



Nur Bukhara Solar PV

Critical Habitat Assessment


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Table of Contents

Abbreviations	5
1 Introduction	6
1.1 Overview and Project Background	6
1.2 Structure of the CHA	6
2 Project Description	7
2.1 Project Location	7
2.2 Project Technology	9
3 Assessment Overview	11
4 Natural Habitat Assessment.....	12
5 Assessment of Critical Habitats and Priority Biodiversity Features	15
5.1 Approach	15
5.2 Definition of Ecologically Appropriate Areas of Analysis (EAAA).....	15
5.3 Stakeholder Consultation/Literature Review	20
5.4 Field Data Collection	21
5.5 Critical Habitat/Priority Biodiversity Feature Determinations	22
6 Summary of CH/PBF Determination Findings.....	39

Table of Tables

Table 1: Ecologically Appropriate Areas of Analysis (EAAA) used in the Critical Habitat Assessment for the Project.....	16
Table 2: Biological experts engaged to provide inputs into the Critical Habitat Assessment and biodiversity baseline studies for the Nur-Bukhara Solar Project.....	20
Table 3: Summary of the results of the Critical Habitat, Natural Habitat, and Priority Biodiversity Features Assessment for the Nur-Bukhara PV Solar Project.	40

Table of Figures

Figure 1: Project location	8
Figure 2: Overview of the PV process (compiled from IFC, 2015)	9
Figure 3: Habitat map of the Nur-Bukhara Solar Project area and immediate surroundings, based on botanical and habitat mapping survey performed by Natalya Beshko on 8-9 April 2023.....	14
Figure 4: Illustration of Ecologically Appropriate Area of Analysis (EAAA) #1 (thick purple outlined polygon), used for plants, waterbirds, Russian Tortoise, and Central Asian Otter.	17
Figure 5: Illustration of Ecologically Appropriate Area of Analysis (EAAA) #2 (thick red outlined polygon),	18
Figure 6: Illustration of Ecologically Appropriate Area of Analysis (EAAA) #3 (red lines, including all portions of ABIS canals within 5 km of Project area, excluding one northern channel separated from the rest by a pump station). This EAAA was used for in the Critical Habitat Assessment for four species of CR/EN fish.	19
Figure 7: Known locations of <i>Calligonum molle</i> and <i>Calligonum matteianum</i> (prepared by Natalya Beshko).....	24
Figure 8: Estimated global Extent of Occurrence (EOO) of <i>Calligonum matteianum</i> , based a minimum convex polygon drawn around the localities where this species is known to occur.....	25
Figure 15: Portion of the Amu Darya river channel, illustrating the multiple, parallel channels that carry water within the overall river channel. In the segment illustrated above, the length of the primary channel (red) is 15 km, but the total length of water channel available as fish habitats along this stretch of the Amu Darya is 48.3 km.....	Error! Bookmark not defined.

Abbreviations

Acronym	Definition
ABIS	Amu-Bukhara Irrigation System
ADB	Asian Development Bank
AoI	Area of Influence
BAP	Biodiversity Action Plan
BESS	Battery Energy Storage System
CHA	Critical Habitat Assessment
CR	Critically Endangered
EAAA	Ecologically Appropriate Areas of Analysis
EBRD	European Bank of Reconstruction and Development
EIA	Environmental Impact Assessment
EN	Endangered
EOO	Extent of Occurrence
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESP	Environmental and Social Policy
GoU	Government of Uzbekistan
GN	Guidance Note
IBA	Important Bird Area
IBAT	Integrated Biodiversity Assessment Tool
IFC	International Finance Corporation
IFIs	international finance institutions
IUCN	International Union for Conservation of Nature
JE	Juru Energy Ltd
KBA	Key Biodiversity Areas (KBA)
LC	Least Concern
NEGU	National Electric Grid of Uzbekistan
NH	Natural Habitat
NT	Near Threatened
OHTL	Overhead Head Transmission Line
PBF	Priority Biodiversity Features
PPA	Power Purchase Agreement
PR	Performance Requirements
PS	Performance Standards
PV	photovoltaic
RR	Restricted Range
SCEPP	State Committee on Ecology and Environmental Protection
TA	Technical Appendix
UzRDB	Uzbek Red Book
VU	Vulnerable

1 Introduction

1.1 Overview and Project Background

Abu Dhabi Future Energy Company PJSC (“Masdar” or the “Developer”) has been awarded by the Ministry of Energy, Government of Uzbekistan, to design, build, finance, construct, commission and operate, maintain and transfer the Nur Bukhara Solar photovoltaic (PV) Project with a capacity of 250 MWA and 63 MW/126 MWh Battery Energy Storage System (BESS) (“Project”). The Project will be designed to meet national regulations and international standards. The Project will be implemented through a long-term, i.e., 25 years power purchase agreement (a “PPA”) between Nur Bukhara Solar PV LLC Foreign Enterprise (the Project Company or the Company) and JSC National Electric Grid of Uzbekistan (“NEGU”) as the offtaker.

The Project will support Uzbekistan to:

- Reduce energy dependence on carbon-based fuels.
- Meet renewable energy targets.
- Reduce greenhouse gas emission rates.

Masdar has appointed Juru Energy Ltd. (JE or the ESIA Consultant) to perform an Environmental and Social Impact Assessment (ESIA) for the Project. The ESIA will be developed in accordance with the requirements of the International Finance Corporation (IFC) Performance Standards (PSs), Asian Development Bank (ADB) Safeguard Policy Statement 2009 (SPS 2009) and with reference to EBRD Environmental and Social Policy 2019 (ESP 2019) Performance Requirements (PRs) and the Equator Principles. The Project is required to undergo a separate national environmental impact assessment (EIA) process, which JE will perform and submit as a separate document to the Ministry of Environment for approval.

This document is the Critical Habitat Assessment (CHA) and has been prepared on behalf of Masdar following the most recent guidance for such in both IFC PS6¹ and EBRD PR6², including pertinent Guidance Notes (GNs)^{3,4}.

1.2 Structure of the CHA

The CHA is structured as follows:

- Chapter 2: Project Description
- Chapter 3: Assessment Overview
- Chapter 4: Natural Habitat Assessment
- Chapter 5: Assessment of Critical Habitat and Priority Biodiversity Features

¹ International Finance Corporation (IFC), 2012. Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. January 1, 2012, IFC, World Bank Group, Washington, DC, USA.

² European Bank of Reconstruction and Development (EBRD), 2019. Environmental and Social Policy: EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources, April, 2019. EBRD.

³ International Finance Corporation (IFC), 2019. International Finance Corporation’s Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. Originally published January 1, 2012, updated June 27, 2019. IFC, World Bank Group, Washington, DC.

⁴ European Bank of Reconstruction and Development (EBRD), 2022. EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources: Guidance Note. September, 2022. EBRD.

