ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

Appendix 13.6 Biodiversity Management Plan

DRAFT VERSION

Contract 5.10.1. Construction of the Kamieniec Ząbkowicki Reservoir - Preparation of design documentation, including obtaining administrative permits and the provision of Author's Supervision, as well as the preparation of bidding documents necessary to select a Contractor for future works under the future Poland's Building Climate Resilience in Water Management Project

Wrocław, October 2026

This document is preliminary in nature and was prepared based on ongoing working analyses conducted for the purposes of the EIA report. The information and conclusions contained herein are subject to change upon completion of the EIA report. This document does not constitute an environmental impact report within the meaning of Section V of Chapter 2 of the Act of October 3, 2008, on Access to Information on the Environment and Its Protection, Public Participation in Environmental Protection, and Environmental Impact Assessments (hereinafter: "the EIA Act").

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1. Introduction

This Biodiversity Management Plan (BMP) was developed for the Task involving the construction of a retention reservoir / storage reservoir on the Nysa Kłodzka River in the Kamieniec Ząbkowicki area. The document identifies natural habitats and species of special conservation importance occurring within the project area, identifies threats to biodiversity resulting from the planned works, and presents measures aimed at avoiding, minimizing, and, if necessary, offsetting these threats, in accordance with the adopted hierarchy of mitigation measures.

The BMP also defines the principles of environmental monitoring during the construction and operation phases of the Task, the roles and responsibilities of the parties involved in its implementation, and the method for reporting results. This document is prepared as part of the environmental impact assessment for the planned Task and forms part of the broader environmental and social documentation for the Project, prepared in accordance with national requirements and the World Bank's environmental and social standards.

This BMP is being prepared during the Task's planning phase and is a working document. The findings presented herein—including the proposed conservation and offset measures and the methods for their implementation and monitoring—may be subject to change as project designs are refined, administrative procedures progress, and further determinations are made. The document will be updated during subsequent stages of the task's preparation and implementation to ensure that it reflects the current state of environmental knowledge and the adopted solutions on an ongoing basis.

1.1. Biodiversity in the Project Area

This document presents a description of the biodiversity identified within the investment area, based on available data, the results of natural resource inventories, and other source materials used for the environmental impact assessment of the project. This chapter covers only those plant, fungus, and animal species, as well as natural habitat, whose presence has been confirmed within the boundaries of the project area or within its direct impact area. The chapter also includes an analysis of other elements relevant to biodiversity conservation, including, in particular, information on the Task's location in relation to protected areas, Natura 2000 sites, ecological corridors / wildlife corridors, valuable landscape features, sensitive habitats, and other forms or elements of the environment that may be significant for the conservation of biological diversity at the local and regional levels. In the list below, key species are defined as those legally protected in Poland and/or those that are rare and endangered.

1.1.1. Protected Areas

According to the information contained in the ESIA, there are essentially no nature conservation areas within the boundaries of the Task site (except for a small portion of the Bardzkie and Sowie Mountains Protected Landscape Area). However, the task area does contain natural monuments, including five specimens of English oak (*Quercus robur)* that are individually protected. The table below presents a summary of designated nature conservation areas in the vicinity of the project.

Table 1 Legally Protected Areas within 5 km of the Project Site

Type and name of the area	Legal basis	Distance (up to 5 km)
Bardzkie and Sowie Mountains Protected Landscape Area (Obszar Chronionego Krajobrazu Góry Bardzkie i Sowie)	Regulation No. 25 of the Lower Silesian Province Governor dated November 28, 2008, on the Bardzkie and Sowie Mountains Protected Landscape Area (Official Journal of the Lower Silesian Province, 2008, No. 317, item 3924)	Approx. 500 m
Bardzkie Mountains Natura 2000 site (PLH020062) (Obszar Natura 2000 Góry Bardzkie)	Regulation of the Minister of Climate and Environment dated September 2, 2021, regarding the Special Area of Conservation for the Bardzkie Mountains (PLH020062) (Official Journal of 2021, item 1792)	Approx. 150 m
Śnieżnicki Landscape Park (Śnieżnicki Park Krajobrazowy) and its buffer zone	Regulation No. 6 of the Lower Silesian Province Governor dated February 27, 2008, on the Śnieżnicki Landscape Park (Official Journal of the Lower Silesian Province, 2008, No. 63, item 809)	Approx. 2.9 km
Obryw Skalny Nature and Landscape Complex (Zespół Przyrodniczo-Krajobrazowy Obryw Skalny)	Resolution No. XXXVI/271/2006 of the Bardo City Council dated September 27, 2006, on the establishment of a nature and landscape complex	Approx. 800 m
The Nysa Kłodzka Gorge near Morzyszów (PLH020043) (Przełom Nysy Kłodzkiej koło Morzyszowa)	Commission Decision of December 12, 2008, adopting, pursuant to Council Directive 92/43/EEC, the second updated list of sites of Community importance comprising the continental biogeographic region (notified as document No. C(2008) 8039) (2009/93/EC)	Approx. 3.2 km

1.1.2. Natural habitats

Six types of natural habitats meeting the criteria for natural habitats were identified within the Task's buffer zone.

Table 2 Summary of key natural habitats located within the Project area and its area of influence

Habitat name	Natura 2000 habitat code	Red List Status
Central European and Subcontinental Oak-Hornbeam Forest	9170	LCA
Willow, poplar, alder, and ash riparian forests	91E0	VU
Sycamore and maple-linden forests on steep slopes and hillsides	9180	NT
Extensively managed lowland and mountain fresh meadows	6510	VU
Variably moist moor grass meadows	6410	VU
Rock faces and siliceous cliffs with communities of *the Androsacetalia vandelli*	8220	VU

1.1.3. Flora

Table 3 List of key flora species found within the Task area and the area affected by the Task

No.	Scientific name	Family	IUCN Status
Vascular plants			
1.	*Allium ursinum*	*Amaryllidaceae*	LC
2.	*Allium angulosum*	*Amaryllidaceae*	LC
3.	*Aruncus sylvestris*	*Rosaceae*	NA
4.	*Carlina acaulis*	*Asteraceae*	NA
5.	*Centaurium erythraea*	*Gentianaceae*	LC
6.	*Colchicum autumnale*	*Colchicaceae*	LC
7.	*Daphne mezereum*	*Thymelaeaceae*	LC
8.	*Galanthus nivalis*	*Amaryllidaceae*	LC
9.	*Lilium martagon*	*Liliaceae*	LC
10.	*Matteuccia struthiopteris*	*Onocleaceae*	LC
11.	*Primula elatior*	*Primulaceae*	LC
12.	*Batrachium fluitans*	*Ranunculaceae*	NE
Mosses and liverworts			
13.	*Frullania dilatata*	*Frullaniaceae*	LC
14.	*Ulota crispa*	*Orthotrichaceae*	LC
15.	*Anomodon attenuatus*	*Anomodontaceae*	LCA
16.	*Calliergonella cuspidata*	*Pylaisiaceae*	LC
17.	*Climacium dendroides*	*Climaciaceae*	LC
18.	*Dicranum polysetum*	*Dicranaceae*	LC
19.	*Eurhynchium striatum*	*Brachytheciaceae*	LC
20.	*Hylocomium splendens*	*Hylocomiaceae*	LC
21.	*Rhytidiadelphus triquetrus*	*Hylocomiaceae*	LC

No.	Scientific name	Family	IUCN Status
22.	*Rhytidiadelphus squarrosus*	*Hylocomiaceae*	LC
23.	*Thuidium tamariscinum*	*Thuidiaceae*	LCA
24.	*Dicranum scoparium*	*Dicranaceae*	LCA
25.	*Pseudoscleropodium purum*	*Brachytheciaceae*	LCA
26.	*Homalia trichomanoides*	*Neckeraceae*	LCA

1.1.4. Fungi and Lichens

Table 4 List of key fungal and lichen species found within the Task area and the area affected by the Task

No.	Scientific name	Family	IUCN/National Status
Fungi			
1.	*Fistulina hepatica*	Incertae sedis	NE/NT
2.	*Inonotus obliquus*	Hymenochaetaceae	LC/LC
Lichens			
3.	Punctelia subrudecta	*Parmeliaceae*	NE/VU

1.1.5. Wildlife / Fauna

Table 5 Summary of key species of fauna found within the Task area and the area affected by the Task

No.	Scientific name	Family	IUCN/National Status
Mammals			
1.	*Sorex minutus*	Soricidae	LC/NE
2.	*Lutra lutra*	Mustelidae	NT/NE
3.	*Castor fiber*	Castoridae	LC/NE
4.	*Canis lupus*	Canidae	LC/LC
5.	*Crocidura suaveolens*	Soricidae	LC/NE
6.	*Mustela nivalis*	Mustelidae	LC/NE
7.	*Sciurus vulgaris*	Sciuridae	LC/NE
8.	*Talpa europaea*	Talpidae	LC/NE
9.	*Cnapheus serotinus*	Vespertilionidae	LC/NE
10.	*Myotis brandtii*	Vespertilionidae	LC/NE
11.	*Myotis mystacinus*	Vespertilionidae	LC/NE
12.	*Nyctalus noctula*	Vespertilionidae	LC/NE
13.	*Pipistrellus nathusii*	Vespertilionidae	LC/NE
14.	*Pipistrellus pipistrellus*	Vespertilionidae	LC/NE
15.	*Pipistrellus pygmaeus*	Vespertilionidae	LC/NE
16.	*Mouse-eared bat*	Vespertilionidae	LC/LC
17.	*Leisler's bat*	Vespertilionidae	LC/LC
18.	*Myotis daubentonii*	Vespertilionidae	LC/NE
19.	*Barbastella barbastellus*	Vespertilionidae	VU/NT
Amphibians			
20.	*Triturus cristatus*	Salamandridae	LC/LC
21.	*Hyla arborea*	Hylidae	LC/LC
22.	*Bufotes viridis*	Bufonidae	LC/NE

No.	Scientific name	Family	IUCN/National Status
23.	*Bufo bufo*	Bufonidae	LC/NE
24.	*Lissotriton vulgaris*	Salamandridae	LC/NE
25.	*Pelophylax esculentus*	Ranidae	LC/LC
26.	*Pelophylax ribindus*	Ranidae	LC/NE
27.	*Rana temporaria*	Ranidae	LC/NE
Reptiles			
28.	*Coronella austriaca*	Colubridae	NT/VU
29.	*Lacerta agilis*	Lacertidae	LC/NE
30.	*Anguis fragilis*	Anguidae	LC/NE
31.	*Natrix natrix*	Colubridae	LC/NE
32.	*Zootoca vivipara*	Lacertidae	LC/NE
Bird Fauna			
33.	*Corvus corax*	Corvidae	LC/LC
34.	*Dryocopus martius*	Picidae	LC/LC
35.	*Dendrocoptes medius*	Picidae	LC/LC
36.	*Alcedo atthis*	Alcedinidae	LC/LC
37.	*Buteo buteo*	Accipitridae	LC/LC
38.	*Mergus merganser*	Anatidae	LC/LC
39.	*Accipiter gentilis*	Accipitridae	LC/LC
40.	*Haliaeetus albicilla*	Accipitridae	LC/LC
41.	*Poecile palustris*	Paridae	LC/LC
42.	*Poecile montanus*	Paridae	LC/LC
43.	*Falco tinnunculus*	Falconidae	LC/LC
44.	*Lesser Pygmy Woodpecker*	Picidae	LC/LC
45.	*Penduline Tit*	Remizidae	LC/LC
46.	*Vanellus vanellus*	Charadriidae	VU/EN
47.	*Podiceps cristatus*	Podicipedidae	LC/LC
48.	*Milvus milvus*	Accipitridae	LC/LC
49.	*Mareca strepera*	Anatidae	LC/LC
50.	*Cygnus olor*	Anatidae	LC/LC
51.	*Picus viridis*	Picidae	LC/LC
52.	*Prunella modularis*	Prunellidae	LC/LC
53.	*Circus aeruginosus*	Accipitridae	LC/LC
54.	*Riparia riparia*	Hirundinidae	LC/LC
55.	*Grus grus*	Gruidae	LC/LC
56.	*Motacilla cinerea*	Motacillidae	LC/LC
57.	*Picus canus*	Picidae	LC/LC
58.	*Strix aluco*	Strigidae	LC/LC
59.	*Chroicocephalus ridibundus*	Laridae	LC/LC
60.	*Accipiter nisus*	Accipitridae	LC/LC
61.	*Asio otus*	Strigidae	LC/LC
62.	*Saxicola torquatus*	Muscicapidae	LC/LC
63.	*Larus cachinnans*	Laridae	LC/LC
64.	*Lanius excubitor*	Laniidae	LC/LC
65.	*Recurvirostra avosetta*	Recurvirostridae	LC/NE
66.	*Tringa ochropus*	Scolopacidae	LC/LC
67.	*Tadorna tadorna*	Anatidae	LC/VU

