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WATER RESERVOIRS PROJECT - ARMENIA

Environmental and Social Impact Assessment for the Kasakh Reservoir Construction Project

BIODIVERSITY ACTION PLAN

Rev02

April 2026

Prepared for:

***European Bank for
Reconstruction and
Development***

and

***Water Committee under the
Ministry of Territorial
Administration and
Infrastructure of the Republic
of Armenia***

 **ATMS
Solutions**
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Consultancy Services Contract № 2023.009567

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This Biodiversity Action Plan (BAP) has been developed as part of the Environmental and Social Impact Assessment (ESIA) for the Kasakh Reservoir Construction Project (hereinafter 'the Project'). The assessment is based on information drawn from multiple sources, including the detailed design documentation, reports from field investigations, meeting records, relevant publications, various databases, and data collected directly by the ESIA team.

Verifying all sources with complete certainty is extremely challenging; therefore, validation has been undertaken primarily through careful review and logical assessment of the available information. Every effort has been made to ensure that all information used in the ESIA has been accurately presented.

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List of Abbreviations

BAP	- Biodiversity Action Plan
BMP	- Biodiversity Management Plan
BOMP	- Biodiversity Offset Management Plan
CH	- Critical Habitat
CJSC	- Close Joint Stock Company
EAAA	- Ecologically Appropriate Area of Analysis
EBRD	- European Bank for Reconstruction and Development
EIA	- Environmental Impact Assessment
ESAP	- Environmental and Social Action Plan
ESIA	- Environmental and Social Impact Assessment
ESHS	- Environmental, Social, Health, and Safety
ESMP	- Environmental and Social Management Plan
ESMS	- Environmental and Social Management System
ESP	- Environmental and Social Policy
EU	- European Union
E&S	- Environmental and Social
GIP	- Good International Practice
ME	- Ministry of Environment
MTAI	- Ministry of Territorial Administration and Infrastructure
NG	- Net Gain
NNL	- No Net Loss
OHS	- Occupational Health and Safety
OHSMP	- Occupational Health and Safety Management Plan
GA	- Government of Armenia
PAP	- Project Affected Person
PBF	- Priority Biodiversity Features
PIU	- Project Implementation Unit
PPE	- Personal Protective Equipment
PR	- Performance Requirement
RA	- Republic of Armenia
SDA	- Spoil Disposal Area
SDMP	- Spoil Disposal Management Plan
SPA	- Spoil Disposal Area
SPMP	- Spill Prevention and Management Plan
SSESMP	- Site-Specific Environmental and Social Management and Monitoring Plan
WCRA	- RA Water Committee
WMP	- Waste Management Plan

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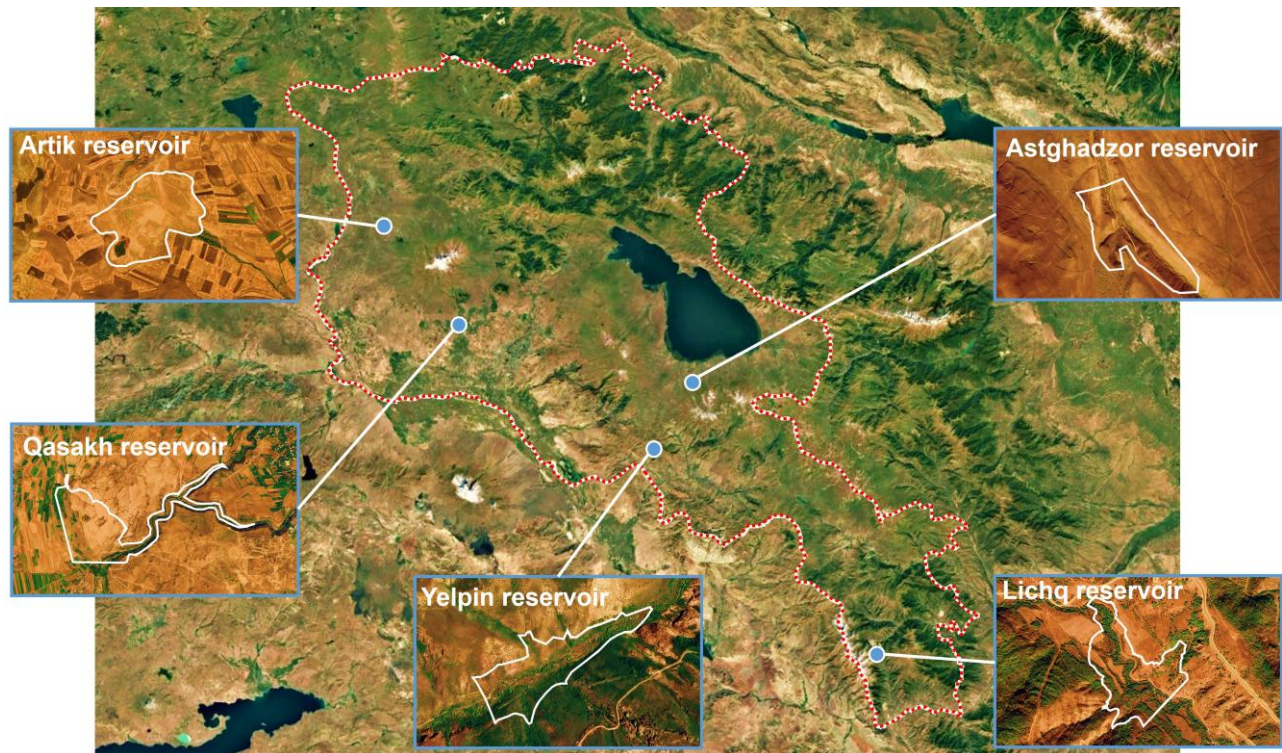
1. Introduction

The Government of the Republic of Armenia ('RA') plans to construct 17 reservoirs within the EU support initiative 'Recovery, resilience and reform: post 2020 Eastern Partnership priorities' to the Government of Armenia ('GA') to enhance the water and food security level in the country. The European Bank for Reconstruction and Development ('EBRD' or the 'Bank') is considering provision of a loan to the GA to finance the construction of five water reservoirs in different regions (Marzes) of Armenia:

- Kasakh reservoir in Aragatsotn Marz¹,
- Lichk reservoir in Syunik Marz,
- Yelpin reservoir in Vayots Dzor Marz,
- Artik reservoir in Shirak Marz,
- Astghadzor reservoirs in Gegharkunik Marz.

The locations of the Project reservoirs are shown in **Figure 1**.

Figure 1. Map of the Project reservoirs



The EBRD has categorized this greenfield project as 'A' in line with its Environmental and Social Policy ('ESP') (2019) because it may cause significant environmental and social impacts. This means that a comprehensive Environmental and Social Impact Assessment ('ESIA') report and associated documents must be elaborated, followed by their public disclosure for a minimum period of 120 days.

One of the five reservoirs listed above is planned for construction within the administrative boundaries of Voskehat, Voskevaz, and Oshakan rural settlements in Ashtarak community (Aragatsotn Marz, RA), as well as Amberd and Aygeshat settlements in Khoy community (Armavir Marz, RA). The Kasakh reservoir is designed to be fed by the Kasakh and Amberd rivers and will

¹"Marz" means "Region" in Armenian

supply water to the Stage 2 Hrazdan Down Channel, through which 503 ha of agricultural land in 21 settlements of Armavir Marz will be irrigated.

The Bank has engaged the Consultant² to update the national Environmental Impact Assessment ('EIA') report for the Kasakh Reservoir Construction Project into the ESIA in accordance with the EBRD ESP and to prepare the associated Environmental and Social (E&S) documentation, including this Biodiversity Action Plan ('BAP') proportionate to the Project's specific impacts, benefits, and opportunities.

2. Need, Purpose and Structure of the BAP

Armenia is a key contributor to biodiversity within the South Caucasus, one of the world's recognised biodiversity hotspots. Despite its relatively small size, Armenia hosts an exceptional variety of ecosystems and habitats, including semi-deserts, mountain steppes, broadleaf and mixed forests, riverine and wetland systems, subalpine and alpine meadows, and high-mountain rocky ecosystems. This habitat diversity supports high species richness and numerous endemic and rare species.

Located at the junction of Europe, Asia, and the Middle East, Armenia also functions as an ecological corridor, facilitating species movement and maintaining genetic exchange across the region. These characteristics give Armenia an important ecological role at both national and transboundary levels.

As presented in the ESIA, the Kasakh Reservoir Construction Project will be implemented in an area of high biodiversity where valued habitats and species were identified. The CHA has revealed biodiversity values assessed as PBFs and CHs that will be adversely affected by the Project; some habitats will be lost. According the EBRD PR6, this requires mitigation and, as a last resort, offsetting. This requirement underpins the need for a Biodiversity Action Plan (BAP).

Purpose of the BAP is development of mitigation measures in accordance with the mitigation hierarchy and design a biodiversity offset strategy to address the project's significant residual impacts on biodiversity.

The BAP provides a biodiversity summary from the ESIA including a description of legal framework for biodiversity conservation, outline of the Project and findings on biodiversity values and impacts on them. In accordance with to the EBRD PR6, a set of mitigation measures is designed in the form of Biodiversity Management Plan (BMP) comprising objectives, specific actions, timelines, assigned responsibilities, and monitoring indicators. Just after, remained residual impacts on some PBFs and CHs are assessed. Finally, the BAP designs an offsetting strategy to achieve no net loss/net gains of priority biodiversity features (PBFs) and critical habitats (CHs).

The BAP has been informed by the Project's biodiversity baseline, national EIA and ESIA reports, and has been developed with input from a range of stakeholders, including Ministry of Environment (ME), biodiversity experts, available national level reports as well as documents prepared by the international organization specialised in the biodiversity studies. The BAP will need to be updated if changes to the Project design occur and prior to the commissioning of the reservoir. Any update of the BAP should be agreed with the EBRD and "no objection" should be obtained from the Water Committee of the Republic of Armenia (WCRA).

²A consortium consisting of ATMS Solutions Ltd. (Armenia) and Ecoline International Ltd. (Bulgaria)

3. Legal and Regulatory Framework for Biodiversity

3.1 National Requirements

According to the **RA Law on Environmental Impact Assessment and Expert Examination (2014, revised in 2023)**³, there are two types of documents, which are subject to environmental impact assessment and expert examination. These documents are:

- (i) Framework Document - a policy, strategy, concept, scheme of utilization of natural resources, program, master plan, urban development document, which are likely to affect the environment; and
- (ii) (ii) Design Document - technical report, feasibility study and construction-engineering design of intended activity.