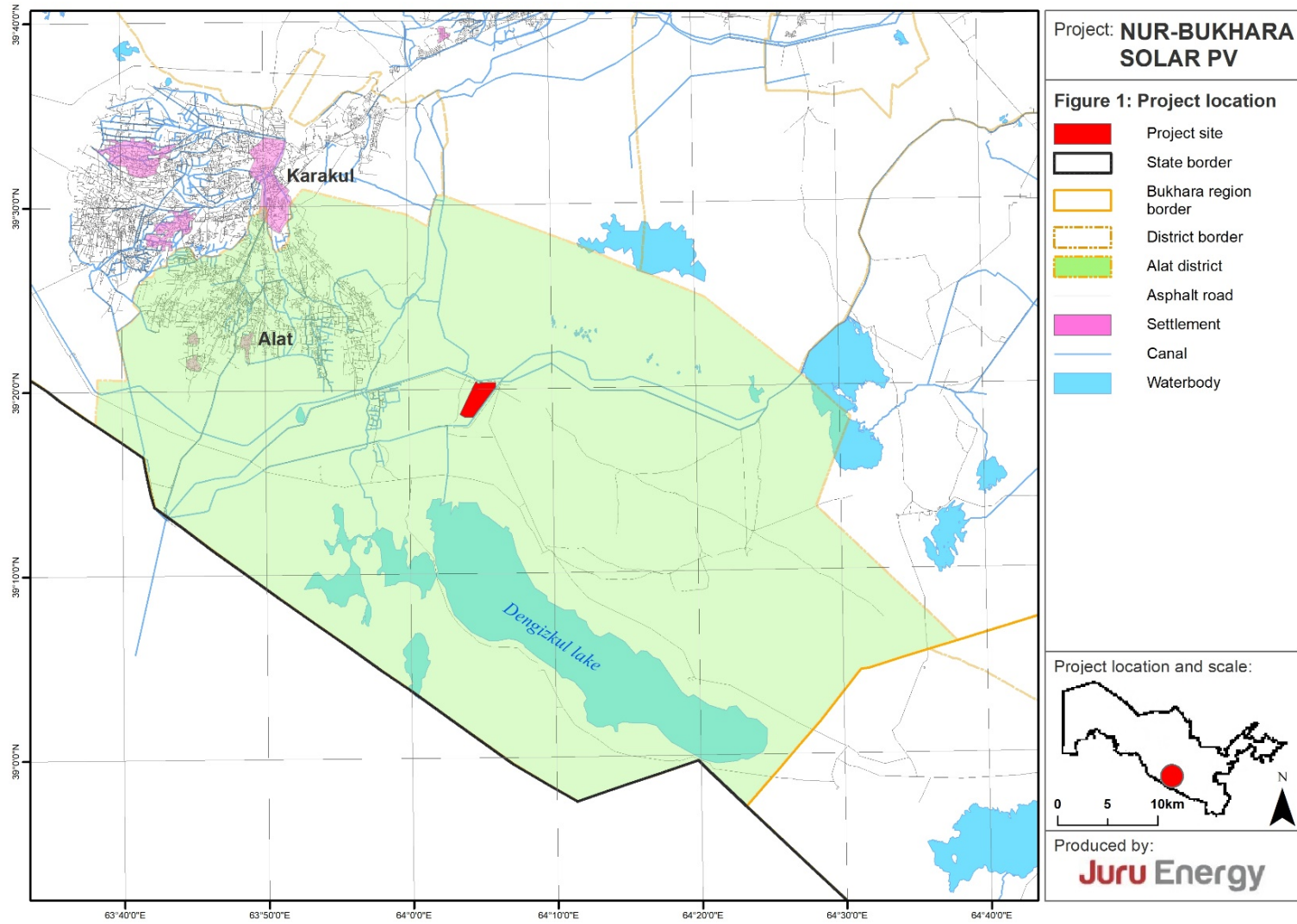
- Chapter 6: Consultation and participation

2 Project Description

2.1 Project Location

The Project site covers approximately 649 ha of land in the Alat District of the Bukhara region of the Republic of Uzbekistan. It is located 24 km southeast of Alat city, close to the border with Turkmenistan, which at the closest point lies around 25 km southeast of the Site. The proposed Site is flat and is surrounded by the Amu-Bukhara canal to the North, South and East. The regional road R78 runs alongside the northern boundary of the Site. The location of the Project is illustrated in Figure 1.

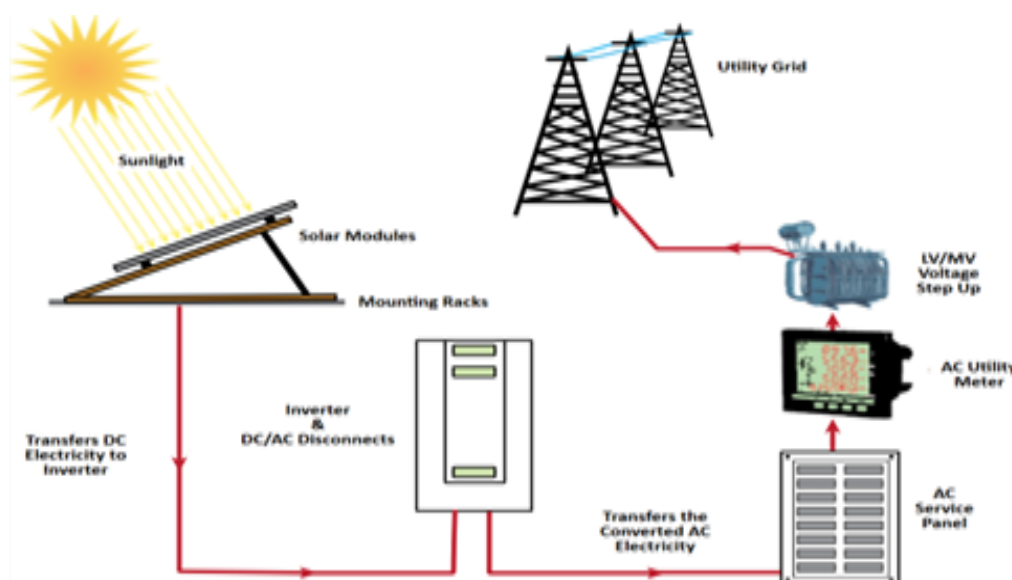
Figure 1: Project location



2.2 Project Technology

Photovoltaic (PV) power uses solar panels to convert sunlight into electricity by converting solar radiation into DC electricity. PV inverters convert the direct current into alternating current, and the transformers (located in the Power Stations) will raise the voltage from Low Voltage (LV) to Medium Voltage (MV). Then, the energy generated will be conducted through an underground medium voltage (MV) network of 35 kV to the 35/220 kV Substation. An overview of the process is illustrated in Figure 2 below.

Figure 2: Overview of the PV process (compiled from IFC, 2015)



The main components of the Project are:

- 513,582 PV modules (half-cut monocrystalline silicon technology)
- Inverters and transformers
- Li-Io battery energy storage system (BESS) (four x 40ft containers)
- Underground cabling system
- 35/220 kV Substation
- Grid connection to an existing overhead transmission line (OHTL), "Karakul 500 SS" - "Hamza-2 SS" from the Project's Substation via a 30m 220 kV Line-in-Line-Out (LILO) connection
- Dismantling and rebuilding of approximately 200 m of existing OHTL w to enable the new LILO link to be made
- On-site buildings, including an operational control centre, office, welfare facilities, security guard house, storage facilities and stores
- New access from Highway R78
- New internal access roads
- Site drainage system

The following activities will be undertaken to develop the Project:

- Site mobilization.
- Civil works
- Procurement and transportation of equipment
- Equipment installation
- Waste generation and disposal
- Commissioning
- Operation and maintenance (O&M)
- Decommissioning

Construction of the Project will be confined to the project site, access road and existing OHTL right of way, and the duration will be approximately 12 to 16 months. The main construction activities are site clearance (rocks, debris, non-functional utilities, vegetation), establishing vehicle access to the Site, civil works (OHTL, substation and main Site), equipment delivery of PV panels and supporting infrastructure), BESS, installation and commissioning. Site establishment and civil works are expected to take three months, followed by eight months for installation and a further three months for commissioning. Work on-site is planned to start at the end of 2023. A material storage area will be established within the main site boundary. At this time, the water source for the construction process will be tankered to the Site. Cement will be from a nearby batching plant (not produced on-site).

The Project may have some on-site accommodation, but contractors will also use offsite accommodation provided it meets Lender standards and adheres to the management and measures stipulated in the ESIA.

The expected lifetime of the PV infrastructure is 25 years (at least), and ten years for the battery system. At the end of its lifetime, options will be considered to replace, repair or remove all infrastructure from the Site.

3 Assessment Overview

IFC Performance Standard (PS) 6 and EBRD Performance Requirement (PR) 6 are largely, but not entirely, aligned with each other, both in general, and also specifically with respect to CHA. One minor point of divergence is with respect to numbering of the CH criteria. Both policies protect a “first tier” of top priority biodiversity features as “Critical Habitat” features, defined in both policies by five completely, or nearly identical criteria, but these criteria are numbered differently. This divergence is reflected in the titles of the subsections that address each of the CH criteria separately, below.

A more substantive difference between IFC PS6 and EBRD PR6 is in the “second tier” of biodiversity features that are protected under these policies. IFC PS6 extends a second tier of protection to Natural Habitat (NH), defined as “areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area’s primary ecological functions and species composition.”⁵ Thus, this second tier of biodiversity protection, for IFC, pertains to “areas,” characterized by the presence of certain ecological assemblages or communities, and is usually measured in areal extent. By contrast, EBRD PR6 does not include any area-based concept analogous to NH, but extends a second tier of protection to “Priority Biodiversity Features” (PBF), defined by four criteria, and potentially including sensitive species, or ecological functions, as well as threatened habitats⁶.

