gaseous and particulate substances emitted into the atmosphere as a result of anthropogenic activity. They enter as a result of various types of emissions: exhaust gases from vehicles, combined heat and power plants, industrial plants, waste dumps, aggregate extraction, transport or handling of raw materials. Hard coal is still the basic energy carrier in the national economy. Its combustion causes emission of gaseous (sulphur dioxides, carbon oxides and nitrogen oxides), dust pollutants and polycyclic aromatic hydrocarbons, including benzo(a)pyrene, the latter two being currently the biggest

[59] Interreg CE 2019. The Green Infrastructure Handbook. Conceptual and theoretical foundations, terms and definitions. Polish short version.

[60] CIEP 2020. State of the environment in the Podlaskie Voivodeship. Report 2020. CIEP Białystok.
[61] CIEP 2020. State of the environment in the Lubelskie Voivodeship. Report 2020. CIEP Lublin.
[62] CIEP 2020. State of the environment in the Podkarpackie Voivodeship. Report 2020. CIEP Rzeszów.

problem. Particulate matter, nitrogen dioxide and ground level ozone are now widely recognised as the pollutants with the greatest health impact. Long-term exposure to these pollutants causes effects ranging from respiratory and cardiovascular diseases to premature death. There is growing concern about air pollution by benzo(a)pyrene, a highly carcinogenic substance, found in concentrations above established standards in urban areas, particularly in central and eastern Europe.

Noise is a stress factor and poses a significant threat to public health. It is one of the most perceptible environmental threats. As an environmental pollutant, it is a factor which to a very large extent influences the quality of human and animal living and recreation conditions in a given area. It also has a negative impact on the quality of nature through the reduction or loss of value of protected, recreational or health resort areas. The main sources of noise which increase acoustic nuisance in the environment are: road and rail traffic, industrial plants and aircraft noise. The acoustic climate of the area covered by the Programme is mainly shaped by traffic noise (mainly road noise and to a small extent rail and aircraft noise) and industrial noise. The main causes of excessive noise in the vicinity of roads include:

- heavy traffic of vehicles and their poor technical condition;
- significant share of heavy goods vehicles in traffic;
- excessive vehicle speeds;
- type and technical condition of road surfaces;
- dynamic growth of international and domestic air traffic;
- lack of proper prioritisation of the road network and the problem of accessibility regulation noticed too late - still a large part of national roads passes through towns in the vicinity of dense housing, carrying both external traffic (including transit traffic of heavy duty vehicles) and local traffic;
- ineffective urban planning and lack of explicit provisions in spatial planning regulations taking into account the noise criterion - resulting in uncontrolled enclosure of roads of classes Z, G and GP by buildings with a residential function, 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 Programme is a result of pressures related to water intake, discharge of municipal and industrial wastewater into waters, area run-off (including from agriculture and rural areas, which as a consequence may lead to the risk of exceeding the acceptable limit of nitrates in drinking water), improper waste management, handling of rainwater and snowmelt, hydromorphological changes and pollution associated with the development of tourism and recreation. In addition, in Podlaskie Voivodeship, due to the agricultural character of the region, it is agriculture (large-scale cattle breeding and wastewater management in rural areas) that should be particularly considered as a cause of pollution, including eutrophication of surface waters. Pollution of drinking water may result mainly from lack of proper protection of water intake areas and lack of proper treatment of wastewater flowing into surface waters.

Extreme events and hydro-technical devices. Climate change, low surface and reservoir retention, construction of surfaces with water-impermeable objects/surfaces (including roads) that accelerate surface runoff, inefficient sewage systems can all lead to an increase in flood risk. Urban flooding and the associated enormous losses are increasingly frequent and are largely due to, on the one hand, torrential rainfall and a lack of drainage capacity due to inefficient sewage systems, but also to the development of buildings and impervious surfaces. It is likely that extreme dry spells are becoming more frequent as a result of climate change, and the negative effects are further exacerbated by the lack of systematic water retention.

Pollution of the land surface, related, inter alia, to the too high share of landfilled waste in relation 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 level of segregation and recovery of raw materials from municipal waste. As a consequence, increasing pollution of land surface leads to the creation of degraded areas, which require revitalization and reclamation.

The main factors threatening biodiversity are: the loss and fragmentation of habitats through the creation of monocultures, the presence and creation of new migration barriers; the overexploitation and misuse of natural resources, e.g. the imbalance in forest ecosystems through intensive forest management; pollution, e.g. the use of pesticides affecting insect populations such as bees; the impact of invasive alien species; and climate change.

Climate change leading inter alia 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 precipitation amounts do not change significantly, but there is an uneven character of precipitation (longer dry periods interrupted by violent and heavy rainfall), which consequently leads to wide-spread water deficits. Damage to forest ecosystems, agriculture and species migration as a result of strong winds and even incidental tornadoes and lightning discharges.

Summary

Given that nature does not respect national borders, the EU has adopted stringent legislation across its territory to protect key habitats and species threatened with extinction. The Birds and Habitats Directives are the EU's main policy tool for halting biodiversity loss.

Due to the fact that a considerable part of the Polish territory included in the Programme is covered by the Natura 2000 network and Ukraine and Belarus by the Emerald network, there is no doubt that nature conservation management in those areas should focus on close cooperation with all stakeholders and the economy sector in order to ensure stable management of the areas in a long-term perspective. With this approach, the aforementioned Natura 2000 network will fully 'support' the principles of sustainable development. Its aim is not to stop economic activity, but to set the framework within which it should take place in order to protect Europe's biodiversity. It should be stressed that the implementation of the Programme may affect environmentally sensitive areas mainly on a temporary basis, and the most significant in terms of potential impact on environmentally sensitive areas are the infrastructural undertakings and projects related to establishment of infrastructure, construction or reconstruction of buildings, etc. However, the impact will be of short-term character and will cease after completion of the projects planned under the Programme.

Some of the measures included in the Programme implementation, especially infrastructure projects related to construction works, have been implemented worldwide for decades. Therefore, in terms of generated environmental effects, they are very well researched and do not generate effects not known or insufficiently studied so far. In addition, their environmental impacts are similar to those generated by projects in other industries related to infrastructure construction. Therefore, there are no major technical shortcomings and gaps in the contemporary knowledge both at the stage of their implementation and operation. Nevertheless, each of the potential project, which could be implemented within the Programme is or will be implemented in specific local conditions, generating more or less significant impacts. When deciding on the location of a given investment, its reconstruction or extension, consideration should be given to the following: (1) where important, large, undivided habitats are located; (2) how ecological corridors of various rank, ecological importance run; (3) what plant and animal species occur in specific places; (4) how

traditional and seasonal animal migrations and migrations proceed. The full environmental impact assessment, on the other hand, will consist of individual conciliation procedures for larger projects in accordance with the principles of the EIA procedures in individual countries.

5.3. ANALYSIS OF THE ENVIRONMENTAL PROTECTION OBJECTIVES SET AT THE INTERNATIONAL, COMMUNITY AND NATIONAL LEVEL RELEVANT TO THE DRAFT PROGRAMME

The aim of the analysis is to evaluate compliance of the draft Programme with objectives of the key strategic documents, especially from the point of view of the Environmental Report. The analysis covered documents setting objectives related to the Programme defined at the global, EU and Polish level. The following documents were analysed:

At global level

- Resolution 70/1 adopted by the General Assembly on 25 September 2015. Transforming our world: The 2030 Agenda for Sustainable Development;
- United Nations Framework Convention on Climate Change;
- The Paris Agreement;
- Convention on Biological Diversity;
- Convention on Wetlands of International Importance especially as Waterfowl Habitat;
- European Landscape Convention;
- Convention on Long-Range Transboundary Air Pollution (LRTAP).

Strategic papers of the EU

- Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - A European Green Deal (COM(2019) 640 final),
- Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Stepping up Europe's 2030 climate ambition (COM(2020) 562 final),
- European Council conclusions of 11.12.2020r. (CO EUR 17, CONCL 8) (on climate change),
- Communications from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions including: 1) Europe's moment: Repair and Prepare for the Next Generation, (COM(2020) 456 final), 2) A budget proposal for the above mentioned plan: The EU budget powering the recovery plan for Europe (COM(2020)442 final),
- Climate Law Proposal for a Regulation of the European Parliament and of the Council establishing the framework for achieving climate neutrality and amending Regulation (EU) 2018/1999 (European Climate Law) (COM (2020) 80 final),
- Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, A new Circular Economy Action Plan for a cleaner and more competitive Europe, (COM(2020)98 final) with annex,
- European Council, A roadmap for recovery towards a more resilient, sustainable and fair Europe 21.04.2020,
- Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions A Clean Planet for all - A

European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy (COM(2018) 773 final),

- Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, An EU Strategy on adaptation to climate change (COM(2013)216 final),
- White Paper: Roadmap to a Single European Transport Area - Towards a competitive and resource-efficient transport system (COM(2011) 144 final),
- Regulation (EU) No 1315/2013 of the European Parliament and of the Council of 11 December 2013 on Union guidelines for the development of the trans-European transport network and repealing Decision No 661/2010/EU,
- Regulation (EU) No 1316/2013 of the European Parliament and of the Council of 11 December 2013 establishing the Connecting Europe Facility, amending Regulation (EU) No 913/2010 and repealing Regulations (EC) No 680/2007 and (EC) No 67/2010,
- 7th General Union Environment Action Programme to 2020. Living well, within the limits of our planet (7 EAP),
- Draft Decision of the European Parliament and of the Council of 20 November 2013 on a General Union Environment Action Programme to 2030 (8 EAP) (COM (2020) 652 final),
- Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, A Europe that protects: Clean air for all, the so-called Clean Air Package, (COM(2018) 330 final),
- Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Clean Energy For All Europeans, the so-called Winter package (COM(2016) 860),
- Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, EU Biodiversity Strategy for 2030, Bringing nature back into our lives (COM(2020) 380 final),
- Territorial Agenda of the European Union Towards an Inclusive, Smart and Sustainable Europe of Diverse Regions,
- Horizon 2020 and Horizon Europe,
- White Paper on the future of Europe (2017).

Strategy papers of Poland:

- The Strategy for Responsible Development for the period up to 2020 (including the perspective up to 2030),
- Long-term National Development Strategy, Poland 2030, Third Wave of Modernity,
- National Spatial Development Concept 2030,
- National Strategy of Regional Development 2030,
- Sustainable Transport Development Strategy until 2030,
- 2030 National Environmental Policy – The Development Strategy in the Area of the Environment and Water Management,
- The National Air Pollution Control Programme,
- National Air Quality Plan for the period up to 2020, including the perspective up to 2030,
- Update of the National Programme for Municipal Waste Water Treatment (5),
- National Strategic Plan for Climate Change Adaptation for sensitive sectors and areas by 2020 and outlook 2030 (SPA 2020).

Strategy papers of Belarus:

- The National Strategy for Sustainable Social and Economic Development of the Republic of Belarus for the period until 2030 (NSSD-2030),
- Strategy in the field of environmental protection of the Republic of Belarus for the period up to 2025,
- Strategy for water resources management in the context of climate change for the period up to 2030 (Water Strategy-2030),
- Strategy for adaptation of forestry in Belarus to climate change until 2050,
- Strategy for adaptation of agriculture of the Republic of Belarus to climate change for the period up to 2050,
- National Strategy for development of the system of specially protected natural areas until , 2030,
- Strategy for the implementation of the United Nations Conventions to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (UNCCD),
- Strategy for the conservation and rational (sustainable) use of peatlands,
- National strategy for the management of solid municipal waste and secondary material resources in the Republic of Belarus for the period until 2035,
- National strategy for the development of tourism in the Republic of Belarus until 2035,
- Strategy for innovative development of the transport complex of the Republic of Belarus until 2030.

Strategy papers of Ukraine:

- Ukraine's Development Strategy until 2030 - the document aims to achieve European living standards and a dignified position of Ukraine on a global scale (draft),
- National Strategy of Regional Development 2021-2027,
- National Transport Strategy of Ukraine until 2030,
- The Concept of Implementation of State Policy in the Field of Climate Change until 2030,
- National Strategy of Waste Management in Ukraine until 2030,
- Low Emission Development Strategy of Ukraine until 2050,
- President of Ukraine Decree “On the Goals of sustainable development of Ukraine for the period up to 2030”,
- The Law “On Basic Principles (Strategy) of the State Environmental Policy of Ukraine until 2030,
- State development programme of the Ukrainian Carpathians for 2020-2022,
- The Concept of Combating Land Degradation and Desertification (The actions were supposed for the period 2015-2020, but the document is still relevant),
- Energy Strategy of Ukraine until 2035 “Security, energy efficiency, competitiveness”.

The objectives of the analysed documents as well as their relation to the objectives of the Programme are presented in Appendix 1.

The analyses conclude the following:

- The analysed documents indicate the following key challenges and directions of action: sustainable development (towards a green and circular economy), reduction of greenhouse gas emissions, use of renewable sources of emissions, improvement of energy efficiency, protection and improvement of the environment, including nature and especially biodiversity, including the protection of

ecosystems, reduction of pollutant emissions to the environment, especially into the air, protection of the urban environment;

- It is concluded that the Programme generally supports the achievement of the objectives of the analysed documents both in terms of reducing greenhouse gas emissions, reducing emissions of pollutants to the environment and improving its quality, protecting biodiversity and ecosystems;
- There was no incompatibility of the Programme objectives with the objectives of strategic documents at the global, EU and national levels.
- Some objectives of the above-mentioned documents are not addressed in the Programme, due to the fact that the document only refers to selected thematic objectives;
- It is concluded that the proposed draft Programme also supports the achievement of the objectives of the documents analysed at regional and national level.

Despite the fact that no areas of the Programme conflicting with the environmental protection objectives of the analysed strategic documents were identified, it must be stated that the implementation of some undertakings covered by the Programme, likely to have a significant impact on the environment, will require detailed analyses under the procedure of environmental impact assessment and these analyses may result in conclusions concerning adjustment of the draft undertakings to the objectives of environmental documents, including new and currently prepared documents.

5.4. ANALYSIS AND ASSESSMENT OF THE EXPECTED SIGNIFICANT ENVIRONMENTAL IMPACTS

Due to the general nature of the Programme and the fact that on the stage of its approval only LIP are generally defined, and considering the long-term perspective of its implementation, it was necessary to identify possible projects which might fall within the scope of implementation in order to assess its potential environmental impact.

Taking into account the applicable regulations, mainly the Polish Regulation of the Council of Ministers on projects which may have a significant impact on the environment, a preliminary environmental impact assessment was carried out for the projects likely to be implemented under the Programme, and potential types of projects which may have a significant impact on the environment (always or potentially) were identified.

Further analyses focused primarily on the analysis of projects likely to have a significant negative impact on the environment, identified in the table below.

Table 11. General characteristics of the Programme and identification of potential undertakings that may be implemented under the Programme along with their preliminary assessment[63]
Caption

No colour - Directions and projects neutral from the point of view of environmental impact or having an insignificant impact

Green - Directions and projects having a positive impact on the environment

Yellow - Directions and projects that may significantly affect the environment (always and potentially) in accordance with the Regulation of the Council of Ministers of 9.11.2010 on projects that may significantly affect the environment.

[63] Own work of Atmoterm SA

Action code Policy objective/ specific objective:	Action	Potential projects that can / or will be implemented	Possible territorial coverage area	Potential, main fields of intervention in the environment
Policy objective 2 - A greener, low-carbon transitioning towards a net zero carbon economy and resilient Europe…				
Specific objective 2.1 Promoting climate change adaptation and disaster risk prevention and resilience, taking into account eco-system based approaches				
2.1.	2.1.1. Joint promotion and implementation of activities related to a low-carbon economy and resilience to climate change.	2.1.1.1 Developing and implementing strategies, solutions, programmes and infrastructural projects to increase the readiness and adaptability of population in the Programme Area.	Depending on the document	Depending on the document type
	2.1.2 Joint actions in the field of adaptation and protection against floods, inundations droughts, desertification, erosion and risk management regarding this area.	2.1.2.1 Developing and implementing strategies, solutions, programmes and related to raising enter and protection of the population, including by building systems and infrastructure for disaster management.	Local and general	Climate-related environmental elements, especially the impact on humans
	2.1.3. Joint actions in the field of adaptation and protection against fire, natural disasters and other local threats as well as the risk management regarding this area.	2.1.3.1 Developing and implementing strategies, solutions, programmes and innovative projects related to raising awareness and protection of the population, including by building systems and infrastructure for disaster management.	Local and general in the Programme Area	Climate-related environmental elements, especially the impact on humans
	2.1.4. Joint actions aimed at prevention and management of risks related to anthropogenic activities.	2.1.4.1 Implementation of projects to strengthen resistance to the effects of anthropogenic	Local and general in the Programme Area	All elements of the environment

Action code Policy objective/ specific objective:	Action	Potential projects that can / or will be implemented	Possible territorial coverage area	Potential, main fields of intervention in the environment
		disasters.		
Specific objective 2.2 Promoting access to water and sustainable water management				
2.2	2.2.1. Joint actions aimed at protection and improvement of water resources' condition.	2.2.1.1 Support in the field of water management, e.g. in the form of developing strategies, solutions, programmes and innovative projects.	Protected areas	Nature, humans
		2.2.1.2 Construction of small retention facilities.	Local, depending on location, and general in the form of increased retention	Water environment and other elements of the environment
		2.2.1.3 Implementation of other forms than small retention facilities for water retention and delay in water runoff, e.g. in green economy.	Local, depending on location, and general in the form of increased retention	Water environment and other elements of the environment
	2.2.2 Joint actions aimed at development of sewage infrastructure and improving wastewater management.	2.2.2.1 Projects in the field of supporting rational management of water resources.	In the area of cooperation and in general	Nature, humans
		2.2.2.2 Implementation of innovative projects in the field of wastewater treatment.	Depending on the location and scope of the project	People, water environment, other water-dependent elements of the environment

Action code Policy objective/ specific objective:	Action	Potential projects that can / or will be implemented	Possible territorial coverage area	Potential, main fields of intervention in the environment
	2.2.3. Joint promotional and educational actions related to sustainable water management.	2.2.3.1 Promoting sustainable water management in the form of developing strategies, solutions, programmes and innovative projects, as well as promotional campaigns and educational activities	Depending on the scope of activities (local and general)	Nature, humans
Specific objective 2.3 Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution				
2.3	2.3.1. Joint actions aimed at protection, regeneration and sustainable use of valuable natural areas, with particular emphasis on cross-border areas.	2.3.1.1 Projects concerning protected areas undertaken to protect, regenerate and safeguard them from harmful anthropogenic activities.	Białowieża Primeval Forest, Bug River Valley, Western Polesie, Eastern Beskids	Nature
	2.3.2 Joint promotional and educational actions expanding knowledge of residents about nature protection and raising awareness of natural valuable areas.	2.3.2.1 Educational projects and information campaigns aimed at increasing the environmental awareness and level of knowledge.	Programme Area	Nature
	2.3.3 Joint actions aimed at protection of nature and biodiversity and development of green infrastructure.	2.3.3.1 Projects to enhance existing biodiversity through appropriate approach to nature protection and, among other things, reduce the impact of illegal landfills as well as air and water pollution.	Programme Area	Nature, humans
	2.3.4 Joint actions aimed at monitoring the condition of the environment, as well as identifying and improving the condition of areas with exceeded environmental quality standards.	2.3.4.1 Joint monitoring projects.	Programme Area	Nature, humans

Action code Policy objective/ specific objective:	Action	Potential projects that can / or will be implemented	Possible territorial coverage area	Potential, main fields of intervention in the environment
Policy objective 4: A more social and inclusive Europe…				
Specific objective 4.1 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				
4.1	4.1.1 Joint actions improving access and infrastructure development of diagnostic and prophylactic tools and resources in various areas of medicine.	4.1.1.1 Projects may include: - purchase of equipment, reconstruction, expansion, renovation of facilities providing services in the field of prevention, diagnosis, including introducing facilities for persons with disabilities, - improvement of the efficiency of admissions, as well as other activities improving the system, - joint cross-border offer of care facilities providing services in the field of prevention and diagnosis.	Programme area	Humans
	4.1.2. Joint actions improving access to specialist medicine, in particular medicine related to cardiovascular diseases, cancer (development of health infrastructure, support for the equipment of healthcare facilities) and emergency medicine.	4.1.1.2 Projects may include: - purchase of equipment, reconstruction, expansion, renovation of facilities providing services in the field of prevention, diagnosis, including introducing facilities for persons with disabilities, - improvement of the efficiency of admissions, as well as other activities improving the system, - joint cross-border offer of care facilities providing	Programme Area	Humans

Action code Policy objective/ specific objective:	Action	Potential projects that can / or will be implemented	Possible territorial coverage area	Potential, main fields of intervention in the environment
		services in the field of prevention and diagnosis.		
	4.1.3 Joint actions improving access to long-term care, especially infrastructure development for geriatric and palliative care.	4.1.3.1 Projects to organise courses and training, promote related professions and increase the availability of care services for people in economic disadvantage and excluded people.	Programme Area	Humans
	4.1.4 Joint actions preventing the occurrence and effects of adverse events such as epidemics (with particular emphasis on local phenomena).	4.1.4.1 Projects aimed at preventing the occurrence and consequences of unpredictable adverse events, e.g. through the development and implementation of strategies, action plans, solutions, innovative programmes and projects, as well as working out solutions to the issue of volunteering in rescue services and the development of cross-border rescue procedures.	Programme Area	Humans
	4.1.5 Joint actions aimed at development of digitization in health care (including the development of telemedicine).	4.1.5.1 Projects in the field of digitization in health care.	Programme Area	Humans
	4.1.6 Joint actions improving the qualifications of medical and rescue personnel.	4.1.6.1 Organisation of joint meetings to exchange good practices, training, workshops or conferences.	Programme Area	Humans
Specific objective 4.2 Increasing the role of culture and sustainable tourism in economic development, social inclusion and social innovation				

Action code Policy objective/ specific objective:	Action	Potential projects that can / or will be implemented	Possible territorial coverage area	Potential, main fields of intervention in the environment
4.2	4.2.1 Joint actions aimed at protection, infrastructure development and promotion of public tourist values and related tourist services.	4.2.1.1 Projects promoting tourism development, e.g. in the form of trainings or workshops on how to set up a business in the tourism industry and manage it effectively, and marketing of services,		Humans
	4.2.1 Joint actions aimed at protection, development and promotion of cultural heritage and services in the field of culture, including development of tourist infrastructure.	4.2.1.1 Projects in the field of: - restoration of existing cultural heritage sites, enabling their preservation for future generations, as well as 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.	Programme Area	Indirectly, all elements of the environment
	4.2.2 Joint actions aimed at protection, infrastructure development and promotion of natural heritage and ecotourism.	4.2.2.1 Projects supporting nature conservation and supporting the tourism industry.	Białowieża Primeval Forest, Northern Podlasie, Augustów Canal, Lublin Region, Eastern Carpathians, Bug River Valley, Western Polesie, Roztocze	Nature, humans

Action code Policy objective/ specific objective:	Action	Potential projects that can / or will be implemented	Possible territorial coverage area	Potential, main fields of intervention in the environment
	4.2.3 Joint actions aimed at adaptation of skills and professional qualifications in the field of tourism to the needs of the tourism market and changes within.	4.2.3.1 Courses, trainings or workshops on setting up, promoting and effectively managing a business in the tourism sector	Programme Area	Humans
Interreg specific objective 1: A better cooperation governance				
I.1.1 Enhancing 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				
I.1.1	1. Increasing and improving the quality of cross-border cooperation between entities from the Programme Area. 2. Improving the access to information on legal, fiscal and formal conditions related to e.g. running a business in each countries of the Programme Area; stimulating economic ties, supporting clusters or promoting jointly operating organizations of entrepreneurs and organizing joint ventures,which may result in the economic development of the support area. 3. Support in the implementation of consulting services assistance to entities applying for additional financial resources (e.g. by helping in creating business plans, drawing up contracts, filling out applications etc.). 4. The creation of open data banks regarding the Programme Area, including statistics on the socio-economic, environmental situation and prospects for sustainable	I.1.1.1 Environmentally neutral, minor infrastructure and investments projects.	Programme Area	Humans

Action code Policy objective/ specific objective:	Action	Potential projects that can / or will be implemented	Possible territorial coverage area	Potential, main fields of intervention in the environment
	development of the area, changes taking place and available investment areas, which may result in the economic development of the support area. 5. Promoting cooperation between border services, customs services and other services related to the operation of border crossings (including phytosanitary and veterinary services) by common trainings and improving the quality of service on border crossings, including purchase of necessary equipment.			
I.1.2 Building up mutual trust, in particular by encouraging people-to-people actions				
I.1.2	1. Joint bottom-up initiatives for the integration of the inhabitants of the Programme Area, including promotion of volunteering. 2. Integrating residents through cross-border events related to environment, art, culture and heritage of the Programme Area. 3. Joint actions aimed at supporting local initiatives and leadership. 4. Cross-border cooperation of educational facilities including integration and educational activities. 5. Cross-border transfer of innovative solutions aimed at undertaking and strengthening further cooperation between research and scientific centres.	I.1.2.1 Environmentally neutral non-investment projects.	Programme Area	Humans

Action code Policy objective/ specific objective:	Action	Potential projects that can / or will be implemented	Possible territorial coverage area	Potential, main fields of intervention in the environment
Large infrastructure projects (LIP)				
LIP 1	Construction of cycling infrastructure on the route Mikaszówka – Rudawka, and Grodno – Racicze	1.1 Construction of cycling infrastructure along the road Mikaszówka – Rudawka, and Grodno – Racicze.	Programme Area	Nature, humans
LIP 2	Early diagnosis and timely treatment - the way to health for the residents of border regions	2.1 Reconstruction of the supply building and connection with the rest of the hospital in Minsk.	Project impact area	Humans
		2.2 Establishing and equipping specialist offices in hospitals in Minsk and Siedlce.	Programme Area	Humans
LIP 3	Common Model Network of Cross-border Emergency Services	3.1 Creation of a common model network of cross-border emergency services including the creation of emergency wards and their equipment in the regions: Suwałki, Grodno, Lida and Volkovysk.	Programme Area	Humans
LIP 4	Strengthening the capacity of Belarusian-Polish health care institutions to deal with epidemiological threats	4.1 Strengthening the capacity of Belarusian-Polish border health care institutions to deal with epidemiological threats, including: construction of a hospital building (1200 m^2) in Brest	Programme Area	Humans
		4.2 Establishment of a hospital laboratory at Brest Regional Clinical Hospital	Programme Area	Humans

Action code Policy objective/ specific objective:	Action	Potential projects that can / or will be implemented	Possible territorial coverage area	Potential, main fields of intervention in the environment
LIP 5	Sustainable Water Management: A Way to Revive Western Ukraine and Eastern Poland	5.1 Construction of 60 km of water supply network in Svitiaz, Pulmo and Shatsk equipped with a water treatment plant, construction of a water treatment plant in Rivne and Hoshcha, reconstruction of a wastewater treatment plant in the village of Kvasiliv, reconstruction of the water supply in Svalyava, construction of a sewage system in Lipina Nowa and Zawody, improvement of the sewage treatment plant in Skierbieszów and cleaning works at the Ternopil reservoir.	Project impact area	All elements of the environment
LIP 6	Carpathian narrow-gauge railway - a journey in the footsteps of the Carpathian forest railway	6.1 Reconstruction and adaptation of the building for tourist services, Majdan.	Majdan area	Humans
		6.2 Construction of a tourist path and an educational footbridge from Majdan station to the nearest hill with a viewing platform.	Region covered by the project	Nature, humans
		6.3 Renovation of the narrow gauge railway track from Majdan station to Dołżyca station (3 km) in order to allow the movement of bicycle vehicles on the tracks.	Region covered by the project	Humans

Action code Policy objective/ specific objective:	Action	Potential projects that can / or will be implemented	Possible territorial coverage area	Potential, main fields of intervention in the environment
		6.4 Construction/reconstruction and establishment of Vyhoda station and railway heritage museum there.	Region covered by the project	Humans
LIP 7	Establishment of the Eastern Centre for Preventive Health Care	7.1 Construction of an additional building and renovation of the existing building with equipment in the Voivodeship Centre of Occupational Medicine the Preventive and Treatment Centre in Lublin.	Programme Area	Humans
		7.2 Renovation of an existing building in the Volyn Regional Territorial Mother and Child Health Care Center.	Programme Area	Humans
LIP 8	Ecological security - establishment of the Ukrainian-Polish forest fire management network in the Carpathian region	8.1 Purchase of specialized equipment for units in the regions of Krosno, Rzeszów and Tarnobrzeg.	Programme Area	Nature, forests
		8.2 Reconstruction and adaptation of existing buildings for the needs of forest fire-fighting units in the areas mentioned above.	Programme Area	Nature, forests
LIP 9	A joint initiative of the Józef Psarski Mazovian Specialist Hospital in Ostrołęka to increase access to health services	15.1 Adaptation and retrofitting of the hospital.	Programme Area	Humans
LIP 10	Development of palliative and geriatric care and improvement of the quality of medical services for cancer patients in hospitals of Lviv and Ternopil regions of Ukraine and Krosno	16.1 Development of cooperation and retrofitting of hospitals.	Programme Area	Humans

Further work has identified criteria for environmental impact assessment on the basis of:

- state of the environment and the identified key issues;
- legal requirements for measures planned under the Programme;
- types of projects identified as likely to have a significant effect on the environment;
- conclusions from the analysis of strategic papers.

The assumed criteria for assessing impact of each individual element of the environment are presented in the table 11).