The Law establishes the general legal and organizational principles for conducting the mandatory EIA of various types of activities and concept documents of sectoral development. According to Article 12 of the Law, the types of activities, which should undergo EIA are divided into "A" and "B" categories depending on their expected environmental impact.

As per Article 12 the Law, the reservoirs or artificial lakes with 500,000 m³ and more capacities are subject of national EIA and State expert examination. The roles and powers of parties engaged in EIA and expert examination processes are set out in Chapter 2 of the Law. The procedure for public notification and public discussions is outlined in the **RA Government Decree №1325-N** dated 19.11.2014⁴.

The **RA Law on flora (1999)**⁵ and **RA Law on fauna (2000)**⁶ outline Armenia's policies for the conservation, protection, use, regeneration and management of natural populations of plants and animals as well as the impact of human activities on biodiversity. These laws are aimed at the sustainable preservation and use of flora/fauna and the conservation of biodiversity. The laws also contain provisions for assessing and monitoring flora and fauna, especially rare and threatened species. The RA Government Decree №71-N and №72-N on approval of the **RA Red Book of animals**⁷ and **RA Red Book of plants**⁸ respectively define the biology of threatened (rare, threatened, endangered, vulnerable) species of flora and fauna as well as their quantity, habitats and variety.

The **Law of Fauna** was materially updated in 2022 to introduce the new concepts in order to complete Armenia's commitments under the 2018 Partnership Agreement with the EU⁹ and align with the EU legislation. The amendments included such notions as fauna monitoring, definition of invasive species, use of fauna for health, protection and industrial purposes, Important Bird Areas (as areas of special environmental interest established for conservation of birds (outside of specially protected nature areas or included therein), serving for nesting, wintering or rest, and others.

RA Government Decree №781-N "On the order of protection of flora of the Republic of Armenia and its use for the purpose of reproduction in natural conditions (2014)"¹⁰ defines the measures for

³<https://www.arlis.am/documentview.aspx?docid=178468>

⁴<https://www.arlis.am/documentview.aspx?docid=188071>

⁵<https://www.arlis.am/documentview.aspx?docid=120784>

⁶<https://www.arlis.am/documentview.aspx?docid=120790>

⁷<https://www.arlis.am/DocumentView.aspx?DocID=56347>

⁸<https://www.arlis.am/DocumentView.aspx?DocID=56348>

⁹Comprehensive and enhanced Partnership Agreement between the European Union and the European Atomic Energy Community and their Member States, of the one part, and the Republic of Armenia, of the other part ([https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:22018A0126\(01\)](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:22018A0126(01))).

¹⁰<https://www.arlis.am/documentview.aspx?docid=91830>

the protection, including translocation, of plants threatened with extinction as a result of economic activity.

The **RA Law on special protected natural areas (2006)**¹¹ regulates special protected areas of RA and eco-systems that have environmental, economic, social, scientific, educational, historical, cultural, healthcare and recreational value. It also outlines the legal basis for state policies regarding sustainable development, restoration, protection, reproduction and use of natural features and complexes. The Law defines four categories of protected areas in Armenia: (i) State Reserves; (ii) National Parks; (iii) Sanctuaries; and (iv) Nature Monuments. The list of the nature monuments is approved by the **RA Government Decree №967-N** dated 14.08.2008¹².

The **RA Forest Code (2005)**¹³ regulates the sustainable management of forests: guarding, preserving, rehabilitation, afforestation and rational use of forests and forest lands in Armenia as well as forest inventory, monitoring and control.

The **RA Water Code (2002)**¹⁴ provides the legal basis for the protection of water resources, the provision of water for people and economic sectors through effective management of water resources and ensuring the protection of water resources for future generations. The Water Code includes the following: responsibilities of state/local authorities and public, development of the national water policy and national water program, water cadastre and monitoring system, public access to relevant information, water use and water system use permitting systems, trans-boundary water resources use, water quality standards, safe operation of hydraulic facilities, protection of water resources and state supervision. The quality of surface water in Armenia is monitored as per the principles of EU Water Framework Directive adopted by the **RA Government Decree №75-N** dated 27.01.2011¹⁵.

Article 1 of the Water Code defines, among other things:

- 'Water protection zone' as an area designated to prevent the pollution and depletion of water resources, and to maintain a favourable water regime; such areas are not subject to privatization or confiscation.
- 'Protected sanitary zone of water ecosystems' as an area designated to protect water resources used for drinking, healthcare, domestic services, medical facilities, resorts, and other health-related purposes.

3.2 Ratified International Agreements

Republic of Armenia is a signatory/party to several international agreements related to biodiversity (**Table 1**).

Table 1. List of ratified by the RA international agreements applicable for the project

International agreements (convention or protocol)	Description
Convention on Wetlands of International Importance - (Ramsar 1971)	The Ramsar Convention is an intergovernmental treaty aiming to maintain the ecological character and plan the sustainable use of Wetlands of International Importance. The Convention entered into force in Armenia in 1993.

¹¹<https://www.arlis.am/documentview.aspx?docid=140513>

¹²<https://www.arlis.am/documentview.aspx?docid=157090>

¹³<https://www.arlis.am/DocumentView.aspx?docid=121312>

¹⁴<https://www.arlis.am/DocumentView.aspx?docid=148955>

¹⁵<https://www.arlis.am/documentview.aspx?docid=200962>

International agreements (convention or protocol)	Description
The Convention on the Conservation of Migratory Species of Wild Animals (1979) (Bonn Convention)	The objective of the Bonn Convention, which was adopted in 1979, is to ensure the conservation of land, marine and air migratory species over the whole of their area of distribution. Armenia is a State party since 2011
Convention on International Trade in Endangered Species (CITES) (1973)	This convention is designed to ensure that international trade in animals and plants does not threaten their survival in the wild. Armenia joined this convention in 2008.
Convention on the Conservation of European Wildlife and Natural Habitats, Bern (1979)	The Bern Convention is a binding international legal instrument in the field of nature conservation, covering most of the natural heritage of the European continent and extending to some States of Africa. Ratified by Armenia in 2008.
The Convention on Biological Diversity (1992)	The three main objectives of the Convention are: the conservation of biological diversity; the sustainable use of the components of biological diversity; and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. Signed by Armenia in 1993.
UN Convention to Combat Desertification, Paris (1994)	This Convention is the sole legally binding international agreement linking environment and development to sustainable land management. The Convention addresses specifically the arid, semi-arid and dry sub-humid areas, known as the drylands, where some of the most vulnerable ecosystems and peoples can be found. Ratified by Armenia in 1997.
Convention on Environmental Impact Assessment in a Transboundary Context, Espoo Convention (1991)	The Convention sets out the obligations of the Parties to carry out an environmental impact assessment of certain activities at an early stage of planning. Before permitting an industrial project, the country to decide on the project ("country of origin") must notify any countries which could be affected by the transboundary impacts of a project located in another country ("affected parties"). The affected party and the public in the affected area must be able to express their views and comments about the proposed project. This is a separate procedure which is additional to any relevant national permitting process. The permitting state must take these comments into account in its final decision and communicate it to the affected country and the public. The projects subject to consultations under the Convention are those listed in Appendix I including 'large dams and reservoirs'. Ratified by Armenia in 1997.

3.3 EBRD Requirements

The main requirements of the EBRD for its own activities are formulated in the Bank's ESP (2019), while the requirements for the E&S aspects of the Client-borrower's activities are set out in the RRs. The ESP sets E&S requirements for the EBRD clients' activities to achieve sustainable results, with the *PR1: Assessment and Management of Environmental and Social Risks and Impacts* being the umbrella PR for the other requirements. The one relevant regarding Biodiversity is the *PR 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources* which

determines the requirements for the conservation of biological and landscape diversity in the development area. PR 6 requires the borrower to characterise the state of biodiversity, identifying sensitive species and habitats, and developing measures to avoid / reduce impacts. PR 6 defines criteria for critical habitat screening and requires developing a BAP where significant adverse impacts on biodiversity are expected.

3.4 Good International Practice (GIP) Guidelines

Specific E&S requirements applicable to the Project are set out in the EBRD's Sub sectoral Environmental and Social Guidelines: Building and Construction Activities (2010)¹⁶. They elaborate on typical E&S risks related to construction, operation, maintenance and decommissioning of facilities.

The following biodiversity guidelines were used for the BAP development:

- EBRD's Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources (Guidance Note PR6, EBRD, 2022)¹⁷,
- Hardner, J., R.E. Gullison, S. Anstee, M. Meyer. 2015. Good Practices for Biodiversity Inclusive Impact Assessment and Management Planning. Prepared for the Multilateral Financing Institutions Biodiversity Working Group¹⁸,
- Biodiversity Offsets: a User Guide. World Bank Group. October, 2016¹⁹,
- A Cross-sector Guide for Implementing the Mitigation Hierarchy. Prepared by The Biodiversity Consultancy. Cross-sector Biodiversity Initiative, 2015²⁰,
- Edgar, P., Foster, J. and Baker, J. (2010). Reptile Habitat Management Handbook. Amphibian and Reptile Conservation, Bournemouth²¹.

3.5 Applicable EU Directives

- Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora²²,
- Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds²³.

4. Project Description

Kasakh Reservoir is planned for construction within the administrative boundaries of Voskehat, Voskevaz and Oshakan villages of Ashtarak community (RA Aragatsotn Marz) and Amberd and Aygeshat villages of Khoy community (RA Armavir Marz) (**Figure 2**) at the confluence of the Kasakh and Amberd rivers, at an elevation of 950-980 MASL. The area proposed for the reservoir is mainly covered by community and private lands of agricultural significance, including pastures and arable land. The reservoir will supply water to the Stage 2 Hrazdan Down Channel, through which 503 ha of agricultural land in 21 settlements of Armavir Marz will be irrigate.

¹⁶<https://www.ebrd.com/downloads/policies/environmental/construction/buidling.pdf>

¹⁷<https://www.ebrd.com/who-we-are/our-values/environmental-and-social-policy/implementation.html>

¹⁸<https://publications.iadb.org/publications/english/document/Good-Practices-for-Biodiversity-Inclusive-Impact-Assessment-and-Management-Planning.pdf>

¹⁹<https://documents1.worldbank.org/curated/en/344901481176051661/pdf/110820-WP-BiodiversityOffsetsUserGuideFinalWebRevised-PUBLIC.pdf>

²⁰<https://www.icmm.com/en-gb/guidance/environmental-stewardship/2015/implementing-mitigation-hierarchy>

²¹<https://dnu7gk7p9afoo.cloudfront.net/Files/37.-edgar-p.-foster-j.-and-baker-j.-2010.-reptile-habitat-management-handbook.amphibian-and-reptile-conservation-bournemouth.pdf>

²²<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A01992L0043-20250714>

²³<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02009L0147-20190626>

The Kasakh Reservoir will occupy an area of 89.7 ha (surface area at the FSL); however, a total of 145.26 ha of land will be permanently allocated for the project's needs, including the protection zone around the reservoir, not flooded part of the dam, and supporting infrastructure.