Finally, another divergence between IFC PS6 and EBRD PR6 is that only the latter states that projects must “meet EU principles,” including the Habitats⁷ and Birds⁸ Directives, “regardless of their geographic location.”⁹ Nonetheless, while the EBRD environmental and social policy extends the principles, and specific protections of EU nature legislation globally, and includes specific listed status of species and habitats under EU nature legislation among its CH and PBF criteria¹⁰, EBRD also recognizes that the conservation sensitivity of certain species and habitats may be different

⁵ International Finance Corporation (IFC), 2019. International Finance Corporation’s Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. Originally published January 1, 2012, updated June 27, 2019. IFC, World Bank Group, Washington, DC.

⁶ European Bank of Reconstruction and Development (EBRD), 2019. Environmental and Social Policy: EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources, April, 2019. EBRD.

⁷ [https://environment.ec.europa.eu/topics/nature-and-biodiversity/habitats-directive_en#:~:text=The%20Habitats%20Directive%20\(Council%20Directive,and%20outside%20Natura%202000%20sites](https://environment.ec.europa.eu/topics/nature-and-biodiversity/habitats-directive_en#:~:text=The%20Habitats%20Directive%20(Council%20Directive,and%20outside%20Natura%202000%20sites). Accessed 29 June, 2023

⁸ https://environment.ec.europa.eu/topics/nature-and-biodiversity/birds-directive_en#:~:text=The%20Birds%20Directive%20aims%20to,thrive%20over%20the%20long%2Dterm. Accessed 29 June, 2023.

⁹ European Bank of Reconstruction and Development (EBRD), 2022. EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources: Guidance Note. September, 2022. EBRD. Page 6

¹⁰ European Bank of Reconstruction and Development (EBRD), 2022. EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources: Guidance Note. September, 2022. EBRD. Table 1

inside, compare with outside of Europe¹¹. For this reason, EBRD Guidance Note (GN) 6 indicates that the CH and PBF criteria related to species' or ecosystems' listed status under the Habitats or Birds Directives and the Bern Convention¹² are applicable for EU members only (Habitats and Birds Directives), or Bern Convention signatories only (Bern Convention)¹³. Uzbekistan is not located within the geographic or ecological realm of Europe, nor is Uzbekistan a Bern Convention signatory, or a political member of the EU. Therefore, the status of specific species and ecosystems within EU nature legislation is not pertinent to the present CHA, per EBRD policy.

Under both IFC PS6 and EBRD PR6, a CH determination triggers a "net positive gain" mitigation standard, as well as the requirement to prepare a Biodiversity Action Plan (BAP). Both of these policies apply a "no net loss" mitigation standard to the second tier of biodiversity features: NH in the case of IFC PS6, and PBF in the case of EBRD PR6. A BAP is not required for projects that trigger only the second tier of biodiversity features under either policy. In order to encompass the complete scope of prioritized biodiversity features that are subject to special protections under IFC PS6 and EBRD PR6, this CHA includes a comprehensive assessment not only of CH features, following the virtually identical procedures and criteria for such in both IFC and EBRD policies, but also NH under IFC PS6, and PBF under EBRD PR6.

4 Natural Habitat Assessment

IFC PS6 does not define a specific process for assessing NH, but it does contain a definition of NH (see above) and indicates that determination of NH should be made "using credible scientific analysis of best available information," indicating also that local knowledge and experience should be utilized¹⁴. Furthermore, IFC PS6 also specifies that "natural" does not connote "pristine" or "untouched" in the context of NH determination, and that areas that are used by humans, and exhibit some modification by humans, and/or have some presence of exotic species should still be considered as NH as long as they retain "the principal characteristics and functions of a native ecosystem."¹⁵

The habitats of the Project area and immediate surroundings were surveyed and mapped by Uzbek botanist, Natalya Beshko, on April 8-9, 2023. Ms. Beshko also performed a floristic survey of the area during this site visit. This information was presented in a botanical/habitat baseline

¹¹ European Bank of Reconstruction and Development (EBRD), 2022. EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources: Guidance Note. September, 2022. EBRD. Footnote 4.

¹² <https://www.coe.int/en/web/bern-convention>. Accessed 29 June, 2023

¹³ European Bank of Reconstruction and Development (EBRD), 2022. EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources: Guidance Note. September, 2022. EBRD. Table 1

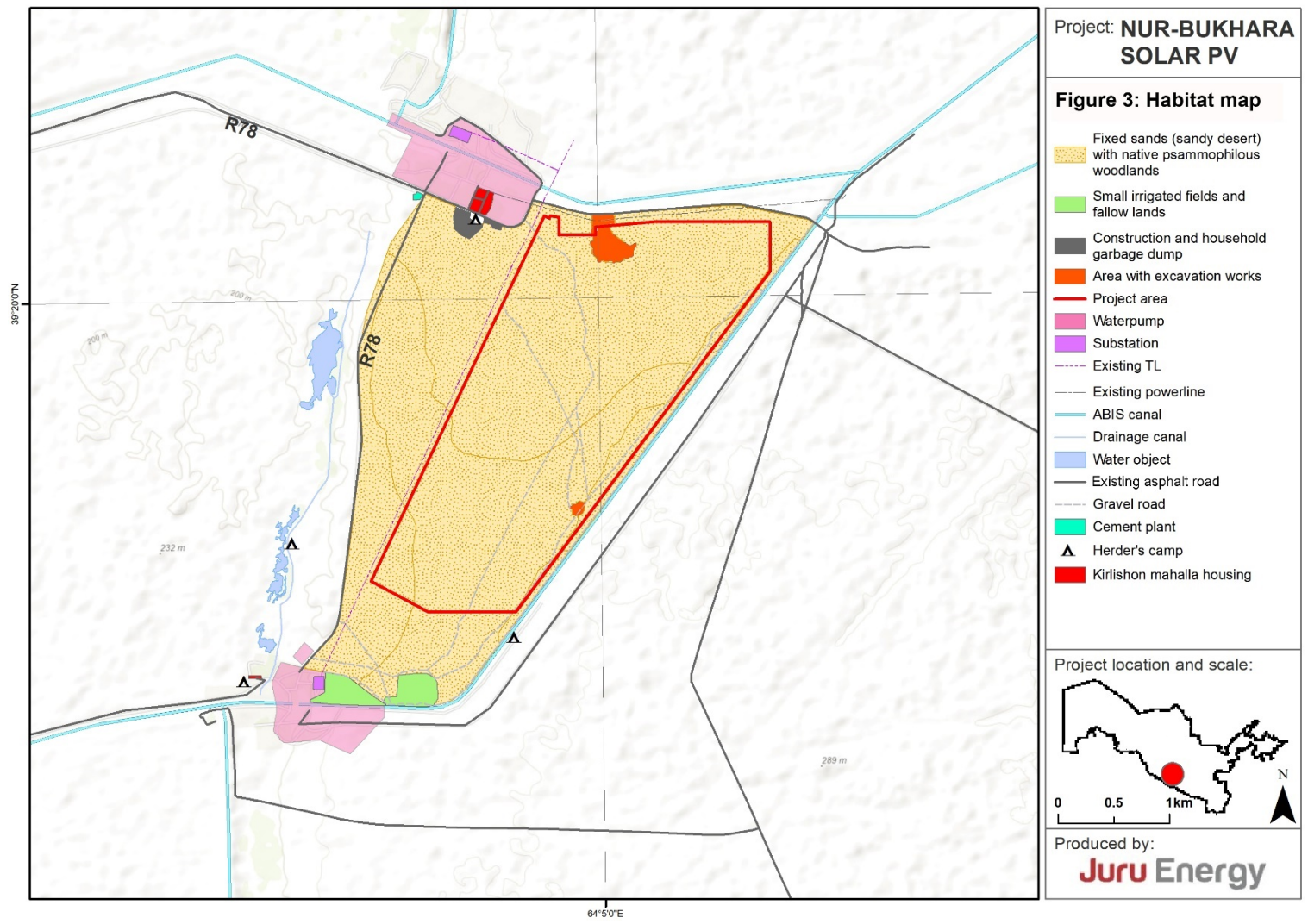
¹⁴ International Finance Corporation (IFC), 2019. International Finance Corporation's Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. Originally published January 1, 2012, updated June 27, 2019. IFC, World Bank Group, Washington, DC. GN 39

¹⁵ International Finance Corporation (IFC), 2019. International Finance Corporation's Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. Originally published January 1, 2012, updated June 27, 2019. IFC, World Bank Group, Washington, DC. GN 39

survey report, which also included an extensive literature review, and interpretation of the ecological condition of the area, based on Ms. Beshko's expertise and experience with the flora and habitats of the region. This report is included within the technical appendices to the ESIA Volume III: Technical Appendix 9 (Spring Botanical Survey report). The habitat map of the Project area and surroundings is shown in Figure 1. Based on the characterization of the structure and composition of the vegetation at the site, the areas mapped by the botanist as "fixed sands (sandy desert) with native psammophilous woodlands" (Figure 1) are determined to be NH, per IFC PS6. This area is used currently as a domestic livestock grazing area by local herders, yet it retains the basic vegetation structure, function, and floristic composition of the native ecosystem, and was described by the botanist as "natural habitat" in the botanical/habitat baseline survey report¹⁶. This NH type covers the vast majority of the Project area (and immediate surroundings) and encompassing 1801 hectares that include all but the two small quarries (Figure 3) which are classified as Modified Habitat, per IFC PS6. The Project will be required to satisfy IFC's "no net loss" (NNL) standard, for projects sited within Natural Habitat and the approach for NNL is elaborated in ESIA Volume II.