Table 12. Selected criteria for assessing impact of the Programme on individual elements of the environment[64]

No.	Analysed elements of the environment	Evaluation criteria
1	Biodiversity	Impact on the diversity of living organisms found in ecosystems, within and between species, and the diversity of ecosystems
2	Fauna	Impact on species, specially protected and threatened with extinction.
3	Flora	Impact on natural habitats, and those protected and threatened with extinction plant species
4	Integrity of protected areas	Impact on maintaining consistency of the protected areas (coherence of structural and functional factors determining the sustainable persistence of species populations and natural habitats), and generally on passable condition of the ecological corridors.
5	Water	1. Impact on the resources of surface water and groundwater. 2. Impact on the quality of surface water and groundwater. 3. Impact on land drainage. 4. Impact on increasing the risk of flooding, floods, landslides and droughts.
6	Air	Impact on air quality, including PM10/PM2.5, particularly in the areas of exceedances.
7	Humans	1. Impact on the occurrence of exceedances of quality standards for air, noise, drinking water, and limits of soil pollution. 2. Vulnerability to the possibility of failure.
8	Land surface	1. Impact on terrain shaping and development, land and soil movement in the course of construction works and decommissioning. 2. Impact on permanent change of land relief due to introduction of anthropogenic landforms, creation of new opencast mines, construction of embankments, cuttings, etc. 3. Impact on soil stabilisation and protection against landslide processes.
9	Landscape	Impact on the landscape values.
10	Climate	1. Effect in the form of CO2 emission reduction. 2. Impact on the improvement of energy efficiency. 3. Impact on adaptation to climate change (extreme events).
11	Natural Resources	Impact of the increase in consumption of rock materials used in the construction phase.
12	Heritage Objects	1. Impact on the maintenance of good technical condition of heritage objects. 2. Impact of the construction works on the condition of the heritage objects

[64] Own work of Atmoterm SA

No.	Analysed elements of the environment	Evaluation criteria
		located in the neighbourhood. 3. Impact of location of new investment on the exposure of a heritage object that constitutes local dominant feature.
13	Material Assets	1. Impact on the value of the property (land and buildings) due to the presence or proximity of the planned investment. 2. Impact on the value of construction facilities of all works and activities that may affect their technical condition both in construction and operation phases. 3. Impact on business values as a result of the implementation of the projects covered by the Programme.

Additional evaluation criteria consisted of horizontal analyses examining consideration of sustainable development, eco-innovation and green and circular economy, and taking into account relationship between the elements of the environment and between effects on these elements,

On the basis of the above mentioned criteria, detailed analyses of the environmental impact of the projects identified in Table 13 as likely to significantly affect the environment, were carried out. The results of these analyses are presented in Appendix 2, and a summary from the point of view of the impact of the entire Programme on particular elements of the environment is presented in the sub-sections below.

It should be noted that the assessments included in the detailed analyses are of a review nature, i.e. the fact that they do not identify a significantly negative impact of a given area of intervention does not mean that it should be assumed a priori that none of the projects implemented within this area will have a significant negative impact on the components of environment, including Natura 2000 areas. Only assessment of a specific project (investment project), with indication of its location, may determine whether there is a significant negative impact or not. However, such an assessment will only concern a specific project and it is not the same as stating the existence of such impact with respect to the entire Programme.

It should be noted that a number of measures covered by the Programme have already been subject to strategic environmental impact assessment (SEA) of policies, strategies or programmes or even environmental impact assessment (EIA) and environmental impact reports have been prepared for them. These undertakings were treated in the same degree of detail in the analyses as other undertakings. This approach allows generalising the overall assessment of the Programme. The used environmental reports on respective strategic documents or reports are listed in sub-section 5.5 and in the detailed analyses of impact of individual potential projects.

As a result of detailed analyses, the impact of undertakings to be implemented under the Programme on particular elements of the environment was summarised in the table below.

Table 13. Possible impacts of projects likely to significantly affect the environment under the Programme

Caption:

Impact	Symbol:	Type of impact	Symbol:	Type of impact	Symbol:
positive	+	direct	B	short-term	>
possible negative	-	indirect	P	medium-term	>>
significant negative	- -	secondary	W	long-term	>>>
both positive and possible negative	+ and -	cumulative	skum.	permanent	<->
both positive and significant negative	+, -, --	potential	prwd	temporary	O

Action code: policy objective, specific objective, measure, project	Potential projects that can / or will be implemented	Elements of environment subject to impact assessment												
		biodiversity	fauna	flora	integrity of protected areas	water	air (including noise)	humans	land surface	landscape	climate	natural resources	heritage objects	material assets
		1	2	3	4	5	6	7	8	9	10	11	12	13
Specific Objective 2.2 Promoting access to water and sustainable water management														
Measure 2.2.1. Implementation of projects aimed at protection and condition improvement of water resources (including river basin management, infrastructure development of rainwater retention systems, activities related to improvement of water quality),.														
2.2.1.2	Construction of small retention facilities	+, >, >>>, <->, B	+, -, >>> B,O, skum.	+, -, >>>, O, B, skum.	-, >>>, B, <->, skum.	+, >>>, P, skum.	-, >, B, skum.	+, -, >, B, skum.	-, >,<->, B	+, -, >>>, B	+, >>>, <->, P skum.	+, >>>, B	+, >>>, prwd, P	+, >>>, prwd, P,
Measure 2.2.2 Implementation of projects related to sewage management														

Action code: policy objective, specific objective, measure, project	Potential projects that can / or will be implemented	Elements of environment subject to impact assessment												
		biodiversity	fauna	flora	integrity of protected areas	water	air (including noise)	humans	land surface	landscape	climate	natural resources	heritage objects	material assets
		1	2	3	4	5	6	7	8	9	10	11	12	13
2.2.2.2	2.2.2.2 Implementation of innovative projects in the field of wastewater treatment	+,>>>,P	-, B,P, >>>, <->,O, skum.	-,+,B,P, >>>, <->,O, skum.	-,B,>>>, ,<->, skum.	+,- ,>,>>>, B	-, >, B,	+,>>>,B	- ,>,>>>,B	-, >,>>>,B	- ,+,>>>,B,P	+,- ,>,>>>,B	N/a	+,>>>,P
Large infrastructure projects (LIP)														
LIP 1 Construction of cycling infrastructure on the route Mikaszówka – Rudawka, and Grodno – Racicze														
1.1	Construction of cycling infrastructure on the route Mikaszówka-Rudawka and Grodno - Racicze	-, +, B, >>>, >	-, +, B, P, >>>, >	-, +, B, P, >>>, >, O	-, B, >>>, >	*n/a*	-, >, B, +, >>>, P	+, >>>, >, P, B	-, >,>>>, B, P	+, >>>, B, P	+, >>>, B, P	-, +, >>>, B	+, >>>, P	*n/a*
LIP 5 Sustainable Water Management: A Way to Revive Western Ukraine and Eastern Poland														
5.1	Construction of 60 km of water supply network in Svitiaz, Pulmo and Shatsk equipped with a water treatment plant, construction of a water treatment plant in Rivne and Hoshcha, reconstruction of a wastewater treatment plant in the village of Kvasiliv, reconstruction of the water supply in Svalyava, construction of	-, B, >, <->, >>>, skum.	-, B, ,>, O, skum.	-, B,P, >, O, skum.	-,>, B,<- >, skum.	-, +, >,>>>, B, skum.	-, >, B, skum.	-, +, >, >>>, B	-, >, O, B	-, >, B	n/a	-, +, >,>>>, <- >, B	n/a	+, >>>, prwd, P, W

Action code: policy objective, specific objective, measure, project	Potential projects that can / or will be implemented	Elements of environment subject to impact assessment												
		biodiversity	fauna	flora	integrity of protected areas	water	air (including noise)	humans	land surface	landscape	climate	natural resources	heritage objects	material assets
		1	2	3	4	5	6	7	8	9	10	11	12	13
	a sewage system in Lipina Nowa and Zawody, improvement of the sewage treatment plant in Skierbieszów and cleaning works at the Ternopil reservoir													

Research questions

In line with the indications contained in the adopted methodology, as part of the work, a number of research problems significant from the point of view of the development directions of the area covered by the Programme in Poland, Belarus, Ukraine, the EU as well as the global ones were analysed. A summary of the results of the most important of these analyses, together with the basic research questions, is presented below:

- Will the implementation of the Programme contribute to the continuation of the implementation of the principle of sustainable development?

Basing on the definition of sustainable development (social and economic development in which political, economic and social activities are integrated with maintenance of natural balance and permanence of basic natural processes in aim to guarantee the possibility to satisfy fundamental needs of individual communities or citizens of both the contemporary and future generations) it may be stated that the Programme will contribute to the delivery of sustainable development of the country. The measures planned to be carried out under its particular objectives will contribute to the solution of environmental problems in the form of challenges relating to the improvement of the environmental quality, halting climate changes, preservation of biodiversity, etc., while affecting the social and economic development.

- Will the implementation of the Programme affect the transformation towards a circular economy?

A number of measures indicated in the Programme will foster the transition towards a circular economy either directly or indirectly. This relates in particular to measures in the field of implementation of small retention facilities, improvement of biodiversity and green infrastructure on which preservation of ecosystem services depends, improvement of transport, etc., as well as in the field of education and maintenance of cultural heritage. It can therefore be concluded that the Programme will contribute to a faster transformation of the region towards a circular economy.

- Will the implementation of the Programme contribute to the reduction of greenhouse gas emissions?

The Programme will contribute to a faster reduction of greenhouse gas emissions in the region. It will be influenced primarily by actions in the field of improving transport (cycle paths), green infrastructure and educational activities. However, it must be noted that these actions will only partially contribute to the reduction of greenhouse gas emissions and regardless of them it is advisable to take further measures to reduce greenhouse gas emissions to meet national and EU targets.

- Have objectives been proposed for the reduction of possible negative environmental impacts?

The Programme envisages implementation of a number of objectives that directly or indirectly affect the protection of the natural environment. These include in particular: support for measures concerning adaptation to climate change, risk prevention and resilience to natural disasters, measures for the protection of environmentally valuable areas, construction of small retention facilities and others. Irrespective of that, almost all measures to be implemented under the Programme will indirectly influence the reduction of pressure on the environment, thus indirectly improving its quality.

- Is there contingency between diagnosis, objectives, proposed actions in the context of sustainable development?

As part of the work on the diagnosis, analyses were performed on the internal coherence and compliance with global, EU and Polish strategic documents. The results of the analyses, presented in relevant sections of the

Environmental Report indicate the consistency between the diagnosis, objectives and proposed measures. It should be emphasised that the measures complement each other, achieving the objectives of the proposed document.

- Do the proposed measures take into account the need to protect nature and landscape and how will they contribute to the proper functioning of the system of protected areas, including Natura 2000?

As already mentioned above, the Programme will favour the protection of nature, biodiversity and the development of green infrastructure. Activities in the field of preparing analyses, strategies and action plans for the protection of naturally valuable areas and habitats will also be of significant importance. Independently, the Environmental Report presents a number of recommendations concerning limitation of the negative impact of projects implemented under the Programme inter alia on protected areas, including Natura 2000.

- Will the proposed activities contribute to the conservation of cultural values?

Among the essential elements of the Programme are activities for the preservation, availability and promotion of tangible and intangible cultural and natural heritage. These actions will be supported by educational elements in other measures of the Programme and information systems on tourist attractions.

- Will the proposed activities contribute to raising the ecological awareness?

Undoubtedly, implementation of all the Programme objectives, which is connected with implementation of strategic documents, is indirectly connected with raising social awareness, including environmental awareness. It should be emphasised that the Programme also indicates a number of educational measures, e.g. in the field of climate change, pro-ecological behaviour and others.

5.4.1. Impact on biodiversity, plants and animals, including Natura 2000 areas and their integrity, including impact on ecological corridors

Within the framework of the drafted document, at the stage of development of the environmental impact Programme, the locations of implementation of individual projects included in the axes of the document were not indicated. As the issue of location is of key importance for the assessment of natural values, the assessment of the impact on individual elements of ecosystems and their integrity was performed at a high level of generality, without consideration of spatial conflicts within individual forms of nature conservation, but with the assumption of the precautionary principle and with an effort to include in this assessment all possible and hypothetical impacts of the planned investments.

In terms of biodiversity impact assessment, the document identifies issues and threats that should be taken into account in project selection and implementation, especially when making decisions about the location of the project, in a way that the natural resources will be affected as little as possible. It is also extremely important to ensure compliance of the implemented projects with national regulations - primarily the Act on Nature Conservation and the resulting regulations, as well as European Union regulations - directives (in particular the "birds" and "habitats" directives).

5.4.1.1. Impact on biodiversity

The main factors having a direct negative impact on biodiversity are: (1) habitat loss and fragmentation, (2) overexploitation and misuse of natural resources, (3) pollution, (4) impact of invasive alien species and (5) climate change. In Europe, the main tool for biodiversity protection is Natura 2000 areas, but it should be remembered that this protection is also achieved through the protection of species and habitats outside Natura 2000 areas, and in Poland also through other spatial forms of nature conservation and environmental

regulations. The need to take biodiversity into account in environmental impact assessments stems from Polish legal regulations, but is also emphasised by Directive 2014/52/EU of 16 April 2014 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 the period up to 2030 indicates that environmental impact assessment should not only focus on minimising the impact of projects, but on ensuring the so-called 'net zero loss' of natural values and restoring biodiversity[65].

One factor with a direct impact on biodiversity is habitat loss and fragmentation The result of fragmentation is not only a significant reduction in the overall adaptability of that population. Many species can function well as so-called metapopulations, consisting of small subpopulations that are in contact with each other through the exchange of individuals. A basic condition for the survival of a metapopulation is the maintenance of ecological connectivity, i.e. the possibility of exchange of individuals and gene flow. When the ecological connectivity between patches is maintained, the metapopulation functions properly and even small fragments of the environment are inhabited by animals.

The assessment of the impact of the Programme on biodiversity and natural values was based on the analysis of the risk of a negative impact on species (of plants and animals) and natural habitats, as well as maintenance of their integrity, both internal, within particular areas, and external to other protected areas and those constituting ecological corridors. Bearing in mind the nature of the planned projects and their locations (e.g. in urban areas and within existing facilities and transformed areas), the assessment also took into account impact on areas outside the legal forms of nature.

At the moment of the Programme preparation, for projects for which precise investment locations were not indicated (it is not possible to precisely define their direct impact on particular forms of nature conservation), the potential impact and potential effects on nature were described. Precise analysis of the impact and the resulting location constraints will result from the environmental impact assessment carried out at the design stage of works.

5.4.1.2. Impact on habitats and flora

Identification of the impact of the Programme provisions on the flora of the areas covered by the measures indicates that the greatest determinant of the occurrence of negative impact on habitats and plants is the location of investments, as well as the area which will be taken up for construction. They may to a significant extent lead to fragmentation of habitats and occupation of plant stands, including those under protection, and may also involve removal of trees and shrubs which, apart from floral values, provide important habitats for insects, birds and bats.

Some activities, especially those in the field of infrastructure, which are connected with construction works, may lead to surface transformation (especially when large areas are occupied, e.g. construction and extension of infrastructure elements), movement of large amounts of earth and aggregate on construction sites, their storage, the need to build and provide associated infrastructure (access roads), devastating the area by heavy equipment or cutting shrubs and trees. In connection with the construction works, there may appear the risk of lowering of the groundwater level and disturbance of its flow within the aquifers, which is essential for the existence of many habitats. In addition, there is a potential for contaminants to infiltrate into water and soil and directly into habitats. In connection with the construction works, there is a risk of lowering the groundwater level and disturbing their flow within aquifers which is important for the existence of many

[65] European Commission 2020. EU Biodiversity Strategy 2030. Bringing nature back to our lives.

habitats. In addition, there is a potential for contaminants to infiltrate into water and soil and directly into habitats.

Nuisances and identified threats and pressures on habitats and plants of the action areas will be related to the following phenomena:

- run-off of polluted rainwater from roads and tracks;
- increased level of soil contamination with heavy metals;
- an increased level of dust in the air and an increase in its toxicity (dioxins, hydrocarbons);
- acidification of precipitation (pollutants from exhaust gases fall on patches of habitats with the rain);
- littering;
- increased human penetration of the area;
- risk of pollutants infiltrating water during infrastructure construction;
- invasion of alien species.

It should be noted that negative impact generated by new investments can be limited by a proper selection of location variants and subsequent application of appropriate mitigation measures. Moreover, the occurrence of the said potential negative impact on natural habitats can be determined at the stage of environmental assessment of particular investments, after updating the information concerning habitats and conducting an inventory in the field, and on this basis mitigation measures and nature compensation appropriate to the damage caused can be planned.

5.4.1.3. Impact on animals

Mammals

The most significant negative impact identified with respect to impact on animal species is related to the occupation of species habitats as a result of the construction of new mainly linear infrastructure elements. This will result in the reduction of the food base, occupation of breeding sites as well as collisions with migration routes. It is therefore important to appropriately identify the occurrence of species and their needs before selecting the investment location and to minimise the negative impact already at the stage of project implementation.

During the operational phase, the most adverse effects will relate to the occurrence or intensity of barrier effects. Large mammals that require large territories will be particularly at risk. In addition, the main threats include:

- formation of barriers to animal movement;
- limiting access to the food base;
- collisions with vehicles, on inland routes causing increased animal mortality;
- disturbance due to excessive noise.

'The Environmental Report on the Effects of the National Road Construction Programme 2014 - 2023' identified a strong negative impact on large mammals with significant migration distance. The main issue will concern significant negative impact on populations of large mammals that exhibit a large migration distance; bear, lynx, wolf, bison, elk, red deer, fallow deer, roe deer, wild boar. Mostly negative impacts and collisions of the routes with the migration corridors of these mammals were found in southern Poland (Carpathian Corridor KK) .[66]

[66] https://www.korytarze.pl

However, the disturbance of the possibility of free movement will occur, but only at the point where permanent structures are created. The remaining mammal species will not be adversely affected to any significant extent. In case of small mammal species, whose migrations and movements are short-distance, the possibility of significant impact on their populations was excluded.

As the Programme does not provide for the construction of roads, but only bicycle paths, their impact on animals will be small, unless the construction of bicycle paths is accompanied by road construction, as part of other projects. However, if the bicycle paths are run along the existing roads, their additional impact will be minimal.

The remaining mammal species will not be significantly affected by strong negative impacts. In the case of small species, whose migrations and movements are short-distance, the possibility of a significant impact on their populations at the national or even Programme level has been ruled out.

The environmental report also analysed 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 the Programme implementation, after the application of appropriate mitigation measures (use of adequate protection, lighting etc.).

Birds

Impact on birds, in particular the objects of protection of Natura 2000, are already possible at the construction stage. This includes potential changes to water relations, which may affect the quality of habitats. Interfering with the ground and placing permanent structures there changes the properties of water infiltration into the ground and its movement within aquifers. Earthworks on hydrogenic soils may lead to their periodic drying and mineralisation, and consequently to change in their physical and chemical properties. This then translates into a reduced possibility of development of insects, which are an important component of food for OSO. Construction works, that would be carried out during the breeding season, may disturb the nesting biology at particular sites. This includes destruction of nesting and feeding grounds as well as noise emissions and disturbance by machine and human traffic. At the stage of construction of technical facilities, access roads will be built, some of which will remain after the completion of works for the purposes of ongoing service. Their construction and use is also associated with pressure on habitats by reducing the availability of nest niches and feeding grounds. Impact in the form of direct collisions with vehicles is also possible.

The operation of the infrastructure that is planned in the document may give rise to impacts that cause:

- change of breeding places;
- the need to change migration routes;
- fragmentation of habitats, which may lead to a weakening of the population as a result of the deterioration of the food base and the need to extend flight routes to the feeding grounds (considerable energy expenditure);
- increase in mortality of individuals due to collisions with vehicles and high infrastructure facilities: accompanying road and rail transport infrastructures;
- disturbance.

In the case of investments with the greatest impact on bird species, the exact scale of the projects is not known, therefore it is not possible to state unequivocally to what extent they will affect the national populations of birds. With the application of appropriate mitigation measures and by selecting at the stage of the environmental impact assessment the location option taking into account the needs of bird species, it is

possible to minimise the negative impact on bird populations. It is also important to carry out post-implementation monitoring in order to optimise actions reducing negative impact or introduce compensatory solutions.

Amphibians and Reptiles

Amphibians and reptiles are the group of organisms that are particularly vulnerable to the infiltration of pollutants into water and soil. Potentially negative (but short-term) impact on amphibians will occur wherever terrain conditions are conducive to their occurrence; typical habitats for amphibians include water reservoirs and watercourses, wetlands, areas with stagnant water after precipitation and even excavations where water may accumulate. Moreover, their low mobility prevents the populations from moving to longer distances from the investments. Therefore, to reduce the risk of loss of local populations of these animals, mitigation actions should be implemented already at the planning stage. At the stage of construction works it is important to secure construction sites and places in their area that can be dangerous for amphibians and reptiles (wells, excavations), as well as to create substitute breeding sites (small retention tanks).

The most significant threats include:

- liquidation of habitats, primarily aquatic, but also terrestrial;
- change of water relations, which may lead to disappearance of water reservoirs;
- crossing of animal migration routes and disruption of migration routes by access roads ;
- presence of numerous so-called 'local ecological traps' accompanying the communication infrastructure, e.g. drainage well, settling tanks, intercepting chambers, etc.;
- pollution of water reservoirs and watercourses, in particular with petroleum substances from construction machinery.

Therefore, it is necessary to take appropriate protective measures (protection of amphibians is a legal obligation, as all amphibian species are protected under national law).

Fish

No significant negative impacts on fish species were found for the planned investments. Possible short-term negative impact on this group of animals may be associated with possible infiltration of pollutants from construction sites into surface water.

The assessment of the degree of impact on this community and the definition of mitigation measures should be carried out following the identification of local site conditions. However, general mitigation measures can be identified to maintain movement, reproduction and feeding of fish species. The main minimising measures are the use of fish ladders and alternative habitats.

Invertebrates

The investments planned in the Programme will potentially occupy sites of protected invertebrate species including insects. However, no significant negative impact on national populations is expected. Negative impacts may be local and site-specific. It is not possible at this stage to assess the actual impact of the project on invertebrate species as they inhabit small areas or occur e.g. on single trees or patches of habitats. It is important to conduct detailed field research on their occurrence and conservation needs. The impact on individual populations should therefore be considered at the stage of developing an environmental impact report, when measures to minimize the impact on specific invertebrate species can be included.

5.4.1.4. Impact on Natura 2000 areas

At the stage of preparing this Programme, investments which were indicated on a general level and did not include exact locations or conditions of the tasks implementation. It was not unambiguously stated that the implementation of the document in question would cause a significant negative impact on Natura 2000 areas. Due to the high level of generality of the analysed document, attention was paid to projects whose possible implementation could potentially cause negative impact on Natura 2000 areas, and therefore they should be carefully analysed at the investment stage in terms of their impact on Natura 2000 areas and their objects of protection.

Due to large areas occupied by Natura 2000 areas, a major problem resulting from the development of linear elements as bicycle paths and water supply networks is the issue of maintaining the cohesion of the Natura 2000 network. The concept of cohesion of the Natura 2000 network refers both to the designated bird and habitat areas, which form the most important links of the network, and to the ecological corridors connecting them. It should be remembered, however, that the mere fact that the investment is located in a given area does not mean that the investment will have a negative impact on the objects of protection of this area. At the stage of conducting the investment, it is necessary to identify the objectives of protection in individual Natura 2000 areas and identify potential and existing threats, and on this basis assess whether the investment will have a negative impact on the area and its integrity and assess the coherence of the network. In Natura 2000 areas, there are no prohibitions on activities, and the protection objectives and needs of individual objects of conservation are of key importance

At the stage of development of this Programme, potential locations of 'natural collisions' and intersections of investments with Natura 2000 areas were indicated in spatial analyses and show on the map (Fig. 12) in sub-section 5.4.10. This part focuses mainly on investments whose locations were defined at the stage of the Programme and it was possible to indicate the Natura 2000 areas on which they could potentially have a direct or indirect impact. The potential negative impact may apply to projects related to the creation of infrastructure. It should be emphasised that the Nature Conservation Act prohibits the implementation of projects that could:

- impair the natural habitats or habitats of animals and plants for the protection of which the Natura 2000 area has been designated (without introducing compensatory measures), or
- impair the integrity of Natura 2000 area or its relationship with other areas, or
- adversely affect the species for the protection of which the Natura 2000 area has been designated.

In accordance with current regulations, implementation of a project which may have a significant negative impact on Natura 2000 areas is possible if it is supported by necessary requirements of an overriding public interest, including social or economic requirements. At the same time, the lack of existence or justification of alternative solutions must be demonstrated. The above premise may be accepted only in the absence of alternative solutions and when providing environmental compensation necessary to ensure the coherence and proper functioning of the Natura 2000 network. Where a significant negative impact concerns priority habitats and species, the overriding public interest refers only to: protection of human health and life, ensuring universal safety and obtaining favourable consequences of primary importance for the natural environment.

For the needs of this Programme, for projects for which, at the stage of preparing the Report, specific or approximate investment locations were indicated and these investments were located in close proximity to the Natura 2000 area, then a detailed analysis of the Natura 2000 area was made, with particular emphasis on the entities for which this area was established. In addition the Standard Data Forms (SDF), uniform throughout the

European Union, descriptive documents containing detailed information on Natura 2000 areas were analysed in detail, focusing on all areas of Special Areas of Conservation (SACs) and Special Protection Areas of Birds (SPAs) for which close proximity to natural areas was demonstrated in the analysed Programme.

- *LIP 1 Construction of cycling infrastructure on the route Mikaszówka – Rudawka, and Grodno – Racicze*

Special Protection Area for Birds (SPA)

Special Bird Protection Area, Augustów Primeval Forest, PLB200002[67].The area includes a forest complex of the Augustów Primeval Forest, located on the border of the Augustów Plain and the Biebrza Basin. The area is covered with varied tree stands (approx. 90% of the area), which in many parts have retained their natural character. Forests dominate, among which the well-preserved wet forests and marsh forests deserve special attention. Large areas are covered with alder forests, and well-preserved oak-hornbeam forests in some places. The main river is Wołkuszanka, flowing through the Augustów Canal to the Niemen. In the southwestern part, the area covers the Rospuda Valley. Deforested areas are grasslands. A bird refuge of European rank. There are at least 40 bird species from Annex I of the Birds Directive, 18 species from the Polish Red Book. During the breeding season, the area is inhabited by at least 1% of the national population of the following bird species: bittern, marsh harrier, marsh harrier, black stork, black grouse, white-backed woodpecker, three-toed woodpecker, green-gray woodpecker, gadożer, capercaillie, black kite, red kite, roller coaster, whooper swan, lesser spotted eagle, crane, woolly eagle, eagle owl, honey buzzard; white-tailed eagle is present in a relatively high density

Special Protection Area (SPA)

Special Area of Habitats Protection Augustowska Primeval Forest / Augustowska Refuge Terespol PLH200005[68]. The Augustów Refuge covers the area of almost the entire Polish part of the Augustów Primeval Forest, which is one of the largest and best-preserved forest complexes in Central and Eastern Europe (nearly 90% forest cover), bypassing the Wigry National Park. A characteristic feature of the Augustowska Primeval Forest stands is the high share of spruce in forest communities. This species occurs both in mineral soils and in peat bogs. This area is also distinguished by a large share of the flora of boreal species, such as: Carex globularis spherical sedge, Carex disperma gentle sedge, Stellaria crassifolia, Stellaria crassifolia, Baeothryon alpinum, blue polemonium coeruleum, low birch Betula humilis, Saxifraga saxiformis. Another peculiarity is the presence of Cladium mariscus, a sub-Atlantic species. Numerous Western European species reach the eastern limits of their range here. However, there are no species widespread in western and central Poland (pedunculate oak, fir, beech, sycamore, broad-leaved lime, service tree). Plant communities in north-eastern Poland have similar properties to flora: boreal communities have a significant share. In the area of the refuge there are many polyhumotrophic (dystrophic) lakes with transitional peat bogs surrounding them. Some watershed areas are occupied by raised bogs, including one of the largest in Poland - the Kuriańskie Bagno. In the valleys of some rivers (especially on the Rospuda River) and on some lakes (especially in the area of the lakes: Wiłkokuk, Zelwa in the Wschodniosuwałskie Lakeland within the refuge and the Augustów Canal) extensive low moss bogs, fed by waters rich in calcium compounds, including Cretaceous bogs. Together with the adjacent forest areas in Lithuania and Belarus, the Augustów Primeval Forest forms one of the largest compact forest complexes in the lowlands of Central Europe. It is also an extremely important migration corridor for forest species of flora and

[67] SDF 2019. Standard Data Form. The area of the Augustów Primeval Forest PLB200002. GDOŚ. Warsaw

[68] SDF 2019. Standard Data Form. The area of the Augustów Primeval Forest PLB200002. GDOŚ. Warsaw

fauna, connecting the forests of Central and Eastern Europe. A refuge for many endangered species, mainly the lynx Lynx lynx and the wolf Canis lupus (the refuge is home to some of their most stable lowland populations), as well as Lutra lutra and Castor fiber beaver. In total, 10 species of animals included in Annex II of Council Directive 92/43 / EEC were found here. Habitat types from Annex I to Council Directive 92/43 / EEC cover approx. 12% of the area. Among the endangered and valuable habitats, swamp forests occupy the largest area (habitat 91D0 from Annex I of the Council Directive 92/43 / EEC). Among this type of forest, bog pine-birch forests (Thelypteridi-Betuletum pubescentis association) are of particular importance. The area of the refuge is the most important area of occurrence of this type of habitat in Poland. Their largest complexes are: 1) on the Rospuda river (the best-preserved patches); 2) in the southern part of the refuge in the Biebrza ice-marginal valley (e.g. around Hruskie); 3) in lake basins connected to the channel of the Augustowski Canal along it (eg in the area of the Paniewo lock, at Lake Kruglak, at Lake Białe, near the Sajenek Pond); 4) in the northern part of the Forest, in many peat bog, often extensive depressions (eg at Lake Wiłkokuk). Many invasive alien species, already widespread in other areas of Poland, are still sparse or not present here. The richness of nature is favored by extensive meadow and pasture management, which is still preserved in some clearings in the Forest. The remaining areas are mainly hay meadows and pastures; many of them are used extensively to this day. The settlement network is poorly developed.

The potential threats to the objects of protection located in the above mentioned Natura 2000 sites are as follows:

- PLB200002 Augustów Primeval Forest - deforestation; construction of roads and motorways; land backfilling, land reclamation (melioration) and drainage. All potential threats have been classified as medium impact threats.
- PLH200005 Augustów Primeval Forest (Refuge) - fertilisation with artificial fertilisers, horse riding, dispersed development; urbanised areas, residential areas; damage by herbivores (including wildlife); angling; change of cultivation method; afforestation of open areas; camping and caravanning; cultivation; eutrophication (natural), fires and firefighting; waste, sewage.

