



PODKARPACKI BOARD OF
AMELIORATION AND HYDRAULIC
STRUCTURES IN RZESZÓW

ENVIRONMENTAL MANAGEMENT PLAN

DRAFT

for

Odra-Vistula Flood Management Project

co-financed by World Bank (WB), Loan Agreement No. 8524 PL
Council of Europe Development Bank (CEB), Framework Loan Agreement No. LD
1866
European Union and
State budget

Sub-component 3B: Protection of Sandomierz and Tarnobrzeg

WORKS CONTRACT 3B.2
Flood protection Tarnobrzeg

**ENVIRONMENTAL CATEGORY B - in accordance with
WB OP 4.01**

Issue	Date	Prepared by	Checked by	Employer's Approval	Description
H	14.11.2017	Marta Rak			

ODRA-VISTULA FLOOD MANAGEMENT PROJECT

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Works Contract 3B.2 Flood protection Tarnobrzeg

The Environmental Management Plan is prepared for Works Contract 3B.2 implemented by the Podkarpacki Board of Amelioration and Hydraulic Structures in Rzeszów.

PROJECT IMPLEMENTATION UNIT:

Podkarpacki Board of Amelioration
and Hydraulic Structures in Rzeszów

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List of definitions and abbreviations used in this EMP

Abbreviation	Description
BOD ₅	Biochemical oxygen demand during 5 days
CEB	Council of Europe Development Bank https://coebank.org/en/
Consultant/Engineer	Consultant/ Contract Engineer for Podkarpacki Board of Amelioration and Hydraulic Structures in Rzeszów
Contractor	Company or public body executing Works Contract 3B.2 Flood protection Tarnobrzeg
Designer	Company or legal person drawing up the design documentation – in this case INFOKOSZT Piotr Montewski
Deep Soil Mixing	A vibration-free Deep Soil Mixing process for construction of anti-filtration barrier which includes cutting and mixing soil located in the base of an embankment with simultaneously supplied cement-bentonite slurry
EIA	Environment Impact Assessment
EIAR	Environment Impact Assessment Report
EMP	Environmental Management Plan
Environmental Decision	Decision on environmental conditions
ESMF	Environmental and Social Management Framework http://www.odrapcu.pl/doc/OVFMP/Environmental_and_Social_Management.pdf
GZWP	Main Aquifer Reservoir (Główny Zbiornik Wód Podziemnych)
IBA	Important Bird Area
IMGW-PIB	Institute of Meteorology and Water Management – National Research Center (<i>Instytut Meteorologii i Gospodarki Wodnej – Państwowy Instytut Badawczy</i>)
Investment/Works Contract	Works Contract 3B.2 Flood protection Tarnobrzeg
JCWP	Surface Water Body (Jednolita część wód powierzchniowych)
JCWpd	Ground Water Body (Jednolita część wód podziemnych)
KZGW	National Water Management Authority (<i>Krajowy Zarząd Gospodarki Wodnej</i>)
OHS	Occupational Health and Safety
PAD	Project Appraisal Document for the World Bank for approval of a Loan to the Polish Government to implement OVFMP ¹
PCU	Odra-Vistula Flood Management Project Coordination Unit http://www.odrapcu.eu/
PIO	Project Implementation Office - created within PIU separate organizational unit responsible for the implementation of Investment
PIU	Project Implementation Unit - Podkarpacki Board of Amelioration and Hydraulic Structures in Rzeszów
PIU/Investor/ Employer	Podkarpacki Board of Amelioration and Hydraulic Structures in Rzeszów http://www.pzmiuw.pl/
POM	Project Operations Manual prepared by Odra-Vistula Flood Management Project Coordination Unit, Wrocław 2015 (binding version is English language version) http://www.odrapcu.pl/doc/POM_ENG.pdf
Project/OVFMP	Odra-Vistula Flood Management Project

¹ <http://documents.worldbank.org/curated/en/2015/07/24763021/poland-odra-vistula-flood-management-project>

PZMiUW	Podkarpacki Board of Amelioration and Hydraulic Structures in Rzeszów (<i>Podkarpacki Zarząd Melioracji i Urządzeń Wodnych w Rzeszowie</i>)
RDOŚ	Regional Directorate for Environmental Protection (<i>Regionalna Dyrekcja Ochrony Środowiska</i>)
Roads authority	Organizational unit implementing the responsibilities of the management of public roads in accordance with the Act on public roads
RZGW	Regional Water Management Authority (<i>Regionalny Zarząd Gospodarki Wodnej</i>)
SHPA	Special Habitat Protection Areas Natura 2000
SHPP	Safety and Health Protection Plan pursuant to art. 21a section 4 of the Act of 7th July 1994 - Building Law
WIOŚ	Provincial Inspectorate for Environmental Protection (<i>Wojewódzki Inspektorat Ochrony Środowiska</i>)
World Bank (WB)	International Bank for Reconstruction and Development http://www.worldbank.org/

List of abbreviated names of legal acts used in this EMP

The names of legal acts mentioned herein are given in their abbreviated form. The full names of legal acts are presented in the table below.

Name in the text	Full name (and publication address)
<i>Building Law Act</i>	Act of 7 th July 1994 - Building Law (consolidated text: Journal of Laws of 2017, item 1332 as amended)
<i>Code of Administrative Procedure</i>	Act of 14 th June 1960 - Code of Administrative Procedure (consolidated text: Journal of Laws of 2017, item 1257).
<i>Environmental Impact Assessment Act</i>	Act of 3 rd October 2008 on making available information on the environment and its protection, participation of the public in environmental protection, as well as environmental impact assessments (consolidated text: Journal of Laws of 2017, item 1405 as amended)
<i>Environmental Impact Assessment Regulation</i>	Regulation of the Council of Ministers of 9 th November 2010 on projects that may significantly affect the environment (consolidated text: Journal of Laws of 2016, item 71).
<i>EPA</i>	Act of 27 th April 2001 - Environmental Protection Act (consolidated text: Journal of Laws of 2017, item 519, as amended).
<i>Flood protection special act</i>	Act of 8 th July 2010 on particular terms of preparation and implementation of Projects with regard to flood-control structures (consolidated text: Journal of Laws of 2017, item 1337, as amended)
<i>NEPA</i>	Act of 16 th April 2004 on environmental protection (consolidated text, Journal of Laws of 2016, item 2134, as amended)
<i>Safety and Health Protection Regulation</i>	Regulation of the Minister of Infrastructure of 23 rd June 2003 on Information Concerning Safety and Health Protection and Safety and Health Protection Plan (Journal of Laws of 2003, No.120, item 1126)
<i>WMP</i>	Regulation of the Council of Ministers of 18 October 2016 on Water Management Plan for waters within the Vistula river basin (Journal of Laws of 2016, item 1911)

SUMMARY

This document presents the Environmental Management Plan (EMP) for the Investment: 'Flood protection Tarnobrzeg' – Works Contract 3B.2 implemented within the Odra-Vistula Flood Management Project, co-financed by the International Bank for Reconstruction and Development (World Bank), Loan Agreement No. 8524 PL; Council of Europe Development Bank (CEB), Framework Loan Agreement No. LD 1866, European Union and State Budget.

This EMP includes the following elements:

- Institutional, legal and administrative conditions with specified selected acts of Polish law, main stages of the EIA procedure, guidelines of the World Bank and the course of EIA procedures for the reviewed Works Contract,
- The condition of individual elements of the environment in the area of the Works Contract, in the scope of landscape shaping, climate, air, soil, surface and ground water condition, acoustic climate, environment and cultural monuments,
- Summary of the environmental impact assessment included in the Environmental Impact Assessment Report for the above mentioned elements of the environment,
- Presentation of mitigation measures to be implemented by the Contractor and the Employer at the stage of preparing, executing and operating the Works Contract with regard to soil, surface and ground water, air, noise, flora and fauna. Mitigation measures plan is specified in a table in Appendix No. 1 to EMP,
- The Monitoring measures plan for the construction stage and at the operation stage of the Works Contract for individual elements of the environment. The Monitoring measures plan is specified in a table in Appendix No. 2 to EMP,
- The procedure and results of public consultations at the stage of general environmental impact assessment (initial phase), environmental impact assessment for the Works Contract, and at the stage of preparation of this EMP,
- The organizational structure of the implementation of EMP, implementation and the reporting procedure.

Appendices to EMP include checklists of the Mitigation measures plan and the Monitoring measures plan, the environmental decision and drawings showing the location of the proposed Works Contract, as well as potential flood risk. The main source for this EMP for the Works Contract 3B.2 is the Environmental Impact Assessment Report for the Investment: '*Vistula River Stage 2 - Expansion of the right embankment of the Vistula river over a length of 13.959 km, the right embankment of the San river over a length of 2.193 km and the left embankment of the Łęg river over a length of 0.112 km, within the communes of Gorzyce and Radomyśl nad Sanem, the Podkarpackie Province*', the Environmental Decision issued by the RDOŚ in Rzeszów and the Environmental and Social Management Framework.

Need for Works Contract implementation

The reason for the implementation of the Works Contract is the need to increase flood safety of the area situated along the right bank of the Vistula River Valley on the area of Gorzyce Commune (Tarnobrzeg District) and Radomyśl nad Sanem Commune (Stalowa Wola District), to protect urban areas and to limit flood losses in the area by elevation and expansion¹ to the existing embankment.

The Works Contract consists on elevation and expansion of existing 4 Sections of flood embankments which are in bad technical conditions and are too low and water may flow over it or may be interrupted in case of a greater freshet.

Location of the Works Contract

Works Contract is located:

- Section I - at the Vistula river kilometrage: 286+816 - 279+416 (the right side embankment),
- Section II - at the Vistula river kilometrage: 278+750 - 273+650 (the right side embankment),
- Section III - at the Vistula river kilometrage: 271+806 - 273+783 (the right side embankment), and at the Łęg river kilometrage 0+770 - 0+900 (the left side embankment),
- Section San - at the San river kilometrage 0+239 - 2+276 (the right side embankment),

on the area of Gorzyce Commune (Tarnobrzeg District) and Radomyśl nad Sanem Commune (Stalowa Wola District), Podkarpackie Province. These sections are shown at the map in Appendix No. 5 to EMP.

Scope of the Works Contract

The Investment / Works Contract 3B.2 entitled 'Flood protection Tarnobrzeg' covers: elevation and expansion of the crest of four sections of the existing flood-protection embankments with their total length of 16.264 km, compaction of the embankment body, sealing of the embankment substrate by means of a vertical anti-filtration barrier set up in the embankment foot at the water-side slope, a depth of 8 m below the terrain level and sealing of the water-side slope by means of a geomembrane screen anchored at the top of the embankment crest and at the bottom of the embankment body in the vertical barrier, in the so-called anchoring ditches sealed with bentonite-cement hold-up.

The Works Contract also covers: construction of service roads with their surface made of broken stone or bituminous mass located partially at the embankment crest and partially at

¹ „Expansion” here and elsewhere in text means that is it increase of the height of the already existing embankment, its expansion at the water-side, put the anti-filtration barrier in the embankment base, strengthen slopes, put the geomembrane at the water-side of embankment

the so-called by-embankment bench (at the air-side). At the embankment water-side by the slope base, apart from a section with its length of about 300 m (the land plot No. 2, the precinct of Witkowice), there will be a 'green route' made to provide an access to the inter-embankment area. Moreover, the Works Contract will cover reconstruction of some embankment passages and embankment culverts together with technical infrastructure colliding with the embankment.

In order to protect the embankments against damage made by burrowing animals, the embankment water-side slopes will be secured by means of a galvanised steel mesh embedded at a depth min. 0.2 m.

Current environmental condition

On the stage of preparing the EIAR¹, assessment of the environment condition was conducted within the area of planned works.

As a result of works related to identifying environmental and cultural qualities it has been found that the area of the Works Contract is characterized by the following regional, local and supra-local conditions:

- The behind-embankment area is a mosaic of farm lands, meadows, wastelands and urbanised areas. Within the Works Contract under consideration, at the behind embankment there are ecological corridors located in Section I at km 137.2÷137.6 of the Vistula river and in Section San. Moreover the following parts: Section II, partly Section III and Section San are situated within the Important Bird Area: the Valley of the Lower San River PL143 (Appendix No. 6 to EMP).
- The Works Contract borders or slightly overlaps with the following sites of community importance i.e. the Natura 2000 site - the Tarnobrzeg Valley of the Vistula River PLH180049 (it overlaps with Section III in the vicinity of Zalesie Gorzyckie with its area of approx. 0.063 ha) and the Natura 2000 site - the Valley of the Lower San River PLH180020 (Section II borders with it from km 0+000 up to km 2+180, Section San borders with it from km 0+180 up to km 2+192) (Appendix No. 6 to EMP),
- The Works Contract borders with the Wisła pod Zawichostem ['Vistula at Zawichost'] Nature Reserve (Section I borders with this area over a length of approx. 280 m, from approx. km 3+020 up to approx. km 3+300) (Appendix No. 6 to EMP).

Due to the applied restrictions with regard to land occupancy on the water-side as well as land-side of the embankment, mitigation measures the Works Contract will not have a signifi-

¹ EIAR named: 'Vistula River Stage 2 - Expansion of the right embankment of the Vistula river over a length of 13.959 km, the right embankment of the San river over a length of 2.193 km and the left embankment of the Łęg river over a length of 0.112 km, within the communes of Gorzyce and Radomyśl nad Sanem, the Podkarpackie Province' - preparation made by the FPP Consulting Ltd.

cant negative impact on the environment. For the needs of the Works Contract this EMP was compiled in accordance with the operational policy OP 4.01 of the World Bank. The EMP contains a plan of mitigation measures minimizing negative impact on the environment, which would be the effect of conducted works and the Monitoring measures plan. The Mitigation measures and Monitoring measures plans have been included in Appendices No. 1 and 2 to EMP.

A summary of the major negative impacts during implementation of the Works Contract

- *Impact on ground surface*

During the implementation period the negative impact on ground surface will be related to: land transformations as a result of the conducted earthworks and area clearing. A potential danger may lay with localized contamination of the ground surface with substances harmful to the environment, including petroleum products in case of spills from machines and equipment. However, in all cases, under the planned mitigation measures, the negative impacts will not be significant.

- *Impact on surface water*

The existing embankment to be expanded in the scope of the Works Contract 3B.2 is away from the Vistula river bed from ca. 80 to 500 m and ca. 60 to 500 m from the San river bed, therefore the Works Contract would not affect the hydrology, flow speed, or sedimentation processes in the rivers.

Water species/habitats of the Vistula river and the San river will remain unaffected by the works in the sections being conducted on the embankments located in a certain distance from the river bed without interfering in the river bed itself. The Vistula river and the San river in these sections, in accordance with the Water Framework Directive (according to the Water Management Plan for waters within the Vistula river basin dated 18.10.2016):

- The Surface Water Bodies: "Tributary from Chwałowice" and "Strachocka River" are natural water bodies; taking into consideration ecological status they were assessed 'good', their ecological potential was assessed 'good'. Environmental objective established for these JCWP: good ecological status and good chemical status.
- The Surface Water Bodies "San River from Rudnia to the estuary", "Łęg River from Murynia to the estuary", "Sanna River" and "Vistula River from San to Sanna" are natural water bodies; taking into consideration ecological status they were assessed 'bad'. Environmental objective established for these JCWP: good ecological status and good chemical status.
- The Surface Water Bodies: "Vistula River from Wisłoka to San" and "Trześniówka from Karolówka to the estuary" are heavily modified water bodies. The ecological po-

tential of these sections was assessed 'bad'. Environmental objective established for these JCWP: good ecological potential and good chemical status.

In the case of smaller streams and ditches (the Vistula river tributaries), impacts on biological elements are expected to occur during the investment implementation only. Any impact onto phytoplankton, zooplankton, benthos will be short-termed (approx. 2-3 months) on a local basis and will not affect the behaviour of the existing structures of the aquatic environment.

Some water turbidity will occur in the course of works. It will lead to the deterioration of such parameters as total suspended solids, dissolved oxygen and other indicators specifying aerobic conditions and organic impurities. Due to the fact that works will be performed locally, it will not lead to any permanent reduction in the class of this Surface Water Body and its state in terms of physico-chemical elements. Turbidity will be reversible in its character and will be limited to the onvestment implementation stage only. Upon the completion of works, the state of these Surface Water Bodies will naturally improve.

- *Acoustic impact*

The conducted study allows to state that acoustic inconvenience will occur only within a relatively short period of implementation. The conducted study for selected location-specific situations show that the range of noise occurrence of an acceptable level for residential buildings and other facilities protected against noise, will not exceed the acceptable noise levels during daytime. As no works are planned during the night, the acoustic impact between 10.00pm and 06.00am will not occur at all. The acoustic impact of construction works will be short-term, lasting at most for several days in the case of individual locations of the works. Additionally, in order to reduce a level of noise emitted to the environment during construction works conducted close to the existing residential premises, it will be used portable sound barriers with their height of min. 4.0 m.

As a result of applying vibration-free Deep Soil Mixing process during construction of a sectional anti-filtration barriers adverse vibration effects on the environment are avoided.

- *Impact on the air condition*

Emission of pollutants into the atmosphere will be generated by machines used during construction works and transport, relocation of earth masses, etc. Emissions will be low enough and short-term, so as not to cause significant negative effects, mainly with regards to danger to people, but also to the quality of the local environment as a whole.

- *Impact on the cultural environment, archaeological sites*

In the vicinity of the embankments (Section II) - at the land plot No. 1714/3 in the precinct of Wrzawy - there is only one structure listed in the register of monuments kept for the Commune of Gorzyce i.e. the war cemetery dated 1809. Its distance from the embankment axis is 50 m and from the demarcation lines - approx. 35 m. Additionally, at km 6+400 of the em-

bankment of the Vistula river (Section I, the land plot No. 203/3), with the range of impact of works, there is a stone with a commemorative plaque (to express appreciation to the local community and their involvement in flood-protection activities) founded in 2005. The Contractor will be obliged to undertake special caution in the course of conducting works at these sections. It will also be the Contractor's responsibility to provide permanent archaeological supervision during earth works.

The mitigation measures applied during the course of Works Contract implementation provide that there will be no negative impact on monuments protected on the basis of regulations on protection and care of monuments.

In case of uncovering structures or archaeological artefacts, the Contractor is obliged to immediately notify the Podkarpacki Voivode Conservator of Historical Monuments, the Engineer, and the Employer and apply the chance finds procedure as outlined in Appendix No. 1 to EMP.

- *Impact on flora and fauna, protected areas including Natura 2000*

The conducted construction works may have an impact on habitats, plants, animals and possibly cause individual specimen losses, but with the implementation of mitigating measures it will not be significant enough to cause adverse effects on the environment. Implementing the mitigation measures as outlined in section 6.8 and Appendix No. 1 of this EMP, including the careful selection of methods of embankment extension, will allow to avoid impact on protected areas and species.

Assessment of impacts of the Works Contract implementation on the environment showed that the inclusion and implementation of mitigating measures (see Appendix No. 1 to EMP), will lead to a significant reduction or avoidance of all major and foreseeable hazards to the environment, related to the Works Contract.

- *Impact on ground water*

Regarding ground water, the direct effects, though insignificant, will take place mainly in the period of Works Contract implementation, when changes will be related to: land transformation as a result of conducted cleaning and earthworks and possible ground water contamination with substances harmful for the environment, including oil substances in case of leaks from machines and equipment used. In any case however, with the assumed mitigation measures, they will not be of significant importance. In the case of drainage of the excavations for structures due to pumping operations, a temporary lowering of the ground water table inside a 3-5 m radius from the excavation.

According to the Water Framework Directive, the Ground Water Body JCWPd No. PLGW2200118, PLGW2200119 and PLGW2200135¹ on which the Works Contract is located are characterized by good water condition, without the risk of failure to reach the established environmental objectives.