¹⁶ Volume III: Technical Appendix 9 (Spring Botanical Survey report)

Figure 3: Habitat map of the Nur-Bukhara Solar Project area and immediate surroundings, based on botanical and habitat mapping survey performed by Natalya Beshko on 8-9 April 2023.



5 Assessment of Critical Habitats and Priority Biodiversity Features

5.1 Approach

The process and structure of this CHA has been developed based on merging the specific guidance provided for such by IFC and EBRD in their most recent GNs^{17,18} with the objective of complying with both. As with the CH criteria, themselves, the guidance for performing CHA provided by IFC and EBRD is largely overlapping, yet the process is described in very different ways in the two pertinent GNs. The most substantive difference is that EBRD recommends performing a CHA as an integrated analysis to identify not only CH features, but also PBF features, presenting a table (EBRD GN6 Table 1) that essentially equates EBRD's PBF criteria to second tier thresholds for the same basic criteria as are used to determine CH, at least for threatened species, and threatened habitats. In this analysis, all of the specific criteria listed by either IFC, EBRD or both for determining CH or PBF (EBRD only) are reviewed individually in separate subsections below, preceded by several introductory steps necessary to support the CHA, as enumerated in IFC GN6, and also paralleling the guidance presented in EBRD GN6, as follows:

- i. Definition of the Ecologically Appropriate Areas of Analysis (EAAA);
- ii. Stakeholder engagement/literature review; and
- iii. Field data collection
- iv. Critical habitat/PBF determination.

5.2 Definition of Ecologically Appropriate Areas of Analysis (EAAA)

A necessary step for performing the CHA, including assessment of PBF, is the definition of the Ecologically Appropriate Area of Analysis (EAAA), which essentially corresponds to a specialized definition of the Project's Area of Influence (AOI) for biodiversity features. IFC and EBRD define the EAAA as a species-specific concept, recognizing that a single project may have entirely different effective areas of influence on different species or biodiversity features, depending on the movement patterns, landscape connectivity, or other ecological characteristics of the species or features. Hence, in principle, there is not a single EAAA for any project, but rather a different EAAA for each potentially affected species or biodiversity feature. In order to perform the CHA for this Project, a set of EAAA was defined based on species-specific consideration of pertinent ecological information. In some cases, the same EAAA was considered to apply to multiple species, where those species shared key dispersal, movement, or other ecological characteristics that resulted in a shared, similar effective area of influence from the Project. The set of EAAA used for the CHA, and the species/groups for which they were considered applicable is presented in Table 1, and the geographic extent of each EAAA is illustrated in Figure 4, Figure 5, Figure 6.

¹⁷International Finance Corporation (IFC), 2019. International Finance Corporation's Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. Originally published January 1, 2012, updated June 27, 2019. IFC, World Bank Group, Washington, DC.

¹⁸European Bank of Reconstruction and Development (EBRD), 2022. EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources: Guidance Note. September, 2022. EBRD.

Table 1: Ecologically Appropriate Areas of Analysis (EAAA) used in the Critical Habitat Assessment for the Project.

EAAA #	Applicable species	Description	Rationale
1	<i>Calligonum matteianum</i> , <i>Calligonum molle</i> , <i>Calligonum paletzianum</i> , Russian Tortoise, White-headed Duck, Marbled Teal, Sociable Lapwing, Dalmatian Pelican, Central Asian Otter	Terrestrial habitat of project area, plus adjacent surrounding uplands extending to, and including nearest waterway (ABIS canal on three sides, natural stream/wetland corridor on the west. Total area roughly double that of the Project area (see Figure 2).	Used for sessile species (plants), as well as terrestrial animals with limited ability to disperse across a waterway or wetland. Also used for breeding and/or migratory waterbirds and an aquatic mammal whose use of the Project area and immediate vicinity is likely to be restricted to aquatic/wetland habitats.
2	Macqueen's Bustard, Egyptian Vulture, Pallas's Fish-Eagle, Steppe Eagle, Saker Falcon, Goitered Gazelle	Project area buffered by 10 km (see Figure 3).	Potential breeding habitat of MacQueen's Bustard or year-round habitat of Goitered Gazelle, inclusive of large home range/territories and ability to cross small waterways; potential use of Project site and vicinity for migratory passage and/or breeding season or wintering season residency by large soaring raptors and vultures with highly dispersive behaviour and large home ranges.
3	Amu Darya Shovelnose Sturgeon, Small Amu Darya Shovelnose Sturgeon, <i>Aspiolucius esocinus</i> , <i>Capoetobrama kuschakewitschi</i>	All ABIS canals and drainage ponds within 5 km of the Project area, excluding one segment that is separated from the rest of the network by a pumping station (See Figure 4).	Nearby portion of ABIS canal network used by endemic and endangered fish that utilize fast-flowing turbid waters of the Amu Darya river system.

Figure 4: Illustration of Ecologically Appropriate Area of Analysis (EAAA) #1 (thick purple outlined polygon), used for plants, waterbirds, Russian Tortoise, and Central Asian Otter.

