

# ENVIRONMENTAL MANAGEMENT PLAN

## DRAFT

### ODRA-VISTULA FLOOD MANAGEMENT PROJECT

Loan Agreement no. 8524 PL

Environmental category B – in accordance with WB OP 4.01

#### Component 3:

Flood Protection of the Upper Vistula

#### Subcomponent 3A:

Flood Protection of Upper Vistula Towns and Cracow

#### Contract 3A.2

##### FLOOD PROTECTION IN SERAFA VALLEY

##### **Works Contract 3A.2/1**

Flood protection in Serafa Valley – Malinówka 1 reservoir

##### **Works Contract 3A.2/2**

Flood protection in Serafa Valley – Malinówka 2 reservoir

<i>Issue</i>	<i>Date</i>	<i>Authors</i>	<i>Verified by</i>	<i>Client's approval</i>	<i>Description</i>
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## ODRA-VISTULA FLOOD MANAGEMENT PROJECT

co-financed by:

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– Loan Agreement no. 8524 PL,

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State Budget

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### **Component 3:**

#### **Flood Protection of the Upper Vistula**

### **Subcomponent 3A:**

#### **Flood Protection of Upper Vistula Towns and Cracow**

### **Contract 3A.2**

#### *FLOOD PROTECTION IN SERAFA VALLEY*

### **Works Contract 3A.2/1**

*Flood protection in Serafa Valley – Malinówka 1 reservoir*

### **Works Contract 3A.2/2**

*Flood protection in Serafa Valley – Malinówka 2 reservoir*

Environmental category B – according to OP 4.01 WB

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OVFM PIU

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**LIST OF BASIC DEFINITIONS AND ABBREVIATIONS APPLIED IN THIS EMP**

Name	Description
BGW	Body of Groundwater
BIOZ Plan	Health and Safety Plan developed based upon Article 21a item 4 of the Act of July 7, 1994 – Building Law Act
BOD <sub>5</sub>	Biochemical oxygen demand during 5 days
BSW	Body of Surface Water
CE	Contract Engineer
CEB	Council of Europe Development Bank <a href="https://coebank.org/en/">https://coebank.org/en/</a>
Consultant / Engineer / Consultant Engineer	Company or legal person providing services for the Investor Technical Assistance Consultant for the OVFM Project – AECOM Polska Sp. z o.o.
Contract / Contract 3A.2	Contract 3A.2 <i>FLOOD PROTECTION IN SERAFA VALLEY</i> comprising: Works Contract 3A.2/1 and Works Contract 3A.2/2
Contractor	Company or a legal person implementing the Contract 3A.2 – Works Contract 3A.2/1 and / or Works Contract 3A.2/2
Designer	Company or a legal person drawing up the design documentation
EIA	Environment Impact Assessment
EMP	Environmental Management Plan
Environmental Decision (ED)	Decision on environmental conditions
ESHS	Environmental, Social, Health & Safety System
ESMF	Environmental and Social Management Framework <a href="http://odrapcu.pl/doc/OVFMP/Environmental_and_Social_Management.pdf">http://odrapcu.pl/doc/OVFMP/Environmental_and_Social_Management.pdf</a>
GDOŚ	General Directorate for Environmental Protection
H&S	Health and Safety
IMGW-PIB	Institute of Meteorology and Water Management National Research Institute
KZGW	National Water Management Authority
LA&RAP	Land Acquisition and Resettlement Action Plan
LSDP	Local Spatial Development Plan
MGR	Major Groundwater Reservoirs
MZMiUW	Małopolski Board of Amelioration and Hydraulic Structures in Cracow

Name	Description
PAD	Project Appraisal Document for the World Bank approval of a Loan to the Polish Government to implement OVFMP <a href="http://documents.worldbank.org/curated/en/320251467986305800/Poland-Odra-Vistula-Flood-Management-Project">http://documents.worldbank.org/curated/en/320251467986305800/Poland-Odra-Vistula-Flood-Management-Project</a>
PCU / OVFM PCU	Odra-Vistula Flood Management Project Coordination Unit <a href="http://odrapcu2019.odrapcu.pl/en/welcome/">http://odrapcu2019.odrapcu.pl/en/welcome/</a>
PGW WP	State Water Holding Polish Waters
PIO	Project Implementation Office – created within PIU separate organizational unit responsible for the implementation of Works Contract
PIU / OVFM PIU	Odra-Vistula Flood Management Project Implementation Unit
PIU / Investor / Employer (to December 31, 2017)	Małopolski Board of Amelioration and Hydraulic Structures in Cracow
PIU / Investor / Employer (from January 1, 2018)	State Water Holding Polish Waters in Warsaw, represented by the Director of the Regional Water Management Authority in Cracow / OVFM Project Implementation Unit
POM	Project Operations Manual prepared by the Odra Vistula Flood Management Project Coordination Unit, Wrocław 2015 <a href="http://www.odrapcu.pl/doc/POM_PL.pdf">http://www.odrapcu.pl/doc/POM_PL.pdf</a> the binding version is the English one: <a href="http://www.odrapcu.pl/doc/POM_ENG.pdf">http://www.odrapcu.pl/doc/POM_ENG.pdf</a>
Project / OVFMP / OVFM Project	Odra-Vistula Flood Management Project
RDOŚ	Regional Directorate for Environmental Protection
Roads authority	Agency responsible for management of public roads in accordance with the Act on public roads
RZGW	Regional Water Management Authority
Waste MP	Waste Management Plan
WIOŚ	Provincial Inspectorate for Environmental Protection
World Bank (WB)	International Bank for Reconstruction and Development <a href="http://www.worldbank.org/">http://www.worldbank.org/</a>
Works Contract 3A.2/1 Task 3A.2/1	Works Contract 3A.2/1 <i>Flood protection in Serafa Valley – Malinówka 1 reservoir</i>
Works Contract 3A.2/2 Task 3A.2/2	Works Contract 3A.2/2 <i>Flood protection in Serafa Valley – Malinówka 2 reservoir</i>

#### LIST OF ABBREVIATED TITLES OF LEGAL ACTS APPLIED IN THIS EMP

Titles, publication reference and abbreviated titles of legal acts quoted within contents of this EMP are given in the table below.

Abbreviated title	Full title (with publication reference)
<i>APC</i>	The Act of June 14, 1960 Code of Administrative Procedure (consolidated text: Journal of Laws of 2020, item 256)
<i>CC</i>	The Act of April 23, 1964 Civil Code (consolidated text: OJ of 2019, item no. 1145 as amended)
<i>LC</i>	The Act of June 26, 1974 Labour Code (consolidated text: OJ of 2019, item no. 1040 as amended)
<i>PC</i>	The Act of June 6, 1997 Penal Code (consolidated text: OJ of 2019, item no. 1950)
<i>BIOZ Regulation</i>	Regulation of the Minister of Infrastructure of June 23, 2003 on Information Concerning Safety and Health Protection and Safety and Health Protection Plan (Journal of Laws of 2003, No.120, item 1126)
<i>Regulation on the levels of noise</i>	Regulation of the Minister of Environment of June 14, 2007 on the permissible levels of noise in the environment (OJ of 2014, item no. 112)
<i>Regulation on the protection of fungi species</i>	Regulation of the Minister of Environment of October 9, 2014 on the protection of fungi species (OJ of 2014, item no. 1408)
<i>Regulation on the protection of plant species</i>	Regulation of the Minister of Environment of October 9, 2014 on the protection of plant species (OJ of 2014, item no. 1409)
<i>Regulation on the protection of animal species</i>	Regulation of the Minister of Environment of December 16, 2016 on the protection of animal species (OJ of 2016, item no. 2183)
<i>EIA Regulation</i>	Regulation of the Council of Ministers of September 10, 2019 on the investment that may significantly affect the environment (consolidated text: OJ of 2019, item no. 1839)
<i>Water MP</i>	Regulation of the Council of Ministers of October 18, 2016 on Water Management Plan for waters within the Vistula River Basin (Journal of Laws 2016, item 1911)
<i>Act on public roads</i>	The Act of March 21, 1985 on the public roads (consolidated text: OJ of 2018, item no. 2068)
<i>EPI Act</i>	The Act of July 20, 1991 on the Environmental Protection Inspectorate (consolidated text: OJ of 2019, item no. 1355 as amended)

Abbreviated title	Full title (with publication reference)
<i>Waste Act</i>	The Act of December 14, 2012 on the waste (consolidated text: OJ of 2019, item no. 701 as amended)
<i>EIA Act</i>	Act of October 3, 2008 on access to information on the environment and its protection, public participation in environment protection and environmental impact assessments (consolidated text, Journal of Laws of 2020, item 283, as amended)
<i>NP Act</i>	Act of April 16, 2004 on the nature protection (consolidated text, Journal of Laws of 2020, item 55)
<i>Act on heritage protection</i>	The Act of July 23, 2003 on the protection of heritage and on the care for heritage (consolidated text: OJ of 2020, item no. 282)
<i>SLI Act</i>	The Act of April 13, 2007 on the State Labour Inspectorate (consolidated text: OJ of 2019, item no. 1251)
<i>SSI Act</i>	The Act of March 14, 1985 on the State Sanitary Inspectorate (consolidated text: OJ of 2019, item no. 59)
<i>EPL Act</i>	The Act of April 27, 2001 Environmental Protection Law (consolidated text: OJ of 2019, item no. 1396 as amended)
<i>Building Law Act</i>	Act of July 7, 1994, Construction Law (consolidated text: Journal of Laws of 2019, item 1186, as amended)
<i>Water Law Act</i>	The Act of July 20, 2017 Water Law (consolidated text: OJ of 2020, item no. 310 as amended)
<i>Equal Treatment Act</i>	The Act of December 3, 2010 on implementation of some regulation of the European Union in reference to equal treatment (consolidated text: OJ of 2016, item no. 1219)
<i>Damage Act</i>	The Act of April 13, 2007 on preventing damages to the environment and their removal (consolidated text: OJ of 2019, item no. 1862)



## Summary

This Environmental Management Plan (EMP) refers to two Works Contracts under Contract 3A.2 *Flood Protection in Serafa Valley*, i.e.:

- Works Contract 3A.2/1  
*Flood protection in Serafa Valley – Malinówka 1 reservoir;*
- Works Contract 3A.2/2  
*Flood protection in Serafa Valley – Malinówka 2 reservoir.*

Contract 3A.2 remains a part of Subcomponent 3A implemented within *Odra-Vistula Flood Management Project* (OVFP), co-financed by the International Bank for Reconstruction and Development (World Bank), and by the Council of Europe Development Bank, European Union Cohesion Fund, and by the State Budget.

This EMP includes the following elements:

- Brief description of the OVFP Project (Chapter 1.1).
- Description of Contract 3A.2 and Works Contracts 3A.2/1 and 3A.2/2, to which this EMP refers to (Chapter 2).
- Institutional, legal and administrative conditions for implementation of the aforementioned Works Contracts with specified binding state legal acts on environmental protection, main stages of the EIA procedure, and also the current course of EIA procedure for the aforementioned Works Contract (Chapter 3).
- Description of individual elements of the environment in the area of the aforementioned Works Contracts (Chapter 4).
- Summary of the environmental impact assessment (Chapter 5).
- Description of mitigation measures to eliminate or limit the adverse impact of the aforementioned Works Contracts on the environment (Chapter 6), including a tabulated summary of those measures (Appendix 1 – Plan of mitigation measures).
- Description of environmental monitoring measures for the aforementioned Works Contracts (Chapter 7), including a tabulated summary of those measures (Appendix 2 – Plan of monitoring measures).
- Description of the course of public consultations on particular stages of environmental documentation development for the aforementioned Works Contracts (Chapter 8).
- Description of the organizational structure for implementation of the EMP (Chapter 9).
- Implementation schedule and description of reporting procedures (Chapter 10).

Appendices to this EMP include: a tabulated summary for the plan of mitigation measures (Appendix 1) and for the plan of monitoring measures (Appendix 2), the list of national legal acts related to environmental protection (Appendix 3), copies of decisions, resolutions, permits and / or notes referring to the environmental protection (Appendix 4), drawings showing the location of the Works Contracts (Appendix 5), a map presenting location of the aforementioned Works Contracts in reference to protected areas (Appendix 6), a map presenting location of the aforementioned Works Contracts in reference to environmental habitats and pro-

tected species occurrence sites (Appendix 7), and a map with location of the Works Contracts' elements (Appendix 8).

### **Characteristics of the Works Contracts**

Works Contracts 3A.2/1 and 3A.2/2 refer to the development of two small dry flood storage reservoirs Malinówka 1 and Malinówka 2 at the Malinówka Stream, in Małopolskie Province, within the District of the City of Cracow and in the District of Wieliczka, in Municipality of Cracow and in Municipality of Wieliczka.

Those reservoirs shall operate as a part of cascade comprising five small dry flood storage reservoirs in the Serafa river-basin: two at the River Serafa (the existing Biezanów Reservoir and the planned Serafa 2 Reservoir) and three at the Malinówka Stream (planned reservoirs: Malinówka 1, Malinówka 2, and Malinówka 3).

### **Scope of the Works Contracts**

The scope of Works Contract 3A.2/1 comprises the following elements:

- Development of a dry flood storage reservoir Malinówka 1 (with an area of about 6.2 ha), with an earth-fill front dam, earth-fill side dams, spillway and discharge facilities, and a stilling basin;
- Development of descend roads from the dams' crests;
- Development of band ditches;
- Development of an inflow channel and of a discharge channel to and from the spillway and discharge facilities;
- Removal of a section of the Malinówka Stream and of an oxbow lake in the dry reservoir's bowl;
- Development of measurement spots;
- Development of sectional sheet pilings replacing side dams for the dry reservoir;
- Provision of land grading in the dry reservoir's bowl;
- Development of four islands protecting environmental valuable trees in the dry reservoir's bowl;
- Redevelopment of storm drainage's outlets and of a ditch draining A4 motorway;
- Demolition and construction of sanitary canalization sections;
- Demolition of a water-supply connection and of a surface water-intake;
- Redevelopment of high-voltage overhead power lines.

The scope of Works Contract 3A.2/2 comprises the following elements:

- Development of a dry flood storage reservoir Malinówka 2 (with an area of about 2.3 ha), with an earth-fill front dam, spillway and discharge facilities, and a stilling basin;
- Development of ditches, including band ditches;
- Development of an inflow channel and of a discharge channel to and from the spillway and discharge facilities;
- Development of a crossing through a ford at the Malinówka Stream;
- Development of service roads and U-turn yards;
- Development of a culvert underneath a service road;

- Development of descend roads to the dry reservoir's bowl;
- Protection of outlets from pipings with non-return valves;
- Provision of land grading in the dry reservoir's bowl;
- Removal of a section of the Malinówka Stream and of two sections of ditches and a pond;
- Demolition of concrete elements in the dry reservoir's bowl;
- Removal of an inactive water piping and three surface water-intakes;
- Demolition and construction of sanitary canalization sections;
- Redevelopment of low-voltage overhead power lines.

### ***Need to implement the Works Contracts***

Implementation of Contract 3A.2, including Works Contracts 3A.2/1 and 3A.2/2, results from the necessary improvement of flood protection in the Serafa Valley (including areas of the Złocień Estate and of the Stary Bieżanów Estate in Cracow) and from the limitation of flood damage in those areas.

The works in question have been included on List no. 1 under item "ID 2\_177\_W" (ordinal number: 1017) in Appendix no. 2 titled "*Investments that do not affect reaching the good status of water adversely or that do not deteriorate the status of water*" to the MasterPlan for the Vistula river-basin (2014)<sup>1</sup>.

### ***Institutional, legal, and administrative conditions***

Works Contracts 3A.2/1 and 3A.2/2 are implemented in accordance with relevant state regulations on the environmental protection and in conformity with proper policies of the World Bank, while considering their characteristics, expected potential impact on the environment, and location in reference to the protected sites.

### ***Status of administrative procedures for the EIA***

In case of the Works Contracts in question, in the years 2012-2019 the following decision and administrative notes in the scope of environmental protection have been issued, e.g.:

- Decision of the Regional Director for Environmental Protection in Cracow dated October 29, 2012 (ref. no.: OO.4233.13.2012.BM) on environmental conditions.
- Resolution of the Regional Director for Environmental Protection in Cracow dated October 3, 2018 (ref. no.: OO.4220.5.10.2018.BM) stating that implementation of the planned Contract shall run in stages and that conditions determined in the decision on environmental conditions have not been modified.
- Resolution of the Regional Director for Environmental Protection in Cracow dated September 12, 2019 (ref. no.: OO.4220.5.28.2019.BM) clarifying doubts to contents of the decision on environmental conditions.
- Resolution of the Regional Director for Environmental Protection in Cracow dated September 16, 2019 r. (ref. no.: OO.4220.5.29.2019.BM) clarifying doubts to contents of the decision on environmental conditions.

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<sup>1</sup> See: description in the footnote in Chapter 1.

### ***Current condition of the environment surrounding the Works Contracts***

As a result of works done to identify values of the natural and cultural environment, it has been identified that the implementation area for Works Contracts 3A.2/1 and 3A.2/2 and its neighborhood are characterized by the following environmental conditions:

- Implementation area for the aforementioned Works Contracts is located within the boundaries of the Body of Surface Water (BSW), i.e. PLRW2000262137749 *Serafa*, and also within the boundaries of the Body of Groundwater (BGW) with a code PLGW2000148.
- Within the implementation area of the Works Contract 3A.2/1 and in its immediate vicinity there are no Natura 2000 sites or other areas and objects under protection based upon the Act on the Nature Protection.
- The implementation area of the Works Contract 3A.2/2 is partially located within the boundaries of protected area – Krzyszkowicki Forest ecological use land.
- Within the impact area of the Works Contract 3A.2/1 no protected natural habitats or protected species of plants and fungi were identified. Among the protected animals presence of 1 protected species of reptiles was identified (sand lizard).
- Within the impact area of the Works Contract 3A.2/2 2 protected environmental habitats (91E0 and 9170) and 1 species of plants under partial protection (red-stemmed feather-moss) were identified. Among the protected animals presence of the following was identified: 2 protected species of insects (buff-tailed bumblebee and red-tailed bumblebee), some protected species of amphibians (frogs of the green frog group, common toad, common frog, moor frog), 1 protected species of reptiles (sand lizard), several dozens of protected birds (including e.g. corn crane, black woodpecker, red-backed shrike), some protected species of bats (common noctule, common pipistrelle, and Brandt's bat/whiskered bat), and 3 protected species of non-flying mammals (Eurasian beaver, hedgehog, and squirrel).
- No heritage protected based upon regulations on the protection of heritage and on the care for heritage is present within the implementation area for the aforementioned Works Contracts. The area of planned development of Malinówka 1 and Malinówka 2 reservoirs is located within archaeological supervision zones.

### ***Summary of the environmental impact assessment***

#### ***Impact on land surface and landscape***

Implementation of the planned Works Contracts is associated with acquisition of land and with local logging of trees and shrubs, but those do not affect land surface and landscape adversely.

#### ***Impact on climate***

Implementation of the planned Works Contracts does not affect the condition of climate.

#### ***Impact on the quality of air***

Impact of the planned Works Contracts on the quality of air is limited in time to the construction stage and it is not significant.

#### Impact on soils and grounds

Implementation of the planned Works Contracts is associated with a permanent transformation of land surface (including soils and grounds) for the development of particular elements of reservoirs and accompanying facilities, as well as with a potential possibility of contamination of the subbase on the construction stage. On the operational stage the small dry flood storage reservoirs shall not affect the condition of soils and grounds. If the conditions determined in Appendix 1 to this EMP would be met properly, the performance would not affect the condition of soils and grounds adversely.

#### Impact on surface water and groundwater

Construction of the planned small dry flood storage reservoirs shall not affect the morphological continuity of the river, and shall also not affect water's hydromorphological, biological, and physical-chemical elements adversely. The performance is associated with a potential possibility of contaminating surface water and / or groundwater on the construction stage. On the operational stage the small dry flood storage reservoirs shall not affect the condition of surface water and groundwater adversely. If the conditions determined in Appendix 1 to this EMP would be met properly, the performance would not affect the condition of surface water and groundwater adversely.

#### Impact on acoustic climate

Impact of the planned Works Contracts on the acoustic climate is limited in time to the construction stage, and it is not significant.

#### Impact on biotic nature

Implementation of the planned Works Contracts is associated with the occurrence of impacts on vegetation and on fauna in the area. Those impacts – resulting mainly from the necessary acquisition of land, traffic of vehicles and machines in the construction period, and logging of trees and shrubs – shall be partially reduced due to the planned mitigation measures (along with the currently developed replacement tree planting program for the whole Subcomponent 3A of the OVFMP, referred to in Chapter 6.8), and in total they shall not affect the condition of protected habitats and species adversely in a regional scale. Implementation of the planned Works Contract 3A.2/1 does neither affect Natura 2000 sites nor other protected areas and objects. Implementation of the planned Works Contract 3A.2/2 shall partially be done within the boundaries of Krzyszkowicki Forest ecological use land, but – in accordance with the results of the Environmental Impact Assessment and the provisions of the environmental decision – it shall not result in significant adverse impact on the aforementioned protected area.

#### Impact on cultural heritage and material goods

Implementation of the planned Works Contracts does neither affect cultural heritage nor material goods adversely.

#### Impact on health and safety of people

The Works Contracts do not generate significant hazards to health and safety of people. They may emerge only in case of a failure, catastrophes, or other random events (such as e.g. leakage of pollutions, fire, finding of unexploded shells and misfires, flood). The EMP determines relevant conditions for prevention of such events and for mitigation of their potential effects.