- *Supervision over mitigation measures*

All mitigation measures will be supervised and controlled by specialists employed by the Contractor (including entomologist, chiropterologist, herpetologist, ornithologist and botanist), with regular controlling by the Engineer. These specialists will be employed throughout the whole period of the Works Contract. Further details of those actions are described in the tables for Mitigation measures plan and Monitoring measures plan (Appendices No. 1 and 2 to EMP).

Impacts during Works Contract operation

- *Impact on ground surface*

In the course of Works Contract operation there will be no physical interference with top or slopes of the embankment. Embankment will be only periodically mowing.

- *Acoustic impact*

During the period of the operation of planned flood infrastructure, no noise emissions will occur. During periodical embankment mowing (2 times/year) small noise emissions will occur due to the equipment used for these works. During freshets, acoustic impact will appear in the form of noise of flowing water.

- *Impact on air quality*

During the phase of embankment operation, there will be no risk to the air condition.

During periodic embankment mowing (2 times/year), a small quantity of exhaust fumes will be released, related to the use of equipment with a mechanical drive. However, their quantity will be very low and will not result in any hazard to the condition of the air in this area. Also, the period of freshets will not pose any hazard to condition of air.

- *Impact on the cultural environment*

Environmental impacts associated with the operation of embankment has no negative impact on historical substance. Embankment will increase level of protection for the historic buildings, or the entire local cultural environment located in the area of potential flood.

- *Impact on flora, fauna, protected areas, including Natura 2000 areas*

No adverse effect on habitats, or protected species of plants, animals or fungi are anticipated during period of operation.

- *Landscape impact*

¹ According to the currently binding regulation of the Council of Ministers of 18.10.2016 on the Water Management Plan in the Vistula River Basin Area (Journal of Laws of 2016, item 1911)

The extended embankments will not be the dominant feature of the landscape in terms of its height.

- *Effect on surface and ground water*

In the embankment operation phase, there will be no danger to surface, ground, or ground water. Due to the high thickness of permeable forms with their relatively high filtration index and the suspension of this barrier (i.e. it does not reach impermeable forms), the impact of anti-filtration barrier, which will be executed in the scope of this Works Contract, is local in its character. No negative impact onto the ground-water relations is foreseen, in particular in the area of agricultural use of plots.

Cumulative impacts

Extension and elevation of the Vistula river and the San river embankments in the proposed Sections will possibly be affected by cumulative impact of similar Projects in the basins of the Vistula river and its tributaries.

However, due to the location of individual Investments and the mitigation measures to be applied the cumulative impacts will be minimal, if they happen.

Limiting adverse impacts and strengthening of favourable ones

Main environmental impacts will take place over the time of the Works Contract implementation. During this time a number of measures should be undertaken, to mitigate or eliminate adverse impact (Appendix No. 1 to EMP) including:

- protection of the aquatic environment and soil against pollution (the use of efficient mechanical equipment, proper storage and handling of substances harmful to the environment, including oil products, such as fuels, lubricants etc., provision of back-up facilities and staff facilities),
- protection against noise: works conducted only from 06.00am to 10.00pm, use of efficient construction equipment, use of portable sound barriers,
 - environmental and landscape protection by Project implementation in accordance with environmental option which reduces interfering with flora and fauna habitats, indicates solutions minimizing the impact on the Natura 2000 areas and taking specific preventive measures;
- minimizing tree and shrub felling and conducting it in the period outside bird's breeding season,
- transfer of protected plant species saplings under proper botanical supervision,
- prior to work commencement, within the indicated time limit removal of the topsoil i.e. upper soil layer along with the present herbaceous vegetation and storing in a place where it will be protected from damage, in order to use it during land reclamation works,

- on embankment sections where reproduction areas of amphibians have been identified, implement measures to protect the animals (dying as a result of conducted works and vehicle traffic) migrating to and from their breeding grounds (e.g. fencing the amphibians habitats from the construction site),
- at the stage of the Works Contract implementation, during periods indicated by the herpetologist, conduct daily monitoring of barriers or traps, and transfer animals in the directions of their original migrations, to appropriate to the species habitats,
- prior to felling of trees and shrub check by entomologist and chiropterologist their possible inhabitation by protected species of insects and bats and in the event of occurrence of protected species the specialist's recommended measures which should be applied.

Additional mitigation measures concerning the restoring of the shelters and feeding sites referred to in the environmental decision

At the course of the conducted assessment, it was stated for the environmental variant (second (II) variant), necessity of removal ca. 2900 trees as well as bushes on the area of about 3.12 ha resulting in the loss of nesting sites for birds and breeding sites for bats. The losses shall not be large enough to be considered significant, however, they require to carry out additional mitigation measures prior to works commencement under article 75 of the Environmental Protection Act [consolidated text: Journal of Laws of 2017, item 519]. The solutions refer to the protected species of invertebrates birds and bats. The conduct of the following additional mitigation measures are planned:

1. As a mitigation measure for the group of species nesting in tree hollows and other such covers (owls, mergansers, hoopoe, tits, flycatchers, starling, nuthatch, etc.), nesting boxes for birds (280 pcs.) will be hung on trees. In the case of bats, the environmental decision indicated the need to hang breeding boxes for this group of mammals (50 pcs.).
2. As a result of startling (disturbance) during the Works Contract implementation, Red-backed shrike is the one to suffer a loss in its population (its several stands are located in the immediate vicinity of the embankment). In case of Red-backed shrike, as a mitigation measure, it was suggested to put 25 poles (the so-called look-out points) with planting of bushes for example wild rose and/or hawthorn.

Essential monitoring

The Monitoring measures plan is specified in Appendix No. 2 to EMP. The Monitoring measures plan includes all the provisions included in the environmental decision issued by RDOŚ, which has been presented in Appendix No. 4 to EMP. The Monitoring measures plan will enable ongoing control over the proper implementation of all mitigation measures.

Conclusions from the review of possible social conflicts

Experiences from more and more frequent floods in the Upper Vistula River basin indicate an urgent need for the implementation of the designed Works Contract. Negative effects of embankment damage during floods and flooding of floodplains as well as water penetration through the embankments, cause the local community to respond favourably to proposed flood protection Works Contract. An argument justifying a favourable attitude towards the Works Contract implementation, is also the limited interference with the environment, with a simultaneous, significant improvement in flood safety. Detailed aspects of social impact of the Works Contract 3B.2 are described in the Land Acquisition and Resettlement Action Plan.

Legal context of the Project

This Works Contract is qualified as the so-called group II, listed in EIA regulation. The Regional Director for Environmental Protection in Rzeszów, by way of a resolution dated 17.05.2013, ascertained an obligation to conduct an Environmental Impact Assessment for the Works Contract and defined the scope of the report. After submission of the EIA Report by the Employer, RDOŚ carried out the EIA procedure with the participation of the general public. For the Works Contract, RDOŚ issued on 07.09.2016 an Environmental Decision where the conditions of its implementation in the aspect of environmental protection are defined.

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1. INTRODUCTION

This study presents the Environmental Management Plan (EMP) for the Works Contract 3B.2 'Flood protection Tarnobrzeg', implemented under the Odra-Vistula Flood Management Project (OVFMP) co-financed by the International Bank for Reconstruction and Development (the World Bank), Loan Agreement No. 8524 PL; Council of Europe Development Bank (CEB), Framework Loan Agreement No. LD 1866 and State Budget. Emphasis should be put on the fact that the presented document is a site-specific study and is dedicated only to the Works Contract 3B.2.

1.1. ODRA-VISTULA FLOOD MANAGEMENT PROJECT

The primary purpose of the OVFMP Project is to protect the population on the floodplains within the selected parts of the river basins of two largest Polish rivers Vistula and Odra against risk caused by extreme floods. Under OVFMP it is planned to execute the most urgent tasks regarding flood management. The Project has been divided into five main investment components that cover: Middle and Lower Odra (Component 1), Kłodzka Valley, including the mountains and upland part of the catchment area of Nysa Kłodzka (Component 2), Upper Vistula River (Component 3), Institutional Strengthening and Enhanced Forecasting (Component 4) and Project Management and Studies (Component 5). The components are divided into Sub-components.

Units directly responsible for the implementation of the above components of the Project are:

- 1) **Regional Water Management Authorities in Wrocław and Szczecin** - in the scope of flood protection of the lower and middle Odra River (part of Sub-component 1B) and flood protection of the Nysa Kłodzka River Valley (Component 2 - only Regional Water Management Authority Wrocław);
- 2) **Podkarpacki, Małopolski and Świętokrzyski Boards of Amelioration and Hydraulic Structures** - in the scope of flood protection of the Upper Vistula River (Component 3);
- 3) **Lubuski and Zachodniopomorski Boards of Amelioration and Hydraulic Structures** - in the scope of protecting the middle and lower Odra River (Sub-components 1A, 1C and a part of 1B).

Detailed information on the Project have been published in the document 'Project Operation Manual'¹.

¹ http://www.odrapcu.pl/doc/POM_ENG.pdf (English language version of this document is binding)

1.2. COMPONENT 3, SUB-COMPONENT 3B

Under Component 3, four Sub-components have been identified, designated as 3.A (Flood Protection for Kraków and Wieliczka), 3.B (Protection of Sandomierz and Tarnobrzeg), 3.C (Passive and active protection in Raba sub-basin) and 3.D (Passive and active protection in San sub-basin) – names used are consistent with the POM.

Under Sub-component 3.B, it is planned to modernize the flood protection embankment system of the Vistula River and its tributaries within the range of Vistula's backwater along with necessary modernization of the pumping station system that protects the areas on the embankment's land-side during runoff of high water.

Works Contract 3B.2 is one of three Investments implemented under Sub-component 3.B, and its implementation is necessary to protect two Communes of Podkarpackie Province: Radomyśl nad Sanem and Gorzyce against flood.

1.3. THE AIM OF PREPARING THE EMP IN THE LIGHT OF POLICIES OF THE WB

According to the information included in the Project Assessment Document (PAD) the OVFM Project, and hence, Works Contract 3B.2 implemented by the **Podkarpacki Board of Amelioration and Hydraulic Structures in Rzeszów** belongs to the projects not having a significant negative impact on the environment, thus classified according to Bank Policy in category B¹ environmental projects. According to the guidelines of the World Bank, the Environmental Management Plan is an instrument specifying: a) the set of measures used to eliminate or mitigate adverse impacts of the Works Contract on the environment, which should be taken at the stage of its implementation and after its completion, and b) actions necessary for the effective implementation of these measures².

The primary purpose of the EMP, prepared individually for each Works Contract, is ensuring effective mitigation/alleviation and monitoring of unfavourable environmental impacts of the analyzed Works Contract, identified at the stage of the Environmental Impact Assessment completed by the Environmental Decision, and during further administrative procedures, necessary for implementation at the stage of construction and operation.

It should be emphasized that this EMP does not supersede the provisions of issued administrative decisions, but is a separate document coordinating and organizing actions. It does not constitute an exemption from implementing the detailed recommendations stated in decisions and legal regulations (see Appendix No. 3 to EMP).

¹ According to the classification specified in item 8 of the operational policy OP 4.01 of the World Bank (version of February 2011:

<http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/EXTPOLICIES/EXTOPMANUAL/0,,contentMDK:20064724~menuPK:64701763~pagePK:64709096~piPK:64709108~theSitePK:502184,00.html>).

² According to item 3 in Annex A to the operational policy OP 4.01 of the World Bank.

2. DESCRIPTION OF THE WORKS CONTRACT

2.1. LOCATION AND AREA

The Works Contract is located at km 271+806 – 286+816 of the Vistula river section from the border of Lubelskie and Podkarpackie Provinces (near Zawichost city) to Zalesie Gorzyckie, the Podkarpackie Province. The Works Contract will be entirely located within the Podkarpackie Province, on the area of two Communes Radomyśl nad Sanem (Stalowa Wola District) and Gorzyce (Tarnobrzeg District). The location of the Works Contract is presented on the below drawing (Fig. 1.).

2.2. CHARACTERISTICS OF THE WORKS CONTRACT

The Works Contract will cover the expansion¹ of:

- the right embankment of the Vistula river at a length of 13.959 km (at km 271+806 - 286+816 of the Vistula river) split into 3 sections:
 - Section I - the right embankment of the Vistula river at km 286+816 - 279+416 within 0+000 - 7+205 in the Commune of Radomyśl nad Sanem, the District of Stalowa Wola (the Stalowowski District);
 - Section II - the right embankment of the Vistula river at km 278+750 - 273+650 within 0+000 - 4+889 in the Commune of Gorzyce, the District of Tarnobrzeg (the Tarnobrzski District);
 - Section III - the right embankment of the Vistula river at km 273+783 - 271+806 within 0+000 - 1+865 in the Commune of Gorzyce, the District of Tarnobrzeg (the Tarnobrzski District) and the left embankment of the Łęg river at a length of 0.112 km (at km 0+770 - 0+900 of the Łęg river within 0+000 - 0+112) in the Commune of Gorzyce, the District of Tarnobrzeg (the Tarnobrzski District);
- the right embankment of the San river at a length of 2.193 km (at km: 0+239 - 2+276 of the San river within 0+000 - 2+193) in the Commune of Radomyśl nad Sanem, the District of Stalowa Wola (the Stalowowski District) (also specified as Section SAN).

The extension is aimed to raise a level of flood safety in the valley of Upper Vistula, in particular within the following Communes: Radomyśl nad Sanem and Gorzyce.

The Contract for Works 3B.2 covers the following operations under its scope:

¹ „Expansion” here and elsewhere in text means that is it increase of the height of the already existing embankment, its expansion at the water-side, put the anti-filtration barrier in the embankment base, strengthen slopes, put the geomembrane at the water-side of embankment

- elevation of the embankment crest, compaction and sealing of the embankment body and its expansion at the embankment side (to reach the 2nd hydrotechnical class parameters):
 - the embankment crest will be raised to the ordinate of dependable water (Q1%) with a normative exceedance (level exaggeration) of 1.0 m;
 - the embankment substrate will be sealed with a vertical, anti-filtration barrier a depth of 8.0 m below the ground level (made through in-depth mixing of ground with bentonite-cement grout). Designed depth of the anti-filtration barrier is consistent with the provisions of the environmental decision, which stated that the depth of the barrier will not exceed 10 below the ground level;
 - the embankment body will be sealed with a PVC geomembrane (1.5 mm thick) at the water side;
 - within the embankment water-locks there will be tight walls (made of steel sheet piles) embedded to seal the substrate.
- the water-side slope will be extra secured with a galvanised or PE-sheathed steel mesh placed directly on geomembrane and covered with a layer of ground which will be used to form the embankment body (protection against damage made by burrowing animals, especially beavers);
- placement of bio-material (bio-mat) at the water-side slope and its coverage with a layer of humus (3 cm thick);
- execution of technological routes along the embankment crest and the by-embankment bench crest;
- execution of a 'green' service route at the embankment water-side (with its surface covered with a mixture of grasses).
- reconstruction of the following embankment passages and entries.
 - Section I - 8 passages and 2 entries;
 - Section II - 7 passages and construction of 1 new entry;
 - Section III - elimination of 2 embankment passages and 7 entries, reconstruction of 1 passage to entry, reconstruction of 3 passages, reconstruction of 3 entries;
 - Section SAN - 2 passages.
- reconstruction of the following water-locks:
 - Section I - 3 embankment water-locks: \varnothing 800 at km 2+735, \varnothing 600 at km 4+093, \varnothing 2x1400 at km 6+206;
 - Section II - 3 embankment water-locks: \varnothing 1000 at km 0+055, \varnothing 1200 at km 2+178, \varnothing 1200 at km 4+887;
 - Section III - 1 embankment water-lock - \varnothing 800 at km 0+283.

- demolition of the abandoned building located at the land plot No. 975 in the precinct of Wrzawy colliding with the infrastructure planned for reconstruction.

The target embankment parameters upon their expansion are as follows:

- Width of the crest - 3.0 m (when the crest has no communication route) or 5.0 m (when the crest has its communication route). Road surface made of asphalt.
- Inclination of the water-side slope - 1:2.5 (Sections: I and II), 1:3 (Section III), 1:2.6 (Section SAN),
- Inclination of the land-side slope - 1:2.5 (Sections: I and San), 1:2.2 (Section II), 1:2 (Section III),
- Width of the by-embankment bench at the land-side - 5 m (3 m of the roadway + shoulders at both sides - 1 m). Road surface made of crushed stone.

Width of the service route - 4.0 m (apart from km 3+017 ÷ 3+311, i.e. along part of the embankment which borders with the Wisła pod Zawichostem ['Vistula at Zawichost'] Nature Reserve where no such line route is planned because this area is protected).

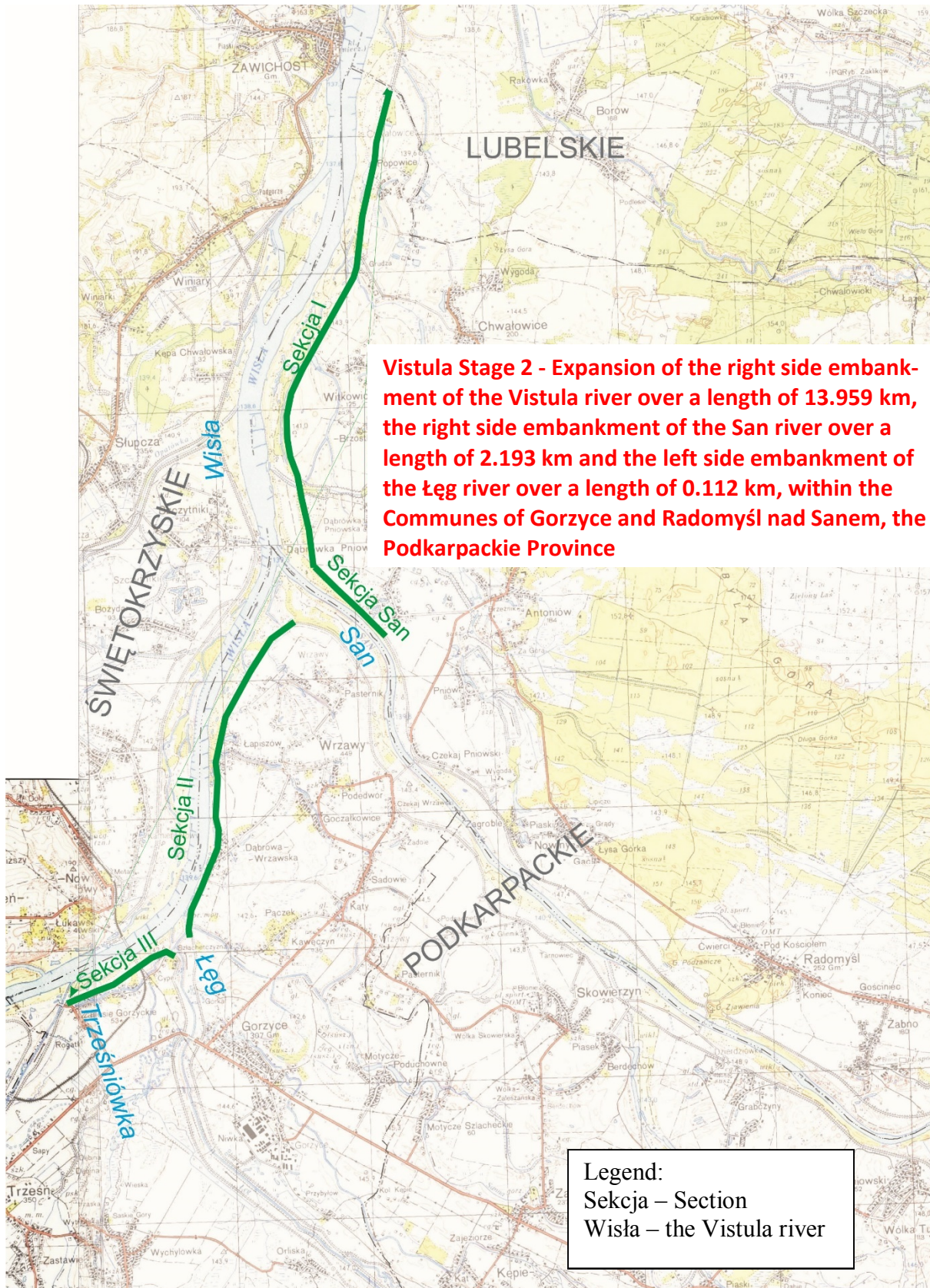


Fig. 1. The location of the Works Contract.