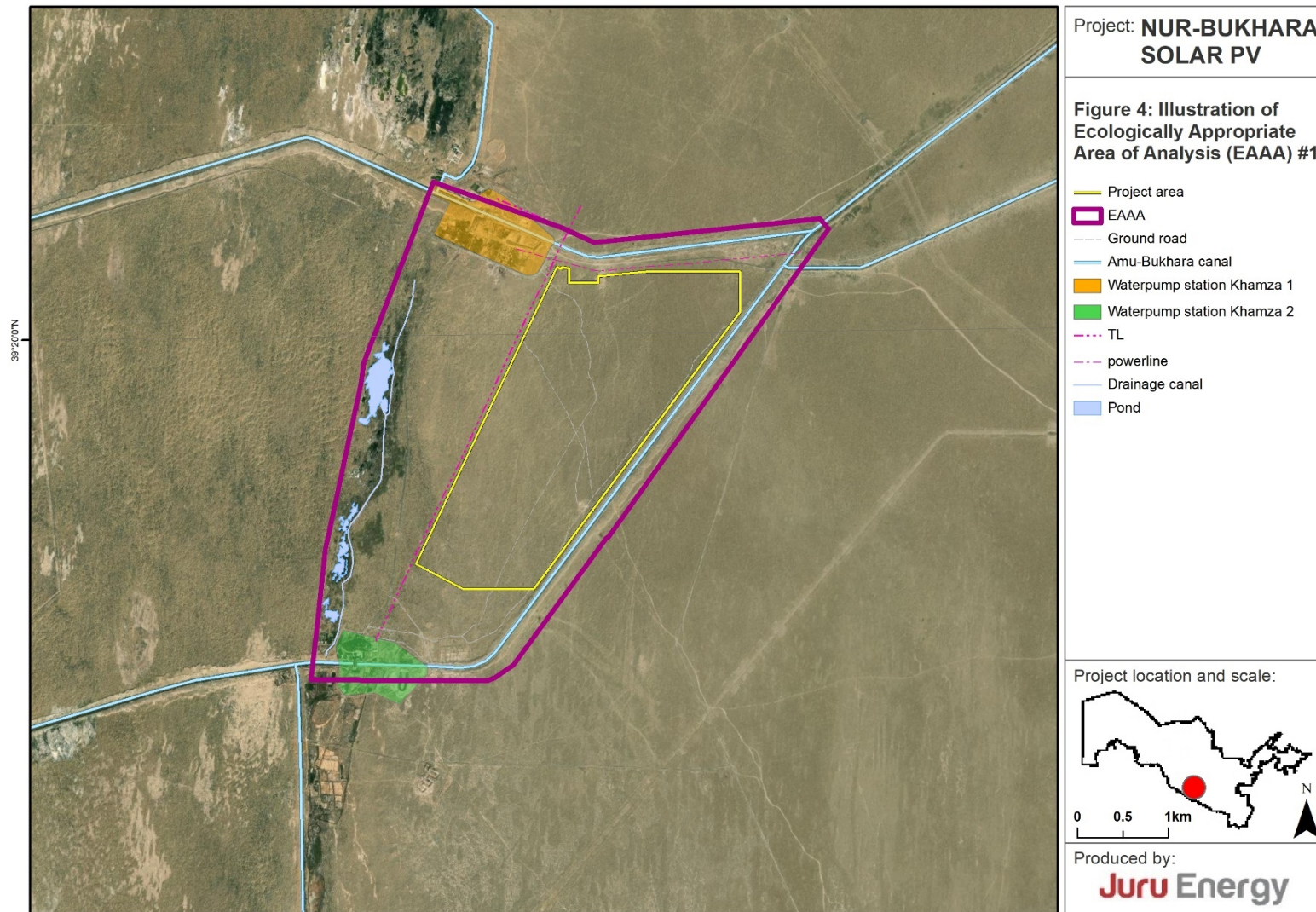


Figure 5: Illustration of Ecologically Appropriate Area of Analysis (EAAA) #2 (thick red outlined polygon),

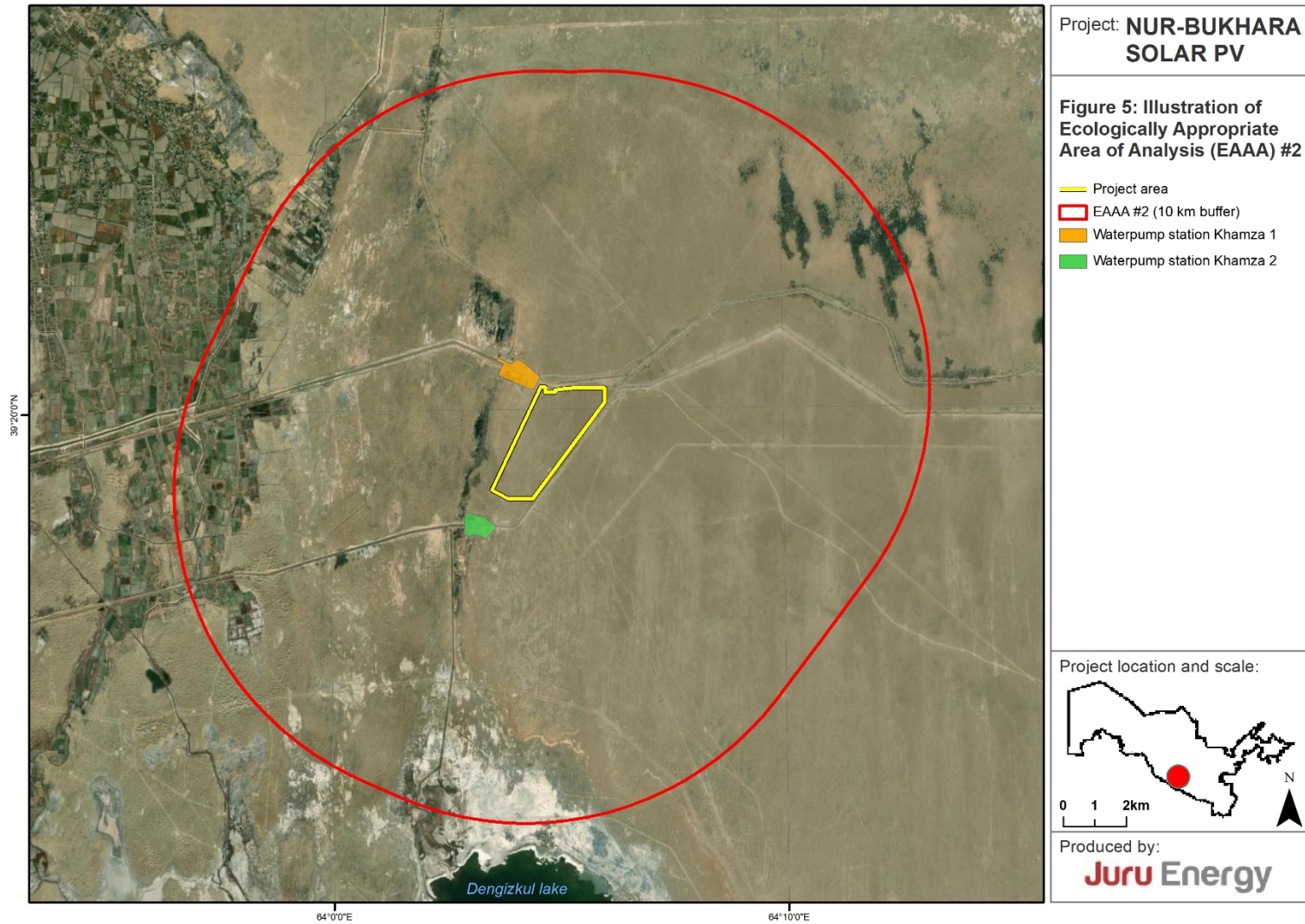
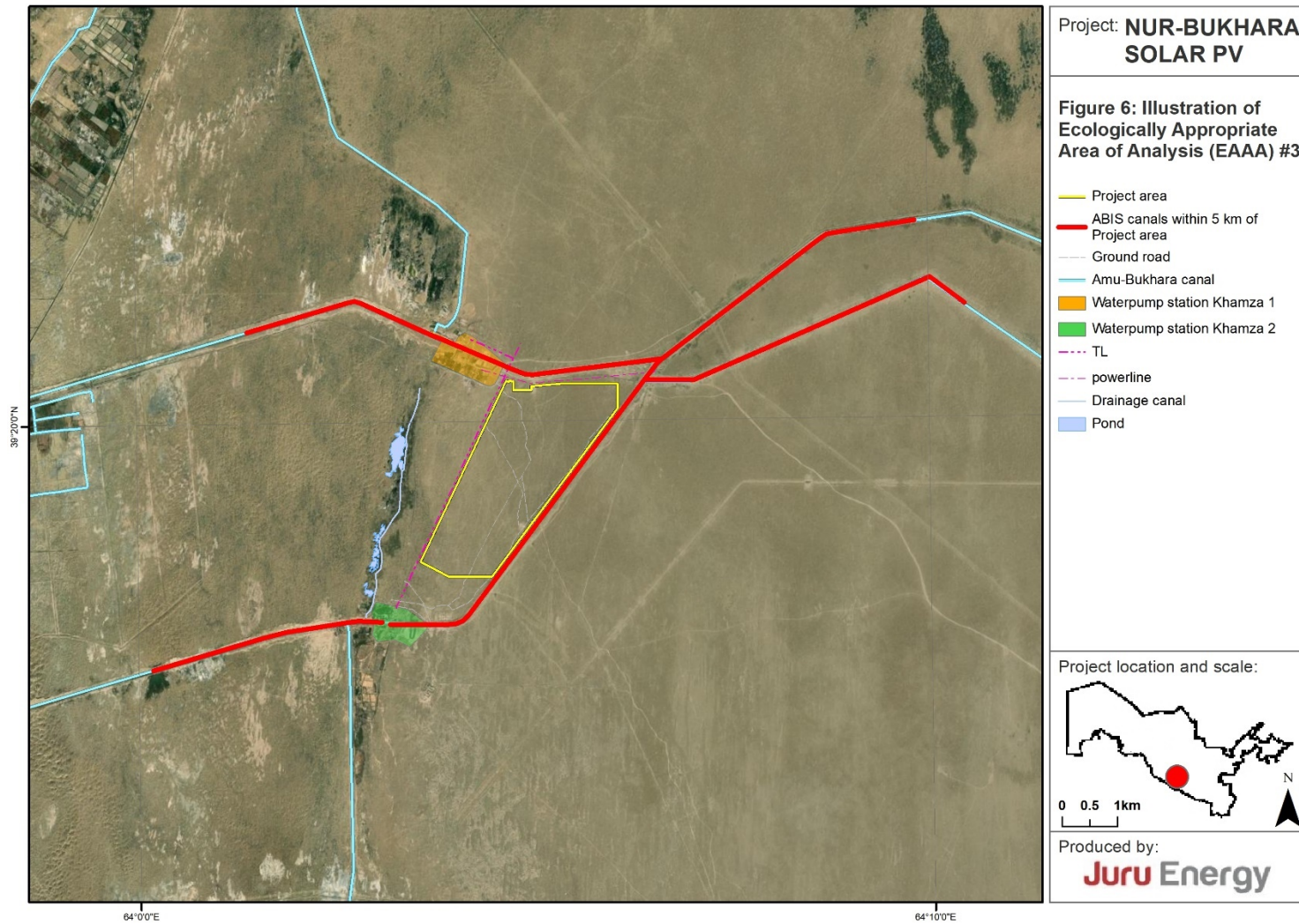


Figure 6: Illustration of Ecologically Appropriate Area of Analysis (EAAA) #3 (red lines, including all portions of ABIS canals within 5 km of Project area, excluding one northern channel separated from the rest by a pump station). This EAAA was used for in the Critical Habitat Assessment for four species of CR/EN fish.