### **Other ESHS hazards**

Regardless of the ones listed above, other ESHS related types of issues or hazards as accidents and near misses, cases of sexual harassment or mobbing, cases of labour law violation, cases of sexually transmitted diseases (including HIV/AIDS) or other infectious diseases (including those caused by coronaviruses), and others, may occur during implementation of the Works Contracts. This EMP determines relevant conditions to prevent hazards of those types and to efficiently react to the cases of their occurrence.

### ***Mitigation measures and monitoring measures***

Chapters 6 and 7 of and Appendixes 1 and 2 to this EMP described and present – in a tabular form – a set of mitigation measures and monitoring measures to eliminate or limit adverse impact of the planned Works Contracts on the environment, and to assure efficient implementation of the EMP's conditions. Those measures contain conditions determined in the binding decision on environmental conditions, as well as additional conditions provided on the stage of works on the EMP.

### ***Public consultations***

Chapter 8 of the EMP provides a relation of public consultations held under the EIA procedure for the planned Works Contracts, including the following:

- Public consultations held on the stage of issuing the environmental decision for the Contract comprising the planned Works Contracts (2012).
- Public consultations on the document titled *Environmental and Social Management Framework (ESMF)* for the OVFM Project (2015).
- Public consultations for this Environmental Management Plan (2020).



# 1 Introduction

This paper presents the Environmental Management Plan (EMP) for two Works Contracts under Contract 3A.2 *Flood Protection in Serafa Valley*, i.e.:

- Works Contract 3A.2/1  
*Flood protection in Serafa Valley – Malinówka 1 reservoir;*
- Works Contract 3A.2/2  
*Flood protection in Serafa Valley – Malinówka 2 reservoir.*

Contract 3A.2 remains a part of Subcomponent 3A implemented within *Odra-Vistula Flood Management Project* (OVFM), co-financed by the International Bank for Reconstruction and Development (World Bank), the Council of Europe Development Bank, by the European Union Cohesion Fund, and by the State Budget.

In reference to the environmental screening described in the Environmental and Social Management Framework for the OVFM Project, the works in question have been included on List no. 1 under item “ID 2\_177\_W” (ordinal number: 1017) in Appendix no. 2 titled “*Investments that do not affect reaching the good status of water adversely or that do not deteriorate the status of water*” to the MasterPlan for the Vistula river-basin (2014)<sup>2</sup>.

## 1.1 Odra-Vistula Flood Management Project

The main objective of the OVFM Project is to protect people in flood plains within selected parts of river-basins of two of the greatest Polish Rivers – Vistula and Odra – against hazards caused by extreme floods. Implementation of the most urgent flood protection assignments was forecasted within the framework of the OVFM.

The OVFM Project consists of the following 5 Components:

- Component 1 – Flood Protection of the Middle and Lower Odra;
- Component 2 – Flood Protection of the Nysa Kłodzka Valley;
- Component 3 – Flood Protection of the Upper Vistula;
- Component 4 – Institutional Strengthening and Enhanced Forecasting;
- Component 5 – Project Management and Studies.

Component 3 is divided into the following Subcomponents:

- Subcomponent 3A – Flood Protection of Upper Vistula towns and Cracow;
- Subcomponent 3B – Protection of Sandomierz and Tarnobrzeg;
- Subcomponent 3C – Passive and Active Protection in Raba Sub-basin;
- Subcomponent 3D – Passive and Active Protection in San Basin.

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<sup>2</sup> The MasterPlans for the Vistula River Basin and for the Odra River Basin remain a result of establishments made with the European Committee, which led to implementation of “*Action Plan for Strategic Planning in Water Management*” by Poland (resolution of the Council of Ministers of July 2, 2013, ref. no.: 118/2013). The MasterPlans remained an update to water management plans, since their previous update in 2015, and subsequently their results – in terms of investments, which affect or which may affect the status of water bodies – were transferred to the updated water management plans (adopted by the resolution of the Council of Ministers of October 18, 2016 [OJ item no. 1967]).

Detailed information on the Project may also be found in the Environmental and Social Management Framework published at e.g. websites of the World Bank<sup>3</sup> and of the Odra-Vistula Flood Management Project Coordination Unit<sup>4</sup>. A detailed description of the Project is also given in PAD<sup>5</sup> and in the Project Operations Manual<sup>6</sup>.

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<sup>3</sup> <http://documents.worldbank.org/curated/en/717671468333613779/Poland-Odra-Vistula-Flood-Management-Project-environmental-and-social-management-framework>

<sup>4</sup> [http://odrapcu2019.odrapcu.pl/en/popdow\\_about\\_project/](http://odrapcu2019.odrapcu.pl/en/popdow_about_project/)

<sup>5</sup> <http://documents.worldbank.org/curated/en/320251467986305800/Poland-Odra-Vistula-Flood-Management-Project>

<sup>6</sup> [http://www.odrapcu.pl/doc/POM\\_PL.pdf](http://www.odrapcu.pl/doc/POM_PL.pdf)  
(a binding English version is available at: <http://www.odrapcu.pl/doc/POM/ENG.pdf>)



## 2 Contract Description

Contract 3A.2 refers to the development of four small dry flood storage reservoirs in the Serafa river-basin, and it is divided into four Works Contracts, and first two remain the subject of this EMP:

- Works Contract 3A.2/1  
Flood protection in Serafa Valley – Malinówka 1 reservoir;
- Works Contract 3A.2/2  
Flood protection in Serafa Valley – Malinówka 2 reservoir;
- Works Contract 3A.2/3  
*Flood protection in Serafa Valley – Malinówka 3 reservoir;*
- Works Contract 3A.2/4  
*Flood protection in Serafa Valley – Serafa 2 reservoir.*

The aforementioned reservoirs shall operate as a part of cascade comprising five dry flood storage reservoirs in the Serafa river-basin: two at the River Serafa (the existing Bieżańów Reservoir and the planned Serafa 2 Reservoir) and three at the Malinówka Stream (planned reservoirs: Malinówka 1, Malinówka 2, and Malinówka 3).

The objective for construction of particular reservoirs is direct improvement of flood protection for areas downstream of each of the reservoirs, whereas the aim for development of the entire cascade of five reservoirs is improvement of flood protection in the Serafa Valley, including areas of the Złocień Estate and of the Stary Bieżańów Estate in Cracow.

The Project Implementation Unit (PIU) for the Contract is the State Water Holding Polish Waters, represented by the Director of Regional Water Management Authority in Cracow, with its office at 22. Marszałka J. Piłsudskiego Street, 31-109 Cracow.

According to the valid bidding documents, the planned Contract's implementation time is at least 12 months.

### 2.1 Justification of the Contract

Intensive development within the catchment of Serafa River in the area of the City of Cracow and the Town of Wieliczka resulted in raised discharge of surface rainfall water to river-beds and streams (due to transformation of the existing green areas to sealed surfaces – roofs of houses, roads, yards, etc.). Furthermore, location of new development within flood plains provided new areas under flood risk.

Flood hazard occurs especially in the area of the City of Cracow at chainage km 3+469 – 8+100 of the River Serafa, i.e. it covers areas of the Złocień Estate and of the Stary Bieżańów Estate. Due to development of Wielicka Strefa Ekonomiczna [Business Zone of Wieliczka], e.g. an industrial area with 2.5 K employees is located within a zone under flood risk. The following sections of the river-bed are under particular risk: area of Rakuś Street, Zamłynie Street, Świeża Street, Korepty Street, and Półłanki Street at Stary Bieżańów; and area of Złocieniowa Street, Agatowa Street, Braci Czeczów Street, and Jasieńskiego Street on the northern side of the Cracow-Tarnów railway line. During the flood of 2010 those areas were flooded twice and inundated.

Areas of Stary Bieżańów comprise detached houses, whereas in the area of Złocieniowa Street and Jasieńskiego Street there are blocks of flats at the Złocień Estate and industrial sites. Such an engineering and technical infrastructure provides high economic losses in case of flood damage caused by inundation of those areas by flood water of the River Serafa.

Immediate works protecting the areas adjacent to the river-bed against the results of floods (e.g. sectional desilting of the river-bed, development of a dike raising the banks, protection of the river-bed) were undertaken after the flood of 2010.

All those works improved flood protection in case of flood water with occurrence probability of over 10%. However, safe accommodation of 10% water requires additional protection works in some sections of the river-bed – flood embankments and channel regulation. Very dense development in the center of Bieżańów unfortunately disables development of flood embankments. Numerous studies – developed after the flood of 2010 – proved that at the current high progress of development only dry flood-storage reservoirs may provide an expected result, i.e. improvement of flood safety. An analysis of site conditions at the Malinówka Stream and at the River Serafa allowed for indicating feasible locations of reservoirs, optimal in reference to land availability and achievement of beneficial capacity of the reservoirs, at simultaneous minimization of the impact on the environment and reduction of development costs. It was indicated that five reservoirs may be developed – three at the Malinówka Stream (Malinówka 1, 2, and 3 reservoirs) and two at the River Serafa (Serafa 2 and Bieżańów reservoirs). Until now the biggest of the reservoirs, i.e. the Bieżańów Reservoir at the Serafa River just downstream of the estuary of Malinówka, has been developed.

## **2.2 Location of the Works Contracts**

The planned Contract 3A.2 is located in Poland, Małopolskie Province, in the area of the City of Cracow (District of the City of Cracow, Municipality of Cracow) and the City of Wieliczka (District of Wieliczka, Municipality of Wieliczka Miasto). Detailed information on the location of Works Contracts 3A.2/1 and 3A.2/2, forming the subject of this EMP, have been presented below.

### **2.2.1 Works Contract 3A.2/1 – Malinówka 1 Reservoir**

The planned small dry flood storage reservoir Malinówka 1 is located within the City of Cracow, in the area of the following streets: A4 Motorway, Mała Góra, Szastera, and Nad Serafą. On the west it reaches vicinity of Wielicka Street, and on the east – developed areas west of the railway line crossed by the River Serafa with the Malinówka Stream reaching it. The entire area forms a depression in reference to surrounding sites. The Malinówka Stream – within the entire reach of the discussed area – is regulated.

The area of Works Contract 3A.2/1 covers farmland and meadows with field vegetation (shrubs and shrubbed tufts). Currently there (according to extracts from land registers) mainly are the following: permanent meadows (ŁII, ŁIII) and arable land (RIIIb, RIVb), as well as roads (dr) and grounds underneath flowing surface water.

Location of the Works Contract 3A.2/1 has been presented on the drawing presented below (Fig. 1) and in Appendix 5 to this EMP – Map with location of the Contract.

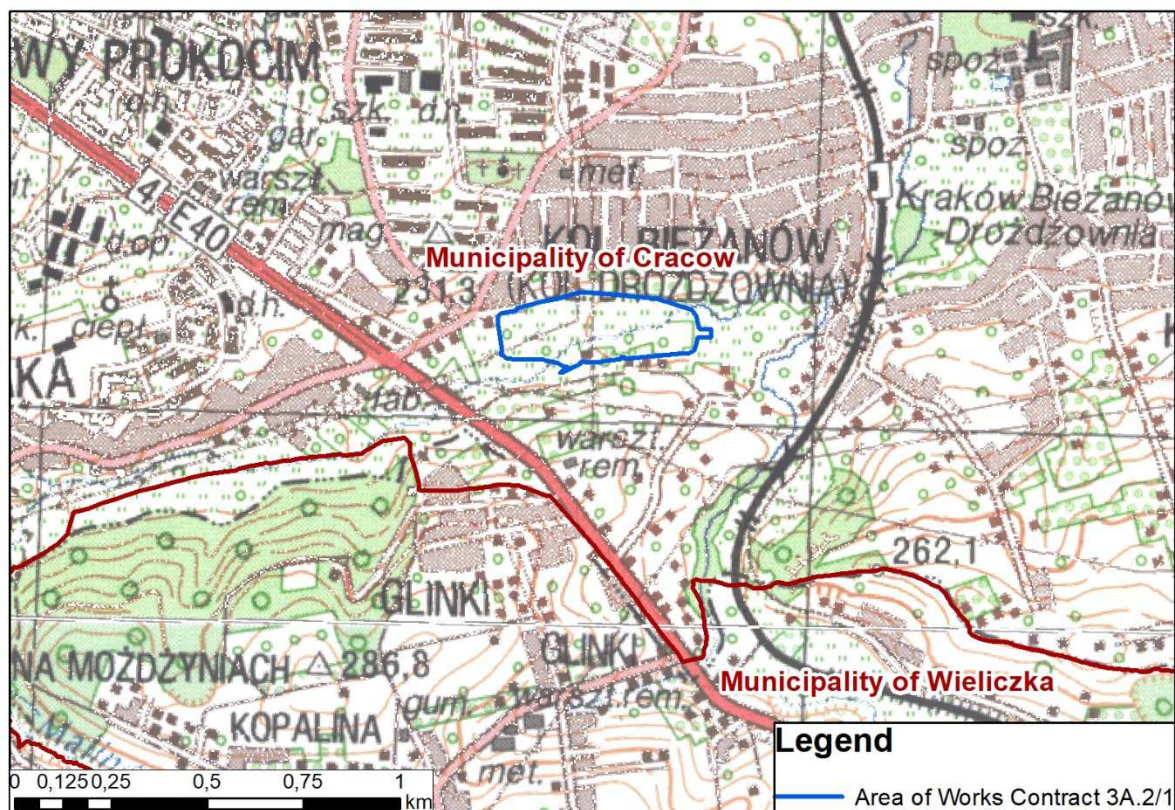


Fig. 1. Location of the Works Contract 3A.2/1 – Malinówka 1 Reservoir  
 (source: own materials)

## 2.2.2 Works Contract 3A.2/2 – Malinówka 2 Reservoir

The planned small dry flood storage reservoir Malinówka 2 is located within the boundaries of the City of Cracow and of the City of Wieliczka. It comprises parts of the Malinówka stream valley on the western side of the Krzyszkowicki Forest, just downstream of the A4 Motorway.

The area of Works Contract 3A.2/2 covers farmland and meadows with field vegetation (shrubs and shrubbed tufts). Currently there (according to extracts from land registers) are the following: permanent pastures (PsIII, PsIV, PsV), afforested and shrubbed grounds (LzIV) and arable lands (RIVb, RV, RVI), permanent meadows (ŁIV, ŁV), roads (dr), ditches (W), waste land (N), and grounds underneath flowing surface water (Wp), industrial areas (Ba), as well as residential areas (B) – at the boundaries.

Location of the Works Contract 3A.2/2 has been presented on the drawing presented below (Fig. 2) and in Appendix 5 to this EMP – Map with location of the Contract.





Fig. 2. Location of the Works Contract 3A.2/2 – Malinówka 2 Reservoir  
 (source: own materials)

## 2.3 Specificity of the Works Contracts

The following items presents specificity of Works Contracts 3A.2/1 and 3A.2/2, which remain a subject of this EMP.

### 2.3.1 Works Contract 3A.2/1 – Malinówka 1 Reservoir

The scope of Works Contract 3A.2/1 comprises the following elements<sup>7</sup>:

- Construction of the dry flood storage reservoir Malinówka 1 at chainage km 0+231 of the Malinówka Stream (with an earth-fill front dam, earth-fill side dams, spillway and discharge facilities, and a stilling basin), having the following parameters:
  - hydraulic class of the structure – III
  - damming height – 4.8 m
  - damming elevation MaxSL – 216.5 m a.s.l.
  - capacity of the reservoir at MaxSL – 114 000 m<sup>3</sup>
  - flood area at MaxSL – about 6.2 ha
  - flow  $Q_{0.2\%}$  at the inlet to the reservoir – 21.18 m<sup>3</sup>/s
  - flow  $Q_{0.5\%}$  at the inlet to the reservoir – 8.35 m<sup>3</sup>/s
  - flow  $Q_{1\%}$  at the inlet to the reservoir – 5.66 m<sup>3</sup>/s
  - reduced flow  $Q(\text{reduced})_{0.2\%}$  – 12.85 m<sup>3</sup>/s
  - reduced flow  $Q(\text{reduced})_{0.5\%}$  – 2.59 m<sup>3</sup>/s
  - reduced flow  $Q(\text{reduced})_{1\%}$  – 2.15 m<sup>3</sup>/s
  - dam's crest elevation – 217.2 m a.s.l.
  - crest width – 3 m
  - length of the front dam – about 80 m
  - length of the right dam's crest – about 340 m
  - length of the left dam's crest – about 434 m
  - riverside slope inclination – 1:3
  - landside slope inclination – 1:2.5
  - shutter in the body and in the subbase
  - slopes protected with anti-erosive mat and sown with a mix of grass
  - time of retention – up to 24 hours
- Development of descend roads from the dam crest into the reservoir's bowl and to the area in vicinity;
- Development of a band ditch along the side dam on the left bank, over a length of about 487 m;

<sup>7</sup> The characteristics of the Works Contract provided in this EMP are for reference only and do not replace the design documentation. The Contractor is obliged to perform the works in accordance with the design documentation and with Technical Specifications corresponding with particular branches.

- Development of a band ditch along the side dam on the right bank, over a length of about 255 m;
- Development of an inflow channel to the spillway and discharge facilities over a length of about 79.4 m at chainage km 0+243-0+323 of the Malinówka Stream;
- Development of a discharge channel from the spillway and discharge facilities over a length of about 34.0 m at chainage km 0+183-0+217 of the Malinówka Stream;
- Removal of a section of the existing Malinówka channel at chainage km 0+183-0+323 of the stream;
- Removal of an oxbow lake at the Malinówka Stream in the reservoir's bowl over a length of about 240 m;
- Construction of measurement spots on the left bank of the inflow channel at chainage km 0+207 and in vicinity of the backflow from the dry reservoir at chainage km 0+709;
- Development of retaining sheet piling replacing sectionally a side dam on the left bank of the dry reservoir's bowl over a length of about 16.5 m and a side dam on the right bank of the Malinówka Stream over a length of about 16.0 m at chainage km 0+411 and of about 30.0 m at chainage km 0+508;
- Grading of the Malinówka 1 Reservoir's bowl with an area of 4.9 ha with a drop of 0.5% toward the Malinówka Stream;
- Development of four islands protecting environmentally valuable trees in the dry reservoir's bowl, with a total area of 0.8 ha;
- Redevelopment of the existing outlet of storm drainage with a diameter of  $\varnothing$  800 mm, including extension of the existing outlet by about 3.2 m at chainage km 0+189 of the Malinówka Stream;
- Redevelopment of the existing outlet of the ditch draining A4 Motorway, including extension of the existing ditch by about 9.6 m at chainage km 0+202 of the Malinówka Stream;
- Demolition of sanitary canalization in the Malinówka 1 dry reservoir's bowl over a length of about 520 m and construction of new sanitary canalization in a reach of about 653 m;
- Demolition of a water-piping connection over a length of about 35 m at chainage km 0+505 of the Malinówka Stream and of an individual surface water-intake in a form of concrete rings with a diameter of  $\varnothing$  1000 mm;
- Redevelopment high-voltage (HV) overhead power lines, including:
  - Removal of a section of HV line 110 kV GPZ Bieżanów - GPZ Wieliczka over a total length of about 255 m, running over the Malinówka Stream over a length of about 16 m at chainage km 0+499, and removal of post from the reservoir's bowl;
  - Construction of a section of HV line 110 kV GPZ Bieżanów - GPZ Wieliczka over a total length of about 250 m, running over the reservoir's bowl over a length of about 148 m, over the Malinówka Stream over a length of about 12 m at chainage km 0+499, over the side dam on the right bank over a length of about 20 m at chainage



km 0+779 of the dam, including development of a new HV line post beyond the reservoir's bowl;

- Removal of a section of HV line 110 kV GPZ Piaski Wielkie - GPZ Bieżanów over a total length of about 261 m;
- Construction of a section of HV line 110 kV GPZ Piaski Wielkie - GPZ Bieżanów over a total length of about 229 m, running over the reservoir's bowl over a length of about 182 m and over the side dam on the left bank over a length of about 36 m at chainage km 0+135 of the dam, including moving of a HV line post from the reservoir's bowl to its backwater section, and construction of a new HV line post in the area of the left side dam.

According to the current estimates<sup>8</sup>, the volume of soil necessary for implementation of the Works Contract 3A.2/1 is about 31 K m<sup>3</sup>. The aforementioned soil masses will be mostly obtained within the framework of the planned grading of land within the reservoir's bowl, and the remainder will be purchased and delivered from licensed external sources proposed by the Contractor and accepted by the Engineer (in compliance with the conditions for protection of environment, protection of material goods and protection of health and safety of people set out in Appendix 1 to the EMP).

### 2.3.2 Works Contract 3A.2/2 – Malinówka 2 Reservoir

The scope of Works Contract 3A.2/2 comprises the following elements<sup>9</sup>:

Construction of the dry flood storage reservoir Malinówka 2 at chainage km 2+279 of the Malinówka Stream (with an earth-fill front dam, spillway and discharge facilities, and a stilling basin), having the following parameters:

- |  |                         |
|--|-------------------------|
| ○ hydraulic class of the structure –               | III                     |
| ○ damming height –                                 | 3.8 m                   |
| ○ damming elevation MaxSL –                        | 229.5 m a.s.l.          |
| ○ capacity of the reservoir at MaxSL –             | 49 000 m <sup>3</sup>   |
| ○ flood area at MaxSL –                            | about 2.3 ha            |
| ○ flow $Q_{0.2\%}$ at the inlet to the reservoir – | 21.10 m <sup>3</sup> /s |
| ○ flow $Q_{0.5\%}$ at the inlet to the reservoir – | 7.80 m <sup>3</sup> /s  |
| ○ flow $Q_{1\%}$ at the inlet to the reservoir –   | 4.63 m <sup>3</sup> /s  |
| ○ reduced flow $Q(\text{reduced})_{0.2\%}$ –       | 17.67 m <sup>3</sup> /s |
| ○ reduced flow $Q(\text{reduced})_{0.5\%}$ –       | 5.66 m <sup>3</sup> /s  |
| ○ reduced flow $Q(\text{reduced})_{1\%}$ –         | 2.39 m <sup>3</sup> /s  |
| ○ dam's crest elevation –                          | 230.2 m a.s.l.          |
| ○ crest width –                                    | 4 m                     |
| ○ length of the front dam –                        | about 100 m             |
| ○ riverside slope inclination –                    | 1:3                     |
| ○ landside slope inclination –                     | 1:2.5                   |

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<sup>8</sup> Based upon the valid Bill of Quantities.