- *LIP 5 Sustainable Water Management: A Way to Revive Western Ukraine and Eastern Poland*

Special Protection Area (SPA)

Special Area of Conservation Mid Bug river Valley **PLB060003**[69]. The area comprises a section of the Bug River valley between the vicinity of the village of Gołębie (where the river, flowing through the territory of Ukraine, becomes a border river) and Terespol. Throughout this section, the river has a natural character, with numerous meanders and oxbow lakes. The riverbed is deeply indented, the slopes reach several metres in height. The river valley is occupied by meadows, locally small patches of degraded riverside forest, clumps of willow thickets and cultivated fields. During the breeding season the area is inhabite by at least 1% of the national population of the following bird species: Montagu's harrier, white stork, corncrake, syrian woodpecker, whiskered tern, black tern, kingfisher, common sandpiper, common redshank, white-winged black tern, black-tailed godwit; the Eurasian bittern, western marsh harrier, bluethroat and barred warbler are relatively densely populated.

[69] SDF 2019. Standard Data Form. Middle Bug Valley PLB060003. GDOŚ. Warsaw

Special Areas of Conservation (SAC)

Special Area of Conservation Orłowski Forest **PLH060061.**[70] This area is important due to the preservation of a well-developed sub-continental oak-hornbeam forest with beech growing here on the border of its range, as well as populations of the nerve root and the golden flax. The following species grow in the ground cover: hairy sedge), greater stitchwort, sweet woodruff, wood anemone, yellow archangel, wood sanicle. There also appear species typical for beech forests: coral root and white helleborine. On the limestone substrate, in the southern exposure, a warm variant of oak-hornbeam forest develops, with species composition referring to the light oak forest; the following species occur: stone bramble, bastard balm, peach-leaved bellflower, angular spurge and cinquefoil. Among protected species we should also mention: february daphne, European wild ginger, bird's-nest orchid, and common twayblade. At the edge of the forest xerothermic scrub and a narrow belt of grasslands have developed. A threat to the objects of protection in the Natura 2000 site Orłowski Forest (Las Orłowski) is currently posed by tree felling, when forest management is not carried out in accordance with the requirements of habitat protection, and agricultural management.

Special Area of Conservation **Drewniki PLH060059.**[71] This area comprises slopes above a small watercourse, the Milutka River, a tributary of the Wojsławka River. On a steep, west-facing slope, the loess cover lying on chalky bedrock is intersected by deep gullies. Brown soils predominate in the area; only in places where the chalky subsoil is exposed do rendzina soils develop. A large part of the area is occupied by sub-continental oak-hornbeam forest (*Tilio-Carpinetum betuli*) with beech (*Fagus sylvatica)* and hornbeam (*Carpinus betulus*) dominating in the tree stand. The following characteristic species grow in the ground cover: hairy sedge (Carex pilosa), greater stitchwort (*Stellaria holostea*), sweet woodruff (*Galium odoratum*), wood anemone (*Anemone nemorosa*), yellow archangel (*Galeobdolon lutea*), wood sanicle (*Sanicula europaea*), smooth crosswort (*Cruciata glabra*), euonymus verrucosus (*Euonymus verrucosus*) and others. The following protected species grow there: white helleborine (*Cephalanthera damasonium*), february daphne (*Daphne mezereum*), European wild ginger (*Asarum europaeum*), bird's-nest orchid (*Neottia nidus-avis*), common twayblade (*Listera ovata*). On calcareous substrate the nerve root (*Cypripedium calceolus*) grows. On the slopes, where the chalky substrate is exposed, there are species-rich patches of Inuletum ensifoliae grasslands, small fragments of Thalictro-Salvietum pratensis and fringe communities of the Trifolio-Geranietea sanguinei class. The grasslands include: swordleaf inula (*Inula ensifolia*), dwarf sedge (*Carex humilis*), large-flowered selfheal (*Prunella grandiflora*), steppe cherry (*Cerasus fruticosa*), ground virginsbower (*Clematis recta*), pannonian thistle (*Cirsium pannonicum*), snowdrop windflower (*Anemone sylvestris*), intermediate wheatgrass (*Elymus hispidus*), Boehmer's cat's-tail (*Phleum phleoides*), spring sedge (*Carex praecox*), Carex euxina (*Carex transyllvanica*).

Special Area of Conservation Wolica River Valley **PLH060058.**[72] The area covers a fragment of the Wolica River valley (a tributary of the Wieprz River). The valley is dominated by different types of meadow communities. In places with lower humidity, there are fresh meadows used extensively with bulbous oat grass (*Arhenatherum elatius)*, ox-eye daisy (*Leuanthemum vulgare)*, common bird's-foot trefoil (*Lotus corniculatus),* and meadow crane's-bill (*Geranium pratensis).* In wetter places the *Calthion palustris* meadows occur, occupying a significant part of the area. Small fragments of the valley are occupied by molinia meadows (*Molinion*) with fluctuating water tables with Purple moorgrass (*Molina coerulea)*, devil's-bit (*Succisa pratensis)* and rosemary-leaved

[70] SDF 2019. Standard Data Form. Area Las Orłowski (Orłowski Forest) PLH060061. GDEP. Warsaw.
[71] SDF 2019. Standard Data Form. Drewniki area PLH060059. GDOŚ. Warsaw.

[72] SDF 2019. Standard Data Form. Wolicy Valley area PLH060058. GDOŚ. Warsaw

willow (*Salix rosmarinifolia)*, in the vicinity of which occurs the poor *Caricetum davalianae* with Davall's sedge (*Carex dvaliana)*, hedgehog grass (*Carex flava*) and marsh helleborine (*Epipactis palustris*). In the oxbow lakes a community with water soldiers (*Stratiotes aloides*), yellow water-ily *(Nuphar luteum*), common frogbit (*Hydrocharis morsus-ranae*) and duckweed (*Lemna sp*.) develops. Small areas are covered by alder and ash riparian forests (*Fraxino-Alnetum*). The tree stand is dominated by black alder (*Alnus glutinosa*), the undergrowth is mostly dominated by black elder (*Sambucus nigra*), while the ground cover is covered by nitrophilous species, mainly common nettle (*Urtrica dioica)* and ground elder (*Aegopodium poagraria*), sometimes also tall goldenrod (*Solidago gigantea*).

Special Area of Conservation Sobibór Forests **PLH060043.**[73] This area includes three fragments of a large forest complex, located in the eastern part of Łęczyńsko-Włodawskie Lakeland. The largest of them, situated in the east, includes forests with a considerable share of swampy coniferous forests and alder swamps; there are also numerous patches of mid-forest raised peat bogs. There is a group of six eutrophic lakes surrounded by lakeside transitional and low peat bogs. The valleys of small watercourses or local depressions are places of occurrence of swamp and meadow complexes. In the 'Mozaika Kosyńska' forest district, there is a unique mosaic of low peat bogs with small ponds and water reservoirs and complexes of wet and dry meadows, alder forests, mixed coniferous forests and sandy grasslands. The southern part of this enclave is formed by a ridge of a terminal moraine overgrown with sandy grasslands. The central fragment (of medium size) includes part of the upper catchment area of the river Krzemianka, with numerous patches of swampy coniferous forests and wet meadows. The western piece (the smallest one) includes the dystophic Dubeczyńskie Lake, surrounded by high, transitional and low peat bogs and swampy coniferous forests. This is the largest in Poland and one of the largest in Europe refugee of the European pond turtle (*Emys orbicularis*), also one of the largest refugees of the swamp minnow (Phoxinus percnurus) in the Lubelskie Voivodeship. Protected species of mammals include: gray wolf (*Canis lupus*), European beaver (*Castor fiber)* and European otter (*Lutra lutra*), as well as pond bat (*Myotis dasycneme*).

Special Area of Conservation Bug River Valley in Polesie **PLH060032.**[74] The area is located in the valley of the Bug River, flowing through Western Polesie, in the area of Skryhiczyn in the south, Husynne, Hniszów, Stulno and Dołhobrody and Jableczna in the north. It marks the state border between Poland and Ukraine. The refuge includes the left-bank part of the valley. The area consists of 6 parts including the most valuable nature and tourist attractive sections of the Middle Bug River Valley. The river has a natural character here, with numerous meanders and oxbow lakes, vast complexes of multi-species, extensively used meadows, among which there are gentle, sandy hills with thermophilous grasslands, and in the depressions - patches of willow-poplar riparian forests and thickets. The Bug River Valley is one of the few preserved unchanged valleys of large European rivers. The Polesie section includes the most valuable sets of extensively used meadows, with numerous oxbow lakes. The whole Bug River Valley is considered to be an ecological corridor of European importance. Altogether 14 species from Annex II of Council Directive 92/43/EEC have been found here, including 7 species of butterflies. The European fire-bellied toad (*Bombina bombina*) also occurs.

The potential threats to the objects of protection located in the above mentioned Natura 2000 sites are as follows:

[73] SDF 2019. Standard Data Form. Wolicy Valley area PLH060058. GDOŚ. Warsaw

[74] SDF 2019. Standard Data Form. The Bug River Valley Poleska area PLH060032. GDOŚ. Warsaw

- PLB060003 Mid Bug River Valley - dispersed development, disposal of waste from households / recreational facilities; angling; footpaths, hiking trails, cycle paths;
- PLH060061 Orłowski Forest: reduced fertility / genetic depression (inbreeding) in animals; cultivation; logging; forestry;
- PLH060059 Drewniki: cultivation; fertilisation /artificial fertilisers/; forestry; disposal of waste from households / recreational facilities; reduced fertility / genetic depression (inbreeding) in animals;
- PLH060058 Wolica River Valley: angling; fires and firefighting; modification of water functioning - in general; reduced fertility / genetic depression (inbreeding) in animals;
- PLH060043 Sobibór Forests: angling; hunting; afforestation of open areas; eutrophication (natural); roads, motorways; Other interference and disturbance caused by human activity; abandonment of pastoralism, Regulation (straightening) of riverbeds and alteration of the course of riverbeds; use of biocides, hormones and chemicals; disposal of waste from households / recreational facilities; walking trails, cycle tracks; manual peat cutting; succession;
- PLH060032 Bug River Valley in Polesie: pollution of the Bug River waters, plans of afforestation of large meadows and grasslands in the valley bottom, plans of recreational management of oxbow lakes in the regions neighbouring with bigger holiday villages.

- *LIP 6 Carpathian narrow-gauge railway - a journey in the footsteps of the Carpathian forest railway*

Bieszczady Mountains PLC 18000175**.** The area includes the Western Bieszczady Mountains, forming a system of parallel ridges running north-west to south-east, divided by wide and deep depressions. In the top parts there are sharply finished rocky ridges and gentle rocky outcrops with alpine grasslands. The top parts of the mountains (above 1150 m above sea level) are overgrown by the mountain meadow communities with glasslands of the reed grass (Calamagrostis arundinacea) and the tufted hairgrass (Deschampsia caespitosa) and the fields of blueberry communities. At the upper forest and along watercourses there are thickets of green alder (Alnus viridis) and rowan (Sorbus aucuparia). In the altitude range of 500-1150 m above sea level there are coniferous forests with the predominance of Carpathian beech forest. Below 500 m above sea level the foothills floor is distinguished. Agricultural areas in the valleys, depopulated after the World War II, are subject to natural succession. They are overgrown mainly by the gray alder, silver birch and willows. Climate of the Bieszczady Mountains is mountainous with continental characteristics. Shaping of the ridges, slopes and valleys depends on the resistance of the flysch rocks to weathering. Depressions of the valleys are formed by sandstone and shale rocks. Bieszczady Mountains are characterised by large water resources, medium variability of total outflow and small underground supply. The river network is lithologically conditioned and has a trellis pattern. A bird refuge of European importance. It is part of the trilateral (Polish-Ukrainian-Slovakian) East Carpathian Biosphere Reserve. The area is one of the most valuable in Europe refugees of the primeval forest fauna with all large predators (bear, wolf, lynx). There are very numerous populations of mammals, reptiles, amphibians, invertebrates and birds. The area is inhabited, among others, by the Carpathian newt (Carpathian endemic) and one of the free-living populations of the European bison.

Potential threats to the objects of protection located in the above mentioned Natura 2000 sites are the following: PLC180001 Bieszczady - angling; roads, motorways; forestry; power and telephone lines; abandonment of pastoralism, lack of grazing; paths, walking trails, cycle tracks; cultivation; hunting; capture / removal of animals and other forms of hunting, fishing and collecting.

[75] SDF 2019. Standard Data Form. Area Bieszczady (Bieszczady Mountains) PLC180001. GDEP. Warsaw.

5.4.1.5. Impact on ecological corridors

The designation and protection of ecological corridors ensures the maintenance of functional connectivity under conditions of the currently widespread fragmentation of the environment. Ecological corridors are areas that allow individuals to move between habitats. Corridors are lifeways that allow many species to continue to exist despite adverse environmental changes, and ensure that Europe's valuable habitats remain highly biodiverse. 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 colonisation of isolated patches;
- Increasing gene flow between subpopulations preventing loss of genetic diversity and counteracting inbreeding depression[76];
- Reduction of mortality, especially of juveniles pushed out of patches of favourable habitats due to territorial behaviour.

The ability to move between patches of habitats is the most frequently 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 can be natural watercourses and their valleys, forest areas, mountain ranges. The anthropogenic forms mentioned most often in the literature are artificial watercourses, woodlots, avenues and special devices such as animal crossings. In practice, the function of the connector is narrowed down to vertebrate animals only (amphibians, reptiles and mammals). The role of the guide can be played by such a structure that allows for the effective movement of individuals or diasporas between patches of habitats in which a specific species finds suitable conditions for its development. Due to the diverse biology of species, the structure and size of such corridors may vary dramatically even within the same systematic group. It depends, among others from dispersion possibilities. Species with low dispersal abilities and most fish or dragonflies require that the spatial structure of ecological corridors is continuous. Species with high dispersal capacity may move through discontinuous patches of habitat. Such an ecological corridor structure is referred to as a mosaic - 'stepping-stones'. This applies to birds and most mammals. The diversity among species with similar ecology is significant. For example, while the wolf (Canis lupus) moves freely between forest complexes at distances of tens of kilometres, the lynx (Lynx lynx) prefers a landscape where forest areas are not separated by large open areas.

Ecological corridors also ensure the integrity of the national network of protected areas, including NATURA 2000 sites, as they allow for the movement of organisms between habitats. In order to maintain the coherence of the Natura 2000 network, it is important to ensure permeability between areas, not only in the national aspect, but also from the point of view of network coherence at the continental level.

The most significant threats that may concern the interruption of the ecological permeability in the system of ecological corridors in the context of the draft Programme concern:

- the occurrence or intensity of barrier effects that will occur as a result of the introduction of permanent physical barriers (fences, embankments, ditches, large transformed surfaces e.g. roads, railways, overhead lines, wind turbines);
- disturbance of animals due to excessive noise during construction and operation;

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

- changes in local systems (disappearance of small water bodies, drainage), which may pose a threat to amphibian breeding;
- felling of trees and shrubs, particularly rows of trees, hollow trees (den trees), and the introduction of lighting, which may adversely affect foraging and migrating bat species;
- pollution associated with traffic routes.

The investments planned under the Programme, depending on their location and type, will have an indirect or direct, short-term, medium-term or long-term impact on biodiversity, plants and animals, including Natura 2000 areas and their integrity, including ecological corridors. The most important factors determining whether or not there is a direct impact of an investment on nature are mainly the location, manner and time of the investment implementation. The most significant in terms of potential impact on environmentally sensitive areas are precisely the infrastructural undertakings and projects connected with activities connected with water and waste water investment, construction of buildings, etc. This impact, however, will be of short-term character and will cease after completion of the undertakings planned in the Programme. In addition, mitigation and compensation measures (if necessary) will be assigned to each implemented project.

5.4.1.6. Impact on biodiversity, plant and animal species, Natura 2000 areas and ecological corridors – a detailed approach

The assessment of the impact of the draft Programme on biodiversity and natural values analysed the risk of negative impacts on species (of plants and animals) and natural habitats, as well as maintenance of their integrity, both internal to individual areas and external to other protected areas and ecological corridors. Bearing in mind the nature of the planned projects and their locations (e.g. in urban areas and within existing facilities and transformed areas), the assessment also took into account impact on areas outside the legal forms of nature. In the context of maintaining natural values and the continuity of ecological corridors, and taking into account the international range of potential implementation, it is important to include in the assessment also resources outside the protected areas.

Some of the projects proposed in the Programme have been directly targeted at improving the functioning of ecosystems and the condition of habitats and species. In particular, measures undertaken under specific objective: 2.3 Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution. Improvement of permeability of ecological corridors as well as implementation of provisions of planning documents for forms of nature protection will definitely have a positive impact on the functioning of ecosystems in the national and continental sense.

Actions related to environmental education will also complement the objective of preserving biodiversity.

In many cases the Project will have an indirect or direct positive impact on natural resources, e.g. through improved functioning of water and wastewater management the quality of waters will improve, and consequently the quality of water-related habitats and species living in the aquatic environment will be improved.

In the analysis of impact on natural resources of the projects, for which at the stage of preparation of the document no specific investment locations were indicated, it was not possible to indicate the exact information on the impact on specific protected areas and objects of protection located in them. Therefore, projects qualified for the Programme should optimally consider the compromise between the needs of investors and residents and natural resources in a given location, as well as choose options which have a minimal interference with ecosystems. The projects should have appropriate environmental documentation, in accordance with applicable regulations, and if it describes the necessity of performing actions minimising the

negative impact or compensating it, they should absolutely be performed. For projects (which may have a negative impact on the environment) for which, at the stage of preparing the Report, specific or approximate investment locations were indicated (LIP 5 - Sustainable water management: a way to revive Western Ukraine and Eastern Poland), an analysis of the impact on individual components of the environment was made.

- *Specific objective 2.1 Promoting climate change adaptation and disaster risk prevention and resilience, taking into account eco-system based approaches*

As part of this objective, measures are planned in the field of the development and implementation of strategies, solutions, programmes and infrastructure projects to increase the adaptive capacity to climate change in the Programme Area, to increase protection inundation, flooding, droughts, protection against forest fires and resilience to the effects of anthropogenic catastrophes by building protection and crisis management systems and infrastructure, and to raise public awareness. The dissemination of knowledge on the role and importance of green infrastructure (GI) in nature conservation and local development, as well as good practices concerning the participation of local groups in the management of the space covered by the Programme and Natura 2000 areas will significantly contribute to the implementation of the EU biodiversity conservation strategy and thus contribute to halting the loss of biodiversity and degradation of ecosystem services and restoring them to the greatest possible extent using GI. Including GI in planning processes supports regional development in the natural, economic and social context. It promotes an increase in the quality of the provided ecosystem services and supports environmentally friendly, expansive ways of land use. By enhancing landscape values it is also possible to positively influence the development of tourism and external promotion of natural values covered by the Programme implementation.

Some activities, especially those in infrastructure that are associated with construction works, can lead to the transformation of the land surface and their impact on nature components is described in the introduction to this section.

For projects aiming at identification, monitoring and improvement of the condition of areas with exceeded environmental quality standards it is very important to properly develop and implement a monitoring system, which gives information on the condition of the environment, and which allows to set priorities for environmental protection, control and enforcement of environmental law requirements. The most important for the correct implementation of the monitoring task is:

- cyclicity of tests/measurements performed;
- unification of the methods and equipment used and, above all, the interpretation of the results;
- the way of informing the society, local and governmental administration, and non-governmental environmental organisations;
- system for verifying environmental policy on the basis of the results obtained from the environmental quality monitoring system;

The purpose of monitoring is to assess, by collecting, analysing and sharing data on the quality of the environment and changes occurring in it, whether the state of the environment is improving or deteriorating.

- *Specific objective 2.2 Promoting access to water and sustainable water management*

The objective provides for measures to implement projects aimed at protection and condition improvement of water resources (including river basin management, infrastructure development of rainwater retention systems, activities related to improvement of water quality).

In the case of activities in the field of building infrastructure for intake and storage of water , impact on natural values may occur at the construction stage and should not go beyond the removal of trees and shrubs and turf from the investment area. In case of sewage treatment systems, reclamation of degraded areas, long-term positive impacts on the animal and plant life may be expected. Possible negative impacts should be rather short-term and relate mainly to the construction phase rather than operation.

Measures under the above specific objective will indirectly or secondarily significantly contribute to the condition of natural habitats and species habitats by reducing infiltration of pollutants into waters and soil, which in turn significantly affects the quality of surface and groundwater, which determines the maintenance of sensitive aquatic and water-dependent ecosystems. They will also positively affect the achievement of environmental objectives of the water bodies, presented in detail in subchapter 4.6. Positive impacts will be felt in the long term and will be permanent.

- *Specific objective 2.3 Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution*

As part of this objective, measures are planned in the field of: protection, regeneration and sustainable use of naturally valuable protected areas; undertaking promotional and educational activities expanding the knowledge of residents about nature protection and raising awareness of naturally valuable areas; protection of nature and biodiversity and development of green infrastructure; implementation of projects aimed at identifying, monitoring and improving the condition of areas with exceeded environmental quality standards.

All projects in this scope will have a positive impact on areas of high natural value, including Natura 2000 areas and biodiversity conservation, as they will directly influence biodiversity conservation by raising environmental awareness. In turn, the EU biodiversity protection strategy will be implemented through the dissemination of knowledge on the role and importance of green infrastructure (GI) in nature conservation and local development, as well as good practices concerning the participation of local groups in the management of space covered by the Programme and Natura 2000 areas, and thus contribute to halting biodiversity loss and degradation of ecosystem services, and their restoration to the greatest possible extent using GI. Proper shaping of GI is conducive to the formation of ecosystems and their maintenance in good condition. As a result, their potential to provide economic and social benefits can be fully exploited. In addition, the use of ecosystem services presented in the context of the benefits that people derive from ecosystems will highlight the contribution of natural systems to broader human well-being and thus justify the need for action to keep the environment as stable as possible. By conserving and responsibly using nature's diverse resources, we gain as a reward what would be many times more expensive or even impossible to achieve by human efforts. And vice versa, often leading to degradation and impoverishment of this system in the name of apparent and temporary profits, we deprive ourselves of the goods and benefits they offer and often expose ourselves to additional and significant costs.

A comprehensive and integrated assessment of ecosystem services and the availability of goods and services provided is intended to increase human responsibility and awareness for the sustainable use of natural resources. This is of key importance especially in a situation of ongoing changes in the natural environment.

Monitoring projects will contribute to quick reaction to possible negative changes in the environment concerning biodiversity and protected areas and will allow preventive measures to be taken in order to avoid their deterioration. The projects covered by these measures will indirectly have a positive impact on nature protection, as they will result in increasing the level of public knowledge and thus their attitude to rational use of nature and care for it.

- *Specific objective 4.1 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*

Within this objective, the Programme envisages supporting activities aimed at: improving access and infrastructure development of diagnostic and prophylactic also in different areas of medicine; improving access to specialist medicine, in particular cardiovascular diseases and cancer (development of health infrastructure, support for the equipment of health care facilities) and emergency medicine; improving access to long-term care, especially infrastructure development for geriatric and palliative care; preventing the occurrence and effects of adverse events such as epidemics (with particular emphasis on local phenomena); supporting the development of digitization in health care (including the development of telemedicine); improving qualifications of medical and rescue personnel.

However, some activities, in particular in the field of construction or extension of health care infrastructure, may be connected with construction works, leading to land surface transformation (in particular when occupying large areas, moving large amounts of earth and aggregate on construction sites, storing them, needing to build and provide associated infrastructure (access roads), devastating the area by heavy equipment, e.g. construction of hospitals or clinics). In connection with the construction works, there may appear the risk of lowering of the groundwater level and disturbance of its flow within the aquifers, which is essential for the existence of many habitats. In addition, there is a potential for contaminants to infiltrate into water and soil and directly into habitats. The projects will have a negative impact on nature but only at the stage of construction and development, so these will be short-term activities, largely dependent on the location. However, a significant part of the projects covered by the Programme relate to the improvement of access to specialist medical services (development of digitalization, specialist training of medical personnel) which will not have a direct impact on protected areas.

- *Specific objective 4.2 Increasing the role of culture and sustainable tourism in economic development, social inclusion and social innovation*

As part of this objective, measures are planned in the field of: protection, infrastructure development and promotion of public tourist values and related tourist services e.g. by shaping an integrated tourist offer by entities in the Programme Area, infrastructure of new and improvement/upgrade of existing routes; protection, development and promotion of culture and its heritage as well as services in the field of culture; protection, development and promotion of natural heritage and ecotourism; support for the adaptation of skills and professional qualifications in the field of tourism to the needs of the tourism market and changes within, e.g. through training related to establishing, running and promoting tourism activities.

The projects covered by these measures will indirectly have a positive impact on biodiversity, plants and animals, including Natura 2000 areas and integrity, including ecological corridors, as during their implementation the environmental awareness of the society will be raised, and thus their attitude to the rational use of natural goods.

However, during the implementation of certain tourism infrastructure projects, depending on their location and type, there will be an indirect or direct, short-term impact on biodiversity, plants and animals, including Natura 2000 areas and integrity, including ecological corridors. The most important factors determining whether or not there is a direct impact of an investment on nature are mainly the location, manner and time of the investment implementation.

- *Interreg specific objective I.1.1 Enhancing 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 implemented under this objective will concern mainly: increasing and improving the quality of cross-border cooperation; improving the access to information on legal, fiscal and formal conditions related to e.g. running a business; stimulating economic ties or promoting jointly operating organizations of entrepreneurs, which may result in the economic development of the support area; support in the implementation of consulting services assistance to entities applying for additional financial resources.

The implementation of this objective will indirectly contribute to the improvement of ecological connectivity by maintaining the current range and/or creating new elements of green infrastructure within local/regional/cross-border projects implemented by administrative cooperation networks and between citizens and institutions. Use of interactive forms of communication between local communities (citizens) and authorities, nature protection services for sustainable space management in areas of natural value. Direct involvement of stakeholders (citizens), institutions and local government units in planning and subsequent implementation of joint activities for the identification, preservation and restoration in areas of high natural value, which in turn may influence the rational management of natural components, e.g. greatly facilitates nature conservation in areas of extensive ecosystems.

- *Interreg specific objective I.1.2 Building up mutual trust, in particular by encouraging people-to-people actions*

The projects will concern: supporting bottom-up initiatives for the integration of the inhabitants of the Programme Area, including promotion of volunteering; organizing events aimed at the cross-border integration of residents related to environment, art, culture and heritage; supporting local initiatives and leadership; supporting cross-border cooperation of educational facilities (e.g. through cross-border exchange of youth or exchange of good practices and innovative solutions in the Programme Area), including integration and educational activities; supporting cross-border transfer of innovative solutions aimed at undertaking and strengthening further cooperation between research and scientific centres.

These activities will not directly affect the environmental components, but many of them may indirectly have a beneficial impact by enhancing cross-border cooperation and contacts, also in the field of nature conservation (exchange of experiences and good practices).

- *Large infrastructure projects (LIPs)*

which will be selected outside the competition. In terms of impacts, the assessment was divided into the sectors affected, i.e. health, tourism and culture, and environment.

Health projects:

- *LIP 2 Early diagnosis and timely treatment - the way to health for the residents of border regions*
- *LIP 3 Common Model Network of Cross-border Emergency Services*
- *LIP 4 Strengthening the capacity of Belarusian-Polish health care institutions to deal with epidemiological threats*
- *LIP 7 Establishment of the Eastern Centre for Preventive Health Care*
- *LIP 9 A joint initiative of the Józef Psarski Mazovian Specialist Hospital in Ostrołęka to increase access to health services*

- *LIP 10 Development of palliative and geriatric care and improvement of the quality of medical services for cancer patients in hospitals of Lviv and Ternopil regions of Ukraine and Krosno*

The abovementioned projects will have no impact on biodiversity. However, the implementation of some projects in the field of construction works of hospitals or other health care facilities may have a temporary negative impact during the construction period through lowering the level of groundwater or its contamination due to the use of construction equipment. The direct impact on natural components are described in detail in the previous specific objectives and in the introduction to this section.

Tourism and culture projects

- *LIP 6 Carpathian narrow-gauge railway - a journey in the footsteps of the Carpathian forest railway*

In the course of implementation of the above mentioned projects for construction and development of the tourist infrastructure, the land surface may be transformed (in particular when large areas are occupied, e.g. during construction and development of infrastructure elements), which may lead to lowering of the groundwater level or water contamination (due to the use of construction equipment), which will directly affect the nature components (impacts are indicated in the introduction to the section). The full environmental impact assessment should be analysed at the design and development stage of the environmental impact report.

- *LIP 1 Construction of cycling infrastructure on the route Mikaszówka – Rudawka, and Grodno – Racicze*

During construction, there may be adverse impacts related to the implementation of the investment, especially in the field of construction or expansion related to construction works, leading to the transformation of the land surface (movement of earth and aggregate on construction sites), which may have a direct impact on the components of nature, especially since the planned investment was designedIn on the area of the Augustów Primeval Forest, in which there is an area of strict habitat and species protection as well as an area of protected landscape. The investment should be integrated into the environment in the best possible way with the application of state-of-the-art environmentally-friendly solutions for this type of investments, therefore the full assessment of the environmental impact of the project should be analysed at the stage of designing.

Environmental projects

- *LIP 5 Sustainable Water Management: A Way to Revive Western Ukraine and Eastern Poland*

The project includes construction of 60 km of water supply network in Svitiaz, Pulmo and Shatsk equipped with a water treatment plant., construction of a water treatment plant in Rivne and Hoshcha , reconstruction of a wastewater treatment plant in the village of Kvasiliv, reconstruction of the water supply in Svalyava, construction of a sewage system in Lipina Nowa and Zawody, improvement of the sewage treatment plant in Skierbieszów and cleaning works at the Ternopil reservoir. Detailed description of Natura 2000 sites in the close vicinity of LIP 5, including the subject of protection has been included in section 5.4.1.4.

