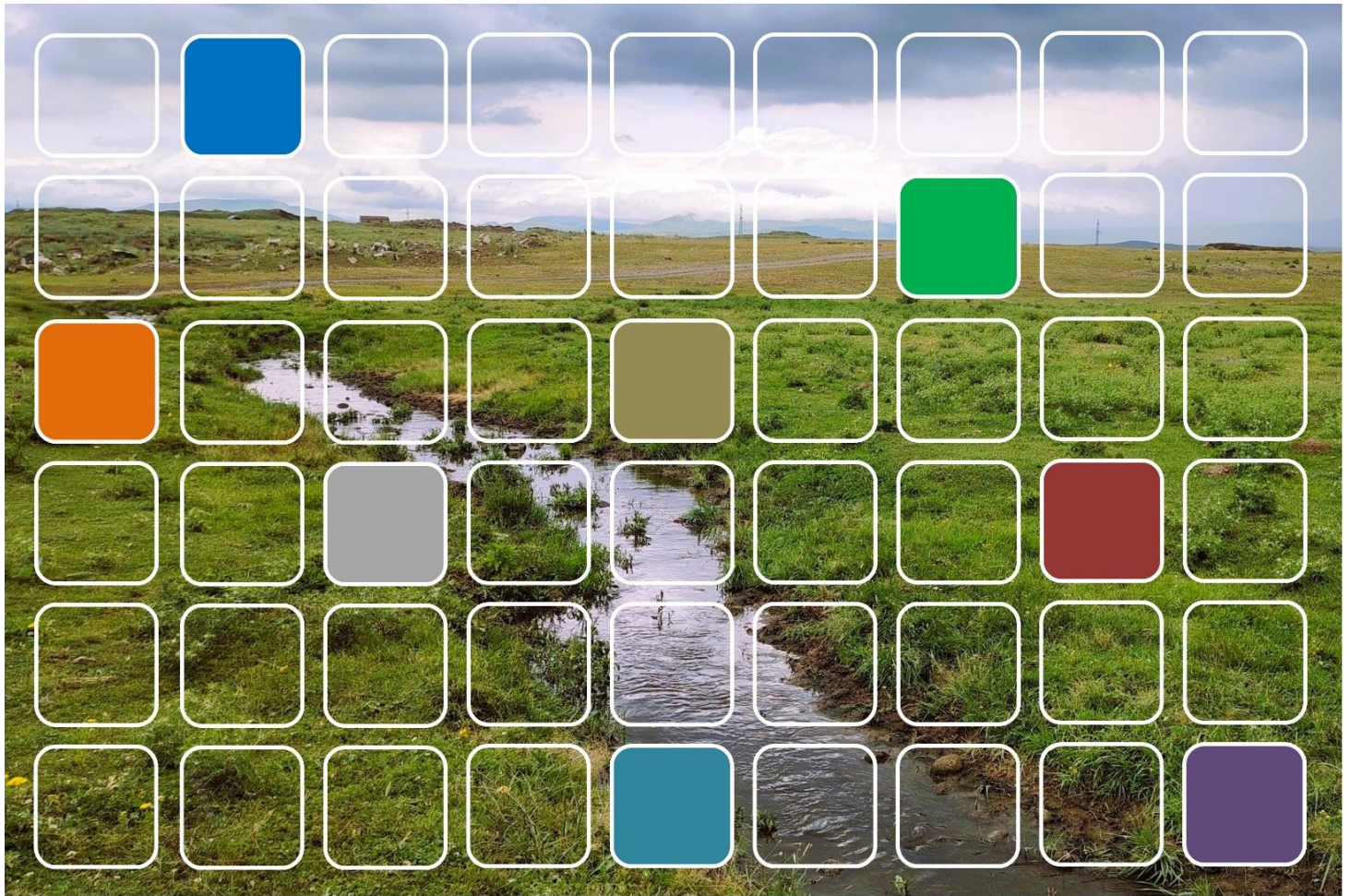




Source: Photo taken by the Consultant during the site visit

WATER RESERVOIRS PROJECT - ARMENIA

Environmental and Social Impact Assessment for the Artik Reservoir Construction Project

BIODIVERSITY ACTION PLAN

Rev01

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**
www.atms.am

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Prepared by:



ATMS Solutions Ltd. (Armenia)

Director: Dr. Artak Ter-Torosyan

1, 11 Griboedov str.,

0051, Yerevan, Armenia

Tel.: +37499 109495

E-mail: artak.ter-torosyan@atms.am

www.atms.am

and



Ecoline International Ltd. (Bulgaria)

Director: Dr. Maia Gachechiladze-Bozhesku

Tel.: +380 951 100 727, + 359 876 63 0522

E-mail: mgachechiladze@ecoline-int.org

www.ecoline-int.org

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Disclaimer

This Biodiversity Action Plan (BAP) has been developed as part of the Environmental and Social Impact Assessment (ESIA) for the Artik 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.

If any inaccuracies are identified within this document, we respectfully request that they be brought to our attention so that the ESIA may be updated accordingly. We cannot accept liability for information that has been reproduced in good faith, irrespective of any consequences arising from its inaccuracy. Any party reproducing information from this ESIA does so entirely at their own risk.

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

Table of Content

1. Introduction.....	6
2. Need, Purpose and Structure of the BAP.....	7
3. Legal and Regulatory Framework for Biodiversity.....	8
3.1 National Requirements	8
3.2 Ratified International Agreements	9
3.3 EBRD Requirements	10
3.4 Good International Practice (GIP) Guidelines	11
3.5 Applicable EU Directives	11
4. Project Description	11
5. Biodiversity Values	13
6. Summary of Potential Impacts	16
7. Mitigation: Biodiversity Management Plan	19
8. Residual impact.....	22
9. Offsetting strategy	25
9.1 Loss and gain analysis and calculations	25
9.2 Offsetting measures	28
10. Biodiversity monitoring	37