3. INSTITUTIONAL, LEGAL AND ADMINISTRATIVE CONDITIONS

3.1. INSTITUTIONS INVOLVED IN IMPLEMENTATION OF THE PROJECT

The Investor/Employer of the Works Contract is the Marshal of Podkarpackie Province, represented by the Podkarpacki Board of Amelioration and Hydraulic Structures in Rzeszów (PZMiUW). Additionally, at the construction and operation stages, its implementation may require involving public administration bodies at the central, regional and local level. The responsibility for the coordination of the Project concerning Loan No. 8524 PL, as well as monitoring of its implementation, lies with the Odra-Vistula Flood Management Project Coordination Unit.

3.2. BINDING POLISH LAW ACTS WITH REGARD TO THE ENVIRONMENT

According to the Polish law, an investment process with regards to environmental protection, is governed by over ten acts and regulations. A list of selected legislation has been included in Appendix No. 3. The Contractor in each case will be obliged to adhere to binding, up-to-date legal acts, if during the course of the Works Contract implementation they are amended. The provisions of EMP do not exempt the Contractor from their requirement of complying with all legal regulations binding in the country where the Works Contract is to be implemented.

3.3. MAIN STAGES OF THE 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 Bank¹ and the Odra-Vistula Flood Management Project Coordination Unit².

3.4. WORLD BANK REQUIREMENTS

Works Contract is co-financed by the International Bank for Reconstruction and Development (the World Bank). The conditions of its implementation, with regard to environmental protection are compliant with the following policies of the World Bank:

- OP 4.01 - on the environmental impact assessment,
- OP 4.04 - on natural habitats, and
- OP 4.11 - on the physical cultural resources,

¹ <http://documents.worldbank.org/curated/en/2015/04/24502899/poland-odra-vistula-flood-management-project-environmental-social-management-framework>

² http://www.odrapcu.pl/popdow_dokumenty.html

the description of which are included in the already prepared Environment and Social Management Framework published on the i.a. web sites of the World Bank and the Odra-Vistula Flood Management Project Coordination Unit.

3.5. THE CURRENT CONDITION OF EIA PROCEDURES FOR THE WORKS CONTRACT

According to the national legislation the Works Contract belongs to Group II, i.e. Projects that may potentially significantly affect the environment, according to the EIA regulation.

The abridged EIA procedure is as follows:

1. On 8th April 2013 the Regional Director for Environmental Protection in Rzeszów received the application submitted by Mr. Stanisław Stachura Director of the Podkarpacki Board of Amelioration and Hydraulic Structures in Rzeszów, concerning issue of the decision on environmental conditions for the implementation of the Works Contract. The application was accompanied by the Project Information Sheet, describing i.e. the anticipated impacts and Works Contract characteristics.
2. By means of the Decision of 17th May 2013, ref. no. : WOOŚ.4233.24.2013.MG-10, the Regional Director for Environmental Protection in Rzeszów ascertained the obligation to conduct an assessment of the environmental impact of the Works Contract, and defined the scope of the environmental impact report of the Works Contract.
3. PZMiUW submitted report on environmental impact assessment entitled: 'Vistula Stage 2 - Expansion of the right embankment of the Vistula river over a length of 13.959 km, the right embankment of the San river over a length of 2.193 km and the left embankment of the Łęg river over a length of 0.112 km, within the communes of Gorzyce and Radomyśl nad Sanem, the Podkarpackie Province' with the letter of 25th July 2014 ref. no.: IM.403.55.6.2013.
4. In connection with RDOŚ doubts, the PZMiUW has supplement the Report two-times (subsequent supplements were submitted on: 16th February 2015 ref. no.: IM.403.55.18.2014 and 20th April 2015 ref. no.: IM.403.55.3.2015).
5. In the course of review the documentation and submit comments and conclusions by the public as well as the parties of the proceedings (public consultation), two organisations: the National Bird Conservation Society [pol. Ogólnopolskie Towarzystwo Ochrony Ptaków, OTOP] and the 'Klub Gaja' Ecological and Cultural Association [pol. Stowarzyszenie Ekologiczno-Kulturalne Klub Gaja] made their proposals and then submitted to the Podkarpacki Board of Amelioration and Hydraulic Structures in Rzeszów. The PZMiUW in Rzeszów made a statement on the submitted comments of the Parties of proceeding as well as RDOŚ in the following letters: on 31.08.2015 (symbol:

IM.403.55.12.2015), on 18.11.2015 (symbol: IM.403.55.17.2015), on 27.01.2016 (symbol: IM.403.32.1.2016), on 14.04.2016 (symbol: IM.403.32.2.2016), on 18.05.2016 (symbol: JRP.403.31.3.2016), on 25.05.2016 (symbol: JRP.403.31.4.2016) in which it provided justifications and accepted suggested mitigation measures submitted by these organisations.

6. After obtaining appropriate expert opinions and conducting public consultations, on 07.09.2016 the RDOŚ issued the decision on environmental conditions (ref. no.: WOOŚ.4233.24.2013.MG.157). The decision was also announced to the public by means of a notice. The decision has not been challenged.
7. The decision was made final on 12.10.2016.

The above decision have been enclosed to EMP (Appendix No. 4).

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4. DESCRIPTION OF ELEMENTS OF THE ENVIRONMENT IN THE VICINITY OF THE WORKS CONTRACT

4.1. LAND SURFACE, LANDSCAPE AND GEOLOGY

The existing embankments are located on the right bank of the Vistula river at km 271+806 – 286+816 in two Communes: Radomyśl nad Sanem (Stalowa Wola District) and Gorzyce (Tarnobrzeg District), Podkarpackie Province. In geographical terms, it is located in the Sandomierz Basin, which geologically belongs to the Carpathian Foredeep. The area is flat, inclined towards the north, level difference range from 142m asl to 185m asl. There are different soil conditions in the area (connected with the formation of river valleys of the Vistula river and the San river). Above the ceiling of Miocene, Krakowieckie loams, Quaternary formations are present, represented by clays, dusty clays, dusts, and strongly hydrated, medium grained and coarse sands, of a brown and grey colour. Locally, in several cross sections, interbeddings and lenses of low bearing capacity soils are present, in the form of clay silts, sand silts and peats.

4.2. CLIMATE

The area covered by the Works Contract is located in the Podkarpackie Climate Region of a lowland climate characterized by a long hot summer and warm winter.

The period between May and October receives ca. 65% of the annual volume of precipitation. The vegetation period is quite long and takes about 7 months.

4.3. AIR QUALITY

No air quality standards are exceeded within the analysed area. The monitoring of atmospheric air in the Podkarpackie Province is conducted by the Provincial Inspectorate for Environmental Protection in Rzeszów.

The basic pollutants under measurement are as follows: sulphur dioxide (SO₂), nitrogen dioxide (NO₂), carbon monoxide (CO), benzene, ozone, PM10 and PM2.5 as well as dust-included metals and benzo(a)pyrene.

Based on these measurements of sulphur dioxide, nitrogen dioxide, carbon monoxide, benzene and ozone it was found that their concentrations stay at low levels and air quality was assessed very good. However, in case of air pollution by PM10 and PM2.5, their standard-exceeding concentrations were found periodically. This is due to the influx of pollutants from other areas characterised by a significantly higher number of emitters.

4.4. SOIL AND LAND

Soils in the Commune of Radomyśl nad Sanem have an average utility value and show considerable spatial variability resulting from the type of materials from which they came from. Alluvial muds got formed within the valley of the Vistula and San rivers. Within the Commune they are the most fertile soils and belong to the 2nd, 3rd and 4th soil quality class. They occur in the western and northern parts of the Commune in the following villages: Chwałowice, Witkowice, Dąbrówka, Pniów, Żabno, Nowiny. The usable value of these soils is reduced by unsettled water relations. There are also other types of soils there: podzolic soils, brown pseudo-podzolic soils with a low level of nutrients and most often acidic in their reaction. Most 3rd-class soils are found in Chwałowice, Witkowice, Dąbrówka, Pniów, Wola Rzeczycka and Nowiny. The weakest soils (with a high proportion of 5th- and 6th-class ones) occur in the following villages: Radomyśl, Antonia and partially in Chwałowice.

The presence of 4 rivers within the Commune of Gorzyce contributed to the formation of various types of soils. Alluvial muds got developed in the proximity of the rivers; they are found in the triangle of the San and Vistula rivers in the village of Wrzawy, Gorzyce in the triangle of the Łęg and Vistula rivers and in the village of Trześć. These soils have a considerable level of decomposed organic matter (humus) and are rich in the following, easily accessible by plants, nutrients: phosphorus, nitrogen and calcium. In terms of agricultural suitability these soils are classified into the wheat-beet group. Plants with high soil requirements such as: sugar beet, wheat, legumes, rapeseed, poppy, vegetables grow on these soils. The reaction of such alluvial muds is most often neutral or slightly alkaline.

4.5. SURFACE WATER

The area covered by the Works Contract is located in the Vistula River Basin. In addition, this area includes its three tributaries: Trześniówka, Łęg and San.

Vistula is the main and longest (1047 km) river in Poland. Its sources are located in southern Poland at an altitude of 1107 m above sea level on the western slope of Barania Góra [Barania Mount] in the Beskid Śląski [Silesian Besid] Mountains. The Works Contract 3B.2 covers a section of the Vistula river from the bridge in Nagnajów up to Zawichost.

Trześniówka is a right tributary of the Vistula river. Its length is 56.9 km and its catchment area is 569.6 km². Its source is located on the Płaskowyż Kolbuszowski [Kolbuszowski Plateau] at an altitude of approx. 230 m above sea level, northwest of Cmolos. It flows into the Vistula river at 272 km of its course, in Sandomierz at an altitude of 140 m above sea level. Its main tributaries are: Kaczówka, Koniecpólka, Mokrzyszówka, Żupawka and Dąbrówka.

Łęg is a right tributary of the Vistula river, which enters it at 274 km in its course, near the village of Zalesie Gorzyckie. Its sources are located in the southern part of the Płaskowyż Kolbuszowski [Kolbuszowski Plateau]. Its catchment area is 960.2 km², while its length of 81.6 km. The upper course of the river is called Zyzoga. It has one large tributary, i.e. Przyrwa on its left-bank.

San is a right tributary of the Vistula river, which enters it northeast of Sandomierz. The length of its watercourse is 443.4 km and its catchment area of 16 861 km² (14 390 km² of which is located in Poland). Its sources are located in Ukraine at an altitude of approx. 925 m above sea level on the south eastern slopes of the Piniaszkowy Mount in the Bieszczady Zachodnie (Western Bieszczady) Mountains. On the river there are two artificial reservoirs: Solińskie Lake (Jezioro Solińskie) and Myczkowskie Lake (Jezioro Myczkowskie). Its main tributaries in the upper course are as follows: Niedźwiedź, Negryłów, Wołosaty, Solinka, Hoczewka, Osława, Sanoczek, Tyrawski Potok, Baryczka, Słupnica and Olszanka, the in the lower course: Wiar, Wisznia, Rada, Łęg Rokietnicki, Szkło, Lubaczówka, Lubienia, Wisłok, Trzebońnica, Tanew, Bukowa.

All the watercourses in the Works Contract area have embankments on both sides protecting against floods. The water system is supplemented by a number of unnamed watercourses and melioration ditches.

In line with "Water Management Plan for waters within the Vistula river basin" (further called WMP), the Works Contract will be implemented in the catchment of eight surface water bodies:

1. JCWP Dopływ z Chwałowic [Tributary from Chwałowice], code: PLRW20001723154,
2. JCWP Rzeka Strachocka [Strachocka River], code: PLRW2000172312,
3. JCWP Wisła od Wisłoki do Sanu [Vistula River from Wisłoka to San], code: PLRW20002121999,
4. JCWP San od Rudni do ujścia [San River from Rudnia to the estuary], code: LRW20002122999,
5. JCWP Łęg od Murynia do ujścia [Łęg River from Murynia to the estuary], code: PLRW200019219899,
6. JCWP Trześniówka od Karolówki do ujścia [Trześniówka from Karolówka to the estuary], code: PLRW200019219699,
7. JCWP Wisła od Sanu do Sanny [Vistula River from San to Sanna], code: PLRW2000212319,
8. JCWP Sanna [Sanna River], code: PLRW200017219898.

The Surface Water Body - Tributary from Chwałowice is a natural body of water. In WMP the state of this Surface Water Body is defined as 'good'¹. Under the State Environmental Monitoring (2010-2012) the ecological state of the analysed Surface Water Body was assessed as 'good'. The chemical state was considered 'good'. Thus, the state of the Surface Water Body was rated 'good'.

The Surface Water Body - Strachocka River is a natural body of water. In WMP the state of this Surface Water Body is defined as 'good'. Under the State Environmental Monitoring (2010-2012) the ecological state of the analysed Surface Water Body was assessed as 'good'. The chemical state was considered 'good'. Thus, the state of the Surface Water Body was rated 'good'.

The Surface Water Body - Vistula River from Wisłoka to San is a heavily changed water body. In WMP the state of this Surface Water Body is defined as 'bad'. Under the State Environmental Monitoring (2010-2012) the ecological potential of the analysed Surface Water Body was assessed as 'poor'. However, the chemical state was considered 'good'. Thus, the state of the Surface Water Body was rated 'bad'.

This Surface Water Body is at the list of surface water bodies intended for the in-take of water for the purpose of public water supply for human consumption.

The Surface Water Body - San River from Rudnia to the estuary is a natural body of water. In WMP the state of this Surface Water Body is defined as 'bad'. Under the State Environmental Monitoring (2010-2012) the ecological potential of the analysed Surface Water Body was assessed as 'moderate'. However, the chemical state was considered 'good'. Thus, the state of the Surface Water Body was rated 'bad'.

The Surface Water Body - Łęg River from Murynia to the estuary is a natural water body. In WMP the state of this Surface Water Body is defined as 'bad'. Under the State Environmental Monitoring (2010-2012) the ecological potential of the analysed Surface Water Body was assessed as 'moderate'. However, the chemical state was considered 'good'. Thus, the state of the Surface Water Body was rated 'bad'.

The Surface Water Body - Trześniówka from Karolówka to the estuary is a heavily changed water body. In WMP the state of this Surface Water Body is defined as 'bad'. Under the State Environmental Monitoring (2010-2012) the ecological potential of the analysed Surface Water Body was assessed as 'moderate'. However, the chemical state was considered 'good'. Thus, the state of the Surface Water Body was rated 'bad'.

The Surface Water Body - Vistula River from San to Sanna is a natural water body. In the Water Management Plan the state of this Surface Water Body is defined as 'bad'. Under the

¹ According to the Regulation of the Ministry of Environment of 22th October 2014 on the classification of Surface Water Bodies and environmental quality standards for priority substances (Journal of Laws 2014, item 1482).

State Environmental Monitoring (2010-2012) the ecological potential of the analysed Surface Water Body was assessed as 'poor'. However, the chemical state was considered 'good'. Thus, the state of the Surface Water Body was rated 'bad'.

The Surface Water Body - Sanna River is a natural body of water. In WMP the state of this Surface Water Body is defined as 'bad'. Under the State Environmental Monitoring (2010-2012) the ecological state of the analysed Surface Water Body was assessed as 'poor'. However, the chemical state was considered 'good'. Thus, the state of the Surface Water Body was rated 'bad'.

Water quality elements and their components being impacted by the Investment were settled on the basis of the assessment of the Investment impact onto the ecological potential / state of waters under the Investment impact. It was examined the Investment impacts on every quality element taken into consideration when classifying the ecological potential / status of waters i.e. on biological elements and their hydro-morphological and physicochemical supporting elements.

The Investment implementation **does not involve interference in the Vistula, San, Trześniówka and Łęg rivers beds**. Thus, the Investment has no effect on the morphological continuity of these rivers and it will not affect hydromorphological elements (morphological conditions).

At the inlets and outlets of the embankment culverts (water-locks):

Section I and section San

- the embankment water-lock 1.1 at km 2+735 at the drainage ditch;
- the embankment water-lock 1.2 at km 4+093 at the drainage ditch;
- the embankment water-lock 1.3 at km 6+206 at the Strachocka river;

Section II

- the embankment water-lock 2.1 at km 0+055 at the drainage ditch;
- the embankment water-lock 2.2 at km 2+178 at the drainage ditch;
- the embankment water-lock 2.3 at km 4+887 at the Sanna river;

Section III

- the embankment water-lock 3.1 at km 0+303 at the drainage ditch;

it is designed to reinforce the riverbeds/ditches bottoms with a stone cover and strengthen its slopes with a mesh-stone mattress. A bank-wall (river-bank band) will be used (with fascine bunch applied) in order to reinforce the slope base.

In such places, impacts on biological elements are expected to occur the Investment implementation only. Any impact onto phytoplankton, zooplankton, benthos will be short-termed (approx. 2-3 months) on a local basis and will not affect the behaviour of the existing structures of the aquatic environment.

Some water turbidity will occur in the course of works. It will lead to the deterioration of such parameters as total suspended solids, dissolved oxygen and other indicators specifying aerobic conditions and organic impurities. Due to the fact that works will be performed locally, it will not lead to any permanent reduction in the class of Surface Water Body in terms of physico-chemical elements. Turbidity will be reversible in its character and will be limited to the Investment implementation stage only. Upon the completion of works, the state of Surface Water Body will naturally improve.

Under the Investment implementation, within the area covered by the direct range and impact of works, there may be unstable - temporary changes taking place within water-dependent flora / fauna ecosystems and their habitat conditions. Thus, it is specified that impacts will refer to indicators on morphological conditions, i.e. bottoms / slopes and their structures. It should be noted that the range of such impacts will be local in nature and will not affect negatively the hydro-morphology of the entire Surface Water Body.

4.6. GROUNDWATER

There was one primary aquifer i.e. Quaternary waters identified in the Radomyśl nad Sanem Commune within the area of the Investment. Its floor is limited by impervious tertiary forms while its ceiling sometimes reaches the ground surface. The surface of ground waters is generally natural and unconstrained within the above-floodplain terrace or at a slight tension when overburdened by clays and silt within the floodplain terrace. It gets stabilised at different depths from 0-2 m below the terrain level up to approx. 2-3 m below the terrain level. Within the above-floodplain terrace the depth of ground waters increases to approx. 4-5 m below the terrain level and within dune areas it reaches several metres. At the same it often happens here that within vast wetlands the surface of water gathering at the ceiling of little permeable organic soils keeps close to the ground surface.

The Investment site is situated within the Main Aquifer Reservoir (GZWP) No. 425 - "Dębica - Stalowa Wola - Rzeszów" enclosed by the Vistula and San rivers.

In the Gorzyce Commune there is one basic aquifer within sandy Quaternary forms located above the ceiling of an impermeable layer of 'Krakowieckie' clays. This aquifer is made of variously-grained sands containing an admixture of gravel in their floor part and dust in their ceiling part with their thickness of 0 to 22 m (13-15 m on average). Waters which are present in sands form natural and unconstrained surfaces, locally, when overburdened, they are under a little hydrostatic pressure. The surface of waters is at a depth of 0.5 to 4 m below the terrain level.

According to the settlements of "Water Management Plan for waters within the Vistula river basin", the Investment will be implemented within the Ground Water Bodies numbered: PLGW2200118, PLGW2200119 and PLGW2200135 with the good state of their waters.

4.7. ACOUSTIC CLIMATE

In the area of the Works Contract implementation there are no significant noise-generating sources. Residential buildings (single-family and farm), located near the embankment, is located rather far from the important transportation routes, etc.

The main noise sources is the village life itself. These sources are constant and are not bound with any significant impact on the environment or the population.