<sup>9</sup> See footnote in chapter 2.3.1.

- shutter in the body and in the subbase
- slopes protected with anti-erosive mat and sown with a mix of grass
- time of retention – up to 24 hours
- Development of a band ditch no. 1 over a length of about 70 m;
- Development of a band ditch no. 2 over a length of about 25 m;
- Development of an inflow channel at chainage km 2+287-2+453 over a length of about 165.5 m;
- Development of an discharge channel at chainage km 2+230-2+264 over a length of about 33.5 m;
- Development of a crossing through a ford at chainage km 2+246 of the Malinówka Stream;
- Development of a ditch R1 over a length of about 60 m along the service road no. 1;
- Development of a ditch R2 over a length of about 74.5 m in the reservoir's bowl, along with an outlet to the relocated Malinówka channel at chainage km 2+342;
- Construction of a culver P1 with a diameter  $\varnothing$  500 mm underneath the service road no. 1;
- Development of a service road no. 1 over a length of about 242 m with a U-turn yard on the left bank of the reservoir;
- Development of a service road no. 2 over a length of about 72 m with a U-turn yard on the right bank of the reservoir;
- Development of three descend roads into the reservoir's bowl;
- Protection of the existing outlet from piping  $\varnothing$  1200 mm with a non-return valve;
- Protection of the existing outlet from piping  $\varnothing$  300 mm with a non-return valve;
- Grading of the Malinówka 2 Reservoir's bowl with a drop of 0.5% toward the Malinówka Stream;
- Removal of the existing Malinówka channel in a reach at chainage about km 2+230-2+443;
- Removal of a ditch over a length of about 164 m in the dry reservoir's bowl;
- Removal of a ditch over a length of about 110 m in the dry reservoir's bowl;
- Removal of a pond;
- Demolition of concrete elements in the dry reservoir's bowl;
- Removal of an inactive water piping wD80 over a length of about 151 m along with three individual surface water-intakes;
- Demolition of a section of sanitary canalization ks400 over a length of about 235 m and construction of new sanitary canalization  $\varnothing$  400 mm on the left bank of the reservoir over a length of about 488 m;



- Demolition of a low-voltage (LV) overhead line 0.4 kV over a length of about 210 m in the Malinówka 2 dry reservoir's bowl and construction of a new LV line beyond the reservoir's bowl.

According to the current estimates<sup>10</sup>, the volume of soil necessary for implementation of the Works Contract 3A.2/2 is about 4 K m<sup>3</sup>. The aforementioned soil masses will be mostly obtained within the framework of the planned grading of land within the reservoir's bowl, and the remainder will be purchased and delivered from licensed external sources proposed by the Contractor and accepted by the Engineer (in compliance with the conditions for protection of environment, protection of material goods and protection of health and safety of people set out in Appendix 1 to the EMP).

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<sup>10</sup> Based upon the valid Bill of Quantities.

## 3 Institutional, legal and administrative conditions

### 3.1 Institutions involved in implementation of the Contract

The investor for the Contract is the State Water Holding Polish Waters in Warsaw, represented by the Director of the Regional Water Management Authority in Cracow (PGW WP RZGW in Cracow).

Additionally, on the stage of performance and of operation, implementation of the Contract may require involvement of public administration units on central, regional, and local levels. An ongoing coordination of the OVFM Project implementation by particular PIUs is the task of the OVFM Project Coordination Unit (see Chapter 9.1).

### 3.2 Binding Polish law acts with regard to the environment

In accordance with the Polish Law the investment process related to the environmental protection remains a subject of several acts and regulations. A summary of selected, basic legal acts in that scope, which are binding for works on the EMP, has been presented in Appendix 3 to this EMP – List of national legal acts related to environmental protection. The number and contents of legal acts given there may be modified along with adjustments to environmental protection provisions valid in the territory of Poland. The Contractor is obliged – except for application of rules determined under this EMP – to apply valid provisions of the state law in the scope of environmental protection.

### 3.3 EIA procedure in Poland

The description of the environmental impact assessment procedure in Polish legislation is included in the *Environmental and Social Management Framework* (ESMF) published on the i.a. web pages of the World Bank (WB)<sup>11</sup> and the Odra-Vistula Flood Management Project Coordination Unit<sup>12</sup>. Furthermore, in case of the EIA procedure legal regulations listed in Appendix 3 to this EMP – List of national legal acts related to environmental protection – are in force.

### 3.4 Guidelines of the World Bank

The Contract in question shall be co-funded by e.g. the International Bank for Reconstruction and Development (World Bank). As a consequence, the conditions for its implementation in the scope of environmental protection shall correspond with Operational Policies and Bank Procedures in the range of environmental protection, including the following policies and procedures, e.g.: *OP/BP 4.01* (on environmental impact assessment), *OP/BP 4.04* (on environmental habitats), and *OP/BP 4.11* (on cultural resources). A description of the aforementioned World Bank Policies is given in the *Environmental and Social Management Framework* (ESMF), as published e.g. at websites of the World Bank<sup>11</sup> and of the Odra-Vistula

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<sup>11</sup> At: <http://documents.worldbank.org/curated/en/717671468333613779/Poland-Odra-Vistula-Flood-Management-Project-environmental-and-social-management-framework>

<sup>12</sup> At: [http://odrapcu2019.odrapcu.pl/en/popdow\\_documents/](http://odrapcu2019.odrapcu.pl/en/popdow_documents/)

Flood Management Project Coordination Unit<sup>12</sup>. Original contents of the aforementioned policies and procedures may be found at websites of the World Bank<sup>13</sup>.

## 3.5 The current condition of EIA procedure for the Works Contracts 3A.2/1 and 3A.2/2

### 3.5.1 Administrative decisions on environmental protection

The following decisions on environmental protection were issued for this Contract:

- **Decision on environmental conditions**

A decision on environmental conditions has been proceeded jointly for all five small dry flood storage reservoirs covered by Contract 3A.2 (as listed in Chapter 2), including Malinówka 1 and Malinówka 2 reservoirs, planned for development under Works Contracts 3A.2/1 and 3A.2/2.

In accordance with a classification given in the EIA Regulation, the assignment forming the subject of Contract 3A.2 is qualified to group I of assignments, which may always significantly affect the environment (due to technological association of all five dry reservoirs), for which it is required to perform an environmental impact assessment prior to the issuance of decision on environmental conditions.

A proceeding on the issuance of decision on environmental conditions, during which an environmental impact assessment was done, has been completed with the issuance of a decision by the Regional Director for Environmental Protection in Cracow dated October 29, 2012 (ref. no.: OO.4233.13.2012.BM – Appendix 4a to this EMP) on environmental conditions for the assignment titled:

1. “Construction of a flood storage reservoir “Bieżanów” on the River Serafa at chainage km 7+284 in the City of Cracow”;
2. “Construction of a flood storage reservoir “Serafa - 2” on the River Serafa at chainage km 9+223 in the City of Cracow”;
3. “Construction of a flood storage reservoir “Malinówka - 1” on the Malinówka Stream at chainage km 0+220 in the City of Cracow”;
4. “Construction of a flood storage reservoir “Malinówka - 2” on the Malinówka Stream at chainage km 2+320 in the City of Cracow”;
5. “Construction of a flood storage reservoir “Malinówka - 3” on the Malinówka Stream at chainage km 3+017 in the City of Cracow and in the City of Wieliczka”.

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<sup>13</sup> At: <https://policies.worldbank.org/sites/PPF3/Pages/Manuals/Operational%20Manual.aspx#S3-2> (in the part titled *Investment Project Financing / Environmental and Social Safeguard Policies*)

- **Resolution on staging of the proceeding**

Resolution of the Regional Director for Environmental Protection in Cracow dated October 3, 2018 (ref. no.: OO.4220.5.10.2018.BM – Appendix 4b to this EMP) states that implementation of the planned contract (comprising development of five dry flood storage reservoirs, one of which – Bieżańów – has already been constructed and handed over for use) shall be done in stages and that the conditions determined in the decision of the Regional Director for Environmental Protection in Cracow dated October 29, 2012 (ref. no.: OO.4233.13.2012.BM) have not been changed.

- **Resolutions clarifying doubts to contents of the decision of the Regional Director for Environmental Protection in Cracow dated October 29, 2012 (ref. no.: OO.4233.13.2012.BM) on environmental conditions:**

- Resolution of the Regional Director for Environmental Protection in Cracow dated September 12, 2019 (ref. no.: OO.4220.5.28.2019.BM – Appendix 4c to this EMP);
- Resolution of the Regional Director for Environmental Protection in Cracow dated September 16, 2019 (ref. no.: OO.4220.5.29.2019.BM – Appendix 4d to this EMP).

Copies of the documents listed above have been reproduced under Appendix 4 to this EMP – Decision, resolutions, permits, notices.

### **3.5.2 Remarks on the validity of the environmental decision**

The environmental impact assessment for assignments under Contract 3A.2 has been done based upon an environmental inventory dated 2011.

The environmental inventory remains a basic document – developed as a practice – in the scope of collecting, analyzing and providing information on elements of the natural environment, which form a basis for the planned assignment's environmental impact assessment. It is worthy to emphasize that none of the provisions of law determines the time of validity for the inventory. Its validity is verified at the issuance of a decision on environmental conditions, and in case the environmental elements would be changed or they would prove a trend of changes, the decision on environmental conditions may state an obligation to provide a repeated environmental impact assessment. It means that the environmental inventory's validity is not legally limited in time and conditions contained therein shall be deemed – at the issuance of the decision on environmental conditions – as binding after issuance of an investment project implementation permit, if the circumstances defined above have not occurred.

Additionally, after analyzing and assessing environmental conditions on site and in vicinity of assignments under the Contract, as done based upon an additional environmental inventory of May 2018, the Regional Director for Environmental Protection issued a Resolution dated October 3, 2018 (ref. no.: OO.4220.5.10.2018.BM) stating that implementation of the planned assignment (comprising development of five dry flood storage reservoirs, one of which – Bieżańów – has already been constructed and handed over for use) shall be done in stages and that the conditions determined in the decision of the Regional Director for Environmental Protection in Cracow dated October 29, 2012 (ref. no.: OO.4233.13.2012.BM) have not been changed.

In accordance with Article 72 (3) and (4) of the binding EIA Act, the Investor may apply for the issuance of decisions mentioned under item (1) of that Article, including the IPIP decision, after 6 years from the day the decision on environmental conditions became final. However, in case of obtaining a statement (resolution) of the Regional Director for Environmental Protection on implementation of the planned assignment in stages and on validity of the conditions for implementation of the contract, as determined in the final decision on environmental conditions, the time for applying for the issuance of relevant construction decision, including the IPIP decision, shall be extended to 10 years. In case of the aforementioned decision on environmental conditions dated October 29, 2012 it means that (due to the issuance of the aforementioned RDOŚ Resolution dated October 3, 2018) it may form a basis for the issuance of further administrative decisions in the investment process until December 3, 2022.



## 4 Description of environmental elements

### 4.1 Land surface and landscape

#### 4.1.1 Works Contract 3A.2/1 – Malinówka 1 Reservoir

According to the physical-geographical regionalization by Kondracki (2001), including following modifications to the aforementioned regionalization, the implementation site for the Works Contract 3A.2/1 is located within Nadwiślańska Lowland and Krakowskie Foothills (Fig. 3):

- megaregion: Carpathian Region;
- province: Western Carpathian Mountains with Western and Northern Podkarpacie;
- subprovince: Northern Podkarpacie;
- macroregion: Sandomierska Valley;
- mezoregion: Nadwiślańska Lowland (northern, western, and north-western parts) and Krakowskie Foothills (southern, eastern, and south-eastern parts).

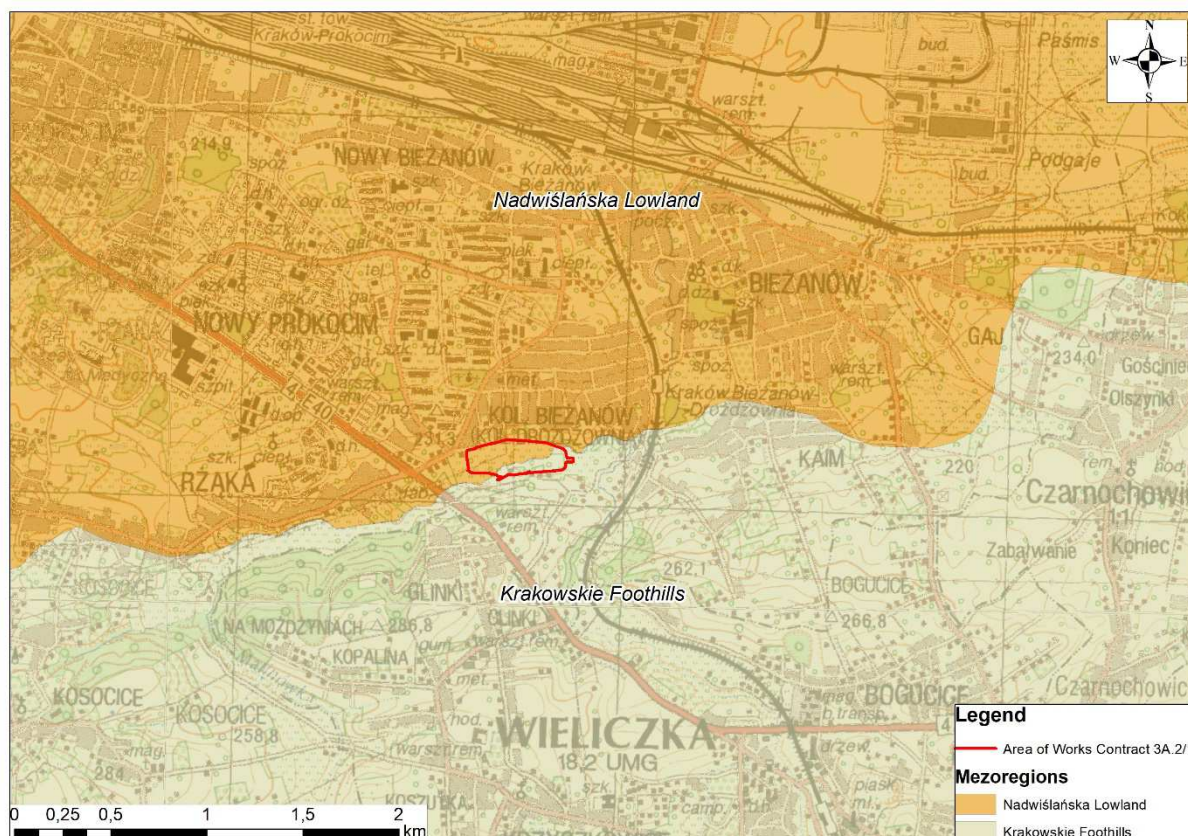


Fig. 3. Location of the Works Contract 3A.2/1 – Malinówka 1 Reservoir in reference to physical-geographical units (source: own materials<sup>14</sup>)

<sup>14</sup> Based upon: Kondracki J.: *Geografia regionalna Polski*, Wyd. Naukowe PWN, Warsaw 2001, and Salon J. et con. 2018 *Physical-geographical mesoregions of Poland: Verification and adjustment of boundaries on the basis of contemporary spatial data*. *Geographia Polonica* vol.91, no.2.

#### 4.1.2 Works Contract 3A.2/2 – Malinówka 2 Reservoir

According to the physical-geographical regionalization by Kondracki (2001), including following modifications to the aforementioned regionalization, the implementation site for the Works Contract 3A.2/2 is entirely located within Krakowskie Foothills (Fig. 4):

- megaregion: Carpathian Region;
- province: Western Carpathian Mountains with Western and Northern Podkarpacie;
- subprovince: Northern Podkarpacie;
- macroregion: Sandomierska Valley;
- mezoregion: Krakowskie Foothills.

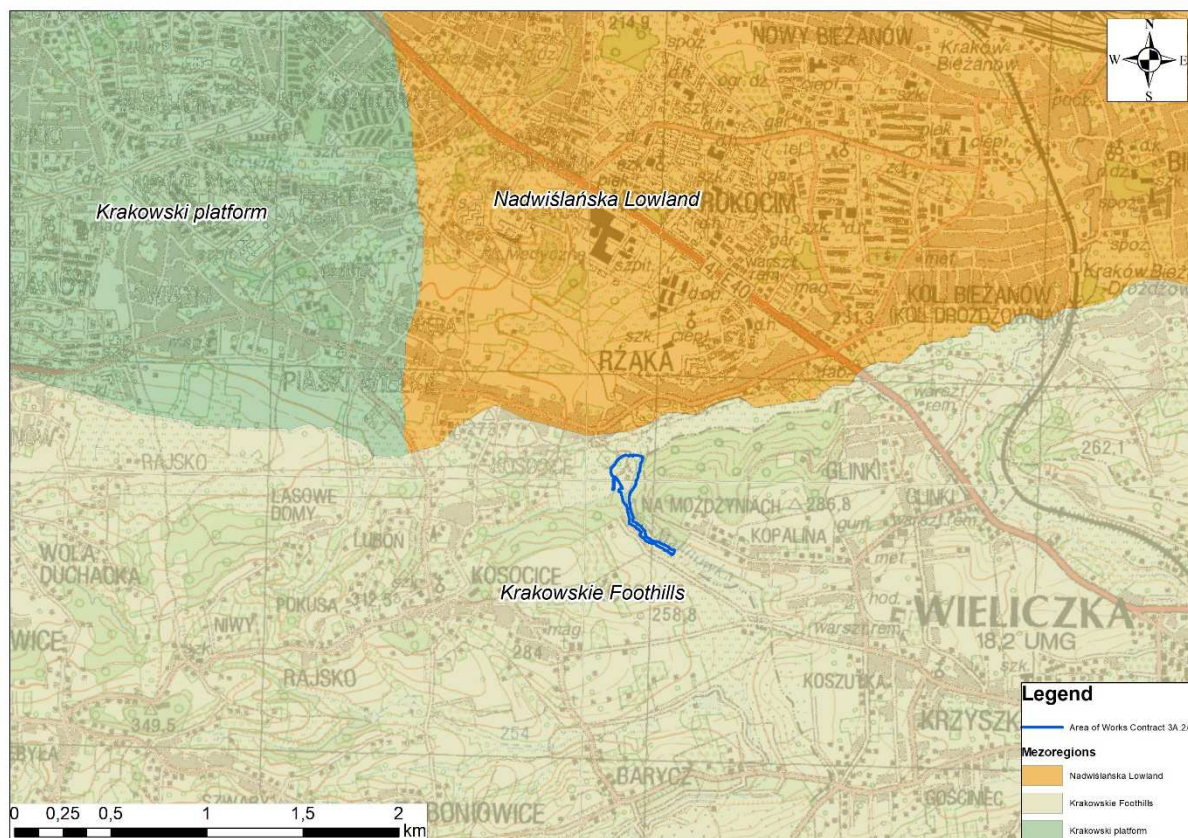


Fig. 4. Location of the Works Contract 3A.2/2 – Malinówka 2 Reservoir in reference to physical-geographical units (source: own materials <sup>15</sup>)

<sup>15</sup> Based upon: Kondracki J.: *Geografia regionalna Polski*, Wyd. Naukowe PWN, Warsaw 2001, and Salon J. et con. 2018 *Physical-geographical mesoregions of Poland: Verification and adjustment of boundaries on the basis of contemporary spatial data*. *Geographia Polonica* vol.91, no.2.



## 4.2 Climate

The City of Cracow and its closest vicinity is located at the bottom boundary of a moderately warm climatic level of the Carpathian Mountains, which is a variety of valley climate. It is specified by high diversity of weather conditions resulting mainly from the inflow of various air masses to that area – polar-maritime mainly, and – to a lesser extent – warm within the entire year: tropical-maritime or continental, as well as cold and dry arctic air.

Meteorological conditions for the City of Cracow and its vicinity in 2018 (WIOŚ, Cracow 2018):

- Mean annual temperature: 10.6°C,
- Annual long-term precipitation rate in the area was from 500 mm at Małopolska Upland to 1200-1400 mm in the Carpathian Mountains.

## 4.3 Air quality

The quality of air within the City of Cracow and in its vicinity may be considered as bad. Acceptable levels determined for suspended particulates PM10 and PM2.5 (daily concentration, as well as alarm levels and mean annual rates) and target levels for benzo(a)pyrene (mean annual concentration) are highly exceeded. Those exceedances also refer to the acceptable level for nitrogen dioxide (mean annual concentration).

The main reason for exceedance – in case of suspended particulates PM10 and PM2.5 and benzo(a)pyrene – is low emission, i.e. emission generated by consumption of coal and its derivatives in individual heating sources, and sometimes of waste by household. Transportation, which is the main source of emission in case of nitrogen oxides and has the biggest share in emission of that pollution, has a smaller contribution in exceedance of the aforementioned substances in the air. Spot sources generally have a smaller impact on the quality of air in Cracow, but locally – in areas located in the industrial impact zone – their share may also raise.