The course of the LIP 5 investment with details of the nature conservation forms located in the close vicinity of the investment are presented in the following figures (**Błąd! Nie można odnaleźć źródła odwołania.**, **Błąd! Nie można odnaleźć źródła odwołania.**, **Błąd! Nie można odnaleźć źródła odwołania.**, ***Błąd! Nie można odnaleźć źródła odwołania.***, ***Błąd! Nie można odnaleźć źródła odwołania.***):

- protected landscape areas: Grabowiecko-Strzelecki Protected Landscape Area, Polesie Protected Landscape Area;

- reserves: Deep Valley, Piaskowy, Pulemecki, Sominec, Bug, GAT, Rosishnyy, Strumień Ossy (Ossa River Stream), ornithological, Sierecki, Czystyliwski, Iszkowski and reserves of local importance;
- landscape parks: Skierbieszów Landscape Park, Sobibór Landscape Park, Zagrebellya Landscape Park;
- Emerald sites: Shatskyi, Seretskyi;
- Ramsar sites: Shatsk Lake;
- national parks: Enchanted Land National Park; Shatsk National Natural Park;
- ecological corridors: The Polesie Ecological Corridor and the entire Bug River Valley, which is considered an ecological corridor of European importance; and
- Natura 2000 sites: 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.

Detailed description of Natura 2000 sites including the subject of protection has been included in section 5.4.1.4.

Planned construction of the water treatment plant and intake, as well as the sewage treatment plant, reconstruction of the sewage treatment plant and water supply system will result in land occupation and change of its use (occupation of land, tree and shrub cutting, environmental fragmentation), but this should not be large. Possible negative impacts may occur at the construction stage, when there will be greenhouse gas emissions from the equipment used. Additionally, the construction will affect the landscape; new objects will appear in the landscape and may disturb it if not properly incorporated into the surroundings. Water pollution may also occur as a result of the use of construction equipment, which will directly affect environmental components. On the other hand, the construction will benefit people as it will improve the supply of drinking water in terms of quantity and quality. Improvement of the sewerage system and sewage treatment will also be beneficial. They will also contribute to the achievement of environmental objectives of water bodies, described in subsection 4.6.

At the stage of construction of technical facilities, access roads will be built, some of which will remain after the completion of works for the purposes of ongoing service. Animal disturbance may also occur due to excessive noise during the construction phase. In case of large mammals the construction of the planned construction infrastructure and its use is also connected with the pressure on the habitats by reducing the availability of nesting niches and feeding grounds. Impact in the form of direct collisions with vehicles is also possible. In the case of small mammal species, whose migrations and movements are short-distance, the possibility of a significant impact on their populations at the national or even Programme level has been ruled out.

Potentially negative (but short-term) impact on amphibians will occur wherever terrain conditions are conducive to their occurrence; typical habitats for amphibians include water reservoirs and watercourses, wetlands, areas with stagnant water after precipitation and even excavations where water may accumulate. This impact will, however, be of short-term character and will cease after completion of the undertaking planned in the Programme.

Due to large areas occupied by Natura 2000 sites, the issue of preserving the cohesion of the Natura 2000 network is crucial. The concept of cohesion of the Natura 2000 network refers both to the designated bird and habitat areas, which form the most important links of the network, and to the ecological corridors connecting them. It should be remembered, however, that the mere fact that the investment is located in a given area does not mean that the investment will have a negative impact on the objects of protection of this area. At the stage of conducting the investment, it is necessary to identify the objectives of protection in individual Natura 2000 areas and identify potential and existing threats, and on this basis assess whether the investment will have a negative impact on the area and its integrity and assess the coherence of the network. In Natura 2000

areas, there are no prohibitions on activities, and the protection objectives and needs of individual objects of conservation are of key importance.

No significant negative impact on biodiversity, flora and fauna, protected areas and Natura 2000 sites was found. In order to ensure adequate protection and minimise the loss of natural resources, preventive measures, limiting, minimising and compensating negative impacts were indicated in section 5.7. It should be remembered that projects of a similar nature have been implemented for decades all over the world. Therefore, in terms of generated environmental effects, they are very well researched and do not generate effects not known or insufficiently studied so far. Moreover, their environmental impacts are similar to those generated by projects in other industries. Therefore, there are no major technical shortcomings and gaps in the contemporary knowledge both at the stage of their implementation and operation.

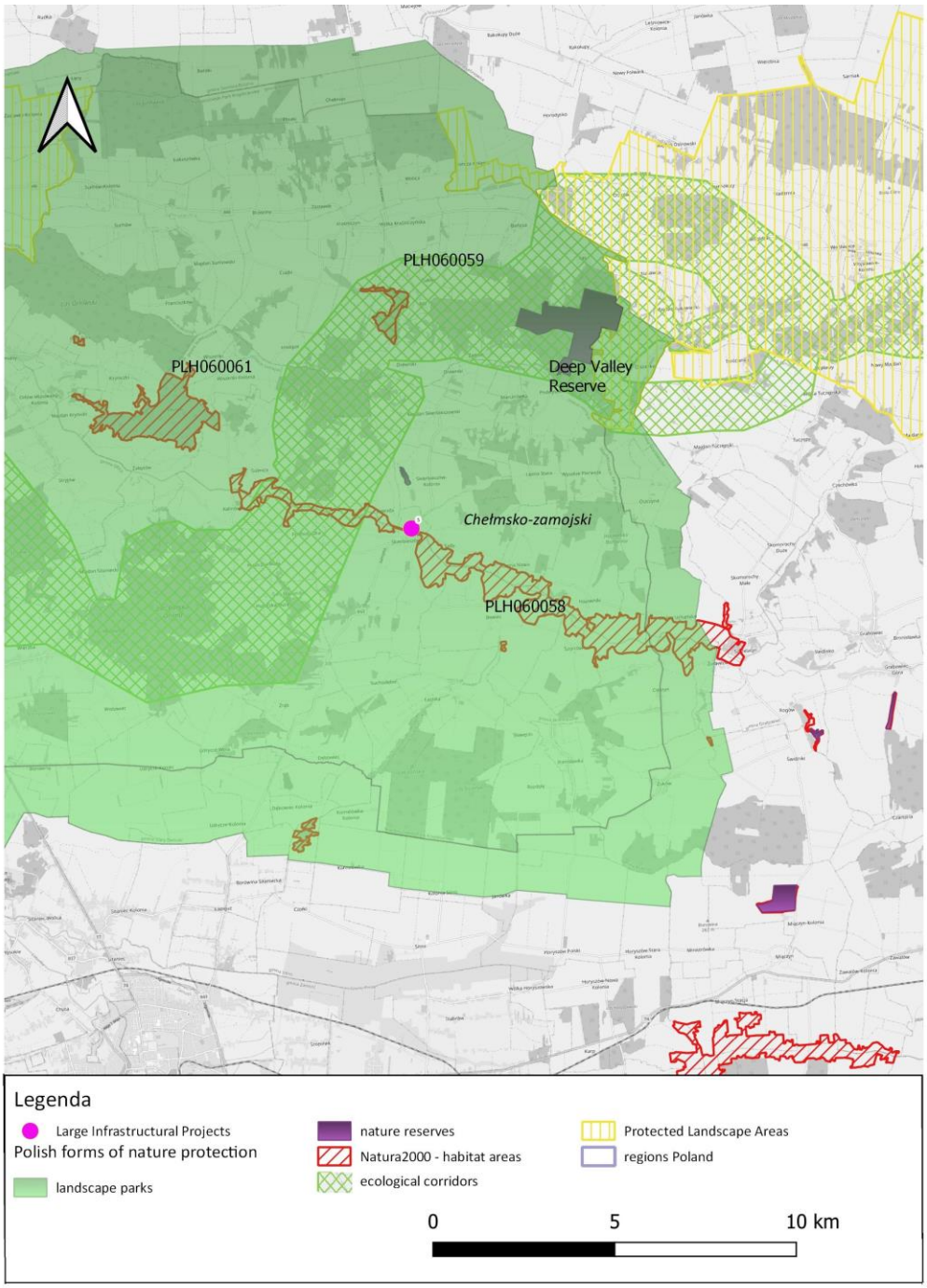

Figure 12. Detailed location of LIP 5 proposed to be implemented under the Programme against the background of protected areas and existing infrastructure - improvement of the municipal wastewater treatment process in the biological wastewater treatment plant in Skierbieszów, construction of a sewage system in Lipina Nowa and Zawody [77].

[77] Own study based on strategic documents listed in section 5.3, Open street map, gdos.gov.pl portal; Scheme and map of the National Ecological Network of the Republic of Belarus - https://minpriroda.gov.by/ru/national -sieci-ekologiczne-ru /; Ukraine data source: https://pzf.land.kiev.ua/pzf4.html and https://www.minregion.gov.ua/napryamki-diyalnosti/building/city-build/materiali-generalnoyi-shemi-planuvannya-teritoriyi-ukrayini/

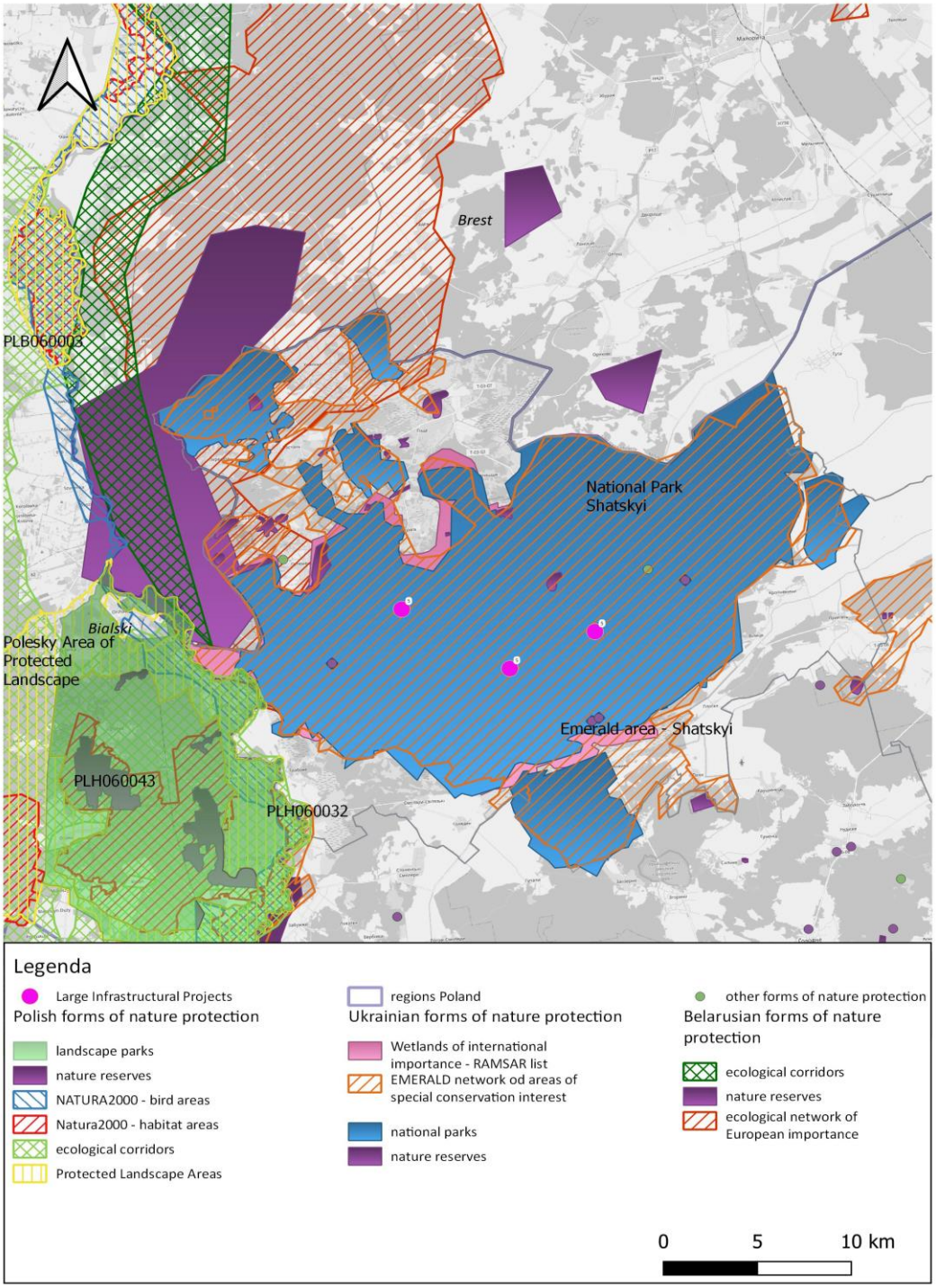

Figure 13. Detailed location of LIP 5 proposed to be implemented under the Programme against the background of protected areas and existing infrastructure - construction of 60 km of water supply networks in three settlements (s. Svitiaz, s. Pulmo, smt. Szatsk)[78].

[78] Own study based on strategic documents listed in section 5.3, Open street map, gdos.gov.pl portal; Scheme and map of the National Ecological Network of the Republic of Belarus - https://minpriroda.gov.by/ru/national -sieci-ekologiczne-ru /; Ukraine data source:

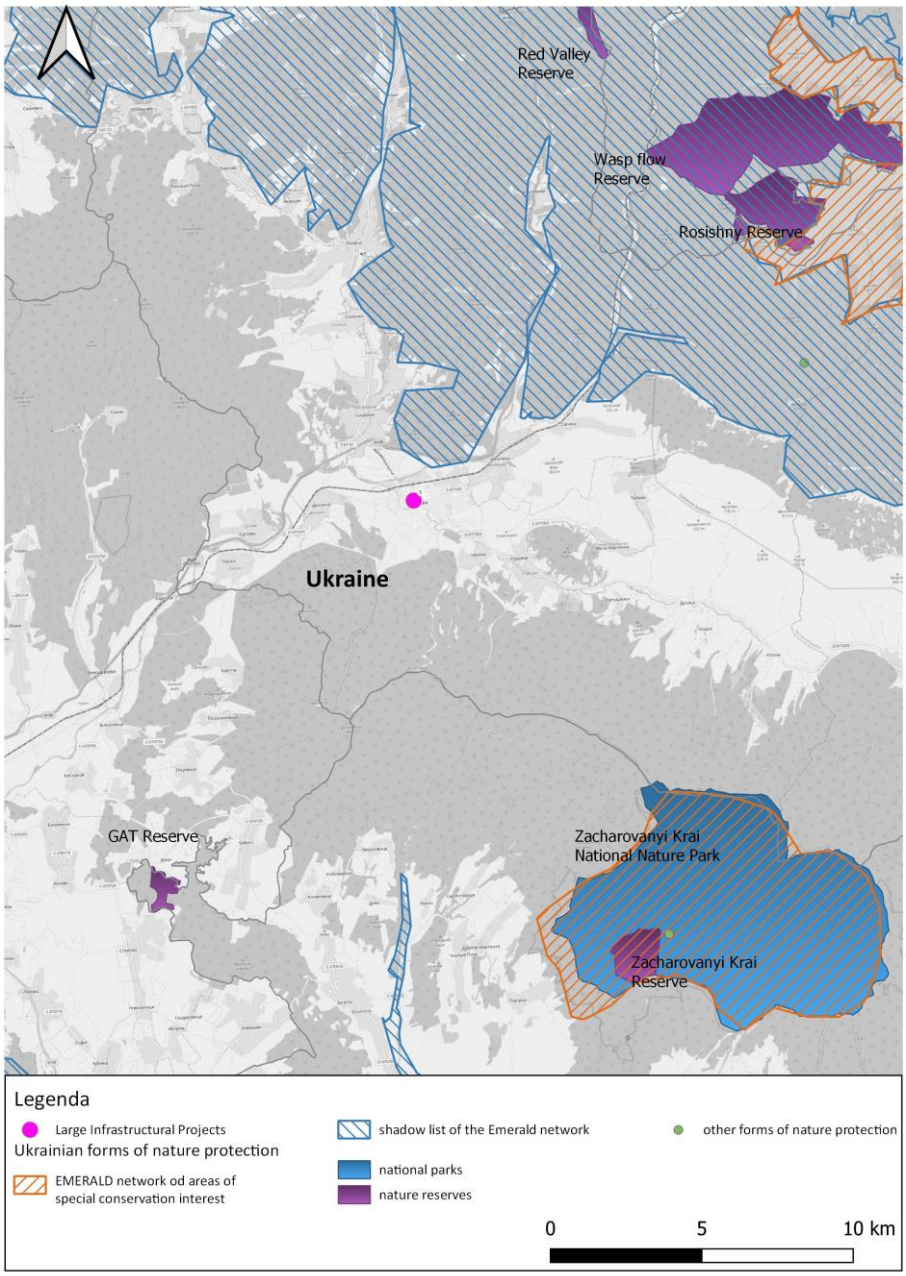

Figure 14. Detailed location of LIP 5 proposed to be implemented under the Programme against the background of protected areas and existing infrastructure - reconstruction of a 1736 m long water pipeline in Svaliava[79].

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https://pzf.land.kiev.ua/pzf4.html and https://www.minregion.gov.ua/napryamki-diyalnosti/building/city-build/materiali-generalnoyi-shemi-planuvannya-teritoriyi-ukrayini/

[79] Own study based on strategic documents listed in section 5.3, Open street map, gdos.gov.pl portal; Scheme and map of the National Ecological Network of the Republic of Belarus - https://minpriroda.gov.by/ru/national -sieci-ekologiczne-ru /; Ukraine data source: https://pzf.land.kiev.ua/pzf4.html and https://www.minregion.gov.ua/napryamki-diyalnosti/building/city-build/materiali-generalnoyi-shemi-planuvannya-teritoriyi-ukrayini/

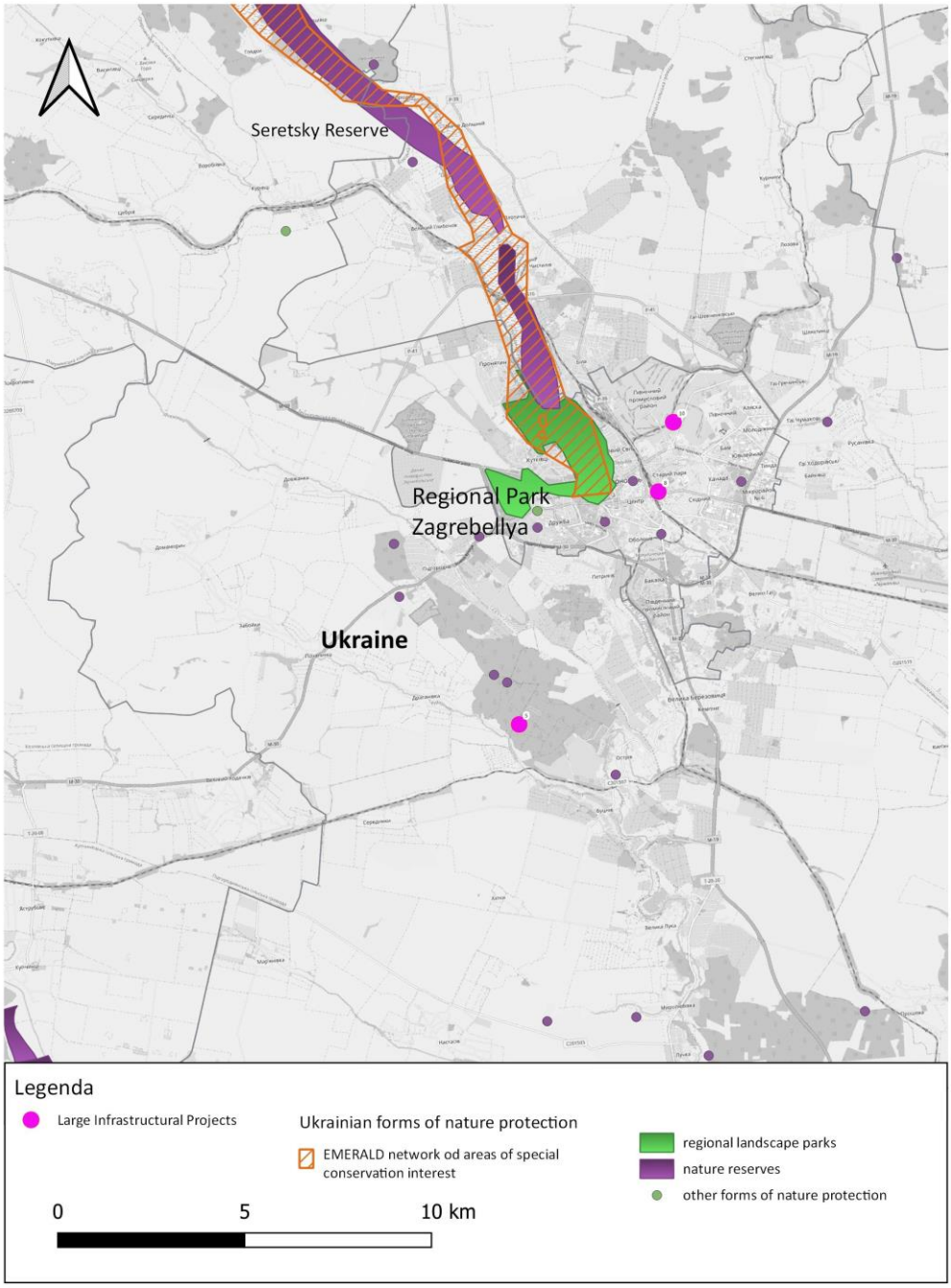

Figure 15. Detailed location of LIP 5 proposed to be implemented under the Programme against the background of protected areas and existing infrastructure - installation of water supply and drainage systems in the areas adjacent to the Tarnopol reservoir[80].

[80] Own study based on strategic documents listed in section 5.3, Open street map, gdos.gov.pl portal; Scheme and map of the National Ecological Network of the Republic of Belarus - https://minpriroda.gov.by/ru/national_-sieci-ekologiczne-ru_/; Ukraine data source: https://pzf.land.kiev.ua/pzf4.html and https://www.minregion.gov.ua/napryamki-diyalnosti/building/city-build/materiali-generalnoyi-shemi-planuvannya-teritoriyi-ukrayini/

Figure 16. Detailed location of the LIP 5 proposed to be implemented under the Programme against the background of protected areas and existing infrastructure - construction of six water supply stations in the city of Rivne, and Hoscha with the installation of six hydrolysis plants for the production of brand "A" sodium hypochlorite, and reconstruction of the sewage treatment plant in the village of Kvasyliv [81].

[81] Own study based on strategic documents listed in section 5.3, Open street map, gdos.gov.pl portal; Scheme and map of the National Ecological Network of the Republic of Belarus - https://minpriroda.gov.by/ru/national -sieci-ekologiczne-ru /; Ukraine data source: https://pzf.land.kiev.ua/pzf4.html and https://www.minregion.gov.ua/napryamki-diyalnosti/building/city-build/materiali-generalnoyi-shemi-planuvannya-teritoriyi-ukrayini/

- *LIP 8 Ecological security - establishment of the Ukrainian-Polish forest fire management network in the Carpathian region*

The project will be beneficial for nature components as it will protect forests against fires and thus preserve larger areas of forests covered by the Programme. Establishment of a forest fire management network in the Carpathian region will allow even more effective protection and coordinated actions to protect these areas of nature value. Effective management of forest fires will have a positive impact on preservation of biodiversity by stopping the degradation of ecosystems and effective protection of plant and animal species.

5.4.2. Impact on humans

The areas of intervention provided for in the Programme may affect people - their health and quality of life. Human is a part of the environment, and has a strong impact on it, but is also highly dependent on it. In most cases, when pressure on other environmental elements decreases, an indirect positive impact on humans occurs. On the other hand, with the increasing pressure on the environment, a negative impact on humans occurs. To a varying degree, a man is dependent on particular components of the environment. Humans' resistance to environmental disturbances has an individual nature, that depends on the environmental component and often has a subjective nature.

The impact on humans of undertakings that may be covered by the Programme according to specific objectives, measures and projects are presented below.

- *Specific objective 2.1 Promoting climate change adaptation and disaster risk prevention and resilience, taking into account eco-system based approaches*

As part of this objective, measures are planned in the field of: protection, regeneration and sustainable use of naturally valuable areas, including Natura 2000 areas; promotional and educational activities expanding the knowledge of residents about nature protection and raising awareness of naturally valuable areas; protection of nature and biodiversity and development of green infrastructure; projects aimed at identifying, monitoring and improving the condition of areas with exceeded environmental quality standards.

Within the scope of these activities, support may be provided for projects concerning the development and implementation of strategies, solutions, programmes and infrastructure projects to increase the adaptive capacity of the population in the Programme Area, to increase protection and resilience to the effects of anthropogenic catastrophes by building protection and crisis management systems and infrastructure, and to raise public awareness.

All these projects will be positive for people as they can directly contribute to their security and adaptation to climate change. They will also contribute to increasing public knowledge and awareness about possible climate change, how to combat it and how to adapt to it.

Some activities, however, may be associated with construction works, which may result in emissions of air pollutants and noise and may cause difficulties during implementation. The assessed draft Programme does not indicate that these impacts will be significantly negative.

- *Specific objective 2.2 Promoting access to water and sustainable water management*

The objective provides for measures to implement projects aimed at protection and condition improvement of water resources (including river basin management, infrastructure development of rainwater retention systems, activities related to improvement of water quality).

Under these measures, projects will be implemented to support the development of strategies, solutions, programmes and innovative projects. These activities will be positive from the point of view of people, as they will allow to rationally choose the right approach to water management, taking into account protection of water resources and prospective approach to supplying people with drinking water.

Among these measures, it is possible to support the construction of small retention facilities. These undertakings will be positive for people as they can directly contribute to the creation of better conditions for recreation, especially in view of progressing climate change. Indirectly, they will affect the water balance by reducing water run-off and storage and, depending on the nature of the project, by preventing flooding or even floods when combined with other facilities of this type.

During construction, they may cause nuisance related to land occupation and noise and exhaust emissions.

Further measures under objective 2.2 will be projects in the field of waste water management. These will include projects to promote rational water management. They will be beneficial to people as they will lead to securing a good quality water supply in the future. During their implementation they may, however, influence the emission of air pollutants and noise to a limited extent. The Programme analyses show that they will not have significant impact and their overall assessment is positive from the environmental point of view.

The objective also includes the implementation of innovative projects in the field of wastewater treatment.

During the implementation of such projects, negative short-term impact on humans, related to the construction process, such as noise and vibration emissions, dust emissions, disturbance of water relations, occupation and restriction of land use, will be possible.

In terms of human impact, once these projects are completed, the positive effects of these projects should be indicated in terms of direct improvement of wastewater collection, which affects the convenience of residents, and indirectly in terms of improvement of the environment by alleviating pressure on it as a result of reduced discharge of untreated wastewater. This leads to an improvement in the state of the environment and the maintenance of its useful functions for people.

- *Specific objective 2.3 Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution*

As part of this objective, measures are planned in the field of: protection, regeneration and sustainable use of naturally valuable areas, including Natura 2000 and Emerald areas; undertaking promotional and educational activities expanding the knowledge of residents about nature protection and raising awareness of naturally valuable areas; protection of nature and biodiversity and development of green infrastructure; implementation of projects aimed at identifying, monitoring and improving the condition of areas with exceeded environmental quality standards.

All projects in this scope will have a positive impact on people, as they will indirectly influence the preservation of the natural environment, including maintenance of its ecosystem services on which humans depend. They will also be important for creating conditions for recreation in cities (if projects are located there), which is important in the situation of progressing climate change and related heat waves. They may also indirectly reduce the speed of water run-off, which may be important for limiting flooding. Monitoring projects, on the other hand, will make it possible to react more quickly to possible negative changes in nature and to take preventive measures.

- *Specific objective 4.1 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*

Within this objective, the Programme envisages supporting activities aimed at: improving access and infrastructure development of diagnostic and prophylactic also in different areas of medicine; improving access to specialist medicine, in particular cardiovascular diseases and cancer (development of health infrastructure, support for the equipment of health care facilities) and emergency medicine; improving access to long-term care, especially infrastructure development for geriatric and palliative care; preventing the occurrence and effects of adverse events such as epidemics (with particular emphasis on local phenomena); supporting the development of digitization in health care (including the development of telemedicine); improving qualifications of medical and rescue personnel.

All these activities have an extremely significant positive impact on people. They will influence the reduction of morbidity, effectiveness and efficiency of treatment, increase resistance to unforeseen events and altogether increase the vitality of the population in the Programme Area. They will also improve accessibility to treatment and thus the quality of life.

However, the implementation of some projects, in terms of construction works for hospitals or other facilities, may, during the construction period, temporarily have a negative impact through the emission of air pollutants, noise or construction-related disturbances. However, no negatively significant impacts have been identified.

- *Specific objective 4.2 Increasing the role of culture and sustainable tourism in economic development, social inclusion and social innovation*

As part of this objective, measures are planned in the field of: protection, infrastructure development and promotion of public tourist values and related tourist services e.g. by shaping an integrated tourist offer by entities in the Programme Area, infrastructure of new and improvement/upgrade of existing routes; protection, development and promotion of culture and its heritage as well as services in the field of culture; protection, development and promotion of natural heritage and ecotourism; support for the adaptation of skills and professional qualifications in the field of tourism to the needs of the tourism market and changes within, e.g. through training related to establishing, running and promoting tourism activities.

The projects included in these measures will have a positive impact on people by improving their knowledge (including ecological knowledge), create opportunities for recreation and development of interests, which may have an indirect impact on the conservation of environmental resources.

With regard to conservation projects involving modernisation, adaptation, reconstruction of cultural heritage objects, if implemented under the Programme, it can be concluded that they will have a similar positive impact.

It should also be noted that the abovementioned projects will influence the intellectual and economic development of the region, which will affect the standard of living of its inhabitants. At the same time, they will contribute to the creation of new jobs

However, during construction, they can be a nuisance to people due to noise emissions and air pollution.

- *Interreg specific objective I.1.1 Enhancing 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 s*

Projects implemented under this objective will concern mainly: increasing and improving the quality of cross-border cooperation; improving the access to information on legal, fiscal and formal conditions related to e.g. running a business in each countries of the PProgramme Area; stimulating economic ties or promoting jointly operating organizations of entrepreneurs, which may result in the economic development of the support area; support in the implementation of consulting services assistance to entities applying for additional financial resources.