4.8. NATURE

The Works Contract 3B.2 will be realized:

- partly within the site of NATURE 2000 Dolina Dolnego Sanu [Valley of the Lower San River] PLH180020. The Investment borders with the Natura 2000 site the Valley of the Lower San River (Section II borders from km 0+000 up to km 2+180, Section San River borders from km 0+180 up to km 2+192),
- partly within the site of NATURE 2000 Tarnobrzaska Dolina Wisły [Tarnobrzeg Valley of the Vistula River] PLH180049 (this site is slightly overlaps with Section III in the vicinity of Zalesie Gorzyckie with its area of approx. 0.0630 ha).
- partly within the "Wisła pod Zawichostem" [Vistula at Zawichost] Nature Reserve located in the Podkarpackie Province borders under the regulation No. 43/08 dated 10 October 2008 issued by the Governor of the Podkarpackie Province on the recognition of the 'Vistula at Zawichost' Nature Reserve (Official Gazette of the Podkarpackie Province no. 80, item 1862). In the case of the above-specified Nature Reserve, Section I borders with this area over a length of approx. 280 m (from approx. km 3+020 up to approx. km 3+300).

The embankments designed to be expanded run partially along the boundaries of the above-mentioned areas. In connection with this extension of the embankment, from within the inter-embankment, the execution of works will be related to slight interference in the above-specified areas i.e. it comes to the occupation of a given area within the project demarcation lines. The Investment also interfere, to a limited extent, in other valuable natural areas, i.e. Important Bird Area (IBA): Dolina Dolnego Sanu [the Valley of the Lower San River] PL143, which is crossed by all sections of the embankment. The Investment is located within the

following ecological corridors: Dolina Górnej Wisły [the Valley of the Upper Vistula river] Kpd-10, Dolina Środkowej Wisły [the Valley of the Central Vistula] GKPdC-10 and Lasy Janowskie [the Janowskie Forests] GKPdC-1B. The ecological corridor the Valley of the Upper Vistula River Kpd-10 is crossed over a length of approx. 2 km through Section San River while Sections: II and III border with corridor. Section I and Section San River border with the ecological corridor the Valley of the Central Vistula River GKPdC-10. Two corridors border with Section I: Janowskie Forests GKPdC-1B and the Valley of the Central Vistula River GKPdC-10 and two corridors are crossed by Section San River: the Valley of the Upper Vistula River Kpd-10 over a length of approx. 2 km, Janowskie Forests GKPdC-1B over a length of approx. 2 km, the Valley of the Central Vistula River GKPdC-10 borders with Section I and Section San River.

4.8.1. Natura 2000 sites

The Works Contract borders with the Natura 2000 site of community importance: the **Valley of the Lower San River PLH180020**, which is characterised by: wide Holocene bed of the valley and equally extensive Pleistocene terrace terrain. There are two terrace levels within the Holocene bed. They are as follows: lower floodplain (riparian) terrace and higher (rendzina-made) terrace.

The Natura 2000 site: the **Valley of the Lower San River** is thoroughly situated located in the Sandomierz Valley [Kotlina Sandomierska]. A total of 14 habitat types listed in the Appendix I of the Habitats Directive were identified here. Clusters of plants located near the riverbeds (willow riparian forests, herbaceous and pioneer vegetation at sand pits and silts) are of utter importance. Various types of extensively cultivated meadows (6510, 6410, 6440) and, especially in the northern part of the area, numerous oxbow lakes with abundant water flora also play a significant role in the valley. The flora and fauna are characterised by their considerable abundance - 19 species listed in the Appendix of the Habitats Directive were identified here. The area also forms an important ecological corridor, among others for ichthyofauna. The San river basin is under the national program on migratory fish restitution (vimba bream, trout, salmon and sturgeon).

The Works Contract is located in part within the area of importance for the Community NATURA 2000 the **Tarnobrzeg Valley of the Vistula River PLH180049**, which is characterized by: great biodiversity of plant and animal species, as well as the existence of unique habitats, the example of which are old river beds with floating, submerged and scrub vegetation, riparian habitats and mountain meadows, numerous fish and amphibians species.

The NATURA 2000 the **Tarnobrzeg Valley of the Vistula River** area is located in its entirety in the Sandomierz Basin within the Vistula lowland, on the border of two Provinces. It in-

cludes the Vistula River Valley limited to the terrace area, at the section from the Wisłoka River estuary to the city of Sandomierz. Significant areas of Vistula sand dunes are covered with vegetation, initiating the succession process. The river valley contains quite large old river beds, with developed natural vegetation.

In the case of mentioned above NATURA 2000 areas, main hazards to individual habitats depend, to a large extent, on species present therein. Risks to meadows are mostly caused by neglecting the twice a year mowings causing overgrowth of meadows within the floodplain and, in consequence, a change of landscape in the terrace area. Flora characteristic for this type of meadows is dying out and is gradually being replaced by shrubs.

Riparian forest areas are threatened by excessive, uncontrolled felling of the relatively small remaining areas of riparian forests. Often old, impressive specimens of poplar, or white willow are felled, which results in local landscape changes and the destruction of remiz nesting locations.

Felling riparian forests is a result of recognizing them as deprived of economic importance, as well as an obstacle in the implementation of the flood protection policy.

Another hazard is the regulation of the river, leveling old riverbeds, elimination of islands and shoals. Increasing the height of embankments is not a typical danger, but its consequence may be the felling of riparian forests.

The basic hazards for a protected zoological species include various forms of poaching such as: angling with prohibited methods and in closed season, nets, night traps, electricity.

In relation to easily startled animals, a main reason for their migration from habitats may be noise and intensive human penetration of the area, related to recreation, hunting and fishing.

4.8.2. Nature reserve

The Works Contract borders with the "Wisła pod Zawichostem" ['Vistula at Zawichost'] Nature Reserve. This is a type of birds reserve with its area of 667.93 ha located within the following Communes: Zawichost, Annopol, Radomyśl nad Sanem, Gorzyce and Dwikozy. It represents a type of aquatic ecosystem and subtype of rivers and their valleys, streams and springs. It was established on the grounds of Regulation No. 12/2008 of the Governor of the Świętokrzyski Province dated 9 October 2008 (Official Gazette of the Świętokrzyski Province no. 217, item 2907) and the Ordinance of the Regional Director of Environmental Protection in Kielce dated 13 October 2016 amending the Regulation on its recognition as the nature reserve (Official Gazette no. 3114). This nature reserve aims to preserve - in social, scientific and educational terms - breeding refuges, feeding and resting places during the migration of rare birds which are characteristic to the Valley of the Vistula river, in particular of birds from the *Charadriiformes* (waders) group.

4.8.3. Location of the Works Contract in respect of protected areas

The Works Contract planned for implementation is partly located within the areas of NATURA 2000 Valley of the Lower San River PLH180020 and NATURA 2000 the Tarnobrzeg Valley of the Vistula River PLH180049 as well as Vistula at Zawichost Nature Reserve. In addition, implementation of the Investment interferes with the IBA the Valley of the Lower San River PL143. The Investment is located within the ecological corridors: the Valley of the Upper Vistula river Kpd-10, the Valley of the Central Vistula river GKPdC-10 and the Janowskie Forests GKPdC-1B.

Location of the protected areas is shown at map in Appendix No. 6 to EMP.

4.9. CULTURAL LANDSCAPE AND MONUMENTS

Within the Commune of Radomyśl nad Sanem there are several historical objects entered by the Provincial Conservator of Monuments into the register of monuments. The most valuable ones include: the church of St. Sigismund in Pniewo, the church of St. John the Baptist in Radomyśl nad Sanem erected in 1852, the "Na Zjawieniu" parish cemetery, the church of the Blessed Virgin Mary's Visitation built in late 19th-early 20th century in Wola Rzeczycka. To the south of the estuary of the San river to the Vistula river, the Commune of Gorzyce with the following monuments: the parish church of St. Andrzej Bobola with its neo-gothic cemetery chapel built in the 2nd half of the 19th century in Gorzyce, the parish church of the Holy Family in Trześnia, built in the 19th century in the Neo-Romantic style as well as the farmhouse granary, which was erected in the 2nd half of the 19th century; there was also a wooden manor house in Trześnia built at that time. At the location of Wrzawy, which is the northernmost part of the Commune, there is a classicist church built in 1870.

Within the area of the Works Contract implementation, with the range of its impact, there is the mound with the monument founded in 1879 by Kalikst Horoch which commemorates the battle fought at this place between the troops led by Józef Poniatowski, the Polish Prince and Ferdinand, the Austrian Archduke. The war cemetery dated 1809 is located around the monument. The site is shown at the map in Appendix No. 6 to EMP.

According to the opinion of the Provincial Conservator of Monuments (letter dated 16.11.2016, sign UOZ-T-1.5183.69.2016, shown in Appendix No. 4 (c) to EMP), there are no other monumental objects in the area covered by the submitted Building Design and in its immediate vicinity [except m/a the cemetery], or archaeological sites".

Below there is a list of structures considered important in social-interaction terms which may be influenced and required to be secured by the Contractor in the course of execution of works:

- At km 4+880 of the embankment of the Vistula river (Section II, the land plot No. 1714/3, the precinct of Wrzawy), there is a memorial site (the mound with its monument; the former war cemetery dated 1809 is located around the monument). It is the Contractor's responsibility to provide protection over the cemetery for the duration of works so that no damage to this object will occur as a result of the Investment realization.
- At km 6+400 of the embankment of the Vistula river (Section I, the land plot No. 203/3), with the range of impact of works, there is a stone with a commemorative plaque (to express appreciation to the local community and their involvement in flood-protection activities) founded in 2005. It is the Contractor's responsibility to provide protection over the stone with the plaque for the duration of works so that no damage to this object will occur as a result of the Investment realization.



Photo. 1 Mound with monument and cemetery from 1809.



Photo. 2 Stone with commemorative plaque.

4.10 POPULATION

The Works Contract 3B.2 is a line investment, the course of which is partially located in the vicinity of human settlements. Considering the entirety of the Works Contract, it affects the protection of an area of a surface of 9.75 km², inhabited by ca. 18 850 people¹.

The total area protected from floods will be the area comprising the villages from the following Communes:

¹ Data comes from the paper Charakterystyka zadania planowanego do realizacji w ramach Projektu Ochrony Przeciwpowodziowej w Dorzeczu Odry i Wisły [Characteristics of the task planned for implementation within the Odra-Vistula Flood Management Project] provided by PZMiUW

- Gorzyce Commune: Gorzyce, Wrzawy, Gołczakowice, Kawęczyn, Pasternik, Motycze Poduchowne, Motycze Szlacheckie, Zalesie Gorzyckie, Sokolniki, Trześć, Górki and Furmany,
- Radomyśl nad Sanem Commune: Chwałowice, Witkowice, Orzechów, Pniów, Dąbrówka Pniowska and Antoniów.

The Works Contract cuts through private property - agricultural and urban areas. The public is already aware of the fact that the area is the location of flood protection facilities, and that it serves social interests.

Issues related to the social context of the Works Contract to be implemented are described in more detail in the Land Acquisition and Resettlement Action Plan for the Work Contract 3B.2 'Flood protection Tarnobrzeg'.

5. SUMMARY OF THE ENVIRONMENTAL IMPACT ASSESSMENT

5.1. IMPACT ON LAND SURFACE AND LANDSCAPE

The works implemented will consist of expansion of the existing embankments. No new impacts with regard to land surface and landscape will emerge.

In connection with earthworks implementation only short-term impacts may occur, associated with a change in landscape qualities at the stage of implementation. All the works which directly affect the visual and aesthetic qualities are derived from the physical intervention into the landscape and will consist in adding or removing certain elements, among others, construction of access roads or felling of trees and shrubs. This impact onto the landscape values at the implementation stage will be short-term and related to the phase of construction.

Works Contract implementation will not cause any changes in land functions and will not affect a change in the land use structure. Impacts created refer to a strip of land, where the upper soil layer will be disturbed. After the completion of the works the impacts will cease to exist and the area will be restored. At the stage of operation the Investment will not affect the landscape.

5.2. IMPACT ON LOCAL CLIMATE

During the Investment implementation no climate changes on a regional scale are foreseen. Some potential differences may occur at particular points within the area of construction works. It will be connected with the felling of trees, organisation and execution of works at construction sites. These changes will be temporary in their character with local impacts on air humidity, temperature, sunshine in the immediate vicinity of the construction works. Under the redeveloped embankments operation no changes in microclimate parameters are expected.

5.3. IMPACT ON AIR QUALITY

During the construction works, air contamination will occur, caused by unorganized emissions, associated mainly with operation of construction equipment and means of transport with combustion engines, emitting gas pollutants to the atmosphere, as well as earth works (delivery, storage and embedding ground masses, placing of concrete at culverts, and asphaltting at part of embankment crossings). Operation of assembly equipment and means of transport as well as combustion engine power units will cause emission of carbon monoxide, nitrogen oxides, sulphur oxides, aldehydes and a mixture of hydrocarbons. It will have a local and periodical impact only, and will cease once the works are completed.

During construction, pollutant emissions in the form of dusts will be related to the displacement of ground masses, both during transshipment of ground masses, as well as the construction thereof. They will be local and periodical in nature. And will cease once the works are completed.

During Works Contract operation, the embankments will be systematically (2 times a year) mowed. During these activities, no single-source emission (in one place) to atmosphere will be present. Possible multi-source emission will appear during the operation of a petrol lawn mower. They will be however, small scale, limited in terms of area and time, and not subject to regulations stipulated in legal acts.

5.4. IMPACT ON SOILS AND GROUNDS

During the works, a structural and soil texture violation will occur, resulting in changes of its characteristics along the expanded embankments.

The selected method of sealing the embankment and its bedding, by means of an anti-filtration barrier, will lower the level of the ground water table within the embankment body (during a surge wave), extending the filtration route and crossing privileged filtration routes.

Anti-filtration barrier (made of Deep Soil Mixing technology) will completely protect the base and body of the embankment in the case of flood freshets, thereby safeguarding the area protected by the embankment.

In light of the already completed sealing by means of an anti-filtration barrier, no negative impact on ground-water conditions has been found on the landside of the embankment especially in agricultural areas. Drainage of ground water from the above mentioned areas (after a flood wave) will be conducted by means of melioration devices in the form of melioration ditches, directing surface water to the river, through embankment culverts.

5.5. IMPACT ON SURFACE WATER

Water quality elements and their components being impacted by the Investment were settled on the basis of the assessment of the Investment impact onto the ecological potential / state of waters under the Investment impact. It was examined the Investment impacts on every quality element taken into consideration when classifying the ecological potential / status of waters i.e. on biological elements and their hydro-morphological and physicochemical supporting elements.

The Works Contract is located ca. 80 m to 500 m from the Vistula riverbank and ca. 60 m to 500 m from the San riverbank. The implementation of the Works Contract does not include interfering with the Vistula river and the San river beds. Thus, the Works Contract has no effect on the morphological continuity of the Vistula river and the San river. Also, it will not

have any impact on hydromorphological elements (morphological conditions). Impacts during the construction stage may result from penetration of substances harmful for the environment, including oil derivative substances into surface water as a result of failure i.e. spillages of fuel and other substance used during construction. Technically operational construction equipment, and proper handling of machines will eliminate any and all such hazards.

The Works Contract poses no risk for implementation of the goals of water protection within the Surface Water Bodies, and will not pose risks for water protection in other adjacent water bodies. As a result, the Works Contract implementation will not cause risks of incompleteness of environmental goals JCWP 'Tributary from Chwałowice', 'San River from Rudnia to the estuary', 'Trześniówka from Karolówka to the estuary'.

In the case of JCWP 'Strachocka River', 'Vistula River from Wisłoka to San', 'Łęg River from Murynia to the estuary', 'Vistula River from San to Sanna', 'Sanna River', where it is planned expansion of the embankments, impacts on biological elements are expected to occur the Investment implementation only. Any impact onto phytoplankton, zooplankton, benthos will be short-termed (approx. 2-3 months) on a local basis and will not affect the behaviour of the existing structures of the aquatic environment.

Some water turbidity will occur in the course of works. It will lead to the deterioration of such parameters as total suspended solids, dissolved oxygen and other indicators specifying aerobic conditions and organic impurities. Due to the fact that works will be performed locally, it will not lead to any permanent reduction in the class of this Surface Water Body and its state in terms of physico-chemical elements. Turbidity will be reversible in its character and will be limited to the construction works stage only. Upon the completion of works, the state of this Surface Water Body will naturally improve.

Under the Investment implementation, within the area covered by the direct range and impact of works, there may be unstable - temporary changes taking place within water-dependent flora / fauna ecosystems and their habitat conditions. Thus, it is specified that impacts will refer to indicators on morphological conditions, i.e. bottoms / slopes and their structures. It should be noted that the range of such impacts will be local in nature and will not affect negatively the hydro-morphology of the Surface Water Bodies.

In the embankment operation phase, there will be no danger to surface, ground, or ground water.

5.6. IMPACT ON GROUNDWATER

Ground waters and their elements being impacted by the Investment were settled on the basis of the assessment of the Investment impact on the quantitative state elements such as:

the surface of ground waters, its location, volume of reserved groundwater resources and the chemical state elements such as: water quality.

The implementation of the Investment will not affect the quantitative and qualitative state of the Ground Water Body. The Investment consists solely of the expansion of the existing flood-protection embankments and it does not involve any intake of ground waters. Potential local contamination of ground waters may come from accidental oil leaks out of construction equipment or penetration of substances from the construction site facilities.

The anti-filtration barrier is used to seal the expanded embankment base. The need for its construction derives from the geological structure of the embankment base which is made of Quaternary sediments (sands and gravels). They allow for the filtration of water into the behind-embankment when flooded.

This adopted method of sealing the embankment and its base by means of the anti-filtration barrier lowers the surface of ground waters in the embankment body during floods, extends route of filtration by going across the privileged route of filtration. A level of hydraulic gradient in the base behind the embankment is lower than the threshold.

This solution cuts off the route of filtration through the base and the embankment body during floods thus securing all the area protected by the embankment.

At the same time - due to the high thickness of permeable forms with their relatively high filtration index and the suspension of this barrier (i.e. it does not reach impermeable forms), the impact of this barrier is local in its character.

The Investment is located beyond the protection areas which were set for the intake of surface and ground waters.

The Investment and its implementation does not threaten the environmental objectives of JCWd.

During the embankment operation phase no hazards for ground water will be present.

5.7. IMPACT ON ACOUSTIC CLIMATE

Noise emissions of a significant level may occur only in the construction period. At this stage, that impact will depend mostly on the intensity of conducted earthworks.

Due to the fact that within Sections I and III of the embankment, these acoustically protected areas are located as close as at a distance of approx. 10 m, there were some solutions suggested which will allow for the observance of the acoustic standards within the nearby located housing development (performance of construction works in the daytime only, use of portable acoustic screens). According to the submitted analysis, it is expected that these solutions will allow to keep the permissible noise level for farmstead areas at 55 dB (A) in

accordance with the Regulation of the Minister of Environment on permissible noise levels in the environment.

To prevent any vibrations during the construction of the auto-filtration barrier the vibration-free Deep Soil Mixing technology has been adopted.

As no works are planned between 10.00pm and 06.00am, the acoustic impact during this period will not occur.

Noise will be a noticeable influence within the redeveloped embankment and will have a direct impact on birds found in its vicinity. Noise through startling (disturbance) and stressful actions may negatively affect the daily migration of medium and large mammals, including above all predators. The impact of these factors will be temporary only. Due to the fact that these species (birds and mammals) are able to adapt to such noise and also choose new migration routes and feeding sites this impact will not significantly negative and after the completion of the work ceased.

Operation of the Works Contract will not cause a deterioration of the acoustic climate for the surrounding environment, except the times of periodic conservation works, to ensure a good technical condition of the embankments and surge waves.