5.3 Stakeholder Consultation/Literature Review

Consultation with scientific experts and other stakeholders who are familiar with the taxa and ecosystems under review is a key step in CHA, per both IFC and EBRD policies. In particular, expert opinion is generally the most important basis for CH/PBF determinations in the case of the more qualitative criteria and thresholds, for example IFC CH criteria 4 (Highly threatened and/or unique ecosystems) and 5 (Key evolutionary processes), which roughly correspond to EBRD CH criteria 1 and 5, as well as EBRD PBF criteria iii (features identified as important by stakeholders/governments) and iv (ecological structure and functions needed to maintain other PBF), and also CH subcriteria b (Vulnerable species) and c (nationally redlisted species) for Critically Endangered or Endangered (CR/EN) species (IFC CH criterion 1, EBRD CH and PBF criterion 2).

Furthermore, expert opinion is often essential for understanding species' ecology and regional ecosystems well enough to define biologically accurate EAAA. To support the current CHA, a series of national biodiversity experts was engaged to provide the expert opinion necessary for evaluating all pertinent taxa and ecosystems against the pertinent CH and PBF criteria. These same experts were also enlisted to perform biodiversity baseline field surveys for their respective taxa to support the CHA, as well as the baseline section of the ESIA (Volume II). The experts were selected on the basis of their professional reputations and expertise in their respective taxa, and their names, affiliations, and areas of expertise are described in Table 2.

Table 2: Biological experts engaged to provide inputs into the Critical Habitat Assessment and biodiversity baseline studies for the Nur-Bukhara Solar Project.

Expert	Affiliation	Area of Expertise
M.Sc. Anna Ten	Juru Energy, Institute of Zoology, Tashkent	Birds
M.Sc. Mariya Gritsina	Institute of Zoology, Tashkent	Mammals
M.Sc. Akbarjon Rozimov	Institute of Zoology, Tashkent	Fish
M.Sc. Timur Abduraupov,	Institute of Zoology, Tashkent	Reptiles and Amphibians
Ph.D. Dmitry Bondarenko	Institute of Zoology, Tashkent	Reptiles and Amphibians
Dr. Natalya Beshko	Institute of Botany, Tashkent	Plants/habitat
Dr. Bekhzod Adylov	Institute of Botany, Tashkent	Plants, Maxent analysis

A comprehensive review of pertinent technical literature was also conducted to support both the CHA and the ESIA. Literature reviews of region- and taxon- specific information were prepared by the national taxonomic experts listed in Table 2, and included within the taxon-specific biodiversity baseline survey reports described below, and provided in ESIA Volume III: Technical Appendix:

- Technical Appendix 5 (TA5): Desk Top Fish Baseline Report (May 2023)

- Technical Appendix 7 (TA7) Mammal Survey (May 2023)
- Technical Appendix 8 (TA8) Reptile baseline report
- Technical Appendix 9 (TA9) Springtime Botanical Survey (May 2023)
- Technical Appendix 10 (TA10) Summer Botanical Survey (June 2023)
- Technical Appendix 11 (TA11) Bird Survey: Asian Houbara, Marbled Teal and White-headed Duck (May 2023)
- Technical Appendix 13 (TA13) Maxent modelling report

Additional review of technical literature and information from publicly available databases pertaining to international conservation status and international good practice for biodiversity conservation, mitigation, and CHA was performed by the team's international biodiversity specialist, Caleb Gordon. This included acquisition of a PS6 report for the Project area from the Integrated Biodiversity Assessment Tool (IBAT)¹⁹. Information from the IBAT report, and other parts of the international literature review has been integrated into the pertinent sections of the CHA and ESIA.

5.4 Field Data Collection

CHA requires the collection of site-specific field survey data for the Project area and surroundings, per IFC PS6 and EBRD PR6, as data from such surveys are generally necessary in order to evaluate many of the CH/PBF criteria, particularly where CH/PBF triggers are defined by quantitative thresholds. Several distinct sets of field surveys of the Project area and surroundings were used to support the CHA with the necessary information, as follows:

- Lender's Scoping Report – The IFC hired TYP SA to perform a scoping study of the Nur-Bukhara solar project site, in order to provide support of the procurement process, and to strengthen developers' bids to develop the project. This scoping study included a set of biodiversity field surveys of the site conducted during 2021, with methodologies and results described in the TYP SA scoping report²⁰, dated November 2022, which was provided to all bidders.
- ESIA Scoping Study – The JE team performed an initial scoping visit to the site on 2-3 March 2023, for the purpose of refining the scope of the ESIA, including necessary biodiversity baseline studies. This visit was attended by Juru lead biologist, Anna Ten, and the results were summarized in the JE Scoping Report²¹.

¹⁹ IBAT PS6 & ESS6 Report. Generated under license 1781-26131 from the Integrated Biodiversity Assessment Tool on 17 January 2022 (GMT). www.ibat-alliance.org

²⁰ TYP SA, 2022. Uzbek Solar 3. Technical, environmental and social consultant Bukhara environmental & social scoping report. Produced for IFC. Verified 2 November, 2022.

²¹ Juru Energy, 2023. Nur Bukhara Solar PV – Environmental & Social Impact Assessment: Scoping Report. Produced for Masdar Clean Energy, 31 March, 2023.

- Biodiversity baseline surveys – Informed by the ESIA scoping study and the technical literature review, the Juru team conducted a set of biodiversity baseline studies for the combined purpose of supporting the baseline section of the ESIA, and also to provide the necessary inputs of site-specific field data to support the CHA. These surveys were performed by the national taxonomic experts listed in Table 2 for their respective taxa, and the specific methodologies, survey effort, and results are presented in the biodiversity baseline survey reports that have been annexed to the ESIA.

5.5 Critical Habitat/Priority Biodiversity Feature Determinations

5.5.1 Critically Endangered (CR) and Endangered (E) Species (IFC CH criterion #1, EBRD CH and PBF criterion #2)

All CR/EN species known, or predicted to occur within the Project site, or close enough to potentially be impacted by the Project were assessed against IFC and EBRD criteria to determine whether any triggered either CH or PBF designation for the Project.

This criterion includes 3 separate subcriteria for CH determinations, as follows:

- Subcriterion a) species listed as CR/EN on the global IUCN Red List of Threatened Species (IUCN redlist)
- Subcriterion b) species listed as Vulnerable (VU) on the IUCN redlist
- Subcriterion c) species listed as CR/EN on national redlists that are not so listed on the IUCN redlist

Furthermore, a CR/EN species may also be classified as a PBF under EBRD PR6, if it does not meet the “first tier” threshold defined in EBRD’s CH criterion 2, but it meets the “second tier” threshold defined in EBRD’s PBF criterion 2.

The specific thresholds for species to trigger CH or PBF under the CR/EN species criterion under IFC PS6²² (CH only) and EBRD PR6²³ (CH and PBF) are as follows:

- Subcriterion a (IUCN CR/EN species).
 - CH triggered if the EAAA supports $\geq 0.5\%$ of the global population and ≥ 5 reproductive units
 - PBF triggered if species is present within EAAA, but EAAA supports $< 0.5\%$ of the global population or < 5 reproductive units
- Subcriterion b (IUCN VU species)
 - CH triggered if loss of the species’ population within the EAAA would result in species’ uplisting to CR or EN on the IUCN redlist

²² International Finance Corporation (IFC), 2019. International Finance Corporation’s Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. Originally published January 1, 2012, updated June 27, 2019. IFC, World Bank Group, Washington, DC.

²³ European Bank of Reconstruction and Development (EBRD), 2022. EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources: Guidance Note. September, 2022. EBRD.