It can be estimated that these projects will be neutral from an environmental point of view, but their positive impact on the development of the region, including on human well-being, should be noted.

- *Interreg specific objective I.1.2 Building up mutual trust, in particular by encouraging people-to-people actions*

The projects will concern: supporting bottom-up initiatives for the integration of the inhabitants of the Programme Area, including promotion of volunteering; organizing events aimed at the cross-border integration of residents related to environment, art, culture and heritage; supporting local initiatives and leadership; supporting cross-border cooperation of educational facilities (e.g. through cross-border exchange of youth or exchange of good practices and innovative solutions in the Programme Area), including integration and educational activities; supporting cross-border transfer of innovative solutions aimed at undertaking and strengthening further cooperation between research and scientific centres.

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

- *Large infrastructure projects (LIPs)*

In terms of impacts, the assessment was divided into the sectors affected, i.e. health, tourism and culture, and environment.

Health projects:

- *LIP 2 Early diagnosis and timely treatment - the way to health for the residents of border regions*
- *LIP 3 Common Model Network of Cross-border Emergency Services*
- *LIP 4 Strengthening the capacity of Belarusian-Polish health care institutions to deal with epidemiological threats*
- *LIP 7 Establishment of the Eastern Centre for Preventive Health Care*
- *LIP 9 A joint initiative of the Józef Psarski Mazovian Specialist Hospital in Ostrołęka to increase access to health services*
- *LIP 10 Development of palliative and geriatric care and improvement of the quality of medical services for cancer patients in hospitals of Lviv and Ternopil regions of Ukraine and Krosno*

All these projects have an extremely significant positive impact on people. They will influence the reduction of morbidity, effectiveness and efficiency of treatment, increase resistance to unforeseen events and altogether increase the vitality of the population in the Programme Area. They will also improve accessibility to treatment and thus the quality of life.

However, the implementation of some projects, in terms of construction works for hospitals or other facilities, may, during the construction period, temporarily have a negative impact through the emission of air pollutants, noise or construction-related disturbances, However, their significant impacts have not been identified.

Tourism and culture projects

The following projects will be implemented in the field of tourism:

- *LIP 6 Carpathian narrow-gauge railway - a journey in the footsteps of the Carpathian forest railway*

The project includes reconstruction and adaptation of the Majdan station building for tourist services; Construction of a tourist path and an educational footbridge from Majdan station to the nearest hill with a viewing platform; renovation of the narrow gauge railway track from Majdan station to Dołżyca station (3 km) in order to allow the movement of bicycle vehicles on the tracks; construction/reconstruction of Vyhoda station and establishment of a railway heritage museum there.

The impact on people of this project will be similar to those identified above.

Local air pollution and noise emissions are possible during construction works, but these effects will be insignificant.

- *LIP 1 Construction of cycling infrastructure on the route Mikaszówka – Rudawka, and Grodno – Racicze*

The creation of the cycle path will be beneficial for the development of cycle tourism, which brings all the human benefits described above. In addition, the cycle path can take over some of the tourist car traffic from the nearby road, which is beneficial in terms of reducing transport emissions and improving air quality.

However, during construction there may be nuisance related to the implementation of the investment and emission of construction pollutants, such as dusting, emission of air pollutants from construction equipment, etc.

Environmental projects

- *LIP 5 Sustainable Water Management: A Way to Revive Western Ukraine and Eastern Poland*

The project includes:

Construction of 60 km of water supply network in Svitiaz, Pulmo and Shatsk equipped with a water treatment plan, construction of a water treatment plant in Rivne and Hoshcha, reconstruction of a wastewater treatment plant in the village of Kvasiliv, reconstruction of the water supply in Svalyava, construction of a sewage system in Lipina Nowa and Zawody, improvement of the sewage treatment plant in Skierbieszów and cleaning works at the Ternopil reservoir. The construction will be beneficial for people as it will improve the supply of drinking water in terms of quantity and quality. However, there is a threat that along with water supply the sewage collection system will not be developed properly, which may have a negative impact on groundwater resources used beyond the reach of the waterworks under construction. People will also benefit from improved wastewater treatment and improved access to sewage systems. Modernization of the sewage treatment plant may also reduce the nuisance for nearby residents in terms of the sensation of odours. This problem should be identified in detail at the investment design stage.

Possible negative impacts may occur during the construction phase. These may include traffic disruption due to trenching and pipeline laying, and noise and air pollution emissions from construction equipment.

Once the location has been determined, the above issues should be examined in detail at the design stage.

- *LIP 8 Ecological security - establishment of the Ukrainian-Polish forest fire management network in the Carpathian region*

The project will be beneficial for people because it will reduce fires in the area of cooperation. Thanks to the implementation, losses of tree stands in forest areas will be reduced, which will have an impact on preserving the absorption of greenhouse gases from these areas, as well as the use of forests by people, including for recreation. In addition, emissions of air pollutants (including greenhouse gases from fires) will be avoided and the level of safety will be improved, especially for the population living near forests.

5.4.3. Impact on water

As a rule, the provisions of EU law prohibit carrying out projects which may deteriorate the status of waters and their ecological functions. The measures provided for under the basic areas of intervention of the Programme meet the above requirements and the possible negative environmental impacts are of temporary nature or will be compensated by significant and necessary benefits for other elements of environment or economy.

The impact on water of undertakings that may be covered by the Programme according to specific objectives, measures and projects are presented below.

- *Specific objective 2.1 Promoting climate change adaptation and disaster risk prevention and resilience, taking into account eco-system based approaches*

As part of this objective, measures are planned in the field of: protection, regeneration and sustainable use of naturally valuable areas, including Natura 2000 areas; promotional and educational activities expanding the knowledge of residents about nature protection and raising awareness of naturally valuable areas; protection of nature and biodiversity and development of green infrastructure; projects aimed at identifying, monitoring and improving the condition of areas with exceeded environmental quality standards.

Within the scope of these activities, support may be provided for projects concerning the development and implementation of strategies, solutions, programmes and infrastructure projects to increase the adaptive capacity to climate change in the Programme Area, to increase protection and resilience to the effects of anthropogenic catastrophes by building protection and crisis management systems and infrastructure, and to raise public awareness.

All these undertakings will be positive for the aquatic environment as they may indirectly contribute to increased adaptation to climate change of aquatic ecosystems. They will also contribute to increasing public knowledge and awareness on the protection of water resources and their ecosystems.

Some adaptation measures may be associated with the formation of additional retention, which will also be beneficial both for the size of water resources, protection against flooding and floods as well as for the water environment.

However, some activities, particularly infrastructure, may be associated with construction works, which may result in temporary water pollution during construction works. It may also be necessary to temporarily lower groundwater levels, causing disturbance to water-dependent ecosystems. However, these changes will be short-term and analyses indicate that they will not have a significant impact on water.

- *Specific objective 2.2 Promoting access to water and sustainable water management*

The objective provides for measures to implement projects aimed at protection and condition improvement of water resources (including river basin management, infrastructure development of rainwater retention systems, activities related to improvement of water quality).

Under these measures, projects will be implemented to support the development of strategies, solutions, programmes and innovative projects. These activities will have a positive impact on the systemic improvement of water management in the Programme Area, including water resources, water quality and water ecosystem services.

Measures aimed at increasing retention will be beneficial both from the point of view of increasing water resources, delaying water run-off, which is connected with protection against flooding and floods, and for the aquatic environment itself.

The measures concerning the implementation of innovative projects in the field of municipal wastewater treatment will be important for the water protection. They will result in reduction of the pollutant load discharged to surface and ground waters, and thus will improve the quality of the water environment and achieving environmental goals of WB . This will be important both for aquatic ecosystems and the quality of water abstracted for consumption. However, in the case of sewerage areas, when the sewage, instead of the current receivers, will be directed to a treatment plant that discharges treated sewage into the river, it may deteriorate the water quality of this river, but in total it will be beneficial for the aquatic environment. Sludge management can also be an issue.

Under current legislation, such projects will be subject to individual environmental impact assessment as projects likely to have a significant impact on the environment.

During the implementation of this type of project there will be possible a negative, short-term impact on water associated with the construction process, such as lowering of the groundwater level, or contamination due to leakage of petroleum products from construction equipment or run-off of liquefied soil.

- *Specific objective 2.3 Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution*

As part of this objective, measures are planned in the field of: protection, regeneration and sustainable use of naturally valuable areas, including Natura 2000 and Emerald areas; undertaking promotional and educational activities expanding the knowledge of residents about nature protection and raising awareness of naturally valuable areas; protection of nature and biodiversity and development of green infrastructure; implementation of projects aimed at identifying, monitoring and improving the condition of areas with exceeded environmental quality standards.

All projects in this scope will have a positive impact on water, as they will indirectly influence the preservation of the water environment, including the preservation of its ecosystem services on which humans depend. Projects in the field of monitoring, on the other hand, will allow faster reaction to possible negative changes in water quality and taking preventive measures.

- *Specific objective 4.1 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*

Within this objective, the Programme envisages supporting activities aimed at: improving access and infrastructure development of diagnostic and prophylactic also in different areas of medicine; improving access to specialist medicine, in particular cardiovascular diseases and cancer (development of health infrastructure, support for the equipment of health care facilities) and emergency medicine; improving access to long-term care, especially infrastructure development for geriatric and palliative care; preventing the occurrence and effects of adverse events such as epidemics (with particular emphasis on local phenomena); supporting the

development of digitization in health care (including the development of telemedicine); improving qualifications of medical and rescue personnel.

All actions in this area will be water neutral. However, some of them, in terms of construction or renovation of health infrastructure, may, during construction, adversely affect the aquatic environment by temporarily lowering the groundwater level and through emissions of pollutants resulting from the use of construction equipment. However, these impacts will be insignificant.

- *Specific objective 4.2 Increasing the role of culture and sustainable tourism in economic development, social inclusion and social innovation*

As part of this objective, measures are planned in the field of: protection, infrastructure development and promotion of public tourist values and related tourist services e.g. by shaping an integrated tourist offer by entities in the Programme Area, infrastructure of new and improvement/upgrade of existing routes; protection, development and promotion of culture and its heritage as well as services in the field of culture; protection, development and promotion of natural heritage and ecotourism; support for the adaptation of skills and professional qualifications in the field of tourism to the needs of the tourism market and changes within, e.g. through training related to establishing, running and promoting tourism activities.

The projects covered by these measures will indirectly have a positive impact on water, as they will increase the level of public knowledge and thus their attitude towards rational use of water and preservation of the water environment.

However, during the implementation of some tourism infrastructure projects, groundwater levels may be lowered or water contaminated during the construction period due to the use of construction equipment.

- *Interreg specific objective I.1.1 Enhancing 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 implemented under this objective will concern mainly: increasing and improving the quality of cross-border cooperation; improving the access to information on legal, fiscal and formal conditions related to e.g. running a business; stimulating economic ties or promoting jointly operating organizations of entrepreneurs, which may result in the economic development of the support area; support in the implementation of consulting services assistance to entities applying for additional financial resources.

It can be estimated that these projects will be neutral from the point of view of impact on water, however, they may indirectly influence rational water management.

- *Interreg specific objective I.1.2 Building up mutual trust, in particular by encouraging people-to-people actions*

The projects will concern: supporting bottom-up initiatives for the integration of the inhabitants of the Programme Area, including promotion of volunteering; organizing events aimed at the cross-border integration of residents related to environment, art, culture and heritage; supporting local initiatives and leadership; supporting cross-border cooperation of educational facilities (e.g. through cross-border exchange of youth or exchange of good practices and innovative solutions in the Programme Area), including integration and educational activities; supporting cross-border transfer of innovative solutions aimed at undertaking and strengthening further cooperation between research and scientific centres.

In principle, they will not directly affect water, but many of them can be indirectly beneficial by enhancing cross-border cooperation and contacts, also in the field of water management.

- *Large infrastructure projects (LIPs)*

In terms of impacts, the assessment was divided into the sectors affected, i.e. health, tourism and culture, and environment.

Health projects:

- *LIP 2 Early diagnosis and timely treatment - the way to health for the residents of border regions*
- *LIP 3 Common Model Network of Cross-border Emergency Services*
- *LIP 4 Strengthening the capacity of Belarusian-Polish health care institutions to deal with epidemiological threats*
- *LIP 7 Establishment of the Eastern Centre for Preventive Health Care*
- *LIP 9 A joint initiative of the Józef Psarski Mazovian Specialist Hospital in Ostrołęka to increase access to health services*
- *LIP 10 Development of palliative and geriatric care and improvement of the quality of medical services for cancer patients in hospitals of Lviv and Ternopil regions of Ukraine and Krosno*

The abovementioned projects will have no impact on water. However, the implementation of some projects in the field of construction works of hospitals or other health care facilities may have a temporary negative impact during the construction period through lowering the level of groundwater or its contamination due to the use of construction equipment.

Tourism and culture projects

- *LIP 6 Carpathian narrow-gauge railway - a journey in the footsteps of the Carpathian forest railway*

As already indicated when discussing the specific objective 4.2, projects covered by these measures will indirectly have a positive impact on water, as they will result in increasing the level of public knowledge, including rational water use and preservation of aquatic environment.

However, during the implementation of some tourism infrastructure projects, groundwater levels may be lowered or water contaminated during the construction period due to the use of construction equipment.

LIP 1 Construction of cycling infrastructure on the route Mikaszówka – Rudawka, and Grodno – Racicze

Generally, the above-mentioned projects will be neutral from the point of view of the impact on water, although the benefits from the point of view of the regulation of rainwater management, which may take place during the implementation of the investment, cannot be disregarded.

During construction, minor adverse impact related to the implementation of the investment may occur in the form of surface run-off.

Environmental projects

- *LIP 5 Sustainable Water Management: A Way to Revive Western Ukraine and Eastern Poland*

The project includes:

Construction of 60 km of water supply network in Svitiaz, Pulmo and Shatsk equipped with a water treatment plant, construction of a water treatment plant in Rivne and , reconstruction of a wastewater treatment plant in the village of Kvasiliv, reconstruction of the water supply in Svalyava, construction of a sewage system in Lipina Nowa and Zawody, improvement of the sewage treatment plant in Skierbieszów and cleaning works at the Ternopil reservoir. The construction will be beneficial for people as it will improve the supply of drinking water in terms of quantity and quality. However, it will affect the use of water resources from the indicated sources. At the same time it will result in discontinuation of use of local, individual higher-altitude water sources, which may be beneficial for water relations in the vicinity of these sources. However, there is a threat that along with water supply the sewage collection system will not be developed properly, which may have a negative impact on groundwater resources used beyond the reach of the sewage systems under construction. On the other hand, activities in the field of sewage systems and improvement of wastewater treatment will be beneficial because they will positively affect the quality of treated wastewater discharged into water. They will also be positive from the point of view of WB's environmental goals (subchapter 4.6). Each element of the project should be recognized in terms of its impact on water in detail at the investment design stage.

Possible negative impacts may occur during the construction phase when excavation and adequate drainage will be required. Water pollution may also occur as a result of the use of construction equipment.

- *LIP 8 Ecological security - establishment of the Ukrainian-Polish forest fire management network in the Carpathian region*

The project will be beneficial for water resources as it will protect forests against fires and thus preserve larger areas of forest, whose function is, among others, to regulate water relations.

5.4.4. Impact on air

The air we breathe is a critical natural resource for humans, plants and animals. Good air quality is essential to protect not only human health and natural capital, but also the environment. Most pollutants are released as a result of human activity in economic sectors such as transport, agriculture, energy production and use, industry or waste management. Air pollution is one of the environmental problems that affect most of Europe. Emission of pollutants such as PM10 and PM2.5, benzo(a)pyrene, ozone or nitrogen dioxide (NO_2). Air pollution affects human health, vegetation and ecosystems, with particulate matter (PM), nitrogen dioxide (NO_2) and ground-level ozone (O_2) posing the greatest threats. The main sources of pollutant emissions are the transport sector and the household and welfare sector, while industry has a particular impact mainly in industrial areas and over long distances. Due to significant impact of air quality on human health and the environment, it is important to take measures to reduce air emissions.

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

- *Specific objective 2.1 Promoting climate change adaptation and disaster risk prevention and resilience, taking into account eco-system based approaches*

As part of this objective, measures are planned in the field of: protection, regeneration and sustainable use of naturally valuable areas, including Natura 2000 areas; promotional and educational activities expanding the knowledge of residents about nature protection and raising awareness of naturally valuable areas; protection of nature and biodiversity and development of green infrastructure; projects aimed at identifying, monitoring and improving the condition of areas with exceeded environmental quality standards.

Within the scope of these measures, support may be given to undertakings aimed at the development and implementation of strategies, solutions, programmes and infrastructure projects, which will implement elements of environmental education raising awareness of the use of low-emission heat supply systems and infrastructure, protection and crisis management and raising public awareness of air quality standards. Implementation of appropriate air quality monitoring methods is necessary in the Programme Area in order to obtain a diagnosis of the air quality status and methods of its protection in the future.

These projects, carried out with care for all components of the environment, especially air quality, will contribute to the reduction of the impact of pollutants on nature and humans, increasing its safety. They will also contribute to increasing the level of knowledge and awareness of the society on the possible measures to eliminate emission of not only greenhouse gases but also other gases into the air, impact of poor air quality on health and life, and air condition in the supported area. Thus they will influence people's behaviour in terms of reducing pollutant emissions.

The development of green infrastructure will have a positive impact on improving air quality in sensitive areas, due to the purifying effect of greenery especially in urban areas.

Join actions to prevent and manage hazards caused by anthropogenic activities such as industrial accidents will have a positive effect on air quality, ultimately reducing the amount of pollutants entering the air from industry, especially in the event of accidents.

However, some activities may be associated with construction works, which may result in emissions of pollutants due to construction works, as well as operation of working machinery and transport. In this case, potentially negative short-term effects on air quality can occur.

- *Specific objective 2.2 Promoting access to water and sustainable water management*

The objective provides for measures to implement projects aimed at protection and condition improvement of water resources (including river basin management, infrastructure development of rainwater retention systems, activities related to improvement of water quality).

Under these measures, projects will be implemented to support the development of strategies, solutions, programmes and innovative projects. These activities will be positive from the point of view of people, as they will allow to rationally choose the right approach to water management, taking into account protection of water resources and prospective approach to supplying people with drinking water, while not influencing air quality in a negative way in their operation.

Among these measures, it is possible to support the construction of small retention facilities. However, in the course of construction of these reservoirs, short-term limited emission of pollutants may occur as a result of construction works and operation of construction equipment. The emission will concern the area locally associated with the investment and will be eliminated upon completion of the investment.

- *Further measures under objective 2.2 Promoting access to water and sustainable water management will be projects in the field of waste water management.*

Similarly to the projects mentioned above, they will serve to protect the quality of water resources, while their operation will not have a negative impact on air quality. Investments related to the construction of wastewater treatment infrastructure will cause emissions to the air during the implementation, inter alia, through construction works, transport of materials and the working machinery. However, the potential negative impact

is local and temporary, therefore the target environmental impact is much more beneficial than the resulting impact on air quality during the implementation.

- *Specific objective 2.3 Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution*

As part of this objective, measures are planned in the field of: protection, regeneration and sustainable use of naturally valuable areas, including Natura 2000 and Emerald areas; undertaking promotional and educational activities expanding the knowledge of residents about nature protection and raising awareness of naturally valuable areas; protection of nature and biodiversity and development of green infrastructure; implementation of projects aimed at identifying, monitoring and improving the condition of areas with exceeded environmental quality standards.

These projects will have similar positive indirect impact on air quality. When there is an impact of air pollutant emissions from anthropogenic areas, taking care of ecosystems and protected areas is particularly important due to the positive impact on air quality. Care for forms of nature protection also means improvement of air quality, especially in areas of human activity. The creation of new green areas and the encroachment of more and more green infrastructure into the urban fabric has a positive effect on improving air quality, especially in residential areas. Monitoring projects, on the other hand, will make it possible to react more quickly to possible negative changes in nature and to take preventive measures. No negative impacts on air quality are expected.

- *Specific objective 4.1 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*

Within this objective, the Programme envisages supporting activities aimed at: improving access and infrastructure development of diagnostic and prophylactic also in different areas of medicine; improving access to specialist medicine, in particular cardiovascular diseases and cancer (development of health infrastructure, support for the equipment of health care facilities) and emergency medicine; improving access to long-term care, especially infrastructure development for geriatric and palliative care; preventing the occurrence and effects of adverse events such as epidemics (with particular emphasis on local phenomena); supporting the development of digitization in health care (including the development of telemedicine); improving qualifications of medical and rescue personnel.

In principle, the proposed activities will not have an impact on air quality, but they may be positive indirectly in terms of protecting the health of people exposed to air pollution. Especially in terms of prevention of health impacts and effects related to exposure to air pollutants. It concerns especially industrial areas, where emission of specific substances may have negative impact on people. The prevention of impact on human health and life may lead indirectly to actions eliminating threats associated with the emission of pollutants.

However, the implementation of some projects, in terms of construction works of hospitals or other facilities, may, during the construction period, cause emissions of pollutants from construction works, transport of materials and as a result of operation of construction equipment.

- *Specific objective 4.2 Increasing the role of culture and sustainable tourism in economic development, social inclusion and social innovation*

As part of this objective, measures are planned in the field of: protection, infrastructure development and promotion of public tourist values and related tourist services e.g. by shaping an integrated tourist offer by entities in the Programme Area, infrastructure of new and improvement/upgrade of existing routes;

protection, development and promotion of culture and its heritage as well as services in the field of culture; protection, development and promotion of natural heritage and ecotourism; support for the adaptation of skills and professional qualifications in the field of tourism to the needs of the tourism market and changes within, e.g. through training related to establishing, running and promoting tourism activities.

The projects covered by these measures will positively influence people's awareness, and thus indirectly increase pro-ecological behaviour leading to reduction of pollutant emissions. Air quality is one of the elements that also show the tourist and health resort values of the areas, therefore the development of tourism may also indirectly contribute to ensuring these environmental values.

The introduction of ecotourism also has a positive effect on air quality, due to the use of ecological solutions that protect the environment, reducing the use of fuel combustion causing significant emissions.

During the implementation of conservation projects involving the modernisation, adaptation and reconstruction of cultural heritage objects and tourism sites, pollutant emissions may occur locally and on a short-term basis depending on the scope of the works and the equipment used.

- *Interreg specific objective I.1.1 Enhancing 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*
- *Interreg specific objective I.1.2 Building up mutual trust, in particular by encouraging people-to-people actions*

The projects, which will be implemented within the framework of the above mentioned objectives will have positive, indirect impact on the air quality, as they will influence the optimisation of management, including environmental management, as well as in the scope of air pollution emission reduction and promotion of pro-ecological solutions in management.

- *Large infrastructure projects (LIP)*

In terms of impacts, the assessment was divided into the sectors affected, i.e. health, tourism and culture, and environment.

Health projects:

- *LIP 2 Early diagnosis and timely treatment - the way to health for the residents of border regions*
- *LIP 3 Common Model Network of Cross-border Emergency Services*
- *LIP 4 Strengthening the capacity of Belarusian-Polish health care institutions to deal with epidemiological threats*
- *LIP 7 Establishment of the Eastern Centre for Preventive Health Care*
- *LIP 9 A joint initiative of the Józef Psarski Mazovian Specialist Hospital in Ostrołęka to increase access to health services*
- *LIP 10 Development of palliative and geriatric care and improvement of the quality of medical services for cancer patients in hospitals of Lviv and Ternopil regions of Ukraine and Krosno*

The projects indicated above will not have a direct impact on air quality. However, their impact may be indirect through taking care of health of the population living in the project areas. Early prevention of diseases caused by poor air quality may contribute to actions aimed at elimination of harmful effects of local emission sources, especially in the field of suspended dust. Additionally, a positive impact may occur indirectly through the

introduced modernisation of health care facilities resulting in savings of thermal energy, electricity and introduction of modern medical transport solutions.

These projects will not have a significant impact on air quality during operation, but may be associated with the occurrence of pollutant emissions and impact on air quality during implementation if associated with construction activities. In terms of construction works of hospitals or other facilities, pollutant emissions may be generated during the construction period as a result of construction works, earthworks, and increased transport of materials.

Tourism and culture projects

- *LIP 1 Construction of cycling infrastructure on the route Mikaszówka – Rudawka, and Grodno – Racicze*

The creation of the bicycle path will be beneficial for the development of bicycle tourism, with all its benefits for reducing emissions by abandoning car transport. The cycle path can take over some of the tourist car traffic from the parallel road, which is beneficial in terms of reducing pollutant emissions.

During the construction of bicycle paths, insignificant emission of dust pollutants from the construction site and pollutants from construction equipment may occur.

- *LIP 6 Carpathian narrow-gauge railway - a journey in the footsteps of the Carpathian forest railway*

The project includes reconstruction and adaptation of the Majdan station building for tourist services, construction of a tourist path and an educational footbridge from Majdan station to the nearest hill with a viewing platform. In addition, it is planned to renovate the narrow gauge railway track from Majdan station to Dołżyca station (3 km) in order to allow the movement of bicycle vehicles on the tracks, as well as to construct/reconstruct Vyhoda station and establish a railway heritage museum there.

The impact of these activities in the project on air quality will be related similarly to those indicated above, by carrying out construction works at the project implementation stage. Construction equipment operation and the works identified above have the potential to have a negative impact on air quality. Construction works will be carried out, heavy transport loads will increase and during the implementation phase there will be significant operation of construction equipment causing local air pollution. However, this impact will be short-term and temporarily limited to the implementation phase.

In addition, the construction of the railway is the creation of a new source of emissions, however if a zero or low emission source is used to drive the railway it will allow the impact on air quality to be kept to a minimum, thus the impact of the project on air quality during the operational phase will be minimal, therefore it can be assumed that there will be no negative impact on air quality.

Environmental projects

- *LIP 5 Sustainable Water Management: A Way to Revive Western Ukraine and Eastern Poland*

The project includes:

Construction of 60 km of water supply network in Svitiaz, Pulmo and Shatsk equipped with a water treatment plant, construction of a water treatment plant in Rivne and Hoshcha, reconstruction of a wastewater treatment plant in the village of Kvasiliv, reconstruction of the water supply in Svaliava, construction of a sewage system in Lipina Nowa and Zawody, improvement of the sewage treatment plant in Skierbieszów and

cleaning works at the Ternopil reservoir. During the operation phase the investment will not have any impact on the air quality in the area where it will operate.

Negative impact may occur at the project implementation stage. During the construction of the water supply network in the indicated locations earthworks will be carried out, facilities included in the system will be built, therefore the emission of pollutants will occur. The sources of pollution will be construction work, heavy transport of materials and raw materials, as well as the work of construction equipment. This impact will be temporarily limited to the time of implementation and the increase of pollutants in the air will be localised in the area of investment. Through mitigation measures it is possible to limit the negative impact on air quality, especially in areas that may potentially exceed the normative concentrations of substances.

- *LIP 8 Ecological security - establishment of the Ukrainian-Polish forest fire management network in the Carpathian region*

The project will be beneficial in terms of reducing pollutant emissions as it will have an impact on preventing and, if it occurs, reducing forest fires. It should be emphasized that the emission of pollutants occurring during forest fires is one of the most important sources of long-range emission, i.e. affecting area beyond the Programme Area. Reduction of forest areas will also reduce absorption of air pollutants. The measure will therefore have a positive impact on air quality.

5.4.5. Impact on land surface and landscape

Human impact on land surface through changes in its treatment is a widespread and multidimensional phenomenon, which often results in significant transformation of land structure, which affects the possibility of the land use, as well as transformation of the landscape. It also often results in its physical degradation. This involves changes in land structure, erosion and conversion of agricultural and forest land use into urbanised or industrial areas. Another form of land surface degradation is chemical degradation, which results from soil acidification, salinisation and accumulation of pollutants.

As regards the impact on the landscape, it should be emphasised that human activity contributes to landscape changes which make the landscape to lose its ability of self-regulation. Therefore it also requires protection as other components of the environment. However, we must remember that the perception of the landscape is subjective, and depends on the aesthetic sensibilities of customers. Often, changes in the landscape are perceived negatively, especially, if the landscape previously remained just a little changed by human activity.

The areas of intervention envisaged in the analysed Programme will affect land surface and landscape depending on the type and location of the project.

- *Specific objective 2.1 Promoting climate change adaptation and disaster risk prevention and resilience, taking into account eco-system based approaches*

As part of this objective, measures are planned in the field of: protection, regeneration and sustainable use of naturally valuable areas, including Natura 2000 areas; promotional and educational activities expanding the knowledge of residents about nature protection and raising awareness of naturally valuable areas; protection of nature and biodiversity and development of green infrastructure; projects aimed at identifying, monitoring and improving the condition of areas with exceeded environmental quality standards.

Within the scope of these activities, support may be provided for projects concerning the development and implementation of strategies, solutions, programmes and infrastructure projects to increase the adaptive capacity to climate change in the Programme Area, to increase protection and resilience to the effects of

anthropogenic catastrophes by building protection and crisis management systems and infrastructure, and to raise public awareness.

All of these undertakings will be positive for land surface preservation and resilience to climate change. They will also be positive for landscape as they will influence the conservation of existing landscapes, although some climate change adaptation infrastructure activities may have impact on transformation of landscape and land surface. However, these actions are not expected to be negative, and if so, to a small extent.

Some activities, especially in the field of infrastructure, may be associated with construction works, which may involve periodic transformation of the land surface and landscape during the works.

- *Specific objective 2.2 Promoting access to water and sustainable water management*

The objective provides for measures to implement projects aimed at protection and condition improvement of water resources (including river basin management, infrastructure development of rainwater retention systems, activities related to improvement of water quality).

Under these measures, projects will be implemented to support the development of strategies, solutions, programmes and innovative projects. These actions will have a positive impact on the systemic improvement of land and landscape protection management.

Measures aimed at increasing retention will be beneficial for the protection of land surface as they should generally reduce the run-off of rainwater and thus the resulting effects (e.g. erosion). They will also be beneficial from the point of view of landscape, although they may influence its transformation, often to a more diversified and natural one, e.g. in the case of restoration of wetlands.