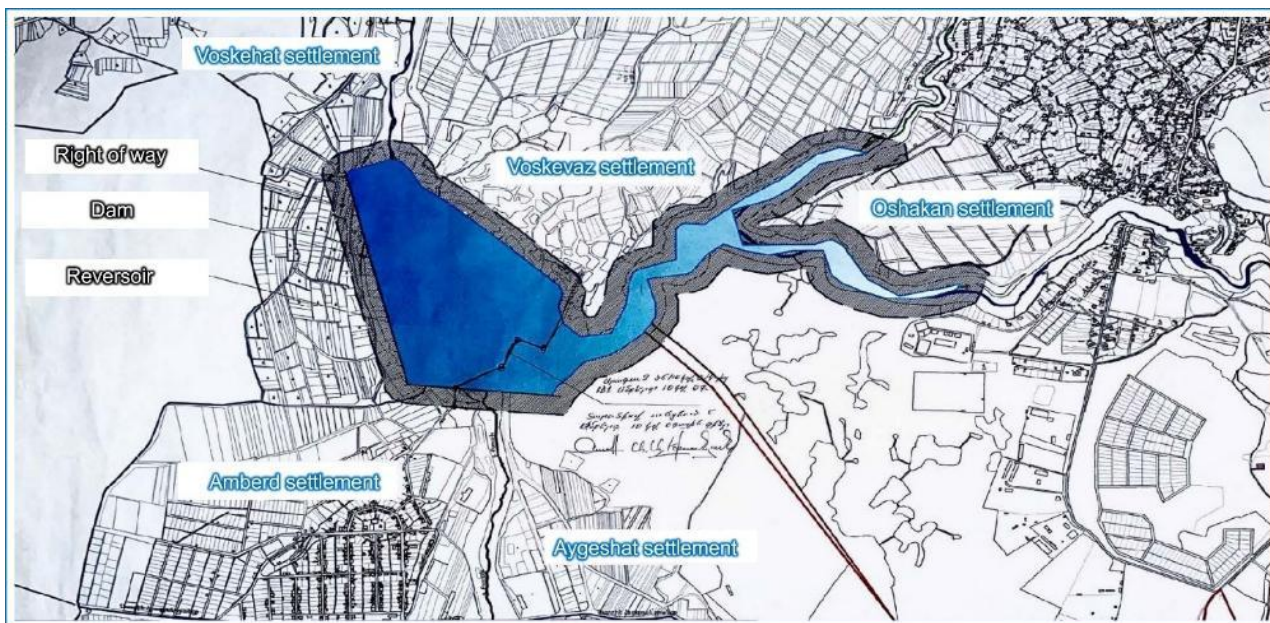
The full footprint area that is 97.18 ha covers the reservoir area of 89.7 ha plus the area of the not flooded part of the dam (7.48 ha). The area of the buffer zone including the footprint area is 145.26 ha, and the area of the buffer zone alone is 48.08 ha.

The reservoir will have a storage capacity of 10 million m³.

The reservoir hydraulic unit consists of:

1. Dam,
2. Construction (diversion) outlets 1 and 2,
3. Irrigation outlet (offtake),
4. Bottom outlet,
5. Emergency spillway.

Figure 2. Location of the Kasakh reservoir within administrative boundaries of 5 settlements



The main technical characteristics of the dam are as follows:

- Dam height - 32.14 m,
- Inclination of the upstream slope - 1:2.5,
- Inclination of the downstream slope - 1:2.2,
- Crest width - 8.0 m,
- Dam length - 1,686 km.

All facilities required for the reservoir construction, except of the loam (clay) borrow pit, are situated within the Construction site (145.26 ha area permanently allocated for the Project needs). These facilities include a construction camp, a stone quarry, two pebble-gravel and loam borrow pits, three stone storage areas, three pebble-gravel storage areas and two topsoil temporary storage areas (Figure 3).

The loam (clay) required for dam construction will be sourced from a borrow pit located in the Gay community of the Etchmiadzin region, approximately 35 km from the Project site. Upon completion of the reservoir construction, the loam borrow pit will be recultivated and returned to Gay community.

Therefore, no temporary land use will be needed from the Project needs.

Figure 3. Layout of the construction site



5. Biodiversity Values

Biodiversity values for this Project are defined as the species and habitats that qualify as Priority Biodiversity Features (PBFs) and Critical Habitats (CHs).

The Critical Habitats Assessment (CHA) against the EBRD PR6 has revealed three habitats (according the EUNIS habitat classification used by the Bern Convention) and 45 species: one mammal species, 32 bird species, one reptile species, one fish species and 10 invertebrate (insect) species identified as PBFs and one habitat and 11 species: 4 mammal species, 6 reptile species and one amphibia triggering CH (see [Table 2](#)).

In line with the EBRD Guidance Note on PR6 and Declaration on the European Principles for the Environment, the EBRD has adopted the country-sensitive approach for countries that are part of the European Neighbourhood Policy, which involves tailoring the application of the criteria and conditions for identifying PBFs and CHs to the needs of a specific country. This means that the requirements of the EU Directives would not be automatically applicable to the analysis below.

Table 2. CHA Findings: Summary Table of PBFs and CHs identified in the footprint area as per EBRD PR6²⁴

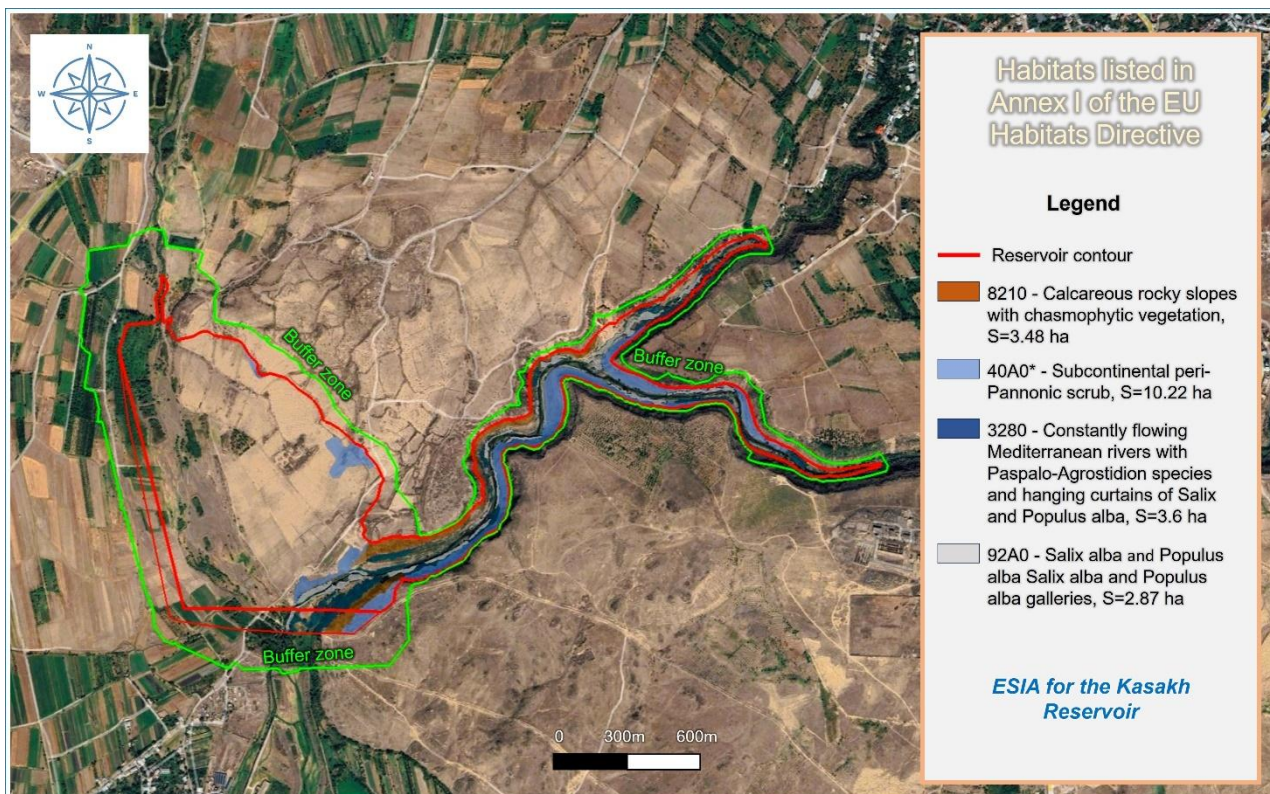
No	Criterion	Features (Habitats/species)
Priority Biodiversity Features as per EBRD PR6 (§12)		
i	12.i.a EAAA ²⁵ is habitat type listed in Annex I of the EU Habitats Directive and Resolution 4 of the Bern Convention	<u>Habitats</u> (×3) 3280 Constantly flowing Mediterranean rivers with Paspalo-Agrostidion species and hanging curtains of <i>Salix</i> and <i>Populus alba</i> , 92A0 <i>Salix alba</i> and <i>Populus alba</i> galleries, 8210 Calcareous rocky slopes with chasmophytic vegetation.
ii	12.ii.a EAAA for species and their habitats listed in Annex II of the Habitats Directive, Annex I of the Birds Directive, or Resolution 6 of the Bern Convention	<u>Birds</u> (×30) <i>Botaurus minutus</i> (LC) <i>Ciconia nigra</i> (LC) <i>Ciconia Ciconia</i> (LC) <i>Pernis apivorus</i> (LC) <i>Tachyspiza brevipes</i> (LC) <i>Buteo rufinus</i> (LC) <i>Aquila nipalensis</i> (EN) <i>Hieraaetus pennatus</i> (LC) <i>Falco peregrinus</i> (LC) <i>Anthropoides virgo</i> (LC) <i>Sternula albifrons</i> (LC) <i>Bubo bubo</i> (LC) <i>Lullula arborea</i> (LC) <i>Luscinia svecica</i> (LC) <i>Neophron percnopterus</i> (EN) <i>Clanga pomarina</i> (LC) <i>Gyps fulvus</i> (LC) <i>Circaetus gallicus</i> (LC) <i>Circus cyaneus</i> <i>Circus macrourus</i> (NT) <i>Circus pygargus</i> (LC) <i>Caprimulgus europaeus</i> (LC) <i>Coracias garrulus</i> (LC) <i>Alcedo atthis</i> (LC) <i>Anthus campestris</i> (LC) <i>Dendrocopos syriacus</i> (LC) <i>Ficedula semitorquata</i> (LC) <i>Lanius collurio</i> (LC) <i>Lanius minor</i> (LC) <i>Pyrrhocorax pyrrhocorax</i> (LC) <u>Insects</u> (×1) <i>Euphydryas aurinia</i>

²⁴In case a species would trigger several criteria in the PBF and CH, it is listed in this table only once as the highest conservation concern, which is CH.