5.8. IMPACT OF NATURE

Impact on habitats and protected species within the Natura 2000 area

Habitats

When assessing the Investment impact onto individual natural habitats it was pointed out that within the analysed area the habitat coded 6440 should be regarded as one of the most valuable one. However, works conducted at the embankment will not affect the change of habitat conditions within alluvial meadows. At some sections their patches border with the embankment, thus in case of entering the area of these meadows, there is a potential risk of their periodic physical damage during works, however it will refer to marginal parts of these patches at the very boundary, which should have neither significant nor irreversible negative impacts. The basic conditions for the preservation of this habitat are as follows: to keep its habitat conditions i.e. periodic flooding and drying-up, which stay undisturbed in the inter-embankment and their adequate extensive use, which in turn is not connected with works conducted at the embankment. A similar situation applies to the other two habitats: Willow riparian forests *Salicetum albae* with river wickers *Salicetum triandro-viminalis* and Oxbow lakes and small ponds. Works conducted at the embankment will not affect the change of their habitat conditions. At some sections their patched border with the embankment, thus, just like in the case of the habitat coded 6440 there is a potential risk of periodic physical damage in the course of conducting these works. The area of these habitats will only be in-

terfered into at their outskirts without fragmentation. Accordingly, the impacts specified above will not be considerably negative.

A level of risk in terms of the deterioration of natural habitats in relation to the Natura 2000 site: the Valley of the Lower San River is as follows: 91E0-1 - min. 10.1 ha (1% out of the total area of this habitat within the site of community importance: the Valley of the Lower San River is as follows), 6440-1 - min. 0.5 ha (0.61% out of the total area of this habitat within the Natura 2000 site), 3150 - 2 (0.54% out of the total area of this habitat). In order to minimise the Investment impact onto a level of deterioration of these natural habitats a series of mitigation measures will be undertaken (see Appendix No. 1 to EMP).

Then the Investment, taking into account: the impact onto the natural habitats covered by the above-specified Natura 2000 sites and other valuable natural habitats, level of their occupation, including their slight loss within the Natura 2000 sites, character of works (the expansion of the existing embankments will intervene mainly into anthropogenically transformed habitats at their crest and foot, other habitats will be occupied only within a marginal part which borders with them from the inter-embankment side) and suggested mitigation measures (among others: protection of natural habitats, appropriate location of construction works facilities, collection of soils masses from external sources) will not be related to the significantly negative impact onto the above-specified areas and valuable natural habitats located beyond their borders.

Proper implementation of the environmental conditions decision in this area will be supervised by a botanist employed by the Contractor.

Flora

The Investment implementation involves the occupation of land and destruction of one stand of Floating fern *Salvinia natans*. This destruction within the Investment will not, due to the state of its population in this region, any negative consequences for the whole volume of the species. Mouse garlic *Allium angulosum* is another species being subjected to the impact of a risk of destruction and deterioration of the quality of its habitat. In connection with the Investment implementation, 6 stands of Mouse garlic will be destroyed due to the occupation of land and mechanical destruction. This species is neither endangered nor vulnerable to its extinction in the region. The destruction of these stands within the Investment will not have any negative consequences for the whole volume of the species. The Investment will not involve the elimination of any stands of Autumn crocus *Colchicum autumnale*. Moreover, it was specified in the provisions of this decision that it is necessary - at places where it is technically possible, upon some consultation with the botanical supervision, in case of any

collision of works with stands of protected species - replant (move) species from a given stand to its adequate habitat.

Then prior to the commencement of the works, the botanist will perform additional survey of flora in order to determine the current distribution of protected plant species on the areas intended for the Works Contract implementation. In case of observing specimens of any protected plants – after obtaining by the Contractor a respective permit of relevant nature protection authority (according to Art. 56 of the Act of 16 April 2004 on Nature Protection) – transfer them to a habitat that fits a particular species beyond the work area. Proper implementation of the environmental conditions decision in this area will be supervised by a botanist employed by the Contractor.

Fauna

The Investment does not cause any negative impact on **invertebrates**, including species which are covered within the boundaries of the above-specified Natura 2000 sites and under species protection. It should also be noted that - due to the foreseeable nature of works in the course of cleaning-up (topsoiling, sowing, mowing of vegetation at the embankment), this impact will be short-term.

In case of **fish** covered under the Natura 2000 sites (*Asp Aspius aspius* is protected under the Natura 2000 site: the Tarnobrzeg Valley of the Vistula River while Amur bitterling *Rhodeus sericeus*, *Asp Aspius aspius* and White-finned Gudgeon *Gobio (Romanogobio) albipinnatus* are protected under the Natura 2000 site: the Valley of the Lower San River), due to a lack of interference in the riverbeds and the above-mentioned oxbow lakes as well as biological cover of the Vistula and San rivers, it is not projected that the Investment will adversely affect the above-listed fish species and their habitats.

The Investment implementation involves the occupation of land and imposes a risk of destruction of the habitats of **amphibians and reptiles**. The impact related a risk of partial destruction of the habitats of amphibians and reptiles refers to the total surface area of 0.34 ha. This influence predominantly refers to habitat which is related to the impact of one specie listed in the Appendix II, i.e. European fire-bellied toad *Bombina bombina*. As a result of the Investment implementation, there will be a small area of drainage ditch (with a total area of approx. 0.22 ha) destroyed. However, the habitat area that will be drained is not located within the Natura 2000 Site: the Valley of the Lower San River PLH180020, where European fire-bellied toad *Bombina bombina* is subject to protection. Within the oxbow lakes and ponds located in the inter-embankment there was a permanent breeding site of amphibians found. Nevertheless, the Investment / its scope does not interfere into water reservoirs.

The impact of the considered Investment onto the habitat of amphibians, reptiles and species inventoried in them is related to the limitation of free migration and the deterioration of quality within the habitats of amphibians and reptiles due to their potential contamination. This limitation of free migration will have the highest impact during the construction stage. Upon the completion of works related to the redevelopment of the flood-protection embankment, they will be an obstacle for amphibians but will not constitute the kind of barrier which amphibians will not be able to overcome. Due to the above, the EMP suggests a number of mitigation measures, including the ones related to work only during specific part of calendar year, use of protective enclosures and transfer of amphibians found at the construction site or in wetlands which collide with such conducted works. Due to the above any significant negative impact of the Investment under consideration onto amphibians and reptiles is not expected.

One of the elements which negatively affects **birds** in the course of construction works will refer to noise emitted by moving vehicles and operating machines at the construction works stage. Starting the expansion of the embankments also leads to forming an ecological trap in the form of short-term favourable conditions for nesting in terms of works downtimes (e.g. for sand martin *Riparia riparia*, ringed plover *Chardrius dubius*, lapwing *Vanellus vanellus*, mallard *Anas platyrhynchos*, etc.). Another impact refers to accidental killing as a result of collisions with vehicles and may primarily involve nesting birds when their offspring (fledglings) leave nests, birds which during migration move low above the ground or feed on it, which also refers to preying birds. The deterioration of the quality of habitats is related to the organisation and conducting works, construction works sites, storage of building materials etc. It results in the destruction and reduction of a number of available nesting and feeding sites. Bearing in mind the size of the construction areas in comparison with the protected areas, its intensity and duration, as well as likelihood of occurrence the impact of the above-specified influences may be considered negligible.

Moreover, the seizure of land for Investment may lead to the partial or total destruction of habitats of avifauna (which form breeding and feeding sites). This influence primarily affects the area within the project demarcation lines where habitats will be totally changed and trees and shrubs - felled. The loss of habitats does not have to result from their total destruction, but it may come from the deterioration or destruction of just one of the habitat types used by a given species. For example some species have their feeding sites spatially separated from their nesting sites (it refers to the majority of preying birds, including Lesser spotted eagle *Aquila pomarina* or Common buzzard *Buteo buteo*) and the destruction of one component of their habitat stands for withdrawing to other areas. However, this influence is temporary only - upon the completion of construction works, during the operation stage, the embankment area can be used again as their feeding and nesting grounds.

Increased human penetration within this area may contribute to disturbance of birds sitting on nests, which in turn may lead to leaving broods by adult birds, exposing eggs and nestlings onto cold / hypothermia or their plundering by predators. Under the condition of keeping the regime of works / their deadlines and assuming that only trees and bushes in the immediate vicinity of the flood-protection embankment will be felled, among the species listed in the Annex I of the Birds Directive, **Red-backed shrike *Lanius collurio* is the one to suffer a substantial loss in its population** (since several stands are located in the immediate vicinity of the embankment). In case of Red-backed shrike, as a compensation for the felling trees and shrubs, it was suggested to identify 25 places located on the east side of the flood-protection embankment where bushes of wild rose and/or hawthorn bushes will be planted and - next to them - poles will be set up for Red-backed shrikes to use them as look-out points. This type of places are eagerly occupied as breeding sites.

It is also dangerous to disturb, as a result of works, the natural balance of reeds. Particular attention should be taken within reeds on the Strachocka river where Western marsh harrier *Circus aeruginosus* with its breeding sites were found. Therefore, any interference into the above-specified reeds were banned. Moreover, a period of construction works in their region was limited from 1 April to 31 July.

In the immediate vicinity of the embankment there are no trees with nests occupied by preying birds or other rare species. However, very close to the embankments there are two breeding sites of Syrian woodpecker *Dendrocopos syriacus*; its district covers an area of approx. 1.5 km² and undoubtedly also includes trees projected for felling. The situation is similar in the case of black woodpecker *Dryocopus martius*; its breeding region has an area of approx. 300-400 ha and trees projected for felling are undoubtedly within its territory. At the time when the works will be conducted to expand the embankments, the number of territorial corncrakes may fall but their level may return to their initial number in the future. A high level of flexibility in the choice of habitats and impressive mobility of males during the breeding season in search of new hunting grounds lead to the conclusion that - as a result of the works - these species will not suffer. The felling of trees in the immediate vicinity of the embankment will put significant strain to birds nesting in tree hollows. **As an additional mitigation measure for this group of species (birds nesting in tree hollows and other such covers** (owls, mergansers, hoopoe, tits, flycatcher, starling, nuthatch, etc.), also referring to the southern part of the 'Vistula at Zawichost' Ornithological Reserve, it was proposed in the decision to hang nesting boxes for birds. The number and types of the proposed boxes were selected on the basis of the analysis of species nesting within the area of the Investment and the number and size of felled trees.

The planned felling of trees (approx. 2900, of which there are 373 trees with a diameter equal to 20 cm or more) and bushes will reduce a volume of birds nesting in tree hollows, at bushes and trees. Taking into consideration the influence of this aspect, it was pointed out in the decision and its provisions that this felling of trees and shrubs should be conducted to the extent necessary for the implementation of this Investment. Moreover, it should be conducted in the period from 16 October to 15 February. In case of owls (tawny owl), white-tailed eagle and black woodpecker, their nesting starts in February. In case of breeding of water birds (greylag goose *Anser anser*, mute swan *Cygnus olor*) under mild spring conditions their breeding territories are occupied as early as February. In case of the group of species listed in the inventory on the studied section of the Vistula river, it can be considered that the substantial part of their reproductive ends at the end of July (and this is the time limit which is valid and applicable to the planned works). In case of water birds (diving ducks *Anatidae*, great crested grebe *Podiceps cristatus*) it actually often happens that nestlings hatch in mid-August and then mid-October being the end of the breeding season.

The negative impact of the Investment onto birds is also made - in case of birds nesting on the ground - by works in the range of removal of topsoil layer. For this reason, fertile layers of soil will be removed beyond the period from 1 March to 31 July (in case of any need to conduct this type of activity at another time it will be consulted with the Contractor's environmental supervision team and the Engineer's natural supervision which safeguards the course of such works).

Noise through startling (disturbance) and stressful actions may negatively affect the daily migration of medium and large **mammals**, including above all the predators. Noise at the construction stage will be connected with machines, their passage and operation, but the impact of these factors will be temporary only. Due to the fact that these species are able to adapt to such noise and also choose new migration routes and feeding sites this impact will not be significant. The elevation and expansion of the existing embankments will not impede any small, medium and large animals.

In case of **bats**, negative impacts could result from collisions on access roads, however this is not as significant aspect as it is in the case of road investments (less traffic). The probability of collision with vehicles refers mainly to low-flying bats (e.g. Brown Long-Eared Bat *Plecotus auritus*) and its risk increases if the construction works site is illuminated (serves as an insect attractant) which have attracting effects on insects, but still it also depends on a degree of activity of species present there. In case of bats this risk of accidentally killing refers only to increased traffic on local roads. Such potential accidental killing can only relate to incidents, with a low probability level of occurrence, and the exposure to this impact is tem-

porary. Places where so-called linear landscape features (along which bats most frequently fly) cross roads are at risk. The risk of loss of habitats due to their elimination or their unfavourable change due to the works implementation is the highest for the felling of trees and bushes in the river valley. It applied especially for old and grand trees with hollows and / or slits in the bark, occasionally or regularly used by bats. Large and hollowed trees are the most important for bats. The inventory of tree plantings conducted as required for the Investment pointed to the collisional location of about 2900 trees, of which approx. 373 trees with their diameter at breast height equal to 20 cm or more. With such tree sizing it can be expected that some of them may have hollows, protruding outer bark or - convenient for bats - hiding places behind broken-off branch fragments. Those trees are mostly located at the Section II. Thus, it was ordered to hang out approx. 50 boxes for bats along the whole section of running works under the supervision and in the places specified by a chiropterologist within the inter-embankment area. Taking into consideration the impact generated at the stage of investment as well as the suggested mitigation measures no significantly negative impact of the project onto bats is projected due to the Investment implementation.

Proper implementation of the environmental conditions' decision with regard to fauna is to be supervised by expert entomologist, chiropterologist, herpetologist, and ornithologist employed by the Contractor.

In the operation phase no adverse impacts on the above mentioned elements of the environment are foreseen.

5.9. IMPACT ON CULTURAL LANDSCAPE AND MONUMENTS

As demonstrated by the environmental impact assessment, there will be no danger in relation to cultural goods and monuments at the stage of implementation and operation of the Works Contract.

Provincial Monuments' Conservator, in the opinion of 16.11.2016 (file ref. UOZ-T-1.5183.69.2016), advised that "(...) He approves the technical design provided that it takes into account - in monuments protection terms - the integrity and inviolability of the land plot no. 1714/3 in the location of Wrzawy, the Commune of Gorzyce, located in Section II, at km 4+880 (...). At this plot, (...) there is a mound with a monument founded in 1879 by Baron Kalikst Horoch (...) Around the monument lies the former war cemetery dated 1809. (...) Moreover, all over the investment covered by the submitted project and within its immediate vicinity there are no other monumental structures or archaeological sites."

5.10. SOCIAL IMPACT

Under the construction phase there may be local and transient deterioration of people's living conditions, which will be chiefly connected with construction works and transport of equipment, machinery and materials. These impacts will be of small nature, they will occur in the immediate vicinity of conducted works and in the immediate vicinity of roads used for transport. Taking into account the above, these impacts will be minor and cease to occur upon the completion of such works.

Flood protection itself is a positive social aspect and it is very positively perceived by people living within the area.

A broader study of this issue was conducted and described in the document Land Acquisition and Resettlement Action Plan for the Works Contract 3B.2 'Flood protection Tarnobrzeg' (prepared by MWR Consulting, 2017).

5.11. IMPACT ON TANGIBLE ASSETS

The implementation of the Works Contract consisting in the reconstruction of the flood embankments will raise a level of flood safety and, consequently, mitigate risks of significant material damage as well as threats to the health and life of people and ecological negative effects. Flood occurrences in the valley of the Vistula river at the section from Tarnobrzeg to Sandomierz have posed threats to the health and life of people living nearby as well as to their material goods. The purpose of the Works Contract is primarily to eliminate such threats.

5.12. EXTRAORDINARY HAZARDS

Both during the construction and operation of the right Vistula River embankment and the right San River embankment, unexpected hazards may occur associated with contamination of the environment, unexploded ordinances and breaking of the embankment. However, correct implementation and operation, and compliance with the principles of proper work organization and compliance with the law and with provisions of the EMP document will ensure total safety to the structure and environment. During the implementation of the Works Contract, an emergency can arise, e.g. failure of working heavy equipment, causing uncontrolled leak of substances harmful for the environment, including, among others, oil derivatives, and ground and water contamination. It is to be prevented by the requirement of using construction equipment (machines and devices) that is technically efficient, being under control at all times, secured against possible leaks of fuels and lubricants. In the event of observing contamination of ground or ground water, the contamination site will be promptly and adequately secured and neutralized with sorbent. During the operation, a construction disaster may oc-

cur related to breaking of the embankment, and water collected in the terrace will flow down, causing local flooding. Due to periodic and relatively short time of collecting higher water levels in the terrace and duly executed structure, and annual inspections and maintenance of the installations, the risk of the embankment's breach will be minimized.

Due to possible flood flows during the Works Contract implementation, the Contractor is obliged to organize and establish detailed rules of conduct in case of flood. The Flood Protection Team will be established in the structure of implementation team of Contractor and will be protected the Works in case of flood risk in the area of the construction works within the executed Investment covered by the present Works Contract.

5.13 CUMULATIVE IMPACTS

Extension of the right-side embankment of the Vistula River along the concerned sections, may potentially entail a cumulative impact of similar Projects being implemented in the basins of the Vistula River and its tributaries.

In the area of the Investment, with regard to the global management of catchment area and management of water resources, the following investments have been identified:

1. Vistula River Stage 1 - extension of the right embankment of the Vistula river in km 5 + 950-15 + 819 on the section from Tarnobrzeg (Skalna Góra) to Koćmierzów (border of Podkarpacie and Świętokrzyskie Provinces) - documentation prepared by DERING Design Group, 36/3 Świerkowa Str., 81-572 Gdynia.
2. Flood protection Sandomierz – Works Contract covering six structures: (1) Flood protection within the mouth section of the Atramentówka River, construction of a new pumping station "Koćmierzów" and of a gravity-type dam lock in Koćmierzów (in the right embankment of the Vistula River) and of a channel draining water from the Atramentówka River to the pumping station. (2) Flood protection within the area of the Struga A watercourse together with an alteration and expansion of the pumping station "Nadbrzezcie". (3) Expansion of the surrounding embankment protecting Glassworks and a Housing Estate against the flood waters in the town of Sandomierz together with an extension of the embankment of the Vistula River from the Lwowska Street to intersection of Koćmierzów embankment. (4) Protection the embankments of Koprzywianka River – left embankment in km 0+ 000 ÷ 12+900, right embankment in km 0+000 ÷ 14+400. (5) Construction of the water pumping station in Szewce, 6) Expansion of the water pumping station in Zajeziarze - documentation prepared by JV: CERMET-BUD Przedsiębiorstwo Inżynierskie Sp. z o.o., 31-432 Kraków, 4 Otwinowskiego Str. (Leader) and MGGP S.A., 33-100 Tamów, 6 Kaczkowskiego Str. (JV Partner) (structures: 1, 2 and 4), SWECO HYDROPROJEKT Kraków Sp. z o.o., 15 Trybuny Ludów Str., 30-660 Kraków (structures 5

and 6), ZAKŁAD USŁUG I ROBÓT WODNYCH Sp. z o.o., 45-317 Opole, 43 Morcinka Str. Design Studio, 45-403 Opole, 4 Oswalda Matei Str. (structure 3).

3. Trześniówka III - extension of left embankment of the Trześniówka river in km 8 + 280-13 + 132 on the left of 4.852 km and right embankment in km 7 + 678-12 + 942 on the left of 5.264 km, in the area of Tarnobrzeg Commune and Grębów Commune - documentation prepared by MGGP S.A. 6 Kaczkowskiego Str., 33-100 Tarnów.

4. Łęg III - extension of the left embankment of the Łęg river in km 5 + 000-7 + 580 on the left of 2.58 km and the right embankment in km 5 + 200-11 + 000 on the left of 5.80 km, in the area of Gorzyce Commune and Zaleszany Commune - documentation prepared by Agencja Technik Ekologicznych i Realizacji Inwestycji mkm PERFEKT Sp. z o.o. (the Agency for Ecological Techniques and Investment Realization mkm PERFEKT Ltd., 1 Rzemieślnicza Str., 30-363 Kraków.