On the other hand, activities relating to the implementation of innovative projects in the field of municipal wastewater treatment will result in permanent transformation of the earth surface through the creation of new facilities and occupation of land previously used by humans and nature. They will also lead to the disturbance of the landscape by new industrial facilities, which will be a negative intervention in the natural landscape. Therefore, when locating them, it is necessary to choose isolated places, where the impact, also on the landscape, will be relatively small.

Under current legislation, such projects will be subject to individual environmental impact assessment as projects likely to have a significant impact on the environment.

Additional short-term impact on land surface and landscape, in the form of excavation and construction, are also possible during the course of such projects and should be reduced upon completion of the works.

- *Specific objective 2.3 Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution*

As part of this objective, measures are planned in the field of: protection, regeneration and sustainable use of naturally valuable areas, including Natura 2000 and Emerald areas; undertaking promotional and educational activities expanding the knowledge of residents about nature protection and raising awareness of naturally valuable areas; protection of nature and biodiversity and development of green infrastructure; implementation of projects aimed at identifying, monitoring and improving the condition of areas with exceeded environmental quality standards.

All projects in this area will have a positive impact on the protection of the land surface and landscape, as outlined above for specific objective 2.1.

- *Specific objective 4.1 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*

Within this objective, the Programme envisages supporting activities aimed at: improving access and infrastructure development of diagnostic and prophylactic also in different areas of medicine; improving access to specialist medicine, in particular cardiovascular diseases and cancer (development of health infrastructure, support for the equipment of health care facilities) and emergency medicine; improving access to long-term care, especially infrastructure development for geriatric and palliative care; preventing the occurrence and effects of adverse events such as epidemics (with particular emphasis on local phenomena); supporting the development of digitization in health care (including the development of telemedicine); improving qualifications of medical and rescue personnel.

All actions in this area will be generally neutral for the land surface and landscape. However, some of them, in terms of construction or renovation of health infrastructure, may have a negative impact on the transformation of the land surface. As these will be activities related to already existing facilities the impact will be insignificant in terms of additional land occupation. The same applies to the impact on the landscape. If the construction of new and modernized facilities is appropriately designed architecturally, it may be expected that the impact on landscape may be positive or at least neutral.

- *Specific objective 4.2 Increasing the role of culture and sustainable tourism in economic development, social inclusion and social innovation*

As part of this objective, measures are planned in the field of: protection, infrastructure development and promotion of public tourist values and related tourist services e.g. by shaping an integrated tourist offer by entities in the Programme Area, infrastructure of new and improvement/upgrade of existing routes; protection, development and promotion of culture and its heritage as well as services in the field of culture; protection, development and promotion of natural heritage and ecotourism; support for the adaptation of skills and professional qualifications in the field of tourism to the needs of the tourism market and changes within, e.g. through training related to establishing, running and promoting tourism activities.

The projects included in these measures should not have a negative impact on the land surface and landscape, although some of the renovated and modernized facilities may occupy additional land surface. On the other hand, the impact on landscape may be positive, as the modernized or renovated facilities will also have renovated façades.

However, temporary disruption to the landscape and transformation of the construction environment may occur during construction activities.

The effect of promoting tourism and cultural heritage should also be positive, as it will indirectly raise the level of social awareness and respect for cultural heritage and the environment.

- *Interreg specific objective I.1.1 Enhancing 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 implemented under this objective will concern mainly: increasing and improving the quality of cross-border cooperation; improving the access to information on legal, fiscal and formal conditions related to e.g. running a business; stimulating economic ties or promoting jointly operating organizations of entrepreneurs,

which may result in the economic development of the support area; support in the implementation of consulting services assistance to entities applying for additional financial resources.

It can be assessed that the projects will be neutral in terms of impact on the land surface and landscape, however, they may indirectly influence rational environmental management, including land surface and landscape.

- *Interreg specific objective I.1.2 Building up mutual trust, in particular by encouraging people-to-people actions*

The projects will concern: supporting bottom-up initiatives for the integration of the inhabitants of the Programme Area, including promotion of volunteering; organizing events aimed at the cross-border integration of residents related to environment, art, culture and heritage; supporting local initiatives and leadership ; supporting cross-border cooperation of educational facilities (e.g. through cross-border exchange of youth or exchange of good practices and innovative solutions in the Programme Area), including integration and educational activities; supporting cross-border transfer of innovative solutions aimed at undertaking and strengthening further cooperation between research and scientific centres.

In principle. These projects will not directly affect land surface and landscape, but many of them may, indirectly, be beneficial as they will enhance cooperation and cross-border contacts, also in the field of land surface and landscape protection.

- *Large infrastructure projects (LIP)*

In terms of impacts, the assessment was divided into the sectors affected, i.e. health, tourism and culture, and environment.

Health projects:

- *LIP 2 Early diagnosis and timely treatment - the way to health for the residents of border regions*
- *LIP 3 Common Model Network of Cross-border Emergency Services*
- *LIP 4 Strengthening the capacity of Belarusian-Polish health care institutions to deal with epidemiological threats*
- *LIP 7 Establishment of the Eastern Centre for Preventive Health Care*
- *LIP 9 A joint initiative of the Józef Psarski Mazovian Specialist Hospital in Ostrołęka to increase access to health services*
- *LIP 10 Development of palliative and geriatric care and improvement of the quality of medical services for cancer patients in hospitals of Lviv and Ternopil oblasts of Ukraine and Krosno*

In general, the above-mentioned projects will not have an impact on the land surface and landscape. However, the implementation of some projects in the scope of construction works of hospitals or other health care facilities may lead to the occupation of additional land area, but these will be relatively small areas and accompanying the existing buildings. In terms of landscape, they can only have a positive impact, as façades will also be renovated during the works. Disturbance of land surface and landscape may occur mainly during construction when construction works are carried out, however, after their completion the area should be tidied up.

Tourism and culture projects

- *LIP 6 Carpathian narrow-gauge railway - a journey in the footsteps of the Carpathian forest railway*

As already indicated when discussing specific objective 4.2, the projects included in these measures will indirectly have a positive impact on land surface and landscape, as they will result in increasing the level of public knowledge, including rational environmental management.

However, during the implementation of some tourism infrastructure projects, there may be a temporary transformation of the land surface during the construction period as a result of excavation and land displacement, and hence disturbance of the landscape.

- *LIP 1 Construction of cycling infrastructure on the route Mikaszówka – Rudawka, and Grodno – Racicze*

As these projects will be implemented along the existing roads, their impact on the earth's surface will be limited to the occupation of additional land for bicycle paths and possibly the widening of the road and the infrastructure for rainwater drainage. Therefore, the impact on land surface will be limited. During the construction period the additional area will be occupied by construction works, after which the area will be cleaned up.

In terms of landscape impact, there should be no negative effects.

Environmental projects

- *LIP 5 Sustainable Water Management: A Way to Revive Western Ukraine and Eastern Poland*

The project includes:

Construction of 60 km of water supply network in Svitiaz, Pulmo and Shatsk equipped with a water treatment plant, construction of a water treatment plant in Rivne and Hoshcha, reconstruction of a wastewater treatment plant in the village of Kvasiliv, reconstruction of the water supply in Svalyava, construction of a sewage system in Lipina Nowa and Zawody, improvement of the sewage treatment plant in Skierbieszów and cleaning works at the Ternopil reservoir. As the pipelines will be run underground, they should not affect (except for the construction period) any permanent transformation of land surface and landscape.

In contrast, the construction of the water treatment plant and the water intake will result in the occupation of land and change of its use, but the area should not be large. However, their construction will affect the landscape, as they will be new objects in the landscape and it may be disturbed if they are not properly incorporated.

In accordance with the regulations, this project, as well as the previous ones, will be classified as a project likely to have a significant impact on the environment and, therefore, its draft will be subject to a detailed environmental impact assessment.

- *LIP 8 Ecological security - establishment of the Ukrainian-Polish forest fire management network in the Carpathian region*

The project will be beneficial for the land surface and landscape as it will contribute to the protection of forests against fires, thus preserving larger forest areas that play important functions for people and nature.

5.4.6. Impact on natural resources

Natural resources underpin the functioning of the European and global economy and our quality of life. These resources include raw materials such as fuels, minerals and metals but also food, soil, water, air, biomass and ecosystems. Demand for resources continues to increase. If current trends continue, the world's population is expected to increase by 30% by 2050, to around 9 billion, the demand for natural resources will increase significantly with it. Various forecasts predict that the depletion, at the current rate of development, of some resources will occur by the 2050s. In this situation, rational management and saving of resources is a fundamental development challenge, both from the perspective of individual countries and on a global scale. The solution is a complete transformation of the economy into a circular economy.

During construction of the facilities covered by all of the Programme directions, primarily rock raw materials, but also metals, including steel and other fossil products will be used. Among the rock materials aggregates such as sands and gravels will be used. It is important that when designing projects to be supported within the Programme, the ecodesign principles are applied taking into account the need for a circular transformation.

The impact on resources of undertakings that may be covered by the Programme according to specific objectives, measures and projects are presented below.

- *Specific objective 2.1 Promoting climate change adaptation and disaster risk prevention and resilience, taking into account eco-system based approaches*

As part of this objective, measures are planned in the field of: protection, regeneration and sustainable use of naturally valuable areas, including Natura 2000 areas; promotional and educational activities expanding the knowledge of residents about nature protection and raising awareness of naturally valuable areas; protection of nature and biodiversity and development of green infrastructure; projects aimed at identifying, monitoring and improving the condition of areas with exceeded environmental quality standards.

Within the scope of these activities, support may be provided for projects concerning the development and implementation of strategies, solutions, programmes and infrastructure projects to increase the adaptive capacity of the population in the Programme Area, to increase protection and resilience to the effects of anthropogenic catastrophes by building protection and crisis management systems and infrastructure, and to raise public awareness.

All these undertakings will have a positive impact on natural resources. Measures in the field of development of strategies and programmes and their implementation will influence more rational use of resources. Activities in the field of increasing knowledge and environmental awareness of the society will have a similar impact.

Action on increasing adaptive capacity and resilience to disasters will also have a positive impact on preserving and safeguarding natural resources as a result of progressive climate change. This will be important for maintaining the ecosystem services on which human depends.

However, some activities may be associated with construction works, which may involve the need for building materials.

- *Specific objective 2.2 Promoting access to water and sustainable water management*

The objective provides for measures to implement projects aimed at protection and condition improvement of water resources (including river basin management, infrastructure development of rainwater retention systems, activities related to improvement of water quality).

Under these measures, projects will be implemented to support the development of strategies, solutions, programmes and innovative projects. These activities will be positive from the point of view of natural resources protection, as they will allow to rationally choose the right approach to water management, taking into account protection of water resources and prospective approach to supplying people with drinking water.

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

In general, the construction of these types of facilities will not involve the use of construction materials and will mainly involve earth moving.

- *Further measures under objective 2.2 will be projects in the field of waste water management.*

These will include projects to promote rational water management. They will be beneficial for the economical use of water resources, necessary for drinking water supply and for industry. They will also contribute to protecting water resources from pollution.

The objective also includes the implementation of innovative projects in the field of wastewater treatment, which will also have a positive impact on securing the quality of surface and ground water resources.

In the course of such projects, it will be necessary to make use of raw building material resources.

- *Specific objective 2.3 Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution*

As part of this objective, measures are planned in the field of: protection, regeneration and sustainable use of naturally valuable areas, including Natura 2000 and Emerald areas; undertaking promotional and educational activities expanding the knowledge of residents about nature protection and raising awareness of naturally valuable areas; protection of nature and biodiversity and development of green infrastructure; implementation of projects aimed at identifying, monitoring and improving the condition of areas with exceeded environmental quality standards.

All projects in this area will have a positive impact, above all in terms of conserving natural resources and their ecosystem services which are extremely important for people, e.g. for food production.

- *Specific objective 4.1 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*

Within this objective, the Programme envisages supporting activities aimed at: improving access and infrastructure development of diagnostic and prophylactic also in different areas of medicine; improving access to specialist medicine, in particular cardiovascular diseases and cancer (development of health infrastructure, support for the equipment of health care facilities) and emergency medicine; improving access to long-term care, especially infrastructure development for geriatric and palliative care; preventing the occurrence and effects of adverse events such as epidemics (with particular emphasis on local phenomena); supporting the development of digitization in health care (including the development of telemedicine); improving qualifications of medical and rescue personnel.

All these activities have an extremely significant positive impact on people. They will influence the reduction of morbidity, effectiveness and efficiency of treatment, increase resistance to unforeseen events and altogether increase the vitality of the population in the Programme Area. This can be regarded, from a developmental point of view, as a positive impact on human resources.

However, the implementation of some projects, in terms of construction works of hospitals or other facilities, may increase the demand for raw materials and construction materials.

- *Specific objective 4.2 Increasing the role of culture and sustainable tourism in economic development, social inclusion and social innovation*

As part of this objective, measures are planned in the field of: protection, infrastructure development and promotion of public tourist values and related tourist services e.g. by shaping an integrated tourist offer by entities in the Programme Area, infrastructure of new and improvement/upgrade of existing routes; protection, development and promotion of culture and its heritage as well as services in the field of culture; protection, development and promotion of natural heritage and ecotourism; support for the adaptation of skills and professional qualifications in the field of tourism to the needs of the tourism market and changes within, e.g. through training related to establishing, running and promoting tourism activities.

The projects included in these measures will have a positive impact on people by improving their knowledge (including ecological knowledge), which will indirectly affect the respect for natural resources.

With regard to conservation projects involving modernisation, adaptation, reconstruction of cultural heritage objects, if implemented under the Programme, it can be concluded that they will have a similar positive impact.

Consumption of resources and construction materials in the case of investment projects is estimated to have a minor impact on all resources in this regard.

- *Interreg specific objective I.1.1 Enhancing 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 implemented under this objective will concern mainly: increasing and improving the quality of cross-border cooperation; improving the access to information on legal, fiscal and formal conditions related to e.g. running a business in each countries of the Programme Area; stimulating economic ties or promoting jointly operating organizations of entrepreneurs, which may result in the economic development of the support area; support in the implementation of consulting services assistance to entities applying for additional financial resources.

It can be estimated that these projects will be neutral from the point of view of impact on natural resources.

- *Interreg specific sbjective I.1.2 Building up mutual trust, in particular by encouraging people-to-people actions*

The projects will concern: supporting bottom-up initiatives for the integration of the inhabitants of the Programme Area, including promotion of volunteering; organizing events aimed at the cross-border integration of residents related to environment, art, culture and heritage; supporting local initiatives and leadership; supporting cross-border cooperation of educational facilities (e.g. through cross-border exchange of youth or exchange of good practices and innovative solutions in the Programme Area), including integration and

educational activities; supporting cross-border transfer of innovative solutions aimed at undertaking and strengthening further cooperation between research and scientific centres.

In principle, they will not directly affect natural resources, but many of them may be indirectly beneficial, as they will strengthen cooperation and cross-border relations, also in the field of environmental protection and its resources.

- *Large infrastructure projects (LIPs)*

In terms of impacts, the assessment was divided into the sectors affected, i.e. health, tourism and culture, and environment.

Health projects:

- *LIP 2 Early diagnosis and timely treatment - the way to health for the residents of border regions*
- *LIP 3 Common Model Network of Cross-Border Emergency Services*
- *LIP 4 Strengthening the capacity of Belarusian-Polish health care institutions to deal with epidemiological threats*
- *LIP 7 Establishment of the Eastern Centre for Preventive Health Care*
- *LIP 9 A joint initiative of the Józef Psarski Mazovian Specialist Hospital in Ostrołęka to increase access to health services*
- *LIP 10 Development of palliative and geriatric care and improvement of the quality of medical services for cancer patients in hospitals of Lviv and Ternopil oblasts of Ukraine and Krosno*

All these projects will not have a significant impact on natural resources. Their only impact will be on the consumption of raw materials and construction materials during construction.

Tourism and culture projects

- *LIP 6 Carpathian narrow-gauge railway - a journey in the footsteps of the Carpathian forest railway*
- *LIP 1 Construction of cycling infrastructure on the route Mikaszówka – Rudawka, and Grodno – Racicze*

These projects, apart from the construction period when raw materials and construction materials will be used, will not have a significant impact on natural resources. This will involve the use of raw and construction materials. Therefore, it is recommended to use, as much as possible, waste materials for construction, e.g. ashes or rubble.

Environmental projects

- *LIP 5 Sustainable Water Management: A Way to Revive Western Ukraine and Eastern Poland*

The project includes:

Construction of 60 km of water supply network in Svitiaz, Pulmo and Shatsk equipped with a water treatment plant, construction of a water treatment plant in Rivne and Hoshcha, reconstruction of a wastewater treatment plant in the village of Kvasyliv, reconstruction of the water supply in Svalyava, construction of a sewage system in Lipina Nowa and Zawody, improvement of the sewage treatment plant in Skierbieszów and cleaning works at the Ternopil reservoir. 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 increased

demand for water and depletion of water resources. Building materials will also be used for construction, however, due to the scope of the investment, this will not have a major impact on natural resources.

- *LIP 8 Ecological security - establishment of the Ukrainian-Polish forest fire management network in the Carpathian region*

The project will be beneficial as it will reduce fires in the cooperation area. The implementation will reduce the loss of natural resources in forest areas.

5.4.7. Impact on climate

Emissions of greenhouse gases such as carbon dioxide (CO2), methane (CH2) or nitrous oxide (N2O) contribute to the greenhouse effect and the phenomenon of rising Earth's temperature, which in turn leads to climate change. It should be stressed that from the perspective of evaluating the impact of greenhouse gas emissions on the formation of the greenhouse effect, the emissions accompanying the production of electricity will be of equal importance as the emissions from the combustion of fuels in vehicle engines. In other words, the source of these emissions is irrelevant. Climate change is already having, and will have in the future, major impact on society, both directly and indirectly, by affecting: water, soil, air and biodiversity.[82] The main sources of greenhouse gas emissions are the energy and transport sectors. As climate change continues and its effects are increasingly felt, it is important to take action to mitigate and adapt to it.

The impact on climate of undertakings that may be covered by the Programme according to specific objectives, measures and projects are presented below.

- *Specific objective 2.1 Promoting climate change adaptation and disaster risk prevention and resilience, taking into account eco-system based approaches*

As part of this objective, measures are planned in the field of: protection, regeneration and sustainable use of naturally valuable areas, including Natura 2000 areas; promotional and educational activities expanding the knowledge of residents about nature protection and raising awareness of naturally valuable areas; protection of nature and biodiversity and development of green infrastructure; projects aimed at identifying, monitoring and improving the condition of areas with exceeded environmental quality standards.

Within the scope of these activities, support may be provided for projects concerning the development and implementation of strategies, solutions, programmes and infrastructure projects to increase the adaptive capacity of the population in the Programme Area, to increase protection and resilience to the effects of anthropogenic catastrophes by building protection and crisis management systems and infrastructure, and to raise public awareness.

These undertakings will contribute to adaptation to climate change by reducing the impact of these changes on nature and humans, increasing their safety. They will also contribute to increasing the level of public knowledge and awareness about possible climate change, its prevention and the need to adapt to it. Thus they will influence people's behaviour in terms of reducing greenhouse gas emissions. The developed strategies and programmes will have a positive impact on a more rational and systematic approach to measures to reduce greenhouse gas emissions and to adaptation to climate change.

[82] KLIMADA: Adaptation to climate change http://klimada.mos.gov.pl/zmiany-klimatu-w-polsce/konsekwencje-zmian-klimatu/

However, some activities may be associated with construction works, which may involve greenhouse gas emissions from construction equipment.

- *Specific objective 2.2 Promoting access to water and sustainable water management*

The objective provides for measures to implement projects aimed at protection and condition improvement of water resources (including river basin management, infrastructure development of rainwater retention systems, activities related to improvement of water quality).

Under these measures, projects will be implemented to support the development of strategies, solutions, programmes and innovative projects. These activities will be positive from the point of view of people, as they will allow to rationally choose the right approach to water management, taking into account protection of water resources and prospective approach to supplying people with drinking water, also taking into account climate change.

Among these measures, it is possible to support the construction of small retention facilities. This will have an impact on stopping water run-off and damage resulting from it, which will be important from the point of view of increasing natural phenomena as a result of climate change (erosion, floods, landslides etc.). The additionally created retention will also affect the greater preservation of water resources, important both for aquatic and water-dependent ecosystems, and for people. This will be important in view of the expected shortages of these resources and preventing the occurrence of droughts.

However, greenhouse gas emissions from construction equipment may occur during construction.

Further measures under objective 2.2 will be projects in the field of waste water management.

Like the projects mentioned above, they will serve to protect the quality of water resources, which is important in view of ongoing climate change and depleting resources.

- *Specific objective 2.3 Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution*

As part of this objective, measures are planned in the field of: protection, regeneration and sustainable use of naturally valuable areas, including Natura 2000 and Emerald areas; undertaking promotional and educational activities expanding the knowledge of residents about nature protection and raising awareness of naturally valuable areas; protection of nature and biodiversity and development of green infrastructure; implementation of projects aimed at identifying, monitoring and improving the condition of areas with exceeded environmental quality standards.

These projects will have similar positive indirect impact on climate. In a situation of progressing climate change and the related rise in temperature, they may be important for the adaptation of ecosystems to the changing conditions. Monitoring projects, on the other hand, will make it possible to react more quickly to possible negative changes in nature and to take preventive measures.

- *Specific objective 4.1 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*

Within this objective, the Programme envisages supporting activities aimed at: improving access and infrastructure development of diagnostic and prophylactic also in different areas of medicine; improving access to specialist medicine, in particular cardiovascular diseases and cancer (development of health infrastructure,

support for the equipment of health care facilities) and emergency medicine; improving access to long-term care, especially infrastructure development for geriatric and palliative care; preventing the occurrence and effects of adverse events such as epidemics (with particular emphasis on local phenomena); supporting the development of digitization in health care (including the development of telemedicine); improving qualifications of medical and rescue personnel.

In principle the proposed measure will not have an impact on climate, but it may be indirectly positive in terms of increasing people's resilience to climate change, and especially in terms of counteracting the occurrence of local phenomena associated with climate change. However, the implementation of some projects, in terms of construction works of hospitals or other facilities, may, during the construction period, cause greenhouse gas emissions from construction equipment.

- *Specific objective 4.2 Increasing the role of culture and sustainable tourism in economic development, social inclusion and social innovation*

As part of this objective, measures are planned in the field of: protection, infrastructure development and promotion of public tourist values and related tourist services e.g. by shaping an integrated tourist offer by entities in the Programme Area, infrastructure of new and improvement/upgrade of existing routes; protection, development and promotion of culture and its heritage as well as services in the field of culture; protection, development and promotion of natural heritage and ecotourism; support for the adaptation of skills and professional qualifications in the field of tourism to the needs of the tourism market and changes within, e.g. through training related to establishing, running and promoting tourism activities.

The projects covered will have a positive impact on people's awareness and thus indirectly on reducing greenhouse gas emissions and taking action to adapt to climate change.

During the implementation of conservation projects involving the modernisation, adaptation and reconstruction of cultural heritage objects and tourism sites, greenhouse gas emissions may occur depending on the scope of the work and the equipment used.

- *Interreg specific objective I.1.1 Enhancing 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*
- *Interreg specific objective I.1.2 Building up mutual trust, in particular by encouraging people-to-people actions*

The projects to be implemented under the above mentioned objectives will have a positive, indirect impact on the climate, as they will affect the optimisation of management, including environmental management, as well as the reduction of greenhouse gas emissions and adaptation to climate change.

- *Large infrastructure projects (LIP)*

In terms of impacts, the assessment was divided into the sectors affected, i.e. health, tourism and culture, and environment.

Health projects:

- *LIP 2 Early diagnosis and timely treatment - the way to health for the residents of border regions*
- *LIP 3 Common Model Network of Cross-border Emergency Services*

- *LIP 4 Strengthening the capacity of Belarusian-Polish health care institutions to deal with epidemiological threats*
- *LIP 7 Establishment of the Eastern Centre for Preventive Health Care*
- *LIP 9 A joint initiative of the Józef Psarski Mazovian Specialist Hospital in Ostrołęka to increase access to health services*
- *LIP 10 Development of palliative and geriatric care and improvement of the quality of medical services for cancer patients in hospitals of Lviv and Ternopil oblasts of Ukraine and Krosno*

As already mentioned above, these projects will not have a major impact on the climate, but they can be indirectly positive in terms of increasing people's resilience to climate change, and especially in terms of counteracting the occurrence of local phenomena associated with climate change. However, the implementation of some projects, in terms of construction works of hospitals or other facilities, may, during the construction period, cause greenhouse gas emissions from construction equipment.

Tourism and culture projects

- *LIP 6 Carpathian narrow-gauge railway - a journey in the footsteps of the Carpathian forest railway*

The project includes reconstruction and adaptation of the Majdan station building for tourist services, construction of a tourist path and an educational footbridge from Majdan station to the nearest hill with a viewing platform; renovation of the narrow gauge railway track from Majdan station to Dołżyca station (3 km) in order to allow the movement of bicycle vehicles on the tracks; construction/reconstruction of Vyhoda station and establishment of a railway heritage museum there.

The climate impact of this project will be similar to those identified above, provided however that zero- or low-emission sources are used to power the railway.

- *LIP 1 Construction of cycling infrastructure on the route Mikaszówka – Rudawka, and Grodno – Racicze*

The creation of the cycle path will be beneficial for the development of cycle tourism, which brings all the benefits for reducing greenhouse gas emissions described above. In addition, the cycle path can take over some of the tourist car traffic from the parallel road, which is beneficial in terms of reducing GHG emissions.

During construction, greenhouse gas emissions from construction equipment will occur.

Environmental projects

- *LIP 5 Sustainable Water Management: A Way to Revive Western Ukraine and Eastern Poland*

The project includes:

Construction of 60 km of water supply network in Svitiaz, Pulmo and Shatsk equipped with a water treatment plant, construction of a water treatment plant in Rivne and Hoshcha, reconstruction of a wastewater treatment plant in the village of Kvasyliv, reconstruction of the water supply in Svalyava, construction of a sewage system in Lipina Nowa and Zawody, improvement of the sewage treatment plant in Skierbieszów and cleaning works at the Ternopil reservoir. The construction will be beneficial for people, especially from the point of view of water supply in the perspective of climate change.

Possible negative impacts may occur at the construction stage, when there will be greenhouse gas emissions from the equipment used.

Once the location has been determined, the above issues should be examined in detail at the design stage.

- *LIP 8 Ecological security - establishment of the Ukrainian-Polish forest fire management network in the Carpathian region*

The project will be beneficial in terms of reducing greenhouse gas emissions as it will have an impact on preventing and, if it occurs, reducing forest fires. It must be emphasized that the emission of greenhouse gases occurring during forest fires is one of the most important factors of climate change. Reducing the area of forest will also reduce carbon sequestration.

5.4.8. Impact on heritage objects

The term heritage object should be understood as any product of human activity, giving evidence to his past activities, which has historical, scientific, artistic or emotional value. This could include e.g. buildings (including industrial ones), urban complexes, landscape etc. The analysis cannot exclude archaeological heritage objects, both discovered and undiscovered, located on land and under water.

The implementation of any investments must take into account, among others, the presence of heritage objects in the area, as they are subject to protection under the relevant Polish, Belarusian and Ukrainian regulations (in Poland these matters are regulated by the Act of 23 July 2003 on the protection and guardianship of monuments)[83].

There are four forms of protecting heritage objects:

- entry in the register of heritage objects;
- listing as a historical monument;
- establishment of a cultural park;
- specifying their protection in local spatial development plans or in a decision on location.

At the stage of selecting the exact location of an investments it is necessary to take into account the location of heritage objects (including archaeological objects) and minimise any possible negative impact of the construction works on the conservation status of these objects. It is desirable to take into account also cultural landscape, historical layout such as parks, avenues of trees, etc. and urban plans.

The impact on heritage objects of undertakings that may be covered by the Programme according to specific objectives, measures and projects are presented below.

- *Specific objective 2.1 Promoting climate change adaptation and disaster risk prevention and resilience, taking into account eco-system based approaches*

As part of this objective, measures are planned in the field of: protection, regeneration and sustainable use of naturally valuable areas, including Natura 2000 areas; promotional and educational activities expanding the knowledge of residents about nature protection and raising awareness of naturally valuable areas; protection of nature and biodiversity and development of green infrastructure; projects aimed at identifying, monitoring and improving the condition of areas with exceeded environmental quality standards.

Generally, these activities should not have a negative impact on the heritage objects, except for the period of construction of some objects, if the construction works were carried out directly in the vicinity of the historic

[83] Journal of Laws of 2003, No. 162, item 1568, as amended

objects. Then the possible indirect negative impact would be related to the emission of air pollutants and generated vibrations.

Positive effects may be associated with works on adaptation to climate change and related to water retention, as they may protect heritage objects against possible damages caused by natural phenomena resulting from climate change. Awareness raising activities in the field of natural and cultural heritage protection will also be positive.

- *Specific objective 2.2 Promoting access to water and sustainable water management*

The objective provides for measures to implement projects aimed at protection and condition improvement of water resources (including river basin management, infrastructure development of rainwater retention systems, activities related to improvement of water quality).

Under these measures, projects will be implemented to support the development of strategies, solutions, programmes and innovative projects, as well as creating small retention and wastewater treatment.

These activities will be, in principle, neutral with respect to heritage objects, although in some cases they may protect them against natural phenomena related to climate change.

- *Specific objective 2.3 Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution*

As part of this objective, measures are planned in the field of: protection, regeneration and sustainable use of naturally valuable areas, including Natura 2000 and Emerald areas; undertaking promotional and educational activities expanding the knowledge of residents about nature protection and raising awareness of naturally valuable areas; protection of nature and biodiversity and development of green infrastructure; implementation of projects aimed at identifying, monitoring and improving the condition of areas with exceeded environmental quality standards.

These actions will, in principle, be neutral for heritage objects, although indirect positive impacts can be found due to the protection of natural areas, which, especially in urban areas, can result in increased water retention and absorption of air pollutants, which is further related to the reduction of negative impacts on historical heritage objects.