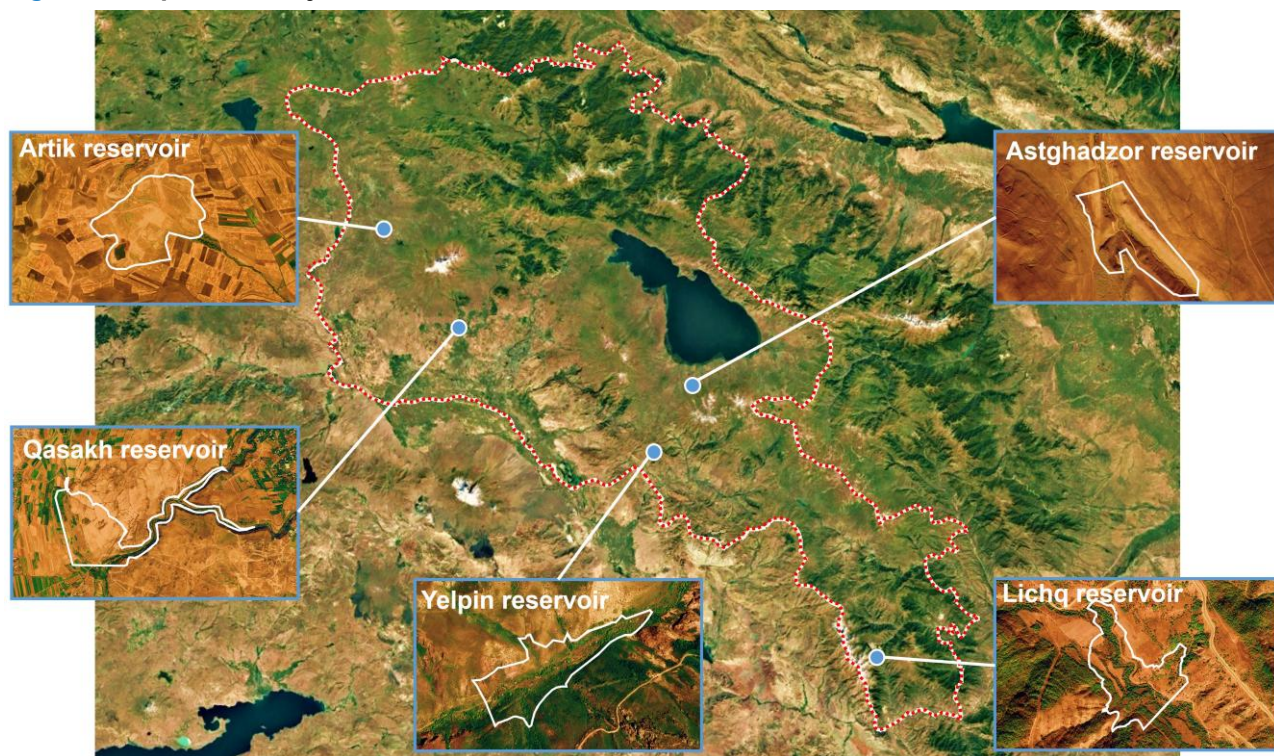
1. Introduction

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 reservoirs listed above is planned for construction within the administrative boundaries of Artik multi-settlement community in the RA Shirak Marz. The Artik Reservoir is designed on the Artikjur River and will provide irrigation water to 300 ha of agricultural land across five rural

¹"Marz" means "Region" in Armenian

settlements in the Artik community, specifically the command area, which includes the villages of Nor Kyanq, Vardaqaar, Panik, Meghrashen and Anushavan.

The Bank has engaged the Consultant² to update the national Environmental Impact Assessment ('EIA') report for the Artik 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 Artik 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).

The purpose of the BAP is the 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

The planned Artik Reservoir will be located within the administrative boundaries of the Artik multi-settlement community. It is designed to be constructed on the Artikjur River, at an elevation of 1,700 meters above sea level (masl). The reservoir will provide irrigation for approximately 300 ha of agricultural land across five rural settlements, specifically the command area, which includes the villages of Nor Kyanq, Vardaqaq, Panik, Meghrashen and Anushavan (**Figure 2**).

The full footprint area (of the reservoir and dam) is assessed as about 66.4 ha. The buffer zone is a very narrow strip, in fact, the reservoir and buffer zone boundaries almost coincide.

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>

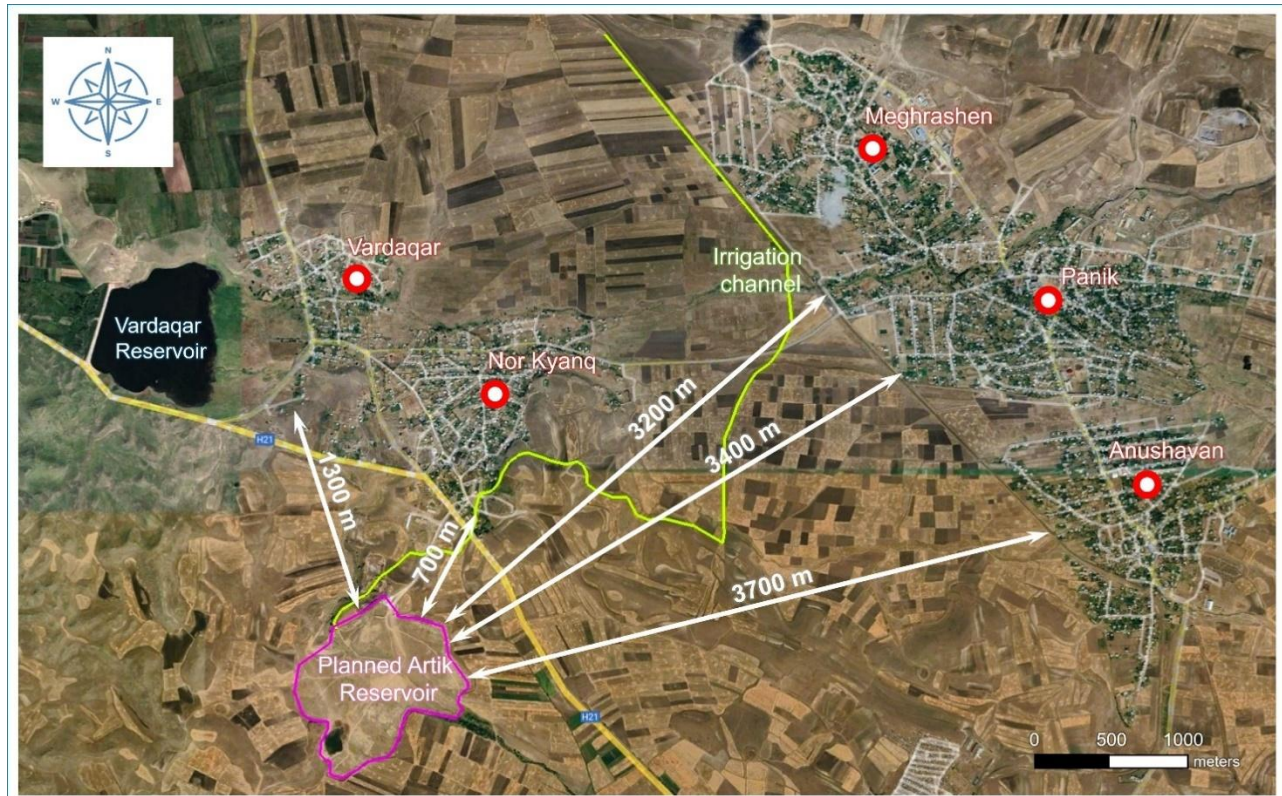
²³<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02009L0147-20190626>