5. San I Stage I - extension and anti-filtration protection of the right embankment of the San river in km 2 + 215-9 + 417, on the left of 7.202 km, in the area of Radomysl nad Sanem Commune, Podkarpackie Province - documentation prepared by MGGP S.A. 6 Kaczkowskiego Str., 33-100 Tarnów. Decision of the Regional Director of Environmental Protection in Rzeszów of 20.07.2012, sign: WOOS.4233.32.2012.MG-30.

6. San II - extension and anti-filtration protection of the left embankment of the San river in km 4 + 438-9 + 390, on the left of 4.952 km, in the area of Zaleszany Commune - documentation prepared by MGGP S.A. 6 Kaczkowskiego Str., 33-100 Tarnów.

Moreover, the scope of this Investment may overlap with other activities, e.g. related to the felling of trees and shrub from the area threatened with flooding conducted on the basis of article 88, clause 1 of the Act - Water Law. Within the embankment under consideration, in reference to the area of the Vistula and San inter-embankment, there were two decisions issued by the Director of the Regional Water Management Authority in Kraków (Cracow) with an order to remove excessive wickers. Based on the decision (sign: OKI-ms-770-839-2/12), excessive wickers were removed from the land plot no. 460/1 from an area of 2.97 ha and from the land plot no. 95 - from an area of 1.61 ha in the precinct of Zalesie Gorzyckie. This felling was completed on 28.02.2013. Then, through the decision (sign: OKI-ms-770-840-4/12/13), excessive wickers were removed from the land plot no. 1 from an area of 0.89 ha and from the land plot no. 4 - from an area of 2.05 ha in the precinct of Gorzyce. This felling was completed on 28.02.2014. Taking the above-mentioned land plots into consideration, only one of them (no. 460/1) is partially located within the the site of community importance: the Tarnobrzeg Valley of the Vistula River PLH180049.

As for the Investment, felling will cover 2,900 trees, whereof within the Natura 2000 sites will include: approx. 655 trees from the Natura 2000 site the Valley of the Lower San River and

1 tree from the Natura 2000 site the Tarnobrzeg Valley of the Vistula River.

The analysis of cumulative impacts showed that, taking into account: the impact onto the natural habitats covered by the above-specified Natura 2000 sites and other valuable natural habitats and protected species, level of their occupation, including their slight loss within the Natura 2000 sites, character of works (the expansion of the existing embankments will intervene mainly into anthropogenically transformed habitats at their crest and foot, other habitats will be occupied only within a marginal part which borders with them from the inter-embankment side) and suggested mitigation measures (among others: protection of natural habitats, appropriate location of construction works facilities, collection of soils masses from external sources etc.) will not be related to the significantly negative impact onto the above-specified areas and valuable natural habitats located in and beyond their borders. Tangible result of carrying out works on a different Contracts at the same time will be increased road traffic related to the transport of ground masses and building materials.

The total cumulative effect of diverse Works Contracts designed for flood protection, will enable more thorough floodplain protection against the flood water across the whole section of the Upper Vistula River and in its basin.

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6. DESCRIPTION OF MITIGATION MEASURES

6.1. LAND SURFACE AND LANDSCAPE

Phase of implementation

With regard to ground surface, including landscape, direct impacts will appear only during the Works Contract implementation, when any changes will be related to land transformations as a result of the conducted earthworks, cleaning activities.

At the places where topsoil was removed (before the end of the works), topsoil should be levelled and then earlier prepared area should be sowed with grass mixes (composition of grass mix will be agreed on with an expert – botanist of the Contractor and will be accepted by the Engineer) and adequately taken care of, by, among others, twofold mowing in June and September, covering also Defects Notification Period.

Mitigation measures concerning the protection of the ground surface, landscape and soils is specified in Appendix No. 1 to EMP (measures number: 9, 12, 13, 21, 22, 25, 26, 31, 36, 47, 51, 54, 58, 63, 66, 70, 92, 93, 95, 96, 97, 105, 106, 112, 113, 116, 117, 119).

Phase of operation

During the operation no adverse impacts on ground surface and landscape are anticipated. Grounds located on the embankment land side will be protected against flooding, as a result of which rational agriculture is possible to develop in the area.

6.2. CLIMATE

Due to lack of negative impacts on climate it was stated that no mitigation measures were necessary.

6.3. AIR QUALITY

Phase of implementation

During construction works the air will be contaminated by an unorganized emission, associated mainly with operation of construction equipment and means of transport driven by combustion engines emitting gas pollutants to the atmosphere, as well as earth works (delivery, storage and ground masses embedding).

Mitigation measures concerning air protection are specified in Appendix No. 1 to EMP (measures number: 16, 91, 94, 105, 106, 107, 108)

Phase of operation

Hazard for the condition of air, in the operation phase of the embankments, will not be present.

6.4. SOILS AND GROUNDS

Phase of implementation

With regard to soil, direct impacts will appear only during the Works Contract implementation, when any changes will be related to land transformations as a result of the conducted earth-works, cleaning activities, or possibly contamination of ground surface with substances harmful for the environment, including oil substances, in the case of leaks from used machines and devices, spillage of such substances in their storage places.

Refuelling should be carried out with the use of mobile or stationary points of fuels distribution with adequate protection, such as station with sorbent used for removal of leaks and overflows of oil derivatives to the ground.

In case of an emergency situation, mitigating measures shall be undertaken (including soil replacement). At the places where topsoil was removed (before the end of the works), topsoil should be levelled and then earlier prepared area should be sowed with grass mixes (composition of grass mix will be agreed on with an expert – botanist of the Contractor) and adequately taken care of, by, among others, twofold mowing in June and September, covering also Defects Notification Period.

Mitigation measures concerning the protection of the soils is specified in Appendix No. 1 to EMP (measures number: 9, 13, 16, 19, 20, 21, 22, 25, 26, 27, 51, 63, 69, 92, 93, 95, 96, 97, 98, 105, 106, 112, 119).

Phase of operation

During the operation no adverse impacts on soils are anticipated.

6.5. SURFACE WATER

Phase of implementation

The impact of the Works Contract on surface water is related mainly to the construction works period.

A very important hazard to surface water is contamination of the ground and water environment with substances harmful for the environment, including oil derivative substances caused by emergency leakage of motor fuels from machine engines or means of transport, or spilling of these substances during their warehousing. In case of an emergency situation, mitigation measures should be taken.

During excavation work, there will be increase of turbidity in the water to which the drainage water will be leaded off. This will worsen such params as a total suspension. Drainage water from excavations, prior to their introduction into the environment, should be cleaned (due to the high content of total suspension). The Contractor shall ensure the flow possibility of em-

bankment culverts and ditches throughout the duration of the works, located on the construction site as well as located along the boundaries of the construction site.

Mitigation measures concerning protection of surface water are specified in Appendix No. 1 to EMP (measures number: 7, 12, 13, 16, 18, 19, 21, 22, 24, 25, 26, 27, 61, 62, 69, 70, 73, 92, 93, 95, 98, 105, 106, 112).

Phase of operation

In the embankment operation phase, there will be no danger to surface water.

6.6. GROUNDWATER

Phase of implementation

The impact of the Works Contract on ground water is related mainly to the construction works period.

A very important hazard to ground water is contamination of the ground and water environment with substances harmful for the environment, including oil derivative substances caused by emergency leakage of motor fuels from machine engines or means of transport, or spilling of these substances during their warehousing.

In case of an emergency situation mitigation measures should be taken.

Mitigation measures concerning protection of ground water are specified in Appendix No. 1 to EMP (measures number: 12, 18, 19, 21, 22, 25, 26, 27, 69, 92, 93, 95, 105, 106).

Phase of operation

In the embankment operation phase, there will be no danger to ground water.

6.7. ACOUSTIC CLIMATE

Phase of implementation

Distribution of noise level around the Works Contract will change along with movement of the area of the works. In order to reduce a level of noise emitted to the environment during construction works conducted close to the existing residential premises, it is necessary to use portable sound barriers with their height of min. 4.0 m. At the stage of performance of construction works, the following technical and organisational measures should be also applied: keep machines which emit noise and vibrations during the Works Contract implementation in good conditions which will allow for the observance of the standards set out in the applicable detailed regulations, construction works related to the Works Contract implementation and materials transportation will be conducted daytime i.e. from 06.00am to 10.00pm only.

Mitigation measures concerning protection against noise are specified in Appendix No. 1 to EMP (measures number: 8, 48, 50, 86, 87, 88, 89, 90, 94).

Phase of operation

During this phase, no noise will be exceeded above limited level (i.e. for normative time at day $L_{Aeq, D} = 61$ dB for residential single-family buildings areas and $L_{Aeq, D} = 65$ dB for farmland areas).

6.8. NATURE

The conducted study demonstrated that implementation of the Works Contract using the mitigation measures, including the special mitigation measures described in Charter 6.15, will not have a negative impact in relation to types of habitats and animals species which are the objects of protection, including in the Natura 2000 site. Therefore, it was necessary to indicate mitigation measures number: 28, 29 and 30 specified in Appendix No. 1 to EMP.

In case of presence of protected species of plant, fungi and animals on the construction site the Contractor's environmental team prepares necessary materials and requests for obtaining decisions for derogations from prohibitions of protection of species of plants, fungi or animals on the terms and in the mode specified by the NEPA (Act of 16 April 2004). The above-mentioned decisions issued by RDOŚ/GDOŚ are to be requested for by the Contractor. Contractor's duty will be to implement the provisions of obtained decisions for derogations from prohibitions of protection of species of plants, fungi and animals.

Mitigation measures of negative impacts on the nature have been indicated in Appendix No. 1 to EMP (measures number: 4, 5, 7, 9, 12, 13, 17, 22, 23, 31, 32, 33, 34, 36, 37, 42, 43, 46, 47, 51, 54, 58, 59, 60, 63, 65, 66, 67, 70, 71, 72, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 99, 112, 113, 115, 116).

Implementation of the proposed mitigating measures by the Contractor also requires involvement of various specialists (botanist, entomologist, chiropterologist, herpetologist, and ornithologist) during the implementation of the works.

6.9. CULTURAL LANDSCAPE AND MONUMENTS

In the direct vicinity of the extended embankment there is one historical facility covered by legal protection – war cemetery. The Provincial Conservator of Historical Monuments pointed out that there are no known archaeological sites near the Investment. However in the area of earthworks, it is possible to find so far unknown and not identified archaeological sites. The Contractor will provide permanent archaeological supervision at the construction site during the earthworks. Mitigation measures concerning culture monuments protection has been indicated in Appendix No. 1 to EMP (measures number: 44, 45, 101, 102).

If during the works, any archaeological objects are found, the Contractor is required to stop the works at the site of the finding, protect the site, and report this fact to the Provincial Conservator of Historical Monuments in Rzeszów, notifying also the Employer and the Engineer.

In this case it will be necessary to conduct archaeological rescue research, following the decision of the Provincial Conservator. The survey will be carried out by the Contractor.

6.10. ORGANIZATION OF THE BACK-UP FACILITIES AND THE CONSTRUCTION SITE

The Contractor, by their own effort, will acquire the area for an arrangement of the back-up facilities and storage yards respecting the requirements and conditions of the World Bank regarding social policies and land compensation. Any approval for temporary occupancy must be preceded by a local vision of the area in terms of its impact on particular environmental elements. When selecting the location for the back up facilities for the construction site, the following aspects should be taken into account:

- examining the area for its ground base, vegetation and ground water table: locate any construction sites on areas free from trees and where the ground water table is below 1.0 m b.g.l.,
- the geological structure of area of construction site location will effectively protect ground water,
- the construction site location will provide convenient access to energy and water supply for social purposes. The access road to the back-up facilities will not hinder access to the nearby buildings,
- locate the construction site only beyond the area of inter-embankment (water side of embankment) and any protected habitats.

In addition, the Contractor has to prepare the construction site organization plan which, apart from the location of the site facilities, will indicate the conditions of its use, including: the location of parks for the construction equipment and other vehicles, the method of soil and water protection against contamination with substances harmful for the environment, the method of draining rain water, the location of the warehouses for construction materials, and the places for municipal and dangerous waste storage.

From the environmental and social point of view, site facilities are a place of potential adverse effects, due to: possible soil contamination, storing and usage of hazardous materials, fuels and oils, water demand, sewage discharge, electric energy demand, and waste generation. Neighbouring with residential buildings may be a source of potential problems with the local community due to the presence of a large number of employees, especially strangers, who may be a source of sexually transmitted infections.

The construction site organization plan should also contain organizational and functional procedures for the construction site in order to protect the local community. The construction sites must observe the OHS regulations valid in Poland and the European Union and be equipped with sealed sanitary devices for sewage collection. Sewage should be removed to

a sewage treatment plant equipped with a drainage station. Waste management procedures must be implemented in accordance with the Act on Waste (minimized generation, segregation or selective collection and storage in appropriate containers and receipt by licensed companies).

6.11. HUMAN HEALTH AND SAFETY

The Contractor will be responsible for the implementation of human health and safety activities related to the appropriate organization of works, technical measures, fire protection, construction site, vehicle and machine conditions and use, and training in transmitting of HIV-AIDS.

Contractor's OHS supervision shall be responsible for adequate marking of construction site according to applicable laws. This marking shall be regularly controlled, in the case of destruction or theft of marking the Contractor shall promptly rebuild or supplement it. The Contractor shall be responsible for any damage to the structures, buildings, roads, drainage ditches, culverts, water supply and gas pipe lines, power poles and power lines, cables, land survey control network and any type of services as well as other types of facilities such as vertical and horizontal signs, information boards, cultural assets etc., caused by the Contractor or his Subcontractors during execution of works. The Contractor shall immediately repair any damage at his own expense and also, if necessary, shall perform other works ordered by the Engineer.

The Contractor shall be obliged to agree with road management authorities of the traffic arrangement and works security plan and next to organize traffic in accordance with the agreed plans (marking and securing the site and marking of de-tours and recommended road signage related to change of traffic organization, etc.). The Contractor shall respect the statutory limitations of speed and loads per vehicle axle during transport of materials and equipment to and from the construction site. The Contractor shall also obtain any necessary permits from authorities, for transport of non-standard loads and shall constantly inform the Engineer about each case of such a transport.

The Contractor is responsible for Contractor's management and engineering-technical personnel training regarding the rules and conditions of the EMP.

Mitigation measures related to the protection of health and safety of people has been indicated in Appendix No. 1 to EMP (measures number: 8, 14, 15, 38, 39, 40, 49, 50, 52, 53, 55, 56, 57, 68, 103, 104, 109, 118).

6.12. EXTRAORDINARY HAZARDS

Crisis situation

In the case of emergency, in the first place, the competent services should be notified:

Service	Phone no.
All services - Alarm number available on the mobile phone	112
Police	997
Fire brigade	998
Emergency medical Services	999

Flood

With regard to the Works Contract in question, the occurrence of flood in the period of execution of works related to expansion of the existing embankments may be considered similar to industrial breakdown. During the period of a flood wave the construction equipment, construction materials and other elements of infrastructure cannot be present on the water-side of the embankment. Freshets of this kind are extreme phenomena; in the case of the region of Sandomierz a flood wave can be anticipated with a great deal of probability adequately earlier and precautions can be taken as well as appropriate preventive measures specified in the construction site's flood management plan for the time of the works.

For the duration of construction works, Flood Management Plan should be provided by the Contractor, specifying the relation between the time of commencement of the evacuation or protection of the equipment and the occurrence of a certain hydro-meteorological situation. This plan must be approved by the Engineer. The Contractor will be obliged to establish communication with IMGW-PIB to receive current information on weather forecast. In case of any warning about high water, the Contractor shall immediately notify the Engineer and the Employer and shall take appropriate actions according to the procedures described by the Flood Management Plan.

Mitigation measures related to the flood protection has been indicated in Appendix No. 1 to EMP (measures number 61 and 62).

Leak of petrol derivatives

Another type of extraordinary hazard is leakage of petrol derivatives to water or to the soil. However, for this purpose appropriate preventive measures are provided, relating to appropriate organization of sites and site facilities, equipping places of possible leaks with proper sorbents and control of the condition of used construction equipment. In the event of any

spillage of oil derivatives, it will ensure that any leakage is immediately removed and contaminated soil layers are managed in compliance with the applicable legal regulations.

Mitigation measures related to the protection of environmental (ground and waters) has been indicated in Appendix No. 1 to EMP (measures number: 12, 13, 18, 19, 21, 22, 69, 92, 95, 106).

Discovery of unexploded shells

Works will be conducted in the Vistula River valley and San River valley, partially at a small distance from the riverbeds. Due to the fact that in this area war operations were conducted during War World II, there is a possibility of finding unexploded shells during construction works such as: detonators, missiles, aerial bombs, artillery and rifle bullets, armored missiles, grenades, mines, explosive materials, scrap containing the residues of explosive materials, etc.

In the event of discovering unexploded shells, the Contractor shall immediately stop the works, evacuate workers and notify the police, a licensed sapper unit as well as Engineer and PIU.

It is strictly forbidden to dig out unexploded shells, raise them, bury them, transfer them or throw them to the fire, river, channel, oxbow lake, channel etc. The Client does not explore the Site in terms of the presence of unexploded shells.

The Contractor shall ensure sapper supervision throughout the performance of earthworks, which will consist in on-going inspection and clearance of the area, including the sites of former military ranges, from hazardous objects of a military origin and their disposal.

Mitigation measures as above has been indicated in Appendix No. 1 to EMP (measure number 103).

Fire

Fire safety in the area of the Investment rests with the Contractor. Detailed procedure in case of fire will be contained in the SHPP prepared by the Site Manager.

Mitigation measures related to the fire protection has been indicated in Appendix No. 1 to EMP (measures number: 14, 25, 39, 40).

6.13. WASTE AND WASTEWATER

Waste management must be carried out in accordance with the Act of 14th December 2012 on waste. It is required to follow a rule of minimizing the amount of the waste generated. The generated waste should be adequately segregated and successively received. At the stage

of its temporary storage, it is necessary to ensure appropriate containers and/or separate and adequately adapt for this purpose places preventing dusting and dispersing light fractions and their adverse environmental impact. Special attention should be paid to the management of hazardous waste. In the case of the occurrence of illegal landfill sites, prior to commencement of works, such areas should be cleaned of the waste deposited there, by being transported to a landfill intended for the storage of a particular type of waste.

The construction sites must be equipped with tight sanitary facilities to collect wastewater. Sewage should be discharged to a sewage treatment plant equipped with a catchment point. Workers should definitely use Toi-Toi portable toilets.

The guidelines related to handling waste and waste water are contained in Appendix No. 1 to EMP (measures number: 14, 21, 22, 23, 26, 27, 39, 40, 105, 109).