²⁵EAAA - ecologically appropriate area of analysis

No	Criterion	Features (Habitats/species)
iii	12.ii.b EAAA supports < 0.5% of global population OR < 5 reproductive units of a CR or EN species	<u>Birds</u> (×1, already triggering ii.a and ii.d) <i>Neophron percnopterus</i> (EN)
	12.ii.c EAAA supports VU species	<u>Fishes</u> <i>Luciobarbus capito</i> (VU)
	12.ii.d EAAA for regularly occurring nationally or regionally listed EN or CR species	<u>Mammals</u> (×1) <i>Neomys teres (schelkovnikovi)</i> (LC) listed in the Red Book of RA as EN <u>Birds</u> (×1, already triggering cr.12 ii.a and ii.b) <i>Neophron percnopterus</i> (EN)
	12.ii.e EAAA for regularly occurring range-restricted species	<u>Birds</u> (×1) <i>Phylloscopus sindianus</i> <u>Insects</u> (×9) <i>Anthocharis gruneri</i> <i>Armenia ledereri</i> <i>Armenia hyrcanica</i> <i>Nordmannia abdominalis</i> <i>Polyommatus (Agrodiaetus) demavendi</i> , <i>Hipparchia syriaca</i> <i>Satyrus amasinus</i> <i>Pseudochazara pelopea</i> <i>Thaleropsis ionia</i>
	12.iii Significant biodiversity features identified by a broad set of stakeholders or governments	<u>Birds</u> (×1) <i>Irania gutturalis</i> (LC) listed in the Red Book of RA as VU <u>Reptiles</u> (×1) <i>Eumeces schneideri</i> listed in the Red Book of RA as VU
Critical Habitats as per EBRD PR6 (§14)		
i	14.i.a EAAA is habitat type listed in Annex IV of the EU Habitats Directive	<u>Habitats</u> (×1) 40A0 Subcontinental peri-Pannonic scrub
ii	14.ii.a EAAA for species and their habitats listed in Annex IV of the Habitats Directive	<u>Mammals</u> (×3) <i>Canis lupus</i> <i>Lutra lutra</i> (NT) <i>Felis silvestris</i> (LC) <i>Pipistrellus sp.</i> <u>Reptiles</u> (×6) <i>Pseudopus apodus</i> <i>Lacerta media</i> (<i>Lacerta viridis</i>) <i>Eryx jaculus</i> <i>Natrix tessellata</i> <i>Coronella austriaca</i> <i>Hemorrhois nummifer</i> (<i>Coluber nummifer</i>) <u>Amphibians</u> (×1) <i>Bufo viridis</i>

The habitats map of PBFs triggering the EBRD PR6 Criterion 12 i.a is presented on **Figure 4**.

Figure 4. Map of the habitats in the Project footprint area listed in Annex I of the EU Habitat Directive

Aquatic life

As described in the ESIA, the composition of fish species found in the Kasakh River is represented by 15 species. This assessment is based on the review and analysis of existing literature, complemented by the field survey observations.

Currently, the main fish species in the middle and upper reaches of the Kasakh River include the Trout, Caucasian scraper, Kura barbel, Kura bleak, European chub, South Caspian sprilin. These species are native to the local fish community. In addition, there are invasive species such as Topmouth gudgeon, Prussian carp, and Rainbow trout. Notably, the Topmouth gudgeon and Prussian carp, which were introduced in the 1960s and 1970s, adapted well to various conditions, gradually expanding their presence and displacing native species from their ecological niches. The Topmouth gudgeon, in particular, has become one of the most populous fish in the middle stretches of the Kasakh River, second only to the South Caspian sprilin.

On the other hand, due to poaching and illegal fishing, several native species, especially the Trout, have nearly disappeared from the main channel of the Kasakh River and are now mostly found in some of its tributaries, namely Amberd. Rainbow trout, by contrast, is found sporadically and in small numbers. Unlike the Topmouth gudgeon and Prussian carp, these species do not breed in the Kasakh River.

From the 15 identified species, one species (Bulatmai barbel, *Luciobarbus capito*) is assessed as the PBF Feature according to the EBRD PR6 criterion 12-ii as it is listed in the IUCN Red List category "Vulnerable" (see [Table 2](#)).

6. Summary of Potential Impacts

As presented in the ESIA, the Project will be implemented in the rich biodiversity area where valued (priority) habitats and species were identified.

The impacts of the Project on biodiversity will occur during both construction and operation / maintenance. The construction phase involves the dam building and reservoir filling. The methodology of impact assessment, including the identification of impact characteristics and significance matrix are detailed in Section 5 of the ESIA. As different species and their groups respond differently to different impacts, their sensitivity as receptors was considered during assessment.

The following potential impacts on biodiversity (including PBFs and CHs) could result from the Project activities during:

1. Construction phase:

- Destruction (loss) of habitats (by vegetation clearance, excavation, top-soil removal and transportation, reservoir filling),
- Flora species loss (by vegetation clearance, including trees cutting, excavation, top-soil removal and its transportation, reservoir filling),
- Disturbance of fauna species by noise, vibration and light pollution (construction machinery, traffic, lighting at the construction site),
- Destruction of sedentary animals' habitats and risk of their death (as a result of excavation, top-soil removal and its transportation, reservoir filling),
- Loss of foraging habitats for transit species of mammals (vegetation clearance, removal of top-soil, excavation, quarrying, movement and placement of topsoil and quarried materials, reservoir filling),
- Loss of foraging habitats for bats (as a result of excavation, top-soil removal and its transportation, reservoir filling) (apparently, but should be confirmed)
- Loss of breeding and foraging habitats for birds (as a result of excavation, top-soil removal and its transportation, reservoir filling),
- Loss of breeding, foraging and wintering habitats of invertebrates and a risk of death of their overwintering stages (vegetation clearance, removal of top-soil, quarrying, excavation, movement and placement of topsoil and quarried materials reservoir filling),
- Destruction of the habitats of the aquatic and semi-aquatic species and a risk of the species death
- Obstacle to migration of the aquatic species (blocking the river native water flow by the construction site)
- Impact on protected areas and internationally designated areas.

2. Operation and maintenance phase:

- Emergence of new habitats (water, riparian),
- Increased access to the area,
- Obstacle to migrations of aquatic species (blocking the native water flow by the dam).

Negative impacts could occur mainly at the construction phase; they are caused by the dam building and flooding of the reservoir footprint area.

Some positive impacts on biodiversity occur during the operational phase; they are connected with the emergence of new habitats where large water surface area and coastal vegetation would attract some species of animals.

The assessment is completed for each predicted impact at the construction and operation phases and per each group of biodiversity receptors, which were combined based on their ecological characteristics; in some cases, impacts on individual species are assessed where possible.

Table 3. Assessment of impacts on the identified biodiversity features (PBFs and CHs)

Code	Receptor	Key impacts identification	Impact significance
3280	Constantly flowing Mediterranean rivers with Paspalo-Agrostidion species and hanging curtains of Salix and Populus alba)	Habitat loss (3.6 ha)	Significant
92A0	Salix alba and Populus alba galleries	Habitat loss (2.87 ha)	Significant
8210	Calcareous rocky slopes with chasmophytic vegetation	Habitat loss (3.48 ha)	Significant
40A0*	Subcontinental peri-Pannonic scrub	Habitat loss (10.22 ha)	Significant
Sedentary animals Reptilians: Pallas's glass lizard (10-50 individuals), Medium Lizard (20-100 individuals), Javelin sand boa (5-20 individuals), Smooth snake (<i>the presence of the species should be re-checked</i>), Coin-marked snake (10-50 individuals), Schneider's skink, (20-100 individuals)		Destruction of sedentary animals' habitats: Reptilians - about 15.84 ha in total (rocky, temperate thickets and scrub habitats; the species' ranges overlap), Risk of their death due to vegetation clearance, excavation works, flooding reservoir	Significant
Sedentary animals Reptilians: Water (dice) snake Amphibians: Variable toad/ green toad		Destruction of animals' habitats and risk of their death; however, the flooded area will increase the periphery of the coastline and thus increase the habitat of the species	Moderate
Transit species of terrestrial mammals: Grey Wolf European wildcat		Loss of foraging habitats for transit species of mammals (should be confirmed)	Low
Flying mammals: bats Pipistrellus sp.		Loss of foraging habitats (should be confirmed) Increase in amphibious insect numbers around the filled reservoir might increase food supply for the bat species	Not defined
Birds European Roller 1-2 pairs Syrian Woodpecker 2-3 pairs Tawny Pipit 1-2 pairs Wood Lark 5-9 pairs White-throated Robin 3-5 pairs		Loss of breeding habitats	Significant

Code	Receptor	Key impacts identification	Impact significance
	Red-backed Shrike 2-4 pairs Lesser Grey Shrike 1-2 pairs	Lost habitats - about 20 ha in total ²⁶ (the species' ranges overlap)	
	Birds: Little Bittern 1-2 pairs Common Kingfisher 1-2 pairs	Temporarily impact on the breeding range	Low
	Birds: Long-legged Buzzard 1 pair Red-billed Chough 1 pair	Somewhat restriction of the individual breeding territories	Low
	Insects: <i>Anthocharis gruneri</i> <i>Armenia ledereri</i> <i>Armenia hyrcanica</i> <i>Nordmannia abdominalis</i> <i>Polyommatus (Agrodiaetus) demavendi</i> <i>Hipparchia syriaca</i> <i>Satyrus amasinus</i> <i>Pseudochazara pelopea</i> <i>Thaleropsis ionia</i> <i>Euphydryas aurinia</i>	Destruction of habitats, increased mortality of individuals due to vegetation clearance, excavation works, flooding reservoir	Significant
	Semi-aquatic species: Transcaucasian water shrew Eurasian otter	Destruction of riparian habitats; risk of death of the water shrew during the riparian habitat destruction (should be confirmed), however but the flooded area will increase the periphery of the coastline and thus increase the habitat of the species	Low
	Fish Bulatmai barbel	Obstacle to migration of the species at the construction and operation phases	Significant

In addition to the habitats lost within the reservoir and dam footprint area, some habitats will be destroyed in the buffer zone west, south and north of the dam due to the planned location of storage areas, construction camp, and other objects (Figure 3). At present, no complete data are available on the types and area of the habitats that will be destroyed due to these auxiliary structures; but, according to a preliminary estimation, most of the habitats are agriculture areas. Nevertheless, the survey to identify habitats and their affected areas should be carried out at the pre-construction phase and appropriate mitigation measures developed (this is included in the BMP, see below).