The reservoir hydraulic unit consists of:

1. Dam,
2. Reservoir body,
3. Construction (diversion) channel,
4. Feeding channel,
5. Main irrigation channel,
6. Outlet,
7. Emergency spillway,
8. Electricity supply

The dam body is planned to be constructed using local construction materials, including cobble-pebble aggregates. As an anti-filtration measure, the Project envisions the use of a clay loam screen.

Figure 2. Location of the Artik Reservoir site and the command area



The main technical characteristics of the dam are as follows:

- Dam height - 10.0 m,
- Inclination of the upstream slope - 1:3.5,
- Inclination of the downstream slope - 1:2.5,
- Crest width - 6.0 m,
- Dam length - 610 m.

Two cobble-pebble borrow pits, located up to 3 km apart within the administrative boundaries of the Nor Kyanq settlement, were studied for the dam construction purposes (Figure 3). Stone material will be supplied from an existing operating mine located approximately 33 km from the site. The reservoir area itself will also serve as a source of cobble-pebble, clay loam, and sand materials.

Figure 3. Master plan of the Project area

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 two habitats (according the EUNIS habitat classification used by the Bern Convention) and 45 species: one habitat, two mammal species, 30 bird species, one reptile, one amphibia species and seven invertebrate species identified as PBFs, and one habitat, one mammal species, two 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 Resolution 4 of the Bern Convention	<u>Habitats</u> (×1 - according the Bern Convention/EU Habitats directive) C1.4 Permanent dystrophic lakes, ponds and pools = 3160 Natural dystrophic lakes and ponds (1.42 ha)

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.

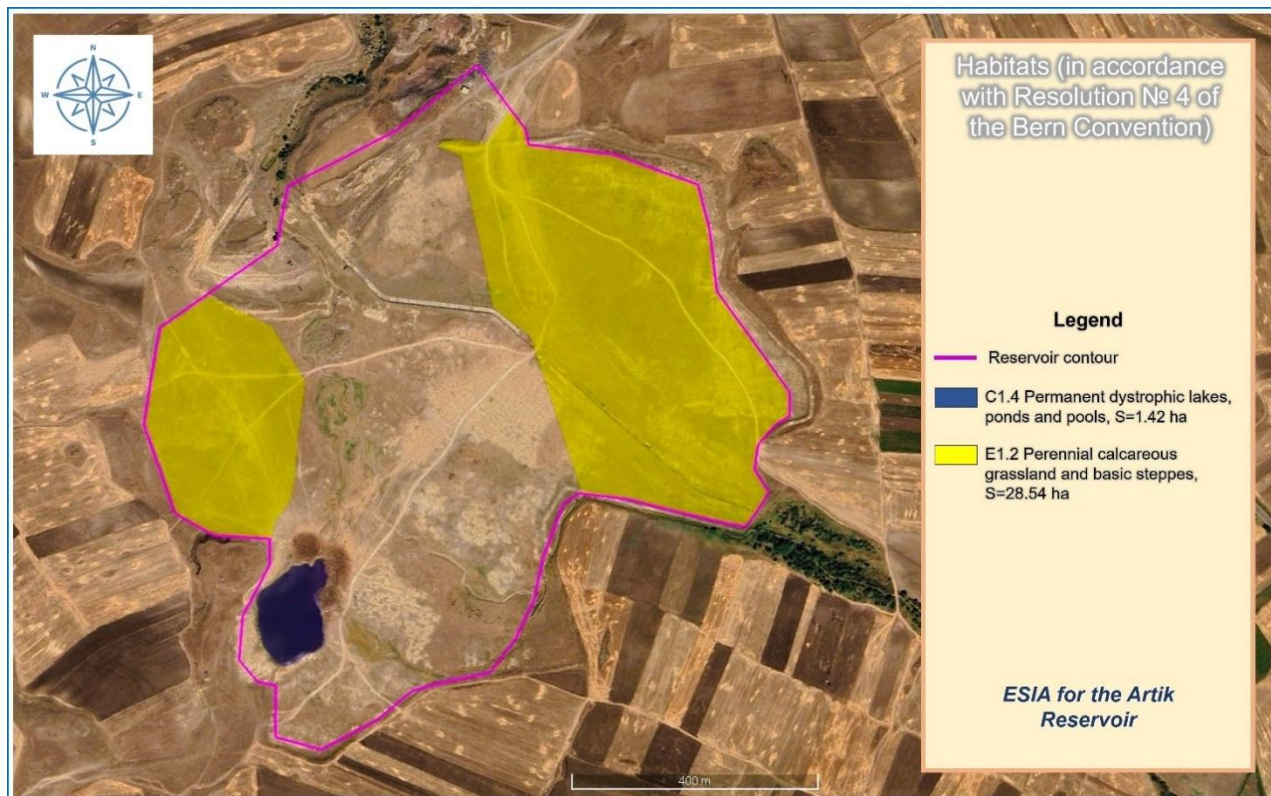
²⁵EAAA - ecologically appropriate area of analysis