## 4.4 Soils and grounds

### 4.4.1 Works Contract 3A.2/1 – Malinówka 1 Reservoir

Currently the area of the planned dry reservoir Malinówka 1 (Works Contract 3A.2/1) is mainly formed by waste land with local groups of trees and shrubs.

Ground and water conditions were recognized in the area of the planned reservoir (up to a depth of ~2.0 m in the reservoir's bowl and 4.0 m b.g.l. in the dam area). The top layer with a thickness of ~0.2 to ~0.7 m is formed by soil and made grounds – top-soil sand. Below, up to a depth of from ~1.0 m to over ~2.5 m there are dusty clays, sandy clays, compacted clays and dusty clays with interlays/inter-layers of clay silt, humid low plasticity clays and plastic clays. Dusty sand, fine sand, semi-compacted sand – usually with admixture of dust – are located deeper (Source: Environmental Impact Report – Dry Flood Storage Reservoirs in the Serafa River Basin, Cracow, May 2012).



According to the soil and agricultural map of the Małopolskie Province<sup>16</sup> the areas, where construction of a dry reservoir is planned, are qualified to the following soil and agricultural complexes: very good and good green land (on alluvial soil), good rye complex (rye and potatoes) (on leached brown soil and on acid brown soil), and strong grain and fodder complex (on alluvial soil).

The area of the planned dry reservoir Malinówka 1 is formed by farmland and meadows with field plants (shrubs and tree tufts). Currently there (according to extracts from land registers) mainly are the following: permanent meadows (ŁII, ŁIII) and arable land (RIIIb, RIVb), as well as roads (dr) and grounds underneath flowing surface water.

In case of the discussed area, there are the following soil classes underneath arable land:

- II – very good arable soil,
- IIIb – averagely good arable soil,
- IVb – average quality, worse arable soil.

#### 4.4.2 Works Contract 3A.2/2 – Malinówka 2 Reservoir

Currently the area of the planned dry reservoir Malinówka 2 (Works Contract 3A.2/2) is mainly formed by afforested land with local groups of trees and shrubs.

The works done for the purpose of the EIA Report proved that geological composition of the area in question includes Quaternary formations. The top layer with a thickness of ~0.3 m is formed by soil, and further – up to a depth of ~3.0 m – by dusty clays, sandy clays, compacted brown dusty clays – hard plastic and plastic – locally with admixture of organic particles, grey-black soft plastic silt. Medium and fine sands – usually with admixture, interlays of dust and clay – are located deeper. They are brown and grey, and are averagely compacted. Archival materials prove that the older subbase is made by Tertiary formations represented by loam, the top of which is located in a depth of around 15.0 m. (Source: Environmental Impact Report – Dry Flood Storage Reservoirs in the Serafa River Basin, Cracow, May 2012).

According to the soil and agricultural map of the Małopolskie Province<sup>17</sup> the areas, where construction of a dry reservoir is planned, are qualified to the following soil and agricultural complexes: medium green land (on specific brown soil – alluvial sediments and alluvial gleysol), weak and very weak green land (on alluvial gleysol and on podzoluvisol and pseudo-podzoluvisol), weak rye complex (rye and potatoes) on podzoluvisol and pseudo-podzoluvisol, strong grain and fodder complex (on specific brown soil – alluvial sediments), forest land (on podzoluvisol and pseudo-podzoluvisol and on specific brown soil – alluvial sediments), and grounds of the State Forest Unit.

The area of the planned dry reservoir Malinówka 2 is formed by farmland and meadows with field plants (shrubs and tree tufts). Currently there (according to extracts from land registers) mainly are the following: permanent pastures (PsIII, PsIV, PsV), afforested and shrubbed grounds (LzIV) and arable lands (RIVb, RV, RVI), permanent meadows (ŁIV, ŁV), roads (dr), ditches (W), waste land (N), and grounds underneath flowing surface water (Wp), industrial areas (Ba), as well as residential areas (B) – at the boundaries.

<sup>16</sup> [https://miip.geomalopolska.pl/mapa/glebowo\\_rolnicza.html](https://miip.geomalopolska.pl/mapa/glebowo_rolnicza.html)

<sup>17</sup> [https://miip.geomalopolska.pl/mapa/glebowo\\_rolnicza.html](https://miip.geomalopolska.pl/mapa/glebowo_rolnicza.html)

In case of the discussed area, there are the following soil classes underneath arable land:

- III – good and averagely good arable soil,
- IV – average quality arable soil (better and worse),
- V – weak arable soil.

## 4.5 Surface water

### 4.5.1 Works Contract 3A.2/1 – Malinówka 1 Reservoir

The Works Contract 3A.2/1 is located in the Upper Vistula river basin, and is managed by PGWWP RZGW in Cracow. The River Serafa remains one of its main water-courses within the discussed reach. Main tributary rivers of Serafa are as follows: Krzyszkowicki Stream (left bank), Malinówka Stream (left bank), Drwina Długa Stream (left bank), Zabawka Stream (right bank). The Malinówka Stream has a regulated channel within the entire range of the discussed area. The stream has lots of inflowing courses. Its surface is overgrown by grass plants, with sparse trees and shrubs. The Malinówka Stream's catchment covers areas of sparse semi-detached houses and detached houses and areas of forests, e.g. Krzyszkowicki Forest. The stream accommodates out-of-class waters – both in terms of physical-chemical pollutions, as well as bacteriological contamination, as it discharges surface water from areas of municipal waste storage facilities in Barycz.

The condition of surface water within the boundaries of the body of surface water covering the area of the planned contract is monitored on an ongoing basis within the framework of state environmental monitoring, and its results are cyclically published on websites<sup>18</sup> of the Central Environmental Protection Inspectorate.

Hydrological specificity of the River Serafa and of the Malinówka Stream in the area of four reservoirs to be developed under Contract 3A.2 (reservoirs: *Malinówka 1*, *Malinówka 2*, *Malinówka 3*, and *Serafa 2* – see: description in Chapter 2) is given in the table below<sup>19</sup>:

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<sup>18</sup> <http://www.gios.gov.pl/pl/stan-srodowiska/monitoring-wod> and  
[http://www.gios.gov.pl/pl/stan-srodowiska/monitoring-wod#mon\\_wod\\_pow](http://www.gios.gov.pl/pl/stan-srodowiska/monitoring-wod#mon_wod_pow)

<sup>19</sup> Flow values given in the table have been calculated for the current conditions of development at the River Serafa and at the Malinówka Stream. Due to that reason values of flows  $Q_{1\%}$ ,  $Q_{0.5\%}$  and  $Q_{0.2\%}$  given in the table differ from the values given in characteristics for particular reservoirs in Chapters 2.3.1 and 2.3.2 (those values have been calculated for forecasted conditions of development at the River Serafa and at the Malinówka Stream – flows raised due to sealing of the catchment).

Marking	<u>Malinówka 1 Reservoir</u>	<u>Malinówka 2 Reservoir</u>	<u>Malinówka 3 Reservoir</u>	<u>Serafa 2 Reservoir</u>
Stream/River	Malinówka	Malinówka	Malinówka	Serafa
Chainage of the reservoir's dam	0+222	2+279	2+990	9+223
Catchment area [km <sup>2</sup> ]	6.73	5.88	5.50	9.84
Characteristic flows[m <sup>3</sup> /s]:				
• average low (SNQ)	0.007	0.006	0.005	0.010
• mean annual (SSQ)	0.055	0.048	0.046	0.081
Probable flows [m <sup>3</sup> /s] for Class III hydraulic structures (at inlet to reservoirs):				
• Q <sub>1%</sub>	4.9	4.17	6.3	15.7
• Q <sub>0.5%</sub> (design flow)	7.5	7.27	14.0	23.7
• Q <sub>0.2%</sub> (control flow)	19.9	20.42	25.4	46.7

*Source: Own study based upon hydrological calculations and hydraulic modeling of flow in water-courses.*

The planned dry Malinówka 1 Reservoir is located within the Body of Surface Water BSW *Serafa* (PLRW2000262137749). In accordance with the currently binding Water Management Plan for the Vistula River Basin (WMP), approved with a Regulation of the Council of Ministers of October 18, 2016 (OJ of 2016, item no. 1911), specificity of the BSW in the area of the analyzed Works Contract is as follows.

**BSW *Serafa* (PLRW2000262137749):**

- BSW type: water-courses in valleys of great lowland rivers (26),
- Status: highly modified body of water,
- Is it monitored: yes,
- Assessment of the current condition (2016): bad,
- Assessment of risk of not achieving the environmental objectives: under risk,
- Derogations: yes,
- Deviation type: extension of the time to reach the objective – no technical possibilities,
- Deadline for achieving the good status: 2027,
- Justification for derogation: no technical possibilities. There is a communal pressure within the BSW. The action program planned a measure comprising review of water-law permits for the transfer of wastewater to the water or to the ground by users of the BSW, due to a risk of not achieving the environmental objectives, in accordance with Article 136 (3) of the Water Law Act, which is to provide a detailed recognition and – as a result – to limit that pressure, so it would be possible to achieve parameters corresponding with good

status rates. However, due to the time necessary for implementation of that measure and subsequent particular recovery measures, as well as the time necessary for obtaining results of the implemented measures, good status may be achieved until 2027.

- Environmental objective: good ecological potential; good chemical status.

Implementation of the Works Contract 3A.2/1 shall not affect the river's morphological continuity, and it also shall not affect its hydromorphological, biological, and physical-chemical elements. The planned works shall not modify the volume and dynamics of flows in the river.

The Works Contract in question shall not form a risk of not achieving the environmental objectives established for the BSW. It shall neither refer to the intake of water nor to the discharge of wastewater to the ground; thus, it shall not affect the quantitative and qualitative status of surface water and groundwater.

Location of the Works Contract in reference to the BSW is given on a figure below (Fig. 5).

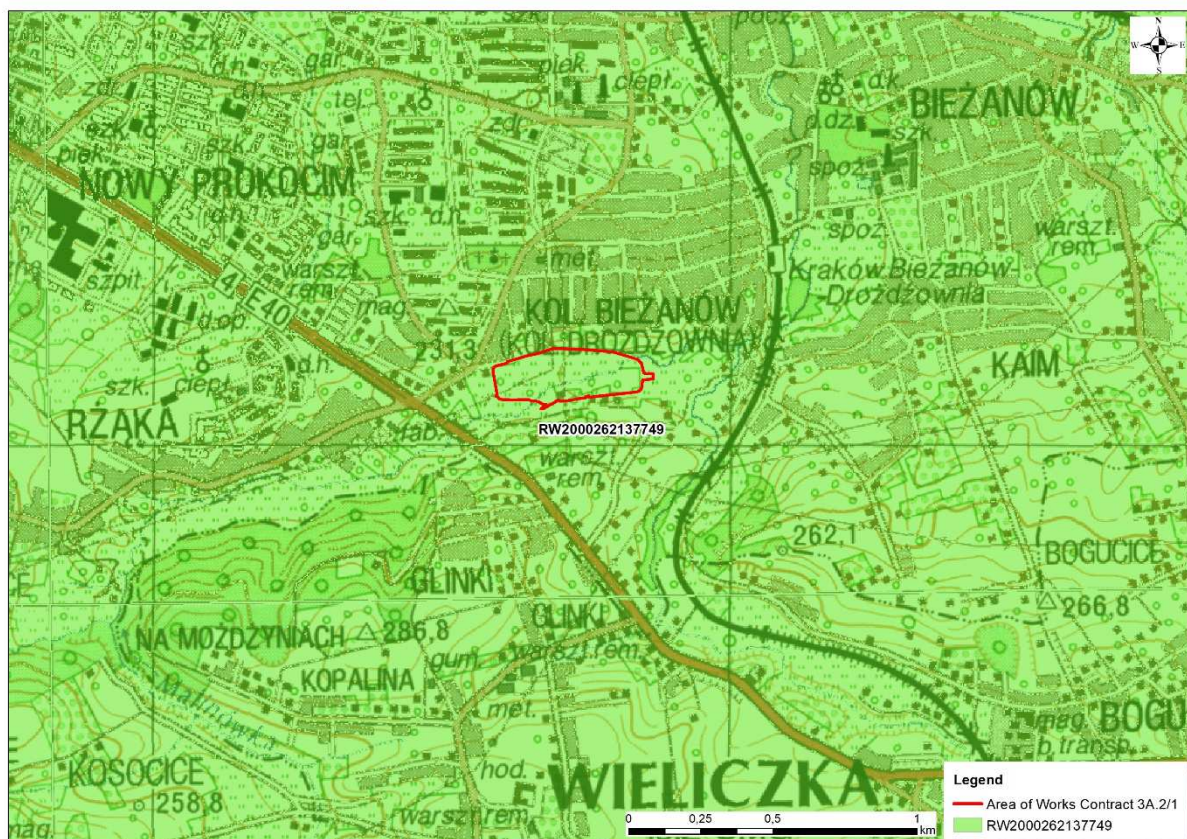


Fig. 5. Location of the Works Contract 3A.2/1 in reference to the BSW  
(source: own materials)



## 4.5.2 Works Contract 3A.2/2 – Malinówka 2 Reservoir

The Works Contract 3A.2/2 is located in the Upper Vistula river basin, and is managed by PGWWP RZGW in Cracow. The River Serafa remain one of its main water-courses within the discussed reach. Main tributary rivers of Serafa are as follows: Krzyszkowicki Stream (left bank), Malinówka Stream (left bank), Drwina Długa Stream (left bank), Zabawka Stream (right bank). The Malinówka Stream has a regulated channel within the entire range of the discussed area. The stream has lots of inflowing courses. Its surface is overgrown by grass plants, with sparse trees and shrubs. The Malinówka Stream's catchment covers areas of sparse semi-detached houses and detached houses and areas of forests, e.g. Krzyszkowicki Forest. The stream accommodates out-of-class waters – both in terms of physical-chemical pollutions, as well as bacteriological contamination, as it discharges surface water from areas of municipal waste storage facilities in Barycz.

The condition of surface water within the boundaries of the body of surface water covering the area of the planned contract is monitored on an ongoing basis within the framework of state environmental monitoring, and its results are cyclically published on websites<sup>20</sup> of the Central Environmental Protection Inspectorate.

Hydrological specificity of the River Serafa and of the Malinówka Stream in the area of four reservoirs to be developed under Contract 3A.2 (reservoirs: *Malinówka 1*, *Malinówka 2*, *Malinówka 3*, and *Serafa 2* – see: description in Chapter 2) is given in the table presented in Chapter 4.5.1.

The planned dry Malinówka 2 Reservoir is located within the Body of Surface Water BSW *Serafa* (PLRW2000262137749). In accordance with the currently binding Water Management Plan for the Vistula River Basin (WMP), approved with a Regulation of the Council of Ministers of October 18, 2016 (OJ of 2016, item no. 1911), specificity of the BSW in the area of the analyzed Works Contract is as follows.

### **BSW *Serafa* (PLRW2000262137749):**

- BSW type: water-courses in valleys of great lowland rivers (26),
- Status: highly modified body of water,
- Is it monitored: yes,
- Assessment of the current condition (2016): bad,
- Assessment of risk of not achieving the environmental objectives: under risk,
- Derogations: yes,
- Deviation type: extension of the time to reach the objective – no technical possibilities,
- Deadline for achieving the good status: 2027,
- Justification for derogation: no technical possibilities. There is a communal pressure within the BSW. The action program planned a measure comprising review of water-law permits for the transfer of wastewater to the water or to the ground by users of the BSW, due to a risk of not achieving the environmental objectives, in accordance with Article 136 (3) of the Water Law Act, which is to provide a detailed recognition and – as a result – to limit

<sup>20</sup> <http://www.gios.gov.pl/pl/stan-srodowiska/monitoring-wod> and [http://www.gios.gov.pl/pl/stan-srodowiska/monitoring-wod#mon\\_wod\\_pow](http://www.gios.gov.pl/pl/stan-srodowiska/monitoring-wod#mon_wod_pow)

that pressure, so it would be possible to achieve parameters corresponding with good status rates. However, due to the time necessary for implementation of that measure and subsequent particular recovery measures, as well as the time necessary for obtaining results of the implemented measures, good status may be achieved until 2027.

- Environmental objective: good ecological potential; good chemical status.

Implementation of the Works Contract 3A.2/2 shall not affect the river's morphological continuity, and it also shall not affect its hydromorphological, biological, and physical-chemical elements. The planned works shall not modify the volume and dynamics of flows in the river.

The Works Contract in question shall not form a risk of not achieving the environmental objectives established for the BSW. It shall neither refer to the intake of water nor to the discharge of wastewater to the ground; thus, it shall not affect the quantitative and qualitative status of surface water and groundwater.

Location of the Works Contract in reference to the BSW is given on a figure below (Fig. 6).

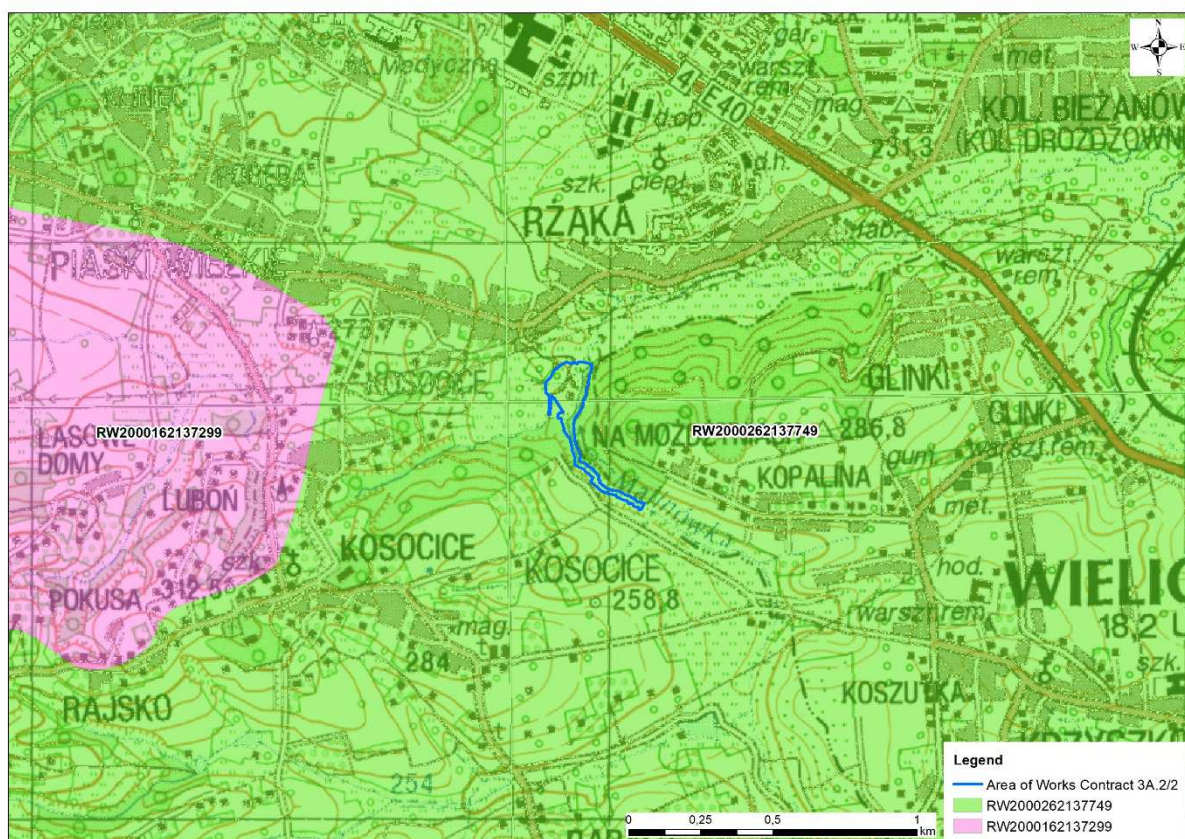


Fig. 6. Location of the Works Contract 3A.2/2 in reference to the BSW  
(source: own materials)

## 4.6 Groundwater

### 4.6.1 Works Contract 3A.2/1 – Malinówka 1 Reservoir

#### Geological formation and hydrogeological conditions

In geological terms the implementation area for the Works Contract 3A.2/1 is located within Przedkarpackie Depression – in its western part. The depression is filled with Miocene molassic sediments. Neogene sediments are located in rocks of various age – from Precambrian period to Cretaceous period, and in tectonic units of various age. Thickness of those sediments is diversified and reflects the subbase morphology. Tertiary sediments (Neogene) in the form of Skawa layers made of loam and – locally – with admixture of sand are covered with a layer of Quaternary sediments made of sand and fluvial gravel and alluvial soil (loam, clay, sand).

Ground and water conditions were recognized in the area of the planned reservoir up to a depth of ~2.0 m in the reservoir's bowl and 4.0 m b.g.l. in the dam area. The top layer with a thickness of ~0.2 to ~0.7 m is formed by soil and made grounds – top-soil sand. Below, up to a depth of from ~1.0 m to over ~2.5 m there are dusty clays, sandy clays, compacted clays and dusty clays with interlays/inter-layers of clay silt, humid low plasticity clays and plastic clays. Dusty sand, fine sand, semi-compacted sand – usually with admixture of dust – are located deeper, and they have not been drilled through up to a depth of 4.0 m b.g.l.

Archival materials prove that the aforementioned Quaternary formations are located up to a depth of around 15.0 – 20.0 m b.g.l. The older subbase is made of Tertiary formations represented by Bogucice sands.

The first water-bearing level occurs at Quaternary formations. The water-bearing layer is made of sand. During drilling the level of Surface water has been drilled through and stabilized at a depth of from ~2.6 to 3.0 m b.g.l. The depth of surface water occurrence may temporarily (drought, increased rainfall, spring thaw, floods in the River Serafa and in Malinówka) be changed. The River Serafa and the Malinówka Stream have a draining character at low and average levels, whereas in case of freshets and floods they cause short-term damming of surface water; thus, providing local submerged areas and marshes.