²⁶This area is calculated basing on the European Roller breeding territory that is the largest one (territories of the other bird species are less and may overlap with the European Roller one). Suitable habitats include trees, shrubs and rocky plots. Some of the mentioned species (as Syrian Woodpecker, White-throated Robin and Tawny Pipit) use fruit orchards and semi-desert plots located around the construction site as habitats; taking this into account proposed area is considered enough to offset the destructed habitats for the species.

7. Mitigation: Biodiversity Management Plan

According to the EBRD PR6, the mitigation hierarchy should be applied, where impact avoidance is the first choice. If avoidance is not possible, adverse impacts have to be minimised or mitigated. And, as a measure of last choice, offsetting may be applied, if significant residual impacts remain after all previous efforts.

Mitigation measures were developed in the ESIA in terms of the priority features groups. In the current BAP, developed measures are presented in the framework of the BMP with monitoring targets (indicators), timeframe and responsible parties.

Mitigation measures related to capacity improvement of the priority species habitats, capture and relocation of animals are included in the offset measures (see the Offsetting strategy, BAP2). Additional studies are included in the BMP to identify habitats that will be destroyed due to the reservoir construction activities within the buffer zone (but beyond the reservoir and dam footprint area), as well as to assess the significance of the project site for bats and semi-aquatic mammals.

This BAP forms part of the tender documentation for the Project. All mitigation contained in this BAP at the pre-construction and construction phase will be included in the Terms of Reference and contract of the Construction Contractor and cascaded into contracts of relevant subcontractors as appropriate. Hiring professional zoologists will be required to implement surveys and relocation of animals.

Project Lenders will be kept updated on BAP implementation progress via regular E&S Monitoring Reports (by independent external monitoring consultants).

All mitigation contained in this BAP at the operation and maintenance phase will be included in the Client's operation plan.

The matrix of the mitigation measures, that is the BMP, is presented in [Table 4](#).

Table 4. Mitigation measures: Biodiversity Management Plan

Measures, actions	Timeframe	Responsible	Indicator
BMP1 (avoidance measures)			
Objective: Avoid mortality of burrow animals due to construction works and flooding			
<i>Pre-construction phase</i>			
A1. Survey the area to map inhabited burrows of badger and other burrowing mammals; if the burrows may be affected by the pre-construction/construction works, provide relocation by species-specific methods	Prior to the commencement of any pre-construction preparations	Mammologist (with support of the Client or the construction contractor)	
Actions			
1. Survey the footprint areas to identify inhabited burrows (and map their locations), species and estimate quantity of animals	First year, best time - February to April, October to November (for badger)	Mammologist	Report, maps
2. If relocation is needed: survey the areas adjacent to the buffer zone with suitable habitats to where the animals can be relocated	First year		Report, maps

Measures, actions	Timeframe	Responsible	Indicator
in order to estimate their species-specific capacity	Second year		Developed relocation protocol.
3. Develop relocation protocol	Second year		Identified/ Safely relocated and settled animals
4. Carry out the relocation	For two years after		Monitoring report, percent of settled animals
5. Monitor the relocated animals in the new locations			
<i>Construction phase</i>			
A2. Before filling the reservoir, check the mapped residential burrows of badger and other animals; if they remain, capture them and relocate to the safe habitats.	Before filling the reservoir, from March - to October	Construction contractor, overall responsibility	
1. Examine potentially flooded area based on the prepared map of the burrow locations (see A1.1) to identify yet inhabited burrows and animals	Mach-September	Mammologist	Identified /relocated animals
2. If any animals remained: capture and relocate them according to the earlier developed protocol (see A1.3)	For two years after		Monitoring report, percent of settled animals
3. Monitor the relocated animals at the new locations			
BMP2 (reduction measures)			
Objective: decrease direct impacts of the construction works, operation and employee on fauna			
<i>Pre-construction phase</i>			
R1. Develop the Worker Code of Conduct for employees of the construction company to prevent poaching and 'Procedures to prevent harm to animals during construction works'	During the building preparation	Construction contractor, overall responsibility	Developed and approved documents
Actions:			
1. Develop the Worker Code of Conduct for employees focusing on prevention of poaching and protection of animals during building	During the construction preparation	Construction contractor, mammologist, herpetologist	Developed documents
2. Develop 'Procedures to prevent harm to animals during construction works' focusing on impact from excavating and blasting			
3. Approve the documents by the construction contractor order	Each new staff worker; all personnel - two times a year	Construction contractor, Supervision Engineer	Approved documents
4. Train personnel and subcontractors on the documents' application			Trained personnel and subcontractors
<i>Construction phase</i>			
R2. Prevent any harm to animals and poaching during construction by applying the developed documents (see R1)	During construction works	Construction contractor - overall responsibility;	Absence of cases of harm to animals, cases of poaching

Measures, actions	Timeframe	Responsible	Indicator
		Water Committee - supervision	
Actions: 1. Apply the "Procedures" during construction works including, among others: - Start construction works from one edge of the dam area, this approach will allow the remaining animals to leave, - Start vegetation clearance and construction works after the breeding season - not earlier than August (i.e. avoid these between March - July to avoid impacts to breeding animals) or confirm absence of breeding animals through an expert survey; this will prevent/reduce mortality of animals including offspring, - Strictly respect the limited project footprint areas, speed limitations, - qualified and experienced zoologist is to be engaged to supervise the excavation works - should any animals be found, procedures on capture and translocation must be followed, 2. Apply and monitor compliance with the Worker Code of Conduct of employee to prevent poaching during construction	During construction works During construction works	Supervision Engineer, Zoologist Supervision Engineer	Number of discovered animals, Number of saved and relocated animals Number of poaching cases
R3. Develop the Worker Code of Conduct for employees of the reservoir operator to prevent poaching and 'Procedures to observe, treat and save encountered animals during operations'	At the finishing construction works	Water Committee	Developed documents
Actions: 1. Develop the Worker Code of Conduct for employees focusing on prevention of poaching and saving animals during operation 2. Develop the 'Procedures to observe, treat and save encountered animals during operations' 3. Approve the documents 4. Educate and train hired personnel on the documents' application	At the operation preparation phase Just after personnel hired, further - two times a year	JRAR CJSC - reservoirs operator - responsible person, mammologist, herpetologist Supervision person	Developed documents Approved documents Trained personnel
<i>Operation and maintenance phase</i>			
R4. Prevent poaching and save animals during the operations of the reservoir hydraulic structure	During operation	JRAR CJSC - reservoirs operator	Absence of cases of harm to animals, cases of poaching
Actions: 1. Observe animals in the reservoir, riverbanks and buffer zone 2. If observed animal is at risk or harmed, implement animal saving actions according to the developed protocol (see R3), contact a responsible person/zoologist	During operation	JRAR CJSC - reservoirs operator Supervision person, if any	Number / species of animals discovered at risk or harmed, number of saved animals

Measures, actions	Timeframe	Responsible	Indicator
3. Apply and monitor compliance of the reservoir's operator with the Worker Code of Conduct to prevent poaching			cases of poaching
BMP3 (reduction measures)			
Objective: Provide fish species with safe migration along the rivers			
<i>Pre-construction phase</i>			
R5. Design and construct a fishway aimed to facilitate safe migration for various fish species by replicating their native environment	Pre-construction phase	Water Committee - overall responsibility	
Actions: - Design the fishway to closely resemble the natural riverbed - Construct the fishway <i>The fishway should be constructed using natural river materials, primarily stones and rocks, with the addition of gravel and sand to decrease water flow velocity. The gravel also creates favourable conditions for fish spawning. The fishway's slopes should range from 2 to 5%.</i> <i>Two construction (diversion) outlets are designed to convey river flows downstream during reservoir construction and to keep the construction site dry. Potentially, one of these outlets (that is designed as an open channel) can be re-designed to meet the fishway requirements.</i> - Monitor fish passing and keep the fishway in working conditions as a constant bypass during the reservoir operation.	Pre-construction phase During operation	Hired designing company Construction contractor JRAR CJSC - reservoirs operator	Design Build the fishway Passing fish, the fishway maintained properly
BMP4: Additional surveys			
<i>Pre-construction phase</i>			
S1. Survey the Project area to identify species of bats, and a) reveal possible bat roosts (can be found on trees, in hollows, crevices, foliage, caves) and estimate their number, b) estimate value of the area for the bats' foraging. If the bat roosts or significant values of the area for the species foraging are identified, develop an offset project. <u>Potential components of the offset project:</u> <i>S1.1 In case the bats' roosts are confirmed in the area, identify existing forest and rocky habitats which are potentially suitable for bat roosting in the vicinities of the flooded area (first of all, in the reservoir buffer / protection zone), built the bat boxes and hang them on trees to increase the habitat capacities for bats (in the framework of offset project), monitor the bats' occurrence</i> <i>S1.2. In case of considerable value of the area for bat foraging, take into account the bats' needs in food (insects) in the offset project on protection and development of habitats for insects (see the Offsetting strategy)</i>	from March to September (active period), November – March (hibernation period)	Water Committee - overall responsibility Mammologist	Report, maps

Measures, actions	Timeframe	Responsible	Indicator
S2. Survey riparian habitats in along the Kasakh and Amberd riverbanks in the dam construction area to confirm/rule out the presence of Transcaucasian water shrew and Eurasian otter; if the species presence is confirmed - a detailed mitigation plan has to be developed and implemented including translocation and settlement with compensation with artificial holts ²⁷	Throughout year excluding breeding season	The Client - overall responsibility, mammologist	Report, maps
S3. Survey the footprint and buffer areas to confirm/rule out the presence of the living dens of Gray Wolf and European Wildcat; if a den is found, take measures to scare away animals from the areas	After the breeding season (after end-June)	The Client - overall responsibility, zoologist	Report, maps; if the den is found, uninhabited den
S4. Carry out a survey to identify habitats that will be destroyed by the construction objects in the buffer zone; if needed, develop appropriate mitigation measures for habitats restoration and/or offset project	In spring - summer	The Client - overall responsibility, geobotanist	Report, maps, addendums to the offsetting strategy

8. Residual impact

The residual impact, remaining impact after the implementation of the mitigation measures is assessed as follows:

Minor or negligible residual impact: considered as negligible or minor/acceptable residual impacts for which additional measures are not necessary,

Moderate or major residual impact: unacceptable unless they can be offset by other positive impacts of the project.