No.	Scientific name	Family	IUCN/National Status
68.	*Charadrius dubius*	Charadriidae	LC/LC
69.	*Columba oenas*	Columbidae	LC/LC
70.	*White-throated Flycatcher*	Muscicapidae	LC/LC
71.	*Luscinia megarhynchos*	Muscicapidae	LC/LC
72.	*Actitis hypoleucos*	Scolopacidae	LC/LC
73.	*Lullula arborea*	Alaudidae	LC/LC
74.	*Tringa totanus*	Scolopacidae	VU/NT
75.	*Cuculus canorus*	Cuculidae	LC/LC
76.	*Locustella luscinioides*	Locustellidae	LC/LC
77.	*Acrocephalus arundinaceus*	Acrocephalidae	LC/LC
78.	*Streptopelia turtur*	Columbidae	VU/VU
79.	*Curruca communis*	Sylviidae	LC/LC
80.	*Nine-striped Warbler*	Sylviidae	LC/LC
81.	*Wryneck*	Picidae	LC/LC
82.	*Gallinula chloropus*	Rallidae	LC/LC
83.	*Sterna hirundo*	Laridae	LC/LC
84.	*Spotted Grass Warbler*	Locustellidae	LC/LC
85.	*Yellow-breasted Warbler*	Acrocephalidae	LC/LC
86.	*Lanius collurio*	Laniidae	LC/LC
87.	*Aythya fuligula*	Anatidae	NT/NT
88.	*Locustella fluviatilis*	Locustellidae	LC/LC
89.	*Turdus philomelos*	Turdidae	LC/LC
90.	*Sternula albifrons*	Laridae	LC/VU
91.	*Carpodacus erythrinus*	Fringillidae	LC/LC
92.	*Merops apiaster*	Metopidae	LC/LC
93.	*Ixobrychus minutus*	Ardeidae	LC/DD
94.	*Oenanthe oenanthe*	Muscicapidae	LC/LC
95.	*Hirundo rustica*	Hirundinidae	LC/LC
96.	*Bucephala clangula*	Anatidae	LC/LC
97.	*Pyrrhula pyrrhula*	Fringillidae	LC/LC
98.	*Coccothraustes coccothraustes*	Fringillidae	LC/LC
99.	*Turdus merula*	Turdidae	LC/NE
100.	*Turdus pilaris*	Turdidae	LC/LC
101.	*Cygnus cygnus*	Anatidae	LC/NT
102.	*Cygnus olor*	Anatidae	LC/LC
103.	*Linaria cannabina*	Fringillidae	LC/LC
104.	*Larus melanocephalus*	Laridae	LC/EN
105.	*Ficedula parva*	Muscicapidae	LC/LC
106.	*Musciapa striata*	Muscicapidae	LC/LC
107.	*Tachybaptus ruficollis*	Podicipedidae	LC/LC
108.	*Motacilla alba*	Motacillidae	LC/LC
109.	*Cinclus cinclus*	Cinclidae	LC/LC
110.	*Emberiza calandra*	Emberizidae	LC/LC
111.	*Emberiza schoeniclus*	Emberizidae	LC/LC
112.	*Coturnix coturnix*	Phasianidae	NT/VU
113.	*Aegithalos caudatus*	Aegithalidae	LC/LC

No.	Scientific name	Family	IUCN/National Status
114.	*Erithacus rubecula*	Muscicapidae	LC/LC
115.	*Scolopax rusticola*	Scolopacidae	LC/LC
116.	*Garrulus glandarius*	Corvidae	LC/LC
117.	*Troglodytes troglodytes*	Troglodytidae	LC/LC
118.	*Carduelis carduelis*	Fringillidae	LC/LC
119.	*Sturnus vulgaris*	Sturnidae	LC/LC
120.	*Anthus pratensis*	Motacillidae	LC/LC
121.	*Oriolus oriolus*	Oriolidae	LC/LC
122.	*Corvus corone*	Corvidae	LC/LC
123.	*Fringilla coelebs*	Fringillidae	LC/LC
124.	*Regulus ignicapilla*	Regulidae	LC/LC
Ichthyofauna / fish fauna			
125.	*Barbatula barbatula*	Balitoridae	LC/NE
126.	*Lampetra planeri*	Petromyzontidae	NT/VU
127.	*Aspius aspius*	Cyprinidae	LC/LCA
128.	*Rhodeus amarus*	Cyprinidae	LC/VU
Invertebrates			
129.	*Osmoderma eremita*	Scarabaeidae	NT/VU
130.	*Anodonta cygnea*	Unionidae	VU/EN
131.	*Mantis religiosa*	Mantidae	LCA/EN
132.	*Formica rufa*	Formicidae	NT/NE
133.	*Bombus terrestris*	Apidae	LC/NE
134.	*Bombus lapidarius*	Apidae	LC/NE
135.	*Bombus pratorum*	Apidae	LC/NE
136.	*Bombus lucorum*	Apidae	LC/NE
137.	*Bombus hypnorum*	Apidae	LC/NE
138.	*Bombus pascuorum*	Apidae	LC/NE
139.	*Bombus ruderarius*	Apidae	LC/NE
140.	*Protaetia speciosissima*	Scarabaeidae	LC/NE
141.	*Phengaris nausithous*	Lycaenidae	NT/LC+NT
142.	*Lycaena dispar*	Lycaenidae	LC/LC+NT
143.	*Protaetia speciosissima*	Scarabaeidae	LC/NA
144.	*Vertigo moulinsiana*	Vertiginidae	VU/CR
145.	*Helix pomatia*	Helicidae	LC/NA

1.2. Identification of Threats to Biodiversity in the Task Area

1.2.1. Existing Threats

Before proceeding with the impact analysis of the planned hydrotechnical infrastructure, it is essential to precisely identify the environmental baseline and the natural pressures existing in the Task Area, independent of the investment itself. Identifying existing degrading factors allows for the proper construction of a baseline scenario, the differentiation of existing trends from the impact of construction work, and the planning of effective compensatory and remedial measures.

The Nysa Kłodzka catchment area, as an area of high landscape and natural value, is characterized by a mosaic of riverine, riparian, and mountain habitats, which are simultaneously subject to constant anthropogenic pressure and variable hydrological conditions. The table below presents the threats to biodiversity present in the area of the planned Task in its baseline state.

Table 6 Identification of threats to biodiversity in the area of the planned Project

Threat Category	Threat Name	Description	Probability of occurrence/pressure
Anthropogenic pressure	Illegal logging and forest fragmentation	Removal of tree stands in the river channel zone and unsustainable forest management, leading to the disappearance of ecological / wildlife corridors along the river.	Low
	Poaching and illegal fishing	Harvesting fish fauna without permits and the use of prohibited fishing gear	High
	Illegal landfills	Dumping of municipal and construction waste in the immediate vicinity of watercourses, which causes soil and water contamination and poses a threat to microfauna and birds	High
	Agricultural pressure	The use of synthetic fertilizers, manure, and plant protection products on adjacent farmland; the plowing of buffer zones; the burning of meadows; and the runoff of agricultural chemicals. These activities cause soil eutrophication, a decline in meadow species diversity, and the destruction of forest edges	High
Hydrological threats and water quality	Dispersed-source run-off from agricultural lands into water bodies	Introduction of nutrients and plant protection products from intensively farmed fields in the catchment area / directly into the river channel, resulting in water eutrophication	High
	Point-source pollution from untreated wastewater	Discharge of domestic wastewater from households not connected to the sewer system or illegal discharge of industrial wastewater, which degrades the physicochemical parameters of the water	Low
	Historical river channel fragmentation	Presence of existing weirs, steps, and control structures that permanently block the river's morphological continuity and hinder fish migration	High
Alien and invasive species (AIS)	Expansion of invasive plant species	Abundant occurrence of non-native and invasive species, particularly those of the genera *Reynoutria* and *Impatiens*	High
	Occurrence of alien animal species		High

Threat Category	Threat Name	Description	Probability of occurrence/pressure
Climate change and natural hazards	Abnormal droughts and low water levels	Occurrence of prolonged low-flow conditions during the summer, leading to the drying up of tributaries, increased water temperatures, and mortality of aquatic organisms	High
	Fires in wastelands and forested areas	Intentional or accidental fires	Moderate
	Flash floods and torrential rainfall	Occurrence of violent, torrential rainfall leading to sudden flood waves, bottom and lateral channel erosion, destruction of nests, uprooting of trees, and destruction of animal habitats	High
Socio-ecological conflicts	Unsanctioned use of valley resources	Collection of firewood, unregulated tourism, and uncontrolled off-road vehicle traffic, which disturb wildlife and destroy the soil cover.	High

1.2.2. Risks arising from the implementation and operation of the Task

Assessing the impact of the planned hydrotechnical infrastructure on the natural environment also requires identifying risk factors that arise at each stage of the project. Unlike the risks present in the baseline condition, the risks associated with the construction and subsequent operation of a flood control reservoir stem directly from the planned construction and installation work, geomorphological changes, and alterations to the river's hydrological regime. According to ESS6, proper identification of these pressures forms the foundation for implementing the mitigation hierarchy. In the Nysa Kłodzka river basin—an area characterized by dynamic hydrography and high habitat sensitivity—the construction phase is primarily associated with temporary land alterations, noise, and pollution risks, while the operational phase introduces permanent changes to the structure of the river-valley ecosystem. The table below presents a proposed catalog of risks resulting from the implementation and operation of the Task.

Table 7 Proposed list of risks resulting from the implementation and operation of the Task

Project Phase	Risk Category	Hazard Name	Description	Environmental Impact
Implementation Phase	Habitat loss and alteration	Direct deforestation and soil stripping	Permanent habitat loss within the reservoir basin and temporary habitat loss in the construction site area	High
	Physical Disturbances and Disturbance	Disturbance of fauna by noise, vibrations, and light	Operation of heavy equipment, transport of materials, and lighting of the construction site, leading to the disturbance of breeding birds and mammals and disruption of migration routes	Moderate
	Air and acoustic environment	Dust and exhaust emissions	Transportation of earth, machine operation, material crushing, and drying of exposed surfaces may cause local dust and exhaust emissions.	Moderate
	Wildlife mortality	Direct mortality of animals during construction	Machinery traffic, excavation, topsoil removal, tree cutting, and work in the riverbed may result in the death of amphibians, reptiles, small mammals, invertebrates, and juvenile birds.	Moderate
	Conflicts with animal life cycles	Destruction of breeding sites, wintering grounds, and shelters	Work carried out during the birds' breeding season, amphibian migration, fish spawning, or bat hibernation may result in reduced reproductive success and a local decline in population size.	High
	Hydrological and water quality threats	Increased water turbidity and siltation of the river channel	Conducting earthworks in the river channel and floodplains, causing the release of suspended solids and the silting up of the gravel bed	High
		Temporary disruption of flow during river channel realignment or construction of temporary structures	The construction of cofferdams, bypass channels, temporary culverts, or drainage systems may restrict biological flow, cause localized drying of the riverbed, or concentrate the flow.	High
	Chemical contamination	Risk of petroleum product spills	Construction equipment failures or spills of fuels and lubricants into water and soil.	High
		Water pollution from wastewater and stormwater runoff from the construction site	Runoff from construction support areas, refueling stations, equipment washing areas, and material and waste storage areas may cause suspended solids, nutrients, or chemicals to enter the river.	Moderate