The essential utilitarian level of surface water is associated with Tertiary formations represented by Bogucice sands. Its water-table is tense. In several wells drilled its level is in the range of 60.0 – 200.0 m b.g.l. and its hydrostatic pressure is from ~5.0 to ~40.0 m, and it locally occurs as Artesian aquifer.

The planned dry Malinówka 1 Reservoir is located in the area of Tertiary groundwater reservoir MGR 451. However, due to high depths of Tertiary water occurrence - ~60 – 100m – and presence of non-permeable insulating layers in the subbase, the impact of collected water on the quality of MGR 451 water is not anticipated. The water collected in the dry flood storage reservoir shall be there for too short time to infiltrate into the orogen. Additionally, the planned reservoirs are situated within a low site, where – in case of higher levels in the Malinówka Stream – water floods that area spontaneously.

The quantitative status and the qualitative status of ground water within the body of ground water covering the area of the planned contract is monitored on an ongoing basis within the

framework of state environmental monitoring, and its results are cyclically published on websites<sup>21</sup> of the State Institute of Geology and of the State Research Institute.

### **Bodies of groundwater (BGW)**

Division of the area of Poland into bodies of groundwater in the process of implementation for the Water Framework Directive is subject to modifications. The current version of the division contains 172 bodies and 3 sub-bodies, and is valid from the end of 2016. The analyzed Contract is located within the Body of Ground Water BGW 148 (European code: PLGW2000148).

The Water Management Plan for waters within the Vistula River Basin (Water MP), as approved by the Council of Ministers on October 18, 2016 (OJ 2016, item 1911), evaluates the quantitative status and the chemical status for BGW 148 as good. In terms of risk of not achieving environmental objectives under the Plan, the unit no. 148 was defined as not being at risk.

Environmental objective: good chemical status, and good quantitative status.

In compliance with provisions under the Water Management Plan for the Vistula River Basin the main environmental objectives for BGW are as follows:

- Preventing the inflow or limitation of the inflow of pollutions to groundwater,
- Preventing the deterioration of status for all bodies of groundwater (including reservations listed under the Water Framework Directive),
- Assurance of balance between the intake and the supply for groundwater,
- Implementation of measures necessary for reversing significant and constantly increasing concentration trend for any pollution generated due to human actions.

In order to meet the requirements for the lack of deterioration for status of waterbodies having at least good chemical and quantitative status, the environmental objective for those would be maintenance of that status.

The designed dry reservoir shall not result in deterioration of the groundwater status, and infiltration of pollutions to the groundwater is not anticipated.

It has been stated that the development of planned water facilities and the intended use of water services shall not violate provisions of the binding Water Management Plan for the river-basin.

Location of the Contract in reference to the BGW was presented on the drawing given below (Fig. 7).

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<sup>21</sup> <https://www.pgi.gov.pl/psh/psh-2/monitoring-wod-podziemnych.html> and <http://mjwp.gios.gov.pl/raporty-art/2017.html>



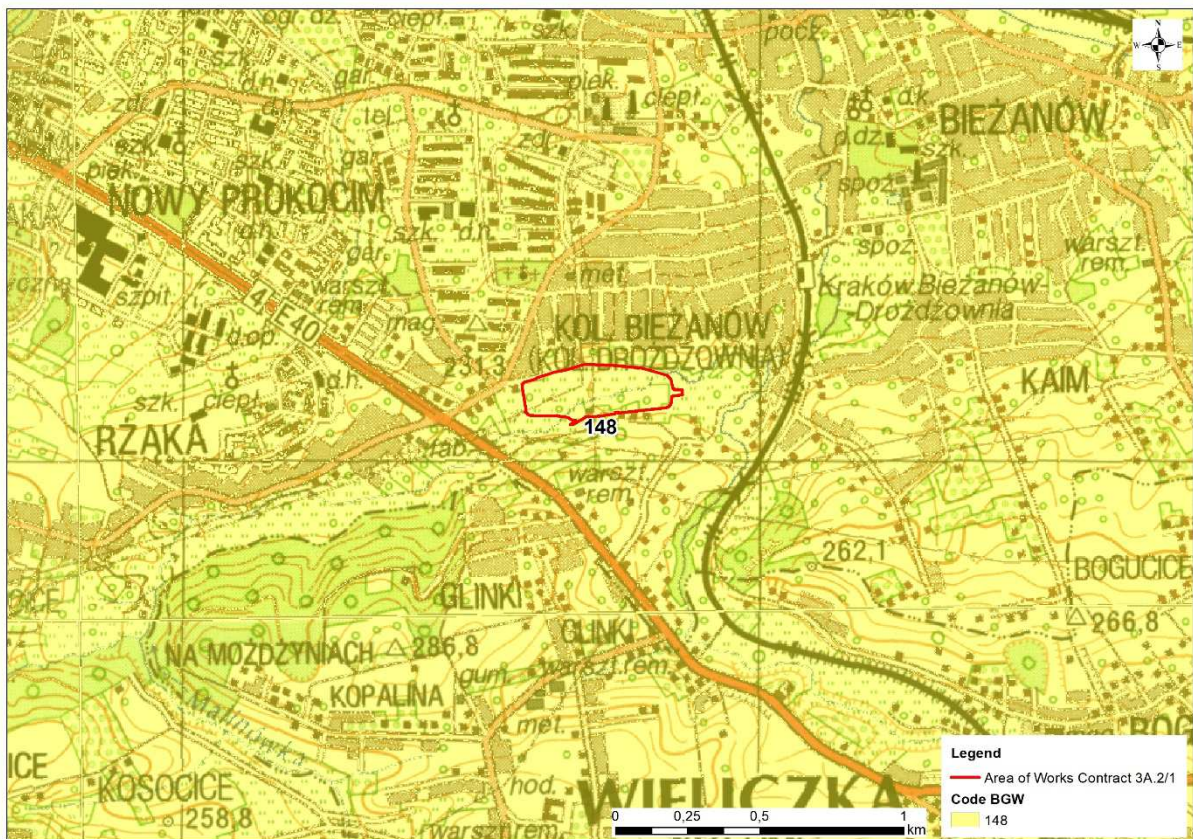


Fig. 7. Location of the Works Contract 3A.2/1 in reference to the BGW  
 (source: own materials)

## 4.6.2 Works Contract 3A.2/2 – Malinówka 2 Reservoir

### Geological formation and hydrogeological conditions

In geological terms the implementation area for the Works Contract 3A.2/2 is located within Przedkarpackie Depression – in its western part. The depression is filled with Miocene molassic sediments. Neogene sediments are located in rocks of various age – from Precambrian period to Cretaceous period, and in tectonic units of various age. Thickness of those sediments is diversified and reflects the subbase morphology. Tertiary sediments (Neogene) in the form of Skawa layers made of loam and – locally – with admixture of sand are covered with a layer of Quaternary sediments made of sand and fluvial gravel and alluvial soil (loam, clay, sand).

The geological composition of the area in question includes Quaternary formations. The top layer with a thickness of ~0.3 m is formed by soil, and further – up to a depth of ~3.0 m – by dusty clays, sandy clays, compacted brown dusty clays – hard plastic and plastic – locally with admixture of organic particles, grey-black soft plastic silt. Medium and fine sand – usually with admixture, interlays of dust and clay – are located deeper. They are brown and grey, and are averagely compacted. Archival materials prove that the older subbase is made by Tertiary formations represented by loam, the top of which is located in a depth of around 15.0 m.

The first water-bearing level occurs at Quaternary formations. The water-bearing layer is mainly made of sand, silt /capillary suction/. During drilling the level of surface water has

been drilled through and stabilized at a depth of from ~1.0 to 1.5 m b.g.l., i.e. at elevation ~205.9 m a.s.l.

The essential utilitarian level of surface water is associated with Tertiary formations represented by Bogucice sands. Its water-table is tense.

The planned dry Malinówka 2 Reservoir is located in the area of Tertiary groundwater reservoir MGR 451. However, due to high depths of Tertiary water occurrence - ~60 – 100m – and presence of non-permeable insulating layers in the subbase, the impact of collected water on the quality of MGR 451 water is not anticipated. The water collected in the dry flood storage reservoir shall be there for too short time to infiltrate into the orogen. Additionally, the planned reservoirs are situated within a low site, where – in case of higher levels in the Malinówka Stream – water floods that area spontaneously.

The quantitative status and the qualitative status of ground water within the body of ground water covering the area of the planned contract is monitored on an ongoing basis within the framework of state environmental monitoring, and its results are cyclically published on web-sites<sup>22</sup> of the State Institute of Geology and of the State Research Institute.

### **Bodies of groundwater (BGW)**

Division of the area of Poland into bodies of groundwater in the process of implementation for the Water Framework Directive is subject to modifications. The current version of the division contains 172 bodies and 3 sub-bodies, and is valid from the end of 2016. The analyzed Contract is located within the Body of Ground Water BGW 148 (European code: PLGW2000148).

The Water Management Plan for waters within the Vistula River Basin (Water MP), as approved by the Council of Ministers on October 18, 2016 (OJ 2016, item 1911), evaluates the quantitative status and the chemical status for BGW 148 as good. In terms of risk of not achieving environmental objectives under the Plan, the unit no. 148 was defined as not being at risk.

Environmental objective: good chemical status, and good quantitative status.

In compliance with provisions under the Water Management Plan for the Vistula River Basin the main environmental objectives for BGW are as follows:

- Preventing the inflow or limitation of the inflow of pollutions to groundwater,
- Preventing the deterioration of status for all bodies of groundwater (including reservations listed under the Water Framework Directive),
- Assurance of balance between the intake and the supply for groundwater,
- Implementation of measures necessary for reversing significant and constantly increasing concentration trend for any pollution generated due to human actions.

In order to meet the requirements for the lack of deterioration for status of waterbodies having at least good chemical and quantitative status, the environmental objective for those would be the maintenance of that status.

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<sup>22</sup> <https://www.pgi.gov.pl/psh/psh-2/monitoring-wod-podziemnych.html> and <http://mjwp.gios.gov.pl/raporty-art/2017.html>



The designed dry reservoir shall not result in deterioration of the groundwater status, and infiltration of pollutions to the groundwater is not anticipated.

It has been stated that the development of planned water facilities and the intended use of water services shall not violate provisions of the binding Water Management Plan for the river-basin.

Location of the Contract in reference to BGW was presented on the drawing given below (Fig. 8).

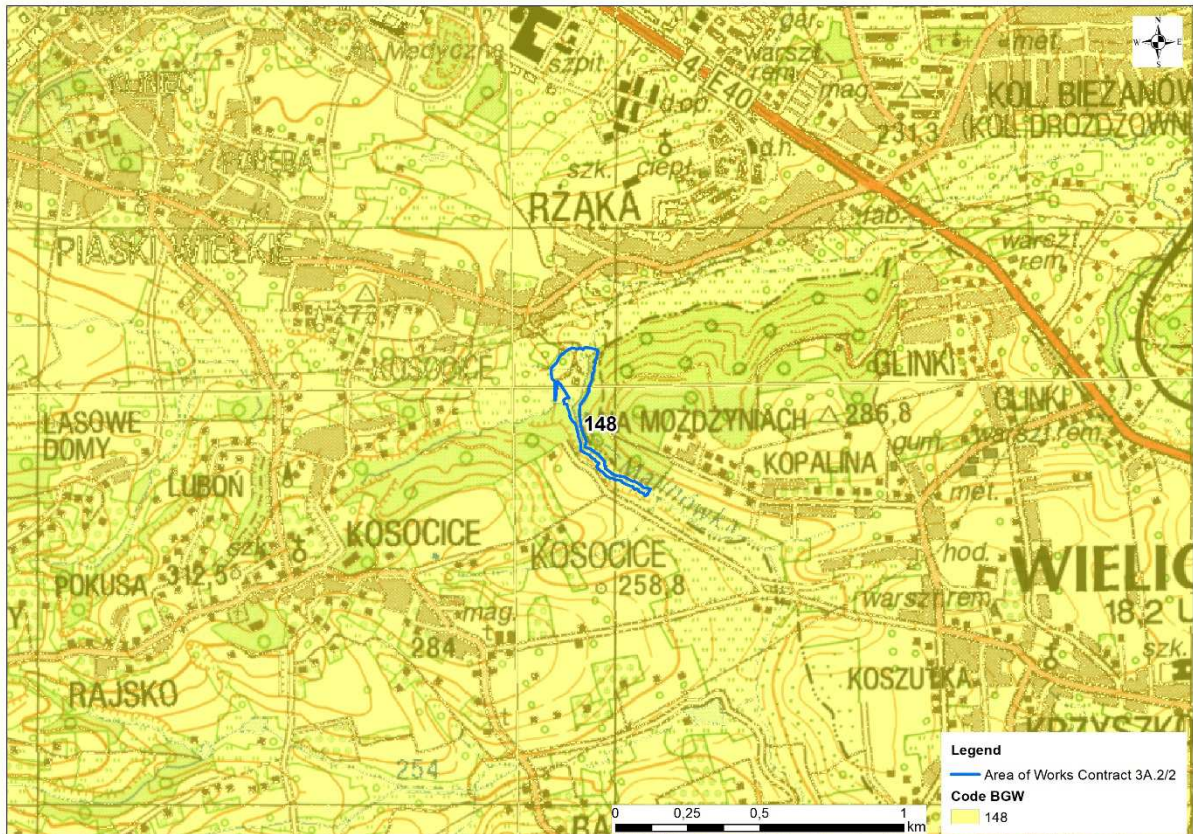


Fig. 8. Location of the Works Contract 3A.2/2 in reference to the BGW  
(source: own materials)

## 4.7 Acoustic climate

When analyzing the noise source, one may classify it to the following groups:

- Traffic noise: road transport, railway transport,
- Industrial noise: installations and used devices,
- Noise associated with the work environment.

Significant impact on the condition of acoustic climate in Małopolskie Province is exerted by traffic noise. The acoustic climate in the area of reservoir in question of mainly generated by the A4 Motorway placed in the neighborhood.

The Works Contracts in question shall be performed in areas without acoustic protection (wasteland), but there are some areas requiring protection of that kind in their vicinity. In case of the Malinówka 1 Reservoir the closest areas requiring acoustic protection are located

on the northern side of that reservoir. Those sites are partially placed in a reach of excessive noise (at night), which is generated by A4 Motorway. Maximum exceedance in that area may reach about 4 dB.

In case of the Malinówka 2 Reservoir the closest areas requiring acoustic protection are located on the western side and on the south-western side of the planned Malinówka 2 Reservoir. Similarly as in the previous case, i.e. Malinówka 1 Reservoir, the acoustic climate in the area in question is shaped by A4 Motorway. Acceptable values in areas requiring acoustic protection in the direct neighborhood of the motorway maximally reach about 19 dB at night (Acoustic Map for the City of Cracow, 2017).

## 4.8 Nature

### 4.8.1 Protected Environmental Habitats and Protected Species of Plants, Fungi, and Animals – Works Contract 3A.2/1

#### Flora

A botanical inventory done at the obtainment of decision on environmental conditions and in May 2018 proved that:

- Protected species of plants and fungi are not present within the Malinówka 1 Reservoir,
- Protected environmental habitats are not present within the Malinówka 1 Reservoir,
- The most valuable elements in the area are old oaks and willows growing along the old channel,
- Such invasive species as Canadian goldenrod and such highly invasive species of trees as box elder and black cherry have been identified within the inspected area.

#### Fauna

A zoological inventory done at the obtainment of decision on environmental conditions and in May 2018 proved that:

- Protected species of invertebrates were not observed within the Malinówka 1 Reservoir and its buffer,
- Occurrence of fish was not identified within the area of the planned Malinówka 1 Reservoir and its buffer,
- Habitats proper for protected species of amphibians were not identified within the Malinówka 1 Reservoir and its buffer,
- Sand lizard was identified among protected species of reptiles,
- The area of Malinówka 1 Reservoir is not an attractive habitat for ornithofauna, it is only used by single specimens of anthropophobic synanthrope populations. Protected species of birds were not identified in the area, but 6 protected species were observed within the buffer, e.g. white wagtail, bunting bird, common blackbird, and common kestrel.
- During night listening watches within the designed Malinówka 1 Reservoir activity of bats was not identified. An analysis of habitat conditions proved that there are no potential bat habitats within the area in question.
- There are no actual or potential habitats of protected species of non-flying mammals in the area of Malinówka 1 Reservoir.

Location of the Contract in reference to the protected resources of the natural environment was presented on a map reproduced under Appendix 7 to the EMP – Map with location of the Contract in reference to natural habitats and protected species occurrence sites.

#### 4.8.2 Protected Environmental Habitats and Protected Species of Plants, Fungi, and Animals – Works Contract 3A.2/2

##### **Flora**

A botanical inventory done at the obtainment of decision on environmental conditions and in May 2018 proved that:

- Occurrence of one protected species of plants – bryophyte under partial protection, i.e. 1 m<sup>2</sup> of red-stemmed feathermoss *Pleurozium schreberi* – has been identified within the Malinówka 2 Reservoir.
- Protected species of fungi are not present within the Malinówka 2 Reservoir.
- Occurrence of two protected environmental habitats has been identified within the Malinówka 2 Reservoir:
  - 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, *Alnion incanae*, *Salicion albae*)  
(1 patch of habitat with an area of 1.2 ha),
  - 9170 Galio-Carpinetum oak-hornbeam forests  
(2 patches of habitat with a total area of 1.2 ha).
- Such invasive species as Canadian goldenrod and small balsam, and such highly invasive species of trees as box elder, black locust, and black cherry have been identified within the inspected area.

##### **Fauna**

A zoological inventory done at the obtainment of decision on environmental conditions and in May 2018 proved that:

- Buff-tailed bumblebee *Bombus terrestris* and red-tailed bumblebee *Bombus lapidarius* were observed within the designed Malinówka 2 Reservoir and its buffer. In the forest located within the contract buffer presence of saproxylic beetles is not excluded.
- Occurrence of fish was not identified within the area of the planned Malinówka 2 Reservoir and its buffer.
- Within the area of the Malinówka 2 Reservoir relatively numerous frogs of the green frog group (in the type of pool frog and edible frog) were identified. Furthermore adult specimens nad larvae forms of common toad and frogs of the brown frog group (common frog, moor frog) were found. At least two huge reservoirs formed by the beaver dams are present within the analyzed area. Furthermore, there are several smaller reservoirs and water-pits, where development of larvae forms of frogs and toads take place. The area of the planned contract may also be used by some specimens of other species of amphibians not identified during the survey.
- Presence of sand lizard and occurrence of habitats potentially applicable by slowworm, viviparous lizard, grass snake, and common viper (however those species were not identified during the survey) were identified in the area.

- The area of the planned reservoir and its buffer remains a habitat for birds. In the area of the Malinówka 2 Reservoir 29 protected species of birds were identified. Most of them probably nest beyond the area of the planned reservoir, and the area to be applied for the purpose of the reservoir is treated only as a feeding site. However, some of them surely nest within sites, which would be transformed due to the performance. 41 species of protected birds were identified within the buffer, including some worth noticing: corn crake, black woodpecker, red-backed shrike.
- High activity of bats was observed during night listening watches within the area of the designed reservoir. Flights and feeding of common noctule was identified (especially within open sites in the southern part of the planned reservoir). Common pipistrelle and Brandt's bat/whiskered bat were identified among other species. Summer colonies of bats are probably present within the forest area in the buffer.
- Eurasian beaver is present within the area of the planned reservoir. The entire water-course within the analyzed area shall be considered as a habitat for that species. Considering the number of huge beaver dams, it shall be assumed that there are at least 2 family groups. Furthermore, hedgehogs and squirrels were identified within the buffer.

Location of the Contract in reference to the protected resources of the natural environment was presented on a map reproduced under Appendix 7 to the EMP – Map with location of the Contract in reference to natural habitats and protected species occurrence sites.

#### **4.8.3 Protected areas – Works Contract 3A.2/1**

In the implementation site of the Works Contract 3A.2/1 (Malinówka 1 Reservoir) and in its closest vicinity (up to 100 m from its boundaries) there are no areas and objects under protection based upon the Act of April 16, 2004 on the nature protection.

In the zone from 100 m to 1.0 km from the boundaries of the implementation site for the Works Contract 3A.2/1 there are the following areas under protection:

- 2 specimens of old trees under protection as environmental monuments  
(in a distance of about 170 m east and about 1.0 km north-east from boundaries of the reservoir),
- Krzyszkowski Forest ecological use land  
(in a distance of about 540 m south-west from boundaries of the reservoir, on the opposite side of A4 motorway).

The closest nature reserve (Groty Kryształowe) is located in a distance of about 4.4 km south-east, and the closest Natura 2000 site (Łąki Nowohuckie [PLH120069]) – in a distance of about 6.2 km north from boundaries of implementation zone for the Works Contract.

Location of the Contract in reference to the closest protected areas was presented on a map in Appendix 6 to the EMP – Map with location of the Contract in reference to protected areas and to NATURA 2000 sites.



#### **4.8.4 Protected areas – Works Contract 3A.2/2**

In the implementation site of the Works Contract 3A.2/2 (Malinówka 2 Reservoir) and in its closest vicinity (up to 100 m from its boundaries) there is 1 area under protection based upon the Act of April 16, 2004 on the nature protection:

- Krzyszkowicki Forest ecological use land (with an area of about 34 ha)  
(a part of eastern edge of the Works Contract implementation site with an area of about 0.5 ha is located within the ecological use land  
[i.e. about 15% of the area of Works Contract implementation site and about 1.5% of the ecological use land's area]).