№	Criterion	Features (Habitats/species)
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> (×28) <i>Pelecanus crispus</i> (LC) <i>Phalacrocorax carbo</i> (LC) <i>Egretta garzetta</i> (LC) <i>Ciconia Ciconia</i> (LC) <i>Ciconia nigra</i> (LC) <i>Tadorna ferruginea</i> (LC) <i>Pernis apivorus</i> (LC) <i>Milvus migrans</i> (LC) <i>Circaetus gallicus</i> (LC) <i>Circus cyaneus</i> (LC) <i>Circus pygargus</i> (LC) <i>Circus macrourus</i> (NT) <i>Circus aeruginosus</i> (LC) <i>Neophron percnopterus</i> (EN) <i>Aquila nipalensis</i> (EN) <i>Aquila heliaca</i> (VU) <i>Clanga pomarina</i> (LC) <i>Hieraaetus pennatus</i> (LC) <i>Tachyspiza brevipes</i> (LC) <i>Buteo rufinus</i> (LC) <i>Falco naumanni</i> (LC) <i>Grus grus</i> (LC) <i>Anthropoides virgo</i> (LC) <i>Coracias garrulus</i> (LC) <i>Lanius collurio</i> (LC) <i>Lanius minor</i> (LC) <i>Pyrhrocorax pyrrhrocorax</i> (LC) <i>Emberiza hortulana</i> (LC) <u>Invertebrates</u> (×1) <i>Euphydryas auria</i>
iii	12.ii.d EAAA for regularly occurring nationally or regionally listed EN or CR species	<u>Mammals</u> (×2) <i>Microtus (Sumeriomys) schidlovskii</i> <i>Spermophilus xanthoprimum</i> <u>Birds</u> (×2, already triggering cr.12 ii.a) <i>Neophron percnopterus</i> (EN) <i>Aquila nipalensis</i> (EN)
	12.ii.e EAAA for regularly occurring range-restricted species	<u>Invertebrates</u> (×6) <i>Ultraaricia crassipuncta</i> <i>Neolysandra coelestina</i> <i>Pseudochazara geyeri</i> <i>Carabus maurus</i> Ad. <i>Dailognatha caraboides</i> <i>Omoplus caucasicus</i>
	12.iii Significant biodiversity features identified by a broad set of stakeholders or governments	<u>Birds</u> (×2, listed in the Red Book of RA as Vulnerable) <i>Larus armenicus</i> <i>Motacilla citreola</i>

No	Criterion	Features (Habitats/species)
		<u>Reptiles</u> (×1, listed in the Red Book of RA as Vulnerable) <i>Darevskia unisexualis</i> <u>Amphibians</u> (×1, listed in the Red Book of RA as Vulnerable) <i>Pelobates syriacus</i>
Critical Habitats as per EBRD PR6 (§14)		
i	14.i EAAA is habitat type listed in Annex 1 of the EU Habitats Directive marked as “priority habitat type”	<u>Habitats</u> (×1 - according the Bern Convention/EU Habitats directive) E1.2 Perennial calcareous grasslands and basic steppes = 62C0* Ponto-Sarmatic steppes (28,54 ha)
ii	14.ii EAAA for species and their habitats listed in Annex IV of the Habitats Directive	<u>Mammals</u> (×1) <i>Vormela peregusna</i> (VU) <u>Reptiles</u> (×2) <i>Lacerta agilis</i> <i>Ophisops elegans</i> <u>Amphibians</u> (×1) <i>Bufo viridis</i>

The habitats map of CHA/PBFs triggering is presented on **Figure 4**.

Figure 4. Map of the habitats in the Project footprint area listed in Resolution 4 of the Bern Convention (as well as listed in Annex 1 of the EU Habitats Directive)



Aquatic life

As described in the ESIA, there is no scientific data on the fish species of the pond near Artikjur river and Nor Kyank village. Recently (01.07.2025) fish sampling and visual observations were carried out using the set of fishing tools in the pond and river Artikjur. This ichthyological survey showed that there are no fish species in the pond and surveyed areas of Artikjur river. According to the information from local residents, years ago, the pond was inhabited by Silver carp (*Carassius gibelio*), which was eliminated by poachers using prohibited fishing methods such as electric stunning and the use of toxic substances.

During these ichthyological studies, tadpoles of the Syrian spadefoot *Pelobates syacrius*, listed in the RA Red Book, measuring 9-12 cm in length, were caught using crab traps set in the pond (**Figure 5**). Considering the body size of the tadpoles, it can be assumed that these amphibians bred here in April, and the large number of tadpoles caught (a total of 38 individuals were caught, all of which were returned to their habitat unharmed) indicates that the pond has favourable conditions for breeding, growth, and development of this Red Book species.

Figure 5. A tadpole of the Syrian spadefoot *Pelobates syacrius*, caught in the pond located in the Project area



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 excavation, top-soil removal and transportation, reservoir filling),
- Flora species loss (due to excavation, top-soil removal and its transportation, reservoir filling),
- Disturbance of fauna species by noise, vibration and light pollution (due to 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 medium mammals (as a result of excavation, top-soil removal and its transportation, reservoir filling),
- Loss of breeding and foraging habitats for birds (as a result of excavation, top-soil removal and its transportation, reservoir filling),
- Risk of bird death due to electrocution from the overhead power line,
- Loss of habitats of invertebrates and risk of partial death of their populations (due to excavation, removal of topsoil and its transportation, reservoir filling),
- Destruction of the habitats of the aquatic species and risk of the species death,
- Impact on protected areas and internationally designated areas.

2. Operation and maintenance phase:

- Emergence of new habitats (water, riparian),
- Increased access to the area.

Negative impacts could occur mainly at the construction phase; they are caused by the dam building, the reservoir bottom planning 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
C1.4	Permanent dystrophic lakes, ponds and pools (3160 Natural dystrophic lakes and ponds)	Habitat loss (1.42 ha)	Significant
E1.2	Perennial calcareous grasslands and basic steppes (62C0* Ponto-Sarmatic steppes)	Habitat loss (28.54 ha)	Significant