In case of moderate or major residual impacts on 1) PBFs, additional measures will be designed to achieve "no net loss" and on 2) CHs net gain is required (through offsets as per EBRD PR6 definitions).

The final significance of the residual potential impacts after avoidance and reduction measures is presented in **Table 5**.

²⁷Translocation and settlement procedures for the species will be elaborated in the form of protocols developed based on national and international requirements, and carried out by experienced zoologist (see below Offsetting strategy, BAP2); special requirements and guidances have to be followed: Shrews: Trapping Guidelines, <https://www.nature.scot/doc/guidance-shrew-trapping-methods>; Carter, P. & Churchfield, S. (2006) The Water Shrew Handbook. The Mammal Society, London, <https://cieem.net/resource/the-water-shrew-handbook/>; Otter Protection: Best Practice Guidance for Developers, Ecologists and Planning Authorities (UK) Nov24 <https://southwalesottertrust.org.uk/wp-content/uploads/2024/11/att.-EHFMJiaizgYqupw5bgZARyss3TPFT6Ut-6LzRztnBc-1.pdf>; Guidance on managing woodlands with otter in England <https://assets.publishing.service.gov.uk/media/5ac62d5740f0b62275f747e5/england-protected-species-otter.pdf>

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Table 5. Assessment of residual impacts

	Receptor	Key impacts identification	Impact significance	Mitigation measures	Residual impact	Offset needed
3280	Constantly flowing Mediterranean rivers with Paspalo-Agrostidion species and hanging curtains of Salix and Populus alba)	Habitat loss (3.6 ha)	Significant	No	Significant	Yes (no net loss)
92A0	Salix alba and Populus alba galleries	Habitat loss (2.87 ha)	Significant	No	Significant	Yes (no net loss)
8210	Calcareous rocky slopes with chasmophytic vegetation	Habitat loss (3.48 ha)	Significant	No	Significant	Yes (no net loss)
40A0*	Subcontinental peri-Pannonic scrub	Habitat loss (10.22 ha)	Significant	No	Significant	Yes (net gain)
	Sedentary animals Reptilians: Pallas's glass lizard (10-50 individuals), Medium Lizard (20-100 individuals), Javelin sand boa (5-20 individuals), Smooth snake (the presence of the species should be re-checked), Coin-marked snake (10-50 individuals), Schneider's skink, (20-100 individuals)	Destruction of sedentary animals' habitats: Reptilians - about 15.84 ha totally (rocky, temperate thickets and scrub habitats; the species' ranges overlap) Risk of their death due to vegetation clearance, excavation works, flooding reservoir	Significant	R1-R4	Moderate	Yes (net gain; no net loss - Schneider's skink)
	Sedentary animals Reptilians: <i>Water (dice) snake</i> Amphibians: <i>Variable toad/ green toad</i>	Destruction of animals' habitats and risk of their death; but the flooded area will increase the periphery of the coastline and thus, will increase the habitat of the species	Moderate	R1-R4	Minor	No
	Transit species of terrestrial mammals: Grey Wolf European wildcat	Loss of foraging habitats for transit species of mammals (should be confirmed)	Low	S3	Minor	No
	Flying mammals: bats Pipistrellus sp.	Loss of foraging habitats (should be confirmed)	Not defined	S1	Not defined	Probably

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	Receptor	Key impacts identification	Impact significance	Mitigation measures	Residual impact	Offset needed
		Increase in amphibious insect numbers around the filled reservoir might increase food supply for the bat species				
Birds European Roller 1-2 pairs Syrian Woodpecker 2-3 pairs Tawny Pipit 1-2 pairs Wood Lark 5-9 pairs White-throated Robin 3-5 pairs Red-backed Shrike 2-4 pairs Lesser Grey Shrike 1-2 pairs		Loss of breeding habitats: Lost habitats - about 20 ha totally (the species' ranges overlap)	Significant	R1-R4	Moderate	Yes (no net loss)
Birds: Little Bittern 1-2 pairs Common Kingfisher 1-2 pairs		Temporarily impact on the breeding range	Low	R1-R4	Minor	No
Birds: Long-legged Buzzard 1 pair Red-billed Chough 1 pair		Somewhat restriction of the individual breeding territories	Low	R1-R4	Minor	No
Insects: <i>Anthocharis gruneri</i> <i>Armenia ledereri</i> <i>Armenia hyrcanica</i> <i>Nordmannia abdominalis</i> <i>Polyommatus (Agrodiaetus) demavendi</i> <i>Hipparchia syriaca</i> <i>Satyrus amasinus</i> <i>Pseudochazara pelopea</i> <i>Thaleropsis ionia</i> <i>Euphydryas aurinia</i>		Destruction of habitats, increased mortality of individuals due to vegetation clearance, excavation works, flooding reservoir	Significant	R1-R4	Moderate	Yes (no net loss)
Semi-aquatic species: Transcaucasian water shrew		Destruction of riparian habitats; risk of death of the water shrew during	Low	S2	Minor	No

	Receptor	Key impacts identification	Impact significance	Mitigation measures	Residual impact	Offset needed
	Eurasian otter	the riparian habitat destruction (should be confirmed) but the flooded area will increase the periphery of the coastline and thus increase the habitat of the species				
Fish	Bulatmai barbel	Obstacle to migration of the species at the construction and operation phases	Significant	R5	Minor	No

9. Offsetting strategy

The technical rationale of how the project's mitigation strategy (offset) will achieve a net gain (NG) or no net loss (NNL), as required by EBRD PR 6, is presented in this section.

The offsetting strategy aims to achieve NNL or NG on biodiversity values (habitats - ecosystems) based on the "biodiversity conservation" approach ("averted loss"). The Project will fully destroy valuable habitats (ecosystems) within the boundaries of the dam and reservoir footprints and, partly, in the buffer zone, due to construction works and flooding. At the same time, similar habitats are situated in surrounding areas. These similar habitats will be conserved to avoid their changes/destruction in the future (due to such potential threats as overgrazing, agricultural usage, hunting).

Furthermore, offset is needed to provide species habitats for animals who will lose their habitats due to construction of the reservoir (see [Table 5](#)). Conserved habitats (ecosystems) will be used for relocation of animals and, where needed, for construction of the species local habitats to increase the habitats capacities. Accordingly, the second offsetting approach – habitat restoration, will be applied in relation to the species habitats while, at the same time, contributing to restoration of the habitats/ecosystems.

Additionally, the restoration approach will be applied to restore habitats (3280 and 92A0) similar to the existing riverine habitats along shoreline of the new reservoir (if suitable sections of the shoreline are defined).

It is proposed to base the offsetting strategy on such pillars as stakeholders' involvement and capacity building, adaptive monitoring and law enforcement, adapted for the offsetting measures.

9.1 Loss and gain analysis and calculations

After the implementation of mitigation measures, the key residual impacts are:

Lost habitats (ecosystems):

- 3280 Constantly flowing Mediterranean rivers with Paspalo-Agrostidion species and hanging curtains of Salix and Populus alba 3.6 ha
- 92A0 Salix alba and Populus alba galleries 2.87 ha
- 8210 Calcareous rocky slopes with chasmophytic vegetation 3.48 ha
- 40A0* Subcontinental peri-Pannonic scrub 10.22 ha

Lost species habitats (in brackets – codes of the habitats/ecosystems where the species occur):

- Reptilians: Pallas's glass lizard, Medium Lizard, Javelin sand boa, Smooth snake, Coin-marked snake, Schneider's skink, totally up to 15.84 ha (8210, 40A0, not PBF/CH – E1.116-AM Armenian flat rock debris swards²⁸),
- Birds: European Roller, Syrian Woodpecker, Tawny Pipit, Wood Lark, White-throated Robin, Red-backed Shrike, Lesser Grey Shrike, totally about 20 ha (3280, 92A0, 8210, 40A0, potentially G1.D4 Fruit orchards).

Habitats of insects (PBF, 10 species - see [Table 5](#)) in the footprint area borders will be lost. Exact habitat area of the each of the insect species is currently unclear and will be estimated under the offset project.

²⁸Description of all habitats (ecosystems) of the footprint area is included in the ESIA

An additional component of the offset may be support of the habitats of the observed bat species just after implementation of the S1 mitigation measure (see Table 4). But it depends on results of the bat field survey planned under the S1 measure.

Lost habitats have a different state of nature - from insignificant disturbances to areas with disturbed lands due to grazing, water intake and people passing. So, appropriate quality coefficients were defined for the habitats (see Table 6). The same coefficients are accepted for similar habitats located in the buffer/protection zone and beyond.

According to the literature sources²⁹ and expert (geobotanist) opinion, all lost habitats (ecosystems) are common for Armenia, there are no rare features among them. According to the practices in Armenia, offsetting multiplier has a range between 1 and 10.

Taking into account all the above, the multiplier of 1.5 is proposed for the PBF habitats (ecosystems) to reach the 'no net loss' target, taking into consideration a potential restoration success rate of around 70%.

The multiplier will need to be discussed and agreed with relevant stakeholders. If validated, this approach would imply the need to realize the below gains through offsetting actions (Table 6).

Table 6. Gains needed regarding Habitats/ecosystems to achieve NNL (PBF) and NG (CH)

Code	Habitats	Residual impact			Offset			
		Physical Loss (ha)	Quality coef-ficients	Calculated loss (Qha)	Multiplier	Quality coef-ficients	Gain needed (Qha)	Gain needed, physical *(ha) ³⁰
3280	Constantly flowing Mediterranean rivers with Paspalo-Agrostidion species and hanging curtains of Salix and Populus alba	3.6	0.8	2.88	1.5	0.8	4.32	5.4
92A0	Salix alba and Populus alba galleries 2.83 ha	2.87	0.8	2.296	1.5	0.8	3.444	4.305
8210	Calcareous rocky slopes with chasmophytic vegetation	3.48	0.7	2.436	1.5	0.7	3.654	5.22
	Total PBF	9.95		7.612			11.418	14.925
40A0*	Subcontinental peri-Pannonic scrub	10.22	0.7	7.154	3	0.7	21.462	30.66
	Total CH	10.22		7.154			21.462	30.66
	TOTAL	20.17		14.77			32.88	45.59
	Other habitats, ha	77.01						
	Footprint area, ha	97.18						
	Buffer zone, ha	48.08						

²⁹Habitats of Armenia, 2016, G.M. Fayvush, A.S. Aleksanyan

https://www.researchgate.net/publication/303689840_Habitats_of_Armenia

³⁰Physical gain needed is calculated by dividing "Gain needed" (Qha) by the respective quality coefficients.