Project Phase	Risk Category	Hazard Name	Description	Environmental Impact
	Waste and excavated material	Improper management of waste and excavated material	Storing excavated soil, construction waste, tree stumps, brush, and demolition materials outside designated areas can lead to soil, water, and habitat contamination.	Moderate
	Alien and Invasive Species (IAS)	Spread of invasive species	The spread of seeds and rhizomes of invasive plants on machine tires and via imported or exported soil, leading to secondary invasions on exposed surfaces and uncontrolled spread to other areas.	High
	Soils and Land Surface	Soil degradation and compaction	The movement of heavy equipment, the storage of materials, and temporary access roads can cause soil compaction, sealing, and erosion, as well as a reduction in soil biological functions.	Low
Operational phase	Ecosystem fragmentation	Permanent barrier to the migration of ichthyofauna and aquatic wildlife	A reservoir dam that disrupts the river's longitudinal continuity and blocks the migration of migratory species	High
	Hydrological changes	Disruption of flow regimes and sediment transport	Trapping of sediment / fluvial sediment by the reservoir, intensification of down-cut erosion downstream of the dam, alteration of natural flow variability	High
	Water quality	Eutrophication and cyanobacterial blooms	Constant impoundment, increased water retention time, inflow of nutrients from the catchment area, and water warming may promote algal and cyanobacterial blooms, deterioration of water quality, and periodic oxygen deficits.	High
		Thermal stratification and oxygen deficits	In the deeper parts of a wet reservoir, thermal stratification may occur, leading to a decrease in oxygen content near the bottom and the release of nutrients from bottom sediments.	Moderate
	Ecosystem transformation	Change in habitat characteristics	Permanent change in environmental conditions in the reservoir basin—disappearance of current-loving species in favor of stagnant-water species	High
		Thermal Changes	Water discharge from a reservoir, especially from a specific depth, can	Low

Project Phase	Risk Category	Hazard Name	Description	Environmental Impact
			alter the natural thermal regime of the river downstream of the dam, affecting fish, invertebrates, and biological processes	
	Wildlife mortality	Fish mortality at spillways and hydroelectric power plants	Mechanical damage to fish passing through spillways, overflow structures, or turbines at a reservoir-based power plant.	High
	Riparian habitats	Destruction of the littoral zone due to water level fluctuations	Changes in impoundment water levels can cause periodic flooding or drying out of the riparian zone, destroying reed beds, spawning grounds, amphibian breeding sites, and bird nests	Moderate
	Geomorphological processes	Erosion of reservoir banks	Waves, water level fluctuations, and slope failures can lead to shoreline abrasion, increased turbidity, and the loss of riparian habitats.	Low
	Bottom sediments	Accumulation of contaminated sediments	The reservoir may retain sediment and pollutants associated with fine-grained material, including heavy metals, petroleum-derived substances, or nutrients, which can degrade the condition of bottom sediments	High
	Flood control capacity	Gradual siltation of the reservoir	Long-term accumulation of fluvial sediment may reduce the retention reservoir's storage capacity, alter habitat conditions, and necessitate periodic dredging.	Moderate
	Maintenance work	Impacts associated with dredging and maintenance	Sediment removal, vegetation clearing, and repairs to reinforcements and hydrotechnical structures may cause turbidity, noise, disturbance of wildlife, and temporary habitat destruction.	Low
	Groundwater and Soil	Flooding and changes in water conditions near the reservoir	Permanent impoundment may cause a rise in the groundwater table, the swamping of adjacent areas, or changes in habitat conditions in meadows, agricultural lands, and forests.	Moderate
	Alien and invasive species — IAS	Spread of non-native and invasive species	The reservoir may create favorable conditions for the expansion of non-native aquatic plant species, fish, mussels, or crayfish, which may displace native species.	High

Project Phase	Risk Category	Hazard Name	Description	Environmental Impact
	Avifauna	Conflicts and changes in habitat use by birds	A new body of water may attract waterfowl, but at the same time cause habitat loss for species associated with river valleys, floodplain meadows, or riparian thickets.	Moderate
	Ecological safety	Risk of sudden water releases	Flood or operational releases may cause sudden changes in flow downstream of the dam, washing away benthic organisms, destroying spawning grounds, and flooding riparian habitats.	High
	Local climate and emissions	Greenhouse gas emissions from sediments and biomass	The decomposition of submerged organic matter and bottom sediments under oxygen-deficient conditions can lead to emissions of methane and carbon dioxide, particularly during the initial operating period of the reservoir.	Moderate
	Anthropogenic pressure	Increased land use and recreation	Access to the water body may increase human traffic, noise, littering, bird disturbance, and pressure on the riparian zone.	High

2. Measures to Mitigate the Task's Negative Environmental Impacts

In accordance with the requirements of the ESS6 environmental and social standard regarding the protection of biodiversity, natural resources, and the sustainable management of living natural resources, a number of feasible mitigation measures have been proposed for the planned Task. Their aim is to achieve no net loss, and preferably a net gain, of biodiversity, particularly on natural habitats, plant, animal, and fungal species, the ecological continuity of watercourses, water quality, and the functioning of water-dependent ecosystems.

The proposed measures have been defined in accordance with the hierarchy of mitigation measures adopted in the standard: first, avoiding negative impacts, followed by their minimization, then the restoration or rehabilitation of environmental elements that have been altered, and, in the case of impacts that cannot be completely eliminated, the implementation of appropriate compensatory measures.

The measures presented in this chapter constitute a catalog of measures that can be applied during the preparation, implementation, and operation phases of the Task. Their implementation should be adapted in each case to the final design solutions, the work

schedule, the results of detailed environmental inventories, and the conditions specified in administrative decisions and the Task's environmental documentation. The purpose of the proposed measures is to reduce the risk of natural habitat loss or degradation, alleviate pressure on protected and environmentally valuable species, maintain the highest possible ecosystem functionality, and ensure the Task's compliance with ESS6 requirements.

2.1. Avoidance

Table 8 Proposed Mitigation Measures – Avoidance

Phase Tasks	Hazard Name	Proposed Measures
IMPLEMENTATION PHASE	Direct deforestation and soil stripping	1. 2. Maintain the continuity of vegetation strips wherever this does not directly interfere with Project elements, including hydrotechnical structures, access roads, construction facilities, and storage yards. 3. Establish "no-go" zones marked on-site before work begins. 4. Accurately marking the areas that need to be cleared.
	Disturbing wildlife with noise, vibrations, and light	1. Avoid locating the noisiest operations, support facilities, generators, crushers, and transshipment yards in the vicinity of fauna / wildlife breeding, resting, and migration areas. 2. Refrain from conducting work at night, except in emergency situations. 3. Avoid permanent lighting of the construction site directed toward the river, forests, wooded areas, and wetlands. 4. Plan transportation routes to avoid areas where animals congregate. 5. Establish buffer zones around identified nests, colonies, burrows, bat roosts, and amphibian breeding sites.
	Dust and Exhaust Emissions	1. Avoid locating access roads and maneuvering areas in the immediate vicinity of natural habitats, surface waters, and patches of protected vegetation. 2. Prioritize the delivery of materials via the existing road network rather than constructing new roads. 3. Avoid crushing, screening, and storing dust-generating materials, as far as possible, outside sensitive areas (surface waters, natural habitats).
	Direct animal mortality during construction	1. Avoid topsoil removal, tree cutting, earthworks, and riverbed work during periods of peak activity and sensitivity among fauna / wildlife 2. Exclude from the work schedule the breeding seasons of amphibians, bird nesting periods, fish spawning, and bat hibernation—depending on the results of the inventory. 3. Refrain from leaving open, unprotected excavations overnight in areas used for migration by amphibians, reptiles, and small mammals. 4. Designate zones near breeding sites and shelters where machinery is prohibited. 5. Conduct a wildlife survey before entering the site and allow work to proceed only after confirming the absence of active breeding or roosting sites.
	Destruction of breeding sites, wintering	1. Avoid disturbing inventoried bird nesting sites, bat roosts, mammal burrows, wintering grounds, spawning grounds, amphibian breeding sites, and habitats of saproxylic invertebrates.

Phase Tasks	Hazard Name	Proposed Measures
	grounds, and shelters	2. Relocate temporary structures, such as support facilities, storage areas, access roads, and material stockpiles, if they interfere with breeding sites and shelters. 3. Impose temporary bans on work in sensitive areas. 4. Preserving deadwood, hollow trees, and stands of trees that do not directly interfere with the project.
	Increased water turbidity and siltation of the river channel	1. Avoid conducting earthworks directly in the active river channel if it is possible to use technologies from the bank or outside the channel. 2. Establish periods during which all work in the river channel is completely suspended during fish spawning and the early developmental stages of ichthyofauna / fish fauna. 3. Avoid locating soil deposits, loose materials, and construction sites in areas directly connected hydraulically to the river. 4. Avoid work in the river channel during high water levels and forecasted floods.
	Temporary disruption of flow during river channel realignment and construction fencing	1. Give preference to design solutions that do not require a complete cutoff of flow in the riverbed. 2. Maintain the continuity of minimum biological flow throughout the entire duration of the work. 3. Avoid enclosing the entire width of the river channel. 4. Prevent sections of the river channel, oxbow lakes, and water-dependent habitats from drying out. 5. Prohibit work that creates a temporary migration barrier during fish migration and spawning periods.
	Risk of oil spills	1. Locate equipment bases, refueling stations, service areas, and fuel storage facilities outside the river valley, outside floodplains, and outside areas with high groundwater levels. 2. Refueling and equipment repairs must not be conducted on the banks of rivers, ditches, or other watercourses. 3. Use only technically sound equipment that has been approved for operation following a leak test. 4. Avoid storing hazardous substances on the construction site if they can be supplied on an as-needed basis.
	Water pollution from wastewater and stormwater runoff from the construction site	1. Avoid locating sanitary facilities, equipment washing areas, and material and waste storage areas in zones where runoff flows directly into the river. 2. Locate these facilities in areas that allow for the complete collection and control of wastewater and stormwater. 3. Prohibit the washing of vehicles, concrete mixers, and other equipment in areas without an impermeable surface and a wastewater collection system.
	Improper management of waste and excavated material	1. Designate temporary storage areas for waste and excavated material away from natural habitats and away from bodies of water. 2. Adopt the principle of not storing waste, excavated material, debris, earth, and demolition materials outside of locations approved in the construction organization plan. 3. Maximize the use of excavated soil in a closed-loop system within the Task boundaries, provided it is not contaminated and does not contain propagules of IAS.

Phase Tasks	Hazard Name	Proposed Measures
	Spread of IAS during the Construction Phase	1. Avoid bringing in soil, aggregate, and plant material from areas where invasive species are present. 2. Prevent the movement of soil from areas occupied by invasive plant species to areas free of invasion. 3. Designate zones contaminated with IAS plant material as special-handling areas, with a ban on unrestricted vehicle traffic and the dumping of excavated material. 4. Clean machinery before entering the project site and before leaving areas where IAS are present. 5. Avoid leaving soil surfaces exposed for extended periods, as they are susceptible to colonization by invasive species.
	Soil degradation and compaction	1. Restrict the movement of heavy equipment to designated access routes. 2. Locate support facilities, storage yards, and equipment parking areas on land that has already been developed or has the lowest ecological value. 3. Prohibit uncontrolled driving on the site outside the work zone. 4. Avoid conducting earthwork when the soil is excessively wet.
OPERATIONAL PHASE	Permanent barrier to the migration of ichthyofauna and aquatic wildlife	1. Evaluate technical solutions to maintain the river's ecological continuity, including consideration of a natural bypass, a fish passage, a bypass channel, or another solution enabling the migration of aquatic organisms. 2. Maintain flow in the river channel or migration bypass throughout the year. 3. Design measures to avoid concentrating flow in areas that create migration traps for fish. 4. Prevent the formation of sections permanently cut off from aquatic fauna / wildlife migration downstream and upstream of the dam.
	Disruption of flow regimes and sediment transport	1. Develop water management guidelines that mimic natural flow variability as closely as possible. 2. Avoid long-term restrictions on flow downstream of the dam to levels that do not meet the needs of the river ecosystem. 3. Design solutions that allow for controlled sediment transport or periodic flushing, provided that this is technically and environmentally justifiable. 4. Avoid sudden changes in flow that are not related to flood control. 5. Maintain a minimum biological flow as a condition for reservoir operation.
	Eutrophication and Cyanobacterial Blooms	1. Limit the design of stagnant bays and shallow, poorly circulated sections of the reservoir that promote blooms. 2. Avoid leaving large amounts of organic biomass in the reservoir basin prior to filling. 3. Establishing rules for the use of the immediate catchment area / watershed / river basin to limit the inflow of fertilizers, wastewater, and organic pollutants.
	Thermal stratification and oxygen deficits	1. Avoid designing deep, poorly mixed zones unless they are necessary for flood control. 2. Ensure the ability to draw water from various depths to avoid the discharge of anoxic water. 3. Limit the inflow of organic matter into the reservoir before it is filled and during operation. 4. Avoid operation that leads to prolonged water stagnation during the summer months. 5. Designing outflow structures so that they do not force the continuous discharge of water from layers with the poorest oxygen parameters.