6.14. REQUIREMENTS FOR IMPLEMENTATION OF ACTION PLANS IN THE CONSTRUCTION PHASE

The Contractor under the specified mitigation measures, included in the decision on environmental conditions, in decision determining requirements for conducting works and in the hereby EMP will prepare and then obtain the Engineer's acceptance, for the following documents necessary for conducting construction:

- Construction site organisation plan, which should contain among other such elements as:
 - *location of the site facilities,*
 - *managing the site facilities,*
 - *securing the site facilities,*
 - *service roads,*
 - *environment protection on the back-up facilities, technological routes and storage yards.*
- Waste management plan, which should contain among other such elements as:
 - *encountered and predicted types and volumes of waste,*
 - *means of preventing negative impact of the waste on environment,*
 - *means of waste management with taking into account collection, transport, recovery and treatment of waste,*
 - *type of generated waste and way of its storage.*
- Quality assurance plan/plans, which should contain among other such elements as:
 - *works performance organisation,*
 - *organisation of traffic at the construction site jointly with marking of the works,*

- *OHS and environment protection,*
- *list of working teams,*
- *scope of duties of the key personnel,*
- *quality control,*
- *laboratory tests.*
- The Construction Site's Flood Management Plan for the Time of the Works, which should contain among other such elements as:
 - *monitoring hydrological and weather situation,*
 - *conditions for allowing flood flows in the period of works performance,*
 - *the rules of work for the Contractor's team in the period of flood risk,*
 - *basic duties of the functional members during the flood risk,*
 - *list of people with assigned duties in the period of flood risk,*
 - *list of equipment and transport means needed to conduct rescue actions.*
- Safety and Health Protection Plan, which should contain among other such elements as:
 - *indication of land development elements, which may create safety and health risks,*
 - *information concerning expected hazards, that could occur during performance of construction works, defining the scale and types of hazards and the place and time of occurrence,*
 - *information on separation and marking of places of conducting construction works, according to the hazard type, with reference to environment,*
 - *information on the way of conducting training of employees prior to beginning performance of particularly hazardous works,*
 - *determining the method of storing and transport of hazardous materials, products, substances and preparations at the construction site,*
 - *indication of technical and organizational means of safeguarding against hazards connected with construction works in increased safety risk zones, or in their immediate vicinity, including means of safe and efficient communication, allowing quick evacuation in the case of fire, mechanical failure, and other hazards,*
 - *indication of the storage location of construction documentation and documents necessary for proper operation of machines and other technical devices.*

NOTE:

The Contractor, preparing the plans of organization of the construction site, including the Safety and Health Protection Plan, will consider appropriate actions as indicated in the Guidelines of the World Bank¹ concerning protection of health, environment as well as safeguard policies. Plans of organization of the construction site that will be drawn up by the Contractor will be reviewed and then submitted for approval by the Engineer.

¹<http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/0,,contentMDK:20120722~menuPK:41392~pagePK:41367~piPK:51533~theSitePK:40941,00.html>

6.15. ADDITIONAL MITIGATION MEASURES CONCERNING THE RESTORING OF THE SHELTERS AND FEEDING SITES REFERRED TO IN THE ENVIRONMENTAL DECISION

At the course of the conducted assessment, it was stated for the environmental variant (second (II) variant), necessity of felling ca. 2900 trees as well as bushes on the area of about 3.12 ha resulting in the loss of nesting sites for birds and breeding sites for bats.

The losses shall not be large enough to be considered significant, however, they require to carry out additional mitigation measures prior to works commencement under article 75 of the Environmental Protection Act [consolidated text: Journal of Laws of 2017, item 519].

As a mitigation measure for the group of species nesting in tree hollows and other such covers (owls, mergansers, hoopoe, tits, flycatchers, starling, nuthatch, etc.), nesting boxes for birds will be hung on trees. In the case of bats, the environmental decision indicated the need to hang breeding boxes for this group of mammals.

As a result of startling (disturbance) during the Works Contract implementation, Red-backed shrike is the one to suffer a loss in its population (its several stands are located in the immediate vicinity of the embankment). In case of Red-backed shrike, as a mitigation measure, it was suggested to put poles – look-out points, along with the planting of bushes, such as wild rose and/or hawthorn.

In the Appendix No. 1 to EMP (measures number 28, 29, 30), there are presented the detailed recommendations of mitigation measures the need of implementation of which has been presented in the course of the conducted assessment of the environmental impact of the Investment . The mitigation measures refer to the protected species of birds and bats.

Phase of implementation

The implementation of the measures referred to above will be carried out by the Contractor (i.e. the Contractor will hung out nesting booths for birds, breeding boxes for bats and will acquire the area, install poles and plant them with bushes for the Red-backed shrike) before commencing the construction works covered by the Work Contract 3B.2. These measures will be carried out under the supervision of the ornithologist and botanist employed by the Contractor. Throughout the duration of the works the Contractor shall make recommendations for the cleaning, maintaining and monitoring of booths and boxes (in the case of bats' boxes 3 years after its hang out) as well as the poles and planting bushes.

Phase of operation

Throughout the duration of the Defect Notification Period and the Warranty Period, the Contractor shall make recommendations for the cleaning, maintaining and monitoring of booths and boxes (in the case of bats' boxes 3 years after its hang out) as well as the poles and

planting bushes. After this period the implementation of these measures will be taken over by PZMiUW.

7. DESCRIPTION OF MEASURES RELATED TO ENVIRONMENTAL MONITORING

7.1. MONITORING IN THE PHASE OF IMPLEMENTATION OF WORKS

The Contractor should, before the commencement of the works, prepare own Plan of monitoring measures that should be correlated to the Monitoring measures plan of the Engineer and other institutions involved in the Works Contract execution. The plan should focus on such environment elements as: the land surface and landscape, climate, air quality, soil and grounds, waters, acoustic climate, nature (habitats, flora, fauna), cultural landscape and monuments, organization of the back-up facilities and the construction site, human health and safety, extraordinary hazards, waste and wastewater, requirements for implementation of action plans in the construction phase.

- **The surface of soil, landscape and ground**

The area of construction works is located beyond the area of a large intensity of traffic. Therefore, as shown in EIA Report, concentration of heavy metals in soil is at a regular level, typical of this region. It is not suggested to conduct soil tests before and at the stage of execution of construction.

In the case of an emergency situation (e.g. leakage of oils, lubricants from construction equipment to the ground, spillages of substances harmful for the environment in their storage place) take mitigation measures (up to the ground replacement inclusively).

Monitoring measures related to protection of soils and landscape were indicated in Appendix No. 2 to EMP (measures number: 9, 12, 13, 16, 19, 20, 21, 22, 25, 26, 27, 31, 36, 47, 51, 54, 58, 63, 66, 69, 70, 92, 93, 95, 96, 97, 98, 105, 106, 112, 113, 116, 117, 119).

- **Climate and air quality**

Monitoring measures related to protection of air quality were indicated in Appendix No. 2 to EMP (measures number: 16, 91, 94, 105, 106, 107, 108).

- **Surface and ground water**

Monitoring of hazard to ground and surface water in the construction phase is intended to identify impact on their quality.

In the case of both surface and ground water, measurements of basic parameters of water indicators should be made in case of their emergency contamination (e.g. leakage of oils, lubricants from construction equipment). The following parameters should be subject to assessment: pH, BOD₅, suspension, turbidity and concentration of oil derivatives.

This applies particularly to works related to drainage of foundation excavation for culverts (lowering of the ground water level).

Monitoring measures related to protection of water have been indicated in Appendix No. 2 to EMP (measures number: 7, 12, 13, 16, 18, 19, 21, 22, 24, 25, 26, 27, 61, 62, 69, 70, 73, 92, 93, 95, 98, 105, 106, 112).

- **Acoustic climate**

The best approach to control noise level during construction is requirement of using such equipment which meets standards of noise limitations and constant monitoring of its condition, including response to any complaints on inconveniences from the local community.

Monitoring measures related to protection of acoustic climate were indicated in Appendix No. 2 to EMP (measures number: 8, 48, 50, 86, 87, 88, 89, 90, 94).

- **Nature (habitats/flora/fauna)**

The Contractor must ensure monitoring by the Contractor's environmental team the works' impact on habitats/flora/fauna at the stage of their implementation.

Effectiveness of the activities conducted according to the needs in order to remove external, invasive plant species, should be monitored.

Monitoring measures related to protection of habitats, fauna and flora were indicated in Appendix No. 2 to EMP (measures number: 4, 5, 7, 9, 12, 13, 17, 22, 23, 28, 29, 30, 31, 32, 33, 34, 36, 37, 42, 43, 46, 47, 51, 54, 58, 59, 60, 63, 65, 66, 67, 70, 71, 72, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 99, 112, 113, 115, 116).

- **Cultural landscape and monuments**

Contractor's duty is to monitor the state of preservation of the historic military cemetery and stone with a plaque.

Monitoring measures related to this subject were indicated in Appendix No. 2 to EMP (measures number: 44, 45, 101, 102).

- **Organization of the back-up facilities and the construction site, human health and safety, extraordinary hazards, waste and wastewater, requirements for implementation of action plans in the construction phase**

Contractor's duty is to monitor of proper execution of all mitigation measures connected with the organization of the back-up facilities and the construction site, human health and safety, extraordinary hazards, waste and wastewater, requirements for implementation of action plans in the construction phase.

Monitoring measures related to these subjects were indicated in Appendix No. 2 to EMP (measures number: 8, 12, 13, 14, 15, 18, 19, 21, 22, 23, 25, 26, 27, 38, 39, 40, 49, 50, 52, 53, 55, 56, 57, 61, 62, 68, 69, 92, 95, 103, 104, 105, 106, 109, 118).

7.2. ENVIRONMENTAL MONITORING IN THE OPERATION PHASE

With regard to the **reviewed elements of the environment** it will be necessary to continue carrying out monitoring measures commenced during the execution of the works in the scope of:

- nesting booths for birds (10 years after hung up of the new booths or 10 years after works commencement in case of the existing booths);
- boxes for bats (3 years after its hung up);
- the occurrence of invasive foreign plants (for a minimum period of 5 years from the completion of construction works during embankment mowing).

The Contractor shall carry out all necessary monitoring measures during the operation phase by the Defect Notification Period and the Warranty Period. After this period, these measures will be continued by PZMiUW.

The Contractor will prepared report containing information concerning the method and scope of the performance of mitigation measures, and also documents confirming the participation of specialists (e.g. memorandum of understanding and/or a declaration of a specialist confirming the proper performance of measures). This report will be supplemented and accepted by the Engineer, and next this report will be submitted by the Contractor (in behalf of PZMiUW) to the Regional Director for Environmental Protection in Rzeszów within 6 months from the date of works completion.

Details of these monitoring measures are described in Appendix 2 to EMP and chapter 6.15 above.

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8. PUBLIC CONSULTATIONS

8.1. PUBLIC CONSULTATIONS ON ENVIRONMENTAL IMPACT ASSESMENT (2015-2016)

At the stage of the procedure of the environmental impact assessment consultations with participation of the public were conducted by the authority issuing the environmental decision i.e. RDOŚ in Rzeszów.

The proceeding conducted from 2nd June 2015 to 22th June 2015 included participation of the public - according to Article 79 of Act on making available information on the environment and its protection, public participation in environmental protection as well as environmental impact assessments. Announcement of the Regional Director for Environmental Protection in Rzeszów of 22nd May 2013 ref.: WOOŚ.4233.24.2013.MG-72 on the submitted application and environmental impact report, along with information about conducting assessment of the impact of the Project on the environment, initiating proceeding, the object of the decision which is to be issued, an authority competent to issuing decisions and authority competent to issue opinions, possibilities of familiarizing with any necessary documentation case and place of providing it for inspection, possibilities and deadline for submission of comments, with observance of 21-day term of their submission and authority competent for their examination, were made public. It was placed on the bulletin board and on the website of the Regional Directorate for Environmental Protection in Rzeszów, on the bulletin board and on the website of the PZMiUW in Rzeszów as well as in the bulletin board and on the website of the Commune Office in Radomyśl nad Sanem and the Commune Office in Gorzyce, also in the area of implementation of the works.

During the conducted public participation, the authority did not receive any comments or conclusions associated with the concerned Project.

Before publication of this decision, the parties have been ensured on possibility of expressing opinions on the gathered evidence, in accordance with Article 10 of the Code of Administrative Proceedings by means of publishing Announcement of the authority dated 3rd July 2015 ref. : WOOŚ.4233.24.2013.MG-79 in the area of implementation of the Project, in the seat of PZMiUW, Office of the Communes Radomyśl nad Sanem and Gorzyce, as well as in the seat of the authority.

On 21.07.2015 Mr Wiesław Nowicki representing the Society for Nature Conservation [pol. *Ogólnopolskie Towarzystwo Ochrony Ptaków*, abbreviation: OTOP] got acquainted with the documentation on the project and then in the letter dated 30 July 2015 he submitted his comments and remarks.

Comment and remarks in the letter of the Society for Nature Conservation (dated 30 July 2015.) and the 'Klub Gaja' Ecological and Cultural Association [pol. *Stowarzyszenie*

Ekologiczno-Kulturalne Klub Gaja] (dated 6 November 2015) were partially the same and they were aimed to:

- a) impose an obligation onto the Investor to properly secure the water-side slope of the re-developed flood-protection embankment against damage by placing a mesh with appropriate parameters on it in order to protect the embankment structure against its dig-out by beavers, in particular during the occurrence of high water level in the inter-embankment.
- b) exclude the felling trees and shrubs under the discussed Investment beyond the demarcation lines of this investment; in particular, exclude the so-called "felling aimed to streamline the riverbed of large waters", specify the date of removal of trees and shrubs to be the period from 16 October to 15 February, and simultaneously exclude the so-called "earth reserve" for the Investment implementation to be collected from the area of the rivers inter-embankments,
- c) order to mount barriers or other obstacles (removable in a controlled manner) at the re-developed embankment passages at the Vistula river embankment section marked "Section I", in order to reduce the harmful impact of unauthorised entry into the *Wisła pod Zawichostem* ["Vistula at Zawichost"] Reserve, and provide access to the inter-embankment by owners of private lands located within the Investment area at the embanked Vistula river edge - if requested so (e.g. by providing them with keys to locks of the projected barriers) - also to be considered in the building permit,
- d) order the Investor to mark the boundaries of the *Wisła pod Zawichostem* ["Vistula at Zawichost"] Reserve in the Commune of Radomyśl nad Sanem by means of notice boards (35 pcs. - according to the Society for Nature Conservation), prior to starting to build the embankment, in accordance with NEPA.

Moreover, the above-mentioned letter by the Society for Nature Conservation also included the following demands to:

- a) exclude to build the so-called "green route" at the section located at the land plot no. 2 within Witkowice Precinct (Section I, Radomyśl nad Sanem) where it is to run at the *Wisła pod Zawichostem* ["Vistula at Zawichost"] Reserve,
- b) order special protection of two breeding habitats of Western marsh harrier (the bird listed in the Annex I of the Birds Directive) near the estuary of the Strachocka river, in particular by resignation from backfilling the reeds (oxbow lakes) where this bird nests and not to conduct any construction works within 50 metres from them in the period from 1 April to 31 July,
- c) order to mount the final number of 550 breeding boxes (including - 250 at the area of Section II - from the border with the city of Sandomierz up to the estuary of the San river and 300 in the southern part of the *Wisła pod Zawichostem* ["Vistula at Zawichost"] Re-

serve) under the supervision of an ornithologist, based on the sizing specified in the annex to the letter by the Society for Nature Conservation as well as on the websites of the 'Bocian' Natural History Society and/or the Society for Nature Conservation and/or USSURI Ltd. Co. till the completion of the project implementation - including:

- 250 pieces of boxes in Section II - on the right bank of the Vistula river between Sandomierz and the estuary of the San river (125 type "A", 110 type "B", 10 - for owls and/or mergansers and 5 - for hoopoe),
 - 300 pieces of boxes in Section I (the Commune of Radomyśl nad Sanem, also - the Commune of Dwikozy) - 130 type "A", 160 type "B", 10 - for owls and/or mergansers; these boxes are to be cleaned annually, old nests removed in the autumn-winter period (16 October - the end of February) within 10 years from their mounting within the discussed area, then monitored (also performed in the mentioned autumn-winter period) by an ornithologist for 6 years - starting from the 4th year upon these boxes are hung up; the location of the listed boxes outdoors should be stored in the GPS system,
- d) withdraw from the set-up of obligatory construction of 50 boxes (projected to be made and hung for bats for their daily stay) using sawdust - boxes made of wood should also be accepted,
- e) oblige the Investor to obtain all the permits relating to exemptions from the bans which are valid in the species protection of animals and plants in case of any projected destruction of habitats located within the Investment environmental impact.

Then the 'Klub Gaja' Ecological and Cultural Association [pol. *Stowarzyszenie Ekologiczno-Kulturalne Klub Gaja*] in its letter also requested that the maintenance of the redeveloped embankment, in particular based on its periodic mowing, is to be conducted not earlier than from mid-July every year.

These comments and remarks by the Society for Nature Conservation were provided to the PZMiUW in the letter dated 4 August 2015 (symbol: WOOS.4233.24.2013.MG.88, which responded by the letter dated 31 August 2015 (symbol: IM.403.55.12.2015).

As it is concluded from the above-specified letter, PZMiUW accepted the proposal of construction of boxes for bats also to be made of wood, dates of works near the estuary of the Strachocka river, and also excluded the construction of the green route at the land plot no. 2 road in the precinct of Witowice. PZMiUW informed further that within Section I it is planned to mount 14 barriers. The felling of trees and shrubs beyond the demarcation lines of this Investment will not be conducted; under the Investment implementation it is not planned to run the so-called "felling aimed to streamline the riverbed of large waters" or collect the so-called "earth reserve" from the rivers inter-embankments.

PZMiUW did not agree with the proposal to secure the water-side slope of the redeveloped flood-protection embankment against damage by placing a mesh on it in order to protect the embankment structure against its dig-out by beavers during the occurrence of high water level in the inter-embankment. Justifying its position PZMiUW stated that based on the so-far experience of the branch management of the Office in Tarnobrzeg it is concluded that within the area where the embankments are located, digging a temporary shelter by beavers has occurred only once - within Section II of the Vistula River embankments during the flood in 2010. A hole / burrow (approx. 1 m) to the depth of the barrier at the embankment water-side slope did not pose a threat to its stability and tightness. Analysing the technical solutions under the planned expansion of the embankments, in particular the anti-filtration barrier projected over the entire length of the embankment made of foil with its appropriate thickness as well as taking into account the fact that within the redeveloped sections there was no place where the embankments are in contact with the riverbeds PZMiUW concluded that it is not justified to secure the embankment using a steel mesh all over the water-side slope of the redeveloped embankments (and it significantly increase investment costs).

PZMiUW questioned the number (550) of boxes for birds specified in the letter by the Society for Nature Conservation (pol. TOP) pointing to the number of trees projected to be felled (373 with DBH over 20 cm) in which hollows could be found; PZMiUW also questioned the solution proposed in the submitted documentation to construct 186 nesting boxes, of which at least half should be hung in Section II where the felling is most intense. PZMiUW also upheld its proposal to clean boxes in the autumn-winter period of 5 years upon their hang-out indicating their average lifetime (several years on average). At the same time PZMiUW accepted the dimensions of these boxes indicated in the letter by the Society for Nature Conservation.

Taking into consideration slight interference into the *Wisła pod Zawichostem* ["Vistula at Zawichost"] Reserve, PZMiUW provides sufficient marking the boundaries of this reserve in a distinct / visible manner i.e. by its enclosure using a tape for the time when works are performed. PZMiUW also explains that works will be conducted under the environmental supervision (according to the EMP supervision of the Contractor's environmental team) and the contractor will be obliged to adhere not to infringe the boundaries of this reserve beyond the scope required to run the investment project.

The Investor will obtain all the necessary permits relating to exemptions from the bans in force in relation to the protected species of animals, plants and fungi, in case of having to violate any of these bans. This obligation stems directly from the law and it is not reasonable to mirror it in this Decision as a condition.

Prior to the issuance of the decision the parties were notified once again on their right to comment on the evidence gathered in accordance with Article 10 of the Code of administrative procedures the Notice of the Regional Director for Environmental Protection in Rzeszów dated 14 October 2015 (symbol: WOOŚ.4233.24.2013.MG.93). In connection with the above-specified Notice at RDOŚ Office none the parties of the proceedings did not get acquainted with the gathered documentation or submitted comments / remarks.

On 9 November 2015 RDOŚ received a request dated 6 November 2015 made by the 'Klub Gaja' Ecological and Cultural Association [pol. *Stowarzyszenie Ekologiczno-Kulturalne Klub Gaja*] represented by Mr. Paweł Grzybowski to take part in the pending proceedings as a party. The letter also contained some conclusions with a suggestion to insert them in the decision conditions. Through the notice dated 12 November 2015 (symbol: WOOŚ.4233.24.2013.MG.101) RDOŚ notified the parties of the proceedings on the accession of the above-specified Association into the proceedings as a party.