As the species occur in the suitable habitats/ecosystems, the species loss and gain analysis is developed based on calculations related to the habitats/ecosystems (**Table 6**). In addition to the four habitats that are PBFs and CH, one more suitable habitat that will be lost in the footprint area (E1.116-AM) is included in the calculation³¹.

Received multipliers for the species are presented in **Table 7**; they provide "net gain" for all concerned species (multipliers are about 2.2).

Table 7. Gains needed regarding species habitats to achieve NNL/NG

Species	Codes of suitable habitats	Residual impact		Offset		Multipliers
		Physical Loss (ha)	Calculated loss (Qha)	Gain needed (Qha)	Gain needed, physical (ha)	
		a	b	c	d	c/b
Reptilians ³² : Pallas's glass lizard Medium Lizard Javelin sand boa Smooth snake Coin-marked snake Schneider's skink	8210, 40A0*, E1.116-AM	15.84	11.302	25.116 ³³	35.88 ³⁴	2.22
Birds European Roller Syrian Woodpecker Tawny Pipit Wood Lark White-throated Robin Red-backed Shrike Lesser Grey Shrike	3280, 92A0, 8210, 40A0*	20.17	14.77	32.88	45.59	2.23

The losses and gains will have to be precisely assessed within the framework of a detailed Biodiversity Offsetting Management Plan (BOMP), based on fieldwork to identify potential conservation and construction areas for the different targets.

Preliminary, potential offsetting areas for the habitats (ecosystems) proposed to be located both within and outside the buffer zone are presented in **Figure 5**.

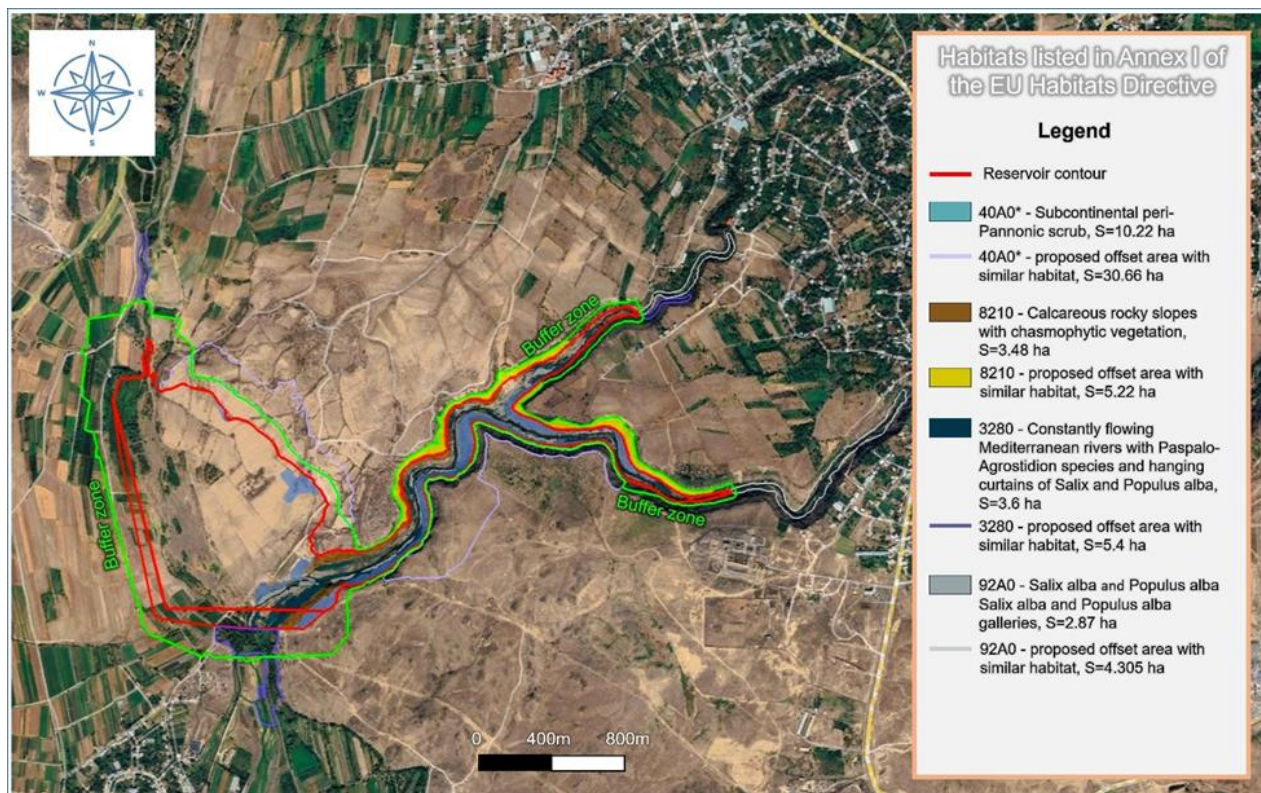
Figure 5. Offsetting areas suggested for the four habitats - PBFs and CH

³¹Lost area of the habitat E1.116-AM is 2.14 ha, quality coefficient 0.8. Multiplier 1.5 is taken for the habitat to provide conservative approach for the species habitats offsetting

³²For reptiles, the loss and gain areas are the sums of the areas of respective habitats.

³³Gain needed area for the E1.116-AM habitat is excluded from this total sum as offsetting will unlikely be ensured for the habitat; accordingly, the offsetting areas cover only 8210, 40A0 habitats

³⁴Gain needed area for the E1.116-AM habitat is excluded from this total sum as offsetting will unlikely be ensured for the habitat, accordingly, the offsetting areas cover only 8210, 40A0 habitats



9.2 Offsetting measures

Offset measures are proposed to achieve>NNL for the PBF and NG for CH. The details are presented in the measures below; the BAP consists of the following four components.

BAP 1: Community-based conservation of valuable habitats (PBF)	
THE SCOPE OF THE MEASURE	
Objective:	Set-up a community-based conservation of valuable habitats (PBF) in the vicinity of the project area, by conciliating local development objectives and biodiversity conservation objectives
CH/ PBF concerned	PBFs: 3280 Constantly flowing Mediterranean rivers with Paspalo-Agrostidion species and hanging curtains of Salix and Populus alba 92A0 Salix alba and Populus alba galleries 8210 Calcareous rocky slopes with chasmophytic vegetation CH: 40A0* Subcontinental peri-Pannonic scrub
MEASURE IMPLEMENTATION	
Project phase	Project lifespan (pre-construction, construction, operation and maintenance)
Measure description	<i>Pre-construction phase</i> - Study the valuable habitats (three PBFs and one CH) in the Project area, their plant composition and ecological structure, specify areas, - Study the reservoir protection/buffer zone and areas around it, upstream and downstream of it to define existing habitats including those that are equivalent to the priority lost habitats, as well as sections

	of the shoreline suitable for the construction and maintenance of the riverbank habitats, 3. Develop a BOMP to provide the conservation of the valuable habitats in the most suitable for conservation areas; if the suitable shoreline sections are defined, the BOMP will include a Riverine Habitats Construction Plan to plan and support the construction and maintenance of the riverbank habitat(s) along the reservoir's banks (using the «restoration» offsetting approach); agree the BOMP with all stakeholders. The final determination of the boundaries of habitats that are equivalent to the valuable lost habitats and the conservation procedures should be detailed in the BOMP and set up precisely by scientists and the Client in close collaboration with the local community in order to ensure the sustainability of the conserved habitats. <i>Construction, operation and maintenance</i> 4. Ensure the conservation of valuable habitats in agreed borders
Timeline	Year 1: Seasonal habitat studies, development of a BOMP, workshop and consultations with local community, the BOMP approval Year 2 and onwards: Implement the conservation measures
Location	Within the reservoir's water protection zone and beyond it; in the area around, upstream Kasakh and Amberd rivers
Party responsible for implementing the measure	Client - overall responsibility
Institutional or technical support	Project Implementation Unit Support Consultant - biodiversity expert / geobotanist
Plan to ensure the measure durability	Dedicate an internal Client staff responsible for Biodiversity conservation linked with local community
Implementation constraints and other remarks:	- Necessary involvement of local community - Necessary management and control of the Client - Law enforcement (for protection of the reservoir's water protection zone)
MEASURE MONITORING	
Key Performance Indicators (KPI) and targets	- Field report on the study of habitats - Developed BOMP - Consultations and workshop with local communities to set-up the habitat conservation - The area of 3280 Constantly flowing Mediterranean rivers with Paspalo-Agrostidion species and hanging curtains of Salix and Populus alba (target 5.4 ha) - The area of 92A0 Salix alba and Populus alba galleries (target 4.305 ha) - The area of 8210 Calcareous rocky slopes with chasmophytic vegetation (target 5.22 ha) - The area of 40A0* Subcontinental peri-Pannonic scrub (target 30.66 ha) - Annual report presenting the progress of implementation and the results and analysis of the conservation process monitoring (target = the availability of the annual report)

Monitoring frequency	annually during the two first years, then bi-annually
Party responsible for monitoring the measure	Supervision Engineer