Code	Receptor	Key impacts identification	Impact significance
	Sedentary animals Mammals: Schidlovsky's vole <i>Microtus (Sumeriomys) schidlovskii</i> (about 700 individuals) Asia Minor ground squirrel <i>Spermophilus xanthoprimum</i> (20-30 individuals) Reptilians: Sand lizard <i>Lacerta agilis</i> Snake-eyed Lizard <i>Ophisops elegans</i> Valentine's lizard <i>Darevskia unisexualis</i> (60-90 individuals)	Loss of animals' habitats and risk of their death Loss of habitats: Schidlovsky's vole - 6.49 ha Asia Minor ground squirrel - 1.1 ha Valentine's lizard - 1.19 ha	Significant
	Sedentary animals Amphibians: Variable toad/ green toad <i>Bufo viridis</i>	Destruction of animals' habitats and risk of their death; but the flooded area will increase the periphery of the shoreline and thus increase the habitat of the species	Moderate
	Sedentary animals Amphibians: Syrian spadefoot (39 tadpoles in the pond) <i>Pelobates syriacus</i>	Loss of animals' habitats (1.42 ha of pond, potentially - about 1,5 ha in-shore of the pond), risk of their death	Significant (should be confirmed)
	Medium mammals and associated habitats: Marbled polecat <i>Vormela peregusna</i>	Loss of foraging habitats (should be confirmed)	Low
	Birds: Red-backed Shrike <i>Lanius collurio</i> 3-5 pairs Ortolan Bunting <i>Emberiza hortulana</i> 2-3 pairs	Loss of breeding habitats Lost habitats – about 6.65 ha totally ²⁶ (the species' ranges overlap)	Significant
	Birds: Identified priority 30 species (see Table 2), other waterbird species attracted by the new water body	Risk of bird death due to electrocution from the overhead power line (about 600 m length)	From low to significant (depending on species)
	Insects: Coleoptera (beetles): Carabus maurus, Dailognatha caraboides, Omophlus caucasicus, Lepidoptera (butterflies): Ultraaricia crassipuncta, Neolysandra coelestina, Pseudochazara geyeri, Euphydryas aurinia	Destruction of habitats, increased mortality of individuals due to excavation works, flooding reservoir	Significant

²⁶This area is calculated basing on the red-backed shrike territory (territory of the ortolan bunting is less and may overlap with the red-backed shrike one). The size of the territory for the red-backed shrike is up to 1.33 ha per pair. Taking into account maximum 5 pairs assessed, the whole area of the species habitats is 6.65 ha.

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).

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 in native state around the reservoir (or area proposed for habitat offsetting – see Offsetting strategy below) with suitable habitats to where the animals can be relocated in order to estimate their species-specific capacity	First year Second year		Report, maps

Measures, actions	Timeframe	Responsible	Indicator
3. Develop relocation protocol	Second year		Developed relocation protocol
4. Provide relocation			Identified/Safely relocated and settled animals
5. Monitoring of the animals in the new locations	For two years after		Monitoring report, percent of settled animals
<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)			
3. Monitor the relocated animals at the new locations	For two years after		Monitoring report, percent of settled animals
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 bulding preparation	Construction contractor, overall responsibility	Developed and approved documents
Actions:	During the construction preparation	Construction contractor, mammologist, herpetologist	Developed documents
	Each new staff worker; all personnel - two times a year	Construction contractor, Supervision Engineer	Approved documents
			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; Water Committee - supervision	Absence of cases of harm to animals, cases of poaching

Measures, actions	Timeframe	Responsible	Indicator
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 relocation 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 operation phase'	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
R4. Equip power line poles with bird protection devices	During construction works	Construction contractor - overall responsibility; Water Committee - supervision	Absence of cases of bird electrocutting
Actions: 1. Buy or order manufacturing the bird protection devices 2. Install them on the power line poles 3. Monitoring efficiency of the devices during operation	Before the power line building In the process of the power line building	Supervision Engineer, Zoologist Zoologist	Installed devices Report, cases of bird death
Operation and maintenance phase			

Measures, actions	Timeframe	Responsible	Indicator
R5. 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 nearby 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 3. Apply and monitor compliance of the reservoir's operator with the Worker Code of Conduct to prevent poaching	During operation	JRAR CJSC - reservoirs operator Supervision person, if any	Number / species of animals discovered at risk or harmed, number of saved animals cases of poaching
BMP3: Additional surveys			
<i>Pre-construction phase</i>			
S1. Survey the footprint area and nearby areas to confirm/rule out the presence of the living den of Marbled polecat; 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

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](#).

WATER RESERVOIRS PROJECT - ARMENIA
ESIA for the Artik Reservoir Construction Project

Biodiversity Action Plan

rev01

Table 5. Assessment of residual impacts

	Receptor	Key impacts identification	Impact significance	Mitigation measures	Residual impact	Offset needed
C1.4	Permanent dystrophic lakes, ponds and pools (3160 Natural dystrophic lakes and ponds)	Habitat loss (1.42 ha)	Significant	No	Significant	Yes (no net loss)
E1.2	Perennial calcareous grasslands and basic steppes (62C0* Ponto-Sarmatic steppes)	Habitat loss (28.54 ha)	Significant	No	Significant	Yes (net gain)
	<i>Sedentary animals</i> Mammals: Schidlovsky's vole (about 700 individuals) Asia Minor ground squirrel (20-30 individuals) Reptilians: Sand lizard, Snake-eyed Lizard, Valentine's lizard (60-90 individuals)	Destruction and loss of animals' habitats and risk of their death Loss of habitats: Schidlovsky's vole - 6.49 ha Asia Minor ground squirrel - 1.1 ha Valentine's lizard - 1.19 ha	Significant	R1-R3, R5	Significant	Yes (no net loss/net gain)
	<i>Sedentary animals</i> Amphibians: Variable toad/ green toad	Destruction of animals' habitats and risk of their death; but the flooded area will increase the periphery of the shoreline and thus increase the habitat of the species	Moderate	R1-R3, R5	Minor	No
	<i>Sedentary animals</i> Amphibians: Syrian spadefoot (39 tadpoles in the pond)	Loss of animals' habitats (1.42 ha of pond, potentially – about 1,5 ha in-shore of the pond), risk of their death	Significant	R1-R3, R5	Moderate (should be confirmed)	Yes (no net loss)
	Medium terrestrial mammals: Marbled polecat	Loss of foraging habitats (should be confirmed)	Low	S1	Minor	No
	Birds Red-backed Shrike 3-5 pairs Ortolan Bunting 2-3 pairs	Loss of breeding habitats; lost habitats – about 6.65 ha totally (the species' ranges overlap)	Significant	R1-R3, R5	Moderate	Yes (no net loss)

	Receptor	Key impacts identification	Impact significance	Mitigation measures	Residual impact	Offset needed
Birds: Identified priority 30 species (see Table 2), other waterbird species attracted by the new water body		Risk of bird death due to electrocution from the overhead power line (about 600 m length)	From low to significant (depends on species)	R4	Minor	No
Insects: Coleoptera (beetles): <i>Carabus maurus</i> , <i>Dailognatha caraboides</i> , <i>Omophilus caucasicus</i> , Lepidoptera (butterflies): <i>Ultraaricia crassipuncta</i> , <i>Neolysandra coelestina</i> , <i>Pseudochazara geyeri</i> , <i>Euphydryas aurinia</i>		Destruction of habitats, increased mortality of individuals due to vegetation clearance, excavation works, flooding reservoir	Significant	R1-R3, R5	Moderate	Yes (no net loss)

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 (of "prevented damage" method). The Project will fully destroy valuable habitats (ecosystems) within the boundaries of the dam and reservoir footprints 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 similar to the existing riverine habitats along shoreline of the new reservoir.