- *Specific objective 4.1 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*

Within this objective, the Programme envisages supporting activities aimed at: improving access and infrastructure development of diagnostic and prophylactic also in different areas of medicine; improving access to specialist medicine, in particular cardiovascular diseases and cancer (development of health infrastructure, support for the equipment of health care facilities) and emergency medicine; improving access to long-term care, especially infrastructure development for geriatric and palliative care; preventing the occurrence and effects of adverse events such as epidemics (with particular emphasis on local phenomena); supporting the development of digitization in health care (including the development of telemedicine); improving qualifications of medical and rescue personnel.

Actions in the above scope will be neutral from the point of view of the impact on heritage objects. However, if they concerned modernisation of heritage objects, they may have positive significance.

- *Specific objective 4.2 Increasing the role of culture and sustainable tourism in economic development, social inclusion and social innovation*

As part of this objective, measures are planned in the field of: protection, infrastructure development and promotion of public tourist values and related tourist services e.g. by shaping an integrated tourist offer by entities in the Programme Area, infrastructure of new and improvement/upgrade of existing routes; protection, development and promotion of culture and its heritage as well as services in the field of culture; protection, development and promotion of natural heritage and ecotourism; support for the adaptation of skills and professional qualifications in the field of tourism to the needs of the tourism market and changes within, e.g. through training related to establishing, running and promoting tourism activities.

The projects included in these measures will generally have a positive impact on people's awareness and thus indirectly on the respect for cultural values and the protection of heritage objects.

Projects involving the restoration, modernisation and adaptation of cultural heritage sites can have a significant positive impact.

- *Interreg specific objective I.1.1 Enhancing 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*
- *Interreg specific objective I.1.2 Building up mutual trust, in particular by encouraging people-to-people actions*

The projects implemented within the framework of the above-mentioned objectives will not directly affect heritage objects, however, their indirect impact will be positive as they will positively contribute to closer cooperation also in the field of cultural heritage protection.

- *Large infrastructure projects (LIPs)*

In terms of impacts, the assessment was divided into the sectors affected, i.e. health, tourism and culture, and environment.

Health projects:

- *LIP 2 Early diagnosis and timely treatment - the way to health for the residents of border regions*
- *LIP 3 Common Model Network of Cross-border Emergency Services*
- *LIP 4 Strengthening the capacity of Belarusian-Polish health care institutions to deal with epidemiological threats*
- *LIP 7 Establishment of the Eastern Centre for Preventive Health Care*
- *LIP 9 A joint initiative of the Józef Psarski Mazovian Specialist Hospital in Ostrołęka to increase access to health services*
- *LIP 10 Development of palliative and geriatric care and improvement of the quality of medical services for cancer patients in hospitals of Lviv and Ternopil oblasts of Ukraine and Krosno*

All of these projects will not affect existing heritage objects as they have not been identified as affecting historic buildings.

Tourism and culture projects

- *LIP 6 Carpathian narrow-gauge railway - a journey in the footsteps of the Carpathian forest railway*

All these projects will have an indirect positive impact on the preservation of cultural heritage through popularisation of heritage objects and increased awareness of their protection, and some of them, such as those concerning reconstruction of forts or facilities of the Carpathian Railway, will directly result in their reconstruction or adaptation for other purposes, securing them for the future. When implementing these objects, attention should be paid to compliance with the principles of conservation of heritage objects.

- *LIP 1 Construction of cycling infrastructure on the route Mikaszówka – Rudawka, and Grodno – Racicze*

The implementation of the elements of this project will partially reduce the emission of air pollutants, which may indirectly positively affect the preservation of heritage objects by reducing their corrosion resulting from air pollution. Since the scope of works is small and there are no heritage objects directly next to the above mentioned roads - this impact will be insignificant. There are no significant historic objects near the investment site.

Environmental projects

- *LIP 5 Sustainable Water Management: A Way to Revive Western Ukraine and Eastern Poland*

The project includes: Construction of 60 km of water supply network in Svitiaz, Pulmo and Shatsk equipped with a water treatment plant, construction of a water treatment plant in Rivne and Hoshcha, reconstruction of a wastewater treatment plant in the village of Kvasyliv, reconstruction of the water supply in Svalyava, construction of a sewage system in Lipina Nowa and Zawody, improvement of the sewage treatment plant in Skierbieszów and cleaning works at the Ternopil reservoir.

The implemented project will not affect heritage objects, however, during the construction works there is a possible negative impact resulting from the works, mainly in the form of air pollution and possible vibrations.

- *LIP 8 Ecological security - establishment of the Ukrainian-Polish forest fire management network in the Carpathian region*

The project will be beneficial to the conservation of historical objects as it will reduce the likelihood of forest fires, which are associated with emissions of air pollutants that are detrimental to heritage objects.

5.4.9. Impact on material assets

Material assets include, inter alia, all buildings, including public utilities as well as private property, residential buildings, houses, infrastructure of various types (e.g. roads, railways, energy, tourism) and others, which are the product of human activity or used for carrying out activities.

Implementation of projects and measures specified in the Programme may result in both positive and negative impacts. Positive impacts are mostly of indirect nature. They are influenced by:

- availability of energy (electricity and heat), gas, water, etc.;
- availability of transport infrastructure (roads, railways);
- availability of public transport;
- creation of entrepreneurship development areas;
- availability of commercial, recreational and tourist infrastructure;

- creation of jobs in the vicinity.

Potential negative impacts on material assets arise from:

- infringement of private property;
- the need to demolish existing buildings;
- exclusion of land from current use;
- loss of some sources of income for existing owners and users;
- permanent exclusion of areas from forestry or agricultural use;
- impairment of soil conditions, e.g. due to drainage;
- Disruption of the continuity of minor roads (e.g. local, forest, field);
- location, in the vicinity, of nuisance facilities emitting air pollution, odours, noise and vibration and altering the landscape impression.

The evaluation of some measures is very subjective. An example of this is the creation of low emission zones and limited use areas. Such a zone may cause an increase or decrease in the value of properties located in or adjacent to it, depending on the location and use of the land, as well as subjective opinions. Thus, the impact of the implementation of a specific measure may be both positive and negative.

Negative impact during the implementation period of projects, due to their limited duration, generally do not change material values.

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

- *Specific objective 2.1 Promoting climate change adaptation and disaster risk prevention and resilience, taking into account eco-system based approaches*

As part of this objective, measures are planned in the field of: protection, regeneration and sustainable use of naturally valuable areas, including Natura 2000 areas; promotional and educational activities expanding the knowledge of residents about nature protection and raising awareness of naturally valuable areas; protection of nature and biodiversity and development of green infrastructure; projects aimed at identifying, monitoring and improving the condition of areas with exceeded environmental quality standards.

These actions may affect material assets both positively and negatively. They will have a positive impact on facilities and areas that have been protected against the effects of climate change, and negatively, if it is related to the occupation of land or the location of new facilities nearby that could be onerous or disturb the landscape.

- *Specific objective 2.2 Promoting access to water and sustainable water management*

The objective provides for measures to implement projects aimed at protection and condition improvement of water resources (including river basin management, infrastructure development of rainwater retention systems, activities related to improvement of water quality).

All projects in this area should have an overall positive impact on material assets in terms of enhancing and protecting water resources, or creating attractive sites. Particularly positive impact may apply to those areas that will gain access to water supply and wastewater collection. Nevertheless, in some cases, when the objects related to the implementation will cause land occupation or will be burdensome or disturb the landscape, they may have a negative impact on the value of plots and houses in the vicinity.

- *Specific objective 2.3 Enhancing Enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution*

As part of this objective, measures are planned in the field of: protection, regeneration and sustainable use of naturally valuable areas, including Natura 2000 and Emerald areas; undertaking promotional and educational activities expanding the knowledge of residents about nature protection and raising awareness of naturally valuable areas; protection of nature and biodiversity and development of green infrastructure; implementation of projects aimed at identifying, monitoring and improving the condition of areas with exceeded environmental quality standards.

Projects under the objective will generally have a positive impact on material wealth as they will enhance the attractiveness of the surrounding area, although with exceptions e.g. in relation to additionally occupied areas or areas with restrictions on development or use. The assessment will depend on the type of project and its location.

- *Specific objective 4.1 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*

Within this objective, the Programme envisages supporting activities aimed at: improving access and infrastructure development of diagnostic and prophylactic also in different areas of medicine; improving access to specialist medicine, in particular cardiovascular diseases and cancer (development of health infrastructure, support for the equipment of health care facilities) and emergency medicine; improving access to long-term care, especially infrastructure development for geriatric and palliative care; preventing the occurrence and effects of adverse events such as epidemics (with particular emphasis on local phenomena); supporting the development of digitization in health care (including the development of telemedicine); improving qualifications of medical and rescue personnel.

All these actions will be positive in terms of their impact on material values, especially for modernized and retrofitted hospitals and health facilities, and the value of the services they provide.

- *Specific objective 4.2 Increasing the role of culture and sustainable tourism in economic development, social inclusion and social innovation*

As part of this objective, measures are planned in the field of: protection, infrastructure development and promotion of public tourist values and related tourist services e.g. by shaping an integrated tourist offer by entities in the Programme Area, infrastructure of new and improvement/upgrade of existing routes; protection, development and promotion of culture and its heritage as well as services in the field of culture; protection, development and promotion of natural heritage and ecotourism; support for the adaptation of skills and professional qualifications in the field of tourism to the needs of the tourism market and changes within, e.g. through training related to establishing, running and promoting tourism activities.

The projects included in these measures will generally be neutral with regard to changes in material wealth, but some projects may make the site more attractive, which may involve an increase in the value of neighbouring properties as well as the development of services in the area. The value of facilities subject to modernization, renovation and adaptation will also increase.

- *Interreg specific objective I.1.1 Enhancing 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*

- *Interreg specific objective I.1.2 Building up mutual trust, in particular by encouraging people-to-people actions*

The projects implemented under the above mentioned objectives will not change material values, although good management of the area and cooperation will increase its attractiveness.

- *Large infrastructure projects (LIPs)*

Major projects listed in the assessment of other impacts (above) will affect the change of material values, as described above, in relation to the specific objectives under which they will be implemented.

5.4.10. Cumulative impacts

Cumulative effects are defined as changes in the environment caused by the influence of actions proposed in the Programme in conjunction with other existing effects and impacts resulting from implementation of strategic documents to be implemented in the future.

To a large extent, the draft of the Programme is general in nature and it does not precisely define the projects to be supported, neither in terms of technical characteristics nor location. In this situation the possibility of accumulation of their impacts on the environment cannot be specifically assessed. It can only be assumed that the accumulation of impacts is likely if they are located within the existing or anticipated impacts from the existing and planned infrastructure. However, in terms of the so-called Large Infrastructure Projects (LIP), for which general characteristics were given, the assessment could be based on the existing conditions in a given location.

The table below presents the results of analyses of possible cumulative environmental effects of both the measures generally specified in the Programme and the large projects.

Table 14. Possible cumulative impacts in the implementation of measures provided for in the Programme

Action	Potential for cumulative impacts
2.1.1. Joint promotion and implementation of activities related to a low-carbon economy and resilience to climate change.	Actions that are positive for the environment should not result in the accumulation of negative impacts.
2.1.2. Joint actions in the field of adaptation and protection against floods, inundations droughts, desertification, erosion and risk management regarding this area.	Actions that are positive for the environment should not result in the accumulation of negative impacts.
2.1.3. Joint actions in the field of adaptation and protection against fire, natural disasters and other local threats as well as the risk management regarding this area.	Actions that are positive for the environment should not result in the accumulation of negative impacts.
2.1.4. Joint actions aimed at prevention and management of risks related to anthropogenic activities.	Actions that are positive for the environment should not result in the accumulation of negative impacts.
2.2.1. Joint actions aimed at protection and improvement of water resources' condition.	Positive actions for the environment should not cause the accumulation of negative effects.
2.2.2. Joint actions aimed at development of sewage infrastructure and improving wastewater management.	Possible accumulation of impacts, depending on the location, in the case of discharge of treated wastewater to one receiver from

Action	Potential for cumulative impacts
	other wastewater treatment plants
2.2.3. Joint promotional and educational actions related to sustainable water management.	Actions that are positive for the environment should not result in the accumulation of negative impacts.
2.3.1. Joint actions aimed at protection, regeneration and sustainable use of valuable natural areas, with particular emphasis on cross-border areas.	Actions that are positive for the environment should not result in the accumulation of negative impacts.
2.3.2 Joint promotional and educational actions expanding knowledge of residents about nature protection and raising awareness of natural valuable areas.	Actions that are positive for the environment should not result in the accumulation of negative impacts.
2.3.3 Joint actions aimed at protection of nature and biodiversity and development of green infrastructure.	Actions that are positive for the environment should not result in the accumulation of negative impacts.
2.3.4 Joint actions aimed at monitoring the condition of the environment, as well as identifying and improving the condition of areas with exceeded environmental quality standards.	N/a
4.1.1 Joint actions improving access and infrastructure development of diagnostic and prophylactic tools and resources in various areas of medicine.	N/a
4.1.2. Joint actions improving access to specialist medicine, in particular medicine related to cardiovascular diseases, cancer (development of health infrastructure, support for the equipment of healthcare facilities) and emergency medicine	N/a
4.1.3 Joint actions improving access to long-term care, especially infrastructure development for geriatric and palliative care.	N/a
4.1.4 Joint actions preventing the occurrence and effects of adverse events such as epidemics (with particular emphasis on local phenomena).	N/a
4.1.5 Joint actions aimed at development of digitization in health care (including the development of telemedicine).	N/a
4.1.6 Joint actions improving the qualifications of medical and rescue personnel.	N/a
4.2.1 Joint actions aimed at protection, infrastructure development and promotion of public tourist values and related tourist services.	N/a
4.2.2 Joint actions aimed at protection, development and promotion of cultural heritage and services in the field of culture, including development of tourist infrastructure.	N/a
4.2.3 Joint actions aimed at protection, infrastructure development and promotion of natural heritage and ecotourism.	Projects may result in increased tourist traffic and cumulative negative impacts of tourists on the environment
4.2.4 Support for the adaptation of skills and professional qualifications in the field of tourism to the needs of the tourism market and changes within.	N/a

Action	Potential for cumulative impacts
Interreg 1 A better cooperation governance.	N/a
LIP 1 Construction of cycling infrastructure on the route Mikaszówka – Rudawka, and Grodno – Racicze	Projects may result in increased traffic and its cumulative negative impacts on the environment
LIP 2 Early diagnosis and timely treatment - the way to health for the residents of border regions (Minsk, Siedlce)	N/a
LIP 3 Common Model Network of Cross-border Emergency Services (Suwałki, Grodno, Lida, Volkovysk)	N/a
LIP 4 Strengthening the capacity of Belarusian-Polish health care institutions to deal with epidemiological threats (Brest)	N/a
LIP 5 Sustainable Water Management: A Way to Revive Western Ukraine and Eastern Poland Construction of 60 km of water supply network in Svitiaz, Pulmo and Shatsk equipped with a water treatment plant, construction of a water treatment plant in Rivne and Hoshcha, reconstruction of a wastewater treatment plant in the village of Kvasiliv, reconstruction of the water supply in Svalyava, construction of a sewage system in Lipina Nowa and Zawody, improvement of the sewage treatment plant in Skierbieszów and cleaning works at the Ternopil reservoir	Possible cumulative impacts with other tasks requiring construction works to be carried out at the same time
LIP 6 Carpathian narrow-gauge railway - a journey in the footsteps of the Carpathian forest railway (Majdan – Dołżyca, Vyhoda)	Projects may result in increased tourist traffic and cumulative negative impacts of tourists on the environment
LIP 7 Establishment of the Eastern Centre for Preventive Health Care (Lublin, Volyn)	N/a
LIP 8 Ecological security - establishment of the Ukrainian-Polish forest fire management network in the Carpathian region	N/a
LIP 9 A joint initiative of the Józef Psarski Mazovian Specialist Hospital in Ostrołęka to increase access to health services	N/a
LIP 10 Development of palliative and geriatric care and improvement of the quality of medical services for cancer patients in hospitals of Lviv and Ternopil oblasts of Ukraine and Krosno	N/a

The analyses were carried out taking into account existing and planned infrastructure as well as the existing protected areas. The available materials were used, including the national strategic papers listed in section 5.3.

All of the above elements, as well as specific large projects, are shown on the map below.

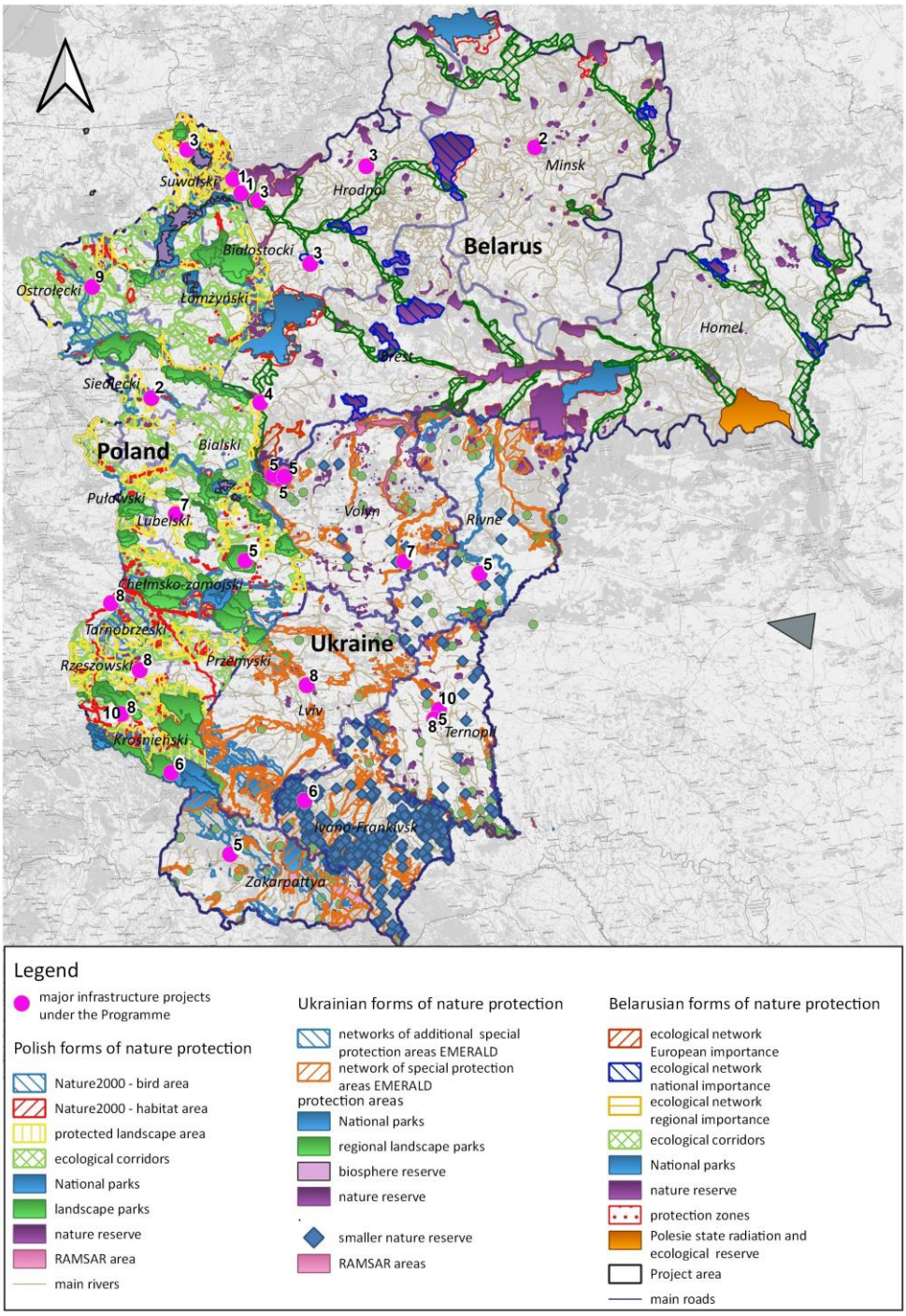

Figure 17. Map showing existing and planned infrastructure, protected areas and location of major infrastructure projects proposed for implementation under the Programme[84].

[84] Own study based on strategic documents listed in section 5.3, Open street map, gdos.gov.pl portal. https://pzf.land.kiev.ua/pzf4.html General scheme of planning of the territory of Ukraine (https://www.minregion.gov.ua/napryamki-diyalnosti/building/city-build/materiali-generalnoyi-shemi-planuvannya-teritoriyi-ukrayini/), Diagram and map of the National Ecological Network of the Republic of Belarus (https://minpriroda.goc.by/national)

On the map, the locations of large projects proposed for implementation under the Programme are marked with numbers as follows:

1. Construction of cycling infrastructure on the route Mikaszówka – Rudawka, and Grodno – Racicze
2. Early diagnosis and timely treatment - the way to health for the residents of border regions (Minsk, Siedlce)
3. Common Model Network of Cross-border Emergency Services (Suwałki, Grodno, Lida, Volkovysk)
4. Strengthening the capacity of Belarusian-Polish health care institutions to deal with epidemiological threats (Brest)
5. Sustainable Water Management: A Way to Revive Western Ukraine and Eastern Poland Construction of 60 km of water supply network in Svitiaz, Pulmo and Shatsk equipped with a water treatment plant, construction of a water treatment plant in Rivne and Hoshcha, reconstruction of a wastewater treatment plant in the village of Kvasiliv, reconstruction of the water supply in Svalyava, construction of a sewage system in Lipina Nowa and Zawody, improvement of the sewage treatment plant in Skierbieszów and cleaning works at the Ternopil reservoir
6. Carpathian narrow-gauge railway - a journey in the footsteps of the Carpathian forest railway (Majdan – Dołżyca, Vyhoda)
7. Establishment of the Eastern Centre for Preventive Health Care (Lublin, Volyn)
8. Ecological security - establishment of the Ukrainian-Polish forest fire management network in the Carpathian region
9. A joint initiative of the Józef Psarski Mazovian Specialist Hospital in Ostrołęka to increase access to health services
10. Development of palliative and geriatric care and improvement of the quality of medical services for cancer patients in hospitals of Lviv and Ternopil oblasts of Ukraine and Krosno.

As already mentioned, layers with protected areas, including Natura 2000 and Emerald sites, were used in the creation of the map, which will enable the identification of impacts on them (using a higher resolution map) when locating already specific projects proposed for implementation.

In conclusion, it can be stated that the analyses have not shown that there could be a significant accumulation of environmental impact of the projects that may be implemented under the Programme.

5.5. ANALYSIS AND ASSESSMENT OF INTERDEPENDENCIES WITH ENVIRONMENTAL REPORTS OF OTHER DOCUMENTS RELATED TO THE DRAFT PROGRAMME

While working on the Environmental Report on the draft Programme, analyses as well as findings and recommendations from the previously developed environmental reports for strategic documents which contain measures connected with activities covered by the Programme were taken into account. In particular, documents and environmental reports for the following documents were analysed:

On the Polish side:

- The Strategy for Responsible Development,
- Strategy 'Energy security and the environment',
- National Strategy of Regional Development 2030,
- National Environmental Policy,
- Sustainable Transport Development Strategy,

- Strategic adaptation plan for sectors and areas vulnerable to climate change,
- Existing strategic papers at regional and local level.

On the Belarusian side:

- Strategy for water resources management in the context of climate change for the period up to 2030 (Water Strategy-2030),
- National strategy for the development of tourism in the Republic of Belarus until 2035,
- State Programme «Environmental Protection and Sustainable Use of Natural Resources» for 2021–2025.

According to the Act of the Republic of Belarus «About the State Environmental Expertise, Strategic Environmental Assessment and Environmental Impact Assessment» dated 18.06.2016 N 399-3 (entered into force on 22.01.2017), strategic documents are subject to mandatory strategic environmental assessment if their development began after 22.01.2017. Therefore, the number of environmental SEA reports on current strategies in Belarus is limited.

On the Ukrainian side:

- Ukraine's Development Strategy until 2030 - the document aims to achieve European living standards and a dignified position of Ukraine on a global scale,
- Basic Principles (Strategy) of the State Environmental Policy of Ukraine until 2030,
- State development programme of the Ukrainian Carpathians for 2020-2022,
- On the Goals of sustainable development of Ukraine for the period up to 2030 (President Decree),
- National Strategy of Regional Development 2021-2027,
- National Transport Strategy of Ukraine until 2030,
- The Concept of Implementation of State Policy in the Field of Climate Change until 2030,
- The Concept of Combating Land Degradation and Desertification,
- National Strategy of Waste Management in Ukraine until 2030,
- Low Emission Development Strategy of Ukraine until 2050,
- Existing strategic papers at regional and local level.

The analysis of the aforementioned documents and the associated environmental reports was aimed at identifying:

- main objectives and the main types of projects envisaged for implementation under the documents subject to environmental impact assessment;
- the main types of impact, detailing cumulative and cross-border impacts;
- indicated measures to prevent, reduce or compensate negative environmental impacts;
- the proposed indicators for monitoring the effects of the implementation of the provisions of the document subject to strategic environmental assessment.

The information contained in the above-mentioned documents was used for environmental impact analyses and significantly supported the assessment in terms of impact on people, natural elements and water.

A review of the records and recommendations contained in the above-mentioned documents indicates the following, similar in most studies, typology of impacts:

- fragmentation of landscape, habitats; creation of barriers and narrowing of the area of land available for moving animals;

- deforestation, changes in land use structure;
- changes in water conditions (drainage, soil irrigation);
- impact on water balance;
- intensified surface run-off;
- emissions of gaseous and dust pollutants;
- noise emissions;
- increase in anthropopressure in the areas adjacent to the investments.
- The group of identified cumulative impacts includes:
    - intensification of pressure against natural qualities and values;
    - pressure on the natural features of the landscape;
    - increasing the so-called barrier effect, i.e. hindering the free movement of animals.

The analyses carried out also indicated certain positive aspects of the implementation of measures indicated in planning documents and the Programme, including inter alia protection of the natural environment, including biodiversity, reduction of air pollutant emissions, including greenhouse gases, which will reduce the negative impact of air pollution on human health and the environment. It was also important to focus actions on adaptation to climate change, including counteracting the effects of natural disasters.

The work on the Environmental Report also analysed the measures minimising the negative environmental impact indicated in the above mentioned environmental reports, which were used to supplement the developed recommendations.

Some of the above-mentioned strategic Belarusian documents emphasize that the solution of the environmental problems is complex and often conflicts with economic and social issues. In this regard, more attention needs to be paid to the development of classification and methods of economic assessment of ecosystem services of terrestrial and aquatic ecosystems. The use of economic assessment of ecosystem services meets the sustainable development goal 15.9 and can be used to substantiate the effectiveness of investments in environmental management and to make optimal management decisions. This is especially true for projects affecting specially protected natural areas, resort areas, objects of cultural and natural heritage.

In Belarus, a rather problematic area is the preservation of cultural heritage. If objects of cultural heritage of worldwide and international importance receive enough attention in the framework of the implementation of state programmes or international assistance, then objects of national and local importance receive much less attention and the condition of many of them deteriorates. This also applies to natural objects (for example, green areas, water bodies, etc.) that are part of the heritage sites. In this regard, a necessary measure is the complete exclusion of the implementation of projects at these facilities in case of non-compliance with environmental safety requirements or the possibility of bypassing them.

In ensuring environmental safety, an important direction is the transition to rational models of consumption and production. In this regard, priority attention should be given to the development of high-tech industries, improving the environmental safety of territories by optimizing the location of production facilities and preserving natural complexes. Sustainable agriculture, optimization of the structure of agricultural lands, organic farming, rational use of peat soils, improvement of technologies for the accelerated restoration of degraded bog ecological systems are important.

5.6. INFORMATION ABOUT THE POSSIBLE CROSS-BORDER IMPACT ON THE ENVIRONMENT

The rules of procedure for environmental impact assessment in a transboundary context are laid down in the Espoo Convention on Environmental Impact Assessment in a Transboundary Context[85] and further specified in the Polish EIA Act. Pursuant to Article 104 thereof, '*where it is found that a significant transboundary impact on the environment may originate in the territory of the Republic of Poland, as a result of the implementation of the draft policies, strategies, plans or programmes, the procedure for the transboundary impact on the environment shall be carried out*'. The basis for undertaking the cross-border assessment is stating the possibility of a significant negative impact as a result of implementation of any of the measures indicated in the Programme or a demand of an interested party. As part of the works on the Report, the possibility of the occurrence of environmental impacts in the cross-border context was assessed, understood as the impact of projects indicated in the Programme on the neighbouring countries and between the countries participating in the Programme.

The potential cross-border impact of activities depends primarily on:

- project location,
- the nature of investments that are planned for implementation,
- the impact range of the proposed projects at the stage of implementation, operation and in the event of possible failures.

The projects eligible for support under the Programme that may have a cross-border impact on the environment include, first of all, investments in the field of water management. As part of the study, projects specified in the Programme (with specified locations and characteristics) LIP as well as potential projects whose location and characteristics were not specified were analysed in detail from the point of view of the above mentioned considerations.

On the basis of the analyses, no possible negative cross-border impacts on the environment were found for both individual projects and the entire Programme.

However, as for some of the measures covered by the Programme no specific projects (location and characteristics) except LIP were identified, but their potential types were used in a hypothetical way, only after their location and type has been identified, it is possible to determine precisely the type and potential scope of environmental impact and to assess their cross-border impact. As only projects which may have a significant impact on the environment may be affected, an EIA report will have to be carried out for such projects in accordance with the requirements of the Directive and national legislation. In these reports, an analysis of cross-border impact should also be carried out, in which such impact will be identified. However, on the basis of current analyses, identification of such impacts is unlikely.

5.7. SOLUTIONS ENVISAGED TO PREVENT, REDUCE OR OFFSET ANY SIGNIFICANT ADVERSE EFFECTS ON THE ENVIRONMENT WHICH MAY RESULT FROM THE IMPLEMENTATION OF THE PROGRAMME

Potential negative impacts of projects implemented under the Programme can be reduced by applying appropriate administrative, organisational and technical recommendations. On the basis of conducted analyses of the state of the environment, as well as problems and challenges it is possible to indicate the most important ones that should be met by the projects undertaken by the investors.