In the zone from 100 m to 1.0 km from the boundaries of the implementation site for the Works Contract 3A.2/2 there are the following areas under protection:

- Krzyszkowicki Forest ecological use land  
(remaining part of the area of the ecological use land located east from the Works Contract implementation site).

The closest nature reserve (Bonarka) is located in a distance of about 4.3 km north-west, and the closest Natura 2000 site (Łąki Nowohuckie [PLH120069]) – in a distance of about 7.3 km north from the boundaries of the Works Contract implementation site.

Location of the Contract in reference to the closest protected areas was presented on a map in Appendix 6 to the EMP – Map with location of the Contract in reference to protected areas and to NATURA 2000 sites.

### **4.9 Cultural landscape and monuments**

Data given in the study of conditions and directions for spatial management of the City of Cracow (Appendix no. 4 to the Resolution of the City Council of Cracow dated July 9, 2014, ref. no.: CXII/1700/14) proves that both: the Malinówka 1 Reservoir, as well as the Malinówka 2 Reservoir are located within archaeological supervision zones.

There are no historic objects included in a heritage register or on a heritage list, including heritage protected based upon the regulation on the protection of heritage and on the care for heritage, within the area of dry Malinówka 1 and Malinówka 2 reservoirs and in their direct impact range.

### **4.10 Population**

The planned Works Contracts 3A.2/1 and 3A.2/2 are investments located within the District of the City of Cracow.

The dry Malinówka 1 Reservoir shall be developed in the area of the District of the City of Cracow, within district XII Bieżanów-Prokocim. The dry Malinówka 2 Reservoir shall be developed in the area of the District of the City of Cracow, within district X Swoszowice and within the Municipality of Wieliczka.

According to data valid for December 31, 2018<sup>23</sup> the City of Cracow is inhabited by 771069 people, and the population density is 2355 people/km<sup>2</sup>. PIB data for the City of Cracow state that the area of district XII Bieżanów-Prokocim is inhabited by 62 830 citizens (the population density is 3401.01 people/km<sup>2</sup>), whereas district X Swoszowice is inhabited by 27 493 citizens (the population density is 1073.05 people/km<sup>2</sup>).

According to data valid for December 31, 2018<sup>24</sup> the City of Wieliczka is inhabited by 23395 people, and the population density is 1745 people/km<sup>2</sup>.

After the construction of a cascade of dry reservoirs in the Serafa River basin, the estimated number of people protected below the Bieżanów reservoir, in an area directly at risk of flooding with a probability of occurring once every 100 years (Q1%), taking into account the perspective development of the area until 2022 – in accordance with current Spatial Development Plans – is 2,400 people.

Issues associated with the social context of the planned Contract 3A.2 is described in details in the *Land Acquisition and Resettlement Action Plan (LA&RAP)* for the Contract in question.

## 4.11 Remaining ESHS issues

ESHS related issues (i.e. the ones related to environmental, social and health and safety aspects) are regulated in Poland by several provision given in binding legal acts, including e.g. the Act of April 27, 2001 Environmental Protection Law, the Act of October 3, 2008 on access to information on the environment and its protection, public participation in environment protection and environmental impact assessments, the Act of April 16, 2004 on the nature protection, the Act of April 13, 2007 on preventing of damages to the environment and on repairing them, the Act of December 14, 2012 on waste, the Act of July 20, 1991 on Environmental Protection Inspectorate, the Act of March 14, 1985 on the State Sanitary Inspectorate, the Act of July 7, 1994 Construction Law, the Act of July 20, 2017 Water Law, the Act of June 26, 1974 Labour Code, the Act of April 13, 2007 on the State Labour Inspectorate, the Act of December 3, 2010 on implementation of some provisions of the European Union in reference to equal treatment, the Act of April 23, 1964 Civil Code, the Act of June 6, 1997 Penal Code, and others.

Legal regulations included in those acts are to e.g.:

- assure proper condition for abiotic environment and for biotic environment on site and in the areas surrounding the implemented construction investments;
- assure safety and health of people in reference to implementation of construction investments;
- prevent cases of sexual harassment and mobbing on work sites;
- assure proper social and labour conditions, and payment for the personnel.

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<sup>23</sup> CSO – Demography Base: Results of Current Studies: Status and Structure of Population: Population: 2018: Status on 06/30: Population according to sex and cities: Małopolskie.

<sup>24</sup> CSO – Demography Base: Results of Current Studies: Status and Structure of Population: Population: 2018: Status on 06/30: Population according to sex and cities: Małopolskie.



Supervision over observing of provisions included in the aforementioned legal acts is performed by e.g. such numerous institutions and state authorities as the: General Directorate for Environmental Protection, Regional Directorates for Environmental Protection, Environmental Protection Inspectorate, State Sanitary Inspectorate, Construction Supervision Authorities (including Provincial Construction Inspectorates and District Construction Inspectorates), State Labour Inspectorate, Ombudsman, Governmental Proxy for Equal Treatment, Governmental Proxy for Rights of the Disabled, Police, and others.

Nonetheless, considering the importance of ESHS issues and the requirements of international institutions financing the OVFP Project (including the World Bank), this Environmental Management Plan and other documents of the Contract contain numerous detailed conditions to assure the proper implementation of any valid provisions and to keep high proceeding standards in the aforementioned scope.

## 5 Summary of the Environmental Impact Assessment

### 5.1 Land surface and landscape

Impact on the landscape and on the land surface at performance of particular work stages requiring application of construction equipment. Adverse impact on surface of land shall be associated with relocation of soil; thus, with transformation of land within the framework of the planned development of dry reservoirs and accompanying facilities. Acquisition of land has been detailed in the *Land Acquisition and Resettlement Action Plan* (LA&RAP) for the Contract in question. The aforementioned impacts shall be temporary and reversable, and their scale depends on the good organization of the site facilities. Adverse impact on the performance stage shall not be significant, while assuming the absence of emergency situations – temporary and reversable.

Changes resulting from the removal of selected trees and shrubs from the performance area shall be permanent (the scope of planned logging was presented in Chapters 5.8.1 and 5.8.2). For the purpose of keeping a natural character of the landscape at the Malinówka 1 Reservoir, it is planned to leave four island with trees over an area of 0.8 ha.

In case of the Malinówka 1 Reservoir (Works Contract 3A.2/1) an area of about 6.2 ha shall be transformed, whereas in case of the Malinówka 2 Reservoir (Works Contract 3A.2/2) – 2.3 ha. Impact of the works on the landscape structure shall be local. After completing the construction works the area of earthworks and the adjacent transformed area – e.g. due to the traffic of machines and means of transportation, etc. – shall be ordered and restored to the condition prior to the commencement of works.

On the use stage the planned small dry flood storage reservoir shall not generate new adverse impacts. Operation of the reservoirs shall allow for protection of the area in the Serafa River Valley against floods. Impact on the surface of land may however be associated with emergency situations (damages to the reservoir or to the dam) or with the occurrence of water levels causing catastrophic floods. While adopting “regular” operations of the reservoirs, in accordance with the assumed objectives, impact on the surface of land shall not occur.

Mitigation measures planned to limit the Works Contracts’ implementation impact on the surface of land and on the landscape were tabulated in Appendix 1 to this EMP – Plan of mitigation measures – and described in Chapter 6.1.

### 5.2 Climate

#### **Modification of climatic conditions**

The designed reservoir shall be a dry reservoir filled-in with water only for a short time at a flood risk. Due to the short time of filling the reservoir in with water, it shall not affect any climatic events on the operational stage, and microclimate in its area shall not be changed.

#### **Emission of greenhouse gases**

Due to combustion of fuel by vehicles and construction machines on the performance stage combustion gases shall be emitted, including carbon dioxide accounted as a greenhouse gas. Furthermore, there shall be a need for electric power due to the use of site facilities,

operations of machines and devices and provision of lighting for the construction site (the use of electric power is connected with the emission of greenhouse gases during its production in power plants).

On the operational stage the need for electric power shall be associated with provision of lighting for the dam and with the use of an outbuilding mainly.

### **Adaptation of the Contract to adverse phenomena associated with climate change**

The planned dry reservoirs have been designed in accordance with binding hydraulic regulations, which include extreme events occurring in the environment due to the changes of climate (it is regulated by relevant regulations on designing, construction, and use of flood storage reservoirs). On the other hand, construction of new dry flood storage reservoirs shall improve flood protection for numerous localities located in Cracow and in its vicinity; thus, it would contribute to the reduction of effects of adverse phenomena accompanying the changes of climate.

## **5.3 Air quality**

Emission of dust and gaseous pollutions shall occur on the construction stage mainly, when works shall be done with application of heavy equipment and diesel vehicle and machines causing emission of gaseous and dust pollutions, and – as a consequence – concentration of pollutions in the air would raise. That shall be an unorganized emission, range of which shall correspond to areas of construction works and the course of access roads and service roads. It shall be local and temporary. After completing the performance it shall cease entirely.

The main factors affecting the air on the construction stage are as follows:

- Dust generated during operations of machines and devices performing the earthworks,
- Combustion gases generated by engines of operating machines and means of transport,
- Dust generated during deliveries of materials and their storage.

The volume of emission shall depend on the number of diesel vehicles and machines used for engineering and on the time of their work. Organization of the works (optimization of the equipment application, work efficiency, etc.), as well as organization of the space, including the construction site and access roads (optimization of delivery routes, location of the site facilities), shall have a significant meaning for limitation of the emission. An additional potential of limiting the emission of pollutions is associated with care for the technical condition of vehicles and machines, as well as with observation of environmental protection and H&S standards. For the purpose of minimizing the adverse impact on the air it is recommended to sprinkle yards and dirt roads regularly with water (limitation of dusting) or even to stop the works at dry and windy weather.

Deliveries of construction materials shall not modify the current general condition of air. In case of the access roads and the temporary roads, due to the temporary character of deliveries, the emission shall practically be of no meaning and it shall not cause exceedance of standard values beyond the traffic routes.

On the operational stage, due to an automatic operation system for the reservoirs, the traffic and nuisance associated with the impact of truck deliveries (emission of pollutions to the air) shall be limited only to the time of drives of vehicles transporting technical supervision ser-

vices to inspect the dam. One shall deem that the construction stage shall not provide permanent adverse changes to the air.

Mitigation measures planned to limit the Works Contracts' implementation impact on the quality of air were tabulated in Appendix 1 to this EMP – Plan of mitigation measures – and described in Chapter 6.3.

## 5.4 Soil and grounds

Impact on soils on the construction stage shall mainly be associated with direct transformations of the land surface (excavations), permanent exclusion of some grounds from the previous use method, modification of soil structure at temporarily acquired land (technological roads, construction sites), as well as with the potential possibility of polluting the soil due to a leakage of diesel derivatives. Those impacts may be local.

After completing the construction works and after the properly done ground reinstatement one shall expect significant changes to soil and water conditions and to soil productivity within temporary acquisition sites.

Except for the listed impact forms there shall be no interference in the soil layer.

At keeping the environmental protection and H&S standards there shall be no significant impact on and deterioration of the quality of soil due to the planned development of dry reservoirs.

Mitigation measures planned to limit the Works Contracts' implementation impact on the quality of soils and grounds were tabulated in Appendix 1 to this EMP – Plan of mitigation measures – and described in Chapter 6.4.

## 5.5 Surface water

Construction of the planned dry flood storage reservoirs Malinówka 1 and Malinówka 2 shall not affect the morphological continuity of the river, and shall also not affect hydromorphological, biological, and physical-chemical elements of the river. Only the excess of water, which would not be accommodated in the Malinówka channel, shall be stored within the reservoirs, and that storage would be periodical and temporary. The planned reservoirs shall not change the volume and dynamics of flows in the river. The Works Contracts in question shall not pose hazard to the achievement of environmental objectives determined for the BSW within the catchment they would be implemented. Implementation of the Works Contracts shall not be associated with the intake of water and with the discharge of waste to the ground; thus, it shall not affect the quantitative status and the qualitative status of surface water and shall not pose risk for achieving the BSW's environmental objectives.

Impact on the water environment during the performance may occur due to interfering in the ground subbase and to the earthworks done with heavy equipment, including diesel machines and vehicles. Works of that type may be related to a risk of disturbing the water relations at the surface water-bearing layers and to a risk of harmful substances' leakage to the environment, i.e. increase of suspension in outflows, spillage of wastewater, fuel or other substances applied during the construction works. The occurrence of a flood wave during the performance may also cause washing-out / destruction of the objects to be developed (dams of the reservoir) and deterioration of the surface water quality. For the purpose of limiting the

risk of the aforementioned events and to reduce their potential effects, this EMP plans relevant mitigation measures – described in Chapters 6.11 and 6.12.

For the purpose of limiting a risk of events that may result in adverse impact on the environment on the operational stage it is planned to provide regular inspection and technical conditions assessments for the reservoir, and – if necessary – also maintenance actions (e.g. removal of sediments from the reservoir bottom after accommodation of a flood wave). The use of the reservoirs shall not modify the quality of surface water.

Mitigation measures planned to limit the Works Contracts' implementation impact on the quality of surface water were tabulated in Appendix 1 to this EMP – Plan of mitigation measures – and described in Chapter 6.6.

## 5.6 Groundwater

Implementation of the subject Works Contracts shall not relate to the intake of water or to the discharge of wastewater to the soil; thus, it shall neither affect the quantitative and the qualitative status of groundwater nor form a hazard for achieving the BGW's environmental objectives.

It is expected that in case of a flood wave causing necessary water storage in dry reservoirs, the storage time shall not exceed 24 hours. Such a short time excludes the possibility of infiltration by huge volume of flood water into the ground within the reservoir, and therefore the contract shall not affect the water relations and the quality of shallow water of water-bearing layers, especially of Neogene level, where – in case of the contract – the main use level occurs.

The use of reservoirs shall not result in modification of the groundwater's quality.

Mitigation measures planned to limit the Works Contracts' implementation impact on the quality of groundwater were tabulated in Appendix 1 to this EMP – Plan of mitigation measures – and described in Chapter 6.6.

## 5.7 Acoustic climate

A potential source of noise shall be machines and devices and means of transportation operating on site on the performance stage. The noise sources shall concentrate in the area of the construction site and the site facilities mainly. Impact on the acoustic climate shall be temporary and local, and shall cease after the completion. The strongest acoustic impact shall occur during the works in vicinity of sites requiring acoustic protection. In case of the Malinówka 1 Reservoir the closest areas requiring acoustic protection are located on the northern side of the reservoir in question. In case of the Malinówka 2 Reservoir the closest areas requiring acoustic protection are located on the western and on the south-western side of the planned reservoir.

The noise associated with truck deliveries may slightly affect the acoustic climate in the area. However, it shall be stated that deliveries of materials during the performance shall be temporary, and the noise generated during deliveries of materials and raw materials may be omitted.



During the use of the planned reservoirs impact on the acoustic climate shall not occur (there may only be a temporary emission of noise during mowing of plants growing on the embankment crest and on slopes).

Mitigation measures planned to limit the Works Contracts' implementation impact on the acoustic climate were tabulated in Appendix 1 to this EMP – Plan of mitigation measures – and described in Chapter 6.7.

## 5.8 Nature

Implementation of the planned Works Contracts is associated with impact on vegetation and fauna of the site. A method adopted for the performance minimizes that impact, and limits it to the impact on vegetation colliding directly with the works. Herbaceous plants shall be destroyed, and trees colliding with the planned works directly and in the area of temporary acquisition shall be logged.

The impact of works on fauna shall mainly result from the increased level of noise, which may affect soil fauna through interference in the soil structure during the performance; however, those shall be reversible and temporary impacts. Furthermore, reinstating a natural soil cover in that area shall in future lead to reinstatement of previous plant groups and fauna groups due to natural succession.

Any adverse impact on plants and animals shall cease to a high extent on the use stage. It is related to the expected restoration of the work site to its original conditions, while keeping the previous land use.

Further sub-clauses discuss in details the impact of the planned development of dry reservoirs Malinówka 1 and Malinówka 2 on the condition of particular protected elements of the natural environment. Mitigation measures planned to limit the Works Contracts' implementation impact on the condition of abiotic nature were tabulated in Appendix 1 to this EMP – Plan of mitigation measures – and described in Chapter 6.8.

### 5.8.1 Impact on the protected environmental habitats and on the protected species of plants, fungi, and animals – Works Contract 3A.2/1

Impact of the Works Contract 3A.2/1 on the environment shall be related to:

- Removal of about 1,500 trees and about 9,497 m<sup>2</sup> of shrubs colliding directly with the planned construction of the Malinówka 1 Reservoir<sup>25</sup>.
- Scaring of the protected species of reptile – sand lizard,
- Scaring of 6 species of protected birds.

In accordance with the binding provisions, disturbance of protected species shall require a prior obtainment of relevant administrative decisions allowing for exceptions from bans related to the protected species (according to conditions described under item no. 37 of Appendix 1 to the EMP).

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<sup>25</sup> The scope of logging has been determined based upon the valid status of design documentation. The most of the trees to be logged is young, and their diameter does not exceed 15 cm (see also information on the planned replacement tree planting program, in Chapter 6.8).

## 5.8.2 Impact on the protected environmental habitats and on the protected species of plants, fungi, and animals – Works Contract 3A.2/2

Impact of the Works Contract 3A.2/2 on the environment shall be related to:

- Removal of about 2,432 trees and about 7,458 m<sup>2</sup> shrubs colliding directly with the planned construction of the Malinówka 2 Reservoir<sup>26</sup>.
- Damaging bryophyte under partial protection, i.e. 1 m<sup>2</sup> of red-stemmed feathermoss *Pleurozium schreberi* – damaging such a small area of commonly present bryophyte shall not be significant. Population of red-stemmed feathermoss shall neither be significantly reduced in a scale of the region nor locally.
- Development of the planned dry Malinówka 2 Reservoir shall affect 2 types of environmental habitats in the area of the designed reservoir. Those are:
  - 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, *Alnion incanae*, *Salicion albae*)  
(1 patch of habitat with an area of 1.2 ha),
  - 9170 Galio-Carpinetum oak-hornbeam forests  
(2 patches of habitat with a total area of 1.2 ha).

The impact shall be permanent (patches of removed habitats would not be reinstated on site after completion of the works).

- Habitat of 2 invertebrates shall be destroyed in the area of the planned dry Malinówka 2 Reservoir: buff-tailed bumblebee *Bombus terrestris* and red-tailed bumblebee *Bombus lapidarius*.
- Destroying habitats of amphibians – frogs of the green frog group in the type of green frog, and frogs of the brown frog group (common frog and moor frog).
- Scaring of the protected species of reptile – sand lizard,
- 41 species of protected birds, which would be disturbed during the construction works, were identified within Malinówka 2 Reservoir and its buffer. The Works Contract implementation site is mainly a feeding site and – in some cases – a nesting site.
- The area of Malinówka 2 Reservoir is a feeding site and a place of flights of bats (common noctule, common pipistrelle, and Brandt's bat/whiskered bat). It is possible to disturb preying specimens and ones flying-by on the construction stage.
- Habitats of Eurasian beaver, hedgehog, and squirrel shall be destroyed in the area of the designed Malinówka 2 Reservoir. Considering the number of huge beaver dams, it shall be assumed that there are at least 2 family groups of that species.

In accordance with the binding provisions, disturbance of protected species and damaging their habitats shall require a prior obtainment of relevant administrative decisions allowing for exceptions from bans related to the protected species (according to conditions described under item no. 37 of Appendix 1 to the EMP).

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<sup>26</sup> The scope of logging has been determined based upon the valid status of design documentation. The most of the trees to be logged is young, and their diameter does not exceed 15 cm (see also information on the planned replacement tree planting program, in Chapter 6.8).

### **5.8.3 Impact on protected areas – Works Contract 3A.2/1**

Implementation of the planned Works Contract 3A.2/1 – both: on the performance stage, as well as on the use stage – shall not cause adverse impact on protected areas and objects located in its wide neighborhood. The closest protected object (old oak in the southern part of the Bieżanów Estate, under protection as an environmental monument) is located in a distance of about 170 m east from boundaries of the Works Contract implementation site, beyond the zone of its potential impact. The closest protected area is located in a distance of about 540 m south-west from the Works Contract boundaries, and it is separated from it by e.g. a wide belt of A4 motorway.

### **5.8.4 Impact on protected areas – Works Contract 3A.2/2**

Implementation of the planned Works Contract 3A.2/2 – both: on the performance stage, as well as on the use stage – shall not cause significant adverse impact on protected areas and objects located in its wide neighborhood. The northern part of the eastern edge of the reservoir (with an area of about 0.5 ha, including e.g. the eastern end of the front dam and the eastern edge of the planned land grading) is located within the western boundaries of the Krzyszkowicki Forest ecological use land (with an area of about 34 ha), but – according to the results of the Environmental Impact Assessment given in the environmental decision – implementation of the Works Contract shall not affect the aforementioned area significantly and adversely (logging of trees within the ecological use land has been limited only to trees colliding with performance sites directly – in the area not greater than about 0.5 ha). Except for the area discussed above, the closest protected object is a group of old trees (environmental monuments) at Podedworze Street in Cracow – located in a distance of about 1.5 km north-west from boundaries of the planned reservoir.

## **5.9 Cultural landscape and monuments**

Construction sites for both of the planned small dry flood storage reservoirs Malinówka 1 and Malinówka 2 are located within archaeological supervision zones. The expected earthworks may potentially result in discovering new archaeological heritage; however, for now no archaeological sites were identified within the area in question. As a consequence, there is no basis at the moment to forecast adverse impact of the planned reservoirs on the cultural landscape and on monuments.

Mitigation measures planned to limit the potential impact of Works Contracts' implementation on the cultural environment were tabulated in Appendix 1 to this EMP – Plan of mitigation measures – and described in Chapter 6.9.