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):

- C1.4. Permanent dystrophic lakes, ponds and pools (3160 Natural dystrophic lakes and ponds (1.42 ha),
E1.2 Perennial calcareous grasslands and basic steppes (62C0* Ponto-Sarmatic steppes (28.54 ha).

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

- Mammals: Schidlovsky's vole (6.49 ha, E1.2 as well as habitat in the footprint area that is not PBF/CH - E5.13 Weed communities of recently abandoned rural constructions), Asia Minor ground squirrel (1.1 ha, E5.13),
- Reptilians: Valentine's lizard (1.19 ha, E5.13),
- Amphibians: Syrian spadefoot (1.42 ha C1.4, about 1.5 ha E5.13)
- Birds: Red-backed Shrike, Ortolan Bunting (totally about 6.65 ha, E1.2, E5.13).

Habitats of Sand lizard and Snake-eyed Lizard (CHs) and invertebrates (PBFs) in the footprint area will be lost. Exact habitats areas of the each of the species is currently unclear and will be estimated under the offset project.

Lost habitats are not entirely natural, as they are disturbed primarily by grazing, watering hole and people passing. So, appropriate quality coefficients were defined for the habitats (see [Table 6](#)). The same coefficients are accepted for similar habitats proposed for offsetting.

According to the literature sources²⁷ and expert (geobotanist) opinion, all lost habitats (ecosystems) are common for Armenia, there are no rare features among them. *Steppes dominated by Agropyron spp. and Elytrigia spp.* (E1.2 habitat) are very common across Armenia, especially in the middle mountain belt, though they generally cover relatively small areas.

According to the practices in Armenia, offsetting multiplier has a range between 1 and 10.

Taking into account all these, the following multipliers are proposed for the habitats (ecosystems):

- multiplier of 1.5 for the PBF to reach the “no net loss target”, taking into consideration a potential restoration success rate around 70%,
- multiplier of 3 for the CH in order to reach the net gain target and to take into consideration the uncertainties on the restoration success.

The multipliers 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 NG (CH) or NNL (PBF)

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) ²⁸
C1.4 (PNF)	Permanent dystrophic lakes, ponds and pools	1.42	0.8	1.136	1.5	0.8	1.704	2.13
	Total PBF	1.42		1.136			1.704	2.13
E1.2 (CH)	Perennial calcareous grasslands and basic steppes	28.54	0.75	21.405	3	0.75	64.215	85.62
	Total PBF	28.54		21.405			64.215	85.62
	Totally	29.96						
	Other habitat, ha	36.44						
	Footprint area, ha	66.4						

Results of the loss and gain analysis regarding the species terrestrial habitats are presented in **Table 7**; analysis combining terrestrial and aquatic habitats for Syrian spadefoot is presented below.

²⁷Habitats of Armenia, 2016, G.M. Fayvush, A.S. Aleksanyan
https://www.researchgate.net/publication/303689840_Habitats_of_Armenia

²⁸Physical gain needed is calculated by dividing “Gain needed” (Qha) by the respective quality coefficients.

Table 7. Gains needed regarding the species terrestrial habitats to achieve NNL²⁹

Species	Codes of suitable habitats	Residual impact			Offset			
		Physical Loss (ha)	Quality coefficients	Calculated loss (Qha)	Multiplier	Quality coefficients	Gain needed (Qha)	Gain needed, physical (ha) ³⁰
Mammals:								
Schidlovsky's vole	E1.2, E5.13	6.49	0.75	4.8675	1.5	0.75	7.301	9.735
Asia Minor ground squirrel	E5.13	1.1	0.75	0.825	1.5	0.75	1.2375	1.65
Reptilians:								
Valentine's lizard	E5.13	1.19	0.75	0.8925	1.5	0.75	1.34	1.785
Sub-total								13.17
Birds:								
Red-backed Shrike, Ortolan Bunting	E1.2, E5.13	6.65	0.75	4.9875	1.5	0.75	7.48	9.975
Total								23.145
Amphibians:								
Syrian spadefoot	E5.13	1.5	0.75	1.125	1.5	0.75	1.6875	2.25

Existing habitats of the mammal and reptilian species (see [Table 7](#)) hardly overlap (maps of the species habitats are presented in the ESIA report). Habitats of the bird species may overlap the mammals and reptilian ranges. Taking this into account, the whole terrestrial habitats offsetting area (excluding Syrian spadefoot habitat) can be proposed from 13.17 to 23.145 ha (see [Table 7](#)). Basing on the conservative approach, 23.145 ha are finally proposed.

Preliminary, potential offsetting area with habitat similar to the terrestrial E1.2 habitat located close to the existing Vardaqr reservoir is presented in [Figure 6](#). This area will cover the whole area for offsetting the species habitats - 23.145 ha.

The offsetting area for the Syrian spadefoot habitats has to combine aquatic habitat (at least, 2.13 ha - see [Table 6](#)) and terrestrial habitat similar to E5.13 habitat (at least, 2.25 ha, see [Table 7](#)). Offsetting C1.4 aquatic habitat has sense only if it is focused on conservation of the Syrian spadefoot as the only discovered aquatic species that is vulnerable and critically demands water for reproduction and tadpoles living. The area proposed to offset E1.2 habitat is not suitable for the species as it is separated from the reservoir by an automobile road.