Phase Tasks	Hazard Name	Proposed Measures
	Change in habitat characteristics — disappearance of species favoring flowing water to species of stagnant-water	1. Limit the area of permanent flooding to what is necessary for flood control. 2. Preserve the longest possible stretches of the river with a flowing character both upstream and downstream of the reservoir. 3. Maintain side channels, tributaries, flowing oxbow lakes, and sections of the river channel as refuges for riverine species. 4. Avoid channel regulation and technical standardization outside the immediate vicinity of the structure. 5. Design-based preservation of the mosaic of riverine and valley habitats in the riparian zone and outside the reservoir basin.
	Thermal changes downstream of the reservoir	1. Designing multi-level water intakes that allow for the selection of a discharge layer with a temperature closest to the natural one. 2. Avoid constant water discharge from a single depth if this would lead to chronic undercooling or overheating of the river downstream of the dam. 3. Preserving riparian vegetation downstream of the reservoir to limit water warming. 4. Develop operating guidelines to limit sudden changes in outflow temperature.
	Fish mortality at spillways and power plant	1. Avoid technical solutions that cause fish to be sucked into turbines, spillways, or overflows. 2. Design screens, guiding barriers, and migration bypasses as essential components rather than optional ones. 3. Avoid locating intakes in areas where fish congregate and along the main migration routes. 4. Ensure a safe downstream passage for fish.
	Destruction of the littoral zone by water level fluctuations	1. Avoid frequent, sudden, and large changes in impoundment levels except during flood conditions. 2. Establish ecologically safe impoundment curves that consider amphibian breeding seasons, fish spawning, and bird nesting periods. 3. Design gentle, varied banks that are resistant to changes in water levels. 4. Avoid operations that lead to the drying out of the reed bed zone during the breeding season of aquatic and marsh organisms.
	Erosion of reservoir shores	1. Avoid locating reservoir shorelines within unstable slopes, landslide-prone areas, or areas particularly susceptible to abrasion. 2. Design the shoreline to minimize wave concentration. 3. Use riparian vegetation as the primary stabilizing measure. 4. Avoid clearing vegetation in sections that do not directly interfere with the constructed structure. 5. Restrict vehicle access and recreational activities to the sections of the shoreline most susceptible to erosion.
	Accumulation of contaminated sediments	1. Desig zones for the initial retention of fluvial sediment that are easy to control and safely clean up. 2. Avoid leaving contaminated soil, waste, demolition debris, and sources of organic matter in the reservoir basin.
	Gradual siltation of the reservoir	1. Preserve natural sediment retention zones upstream of the reservoir, provided they do not cause environmental damage. 2. Provide solutions that allow for sediment management without frequent, invasive dredging.

Phase Tasks	Hazard Name	Proposed Measures
	Impacts related to dredging and maintenance	1. Design the reservoir to minimize the need for frequent dredging and maintenance work. 2. Designate permanent technical access points to avoid damaging new habitat areas each time. 3. Avoid conducting maintenance work during periods of nesting, spawning, breeding, and animal migration. 4. Prioritize technical solutions that are durable and require less frequent intervention in the riparian and bottom zones. 5. Exclude areas serving as natural refuges from routine maintenance, provided this does not jeopardize the safety of the facility.
	Spread of standing-water species and IAS	1. Avoid creating conditions conducive to invasive aquatic species by limiting shallow, rapidly warming bays. 2. Prohibit the intentional introduction of non-native species of fish, crayfish, mussels, and aquatic plants. 3. Restrict access to boat launch sites, watercraft, and water recreation activities that may serve as vectors for the spread of invasive aquatic species. 4. Preserve competitive native vegetation to limit colonization by non-native species.
	Collisions and changes in habitat use by birds	1. Avoid locating overhead power lines, fences, masts, and other infrastructure that poses a collision risk along bird migration routes. 2. Limit recreational access to areas of particular importance to waterfowl and wetland birds. 3. Avoid removing trees and shrubs used as nesting sites, unless they directly interfere with the safety of the facility. 4. Designate quiet zones and no-entry zones during the breeding season.
	Risk of sudden water discharges	1. Develop water management guidelines that prevent sudden changes in flow, except in cases of an immediate flood threat or a threat to the facility's flood safety. 2. Designing spillway structures that allow for a gradual increase and decrease in outflow. 3. Avoiding operational activities that cause sudden exposure or flooding of habitats downstream of the dam. 4. Maintain an environmental flow and ensure safe flow variation conditions. 5. Exclude discharge tests and maneuvers during periods of increased biological sensitivity, unless required for safety reasons.
	Greenhouse gas emissions and sludge from biomass	1. Remove excess biomass, organic waste, and easily degradable material from the reservoir basin before filling. 2. Design operations to minimize prolonged anaerobic conditions in the bottom zones. 3. Avoid the formation of shallow, stagnant, and highly warming bays that promote intensive biomass production and decomposition.
	Increased land use and recreation	1. Prevent uncontrolled public access to the entire shoreline. 2. Designate a limited number of access points to the water. 3. Establish zones off-limits to recreation, camping, boat launching, and vehicle traffic. 4. Avoid locating parking lots, trails, and tourist infrastructure in shoreline zones of high ecological value. 5. Limiting lighting, noise, and nighttime traffic in the vicinity of the reservoir.

2.2. Minimization

Table 9 Proposed Mitigation Measures – Minimization

Stage Tasks	Hazard Name	Proposed Measures
IMPLEMENTATION PHASE	Direct forest clearing and soil stripping	1. Conduct logging in stages, limited to the scope approved in the project documentation and after marking the trees designated for removal. 2. Ensure the presence of environmental supervision during logging, clearing, and topsoil removal. 3. Selective removal of the topsoil layer and its temporary storage in a manner that allows for later use in reclamation. 4. Limit the width of work strips and access roads. 5. Protect trees remaining in the vicinity of the work from mechanical damage, root collar burial, and soil compaction within the root system. 6. Where possible, leave fragments of dead wood, stumps, and snags as habitat elements outside the zone of immediate hydraulic hazard.
	Disturbing fauna / wildlife with noise, vibrations, and light	1. Use technically sound equipment with reduced noise emissions. 2. Limit the simultaneous operation of multiple machines near sensitive habitats. 3. Use temporary screens, earthen embankments, or natural vegetation barriers in areas particularly vulnerable to noise. 4. Use directional lighting of the construction site, limit light emissions toward the river and wooded areas. Use red lighting at night. 5. Establish work hours that minimize impact during times of peak wildlife activity, particularly at dusk, at night, and at dawn. 6. Ongoing monitoring of fauna reactions by environmental supervisors and the option to temporarily suspend work if significant disturbance is observed.
	Dust and Exhaust Emissions	1. Sprinkling of access roads, maneuvering areas, and exposed ground surfaces during dry periods. 2. Limiting vehicle speeds on service roads. 3. Covering or sprinkling dust-generating materials during transport and storage. 4. Regularly clean the exit roads from the construction site. 5. Use of machinery that meets current exhaust emission standards. 6. Shut off engines during stops and limit equipment idling.
	Direct animal mortality during construction work	1. Site inspection by environmental supervisors prior to the start of earthwork, tree removal, backfilling of excavations, and work in riverbeds. 2. Installation of temporary herpetological barriers along amphibian and reptile migration routes. 3. Regular inspections of excavations, ditches, manholes, and depressions, and, if necessary, trapping and relocating animals outside the danger zone. 4. Construction of gentle ramps or escape routes from excavations. 5. Limiting vehicle speeds on the construction site. 6. Provide training for workers on how to proceed if they encounter animals.
	Destruction of breeding sites, wintering grounds, and shelters	1. Before work begins, inspect active nests, burrows, tree hollows, bat roosts, spawning grounds, amphibian breeding sites, and wintering grounds. 2. If active breeding sites are detected, temporarily suspend work in the buffer zone designated by the environmental supervision authority until the end of the sensitive period. 3. Relocate habitat elements that can be moved—such as dead wood, logs, stone mounds, and fragments of tree stumps—outside the work zone.

Stage Tasks	Hazard Name	Proposed Measures
		4. Phasing of work so that not all habitat structures are removed simultaneously over a large area. 5. Maintain temporary refuges for small animals on the periphery of the construction site. 6. Document identified breeding sites and shelters, and report on nature monitoring activities.
	Increased water turbidity and siltation of the river channel	1. Use cofferdams, silt barriers, sedimentation curtains, or temporary filtration barriers at work sites near bodies of water. 2. Conducting work in the riverbed in stages, on the shortest possible sections. 3. Stabilize exposed slopes, banks, and ground surfaces immediately after work is completed. 4. Collecting and pre-treating water from construction drainage systems before discharge. 5. Ongoing monitoring of turbidity, total suspended solids, and visible siltation downstream of the work site. 6. Suspend earthwork in the riverbed during high water, heavy rainfall, or when established turbidity/suspended solids thresholds are exceeded.
	Temporary disruption of flow during riverbed realignment and construction fencing	1. Staging the construction of the barrier to maintain minimal biological flow. 2. Maintain the flow capacity of bypass channels, temporary culverts, and riverbed diversions. 3. Continuously monitor water depth, flow velocity, and oxygen levels in temporarily altered river sections. 4. Implement measures to prevent fish and invertebrates from becoming trapped in isolated sections of the riverbed. 5. Harvesting and relocating aquatic organisms from sections designated for temporary drainage. 6. Limiting the duration of diversions and cofferdams to the minimum necessary for the project.
	Risk of oil spills	1. Equipping the construction site with sorbents, sorption sleeves, mats, emergency containers, and spill neutralization kits. 2. Refuel and service equipment only in designated areas with an impermeable surface. 3. Perform daily leak checks on machinery operating near bodies of water. 4. Do not leave equipment with leaks on the construction site. 5. Develop and implement a procedure for responding to environmental incidents. 6. Train employees on how to respond to fuel, oil, or lubricant spills.
	Water pollution from wastewater and stormwater runoff from the construction site	1. Collect stormwater and snowmelt runoff from support facilities, parking lots, and material storage areas. 2. Use settling tanks, oil-water separators, and filters before discharging water into a reservoir. 3. Regular collection of domestic wastewater from support facilities by authorized entities. 4. Prohibition on discharging untreated wastewater and water used to wash equipment into the ground or into the sewer system. 5. Monitoring the water quality downstream of the construction site, including suspended solids, petroleum substances, and basic physicochemical parameters. 6. Prevent loose materials, cement, lime, and chemicals from causing surface runoff.
	Improper management of waste and excavated material	1. Implementation of a waste and soil management plan for the construction site. 2. Sort waste according to codes and store it in labeled, secured areas. 3. Regular collection of waste by authorized entities. 4. Prevent excavated material from flowing into watercourses and spreading beyond designated areas.

Stage Tasks	Hazard Name	Proposed Measures
		5. Separate storage of topsoil, mineral soil, subsoil, demolition materials, and hazardous waste. 6. Maintaining records of the quantities of excavated soil produced, used, and removed.
	Spread of IAS during the implementation phase	1. Update the map of invasive species locations before work begins. 2. Mark patches of invasive plants and subject them to special work protocols. 3. Wash the wheels, tracks, and attachments of machinery used in areas where invasive plant species are present. 4. Separately handle soil containing rhizomes, seeds, or fragments of invasive plants. 5. Promptly reseeding, mulching, or sowing exposed areas with mixtures of native species. 6. Monitor the regrowth of invasive plant species during construction and remove them promptly before they disperse seeds.
	Soil degradation and compaction	1. Designate and mark permanent routes for machinery. 2. Use of road plates, geotechnical mats, or other solutions to minimize soil compaction in sensitive areas. 3. Limit the movement of heavy equipment on heavily saturated soil. 4. Separately remove and store the topsoil layer.
OPERATIONAL PHASE	Permanent barrier to the migration of ichthyofauna and aquatic wildlife	1. Ensuring the proper functioning of migration structures, such as a fish pass or other solution adopted in the project. 2. Maintain flow through migration devices throughout the entire migration period for fish and aquatic organisms. 3. Regularly check the patency of fish passes, inlets, screens, channels, and bypasses. 4. Monitor the effectiveness of fish migration, including observations, test catches, or telemetric monitoring, if warranted. 5. Removal of blockages, debris, sediment, and obstacles that restrict migration. 6. Adaptively adjust the fishway's operating parameters if monitoring indicates insufficient effectiveness.
	Disruption of flow regimes and sediment transport	1. Maintaining a minimum biological flow downstream of the dam. 2. Implementing changes to the outflow gradually, with specified maximum permissible rates of increase and decrease in flow. 3. Monitor flows, water levels, and channel morphology downstream of the reservoir. 4. Periodically assess bottom and bank erosion downstream of the dam. 5. If necessary, controlled management of sediment / fluvial sediment, e.g., through flushing, sediment dosing, or riverbed stabilization measures. 6. Revision of water management guidelines if adverse hydromorphological changes are identified.
	Eutrophication and cyanobacterial blooms	1. Monitoring of nutrient concentrations, chlorophyll-a, water transparency, temperature, and dissolved oxygen. 2. Controlled removal of excess plant biomass, outside of periods when fauna / wildlife is vulnerable. 3. Limiting the use of bait, feeding of birds, and other practices that increase the inflow of organic matter. 4. Implementation of a warning system and temporary restrictions on recreational use in the event of cyanobacterial blooms. 5. If necessary, implement measures to improve water exchange or oxygenation, provided they do not cause additional environmental damage.