## **5.10 Material goods**

In terms of protecting the material goods the development of small dry flood storage reservoir – included in Contract 3A.2 – shall improve flood safety for developed areas in vicinity of the River Serafa, including the areas of e.g. Złocień Estate and Stary Bieżanów Estate in Cracow. Occurrence of impact on structures located in vicinity is possible in the neighborhood of construction yards and delivery routes. The occurrence of adverse impact on the material goods has not been identified.

Issues associated with the social context of the Contract 3A.2, including expropriation of properties, restriction of the previous use method, or access to properties, are described in details in the *Land Acquisition and Resettlement Action Plan* (LA&RAP) for the Contract in question.

## 5.11 Health and safety of people

The designed construction works performed under Contract 3A.2 shall temporarily deteriorate the inhabitants' quality and standard of life, but that impact shall be temporary and reversible. Due to the performance there will be increased emission of noise in vicinity of the works and dusting shall increase locally, and – due to the increased traffic of trucks – emission of combustion gases shall raise. However it shall be emphasized that those impacts would be temporary and limited, and they would cease at the completion.

The operational stage is associated with a positive impact on the people and their properties. The main objective of the Contract is to protect people and their material goods against flooding during high water levels. Operations of the developed small dry flood storage reservoir shall increase the feeling of safety among people living in the areas located in the River Serafa Valley.

Mitigation measures planned to limit the Works Contracts' implementation impact on the health and safety of people were tabulated in Appendix 1 to this EMP – Plan of mitigation measures – and described in Chapter 6.11.

## 5.12 Exceptional hazards to the environment

Implementation of the planned Works Contracts is associated with a possibility of occurrence of the following crisis or emergency situations, which may cause exceptional hazard to the environment:

- Uncontrolled emission (leakage) of diesel substances

There may be an emergency situation on the performance stage, what would result in a leakage of diesel derivatives from vehicles, construction machines, tanks, etc., polluting surface water of land surface (including soil). Limitation of the risk and effects of such events takes place based upon proper organization of the site facilities and care for the proper technical conditions of vehicles, and machines and equipment applied on site, and – in case of their occurrence – based upon application of procedures referring to crisis and emergence situations described in the EMP.

- Fire or explosion of flammable substances

There may be an emergency situation on the performance stage associated with fire (e.g. due to equipment failure, negligence by the personnel, explosion of flammable substances, lightning strike, etc.). Limitation of the risk and effects of such events takes place based upon strict observance of H&S rules, proper organization of the site facilities and care for the proper technical conditions of vehicles, and machines and equipment applied on site, and – in case of their occurrence – based upon application of procedures referring to crisis and emergence situations described in the EMP.

- Identification of unexploded shells or ordnance

Dangerous military materials, e.g. unexploded shells and ordnance, may be found on the performance stage. Limitation of a potential hazard associated with such events takes place based upon provision of an ongoing sapper supervision over the works, and – in case of identifying such materials – upon strict observance of procedures referring to cases of identifying presence of unexploded shells and ordnance described in the EMP.

- Immediate water raise, flood

Water level may raise immediately in water-courses within the construction site or a flood may occur on the performance stage, what would pose risk to health and life of the personnel and cause material damage on site. In order to minimize potential effects of such events the Contractor shall consider flood threat at organizing the site facilities and the remaining part of the construction site, and shall develop a *Flood Protection Plan for the Construction Site* and shall strictly apply conditions contained therein.

- Possible failure or disaster at the reservoir on the use stage

Use of the dry flood storage reservoir is associated with a potential risk of spilling water over the dam crest or with a dam failure, due to the occurrence of e.g.: long-term storm rainfall, failure of discharge facilities, and others. Limitation of risk in case of such catastrophes takes place based upon particular design and technical solutions applied for the planned reservoirs, in accordance with the guidelines binding for designing of hydraulic objects (e.g. particular dimensions of discharge facilities and of reservoirs' embankments, proper selection of materials to construct embankments, application of required membranes, works technology including necessary sufficient compaction of embankments, provision of reservoirs with control and measurement apparatus, etc.). Considering that protection and the fact that the reservoirs have been designed including hydrological data defining the scale of flows in water-courses within the discussed area in computational periods, it may be stated that the discussed hazard is highly potential and the probability of its occurrence is minor. On the operational stage the subject reservoirs shall be applied in accordance with the use manual, including any formal and legal requirements on both: environmental and technical aspects, as well as safety of the structure.

Mitigation measures planned to limit the effects of potential crisis situations, which may emerge due to or in the time of Works Contracts implementation were tabulated in Appendix 1 to this EMP – Plan of mitigation measures – and described in Chapter 6.12.

### 5.13 Other hazards related to ESHS

Implementation of the Contract may relate to numerous impacts related to ESHS issues (i.e. environmental, social and health and safety aspects). Except for the issues discussed above in Chapters 5.1-5.12, the following additional issues or hazards related to that subject may occur during implementation of the Contract, e.g.:

- Accidents and near misses, including participation of people associated with implementation of the Contract and/or of third parties;
- Cases of such unacceptable behavior on work sites as sexual harassment or mobbing;



- Cases of intentional or unintentional violation of labour law's provisions, including the ones associated with social conditions and labour conditions, and with payment to the personnel;
- Cases of infections with sexually transmitted diseases (including HIV/AIDS) or other infectious diseases (including those caused by coronaviruses), resulting from the lack of knowledge or from non-compliance with applicable rules on preventing and controlling infections of that type.

Due to significant social effects of those hazards, this Environmental Management Plan and other documents of the Contract contain numerous detailed conditions to prevent and efficiently react in case such events occur, and to assure proper implementation of any provisions of national legislation in that scope (see e.g.: Chapter 6.13).

## 5.14 Cumulative impact

Development of two small dry flood storage reservoirs Malinówka 1 and Malinówka 2, being subjects of this EMP, shall be done in a relatively small distance from the planned development sites for the other two dry reservoirs under Contract 3A.2 (i.e. Malinówka 3 Reservoir and Serafa 2 Reservoir), and in vicinity of the recently constructed Bieżańów (see e.g.: description in Chapter 2). As informed in e.g. Environmental Management Plans under development for Works Contracts 3A.2/3 and 3A.2/4, and in the environmental decision issued for the aforementioned assignment (see: description in Chapter 3.5), development of any of those reservoir is associated with the occurrence of significant emission or other significant impact on the environment, scale of which would cause the possibility of significant impact on the abiotic environment or on the biotic environment, even in case of simultaneous performance at four reservoirs under Contract 3A.2. Analysis of mitigation measures described in EMPs for the aforementioned Works Contracts concludes with a statement that in case of performing the construction works in conformity with the conditions contained therein there is no risk of significant adverse cumulative impact, even in case of developing four small dry flood storage reservoirs in the planned locations simultaneously. Similarly, in case of the operational stage for the developed cascade of small dry flood storage reservoirs in the Serafa River Basin it is not expected to face adverse impact on the environment due to potential accumulation of potential impact of each of the reservoirs.

## 6 Description of mitigation measures

In order to limit potential adverse impact of the planned Contract onto particular elements of the environment, Appendix 1 to this EMP provides a list of mitigation measures binding for the Contractor of Works Contracts 3A.2/1 and 3A.2/2. The measures have been developed based upon the conditions included in the binding decision on environmental conditions, including a supplementation with additional conditions determined at the development of the EMP. A summary of main mitigation measures' categories has been presented in the following parts of this chapter, with a breakdown into particular components of the environment discussed in Chapters 4 and 5 of the EMP.

Notwithstanding the above (in accordance with the condition in item no. 88 in Appendix 1 to the EMP), the Contractor shall be obliged to apply and observe all ESHS policies' requirements and conditions (i.e. the ones related to environmental, social and health and safety issues) as determined in the Contract documents, in the Operational Policies and Procedures of the World Bank<sup>27</sup> concerning protection of health and environment, as well as safeguard policies, in the WBG's Environmental, Health and Safety (EHS) Guidelines<sup>28</sup>, in the ESHS Code of Conduct (developed on the stage of filing a bid<sup>29</sup>), in documents of the Contractor listed in Chapter 6.14 and in item no. 69 in Appendix 1 to the EMP, and as results from the legislation valid in Poland (including the Labour Code, the Construction Law, and others).

### 6.1 Land surface and landscape

Basic forms of the potential adverse impact of the planned implementation of Works Contract 3A.2/1 and 3A.2/2 on the surface of land and on the landscape were provided in Chapter 5.1.

In order to limit those impacts Appendix 1 to the EMP implements mitigation measures to e.g.:

- Limit the impact on the condition of land surface and landscape associated with land acquisition (e.g. items no. 5, 6, 9, 13, 14, 15, 24, 25, 34, 38, 40, 42, 43, 45);
- Limit the damage to landscape values associated with the removal of or damages to trees and shrubs (e.g. items no. 16, 18, 19, 20, 21, 22, 23, 40).

<sup>27</sup> Available on e.g. a website:

<https://policies.worldbank.org/sites/PPF3/Pages/Manuals/Operational%20Manual.aspx#S3-2> (in part titled *Investment Project Financing / Environmental and Social Safeguard Policies*).

<sup>28</sup> The guidelines are published on the World Bank's internet service at:

[https://www.ifc.org/wps/wcm/connect/Topics\\_Ext\\_Content/IFC\\_External\\_Corporate\\_Site/Sustainability-At-IFC/Policies-Standards/EHS-Guidelines/](https://www.ifc.org/wps/wcm/connect/Topics_Ext_Content/IFC_External_Corporate_Site/Sustainability-At-IFC/Policies-Standards/EHS-Guidelines/) and <https://www.ifc.org/wps/wcm/connect/29f5137d-6e17-4660-b1f9-02bf561935e5/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES&CVID=jOWim3p>

<sup>29</sup> In accordance with conditions given in the bidding documents in part ITB 11.1 (h).

## 6.2 Climate

Due to the absence of adverse impact on the climate (see: description under Chapter 5.2), it was not stated necessary to implement mitigation measures for that environmental component. Some mitigation measures – listed in Chapter 6.3 – are indirectly connected to the protection of climate, and they refer to the protection of air against contamination with combustion gas.

## 6.3 Air quality

Basic forms of potential adverse impact of the planned Works Contracts 3A.2/1 and 3A.2/2 on the air were presented in Chapter 5.3.

For the purpose of limiting those impacts Appendix 1 to the EMP implements mitigation measures to e.g.:

- Limit the contamination of air with combustion gas (e.g. items no. 50, 57);
- Limit the contamination of air due to emission of dust (e.g. items no. 58, 59, 65).

## 6.4 Soils and grounds

Basic forms of potential adverse impact of the planned Works Contracts 3A.2/1 and 3A.2/2 on soils and grounds were presented in Chapter 5.4.

For the purpose of limiting those impacts Appendix 1 to the EMP implements mitigation measures to e.g.:

- Limit the damage to soil due to land acquisition (e.g. items no. 5, 6, 13, 14, 15, 24, 25, 34, 38);
- Limit the loss of top-soil layer (e.g. items no. 39, 40, 41, 42, 43);
- Limit the risk of polluting the ground on the performance stage (e.g. items no. 46, 47, 49, 50, 51, 52, 53, 54, 55, 56, 64, 65, 66, 67, 68).

## 6.5 Surface water

Basic forms of potential adverse impact of the planned Works Contracts 3A.2/1 and 3A.2/2 on surface water were presented in Chapter 5.5.

For the purpose of limiting those impacts Appendix 1 to the EMP implements mitigation measures to e.g.:

- Limit the risk of polluting the water on the performance stage (e.g. items no. 5, 6, 13, 14, 15, 24, 25, 34, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 64, 65, 66, 67, 68);
- Limit the risk of polluting the water on the operational stage (e.g. items no. 44, 45, 47);
- Limit the risk of adverse impact on biological elements of the water quality (e.g. items no. 34, 35, 36, 82).

## 6.6 Groundwater

Due to the fact that the potential implementation impact of Works Contracts 3A.2/1 and 3A.2/2 on groundwater (as described in Chapter 5.6) essentially overlaps impacts on the ground environment and on the surface water (described in Chapters 5.4 and 5.5), it was not stated necessary to implement additional mitigating measures in that scope, i.e. other than mitigation measures for the ground environment (see: description in Chapter 6.4) and mitigation measures for the surface water (see: description in Chapter 6.5).

## 6.7 Acoustic climate

Basic forms of potential adverse impact of the planned Works Contracts 3A.2/1 and 3A.2/2 on the acoustic climate were presented in Chapter 5.7.

For the purpose of limiting those impacts Appendix 1 to the EMP implements mitigation measures to e.g.:

- Limit noise generated on the performance stage and to limit the impact of that noise on acoustically protected sites (e.g. items no. 14, 15, 57, 60, 61, 62, 63).

## 6.8 Nature

Basic forms of potential adverse impact of the planned Works Contracts 3A.2/1 and 3A.2/2 on the abiotic nature's resources were presented in Chapter 5.8.

For the purpose of limiting those impacts Appendix 1 to the EMP implements mitigation measures to e.g.:

- Limit losses in environmental resources associated with land acquisition, including acquisition of environmental habitats and habitats of plants and animals (e.g. items no. 5, 6, 13, 14, 15, 25, 26, 34, 36, 39, 40, 41, 42, 43, 82);
- Limit losses in environmental resources associated with logging of or damages to trees and shrubs (e.g. items no. 16, 17, 18, 19, 20, 21, 22, 23, 33, 36, 37, 40, 82);
- Eliminate or limit losses in environmental resources associated with accidental mortality of specimens of protected species on site (e.g. items no. 17, 24, 25, 26, 28, 29, 30, 31, 32, 33, 34, 36, 39, 82);
- Eliminate or limit the performance impact on the results of breeding and migration of protected animal species (e.g. items no. 24, 25, 26, 29, 32, 34, 35, 36, 37, 46, 47, 48, 60, 82);
- Eliminate or limit the performance impact on the spread of invasive plant species of foreign origin (e.g. items no. 27, 36, 82);
- Limit a risk of adverse impact on biological elements of the water quality (e.g. items no. 34, 35, 36, 82).

Notwithstanding the abovementioned mitigation measures introduced in Appendix 1 to the EMP (resulting i.a. from the conditions set out in the applicable environmental decision), in order to limit the impact of the implementation of all the Works Contracts included in Subcomponent 3A of the OVFMP on the state of woody greenness resources within and around

the city of Krakow, in spring 2020 PGW WP RZGW in Cracow started work to develop an additional replacement tree planting program for the whole subcomponent. The program, planned to implementation in cooperation with local authorities, would compensate for the loss of tree resources caused by the necessary felling of trees carried out under the aforementioned contracts within and around the city of Cracow. Currently (as of the second quarter of 2020), consultations and working meetings of the Directorate PGW WP RZGW in Cracow with representatives of the Cracow City Council and representatives of local ecological organizations are held to establish the detailed assumptions and rules for the implementation of the planned replacement tree planting program.

## 6.9 Cultural landscape and monuments

In accordance with a description given in Chapter 5.9, the planned implementation of Works Contract 3A.2/1 and 3A.2/2 does not provide adverse impact on known cultural assets. In order to eliminate the potential adverse impact on yet undiscovered cultural objects, Appendix 1 to the EMP implements mitigation measures to assure establishment of conditions for the performance with locally relevant heritage conservator and to implement relevant procedures in case of discovering mobile heritage or archaeological sites on the performance stage (items no. 79, 80, 83).

## 6.10 Material goods

In accordance with a description given in Chapter 5.10, the planned implementation of Works Contracts 3A.2/1 and 3A.2/2 does not provide significant adverse impact on the condition of material goods. In order to eliminate the potential adverse impact of the works on material goods, Appendix 1 to the EMP implements mitigation measures to provide protection for buildings, roads, and other infrastructural elements against unfavorable impact of the works and / or transportation associated with implementation of the Contract (items no. 5, 6, 7, 8, 9, 11, 12, 71). Some mitigation measures listed under Chapter 6.1, as well as measures listed under items no. 3 and 4 in Appendix 1 to the EMP – in reference to the purchase and to the compensation due to implementation of the Contract, are indirectly associated with the protection of material goods, and those are to limit the impact of land acquisition during the works.

## 6.11 Health and safety of people

Basic forms of potential adverse impact of the planned Works Contracts 3A.2/1 and 3A.2/2 on the health and safety of people were presented in Chapter 5.11.

For the purpose of limiting those impacts Appendix 1 to the EMP implements mitigation measures to e.g.:

- Limit the impact of the planned works on the sanitary condition of air (listed under Chapter 6.3);
- Limit the impact of the planned works on the acoustic climate (listed under Chapter 6.7);
- Eliminate or limit the risk of chemical contamination of water and ground on the performance stage (listed under Chapters 6.4, 6.5, and 6.6);



- Secure safety on site and in its vicinity  
(items no. 7, 8, 10, 11, 12, 46, 47, 69, 70, 71, 72, 73, 74, 75, 84, 88, 96, 97);
- Assure proper reaction in case of exceptional hazards  
(items no. 76, 77, 78, 96).

## 6.12 Extraordinary hazards to the environment

Basic types of exceptional hazards (crisis situations), which may potentially occur due to the implementation of Works Contracts 3A.2/1 and 3A.2/2 were presented in Chapter 5.12.

In order to limit potential effects of crisis situations Appendix 1 to the EMP implements mitigation measures to e.g.:

- Eliminate or limit the risk of chemical contamination of water and ground on the performance stage (listed under Chapters 6.4, 6.5, and 6.6);
- Secure safety in case of fire (e.g. item no. 69);
- Secure safety in case of identifying unexploded shells and ordnance (e.g. items no. 69, 70, 78, 84);
- Secure safety in case of flood  
(e.g. items no. 76);
- Assure proper reaction in case of exceptional hazards  
(items no. 76, 77, 78, 96).

## 6.13 Other ESHS hazards

Exemplary forms of additional hazards associated with ESHS issues (other than the ones discussed previously in Chapters 5.1-5.12) were presented in Chapter 5.13.

In order to prevent hazards of that type, except for the measures listed in Chapters 6.1-6.13, Appendix 1 to this EMP implements additional mitigation measures to e.g.:

- prevent accidents and near misses on work site and in other places related to the implementation of the Contract (e.g. items no. 88, 89, 90, 91, 96 and others listed in Chapters 6.11 and 6.12);
- combat such unacceptable behavior on work site as cases of sexual harassment or mobbing (e.g. items no. 92, 93, 96);
- assure proper social conditions, and labour conditions and payment to the personnel engaged in implementation of the Contract, in compliance with the law (e.g. items no. 94, 95, 96);
- assure proper procedures for ongoing information provision on issues and hazards associated with the aforementioned subject (e.g. item no. 96);
- reduce the risk of spreading infectious diseases, especially sexually transmitted diseases (including HIV/AIDS) and diseases caused by coronaviruses (e.g. item no. 97).

## 6.14 Requirements for implementation of action plans in the construction phase

For the purpose of providing proper performance organization, as well as for the proper implementation of conditions determined under Appendices 1 and 2 to the Environmental Management Plan, the Contractor is obliged to develop and obtain the Engineer's acceptance for the following documents, which shall subsequently be implemented:

- Construction site organization plan, which should contain such elements as e.g.:
  - location of the site facilities,
  - development of the site facilities,
  - protection of the site facilities,
  - service roads,
  - environmental protection on the site facilities, technological roads, and yards.
- Waste management plan, which should contain such elements as e.g.:
  - encountered and predicted types and volumes of waste,
  - means of preventing adverse impact of waste on the environment,
  - means of waste management considering collection, transportation, recovery and treatment of waste,
  - type of generated waste and method for its storage.
- Quality assurance plans (general one and detailed ones), which should contain such elements as e.g.:
  - works performance organization,
  - organization of traffic at the construction site, including marking of the works,
  - H&S and environmental protection,
  - list of working teams,
  - scope of duties of the key personnel,
  - quality control,
  - laboratory tests.
- Flood protection plan for the site for the performance time, which shall contain the following:
  - monitoring of hydrological and meteorological conditions,
  - conditions for accommodation of flood flows during the performance,
  - the rules of work for the Contractor's team in the period of flood risk,
  - basic duties of the managing staff during the flood risk,
  - list of managing staff in the period of flood risk,
  - list of equipment and transport means needed to conduct rescue actions.

- Health and safety plan (BIOZ Plan), which should contain such elements as e.g.:
  - indication of plot or land development elements, which may create a risk to safety and health of people,
  - information concerning expected hazards that could occur during the performance, defining the scale and types of hazards and the place and time of occurrence, including reference to the natural environment,
  - information on designation and marking for construction work sites, according to the type of hazard,
  - information on the method of training for the employees prior to the commencement of particularly hazardous works,
  - determining the method of storing and transport of hazardous materials, goods, substances and preparations at the construction site,
  - indication of technical and organizational means of safeguarding against hazards connected with the construction works in increased health risk zones, or in their immediate vicinity, including means of safe and efficient communication allowing for quick evacuation in the case of fire, failure, and other hazards,
  - indication of the storage location for construction site's documentation and documents necessary for proper operation of machines and other technical devices.

At developing the aforementioned documents the Contractor shall include e.g. provisions of the decision on environmental conditions (and of other administrative decisions related to the environmental protection, if applicable), conditions determined in the EMP, the appropriate Operational Policies and Procedures of the World Bank<sup>30</sup> concerning protection of health and environment, as well as safeguard policies, the WBG's Environmental, Health and Safety (EHS) Guidelines<sup>31</sup>, the ESHS Code of Conduct (developed on the stage of filing a bid<sup>32</sup>) and binding provisions of the state law (including the Labour Code, the Construction Law, and others).