Preliminary, the following potential areas for the Syrian spadefoot habitats offsetting may be proposed (listed below in order of priority):

- the Vardaqr reservoir and the area adjacent to it from the east (but only in the case if the reservoir itself is suitable for safety living of the Syrian spadefoot tadpoles),
- specially built artificial pond and the area around - in one of the natural and semi-natural plots of land around the Project reservoir (such plots are located among agricultural fields) or downstream,

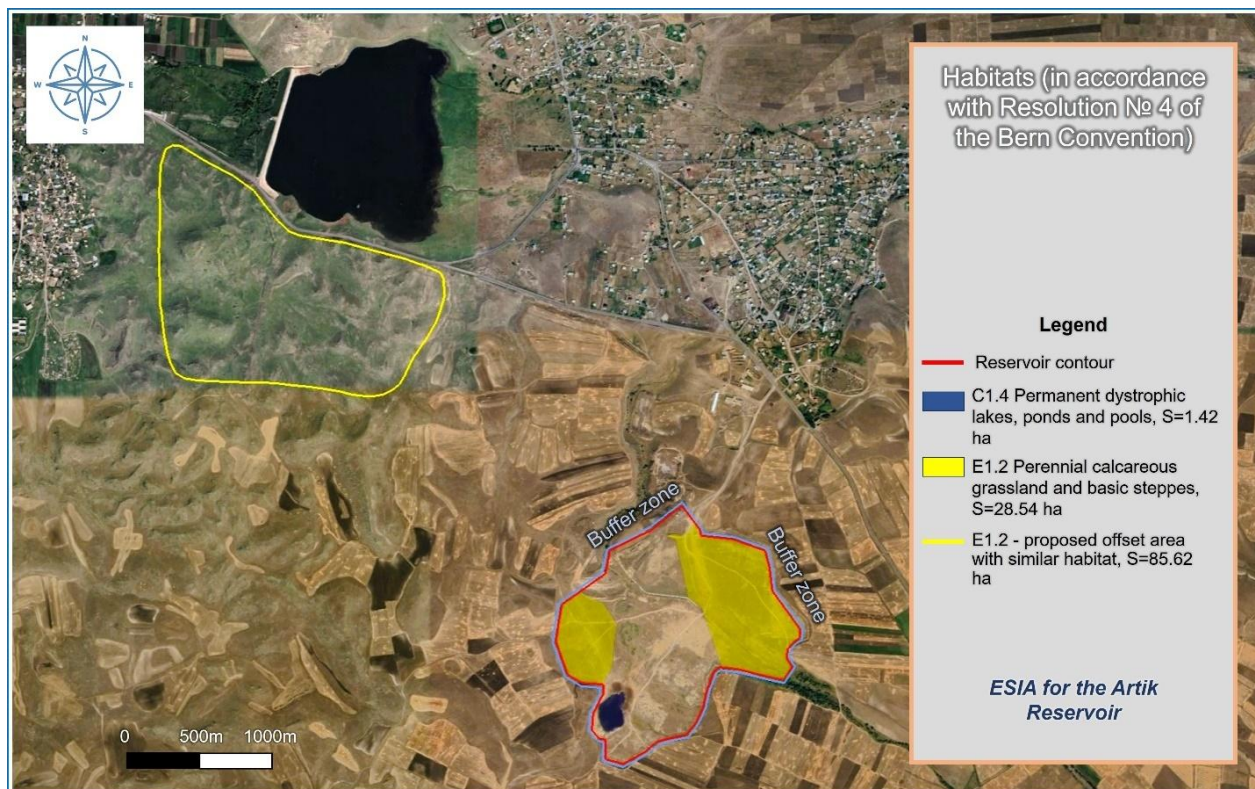
²⁹For some of the species, the lost terrestrial habitats are sum of plots of the E1.2 and E5.13 habitats; multiplier 1.5 is proposed as all the species are triggered as PBFs.

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

- specially built artificial pond and the area around – in the area adjacent to the Vardagar reservoir from the east.

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 lost habitat areas and potential offsetting areas, including aquatic habitat for Syrian spadefoot.

Figure 6. Offsetting area suggested for the CH habitat E1.2 (62C0*)



9.2 Offsetting measures

Offset measures are proposed to achieve NNL for the PBFs and NG for CHs. The details are presented in the measures below; the BAP consists of the following five components.

BAP 1: Community-based conservation of valuable habitat (CH)	
THE SCOPE OF THE MEASURE	
Objective:	Set-up a community-based conservation of valuable habitat (CH) in the vicinity of the project area, by conciliating local development objectives and biodiversity conservation objectives
CH/ PBF concerned	CH: • E1.2 Perennial calcareous grasslands and basic steppes
MEASURE IMPLEMENTATION	
Project phase	Project lifespan (pre-construction, construction, operation and maintenance)
Measure description	<i>Pre-construction phase</i> 1. Study the habitat in the Project area, its plant composition and ecological structure, specify areas, 2. Study the proposed offsetting area (see Figure 6) and other areas around the Project area to define existing habitats including those that are equivalent to the lost habitat,

	3. Develop a BOMP to provide the conservation of the valuable habitat in the most suitable for conservation areas; the BOMP will include a Riverine Habitats Construction Plan to plan and support the construction and maintenance of shoreline vegetation similar to the one of the C1.4 habitat in the suitable areas along the Project reservoir's banks; agree the BOMP with all stakeholders. The final determination of the boundaries of habitats that are equivalent to the valuable lost habitat 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 habitat 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	Preliminary, to the south of the Vardaqr reservoir; possibly in other areas around the Project area
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 offsetting area)
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 E1.2 Perennial calcareous grasslands and basic steppes (target 85.62 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 (PBFs/CHs)
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CH/ PBF concerned	PBFs: Mammals: - Schidlovsky's vole - Asia Minor ground squirrel Reptilians: - Valentine's lizard CHs - Sand lizard, - Snake-eyed Lizard
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 populations, areas of habitats (specify for mammals and Valentine's lizard and study for Sand lizard and Snake-eyed Lizard), - Study the proposed offsetting area for E1.2 habitat (see BAP1 above) and areas around the Project area, including upstream and downstream the Project reservoir, to estimate habitats suitable for the population translocation/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 (and, possibly, burrows) in habitats defined for translocation to increase habitat capacities for the species, - survey the footprint area to capture as many individuals as possible and to move them to the safe habitats identified and/or arranged. 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 habitats of the species, - Introduce/support a sustainable grazing practice in the offsetting areas, as the improved quality of the habitats can provide higher and diverse food supply for the species, thus supporting an increase in their density. This measure requires additional involvement, awareness and sensitization of the local community that will be planned in the BOMP. Animals safely translocation 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 conditions³¹,

³¹Approved by the RA governmental decree #758-N from 23.03.2024 <https://www.arlis.am/hy/acts/193176>