Stage Tasks	Hazard Name	Proposed Measures
	Thermal stratification and oxygen deficits	1. Monitor temperature and oxygen profiles in the water column, particularly during the summer and at low flow rates. 2. Adjust the depth of water intake if the facility is equipped with multi-level intakes. 3. Monitoring the quality of water discharged downstream of the dam, including temperature, oxygen, conductivity, and nutrient levels. 4. Implement corrective measures if a discharge of water with low oxygen content is detected.
	Change in habitat character—disappearance of stream-loving species in favor of standing-water species	1. Maintain sections of lotic habitats upstream and downstream of the reservoir in the best possible hydromorphological condition. 2. Preserving or creating a varied shoreline, shallows, vegetation zones, and microhabitats. 3. Monitor the composition of the ichthyofauna / fish fauna, macroinvertebrates, and aquatic vegetation. 4. Limiting technical bank reinforcement to areas necessary for safety. 5. Maintaining tributaries, oxbow lakes, and lateral hydrological connections as refuges. 6. Adapt water management to the needs of river habitats downstream of the reservoir.
	Temperature changes downstream of the reservoir	1. Monitor water temperature upstream of the reservoir, within the reservoir, and downstream of the dam. 2. Control the depth of water intake to minimize temperature differences between the outflow and the river's natural flow regime. 3. Gradual changes to outflow parameters to minimize thermal shock to fish and invertebrates. 4. Maintaining shade in the riverbed downstream of the reservoir through riparian vegetation. 5. Periodic analysis of the impact of outflow temperature on spawning, egg development, and the activity of aquatic organisms. 6. Adjustment of operating procedures in the event that established temperature thresholds are exceeded.
	Fish mortality at spillways and power plants	1. Installation of grates, barriers, screens, guides, or deterrent systems to prevent fish from entering hazardous equipment. 2. Ensure a safe downstream migration route for fish. 3. Reducing flow velocity at the intakes to the facilities, if technically feasible. 4. Regularly inspect for dead or injured fish downstream of spillways, overflows, and any turbines. 5. Adjusting facility operations during migration periods and the downstream movement of juvenile fish. 6. For power plants—using turbines or technological solutions that reduce fish mortality.
	Destruction of the littoral zone by water level fluctuations	1. Maintain water levels as stable as possible during amphibian breeding seasons, fish spawning, and the nesting periods of waterfowl and marsh birds. 2. Gradually lower and raise the impoundment level / water level, provided this does not interfere with flood control functions. 3. Monitor the condition of reed beds, spawning grounds, amphibian breeding sites, and bird nests. 4. Creating gentle riparian zones resistant to periodic flooding and exposure. 5. Limit mowing, vegetation removal, and maintenance work in the littoral zone. 6. Designating sections of the shoreline to be left to natural succession.

Stage Tasks	Hazard Name	Proposed Measures
	Erosion of the reservoir's shoreline	1. Monitor sections susceptible to abrasion, slope failures, and shoreline scouring if such issues are identified. 2. Use biological or bio-engineering stabilization methods—such as planting willows, installing fascines, using coconut mats, or applying cover material—only where necessary. 3. Limit wave action caused by the movement of watercraft. 4. Prohibit vehicles from driving onto banks susceptible to erosion. 5. Maintain riparian vegetation as a natural erosion control measure. 6. Promptly repair local damage before it develops into more extensive forms of erosion.
	Accumulation of contaminated sediments	1. Monitoring the quality of bottom sediments, including heavy metals, petroleum-derived substances, nutrients, and organic matter. 2. Identify sources of pollution in the catchment area / watershed / river basin and cooperate with the relevant authorities to reduce them. 3. Designation of zones for the controlled accumulation of sediments that are easy to monitor and, if necessary, remove. 4. Prohibition of uncontrolled sediment movement within the reservoir. 5. Testing of sediments prior to each planned dredging operation. 6. Selecting a method for sediment removal and disposal based on the results of quality tests.
	Gradual siltation of the reservoir	1. Regular bathymetric measurements and assessment of the rate of sediment / fluvial sediment accumulation. 2. Maintain the operational efficiency of water management equipment. 3. Monitor sediment inflow from the catchment area / watershed / river basin, including the identification of sections prone to erosion. 4. Selective sediment removal, with restrictions on the spatial and temporal scope of the work. 5. Conducting dredging operations outside of spawning, nesting, and amphibian breeding seasons. 6. Use sediment only after confirming its quality and ensuring there is no risk of spreading IAS or pollutants.
	Impacts associated with dredging and maintenance	1. Prepare a maintenance plan that takes natural constraints into account. 2. Conduct work in phases, covering limited areas. 3. Use technologies that minimize the stirring up of suspended sediment. 4. Conduct environmental monitoring during dredging, vegetation mowing, reinforcement repairs, and work in the riparian zone. 5. Maintaining refuge zones that are not included in concurrent maintenance work. 6. Monitoring turbidity, noise, and reactions of the fauna / wildlife during work.
	Flooding and changes in water conditions in the vicinity of the reservoir	1. Monitoring of groundwater levels in piezometers around the reservoir. 2. Monitoring habitats sensitive to waterlogging or desiccation. 3. Maintaining the functionality of ditches, culverts, outflows, and water regulation structures, provided that this does not degrade the condition of natural habitats / wildlife habitats. 4. Adjusting the impoundment level / water level or operating procedures if adverse changes in habitats are detected. 5. Implementing local measures to prevent excessive flooding of adjacent areas. 6. Documenting changes in vegetation as an indicator of long-term hydrological changes.

Stage Tasks	Hazard Name	Proposed Measures
	Spread of stagnant-water species and IAS	1. Monitoring plants, fish, crayfish, mussels, and other non-native or invasive organisms. 2. Rapid removal of non-native species outbreaks at an early stage of colonization. 3. Inspecting boat launch sites, piers, fishing spots, and water access points. 4. Implementing a requirement to clean watercraft, fishing gear, and work equipment. 5. A ban on stocking with non-native species and control of illegal introductions. 6. Educate reservoir users about the risks of spreading invasive alien species.
	Collisions and changes in habitat use by birds	1. Marking infrastructure elements that pose a collision risk, such as power lines, fences, or transparent screens. 2. Restricting the movement of people and equipment in areas where birds congregate. 3. Designation of quiet zones and seasonal exclusion zones. 4. Monitoring of breeding, migratory, and wintering bird populations. 5. Adjusting mowing and maintenance schedules to the birds' breeding cycle. 6. Preserving diverse riparian, meadow, and shrub habitats around the reservoir.
	Risk of sudden water releases	1. Establish maximum permissible rates of change in outflow downstream of the dam. 2. Gradually open and close spillway structures, unless an emergency or flood situation occurs. 3. Monitoring of flow, water level, and channel response downstream of the reservoir. 4. Notifying the site manager and relevant authorities of planned major releases. 5. Avoiding testing of spillway structures during biologically sensitive periods. 6. Periodically review water management guidelines based on the results of environmental monitoring.
	Greenhouse gas and biomass sediment emissions	1. Monitor oxygen conditions in the water and sediments, particularly during the initial operating period of the reservoir. 2. Remove excess vegetation and biomass in a controlled manner. 3. Minimizing stagnation in shallow, rapidly warming bays. 4. Include emissions from sediments and biomass in the reservoir's long-term environmental monitoring.
	Increased human presence and recreation	1. Channeling human traffic through designated trails, overlooks, boardwalks, and recreational areas. 2. Restricting access to nesting areas, reed beds, erosion-prone shorelines, and wildlife refuges. 3. Introduce regulations for reservoir use, including rules regarding noise, waste, campfires, camping, dogs, and vehicle traffic. 4. Installation of informational signs regarding prohibitions and natural features. 5. Providing waste receptacles and ensuring regular cleanup of accessible areas. 6. Monitoring recreational pressure and the option to seasonally close selected areas.

2.3. Restoration/Rehabilitation of Environmental Elements

Table 10 Proposed mitigation measures – restoration of environmental elements

Stage Tasks	Threat Name	Proposed Actions
IMPLEMENTATION PHASE	Direct forest clearing and soil stripping	1. Reclamation of temporarily occupied areas upon completion of work, including construction sites, storage yards, access roads, and maneuvering areas. 2. Restoration of the proper soil profile using previously removed topsoil layer. 3. Aeration of soils compacted by heavy equipment traffic. 4. Where possible, restoration of vegetation using native species of trees, shrubs, and herbaceous plants.
	Disturbing fauna / wildlife with noise, vibrations, and light	1. Removal of temporary light sources, screens, fences, support facilities, and other construction infrastructure elements that restrict animal movement. 2. Restore quiet buffer zones by limiting subsequent technical and recreational use in sensitive areas.
	Dust and Exhaust Emissions	1. Reclaim areas degraded by traffic and the deposition of dust-generating materials. 2. Planting of buffer vegetation in areas where temporary construction impacts have disrupted existing green belts.
	Direct Animal Mortality During Construction	1. Restoring the passability of local migration routes for amphibians, reptiles, and small mammals upon completion of the work. 2. Removal of anthropogenic traps, such as unsecured excavations, manholes, utility trenches, or depressions. 3. Restoration of vegetation cover in areas where its removal increased the risk of wildlife mortality. 4. If a local decline in the population of selected animal groups is observed, implement remedial measures as directed by environmental authorities.
	Destruction of breeding sites, wintering grounds, and shelters	1. Restore amphibian breeding sites, such as shallow water depressions, seasonal pools, backwaters, or moist depressions in the terrain, if they have been temporarily destroyed. 2. Restore or replenish reed beds, thickets, and riparian vegetation that serve as nesting and shelter sites. 3. In the event of the loss of potential bat or bird roosts—implementing alternative solutions within the project site or its immediate vicinity, in accordance with a specialist's recommendations. 4. Monitoring the use of restored habitats by target species.
	Increased water turbidity and siltation of the riverbed	1. Removal of excess sediment deposited in the riverbed due to construction work, if its presence degrades habitat conditions. 2. Restore the natural or near-natural variation in the riverbed, including a sequence of rapids, shallows, deeps, and sandbars. 3. Restore a gravel-and-rock substrate in sections that are potential spawning grounds. 4. Stabilize the banks using biological or biological-technical methods. 5. Restore riparian vegetation to limit the runoff of suspended solids into the watercourse 6. Assessment of restoration effectiveness through monitoring of turbidity, bottom sediments, and macroinvertebrates.