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<sup>30</sup> Available on e.g. a website:

<https://policies.worldbank.org/sites/PPF3/Pages/Manuals/Operational%20Manual.aspx#S3-2>  
(in part titled *Investment Project Financing / Environmental and Social Safeguard Policies*).

<sup>31</sup> The guidelines are published on the World Bank's internet service at:

[https://www.ifc.org/wps/wcm/connect/Topics\\_Ext\\_Content/IFC\\_External\\_Corporate\\_Site/Sustainability-At-IFC/Policies-Standards/EHS-Guidelines/](https://www.ifc.org/wps/wcm/connect/Topics_Ext_Content/IFC_External_Corporate_Site/Sustainability-At-IFC/Policies-Standards/EHS-Guidelines/) and  
<https://www.ifc.org/wps/wcm/connect/29f5137d-6e17-4660-b1f9-02bf561935e5/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES&CVID=jOWim3p>

<sup>32</sup> In accordance with conditions given in the bidding documents in part ITB 11.1 (h).

## 7 Description of measures related to environmental monitoring

Appendix 2 to this EMP provides a summary of monitoring measures binding for the Contractor for the Works Contracts 3A.2/1 and 3A.2/2. Those measures have been developed based upon the conditions included in the valid decision on environmental conditions, along with additional conditions established on the stage of EMP development.

Monitoring measures listed in Appendix 2 to the EMP belong to one category:

- Monitoring for implementation of mitigation measures from Appendix 1 to the EMP (items no. 1-97 of Appendix 2 to the EMP).

## 8 Public consultations

### 8.1 Public consultations on the EIA stage (2012)

In accordance with the Polish EIA procedure, on the stage of issuing a decision on environmental decision the Works Contracts forming Contract 3A.2 (including planned development of small dry flood storage reservoirs Malinówka 1 and Malinówka 2) shall be subject to obligatory public consultations. On the EIA procedure stage the consultations with the public were done by the unit issuing the ED, i.e. RDOŚ in Cracow.

In order to assure participation of the public in the proceeding, announcement of the Regional Director for Environmental Protection in Cracow (dated 08/10/2012, ref. no.: OO.4233.13.2012.AG) informing on the commencement of proceeding on the issuance of a decision on environmental conditions for the Contract in question, on undertaking an environmental impact assessment for the subject Contract, on unit responsible for the issuance of decision, and on unit responsible for the issuance of opinions on implementation and use of the Contract, and on possibility of acknowledging the case documentation and submitting remarks and motions within 21 days, was placed on a noticeboard and published at a website of the Regional Directorate for Environmental Protection in Cracow, as well as on noticeboards of the City Office of Cracow and the City and Municipality Office of Wieliczka. Publication of the Announcement on the noticeboard of RDOŚ in Cracow took place from 08/17/2012 to 09/07/2012, whereas on the noticeboard in the City Office of Cracow – from 08/17/2012 to 09/08/2012, and on the noticeboard in the City and Municipality Office of Wieliczka – from 08/17/2012 to 09/07/2012. **The Regional Directorate for Environmental Protection in Cracow did not receive any remarks and motions from the parties, the public, and social and ecological organizations, within the legally established period of 21 days.**

### 8.2 Public consultations on Environmental and Social Management Framework (2015)

The draft ESMF was subject to public consultations conducted in accordance with the World Bank's operational policy OP 4.01. Their purpose was to allow the society to acknowledge contents of that document and to assure the possibility of filing potential remarks, enquiries, and applications to its contents.

Documentation on the public consultations process for the ESMF is available on a website of the Odra-Vistula Flood Management Project Coordination Unit<sup>33,34</sup>.

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[http://www.odrapcu.pl/doc/OVFMP/RPZSiS\\_Zalacznik\\_08\\_Raporty\\_z\\_procedury\\_upublicznienia\\_projektu\\_EMAF.pdf](http://www.odrapcu.pl/doc/OVFMP/RPZSiS_Zalacznik_08_Raporty_z_procedury_upublicznienia_projektu_EMAF.pdf)

<sup>34</sup> [http://www.odrapcu.pl/doc/OVFMP/RPZSiS\\_Zalacznik\\_09\\_Raporty\\_z\\_konsultacji\\_spoecznych\\_RAF.pdf](http://www.odrapcu.pl/doc/OVFMP/RPZSiS_Zalacznik_09_Raporty_z_konsultacji_spoecznych_RAF.pdf)



### 8.3 Public consultations on EMP (2020)

The draft document was subject to the public consultation procedure carried out in compliance with the World Bank operational policies (*OP/BP 4.01*).

After the draft of an EMP document has been prepared, its electronic version is placed on publicly available websites. Detailed information on the possibility to get to know the content of this document and possibilities to lodge motions and remarks (jointly with detailed contact data (e-mail address, office hours, telephone numbers) is provided for public information in the local press and on the website of the implementation unit of the Contract being subject to EMP.

In view of the current situation of the COVID-19 epidemic, the action plan for the publication of the Environmental Management Plan takes into account the World Bank's Technical Note *"Public Consultation and Stakeholder Engagement in World Bank Supported Activities, in the event of restrictions on public meetings"*.

The meeting so far organised as part of the publication of the document in the form of an open debate will be replaced by the organisation of a webinar, i.e. a type of webinar conducted and implemented with the use of webcast technology, which enables two-way communication between the meeting leader and participants, using virtual tools. The meeting will be organized through Microsoft Teams application. This program allows you to organize and conduct a webinar, with the possibility of sharing, among other things, a presentation or a screen view, as well as switching between several speakers and asking questions by participants in a chat (only in writing) and answering them by the speakers. Participants are only required to have access to the Internet and a web browser - no other program is required to install on their computer to join the webinar.

In connection with the above, the announcement about the publication of the EMP document will contain information about the date and time of the start of the webinar together with an indication that a link will be made available on the Investor's website to join the webinar.

In order to allow questions to be asked during the period of publication of the EMP, a helpline will be launched. The information about the helpline will also be included in the announcement about the publication of the EMP.

Comments from the public that need to be taken into account are introduced into the EMP document and prepared for its final version. An EMP in this form is also sent to the World Bank to obtain the "No objection" clause.

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## 9 Organizational structure of EMP implementation

Contract 3A.2 is a part of the Odra-Vistula Flood Management Project co-financed from the funds of the World Bank, the Council of Europe Development Bank, the European Union Cohesion Fund, and the State budget. Therefore, the structure of supervision over implementation of the EMP must correspond to both: regulations of the Polish law, as well as the requirements of the World Bank.

### 9.1 Odra-Vistula Flood Management Project Coordination Unit

The overall coordination of the implementation of the individual EMPs within the Project is the responsibility of the Project Coordination Unit (PCU), which functions as an organisational unit within the structures of the National Water Management Authority (KZGW), which is an organisational unit of the State Water Holding Polish Waters (PGW WP).

The PCU assignments are as follows:

- management of tasks of Project Implementation Units (PIU/JRP) and Project Implementation Units (PIU/JWP), within the scope of tasks included in the Project;
- technical assistance and support to the PIU/JRP and PIU/JWP in the implementation of the tasks of the Project, including the application of World Bank procedures on procurement, environmental protection and social issues;
- preparation of annual work programmes for the Project and evaluation of their progress;
- supervise the work of the Project and evaluate their progress;
- ongoing control and monitoring of funds allocated for the implementation of the Project and participation in the management of funds of the Project;
- reporting, including preparation and submission of quarterly reports on the implementation of the Project to the World Bank, the CEB and the Steering Committee.

### 9.2 Project Implementation Unit

An entity which is directly responsible for implementation of the EMP for the Contract and for monitoring of the progress of its implementation is the Project Implementation Unit (PIU), i.e. State Water Holding Polish Waters, Regional Water Management Authority in Cracow.

Due to implementation of the OVFM Project, the Project Implementation Office (PIO) was assigned within the PIU structure, which is a separate structure supervised by the President of State Water Holding Polish Waters. This structure is transparent and has a high decisive level, which increases the effectiveness of the Contract implementation.

As a part of EMP implementation supervision, the PIO fulfils the following assignments:

- monitoring of the EMP implementation progress;
- financial management and bookkeeping;
- preparation of required reports for the needs of EMP implementation monitoring and co-ordination of its execution by all services engaged in the EMP implementation.

The scope of PIO employees' duties connected with the fulfilment of supervision over EMP implementation<sup>35</sup> is as follows:

- managing, coordinating, and supervising the EMP implemented by the Designer, the Consultant, and the Contractor;
- direct supervision over the correct Contract implementation;
- cooperation with the PCU;
- conducting an administrative and legal supervision over EMP implementation;
- verifying the Reports and studies on EMP implementation, as prepared by the Consultant and by the Contractor;
- conducting a financial supervision over EMP implementation;
- supervising the proper application of formal procedures during implementation of the EMP, as required by the Building Law, Works Contract, the Environmental Protection Law, and others.

### 9.3 Engineer - Consultant

The role of the Engineer is to support the PIU (PGW WP RZGW in Cracow) in an effective conduction of the whole Works Contract process (from preparation of the Contract to its settlement).

The Consultant/Engineer shall be selected using QCBS method (quality and cost based selection), in accordance with the "Guidelines: Selection and Employment of Consultants by World Bank Borrowers".

In accordance with the scope specified in the Contract Engineer Agreement, the Engineer/Consultant shall be obliged to perform e.g. the supervision over EMP implementation<sup>36</sup>, comprising the following:

- monitoring of EMP implementation, as done by the Contractor;
- monitoring of the Contractor's activities;
- checking the quality of construction works performed by the Contractor and built-in construction products, and especially preventing the usage of building materials which are defective and not accepted for use in the construction industry;
- representing the Investor on site by performing the control of the compliance of the construction process with the design and with the construction permit/investment project implementation permit, and with regulations related to the environmental protection and technical know-how;
- supervision over all issues related to the environmental protection by specialists experienced in the field of environmental protection (including a key environmental management expert) and by other Engineer's personnel;
- constant monitoring over proper implementation of measures mitigating the adverse environmental impact;

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<sup>35</sup> That supervision is done by e.g. an Environmental Specialist of the PIO team.

<sup>36</sup> That supervision is done by e.g. the following: Key Environmental Management Expert, H&S Expert, Supervising Inspectors, and Resident Engineer.

- conduction of additional tests, if it would be necessary to verify the reports of the Contractor;
- identifying problems resulting from harmful environmental impact caused by the construction works, and presentation of solutions to those problems;
- verifying and accepting construction works being covered or of concealed works, participation in tests and technical commissioning of technical installations and devices, as well as preparation of and participation in performing the commissioning activities for finished engineering objects and handing them over for use;
- confirmation of the works factually completed and of the removal of defects, as well as, at the request of the Investor, verification of site's settlements.

## 9.4 Contractor

A Contractor shall be selected for the purpose of performance, and it shall be responsible for implementation of individual EMPs. The Contractor's liabilities in that scope are as follows:

- conducting construction works according to the rules specified in the EMP, in accordance with contract conditions and design documentation, pursuant to applicable legal provisions and requirements of administrative decisions issued for this Contract;
- designation of the EMP Coordinator, discussed under item no 81 of Appendix 1 to the EMP;
- assurance of permanent environmental supervision (including environmental experts listed in item no. 82 of Appendix 1 to the EMP), sapper supervision (according to item no. 84 of Appendix 1 to the EMP), and archaeological supervision (according to item no. 83 of Appendix 1 to the EMP);
- ensuring the permanent H&S supervision, discussed under item no. 90 of Appendix 1 to the EMP;
- assurance of the Sexual Harassment and Mobbing Prevention Specialist, discussed under items no. 92 and 93 of Appendix 1 to the EMP;
- implementation of the Engineer's recommendations (including environmental supervising experts and the Investor's supervising inspector) concerning implementation of the EMP;
- ensuring – prior to the commencement of works – the preparation of: BIOZ Plan, Waste Management Plan, Quality Assurance Plan/Plans, Flood Protection Plan for the site for the performance time, and Construction Site Organization Plan;
- if it will be necessary, the Contractor's environmental team would develop necessary materials and applications for the obtainment of permits/decisions for departures from bans to protect species of plants, fungi or animals based upon the rules of and in the mode specified by the NP Act (of April 16, 2004). The above-mentioned decisions issued by RDOŚ/GDOŚ are to be requested for by the Contractor. The Contractor's duty is to implement the provisions of obtained decisions for departure from the protection of species of plants, fungi or animals;
- keeping the construction site records;

- drafting the reports (e.g. monthly report and final report, report to the RDOŚ and/or to the GDOŚ [the latter only in the scope resulting from decisions obtained from those authorities on the implementation stage, if the Contract would need to obtain such decisions]);
- preparing memos and reports concerning the environmental protection;
- applying to the Investor for modification of design solutions, if it is justified by a necessity of increasing safety for performance of the construction works or improving the construction process related to implementation of the EMP;
- repairing the potential faults/defects, which would be notified by the Engineer and/or by the Client (in case the notification period for defects, guarantee, and warranty would be supported by the Engineer) during the works and during the defects, guarantee, and warranty notification period. The Contractor is obliged to report any actions implemented to remove the faults/defects. The report shall be filed to the Engineer/Client.



## 10 EMP implementation schedule and reporting procedures

Implementation of the EMP shall allow the parties involved in the preparation, performance and supervision of the Works Contract, for:

- identifying different environmental aspects which have a considerable impact on the state of the environment, and therefore allow for controlling, correcting, and reducing them, but which consequently generate economic effects;
- rectifying adverse consequences of the works conducted during the implementation to the benefit of the environment and financial results;
- determining the aims and measures performed within the adopted environmental policy, covered by the EMP, which require expenditures and bring tangible effects;
- identifying and eliminating prospective hazards and failures, preventing and removing the environmental effects, which may be connected with them and which may entail losses disproportional to the preventive costs;
- using the natural resources reasonably, with minimum environmental loss and optimum generation of costs.

Furthermore, implementation of recommendations and measures required under the EMP may reduce or even eliminate a risk of occurrence of adverse social, environmental and economic events and phenomena related to the Contract, and in particular:

- a risk to ignore the environmental protection issues during the process of implementation of measures by the Contractor;
- a risk of escalation of the local community protests as a result of a failure of the Contractor to adhere to technologies for conducting the works and environmental procedures approved by the Engineer;
- a risk of additional environmental penalties;
- a risk of additional damage to the environment.

Taking into account the significance of the aspects specifying the environmental conditions and community conditions, the following EMP implementation procedures are anticipated:

- prior to the selection of the Contractor, the Employer shall submit a draft of this EMP to the World Bank in order to obtain its opinion;
- after obtaining a positive opinion of the World Bank, the draft EMP shall be consecutively subject to public consultations;
- after the public consultations (and supplementing the document with the consultations report), the EMP shall be updated and submitted in its final version for the approval by the World Bank;
- upon the approval of EMP by the World Bank, the final document shall be attached to the Bidding Documents for selection of the Contractor;
- all activities of the Contractor shall be systematically reported (once a month), in Polish and, if required, in English, in paper and in electronic versions, with reference to the obligations required by the EMP and other contractual documents. Those reports shall be subject to the approval of the Engineer and the Employer.

Furthermore, relevant units involved in implementation of the Contract shall be obliged to fulfil additional obligations related to monitoring and reporting of issues associated with the environmental protection, as determined in administrative decisions issued for the subject Contract (see: Chapter 3.5) and given in Appendix 1 and Appendix 2 to this EMP (Plan of mitigation measures, Plan of monitoring measures).

Monitoring at the works execution stage involves the preparation of summary reports on monitoring of nature by the Contractor, confirmed by the experts of the Contractor's environmental team, approved by the Engineer's environmental team, and submitted to RDOŚ by the PIU. Detailed contents of the report shall be defined by the Engineer (commencement report, periodical reports – monthly, ad-hoc, closure); it shall also determine the due dates.

The progress reporting system under the Project shall also base on monthly reports submitted by Contractors to the PIO through the Engineer, and upon Engineer's monthly and quarterly reports. Monthly and quarterly reports on the EMP implementation (Contractor's and Engineer's) shall be prepared as a part of monthly reports or as a separate document.

The PIU shall supply the PCU with quarterly reports in the part referring to measures implemented by them. They shall contain a required set of information and descriptions allowing for the preparation of the Project's quarterly report by the PCU. Furthermore, especially in the case of problems with the Works Contract implementation, the PCU shall expect the PIU to submit summaries and data in the monthly periods.

The following reporting procedures were established:

1. Reporting:

- a) Reports (monthly, quarterly, ad-hoc, final) shall be developed by the Contractor,
- b) Report review by the Engineer,
- c) Submission of the report to the Employer (for information),
- d) Provision of a report to RDOŚ and / or GDOŚ (only in a range resulting from administrative decisions issued on the performance stage, if they would require reporting of measures in question),
- e) Submission of a PIU's quarterly report to the PCU,
- f) Final report on implementation of the EMP prepared by the Engineer (after verification by the PIU and by the PCU, submitted to the World Bank not later than 3 months after the completion of works).

2. Filing system:

- a) the Contractor: 1 copy of each report in an electronic version for 5 years from the date of the Works Contract completion,
- b) the Engineer: 1 copy of each report in an electronic version for 5 years from the date of the Works Contract completion,
- c) the Employer: 1 copy of each report in an electronic version for 5 years from the date of the Works Contract completion.

### 3. Evaluation:

- a) ongoing assessment of the outcomes of the planned measures implementation which arise from the EMP;
- b) ongoing analysis of documentation (Reports of the Contractor) by the Engineer;
- c) providing the Employer with reliable information on the course of the construction process, with special consideration of implementation of the measures limiting the adverse impact on the environment, and recommendations arising from environmental decisions;
- d) development and provision of quarterly reports to the World Bank by the PCU.

The following is planned:

- *ex-ante* evaluation: Report prior to the commencement of the Works Contract implementation (Engineer's Report),
- ongoing evaluation: Engineer's quarterly reports,
- *ex-post* evaluation:
  - Report upon the completion of the works (final reports on implementation of the EMP developed by the Contractor and by the Engineer),
  - EMP Report upon expiry of the Defects, Guarantee and Warranty Notification Period drawn up by the Contractor.

## 11 Source materials

1. Environmental Impact Report – dry flood storage reservoir in the Serafa River Basin, Cracow, Mat 2012.
2. Decision on environmental conditions dated October 29, 2012 (ref. no.: OO.4233.13.2012.BM.) for the planned development of five small dry flood storage reservoirs in the Serafa River Basin (Biezanów, Serafa 2, Malinówka 1, Malinówka 2, and Malinówka 3 reservoirs), including two reservoir referring to this EMP.
3. MasterPlan for the Vistula River Basin. National Water Management Authority, Warsaw 2014.
4. Architectural-construction design for Contract 3A.2 Flood Protection in Serafa Valley:
  - 3A.2 Flood Protection in Serafa Valley, Water-Law Study – Malinówka 1 Reservoir, Cracow 2019;
  - 3A.2 Flood Protection in Serafa Valley, Water-Law Study – Malinówka 2 Reservoir, Cracow 2019;
5. Report on the environment for Małopolskie Province in 2017, Provincial Inspectorate for Environmental Protection in Cracow, Cracow 2018.
6. Environmental Protection Program and Waste Management Plan for the City of Cracow remaining its element – plan for the years 2005-2007, including tasks done in 2004 and perspective for the years 2008-2011 – Volume I Environmental Protection Program.
7. World Bank Operational Policy OP 4.01 – Environmental Impact Assessment (<https://policies.worldbank.org/sites/PPF3/Pages/Manuals/Operational%20Manual.aspx#S3-2> [in the part titled *Investment Project Financing / Environmental and Social Safeguard Policies*]).
8. Environmental and Social Management Framework, final document, April 2015 ([http://odrapcu2019.odrapcu.pl/en/popdow\\_documents/](http://odrapcu2019.odrapcu.pl/en/popdow_documents/)).
9. Poland – Odra-Vistula Flood Management Project: environmental and social management framework (<http://documents.worldbank.org/curated/en/2015/04/24502899/poland-odra-vistula-flood-management-project-environmental-social-management-framework>).
10. Odra-Vistula Flood Management Project – Project Operations Manual, Wrocław 2015 ([http://www.odrapcu.pl/doc/POM\\_PL.pdf](http://www.odrapcu.pl/doc/POM_PL.pdf))
11. Website: [http://odrapcu2019.odrapcu.pl/en/popdow\\_documents/](http://odrapcu2019.odrapcu.pl/en/popdow_documents/)
12. Website: [www.isok.gov.pl/](http://www.isok.gov.pl/)
13. Acoustic maps for the City of Cracow ([https://www.krakow.pl/encyklopedia\\_krakowa/13140.artykul.mapa\\_akustyczna\\_miasta\\_krakowa.html](https://www.krakow.pl/encyklopedia_krakowa/13140.artykul.mapa_akustyczna_miasta_krakowa.html))
14. Geo-service GDOŚ <http://geoserwis.gdos.gov.pl/mapy/>

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## 13 Appendices

Appendix 1. Plan of mitigation measures;

Appendix 2. Plan of monitoring measures;

Appendix 3. List of national legal acts related to environmental protection;

Appendix 4. Decisions, resolutions, permits, notices

Appendix 4a. Decision on environmental conditions dated October 29, 2012

Appendix 4b. Resolution of the RDOŚ dated October 3, 2018

Appendix 4c. Resolution of the RDOŚ dated September 12, 2019

Appendix 4d. Resolution of the RDOŚ dated September 16, 2019

Appendix 5. Map with location of the Contract

Appendix 6. Map with location of the Contract in reference to protected areas

Appendix 7. Map with location of the Contract in reference to natural habitats and protected species occurrence sites

Appendix 8. Map with location of the Contract's elements