Through the letter dated 12 November 2015 (symbol: WOOŚ.4233.24.2013.MG.100) RDOŚ passed to PZMiUW the letter dated 6 November 2015 by the 'Klub Gaja' Ecological and Cultural Association which was then replied by PZMiUW through the letter dated 18 November 2015 (symbol: IM.403.55.17.2015) with additional information provided on the water-course riverbeds, ditches and their reinforcements. By letter dated 8 December 2015 (symbol: WOOŚ.4233.24.2013.MG.113) RDOŚ called upon to clarify the information contained in the above-specified letter, to which PZMiUW replied by the letter dated 27 January 2016 (symbol: IM.403.32.1.2016). Once again RDOŚ called upon to clarify the information contained in the supplement to the letter dated 18 February 2016 (symbol: WOOŚ.4233.24.2013.MG124), in response to which PZMiUW filed the supplement together with the letter dated 14 April 2016 (symbol: IM.403.32.2.2016).

By the letters dated 18 May 2016 (symbol: JRP.403.31.3.2016) and dated 25 May 2016 (symbol: JRP.403.31.4.2016), PZMiUW provided further clarifications on the Investment and its scope derived from the arrangements made in consultation with representatives of ecological organisations being parties to the the proceedings), with Mr. Wiesław Nowicki PhD representing the Society for Nature Conservation and the 'Klub Gaja' Ecological and Cultural Association.

PZMiUW has undertaken to:

- secure the embankment water-side slopes - using a mesh - against their damage by burrowing animals, including beavers,
- mount 280 nesting boxes for birds,

- monitor and clean 319 breeding boxes (apart from the ones hung under the considered Investment), also the ones found within the *Wisła pod Zawichostem* ["Vistula at Zawichost"] Reserve,
- mark - prior to the start of construction works - the area of the reserve with 35 plates made of galvanised sheet metal mounted on metal poles embedded into the ground in accordance with the Regulation of the Minister of Environment dated 10 December 2004 on the design of plates (Journal of Laws No. 268, item 2665),
- set up barriers at the embankment ramps in Section I (apart from the ramps at km 0+530 and 6+410) aimed to limit free entry into the inter-embankment but letting to enter (drive into) it by owners of land plots located at the inter-embankment,
- start mowing upon the completion of the embankments within Section I, not earlier than on June 15 (the water-side slope) and not earlier than on 1 July (the land-side slope).

The above findings are included in the environmental decision.

Once again, in the period from 14 June 2016 up to 4 July 2016, public participation was guaranteed in accordance with article 79 of the Act on the provision of information on environment and its protection, public participation in the environmental protection and environmental impact assessments. The Notice of the Regional Director for Environmental Protection in Rzeszów dated 6 June 2016 (symbol: WOŚ.4233.24.2013.MG.144) on the submitted application and the report on environmental impact assessment together with information on the participation in this environmental impact assessment, its initiation, decision to be issued, competent body to issue this decision and authority competent to issue appropriate opinion, grounds to get acquainted with all the documentation, place where it is made available, grounds and deadline for submitting comments, 21-day deadline for their submission and competent authority for their consideration is given to the public. It was placed in the following places: on the notice board and website of the Regional Directorate for Environmental Protection in Rzeszów, on the notice board and website of PZMiUW in Rzeszów, near the project implementation site, on the notice board and website of the Communal Office of Radomyśl nad Sanem and on the notice board and website of the Communal Office of Gorzyce.

During the conducted public participation no comments or requests related to the present project were submitted at RDOŚ.

Prior to the issuance of the environmental decision the parties were notified once again on their right to comment on the evidence gathered in accordance with article 10 of the Code of administrative procedures the Notice of the Regional Director for Environmental Protection in Rzeszów dated 12 July 2016 (symbol: WOŚ.4233.24.2013.MG.148). In connection with the

above-specified Notice at RDOŚ none the parties of the proceedings did not get acquainted with the gathered documentation or submitted comments / remarks.

8.2. PUBLIC CONSULTATIONS ON ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK (2015)

Upon providing a draft of “Environmental and Social Management Framework” (ESMF) on 19th February 2015, an electronic version of this document has been posted on the website of Podkarpacki Board of Amelioration and Hydraulic Structures in Rzeszów (www.pzmiuw.pl). A printed document has also been provided for review in the seat of this institution. ESMF draft has also been posted on the website of OVFM PCU (http://www.odrapcu.pl/en_popdow_dokumenty_RPZSiSS.html) and of the World Bank.

Detailed information about all aspects of these consultations are on the web site:

http://www.odrapcu.pl/doc/OVFMP/ESM_Annex_08_Public_disclosure_EAMF_reports.pdf

8.3. PUBLIC CONSULTATIONS ON EMP (2017)

The draft of this document is subject to the procedure of public consultations conducted in accordance with the operational policy of the World Bank OP 4.01.

After preparing of the draft of EMP and obtaining the consent of Bank its electronic version is made public on publicly available web pages, and paper version is provided for inspection to the parties concerned. The detailed information about the possibility to review of this document and the possibility to submit conclusions and comments (along with the indication of detailed contact data (e-mail address, address of the place where the document project is available, office hours, phone number) is provided to the general public in the local press and on web pages of PZMiUW. After the period of 10 days of the document publishing a meeting is organized for people concerned, during which there is a presentation of the Project and then a discussion concerning any issues relating to the EMP draft which was a subject to public consultation. At that meeting all of the submitted before (by e-mail, by phone, orally to the minutes) questions and comments are read out and answers are also provided. During the meeting participants' questions and comments are also collected. If an answer does require a lot of time, then the contact data of the person are recorded and the answer will be sent by e-mail or by mail within 7 days. Minutes from the meetings are drawn up and sent to the World Bank. Comments from the society, which require taking into account are introduced to the EMP document and its final version is prepared. In this form EMP is also sent to WB to gain the clause of acceptance of the so-called “no objection”.

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9. ORGANIZATIONAL STRUCTURE OF EMP IMPLEMENTATION

The Project including Works Contract 3B.2, being the subject of this EMP is a part of Odra-Vistula Flood Management Project co-financed from the funds of the World Bank, the Council of Europe Development Bank, the European Union and State budget. Therefore, the structure of supervision over implementation of EMP must correspond to both regulations of Polish law and the requirements of the World Bank.

9.1. ODRA-VISTULA FLOOD MANAGEMENT PROJECT COORDINATION UNIT

Project Coordination Unit (PCU) is responsible for the coordination of implementation individual EMPs within the OVFM Project. PCU belongs to budget units supervised by the President of the KZGW.

The PCU tasks in respect to implementation of this EMP are, as follows:

- cooperation with the Ministry of Finance, the Ministry of Interior Affairs and Administration, the Ministry of the Environment, the Ministry of Maritime Economy and Inland Navigation, the KZGW and other bodies of government and self-government administration connected with the Project implementation;
- coordination of activities of PIUs and supporting such units within EMP implementation;
- monitoring and assessment of the EMP implementation progress;
- ongoing cooperation with the World Bank, including the preparation of quarterly progress reports on the Project implementation.

9.2. PROJECT IMPLEMENTATION UNIT

An entity which is directly responsible for implementing EMP for the Project and monitoring the progress in its implementation is Project Implementation Unit (PIU) as a regional self-government agency (PZMiUW in Rzeszów).

PIU is a separated from PZMiUW organisational unit, subordinate supervised by the PZMiUW Director. PIU is responsible for the execution of the tasks of the Project. This structure is transparent and has a high decisive level which increases the effectiveness of the Project implementation.

As part of EMP implementation, PIU fulfils the following tasks:

- monitoring of the EMP implementation progress;
- financial management and bookkeeping;
- preparing required reports for the needs of EMP implementation monitoring and coordination of its execution by all services engaged into EMP implementation;

The scope of PIU employees' duties connected with the fulfilment of supervision over EMP implementation is as follows:

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

9.3. ENGINEER - CONSULTANT

The role of the Engineer is to support PIU in an effective conduct of the whole Works Contract process (from preparation of the Works Contract to its settlement).

The Engineer was appointed 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 Engineer Contract, Engineer will be obliged to perform among others the supervision over EMP implementation, comprising, i.a. the following:

- monitoring of EMP implementing by the Contractor;
- monitoring of the Contractor's activities;
- checking the quality of construction works and built-in construction products performed by the Contractor, preventing the usage of building materials which are defective and not accepted for use in the construction industry;
- representing PZMiUW in Rzeszów on Site by performing the control of the compliance of the construction process with the Works Contract and the Building Permit, regulations related to environment protection and technical know-how;
- supervision of all issues related to environmental protection by specialists experienced in the field of environmental protection and other Engineer's personnel;
- constant monitoring over proper execution of mitigation measures the adverse environmental impact;

- if necessary, conducting additional tests to verify the reports of the Contractor;
- identifying problems resulting from harmful environmental impact of implementing construction works and presentation of proposed solutions to these problems;
- verifying and acceptance of construction works being covered or temporary works, participation in tests and technical commissioning of technical installations and devices, as well as the preparation and participation in performing the commissioning activities or finished building and approving them for use;
- confirmation of the works actually completed and the removal of defects, as well as, at the request of the Employer, maintaining control of financial settlements of the Works Contract.

9.4. CONTRACTOR

The Contractor will be responsible for implementing the EMP. The Contractor' responsibilities within this scope are as follows:

- conducting construction works according to the rules specified in EMP, Works Contract conditions and design documentation pursuant to applicable legal provisions and requirements of administrative decisions issued for the Works Contract;
- involvement of the following specialists to implement the site-specific EMP: (i) a botanist, (ii) entomologist, (iii) chiropterologist, (iv) herpetologist and (v) ornithologist. Those specialists will be involved in the implementation of mitigation and monitoring measures;

Note: in accordance with the environmental decision it is acceptable to combine mentioned above maximum 2 functions by one person. Combination of functions will be subject to acceptance by the Engineer, the condition for acceptance is to demonstrate the appropriate knowledge and experience of the expert: supervision will be performed by specialists with higher education in the field of biology, forestry, environmental protection who has run at least two professional nature supervisions during investments in the field of ornithology / botany / herpetology, respectively.

- ensuring the permanent sapper and archeological supervision;
- carrying out the Engineer's recommendations (including the recommendations of experts from Engineer's environmental team and the Investor's supervision) concerning the implementation of EMP;
- ensuring the preparation of a Safety and Health Protection Plan, Waste management plan, Quality assurance plan/plans, The construction site's flood management plan for the time of the works and Building site organisation design;

- if it will be necessary, the Contractor's environmental team prepares necessary materials and requests for obtaining decisions for derogations from prohibitions of protection of species of plants, fungi or animals on the terms and in the mode specified by the NEPA (Act of 16 April 2004). The above-mentioned decisions issued by RDOŚ/GDOŚ are to be requested for by the Contractor. Contractor's duty will be to implement the provisions of obtained decisions for derogations from prohibitions of protection of species of plants, fungi and animals.
- keeping the construction site documentation;
- drafting monthly reports and technical inspection reports;
- preparing reports concerning environmental protection.

10. EMP IMPLEMENTATION SCHEDULE AND REPORTING PROCEDURES

Table 1. Preliminary schedule of additional mitigation measures concerning the restoring of the shelters and feeding sites, referred to in the environmental decision.

Item	Measure	Implementation period Authority responsible for implementation	Implementation year/half-year																	
			2018		2019		2020		2021		2022		2023		2024		2025		2026-2028	
			I ¹	II ²	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II
1	Preparing site work's programme	2 months Contractor																		
2	Execution of works / measures for the mitigation program	6 months/ environmental team - Contractor																		
3	Monitoring and yearly maintaining and cleaning of booths and boxes (in the case of bats' boxes 3 years after its hang out) and monitoring of poles and bushes	Implementation period of contracts for works Contractor																		
4	Monitoring and yearly cleaning of booths and boxes (in the case of bats' boxes 3 years after its hang out) and monitoring of poles and bushes	Defect Notification Period and Warranty Period Contractor																		
5	Monitoring and yearly maintaining and cleaning of nesting booths for birds (to 10 years after hang out of new booths and after works commencement in case of existing booths)	Once a year PZMiUW																		

¹ First half-year; ² Second half-year;

The implementation of EMP will allow the parties involved in the preparation, performance and supervision of Works Contract to:

- identify different environmental aspects which have a considerable impact on the state of the environment and therefore to control, correct, and reduce 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;
- determine the aims and tasks performed within the adopted environmental policy, covered by EMP, which require expenditure and bring tangible effects;

- identification and elimination of 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;
- reasonably use the nature's resources, with minimum environmental loss and the optimum generation of costs.

Furthermore, the implementation of recommendations and activities required by EMP may reduce or even eliminate risks involved in the Works Contract, in particular:

- a risk to ignore the environmental protection issues during the process of implementation of the Works Contract by Contractor;
- a risk of the 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 incurring additional losses in the environment.

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

- before the selection of the Contractor, the Contracting Authority will submit a draft of this EMP to the World Bank in order to obtain its opinion;
- EMP will be then subject to public consultations;
- after the public consultations (and supplementing the document with the consultations results), EMP will be submitted in its final version for the approval by the World Bank;
- upon the approval of EMP by the World Bank, a final document will be attached to the Bidding Documents for selection of the Contractor;
- all activities of the Contractor will be systematically reported (once a month), both in Polish and in English, in paper and electronic versions, with reference to the obligations required by EMP and other contractual documents. These documents will be subject to the approval of the Engineer and the Employer.

Furthermore, an environmental decision imposes an obligation of monitoring and reporting the Work Contract's environmental impact within the scope of environmental monitoring, which consists of (these obligations will be fulfilled by the Contractor):

- During the implementation of the Works Contract constant environmental supervision shall be ensured (according to the EMP the Contractor's environmental team).
- Constant monitoring and maintenance in good working order of all devices during operations shall be ensured.
- Prepare report containing information concerning the method and scope of the performance of mitigation measures, and also documents confirming the participation of specialists (e.g. memorandum of understanding and/or a declaration of a specialist confirming the proper performance of measures together with photographic documentation) should be submitted to the Regional Director for Environmental Protection in Rzeszów within 6 months from the date of works completion (according to the EMP the Contractor's environmental team).

Monitoring at the works execution stage involves the preparation of consolidated reports from 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 PIU. A detailed report scope shall be defined by the Engineer (commencement report, periodical report – monthly, ad-hoc, closure, to RDOŚ in Rzeszów); it shall also define the due dates.

The Project reporting system will also be based on monthly reports submitted by the Contractor to PIU by the Engineer and Engineer's monthly and quarterly reports. Monthly reports on EMP implementation (Contractor's or Engineer's) shall be prepared as part of monthly reports or a separate document. On this basis there will be consolidated, quarterly reports drawn-up.

PIU shall supply PCU with quarterly reports in the part referring to Works Contract implementation. They shall include a required set of information and descriptions enabling the preparation of the Project quarterly report by PCU. Furthermore, especially in the case of problems with the Works Contract implementation, the PCU shall expect PIU to submit the statements and data in the monthly periods.

The following reporting procedures are determined:

- 1) Reporting:
 - a) Reports (initial, monthly, ad-hoc, final, to RDOŚ in Rzeszów) drawn up by the Contractor,
 - b) Report review by the Engineer,
 - c) Submission of a report to the Employer (for information),

- d) Submission of a report to RDOŚ in Rzeszów (only within the scope required by the environmental decision i.e. within 6 months after works completion) – the Contractor after authorization by PIU,
- e) Submission of a PIU's quarterly report to PCU,
- f) Final report on implementation of the EMP prepared by the Engineer (after verification by the PIU and PCU submitted to the World Bank not later than 3 months after the completion of the works).

2) Archiving:

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

3) Evaluation – on-going assessment of the outcomes of the planned activities implementation which arise from EMP. Ongoing analysis of documentation (the Reports of the Contractor) by the Engineer. Providing the Employer with reliable information on the course of the construction process, including the fulfilment of activities limiting the adverse impact on the environment and recommendations arising from environmental decisions.

PCU shall also prepare quarterly reports on implementation of the EMP and submit them to the World Bank as part of the quarterly report for OVFMP.

The following is planned:

- *ex-ante* evaluation: Report prior to the commencement of the Works Contract execution for the works (Engineer's Report),
- ongoing evaluation: Engineer's quarterly reports,
- *ex-post* evaluation:
 - ✓ Report upon the completion of the works (within the scope required by the environmental decision for submission to the RDOŚ in Rzeszów prepared by the Contractor, supplemented and accepted by the Engineer).

- ✓ Report upon the completion of the works (EMP final report drawn up by the Engineer),
- ✓ EMP Report upon expiry of the Defects Notification Period drawn up by the Engineer.

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11. SOURCE MATERIALS

1. Environmental Impact Assessment Report for the Works Contract entitled: '*Vistula Stage 2 - Expansion of the right embankment of the Vistula river over a length of 13.959 km, the right embankment of the San river over a length of 2.193 km and the left embankment of the Łęg river over a length of 0.112 km, within the communes of Gorzyce and Radomyśl nad Sanem, the Podkarpackie Province*' - provided in May 2014 by the FPP Consulting Ltd., Wilcza 50/52, 00-679 Warszawa. (author's team: Marzena Zblewska, Emilia Olkowska, Katarzyna Semaniuk, Wojciech Ciurzycki, Rafał Cieślak, Jan Kusznieryz, Piotr Tarasiuk, Maciej Arciszewski, Wojciech Czerniak, Michał Jantarski, Janusz Hejduk, Karol Szymankiewicz, Marta Wronka-Tomulewicz).
2. Supplementation of the Report of Environmental Impact Assessment of the Works Contract covering the documents from: February 2015, April 2015, January 2016, March 2016.
3. Natural inventory for Works Contract '*Vistula Stage 2 - Expansion of the right embankment of the Vistula river over a length of 13.959 km, the right embankment of the San river over a length of 2.193 km and the left embankment of the Łęg river over a length of 0.112 km, within the communes of Gorzyce and Radomyśl nad Sanem, the Podkarpackie Province*', May 2014
4. Decision on environmental conditions dated 07.09.2016 (ref. no. WOOŚ.4233.24.2013.MG.157) for the concerned Works Contract '*Vistula Stage 2 - Expansion of the right embankment of the Vistula river over a length of 13.959 km, the right embankment of the San river over a length of 2.193 km and the left embankment of the Łęg river over a length of 0.112 km, within the communes of Gorzyce and Radomyśl nad Sanem, the Podkarpackie Province*', issued by RDOŚ in Rzeszów,
5. Construction project for the task '*Vistula Stage 2 - Expansion of the right embankment of the Vistula river over a length of 13.959 km, the right embankment of the San river over a length of 2.193 km and the left embankment of the Łęg river over a length of 0.112 km, within the communes of Gorzyce and Radomyśl nad Sanem, the Podkarpackie Province*' Section I, Section SAN, Section II and Section III, INFOKOSZT Piotr Montewski, November 2016.
6. Characteristics of Task Planned for Execution within the Odra-Vistula Flood Management Project, Document Prepared by PZMiUW in Rzeszów.
7. World Bank Operational Policy OP 4.01 – Environmental Assessment (<http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/EXTPOLICIES/EXTOPMAN>)

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8. Environmental and Social Management Framework, final document, April 2015
(http://www.odrapcu.pl/doc/OVFMP/Ramowy_Plan_Zarz%C4%85dzania_Srodowiskiem_i_Spo%C5%82eczenstwem.pdf)
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. Website: http://www.odrapcu.pl/popdow_dokumenty.html.
11. Website: www.isok.gov.pl/.

APPENDICES

- Appendix 1. Plan of mitigation measures**
- Appendix 2. Plan of monitoring measures**
- Appendix 3. List of national legal acts related to environment protection**
- Appendix 4. Environmental Decision (a) together with supplementary letter of RDOS dated 23.05.2017 (b) and a letter from the Provincial Office for the Preservation of Monuments (c)**
- Appendix 5. Drawing showing the location of Works Contract**
- Appendix 6. Location map of the Works Contract on the background of designated areas and Natura 2000 network**
- Appendix 7. Drawing showing the location of the Works Contract on the potential flood risk areas (presentation of detailed maps in electronic version on CD)**
- Appendix 8. Drawing showing the location of the Works Contract on the areas excluded from potential flood risk (presentation of detailed maps in electronic version on CD)**