[85] Journal of Laws of 1991, item 1110

Meeting the recommendations should contribute to ensuring that the projects conducted under the Programme will be pro-ecological, oriented to minimise burdensome impact on the environment and human health, or projects having a positive impact on the environment.

Recommendations were systematised as general ones referring to formal and legal requirements, planning-strategic, technical-technological, social, health, environmental and environmental management requirements and those referring to particular priority directions of the Programme.

Many of these recommendations are obvious and widely used, but they are all quoted for completeness and to give non-specialists in each field an idea of the comprehensive approach to the strategic evaluation of the Programme.

Formal and legal recommendations:

- preliminary assessment (screening) of projects qualified to the group of projects likely to have a significant impact on the environment or on the Natura 2000 area;
- assessment of compliance with environmental quality standards in the implementation phase of a project and after its completion;
- conducting an analysis of compliance with the emission standards in the case of emissions into the environment.

Planning and strategic recommendations:

- carrying out analysis of compliance with existing (at the time of project evaluation) strategies and national programmes for the environmental protection;
- analysing compliance with the existing (at the time of project evaluation) land use plans;
- in the case of undertakings related to the use of water, that may affect the status of water: analysis of compliance with water management plans for river basin;
- in the case of projects related to the use of water, that may affect the status of water: an analysis of compliance with the conditions of water use in the water region or basin area (if such exist at the time of project assessment);
- in the case of undertakings located in areas at risk of flooding, assessment should be carried out relating to their impact on increasing flood risk, and their vulnerability to flooding.
- in the case of projects involving air pollutant emissions, analyse compliance with air protection programmes for zones where air quality standards are exceeded.

Technical and technological recommendations:

- application of best available techniques especially where the project includes construction or modernisation of installation that is likely to have significant impact on the environment as a whole;
- promoting the use of eco-innovation, that reduces negative impacts on the environment;
- application of solutions that ensure savings in energy and raw materials, including water;
- implementation of low- and non-waste technologies;
- respect for the hierarchy of waste management practices and waste prevention according to the principles of circular economy;
- the use of appropriate methods of wastewater treatment and waste management, in particular to ensure their proper state and composition before their discharge into the environment;
- in the case of projects the implementation of which causes interference with nature or leads to reduction in the retention capacity of the basin - using appropriate compensatory solutions.

- in the case of projects involving civil works, the use of construction techniques that ensure the reduction of the area occupied by the construction, the use of low-invasive methods in connection with earthworks, the reduction of local environmental impact, dust, noise and the possibility for water pollution;

Health and social recommendations:

- providing full information to the public about the impact of the project on the environment - at the stage of implementation and after completion of the project;
- undertaking a pre-investment dialogue, minimisation of environmental and social conflicts related to the implementation of the project;
- minimisation of the population exposed to the impact of factors that are harmful to health (air pollution, noise) and that are generated by the undertaking;
- application of good practices and mitigation measures during the investment works (construction).

Natural recommendations:

- minimising disruptions within ecosystems (e.g. intersections of ecological corridors, fragmentation of ecosystems);
- avoiding interference and transformation of Natura 2000 habitats that are at the higher risk of losing biodiversity in the EU: coastal habitats, wetlands and meadow areas;
- preservation of landscape in case of projects that may cause conflicts of nature and landscape (also taking into account the exposure of heritage objects);
- consideration of the need to conduct environmental compensation, where appropriate;
- taking into account the need of pre- and post-implementation monitoring for projects colliding with the needs of protecting species and natural habitats.

Recommendations for environmental management:

- adoption of adequate environmental monitoring methods, including: the base status, implementation, exploitation, as well as shutting down and decommissioning;
- application of a system approach to environmental management during construction and operation of facilities and infrastructure;
- proper identification of environmental aspects associated with the construction and operation of the above mentioned objects and infrastructure;
- application of the principle of continuous reduction of impact on the environment and human health in objects and processes, according to the principles of environmental management.

Taking into account the possible impact of potential projects under the Programme on individual elements of the environment, it was assumed that recommendations will be executed for individual project groups - from the point of view of minimising their impact on the environment. It should be noted, however, that the nature of the Programme is general and, therefore, the recommendations may seem general and widely known, nevertheless it was considered worthwhile to cite them as a starting point for the proposal of criteria for selection of solutions. In general, it can be concluded that they are included in the principles of eco-design. Recommendations for individual actions covered by the Programme to minimise effects, particularly on nature and other elements of the environment, are presented below.

5.7.1 Solutions for biodiversity, animals, plants and ecological corridors

In nature conservation practice, the creation of cross-border protected areas is not a new phenomenon, but has undoubtedly gained in popularity in recent years. This trend fits in perfectly with regional integration processes, which are present in almost every region in the world. It is not only an opportunity to increase the effectiveness of management in areas of extensive ecosystems, but also to achieve additional benefits associated with the development of tourism or promotion of international cooperation[86]. This phenomenon is also perfectly in line with the change in the approach to nature conservation: from protection of isolated areas to protection of landscape - areas remaining in a network, connected with each other by ecological corridors. The creation of cross-border areas perfectly complements this vision.

In order to preserve biodiversity, it is important to preserve primarily rare species and natural habitats and to maintain both the internal integrity of individual areas and external integrity 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 human and nature function best in relationship with each other. The purpose of the network is not to systematically exclude economic activities from its boundaries, but rather to set parameters according to which these activities may be undertaken, while protecting valuable species and habitats in the area. **It should be stressed that the ecosystems existing in the Polish, Ukrainian and Belarusian part of the Programme Area permeate one another and the formal boundaries are not important for the functioning of the ecosystems.** In case of species with large geographic range limits such as brown bear, wolf, lynx and European bison, regional populations of these animals often extend beyond national borders. In such circumstances, it is difficult for one Member State to manage and ensure the conservation of its large carnivores in the absence of joint and convergent action by its neighbours. For this reason it is important that neighbouring Member States with border populations of large carnivores (sub-populations) develop integrated management plans for these populations.

Therefore, prevention, limitation or natural compensation of environmental effects which may result from the implementation of the Programme should first of all be connected with an appropriate, least environmentally harmful determination of the course of each investment. Methods of preventing, limiting and compensating for negative impacts on biodiversity, plants, animals and Natura 2000 sites for projects that may have a significant impact on the environment, which may be implemented under the Programme, is presented in Table 15. Pursuant to the Act on Nature Conservation (Art. 34),[87] nature compensation may be performed only if a significant negative impact on the subject of protection of Natura 2000 area or its integrity is found, there is no alternative solution and the overriding public interest of the investment is proven; if all methods of avoiding and minimising the impact of the investment have been used; and it should be adequate to the scale of damage. When considering the location of compensatory measures, care should be taken to ensure that the following conditions are met:

- reconstructed area must be located outside the impact range (but as close to the affected area as possible);
- in the same biogeographical region and so that it can fulfil the same functions;
- structures and processes of the reconstructed area are to be as close as possible to the previous conditions.

[86] Dudek A. 2014. 'Cross-border protected areas - problems and opportunities for cooperation'. Works and Geographical Studies 54: 139-147.
[87] The Nature Conservation Act of 16 April 2004, Journal of Laws of 2004, No. 92, item 880 Art. 34

Compensatory measures must not endanger other Natura 2000 areas - they cannot be compensated at the expense of their own conservation objectives.

When deciding on the location of a given investment, its reconstruction or extension, consideration should be given to the following:

- where important, large, undivided habitat areas are located;
- how ecological corridors of different rank and ecological importance run;
- what species of plants and animals occur in specific places;
- how the traditional and seasonal movements and migrations of animals proceed.

Mitigation solutions in this scope should be specified in detail at the stage of drawing up the environmental impact report for particular investments (if such a report is required). The main tasks and procedures commonly applied and allowing to reduce the negative impact (if any) on natural components are indicated below:

- nature inventory of the site prior to the start of the project;
- adjusting the timing of works to the breeding periods of animals and the phenological periods in the case of natural habitats;
- restriction of land occupation so as to cause the least possible interference with Annex I habitats of the Habitats Directive and habitats of protected species;
- providing nature supervision during the works;
- application of solutions allowing maximum naturalisation of bank reinforcements and embankments, crossings and culverts;
- reducing tree and shrub removal to a minimum;
- fencing of the construction site to protect reptiles and amphibians;
- implementation of compensatory measures - e.g. relocation of valuable specimens of plant species to another favourable location under appropriate supervision;
- protecting the work area against infiltration of pollutants into water and soil;
- securing root systems during earthworks;
- vibration reduction;
- ensuring the patency of migration corridors for bats by maintaining rows of trees and shrubs;
- creation of replacement breeding sites (small retention reservoirs) for birds.

Among the mammal species special attention should be paid to rare species of bats. On the other hand, even if individual potential effects will occur under the Programme, they will not be significant considering the scale of the Programme. Following the application of appropriate mitigation measures (use of adequate safeguards, minimization of noise intensity) during construction it will not differ in its nature from any other construction project (road, residential or industrial). The deterrent effect, leading to the abandonment of feeding grounds or flight routes (particularly in spring and summer for sedentary bats), and the barrier effect on migration routes, are very poorly understood.[88] The use of lamps to illuminate construction sites is a major problem for bats whose food is insects attracted by light. The problem mainly concerns all species of serotine bats (Eptesicus sp.), pipistrelles (Pipistrellus sp.; especially the tiny P. pipistrellus) and common noctule (Nyctalus noctula). In order to reduce the adverse effect of attracting bats to the area of developments under construction/reconstruction/expansion, lighting should have as low intensity as possible, a warm colour and should be directed only towards the element it is to illuminate. It is also important to ensure that the duration

[88] Entwistle A. 2001. Habitat Management for Bats. Red. Joint Nature Conservation Committee.

of lighting is appropriate to the time of year and that the light source is protected/covered to avoid creating an 'ecological trap' for insects. The problem of the impact of lighting on bats may only concern the spring-summer-autumn period. In winter, when the nights are longest and the time needed to illuminate sites is longer, both bats and insects overwinter in their roosts. However, there may be occasional flights within the complex between individual wintering sites. In the case of bat population protection, compensation measures should be planned in the long term and selected in such a way as to actually compensate for the lost sites. It should be proposed that underground sites located away from planned investments are adapted for hibernation and swarming, thus providing replacement sites for the bats.89. The loss of summer roosts in tree hollows, on the other hand, can best be compensated for by setting up roosts in neighbouring woodlands or old-growth forests.

In order to reduce the potential risk of loss of local populations of amphibians and reptiles, mitigation actions should be implemented already at the planning stage. At the stage of construction works it is important to secure construction sites and places in their area that can be dangerous for amphibians and reptiles (wells, excavations), as well as to create substitute breeding sites (small retention tanks).

Undoubtedly, one of the most important solutions for the preservation of biological diversity (plants, animals and ecological connectivity) under the implemented cross-border cooperation Programme is to raise the ecological awareness of the society on the importance of preserving biodiversity for maintaining the quality of the natural environment and ensuring the sustainability of natural processes. A conscious attitude of people, characterised by responsibility for the condition of the natural environment with which (and in which) they coexist, should result precisely from reliable knowledge and determination to preserve it in the least changed state possible. The determinant of ecological awareness is respect for nature, adherence to the principles of nature protection and counteracting environmental threats. Ecological knowledge, i.e. knowledge of the relationships and laws governing nature, allows for its effective protection.

Out of the general challenges of the environmental protection, those concerning the need to maintain ta high level of ecological diversity were highlighted. It concerns above all the protection and restoration of proper condition of species and habitats, maintenance of ecological connectivity (system of ecological corridors) and restoration of proper water and air quality. It was indicated that withdrawal from the implementation of the Programme will mean weakening of the implementation of environmental protection objectives in the context of a broader perspective on these issues. Failure to implement the Programme will contribute to the consolidation of negative trends in the environment.

It was concluded that the planned road projects, by improving the efficiency of the road network in the borderland, are also beneficial from an environmental point of view, as they will improve accessibility of the area and reduce transport costs. In view of the scale of the funding and the much broader objectives than just environmental protection, it should not be expected that the Programme will solve the numerous problems of environmental protection in the region. It should be treated as a step in the right direction.

It was pointed out that some of the measures included in the Programme implementation, especially infrastructure projects related to construction works, have been implemented worldwide for decades. Therefore, in terms of generated environmental effects, they are very well researched and do not generate effects not known or insufficiently studied so far. In addition, their environmental impacts are similar to those

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

generated by projects in other industries related to infrastructure construction. Therefore, there are no major technical shortcomings and gaps in the contemporary knowledge both at the stage of their implementation and operation. Nevertheless, each of the projects listed in the Programme is or will be implemented in specific local conditions generating more or less significant impacts, while the full environmental impact assessment will consist of individual conciliation procedures for major projects in accordance with the principles of EIA procedures in individual countries.

Table 15. Ways of preventing, reducing and compensating negative impacts on biodiversity, flora, fauna and Natura 2000 sites of undertakings likely to have a negative impact on the environment, which may be implemented under the Programme

Phase	**Ways of preventing, limiting and compensating negative impacts, alternative actions**
Types of projects: **Adaptation of urban areas to climate change** **Construction, reconstruction or renovation of water facilities and associated infrastructure serving to reduce the effects of floods or drought** **Small retention facilities**	
implementation	- nature inventory of the site prior to the start of the project (if required); - taking landscape protection into consideration 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 retention capacity should be restored first; - restriction of land occupation so as to cause the least possible interference with Annex I habitats of the Habitats Directive and habitats of protected species; - adjusting the timing of works to the protective periods of animal breeding; - implementation of compensatory measures - e.g. relocation of valuable specimens of plant species to another favourable location under appropriate supervision; - where possible, removal of the soil layer for the protection against pollution and its re-use; - securing the construction site to protect reptiles and amphibians; - ensuring the patency of migration corridors for bats; - protecting the work area against infiltration of pollutants into water and soil;

Phase	Ways of preventing, limiting and compensating negative impacts, alternative actions
	- implementation of compensatory measures - e.g. relocation of valuable specimens of plant species to another favourable location under appropriate supervision; - conducting construction works in a manner compliant with the principles of water protection (including the Water Framework Directive) and outside the animal breeding season; - reducing tree and shrub removal to a minimum; - carrying out works relating to tree removal outside the breeding season; taking into account the need of pre- and post-implementation monitoring for projects colliding with the needs of protecting species and natural habitats
Types of projects: **Construction and modernisation of infrastructure necessary to capture, treat, store and distribute drinking water, including those related to adaptation to climate change** **Wastewater treatment plants** **Sewerage system** **LIP 5 Construction of 60 km of water supply network in Svitiaz, Pulmo and Shatsk equipped with a water treatment plant, construction of a water treatment plant in Rivne and Hoshch, reconstruction of the sewage treatment plant in the village of Kvasiliv, reconstruction of the water supply in Svalyava, construction of the sewage system in Lipina Nowa and Zawody, improvement of the work of the sewage treatment plant in Skierbieszów and cleaning works at the Tarnopol reservoir.**	
implementation	- running new installations in a way that prevents (or minimises) cutting and fragmentation of valuable natural structures, including protected areas and unprotected areas with high natural values; - construction work performance in a manner ensuring water protection; - fencing of the construction site to protect reptiles and amphibians; - adjusting the timing of works to the breeding periods of animals and the phenological periods in the case of natural habitats; - efficient execution of the works and limiting to the minimum the zone of direct interference with the environment in order to reduce the time and scope of possible negative impact on the environment; - limitation of construction works and transformation of the land surface to the necessary minimum, removal of soil layer and turf in order to protect it from contamination and reuse or application of jacking technologies in case of

Phase	Ways of preventing, limiting and compensating negative impacts, alternative actions
	sewerage networks; - where flushing and pressure testing with water is necessary, verify that no treatment of waste water is required before discharge into the environment; - reducing tree and shrub removal to a minimum; - ensuring protection of trees from damage during the construction works; - implementation of compensatory measures - e.g. relocation of valuable specimens of plant species to another favourable location under appropriate supervision;
operation (exploitation)	- implementation of a sewage network monitoring system, and in the case of installation, protection against failure
Types of projects: **Tourism projects** **LIP 1 Construction of bicycle infrastructure on routes: Mikaszówka - Rudawka and Grodno - Racicze** **LIP 6 Carpathian narrow-gauge railway Majdan – Dołżyca**	
implementation	- nature inventory of the site prior to the start of the project (if required); - securing the construction site to protect reptiles and amphibians; - protecting the work area against infiltration of pollutants into water and soil; - adjusting the timing of works to the breeding periods of animals and the phenological periods in the case of natural habitats; - implementation of compensatory measures - e.g. relocation of valuable specimens of plant species to another favourable location under appropriate supervision; - reduction of construction works and soil transformation to a necessary minimum; - reducing tree and shrub removal to a minimum; - 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 planting, reconstruction of destroyed green areas in the vicinity of the investment;

Phase	Ways of preventing, limiting and compensating negative impacts, alternative actions
	- ensuring the patency of animal migration corridors.
operation (exploitation)	- controlling and, if necessary, limiting the intensity of tourist traffic - periodic clean-ups of areas along the bike trail and narrow-gauge railroad, increased number of toilets and trash receptacles; - educational activities (e.g. installation of information boards) informing about appropriate behaviour.

5.7.2 Ways of preventing and limiting negative impact with respect to other elements of the environment (apart from nature - described above)

The methods of preventing and limiting the negative impacts of projects that may be supported under the Programme on other elements of the environment, apart from nature, which have been discussed in greater detail above, are presented below. As the Programme is of a general nature and only some of the projects have a general location, the recommendations given below are also of a general nature and refer to possible types of projects which may be supported within the Programme.

In terms of impact on water

As a result of the implementation of measures included in the Programme, negative impact on the aquatic environment may occur. Therefore it is proposed to carry out the following actions mitigating or compensating possible negative impact at the stage of implementation and operation:

- applying water-saving solutions to each investment,
- protection against the migration of pollutants into water which may arise as a result of modernization and construction works,
- providing special care for construction equipment in use to avoid leakage of operating fluids into the ground,
- securing fuel tanks and fuel distribution area,
- at the construction design stage, performing simulations determining the actual thickness of the Quaternary aquifer, the lithological variability, as well as taking into account the periodic reduction in recharge of the aquifer and of the operation of the nearest groundwater intakes.

Methods of prevention and limitation of the impact on water should be specified in detail during the analysis of the environmental impact of individual types and kinds of projects.

In terms of impact on air and climate

Implementation of mitigation measures with respect to air and climate protection in investments planned within the Programme will be connected with application of solutions both at the stage of implementation and then exploitation. At the implementation stage impacts will be short-term and will end after the construction period. The impact during operation will be more noticeable than at the stage of implementation, however, the reduction of negative impact that can be proposed at the strategic environmental assessment stage is limited.

On the basis of the impact analysis carried out in this report, the following solutions to minimise the negative impact may be proposed:

- cleaning of vehicle wheels before leaving the construction site for the road to reduce secondary air pollution,
- application of appropriate techniques to reduce air emissions (use of low-emission machinery, vehicles and equipment),
- management of green areas along vehicular roads, including the use of 10-20 m wide isolating green belts using evergreen species,
- protection of greenery, especially urban greenery,
- preferring low-carbon solutions, e.g. in transport,
- application of best available technologies (BAT) to ongoing projects.

In terms of impact on land surface, geological resources, soils

Negative impact on land surface and soil will be mostly related to the projects transforming land surface and occupying the land. These impacts will occur during construction as well as later, during the operation of the constructed facilities. Below, it is proposed to consider the following actions in order to minimize the negative impacts:

- minimising the zone of direct interference of construction works,
- minimise the area allocated for construction backup facilities and protect storage and parking areas from emergency spillages of fuel and lubricants,
- proper preparation of neutralizing materials in the event of possible leaks or failures, both at the stage of implementation and operation,
- adequate preparation of impervious areas for temporary storage of waste generated as a result of demolition works and during construction works,
- the movement of construction machinery and transport vehicles on strictly defined access routes,
- appropriate storage of contaminated land, soil layers and humus,
- recultivation of sites degraded during the works,
- use of the topsoil secured during construction,
- application of green cover along routes adjacent to soils to be cultivated,
- application of technologies limiting the range of the working drainage,
- adequate equipping of asphalt and concrete roads and yards with devices to capture pollutants from rainfall run-off and snowmelt water.

In terms of impact on people

The mitigation measures proposed below may reduce negative impact on human health and safety to some extent:

- appropriate conduct of construction works to eliminate excessive emissions of nuisance pollutants, noise and vibration,
- space efficiency,
- using road surfaces that limit acoustic nuisance, using green belts along the roads, using noise barriers as a last resort,
- modernization of the road surface and elimination of critical points on roads,
- equipping roads with alarm systems enabling quick access to an accident and removal of its consequences,

- protection, where possible, against animal intrusion into the road,
- traffic light operation optimization.

In terms of impact on the landscape

Considering the negative impact on landscape of some of the projects and measures planned for implementation, it is necessary to take into account the introduced changes to the landscape and, in particular, the conditions set out in the landscape protection areas - landscape parks and landscape conservation areas, taking into account the restrictions indicated in the documents establishing the said areas, as well as the objectives of protection of individual areas. It is proposed to consider the following solutions to limit the negative impact on landscape of projects implemented under the Programme:

- taking into account in the construction project the visual effect of the separation of the communication route/associated object from the cultural heritage objects by using landscape shields in the form of slopes, earth embankments or isolating greenery in order to protect the display values,
- for reasons of protection of the natural and cultural landscape, the use of massive noise barriers should be considered outside the areas of dense residential development, and in such cases their integration into the transformed landscape should be taken into account,
- regulation of waste handling before the start of construction work,
- to ensure that the share of recovered waste in the overall waste generated is as high as possible and to maximise the amount of waste recovered on site,

In terms of impact on heritage objects and material assets

The impact of projects implemented under the Programme on material assets and heritage objects may be minimised through the following:

- the what-if analysis (analysis of alternatives) and the choice of an optimal location for the investment as well as an appropriate selection of technologies and safeguards at the stage of the technical, economic and environmental study, an element of which is, among other things, the environmental impact report,
- application of measures to reduce the impact of vibrations on heritage objects in the vicinity of the works,
- conducting construction works in a way that reduces the impact of air pollution on heritage objects,
- preventing new developments from obscuring heritage objects and not impeding access to them.

6. ALTERNATIVE SOLUTIONS TO THE SOLUTIONS INCLUDED IN THE PROGRAMME

The Environmental Report, in accordance with the SEA Directive must present alternatives to the solutions of the draft document, taking into account the objectives and the geographical scope of the document, the objectives and subject of protection for Natura 2000 areas and the integrity of the area. Alternatives to the solutions should contain reasons for their selection, and a description of evaluation methods leading to this choice or explanation for the absence of alternative solutions, including any difficulties encountered due to technical deficiencies or gaps in modern knowledge.

Taking into account that the Programme is of a general nature and that only LIPs have a general location, as well as the fact that it was agreed with the parties involved in it, it was not possible to present an alternative version of the Programme which could have a less negative impact on the environment. In this situation, the Environmental Report presents the locations of protected areas, their protection objectives, as well as the

places of possible accumulation of impacts. This provides an opportunity for approximate assessment of the possibility of applying alternatives at the stage of selection of specific projects for implementation and their design in order to eliminate or reduce their negative environmental impact in the indicated areas. These indications could be used in the selection of projects or their variants at the stage of Programme implementation.

At present, only the following alternative option can be considered in relation to the currently proposed version of the Programme - modification of the Programme in the direction of increasing the allocation of funds for activities in the field of mitigation of negative effects of climate change and protection of nature-value areas, because, as it results from the analyses, the needs in this respect are justified by high natural values of the region; also there are important environmental issues in the region, which require actions. However, it should be taken into account that the Programme was jointly formulated and its amendment would have to be accepted by all parties to the Programme, which is doubtful. Moreover, the Programme covers many elements of cooperation in the region and not only the environmental area. Besides, as it was presented in the Environmental Report, its impact on the environment is generally small. It also seems that the draft Programme adequately considers the allocation of funds in relation to the needs of the region.

7. PROPOSED METHODS OF EVALUATING THE EFFECTS OF THE PROGRAMME IMPLEMENTATION

During the implementation of the Programme the most important are the process control, and impact assessment of the tasks covered by the financial support within the specific areas of intervention. Therefore, it is necessary to develop proposals of the analysis methods that will allow to evaluate implementation process and control realisation of the objectives established under the Programme, i.a. through monitoring of the environmental effects and changes in the environment. However, the Programme is developed on a high level of generality, and it does not specify all projects, except LIPs, that will be funded, nor their specific location. Moreover, it should be noted that it has limited impact on solving environmental problems as well as reducing negative impact, due to its specific financial and material scope.

Moreover, in the area covered by the Programme, in all participating countries, other investments resulting from other programmes and activities are implemented. Therefore, it is proposed to conduct monitoring of its environmental impact at two levels and based on the following data sources:

- monitoring changes in the load of pollutant emissions on individual components of the environment, i.e. the so-called pressure on the environment[90] - on the basis of data on the implementation of selected Programme undertakings related to the implementation of investments in the field of wastewater treatment, sewage systems, small retention or infrastructure.

- monitoring of changes in the environment - based on the analysis of the measurement results obtained in the framework of regional and national monitoring in particular countries. However, it should be noted that in countries participating in the Programme there are different environmental monitoring systems in terms of monitored elements and the period of their assessment, which are often incomparable.

[90] According to the DPSIR model (driving forces - pressures - state - impact - response)

As other investments will be implemented in the area covered by the Programme, monitoring of changes resulting from implementation of the Programme should cover the area/catchment which will be affected by implementation of undertakings supported by the Programme, provided that adequate data in this respect are available. In cases of deterioration of the condition of any element of the environment, it is suggested to analyse the reasons and to determine whether it is not a result of the implementation of the Programme.

Moreover, it should be noted that a number of investments classified as undertakings which may always or potentially significantly affect the environment will be implemented under the Programme. Therefore, they will be subject to project-specific environmental impact procedures (EIA), which may result in the need to monitor the effects of those individual undertakings.

As comparable data from particular countries will not always be available, in monitoring the effects of the Programme implementation it is also worth to use the assessments made by the European Environment Agency and refer to the given indicators in the assessment of the state of the environment presented in section4.

A proposal of indicators for evaluation of effects of the Programme implementation has been included in the table below. Some of the indicators presented here will result from the implementation of undertakings carried out under the Programme, while the remaining ones are indicators determined within the regional and national monitoring systems.

Table 16. Suggested indicators for monitoring the effects of the Programme implementation

Indicator	Unit	Data Source
Surface area of new or upgraded green infrastructure	ha	Implementation reports
Population additionally connected to mechanical and biological wastewater treatment plants	number	Implementation reports
Additional small retention capacity	m^3	Implementation reports
Number of implemented projects related to the protection of protected areas, including biodiversity	number	Implementation reports
Number of water bodies where quality improvement/deterioration occurred in the catchment area covered by the projects of the Programme (if such data are available)	number	National or regional monitoring + implementation reports

Indicator	Unit	Data Source
Number of protected areas where projects concerning their protection and biodiversity protection were implemented	number	National or regional monitoring + implementation reports

8. CONCLUSIONS

On the basis of analyses, within the framework of preparing the Environmental Report on the Cross-border Cooperation Programme Poland-Belarus-Ukraine 2021-2027 the following conclusions can be formulated:

- It is assessed that the Programme, as a whole, will have a positive impact on the environment and help solve a number of issues concerning the state of the environment in the region. Nevertheless, some of the supported areas, especially as regards water and wastewater management, may have significant negative impact on the environment or its individual components. Specific conclusions in this regard are presented in relevant sections of the Report. It should be noted, however, that it is possible to shape the planned projects in such a way as to eliminate, reduce or compensate for these impacts.
- As the draft Programme is formulated at a very general level, without specifying all the projects (location and characteristics) that can be supported, the Environmental Report can only indicate those sample projects which may have a significant negative impact on the environment, and which at the stage of preparing the investment will have to be subject to a detailed assessment, in accordance with the relevant regulations in force in the countries participating in the Programme.
- Bearing in mind the objectives and scope of the Programme, at the stage of development of this Environmental Report no significant negative impact on Natura 2000 and Emerald areas, including their integrity and coherence, was identified. It should be noted, however, that only 10 projects (LIPs) to be supported under the Programme were specified in detail. Therefore, a significant negative impact on Natura 2000 and Emerald areas cannot be ruled out in the case of individual investments, which can only be assessed at the design stage.
- The assessment of the environmental benefits resulting from the implementation of the Programme shows its great significance in solving the environmental problems of the region as well as the support in financing the environmental actions. Without the implementation of the Programme, the activities for the benefit of environmental protection would have to be significantly limited due to insufficient funds available for this purpose.
- On the basis of the analysis of the objectives of the EU strategic documents, it is concluded that the Programme implements the objectives of these documents, and in particular the objectives set out in the European Green Deal Strategy.
- Similarly, the analysis of the objectives of the strategic documents of Poland, Belarus and Ukraine showed that the Programme, in general, fulfils these objectives.
- On the basis of the analyses, no possible negative cross-border impacts on the environment were found for both individual projects and the entire Programme. However, as for some of the measures

covered by the Programme, except LIPs, no specific projects (location and characteristics) were identified, but their potential types were used in a hypothetical way, only after their location and type have been identified, it is possible to determine precisely the type and potential scope of environmental impact and to assess their cross-border impact. As only projects which may have a significant impact on the environment may be affected, an EIA report will have to be carried out for such projects in accordance with the requirements of the Directive and national legislation. However, on the basis of current analyses, identification of such impacts is unlikely.

- In order to limit negative impacts of the Programme on the environment, the principles of monitoring the effects of Programme implementation and a number of recommendations were proposed to reduce negative impacts of particular sample of projects that may be supported under the Programme or possible alternative solutions (in case of in-depth analyses of particular measures). Implementation of these recommendations will contribute to reduction of the negative impact on the environment.

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APPENDIXES

Appendix 1	Analysis of the coherence of the objectives of the draft Programme with the objectives of strategic papers on a global, EU, Polish, Belarus and Ukraine level
Appendix 2	Specific analyses
Appendix 3	Declaration