	- The Procedure for issuing permits for the resettlement of wild animals into natural conditions³² Internationally coordinated approaches for animal relocation are presented in IUCN Guidelines for Reintroductions and Other Conservation Translocations³³. For the species-specific approaches and technics the following manuals and reports 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_reptileguidelines.pdf 3. Translocation Model for the California Ground Squirrel (<i>Otospermophilus beecheyi</i>) to Facilitate California Grassland Ecosystem Recovery, March 2016 https://sdmmp.com/download.php?cid=SDMMP_CID_187_67a2b4fe9dc33 4. Townsend's Ground Squirrel Conservation on the Hanford Site for Calendar Year 2022: Translocation to Support At-Risk Ground Squirrel Populations https://www.hanford.gov/files.cfm/HNF-69169_-_Rev_00.pdf 5. Translocating European Ground Squirrels https://www.mossy.earth/projects/translocating-european-ground-squirrels
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	Preliminary, to the south of the Vardaqar reservoir (proposed area for the E1.2 habitat offsetting area), possibly in other areas around the project area
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

³²Approved by the order of the Ministry of Environment of the RA #113-N from 03.04.2024
<https://www.arlis.am/hy/acts/191577>

³³IUCN/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>

	- Area of inhabiting mammals: Schidlovsky's vole (target 9.8 ha), Asia Minor ground squirrel (target 1.7 ha) - Area of inhabiting reptilians: Valentine's lizard (target 1.8 ha), Sand lizard and Snake-eyed lizard (target will be established after the pre-construction survey) - 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: - Red-backed Shrike - Ortolan Bunting

MEASURE IMPLEMENTATION

Project phase	Project lifespan (pre-construction, construction, operation and maintenance)
Measure description	<i>Pre-construction phase</i> - Study the areas around the Project area, including upstream and downstream the footprint area, and the proposed offsetting area for E1.2 habitat (see BAP1 above) 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 thorny bush species upstream and downstream the footprint area as breeding spots for Red-backed Shrike, helping to discover new breeding sites. The habitats that are most suitable for the species are steppe, meadow, grass and scrub habitats. According to the preliminary estimation, habitats potentially suitable for the bird species can be located upstream and downstream the footprint area or in the proposed offsetting area for the E1.2 habitat. 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 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	Preliminary: upstream and downstream of the footprint area or proposed offsetting area for the E1.2 habitat
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: Red-backed Shrike, Ortolan Bunting (target 9.98 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:	PBFs: Coleoptera (beetles) <i>Carabus maurus</i>, <i>Dailognatha caraboides</i>, <i>Omophlus caucasicus</i>, Lepidoptera (butterflies) <i>Ultraaricia crassipuncta</i>, <i>Neolysandra coelestina</i>, <i>Pseudochazara geyeri</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 footprint area to estimate the size of the beetle and butterfly species population and areas of the habitats, lost by this species, 2. Study areas around the footprint area and the proposed offsetting area for E1.2 habitat (see BAP1 above) 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 defined offsetting primarily by planting forage plants for the butterfly species and placing large stones for beetles. The insect species habitats have to coincide with habitats conserved/constructed for the reptilian and bird species (see BAP2-3) 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, 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	Preliminary, semi-natural areas around the footprint area and the proposed offsetting area for E1.2 habitat
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 the beetles and butterflies (target will be established after the pre-construction survey) - 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 5: Conservation and construction of the Syrian spadefoot habitats (PBF)**THE SCOPE OF THE MEASURE**

Objective	Set-up a conservation and construction/support of the Syrian spadefoot habitats (PBF)
CH/ PBF concerned	PBF: Amphibians: Syrian spadefoot

MEASURE IMPLEMENTATION

Project phase	Project lifespan (pre-construction, construction, operation and maintenance)
Measure description	<i>Pre-construction phase</i> - Study areas around the existing pond located in the footprint area (especially less disturbed areas adjoined the pond from the west), the banks of the Artikjur river upstream and downstream to estimate the structure and size of the Syrian spadefoot population, areas of habitats, - Study the Wardaqar reservoir and other bodies of water in the Artik multi-settlement community area, if they are, potential for the species inhabiting to estimate aquatic and riparian terrestrial habitats suitable for the species population translocation/development, including the "capacity" of the habitats, - If there are no such water bodies, build artificial pond with the surface of about 2 ha in areas around the Project area or downstream, or in the area adjacent to the Vardaqar reservoir from the east, - Develop a BOMP, agree the BOMP with all stakeholders, - Within the framework of the BOMP: - capture as many individuals as possible (adult in terrestrial habitats and tadpoles in the existing pond) and to move them to the safe habitats identified and/or arranged, - development of the water body management rules to avoid disturbances and death of adults Syrian spadefoot and their tadpoles. The final determination of the habitats should be detailed in the BOMP and set up precisely by aquatic 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> 8. Once the reservoir has been filled, assess newly created habitats (aquatic and riparian terrestrial) in terms of their suitability for the species population; if they are deemed suitable, develop and implement a plan to restore the species population in the new reservoir, 9. Monitor and maintain habitats of the species, 10. Restrict the use of the shoreline where the species inhabits for livestock watering. The BOMP implementation requires additional involvement, awareness and sensitization of the local community that will be planned in the BOMP. Animals safely translocation 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 conditions³⁴, ▪ The Procedure for issuing permits for the resettlement of wild animals into natural conditions³⁵ Internationally coordinated approaches for animal relocation are presented in IUCN Guidelines for Reintroductions and Other Conservation Translocations³⁶. For the species-specific approaches and technics, the following manuals and reports have to be followed: 6. Reptile Habitat Management Handbook https://www.arc-trust.org/shop/reptile-habitat-management-handbook 7. 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	Preliminary, the Vardaqr reservoir, or new pond specially built
Party responsible for implementing the measure	The Client - overall responsibility
Institutional or technical support	Project Implementation Unit Support Consultant - biodiversity expert / aquatic 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	

³⁴Approved by the RA governmental decree #758-N from 23.03.2024 <https://www.arlis.am/hy/acts/193176>

³⁵Approved by the order of the Ministry of Environment of the RA #113-N from 03.04.2024 <https://www.arlis.am/hy/acts/191577>

³⁶IUCN/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>

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: aquatic habitat (target at least 2 ha), terrestrial habitats located around the aquatic habitat (target 2.25 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

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 CHs/PBFs, 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.