- PBF triggered if species is present within the EAAA
- Subcriterion c (nationally CR/EN species)
 - CH triggered if EAAA contains “important concentration” of species, as evaluated through expert opinion
 - PBF triggered if species occurs regularly within EAAA

CR/EN species triggering CH or PBF determination for the Project are discussed individually below.

5.5.1.1 *Calligonum matteianum* (IUCN EN, nationally Category 2 – Rare)

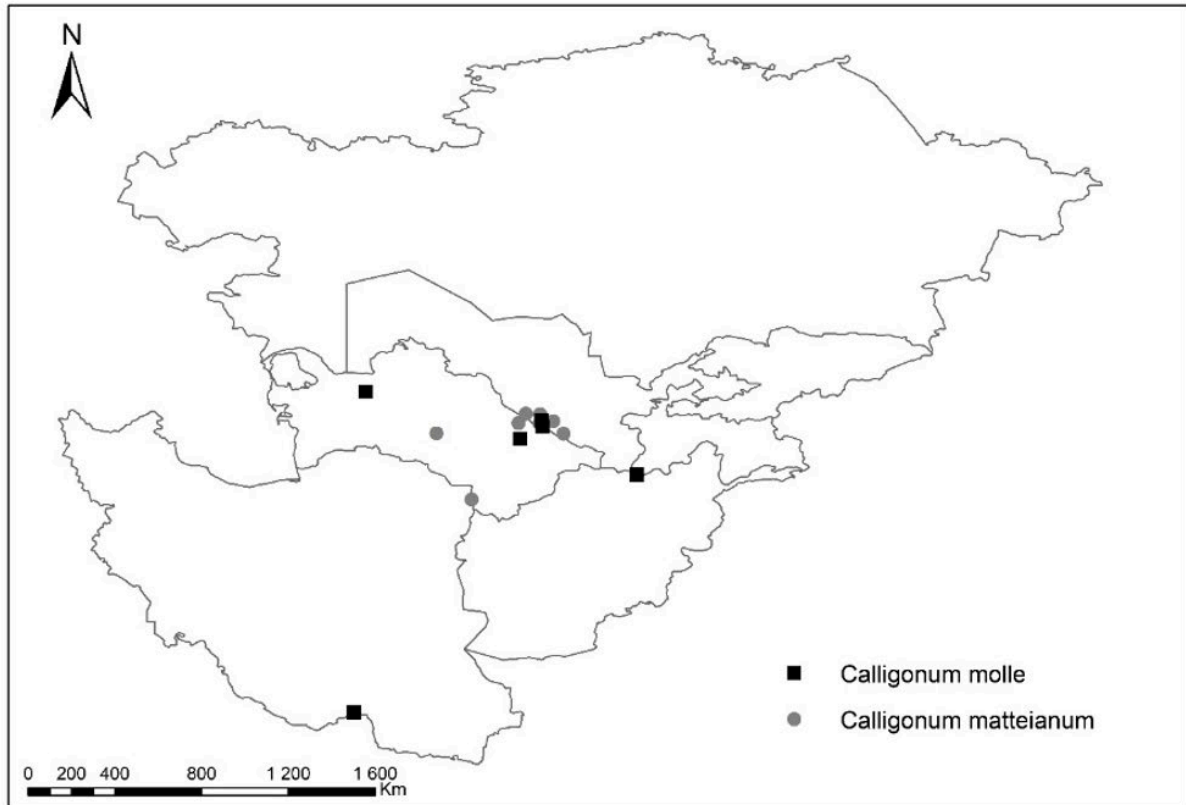
Precise documentation of the number and distribution of individuals of this species within the Project’s EAAA is complicated by the fact that is only possible to distinguish this species from other congeneric species that may co-occur with it during a brief window of time in late May and early June when the seeds have ripened but have not yet fallen from the parent plant. This was further complicated by the fact that baseline field surveys conducted at the site and surroundings during this time window in 2023 found that *Calligonum* individuals did not flower or produce seeds in 2023, likely due to a spring drought. Nonetheless, it is known that this species occurs on the Project site, as several specimens were documented during the surveys conducted during Spring, 2021 for the TYP SA scoping report²⁴ (note, these surveys were conducted by Uzbek botanist Natalya Beshko, who also performed the 2023 baseline botanical surveys).

The extreme difficulty in identification of this species in the field also poses a severe limitation on understanding this species’ global distribution and population size. The IUCN redlist presents neither a global population estimate nor a map of this species’ distribution, as is the case for most plant species on the Red List. The Kew Gardens Plants of the World Database only shows the entire countries of Uzbekistan and Turkmenistan as a representation of this species’ global range, as is the case for most/all of its plant distribution maps²⁵. According to the national botanical expert, Natalya Beshko, this species likely has a fairly broad distribution within suitable desert habitat in central Asia, yet it is only known from a small handful of locations (Figure 7).

²⁴ TYP SA, 2022. Uzbek Solar 3. Technical, environmental and social consultant Bukhara environmental & social scoping report. Produced for IFC. Verified 2 November, 2022.

²⁵ <https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:978271-1> accessed 1 July, 2023

Figure 7: Known locations of *Calligonum molle* and *Calligonum matteianum* (prepared by Natalya Beshko)



In order to be able to evaluate this species against CH/PBF criteria, we applied conservative estimates of this species' global and local distributions. For the global distribution, (equivalent to Extent of Occurrence, or EOO per IUCN and EBRD definitions), we calculated the area of the minimum convex polygon enclosing all of the known locations of this species (Figure 7). The resulting EOO polygon is shown in Figure 8, and has a total area of 108,402 km².

Figure 8: Estimated global Extent of Occurrence (EOO) of *Calligonum matteianum*, based a minimum convex polygon drawn around the localities where this species is known to occur.



At the EAAA level, we conservatively assumed that the species covers the entire EAAA (EAAA #1, Figure 4), which has an area of 15 km². Based on these estimates of the global (EOO) and local (EAAA) areal extent of *C. matteianum*, the Project is estimated to contain roughly 0.0138% of the species' global population. This is over an order of magnitude below the 0.5% threshold necessary to trigger a CH determination under IFC PS6 CH criterion 1a, thus, we conclude that the Project does not trigger CH for *C. matteianum*. We note that this conclusion is based on very conservative and precautionary assumptions that likely overestimated this species' coverage within the EAAA and underestimated this species' EOO²⁶, hence we consider the conclusion that this species does not trigger a CH determination to be robust to uncertainties regarding the species' local and global distributions. Though this species does not trigger a CH determination, it is classified as a PBF for the Project, under EBRD, on the basis of its documented presence within the EAAA.

²⁶ A model containing an alternative, and substantially larger estimate of this species' EOO is presented in annex TA13 of the ESIA

5.5.1.2 *Calligonum molle* (IUCN EN, nationally Category 2 – Rare)

Similar to congeneric species, precise documentation of the number and distribution of individuals of this species within the Project's EAAA is complicated by the fact that is only possible to distinguish this species from other congeneric species that may co-occur with it during a brief window of time in late May and early June when the seeds have ripened but have not yet fallen from the parent plant. This was further complicated by the fact that baseline field surveys conducted at the site and surroundings during this time window in 2023 found that *Calligonum* individuals did not flower or produce seeds in 2023, likely due to a spring drought. Nonetheless, it is known that this species occurs on the Project site, as several specimens were documented during the surveys conducted during Spring, 2021 for the TYP SA scoping report²⁷ (note, these surveys were conducted by Uzbek botanist Natalya Beshko, who also performed the 2023 baseline botanical surveys).