Stage Tasks	Threat Name	Proposed Actions
	Temporary disruption of flow during channel realignment and construction fencing	1. Restoration of the original or target-designed channel alignment upon completion of temporary river channel alteration. 2. Removal of bypass channels, cofferdams, and temporary culverts if they no longer serve an environmental or technical function. 3. Restoration of flow continuity, depth, and water velocity gradients. 4. Restoring the ability of aquatic organisms to migrate upon completion of the work
	Risk of oil spills	1. Immediate removal of soil contaminated with fuels, oils, or lubricants. 2. Removal and transfer of contaminated soil to authorized entities. 3. Cleaning or replacing filter material in ditches, settling basins, and separators in the event of a failure. 4. Restoration of soil and water quality parameters to levels compliant with legal requirements. 5.6. Conducting tests to confirm the effectiveness of the remediation.
	Water contamination from construction site wastewater and stormwater	1. Clean out ditches, depressions, and receiving bodies of water into which contaminated water may have entered. 2. Removal of sediments contaminated with petroleum-derived substances, mineral suspended solids, or domestic wastewater. 3. Restoration of local buffer zones to limit surface runoff. 4. Water quality monitoring after the completion of remediation activities.
	Improper management of waste and excavated material	1. Removal of all construction, municipal, and hazardous waste from temporarily occupied areas 2. Restoration of the original topography at temporary spoil storage sites. 3. Reclamation of storage yards, soil stockpiles, and construction support areas. 4. Restoration of the humus layer and vegetation cover where indicated in the project documentation. 5. Verification that the remaining soil does not contain propagules of invasive species or contaminants.
	Spread of IAS during the construction phase	1. Removal of invasive species populations that have emerged or spread during the construction work. 2. Restore the vegetation cover using native species that compete with IAS. 3. Reclaim exposed soil surfaces in a manner that limits re-colonization. 4. Disposal of IAS biomass in accordance with legal requirements. 5. Monitoring regrowth for several growing seasons after the completion of the work.
	Soil Degradation and Compaction	1. Loosening and aerating compacted soils. 2. Where possible, restore the humus layer using previously deposited humus. 3. Fill in soil depressions and level the terrain's micro-relief. 4. Seeding with mixtures of native grass and herbaceous plant species adapted to local habitats. 5. Restoring meadows, grasslands, herbaceous vegetation, or riparian vegetation, depending on the nature of the site. 6. Monitoring the erosion control effectiveness of grass areas and other erosion control measures.

Stage Tasks	Threat Name	Proposed Actions
OPERATIONAL PHASE	Permanent barrier to the migration of ichthyofauna / fish fauna and aquatic wildlife	1. Restoring the ecological passability of the watercourse through the maintenance, modernization, or adjustment of migration structures. 2. Restoring flow conditions in the fish passage, bypass channel, or bypass rapids if monitoring indicates that they are insufficiently effective. 3. Removal of sediment, debris, and obstacles that restrict migration. 4. Restoring resting habitats for fish in the vicinity of fish passage structures. 5. Monitoring the use of migration aids by target species.
	Disruption of flow regime and sediment transport	1. Restoring morphological diversity to the river channel downstream of the reservoir if operation leads to its simplification. 2. Replenishing the deficit of gravel and boulder sediment in areas of bottom erosion or spawning ground degradation. 3. Restoring lateral hydrological connections, oxbow lakes, bays, and floodplains where technically feasible. 4. Restoring natural channel structures, such as scour banks, sandbars, deep pools, and rapids. 5. Adjusting restoration measures based on hydromorphological monitoring.
	Eutrophication and Cyanobacterial Blooms	1. Restoring or strengthening vegetated buffer zones that limit the inflow of nutrients. 2. Restoring rush vegetation and macrophytes that serve a filtration function. 3. Controlled removal of excess plant biomass and organic sediments. 4. Restoring oxygen conditions in areas prone to oxygen deficits.
	Thermal stratification and oxygen deficits	1. Restoring proper oxygen conditions through technical or biological measures tailored to the nature of the water body. 2. Restoring riparian vegetation to limit excessive heating of shallow zones. 3. Removal of excessive amounts of decomposing organic matter. 4. Restoring local water circulation in bays and stagnant zones if monitoring indicates persistent oxygen deficits. 5. Verifying the effectiveness of measures through monitoring of temperature and oxygen profiles.
	Change in habitat character—disappearance of current-loving species in favor of still-water species	1. Restoration of current-loving habitats downstream of the reservoir and in its tributaries. 2. Creating rapids, gravel spawning grounds, areas of faster current, and microhabitats for rheophilic invertebrates and fish. 3. Restoring shade to the riverbed through riparian vegetation. 4. Restoring connections to tributaries and refuge river sections. 5. Monitoring the composition of the ichthyofauna and macroinvertebrates as an indicator of the effectiveness of the measures.
	Temperature changes downstream of the reservoir	1. Restoring riparian vegetation to provide shade for the riverbed downstream of the dam. 2. Restoring local thermal refuges, e.g., connections to cooler tributaries, springs, or areas of deeper current. 3. Restoration of diverse channel morphology to limit excessive water heating. 4. If a permanent deterioration in thermal conditions is observed, implement operational and habitat-related adjustments.

Stage Tasks	Threat Name	Proposed Actions
	Destruction of the littoral zone due to water level fluctuations	1. Restore rushes, emergent, and submerged vegetation in the riparian zone. 2. Create gentle, mosaic-like shorelines resistant to periodic flooding and exposure. 3. Restoring breeding sites for amphibians, spawning grounds for fish, and foraging areas for waterfowl and marsh birds. 4. Restoration of shallows, bays, and local areas of calm water. 5. Protecting restored sections of the shoreline from recreational pressure.
	Erosion of Reservoir Shores	1. Reprofiling degraded shorelines using gentle slopes. 2. Stabilizing the shores using biological and bio-engineering methods, such as fascines, willow plantings, coconut mats, or rush vegetation. 3. Restoration of a strip of riparian vegetation that serves as erosion control. 4. Restoration of damaged riparian habitats following episodes of abrasion. 5. Monitoring of sections requiring further remedial actions.
	Accumulation of Contaminated Sediments	1. Removal or isolation of contaminated sediments if tests confirm a risk to the environment. 2. Disposal of sediments in accordance with the results of quality tests and legal requirements. 3. Restoration of the seabed structure following sediment removal work. 4. Restoration of aquatic and riparian vegetation in areas disturbed during the work. 5. Monitoring the quality of sediments and water after the completion of remedial actions.
	Gradual siltation of the reservoir	1. Restoring the reservoir capacity / storage volume and habitat function through the selective removal of excess sediment. 2. Restoring depth variation in the bottom in areas that have become excessively shallow. 3. Restoring shallow zones, islands, bays, and wetlands in a controlled manner, if they can serve an ecological function. 4. Use of clean sediments for habitat restoration, provided they meet quality requirements. 5. Ensuring that restoration activities do not lead to the spread of invasive species.
	Flooding and changes in water conditions in the vicinity of the reservoir	1. Restoring proper water conditions in water-dependent habitats if monitoring indicates their degradation. 2. Restoration of wet meadows, herbaceous vegetation, reed beds, or wetlands where changes in moisture levels have created conditions conducive to their renaturalization. 3. Remedial measures in habitats that are too dry or excessively flooded, in accordance with the results of hydrological monitoring. 4. Restoration of local outflows, sluices, or hydrological connections, if required for habitat protection.
	Spread of Standing-Water and Invasive Species	1. Removal of invasive species from riparian zones, littoral zones, and recreational areas. 2. Restoration of native plant communities resistant to colonization by invasive aquatic species. 3. Restoring sites where IAS patches have been removed. 4. Monitoring the effectiveness of these measures for at least several growing seasons.

Stage Tasks	Threat Name	Proposed Actions
	Conflicts and Changes in Habitat Use by Birds	1. Restoring safe nesting and resting sites for waterfowl and marsh birds. 2. Restoring reed beds, thickets, and island vegetation that serve as shelter.
	Greenhouse gas emissions and sludge from biomass	1. Remediation of shallow, stagnant bays if monitoring indicates they significantly contribute to water quality deterioration.

2.4. Offset

Table 11 Proposed compensatory measures

Group/environmental receptor	Anticipated loss requiring compensation	Proposed compensatory measures	Proposed criteria for the location of compensation	Proposed effectiveness indicators/monitoring
Riparian forests 91E0 — willow, poplar, alder, and ash riparian forests	Permanent loss of riparian forest habitats in the river valley due to logging followed by flooding of the reservoir basin.	1. Restoration or improvement of riparian forests outside the flooded area, preferably in the same river valley or within the Nysa Kłodzka catchment area. 2. Planting and supporting the natural regeneration of typical species: black alder, willows, poplars, and European ash—taking into account current phytosanitary threats to ash trees. 3. Removal of alien and invasive species. 4. Leaving deadwood, windfalls, and hollow trees in place. 5. Limiting forest management or establishing no-harvest zones.	Riparian areas outside the reservoir basin, as close as possible to lost forest patches but outside the range of permanent flooding. Preferred sites include degraded lands, over-drained riparian forests, former riparian meadows, wastelands, and wooded areas requiring restoration.	Assessment of the habitat's conservation status in accordance with the State Monitoring methodology for the given habitat type; monitoring for at least 20 years, every 4–5 years.
9170 Oak-hornbeam forests — Central European and subcontinental oak-hornbeam forests	Loss of deciduous forest patches and their habitat	1. Restoration or improvement of the condition of oak-hornbeam forests	Forest or former agricultural lands within the range of oak-hornbeam forests, preferably	Assessment of the habitat's conservation status in accordance with the State Monitoring

Group/environmental receptor	Anticipated loss requiring compensation	Proposed compensatory measures	Proposed criteria for the location of compensation	Proposed effectiveness indicators/monitoring
	functions due to flooding and logging.	on lands outside the Task area. 2. Conversion of stands containing non-native species or monocultures into oak-hornbeam forests. 3. Planting of native species: English oak, hornbeam, linden, maple, sycamore, elm, and hazel. 4. Introduction of an understory and ground vegetation characteristic of oak-hornbeam forests, with a preference for natural succession. 5. Increasing the amount of deadwood and protecting hollow trees.	in the vicinity of existing 9170 patches, ecological corridors, and forest complexes.	methodology for the given habitat type; monitoring for at least 20 years, every 4–5 years.
A mosaic of valley habitats: woodlands, shrublands, wet meadows, and forest-meadow ecotones	Loss of the habitat mosaic serving as a feeding, breeding, and migration base for birds, amphibians, reptiles, mammals, and pollinating insects.	1. Creation of replacement habitat complexes: wet meadows, herbaceous vegetation, shrublands, tree belts, ponds, field margins, and buffer zones. 2. Restoration of extensive meadow management - late mowing, no fertilization, and no overseeding with non-native seed mixtures. 3. Creating vegetation strips along watercourses and ditches. 4. Increasing connectivity between forest,	Land outside the reservoir basin, preferably in the same valley or connected to local migration corridors. Preferred: low-intensity agricultural land, wasteland, and degraded meadows.	Area of the habitat mosaic; number of ponds; proportion of flowering plants; abundance of open-country birds, amphibians, and pollinating insects; IAS species; monitoring at least 20 times, every 4–5 years.

Group/environmental receptor	Anticipated loss requiring compensation	Proposed compensatory measures	Proposed criteria for the location of compensation	Proposed effectiveness indicators/monitoring
		meadow, and aquatic complexes.		
Vascular plants—including *Allium ursinum, Galanthus nivalis, Primula elatior, and Batrachium fluitans*	Loss of sites for protected plant species associated with deciduous forests, wetland habitats, and aquatic habitats.	1. Secure populations outside the floodplain by protecting existing sites in substitute locations. 2. If conservation is not possible, relocate some individuals, bulbs, clumps, seeds, or diaspores to prepared alternative habitats after obtaining the required permits. 3. Restoring habitat conditions: shade, moisture, humus-rich soils, and with no pressure from invasive plant species. 4. For **Batrachium fluitans** —restore sections of shallow, well-oxygenated watercourses or channels with adequate flow.	For forest species—oak-hornbeam forests and riparian forests outside the task area. For aquatic species—natural or restored watercourses and oxbow lakes outside the reservoir's area of influence.	Number of preserved/transplanted clumps/tufts or sites; survival rate; flowering and regeneration; population stability; annual monitoring for a minimum of 5 years.
Mosses and liverworts—forest, tree-dwelling species, and wetland species	Loss of microhabitats on trees, dead wood, soil, and in moist areas.	1. Protect and improve the quality of replacement habitats in mature deciduous forests and riparian forests. 2. Relocate pieces of dead wood, logs, stumps, or bark fragments containing valuable microhabitats, if technically feasible (after obtaining the necessary permits). 3. Increasing the amount of dead	Mature deciduous forests, riparian forests, moist ravines, and riparian woodlands outside the floodplain.	Number of preserved microhabitats; area of moss patches; moisture levels in microhabitats; presence of target species; monitoring every 2–3 years for at least 3 cycles.