BAP 2: conservation and construction of the sedentary species' habitats (PBF/CH)	
THE SCOPE OF THE MEASURE	
Objective	Set up a conservation and construction/support of the sedentary species habitats (PBF and CHs)
CH/ PBF concerned	CHs: - Pallas's glass lizard - Medium Lizard - Javelin sand boa - Smooth snake - Coin-marked snake PBF: - Schneider's skink
MEASURE IMPLEMENTATION	
Project phase	Project lifespan (pre-construction, construction, operation and maintenance)
Measure description	<i>Pre-construction phase</i> - Study the Project area to estimate the structure and size of the sedentary species population, areas of habitats, - Study the reservoir's water protection /buffer zone and adjacent areas to estimate habitats suitable for the population relocation/development, including the "capacity" of the habitats and possibilities to construct additional habitats to increase their capacity; define boundaries of the suitable habitats, - Develop a BOMP, agree the BOMP with all stakeholders, - Within the framework of the BOMP: - provide additional rocky outcrops to increase habitat capacities for the lizards and snakes, - survey the Project area to capture as many individuals as possible and to move them to the safe habitats identified and/or arranged. According to the preliminary estimation, suitable rocky and scrub habitats (8210, 40A0*) can be defined in the reservoir' water protection zone and beyond it (see Figure 5). The final determination of the habitats should be detailed in the BOMP and set up precisely by zoologists and the Client specialists in close collaboration with local community in order to ensure the sustainability of the habitats. <i>Construction, operation and maintenance</i> - Before filling the reservoir, survey the flooded area and capture as many individuals as possible (if remained), and to move them to the safe habitats identified and/or arranged before - Monitor and maintain scrub and rocky habitats of the species, - Introduce/support a sustainable grazing practice in the areas that surround the planned reservoir, as the improved quality of the habitats can provide higher and diverse food supply for reptilians (increasing

	insect quantity), thus supporting an increase in the density of the snake and lizard species. This measure requires additional involvement, awareness and sensitization of the local community that will be planned in the BOMP. Reptilians safely relocation and settlement procedures will be elaborated in terms of protocols developed basing on national and international requirements. The following national regulatory documents of the RA will be followed: ▪ The Procedure for relocating wild animals to natural conditions³⁵, ▪ The Procedure for issuing permits for the resettlement of wild animals into natural conditions³⁶ Internationally coordinated approaches for animal relocation are presented in IUCN Guidelines for Reintroductions and Other Conservation Translocations³⁷. For the species-specific approaches and technics the following manuals have to be followed: 1. Reptile Habitat Management Handbook https://www.arc-trust.org/shop/reptile-habitat-management-handbook 2. Reptile Guidance for Developers https://www.lbp.org.uk/downloads/Publications/PlanningGuidance/NE_reptilesguidelines.pdf
Timeline	Year 1: Seasonal studies, development of a BOMP, workshop and consultations with local community, the BOMP approvment Year 2: habitats construction, relocation of the species individuals Year 3 and onwards: monitoring of the populations
Location	Within the reservoir's water protection zone and beyond it
Party responsible for implementing the measure	The Client - overall responsibility
Institutional or technical support	Project Implementation Unit Support Consultant - biodiversity expert / zoologist
Plan to ensure the measure durability	• Dedicate an internal Client staff responsible for Biodiversity conservation linked with local community
Implementation constraints and other remarks	• Necessary involvement of local community • Necessary management and control of the Client • Law enforcement (for protection of the reservoir's water protection zone)
MEASURE MONITORING	
Key Performance Indicators (KPI) and targets	• Field report on the study of the species populations and habitats • Developed BOMP • Consultations and workshop with local community • Area of inhabiting reptilians: Pallas's glass lizard, Medium Lizard, Javelin sand boa, Smooth snake, Coin-marked snake, Schneider's skink (target 35.88 ha)

³⁵ Approved by the RA governmental decree #758-N from 23.03.2024 <https://www.arlis.am/hy/acts/193176>

³⁶ Approved by the order of the Ministry of Environment of the RA #113-N from 03.04.2024 <https://www.arlis.am/hy/acts/191577>

³⁷ IUCN/SSC (2013). Guidelines for Reintroductions and Other Conservation Translocations. Version 1.0. Gland, Switzerland: IUCN Species Survival Commission <https://portals.iucn.org/library/efiles/documents/2013-009.pdf>

	Annual report presenting the progress of implementation and the results and analysis of the monitoring (target = the availability of the annual report)
Monitoring frequency	annually during the first three years, then bi-annually
Party responsible for monitoring the measure	Supervision Engineer

BAP 3: conservation and construction of the bird species' habitats (PBF)**THE SCOPE OF THE MEASURE**

Objective:	Set up a conservation and construction/support of the bird species' habitats (PBF)
CH / PBF concerned	PBFs: - European Roller - Syrian Woodpecker - Tawny Pipit - Wood Lark - White-throated Robin - Red-backed Shrike - Lesser Grey Shrike

MEASURE IMPLEMENTATION

Project phase	Project lifespan (pre-construction, construction, operation and maintenance)
Measure description	<i>Pre-construction phase</i> - Study the reservoir's water protection zone and adjacent areas to estimate habitats suitable for the bird species, including the "capacity" of the habitats and possibilities to construct additional habitats to increase their capacity; define suitable habitats, - Develop a BOMP, agree the BOMP with all stakeholders, - Within the framework of the BOMP implementation. - Plant additional indigenous species of Poplar, Willow, and Walnut trees for Syrian Woodpecker in the vicinity of the reservoir area, - Plant additional thorny bush species in the vicinity of the reservoir area as breeding spots for White-throated Robin, Red-backed Shrike, and Lesser Grey Shrike, helping them to discover new breeding sites. All conserved habitats (see BAP1) are suitable for the species; accordingly, the offsetting area of the habitats (45.59 ha) is considered as offsetting area for the bird species. As some of the bird species use fruit orchards and semi-desert plots located around the construction site as habitats, these habitats will expand the species inhabiting territories. The final determination of the habitats should be detailed in the BOMP and set up precisely by zoologists and Client specialists in close collaboration with local community in order to ensure the sustainability of the habitats. <i>Construction, operation and maintenance</i> - Monitor and maintain the planted tree and bush species, - Introduce/support sustainable grazing practices in the local community, which would improve the quality of grassland habitat, increase the number and diversity of invertebrates, and support the necessary food supply for the bird species

	This measure requires additional involvement, awareness and sensitization of the local community that will be planned in the BOMP.
Timeline	Year 1: Seasonal studies, development of a BOMP, workshop and consultations with local community, the BOMP approval Year 2: habitats construction Year 3 and onwards: monitoring of the populations
Location	The reservoir's water protection zone, areas around, upstream and downstream of the zone
Party responsible for implementing the measure	Client - overall responsibility
Institutional or technical support	Project Implementation Unit Support Consultant - biodiversity expert / zoologist
Plan to ensure the measure durability	Dedicate an internal Client staff responsible for Biodiversity conservation linked with local community
Implementation constraints and other remarks	- Necessary involvement of local community - Necessary management and control of the Client - Law enforcement (for protection of the reservoir's water protection zone)
MEASURE MONITORING	
Key Performance Indicators (KPI) and targets	- Field report on the study of the species habitats - Developed BOMP - Consultations and workshop with local community - The area inhabited by birds: European Roller, Syrian Woodpecker, Tawny Pipit, Wood Lark, White-throated Robin, Red-backed Shrike, Lesser Grey Shrike (target 45.59 ha) - Annual report presenting the progress of implementation and the results and analysis of the monitoring (target = the availability of the annual report)
Monitoring frequency	annually during the first three years, then bi-annually
Party responsible for monitoring the measure	Supervision Engineer

BAP 4: conservation and construction of the insect species' habitats (PBF)**THE SCOPE OF THE MEASURE**

Objective:	Set up a conservation and construction/support of the insect species' habitats (PBF)
CH / PBF concerned:	PBF: <i>Anthocharis gruneri</i> <i>Armenia ledereri</i> <i>Armenia hyrcanica</i> <i>Nordmannia abdominalis</i> <i>Polyommatus (Agrodiaetus) demavendi</i> <i>Hipparchia syriaca</i> <i>Satyrus amasinus</i>

	• <i>Pseudochazara pelopea</i> • <i>Thaleropsis ionia</i> • <i>Euphydryas aurinia</i>
MEASURE IMPLEMENTATION	
Project phase	Project lifespan (pre-construction, construction, operation and maintenance)
Measure description:	<i>Pre-construction phase</i> 1. Study the Project area to estimate the size of the insect species populations and areas of the habitats, lost by these species, 2. Study the reservoir's water protection zone and adjacent areas to estimate habitats suitable for the species, including the "capacity" of the habitats and possibilities to construct additional habitats to increase their capacity; define suitable habitats, 3. Develop a BOMP, agree the BOMP with all stakeholders, 4. Within the framework of the BOMP implementation. - Develop similar habitats in unflooded areas (preferably in the reservoir's water protection zone) ensuring the habitat connectivity (primarily requires planting forage plants, including herbaceous plants for the species and in some cases improving soil conditions). The insect species habitats have to coincide with the conserved valuable habitats, and habitats conserved/constructed for the reptilian and bird species (see BAP1-3) supporting the food chains. The determination of the habitats should be detailed in the BOMP and set up precisely by entomologists and Client specialists in close collaboration with local community in order to ensure the sustainability of the habitats. <i>Construction, operation and maintenance</i> 5. Monitor and maintain the habitats with the species forage plants 6. Introduce/support sustainable grazing practices in the local community, which would improve the quality of grassland habitat and increase the number and diversity of invertebrates. This measure requires additional involvement, awareness and sensitization of the local community that will be planned in the BOMP.
Timeline	Year 1: Seasonal studies, development of a BOMP, workshop and consultations with local community, the BOMP approval, Year 2: habitats construction, Year 3 and onwards: monitoring of the population.
Location	Predominantly within the reservoir's water protection zone
Party responsible for implementing the measure	Client - overall responsibility
Institutional or technical support	Project Implementation Unit Support Consultant - biodiversity expert / zoologist
Plan to ensure the measure durability	• Dedicate an internal Client staff responsible for Biodiversity conservation linked with local community
Implementation constraints and other remarks	• Necessary involvement of local community • Necessary management and control of the Client • Law enforcement (for protection of the reservoir's water protection zone)
MEASURE MONITORING	

Key Performance Indicators (KPI) and targets	• Field report on the study of the species and their habitats • Developed BOMP • Consultations and workshop with local community • The area inhabited by insects (the 10 species, PBFs; target: at least 1,5 times greater than the area of the lost habitats • Annual report presenting the progress of implementation and the results and analysis of the monitoring (target = the availability of the annual report)
Monitoring frequency	• annually during the first three years, then bi-annually
Party responsible for monitoring the measure	Supervision Engineer

10. Biodiversity monitoring

After the completion of the studies and surveys, a robust baseline will be established. Only after that can the BMP be updated and detailed. Reliable and high-quality monitoring and evaluation are the keys to adaptive management. Adaptive management is a good practice that is necessary to ensure the efficiency of the mitigation and offsetting.

For the PBFs and Cha, it is proposed to establish the long-term joint-monitoring of habitats and indicator species with the involvement of the national/local key specialists/stakeholders. The following two types of monitoring will be maintained: 1) the monitoring of mitigation measures and 2) the monitoring of habitats and species of the BOMP.