Group/environmental receptor	Anticipated loss requiring compensation	Proposed compensatory measures	Proposed criteria for the location of compensation	Proposed effectiveness indicators/monitoring
		wood in compensation sites. 4. Limiting the removal of windfalls, fallen trees, and dying trees. 5. Ensuring a stable microclimate—shade, humidity, and limited light penetration.		
Fungi and lichens — *Fistulina hepatica, Inonotus obliquus, Punctelia subrudecta*	Loss of old trees, dead wood, and lichen sites.	1. Protect trees colonized by fungi and lichens. 2. Relocate selected trunks or logs bearing fruiting bodies or potential substrate, if feasible.	Mature deciduous tree stands, tree alleys, field and riparian tree stands outside the reservoir basin.	Number of protected biocenotic trees; amount of dead wood; presence of fruiting bodies; condition of lichens; monitoring every 2–3 years for at least 3 cycles.
Semi-aquatic mammals—otter (*Lutra lutra)* and beaver (*Castor fiber)*	Loss of river valley sections, burrows, foraging grounds, resting sites, and habitat connectivity. The otter and beaver have been identified as key mammals of the area.	1. Protection of existing burrows and dens in compensation sites. 2. Restore migration corridors along watercourses. 3. Construction or adaptation of dry ledges under bridges/culverts if the compensation includes sections crossed by roads.	Watercourses and river valleys outside the reservoir basin, preferably hydrologically connected to the Nysa Kłodzka River or its tributaries.	Monitoring of the species' conservation status at the site in accordance with the State Monitoring methodology; every 2 years over at least 3 cycles.
Bats	Loss of hollow trees, flight paths, foraging sites near water, and forest edges and tree lines.	1. Installation of bat shelters as a supplementary measure, not a substitute for tree conservation. 2. Restoration of linear flight paths: tree-lined avenues, rows of trees, field-edge woodlands, and strips along watercourses. 3. Create foraging areas: ponds, wetlands, extensive	Forest complexes, stream valleys, and a mosaic of meadows and woodlands outside the task area, preferably within a functional radius of the lost foraging areas.	Number of protected hollow trees; use of shelters; acoustic activity; continuity of flight paths; detector-based monitoring for at least 5 years.

Group/environmental receptor	Anticipated loss requiring compensation	Proposed compensatory measures	Proposed criteria for the location of compensation	Proposed effectiveness indicators/monitoring
		meadows, and stream banks. 4. Limiting artificial lighting.		
Large and medium-sized mammals	Loss of fragments of forest, shrub, and meadow habitats, as well as local migration routes.	1. Planting strips of trees and shrubs to connect forest complexes. 2. Reducing fragmentation by removing unnecessary fences or adapting them to facilitate migration of wildlife. 3. Establishing zones excluded from intensive recreational use. 4. Enriching habitats with shelter elements - shrubbery, dead wood, and field boundary strips.	Valley narrowings, connections between forest complexes, areas distant from intensive development and roads.	Passability of corridors; camera trap recordings; presence of tracks; continuity of shelter vegetation; 5–10 years of monitoring.
Amphibians	Loss of breeding, wintering, migration, and foraging sites due to flooding and valley transformation.	1. Construction of replacement pond complexes—preferably consisting of several to a dozen or so ponds of varying depths and exposures 2. Restoration of wetlands, shallow floodplains, and seasonal pools. 3. Provision of terrestrial habitats: thickets, wet meadows, piles of stones and wood, and unmowed areas. 4. Creation of wintering grounds—stone mounds, hummocks, logs, and earth-and-stone piles. 5. Limiting the fish-stocking of	Outside the floodplain but as close as possible to preserved populations; in areas without a permanent fish presence, with gentle banks and aquatic vegetation.	Number of reservoirs; presence of spawn, larvae, and adults; reproductive success; absence of fish; water quality; annual monitoring for a minimum of 5–7 years.

Group/environmental receptor	Anticipated loss requiring compensation	Proposed compensatory measures	Proposed criteria for the location of compensation	Proposed effectiveness indicators/monitoring
		compensation reservoirs. 6. If necessary, construct permanent or seasonal fences and crossings along migration routes.		
Reptiles	Loss of a mosaic of sunlit habitats, shorelines, slopes, ecotones, thickets, and overwintering sites.	1. Creation of replacement habitat complexes: sunlit slopes, grasslands, thickets, field margins, and forest edges. 2. Construction of wintering sites and hiding places: piles of stones, logs, branches, tree trunks, sand, and soil. 3. Creating egg-laying sites for lizards and grass snakes—compost piles, sandy mounds, and plant debris piles. 4. Extensive mosaic mowing, leaving refuges. 5. Limiting tree succession in areas designated for thermophilic species.	Dry and semi-dry slopes, embankments, forest edges, field boundaries, former farmland, and wasteland outside the project area.	Number of shelter structures; presence of individuals; use of breeding/wintering sites; preservation of vegetation mosaic; 5-year transect monitoring.
Forest birds and cavity-nesting birds	Loss of tree stands, tree cavities, old-growth trees, and nesting sites.	1. Protection of old-growth trees and cavity-nesting trees. 2. Designation of reference areas free from logging. 3. Increase the amount of standing and fallen dead wood. 4. Installation of nesting boxes for selected species as a temporary measure.	Deciduous and mixed forests outside the reservoir basin, preferably contiguous with existing forest complexes.	Number of trees with cavities; number of breeding pairs; occupancy of nesting boxes; number of indicator species; ornithological monitoring for a minimum of 5 years.

Group/environmental receptor	Anticipated loss requiring compensation	Proposed compensatory measures	Proposed criteria for the location of compensation	Proposed effectiveness indicators/monitoring
		5. Restoring tree stands to native deciduous forests.		
Waterfowl, river birds, and shorebirds	Loss of natural riverbanks, sandbars, slopes, floodplain meadows, shallows, and breeding sites.	1. Restoration of shallow floodplains, oxbow lakes, wetlands, and periodically flooded meadows. 2. Creation or restoration of sandy-gravel sandbars and nesting islands. 3. Creation of steep nesting slopes for the kingfisher and, potentially, the European Bee-eater. 4. Extensive management of breeding meadows—late mowing, no intensive grazing during the breeding season. 5. Restricting access by people and predators to breeding islands. 6. Designation of quiet zones during the breeding and migration seasons.	River valleys and floodplains outside the project area, including degraded oxbow lakes, wet meadows, excavation pits suitable for restoration, and river sections with potential for naturalization.	Number of breeding pairs; breeding success; area of wetlands and meadows; number of islands/islets; level of predation and human disturbance; annual monitoring for a minimum of 5 years.
Birds of open and scrubby landscapes	Loss of thickets, meadows, ecotones, and the mosaic of valley habitats.	1. Restoration of a mosaic of meadows, shrublands, and field-edge woodlands. 2. Planting native fruit-bearing shrubs: hawthorns, blackthorns, roses, dogwoods, viburnums, and black elderberries. 3. Maintain unmowed strips and ecotone zones. 4. Extensive mowing after the breeding season.	Agricultural and former agricultural lands, side valleys, wastelands, forest edges, and watercourses outside the project area.	Number of breeding pairs; area of shrublands and meadows; availability of food sources; breeding success; 5-year monitoring.

Group/environmental receptor	Anticipated loss requiring compensation	Proposed compensatory measures	Proposed criteria for the location of compensation	Proposed effectiveness indicators/monitoring
Ichthyofauna	Loss of river habitats, spawning grounds, free-flowing river sections, and breeding and migration sites.	1. Where possible, naturalization of watercourse sections: restoration of rapids, shoals, sandbars, and variation in current and substrate. 2. If possible, restore gravel-and-rock spawning grounds for rheophilic species. 3. Improve the passability of small barriers on tributaries—culverts, weirs, and sluice gates. 4. Restore areas of calmer water and aquatic vegetation for the European bullhead. 5. Protect and support populations of mussels of the family Mytilidae, which are essential for the reproduction of the European bullhead. 6. Reducing sedimentation and the inflow of nutrients from agricultural areas.	Tributaries and river sections outside the influence of the reservoir's backwater, preferably within the same river basin and with the potential for permanent improvement of hydromorphological conditions.	Fish fauna composition; abundance of target species; presence of larvae/lampreys; substrate structure; passability of barriers; ichthyological monitoring for 5–10 years
Saproxylic invertebrates	Loss of old hollow trees, decaying wood piles, and dead wood.	1. Relocation of sections of decaying wood piles only under the supervision of a specialist and after obtaining the necessary permits. 2. Planting long-lived trees—oaks, linden trees, and pollarded willows—to ensure the continuity of	Avenues, parks, riparian and field-side tree stands, and forest edges outside the reservoir basin.	Number of trees with hollows; presence of frass/larvae/individuals; number of decaying logs; age continuity of trees; entomological monitoring over 5–10 years.

Group/environmental receptor	Anticipated loss requiring compensation	Proposed compensatory measures	Proposed criteria for the location of compensation	Proposed effectiveness indicators/monitoring
		the habitat in the future.		
Ants, bumblebees, and pollinating insects	Loss of meadows, forest edges, field boundaries, herbaceous vegetation, and nesting sites.	1. Establish and maintain flower meadows with native species of local origin. 2. Restore field margins, slopes, herbaceous vegetation strips, and forest edges. 3. Limit mowing to 1–2 times per year, leaving unmowed strips. 4. Protecting and, if necessary, relocating *Formica rufa* ant nests if conflicting sites cannot be preserved. 5. Creating nesting sites for bumblebees— unmowed slopes, clumps of grass, dead wood, and burrows of small mammals.	Extensive farmland, forest edges, wasteland, field margins, and side valleys outside the floodplain.	Coverage of nectar-producing plants; number of pollinator species and individuals; number of ant nests; absence of pesticides; 5-year monitoring.
Ecological corridors / wildlife corridors in the river valley	Loss of valley continuity and displacement of migratory functions outside the reservoir basin.	1. Designation and permanent protection of alternative migration corridors outside the reservoir area. 2. Linear plantings connecting forests, tree stands, and watercourses. 3. Restoration of vegetation strips along ditches and tributaries. 4. Removal of migration barriers, such as unnecessary fences. 5. Adapting culverts and crossings for small	Primarily side valleys, tributaries, existing tree stands, and landscape narrowings that allow animals to bypass the reservoir.	Length of restored corridors; continuity of vegetation cover; records of fauna; number of barriers removed; monitoring using camera traps and track surveys for at least 5 years.

Group/environmental receptor	Anticipated loss requiring compensation	Proposed compensatory measures	Proposed criteria for the location of compensation	Proposed effectiveness indicators/monitoring
		and medium-sized animals.		
Alternative habitats for species that rely on dead wood, tree cavities, and old trees	Loss of biocenotic trees, dead wood, decaying wood piles, tree cavities, and microhabitats important for birds, bats, fungi, lichens, and insects.	1. Protection of trees with cavities, dying trees, and trees with fungal fruiting bodies—provided they do not conflict with the implementation of the Project. 2. Creation of deadwood piles and decaying wood sites. 3. Planting long-lived trees to facilitate microhabitat succession.	Forests, field hedgerows, rural parks, tree-lined avenues, and riparian zones outside the floodplain.	Amount of dead wood; number of biocenotic trees; use by birds, bats, and insects; monitoring every 2–3 years.
Protected areas and links to the Natura 2000 network / areas of protected landscape (OChK)	Risk of indirectly weakening the ecological coherence of the Task's surroundings.	1. Locate compensation measures in a way that strengthens ecological connectivity among existing forms of nature conservation. 2. Restore connections between the river valley, forests, and Natura 2000 sites. 3. Coordinate actions with the relevant nature conservation authorities, land managers, and local stakeholders.	Preferred areas outside the task site but within the same landscape unit and catchment area, in the vicinity of existing nature conservation measures, provided that the actions are consistent with their conservation objectives	Area under permanent protection; improved habitat connectivity; compliance with conservation objectives; monitoring of effects at the landscape scale.

2.4.1. Supplementary Principles for Implementing Offsets

The effectiveness of compensatory measures depends not only on the appropriate selection of measures for specific species and habitat groups, but also on how they are planned, implemented, and maintained over the long term. In the case of a project involving the creation of a wet reservoir—and thus the permanent impounding of a

significant portion of the area—compensation should be treated as a comprehensive program to restore the natural functions lost as a result of the project.

Compensatory measures should be implemented in locations that ensure the greatest possible ecological equivalence to the lost habitats and that enable the preservation or restoration of functional connections within the landscape. It is particularly important to ensure the sustainability of the compensation effects, to implement the compensation well in advance, and to conduct monitoring that allows for the assessment of the effectiveness of the measures and the introduction of corrections if the intended results are not achieved.

The basic principles that should be taken into account when implementing a nature compensation program are presented below.

Table 12 Supplementary Principles for Implementing Compensation

Principle	Recommendation
Ecological Equivalence	Compensation should primarily address the same habitat types and ecological functions that will be lost. For riparian forests, riparian forests should be compensated; for oak-hornbeam forests, oak-hornbeam forests; for amphibian habitats, aquatic-terrestrial complexes; and so on.
Additionality	Measures should go beyond the standard obligations of site managers. They should not consist solely of protecting areas that would have been preserved anyway without the project.
Proactive Implementation	Key measures, especially for amphibians, reptiles, birds, bats, and saproxylic insects, should be implemented before the reservoir basin is impounded so that replacement habitats are available at the time the original habitats are lost.
Functional proximity	Compensation within the same catchment area is preferred, so that the measures support the same local populations.
Sustainability	Compensation areas should be legally or contractually secured for the long term, preferably for the entire duration of the project.
Compensation ratio	The compensation area should be larger than the area lost, particularly for forest and riparian habitats, due to the time lag in achieving full functionality. The ratio will be determined for natural and transformed habitats using a biodiversity calculator accepted by the World Bank.
Adaptive Monitoring	If monitoring reveals a lack of expected effects, corrective measures should be implemented: replanting, changing the mowing regime, improving water management, removing invasive alien species (IAS), and increasing the compensation area.

3. Monitoring, Condition Assessment, and Adaptive Measures

The monitoring activities, condition assessment, and other elements described in this chapter were developed based on the assumptions of the ESIA and the Environmental and Social Management Plan (ESMP). Their primary objective is to verify the effectiveness of the implemented preventive and mitigation measures and to identify, on an ongoing basis, the need for adaptive management in the event of deviations from expected results.

For the purposes of the Task, a preliminary set of monitoring activities has been developed, directly linked to the designed preventive, mitigation, and compensation measures. The activities presented are a proposal at the current stage of the Task's preparation and may be subject to change as design solutions are refined and the administrative procedure progresses. For individual monitoring methods, where possible and justified, threshold values or response criteria will be defined. Exceeding these thresholds will serve as the basis for reviewing the effectiveness of the implemented measures and, if necessary, for applying modified or additional measures. This approach will ensure flexible, monitoring-based management of the Task's impact on natural elements.

The table below presents a proposed overview of monitoring activities planned for specific impact areas of the Task, along with their objectives, key monitoring activities, selected performance indicators, and responsibility for their implementation.

Table 13 Proposed monitoring activities during the Task's implementation and operation phases

No.	Subject of Monitoring	Purpose and Scope	Key monitoring activities	Selected indicators	Responsibility
1	**Tree Felling**	Verification that only trees covered by the permit are removed; assessment of the effectiveness of forest/shrub fire prevention in the vicinity.	• Compliance of tree removal with the scope of the permit	• Number of trees removed	Contractor / environmental supervision
2	**Habitat restoration**	Assessment of the effectiveness of habitat restoration (planting, seeding) until the permanent establishment of vegetation is confirmed.	• Regular field inspections of restoration sites • Assessment of the survival rate and condition of plantings, as well as vegetation cover • Corrective measures (replanting, reseeding) in case of failure	• Good phytosanitary condition of trees • Increasing vegetation cover • Absence of invasive/non-native species	Restoration Contractor / Engineer
3	**Disturbance of wildlife (noise, vibrations, light)**	Assessment of the effectiveness of measures to minimize disturbances at wildlife breeding, resting, foraging, and	• Compliance with temporal/spatial restrictions (prohibition on nighttime work)	• No nighttime work except in case of emergencies • No significant	Contractor / environmental supervision

No.	Subject of Monitoring	Purpose and Scope	Key monitoring activities	Selected indicators	Responsibility
		migration sites for fauna.	• Buffer zones around nests, burrows, colonies, and shelters • Inspection of equipment and directional lighting • Patrols and observations of animal behavior	disturbance (animals leaving their habitats) • Maintenance of buffer zones • 100% of employees trained	
4	**Animal mortality**	Verification of the effectiveness of measures to minimize the killing, injury, or trapping of animals during high-risk operations.	• Environmental inspections prior to high-risk work • Technical condition of herpetological enclosures and excavation safeguards • Record of mortality/entrapment incidents and rescue operations	• No animal mortality or isolated cases of mortality • No recurring entrapments in excavations • Number of individuals captured and relocated • Passability of routes after completion of work	Contractor / environmental supervision
5	**Dust and exhaust emissions**	Verification of the effectiveness of measures to limit dust and exhaust emissions outside the work area, especially toward habitats and water bodies.	• Location of roads/yards/storage areas relative to habitats and water bodies • Sprinkling and covering of dust-generating materials • Technical condition and emission standards of machinery	• No visible, prolonged dust emission • Machinery that meets current emission standards • Number of incidents and corrective actions implemented	Contractor / Engineer
6	**Risk of petroleum product spills**	Mitigation of the risk of fuels, oils, and lubricants entering the soil.	• Locating refueling/maintenance areas outside sensitive areas • Daily inspection of equipment for leaks • Availability of emergency kits and response procedures	• No refueling in sensitive areas • Availability of complete emergency kits • Number of leaks and response time • % of employees trained	Contractor / Engineer
7	**Surface waters**	Assessment of water quality and hydromorphological conditions during and after the completion of works in the vicinity of watercourses;	• Turbidity and suspended solids upstream/downstream of the works • Effectiveness of cofferdams,	• Turbidity close to reference values • No significant siltation of bottom habitats	Contractor / natural resources or environmental supervision (ongoing

No.	Subject of Monitoring	Purpose and Scope	Key monitoring activities	Selected indicators	Responsibility
		monitoring also during the operational phase (including downstream of the dam).	sedimentation curtains, and filtration barriers • Maintenance of biological flow • Monitoring of aquatic organisms prior to the drainage of river sections	• Maintenance of minimum biological flow • No oil spills into water bodies	participation in riverbed work)
8	**Waste and excavated material management**	Verification of proper storage, sorting, and disposal of waste and excavated material.	• Location and marking of storage sites away from habitats/water bodies • Segregation of waste by code, record-keeping of excavated material • Inspection of waste and transport documentation • Final inspection of the site upon completion of work	• No storage outside designated areas • Regular collection by authorized entities • No use of contaminated excavated material • Site reclamation upon completion of work	Contractor / Engineer (environmental supervision in sensitive areas)
9	**Invasive species**	Confirmation of the effectiveness of mitigation measures to minimize the spread of invasive alien species (IAS); specific rules are set forth in a separate IASMP.	• Updating the map of IAS sites and marking the IAS patches • Prohibition on moving soil from IAS patches • Cleaning of equipment, reseeding of exposed areas • Monitoring of regrowth over several growing seasons	• Current map of IAS sites • No movement of contaminated soil • No new, persistent IAS foci	Contractor / environmental supervision; details per IASMP
10	**Animal migration (including ichthyofauna)**	Assessment of whether technical and organizational solutions maintain the ecological continuity of the watercourse and the ability of aquatic and terrestrial wildlife to migrate.	• Passability of the river channel and fish passages • Phasing of work in the river channel, maintenance of biological flow • Monitoring of aquatic organisms prior to dewatering • Incorporating spawning/migration periods into the schedule • Effectiveness of migration structures	• Maintaining the ecological passability of the watercourse • Operation of the fish passage in accordance with the design • No sections permanently cut off from migration • No mass fish mortality	Contractor / environmental supervision (construction); Investor (operation)

No.	Subject of Monitoring	Purpose and Scope	Key monitoring activities	Selected indicators	Responsibility
			during the operational phase		
11	**Bottom sediments**	Assessment of the accumulation of sediment and pollutants in the reservoir and the effectiveness of measures to limit their impact on water quality and habitats.	• Qualitative sediment analyses (heavy metals, hydrocarbons, nutrients) • Identification of accumulation zones and sources of pollutants • Pre- and post-dredging monitoring	• Designated monitoring zones for accumulation • Regular bathymetric measurements • No use of contaminated sediments • No prolonged oxygen deficits	Investor / environmental supervision (operational phase)

3.1. Staff training

The contractor, in cooperation with the environmental supervision team, will provide specialized environmental and social training tailored to the scope of roles and responsibilities of all employees and subcontractors. This training will include initial orientation training for all individuals starting work at the construction site. Environmental supervision personnel will receive additional, specialized training corresponding to the requirements of their assigned tasks, including, among other things, species identification, inventory and monitoring techniques, operation of measuring equipment, and data analysis.

During periodic field inspections, employees' knowledge of general environmental, social, and occupational health and safety requirements will be assessed to verify compliance with the procedures and plans in effect for the Task. The Contract Engineer will be required to have a thorough understanding of the provisions of the ESIA, ESMP, and BMP, as well as to complete training on their practical implementation.

Training sessions on implementation and reporting under the ESMP, ESIA, and BMP will also be conducted, in accordance with World Bank guidelines and the Task's Environmental and Social Management Framework (ESMF). Employees will be trained before work begins, and in the case of new hires, immediately upon hiring. The training will cover, in particular, safety issues, environmental and social requirements, and procedures applicable on the construction site (for example such as training on chance finds procedures, as the project involves earthworks) and additional briefings will also be conducted during site visits.

3.2. Reporting and Monitoring

The Contract Engineer will be responsible for supervising the implementation of monitoring activities throughout the entire construction period, as well as during the operational phase following the completion of construction.

During the construction phase, the Contractor will be required to prepare monthly environmental and social reports, to be submitted to the Contract Engineer, covering, among other things, work progress, implementation of the ESMP and BMP requirements, monitoring results, identified nonconformities, and corrective actions that have been implemented or are planned. The reports will include a separate section on environmental results, including indicators related to biodiversity.

The Contract aggregates the data and submits summary reports to the PIU, which—after verification and approval by the PCU—submits a periodic summary report to the World Bank on a quarterly or semi-annual basis, in accordance with ESCP guidelines. The summary report includes information on the Task's progress, the level of compliance with environmental and social requirements, as well as significant changes or updates to the BMP and ESMP.

In the event of an accident, environmental incident, or adverse environmental impact - including on biodiversity - that was not anticipated in the ESIA or ESMP, the Contract Engineer shall be required to immediately report such an event to the PIU. In the event of a serious environmental or social incident, the PIU shall notify the World Bank through the PCU within 48 hours of its occurrence, regardless of the established reporting cycle.

3.3. Updating the BMP

This Biodiversity Management Plan (BMP) will be updated as needed, particularly in the event of significant changes in the implementation of the Task or in the technology used to carry out the work, the identification of non-compliance with E&S requirements, the occurrence of unforeseen impacts, or the receipt of environmental monitoring results indicating that the mitigation measures or compensatory measures implemented are ineffective.

Updates to the BMP will be implemented in accordance with the adaptive management procedure specified in the Environmental Management Plan (EMP): identification of the problem by the Contract Engineer, Consultant, or PIU; assessment of its significance; implementation of a corrective action; verification of its effectiveness; and formal closure of the matter. The PIU coordinates the updating and revision of the BMP. Any changes made will be documented, approved, and communicated to the relevant

parties, in accordance with the requirements of the Task, the ESMP, and the obligations under the loan agreement.

3.4. Environmental and Social Audit

Regular audits of the implementation of the Environmental and Social Management Plan (ESMP), including the Biodiversity Management Plan (BMP), will be conducted by an independent environmental and social auditor — an external entity or expert, independent of the PIU, the Contractor, and the Contract Engineer, selected by the PIU in consultation with the PCU and the World Bank. Audits will be conducted at least once a year during construction and at least once every two years during the operational phase for the first 5 years, in accordance with the ESCP provisions.

The audits will include an assessment of the following aspects:

the adequacy of management plans relative to the scale and nature of anticipated impacts and the current stage of Task implementation;

the level of awareness, competence, and compliance of staff activities with the requirements of the ESMP, BMP, and related plans, procedures, and instructions;

the effectiveness of management, supervision, and operators in implementing, maintaining, and enforcing the requirements of the BMP and related plans;

the adequacy of allocated resources, equipment, and the budget for implementing the ESMP and BMP.

All recommendations resulting from the audits will be discussed with the Contractors. Corrective actions will be monitored through an appropriate nonconformity log to ensure full documentation of the process, oversight of the implementation of recommendations, and formal closure of individual issues upon their effective implementation.

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