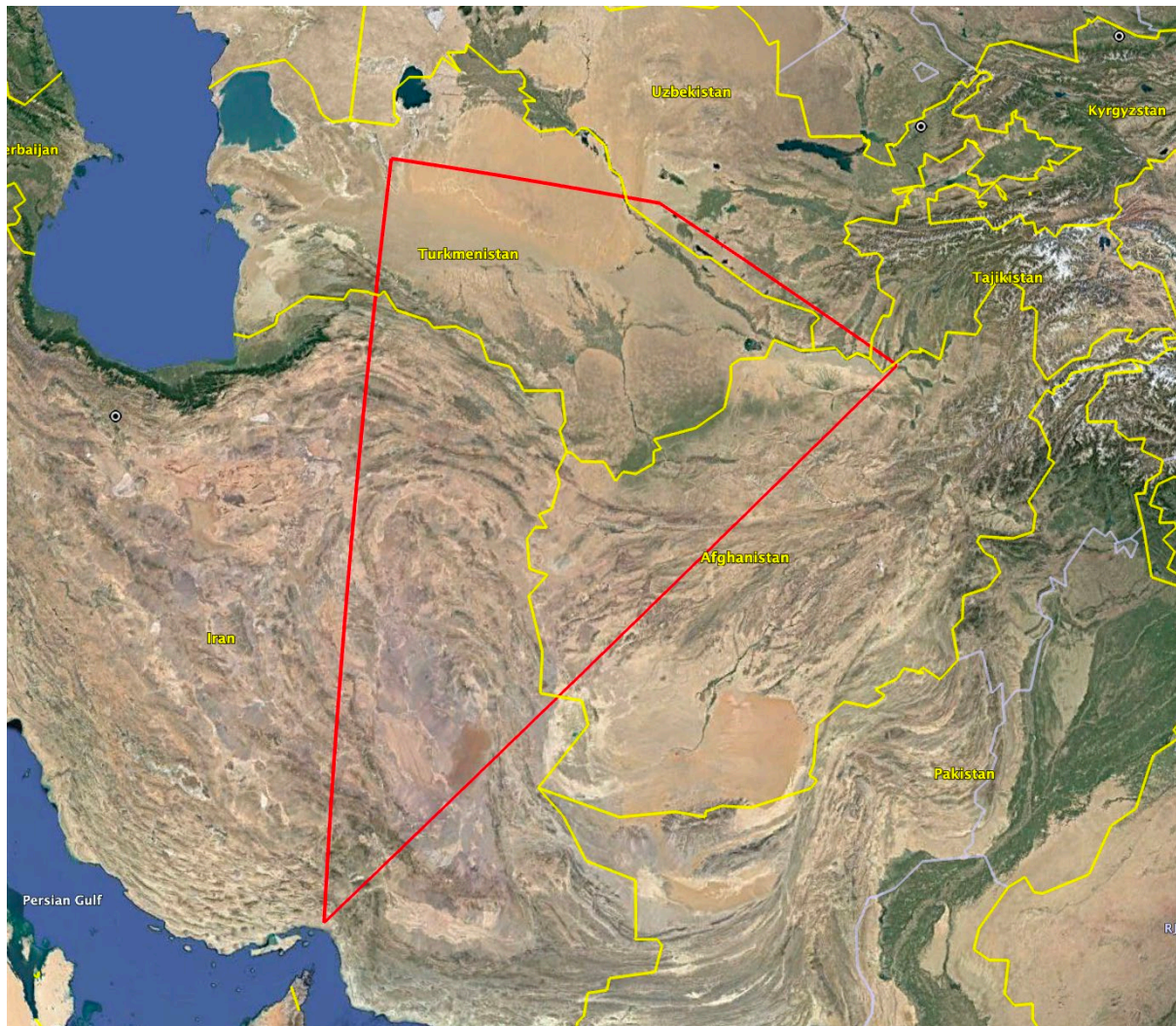
The extreme difficulty in identification of this species in the field also poses a severe limitation on understanding this species' global distribution and population size. The IUCN redlist presents neither a global population estimate nor a map of this species' distribution, as is the case for most plant species on the Red List. The Kew Gardens Plants of the World Database only shows the entire countries of Uzbekistan and Turkmenistan as a representation of this species' global range, as is the case for most/all of its plant distribution maps²⁸. According to the national botanical expert, Natalya Beshko, this species likely has a fairly broad distribution within suitable desert habitat in central Asia, yet it is only known from a small handful of locations (Figure 7)

²⁷ TYP SA, 2022. Uzbek Solar 3. Technical, environmental and social consultant Bukhara environmental & social scoping report. Produced for IFC. Verified 2 November, 2022.

²⁸ <https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:978271-1> accessed 1 July, 2023

In order to be able to evaluate this species against CH/PBF criteria, we applied conservative estimates of this species' global and local distributions. For the global distribution, (equivalent to Extent of Occurrence, or EOO per IUCN and EBRD definitions), we calculated the area of the minimum convex polygon enclosing all of the known locations of this species (Figure 7). The resulting EOO polygon is shown in Figure 9, and has a total area of 811,930 km².

Figure 9: Estimated global Extent of Occurrence (EOO) of *Calligonum molle*, based a minimum convex polygon drawn around the localities where this species is known to occur.



At the EAAA level, we conservatively assumed that the species covers the entire EAAA (EAAA #1, Figure 4), which has an area of 15 km². Based on these estimates of the global (EOO) and local (EAAA) areal extent of *C. molle*, the Project is estimated to contain roughly 0.00185% of the species' global population. This is over an order of magnitude below the 0.5% threshold necessary to trigger a CH determination under IFC PS6 CH criterion 1a, thus, we conclude that the Project does not trigger CH for *C. molle*. We note that this conclusion is based on very conservative and precautionary assumptions that likely overestimated this species' coverage within the EAAA and

underestimated this species' EOO²⁹, hence we consider the conclusion that this species does not trigger a CH determination to be robust to uncertainties regarding the species' local and global distributions. Though this species does not trigger a CH determination, it is classified as a PBF for the Project, under EBRD, on the basis of its documented presence within the EAAA.

5.5.1.3 *Calligonum paletzkianum* (IUCN VU, nationally Category 3 – Vulnerable)

This species is known to occur in desert regions of Uzbekistan, Turkmenistan, and Iran³⁰. Within Uzbekistan, it is only known from areas surrounding Lake Dengizkul. During field surveys conducted for the TYP SA E&S Scoping report, several specimens were found in the northern part of Project site, in surroundings of the quarry. Because it is classified as IUCN VU, in order to trigger a CH determination under IFC CH criterion 1b, there would need to be a significant likelihood that the loss of this species' population within the Project's EAAA could result in its uplisting to globally EN or CR. Although this species, like the two EN species of *Calligonum* addressed previously, has a relatively limited distribution in Uzbekistan and globally, the relatively small size of the area within which this species could be affected by the Project EAAA in relation to the species' global range, which spans three central Asian countries, renders it highly unlikely that the development of the Project would result in this species' uplisting to globally CR or EN. This determination was supported by expert judgements of national botanist, Natalya Beshko and international biodiversity specialist, Caleb Gordon. Though this species does not trigger a CH determination, it is classified as a PBF for the Project, under EBRD, on the basis of its documented presence within the EAAA.

5.5.1.4 White-headed Duck (*Oxyura leucocephala*, IUCN EN, nationally EN)

The EAAA delineated for the White-headed Duck (EAAA #1, Table 3) included the small ponds and drainage channels to the west of the Project area. Spring 2023 baseline surveys conducted at the drainage ponds located to the west of the Project area did not result in the detection of this species. On the basis of this survey, the national ornithologist concluded that these drainage ponds were not likely extensive enough to support breeding of this species.

The IUCN minimum global population estimate for this species is 5,300 individuals³¹. Therefore, a breeding population deemed nationally important (subcriterion c) or containing at least 26 individuals and five breeding pairs (subcriterion a) would need to occur within the EAAA for the Project to trigger a CH determination for this species under the CR/EN species criterion. The data collected for the baseline characterization suggests that this is unlikely, therefore, it was concluded that this species does not trigger a CH determination. Nonetheless, because of its possible occurrence within the EAAA, particularly as a breeder, it is classified as a PBF for the Project.

²⁹ A model containing an alternative, and substantially larger estimate of this species' EOO is presented in annex TA13 of the ESIA

³⁰ <https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:693371-1> accessed 1 July, 2023.

³¹ IUCN Red List of Threatened Species accessed 20 May 2023.

5.5.1.5 Marbled Teal (*Marmaronetta angustirostris*, IUCN NT, nationally EN)

The EAAA delineated for the Marbled Teal (EAAA #1, Table 3) included the small wetlands to the west of the Project area. Spring 2023 baseline surveys conducted at the small wetlands located to the west of the Project area did not result in the detection of this species, though the national ornithologist who conducted the survey concluded that these wetlands could possibly support breeding of this species.

The IUCN minimum global population estimate for this species is 10,000 individuals³². Because this species is classified as EN at the national level but not the global level, the pertinent CH subcriterion is c, which requires the presence of an “important concentration” within the EAAA. Because the species was not detected within the EAAA in field surveys conducted during the 2023 breeding season, it was concluded that this species does not trigger a CH determination. Nonetheless, because of its possible occurrence within the EAAA, particularly as a breeder, it is classified as a PBF for the Project.

5.5.1.6 Macqueen’s Bustard (*Chlamydotis macqueenii*, IUCN VU, nationally VU)

Spring 2023 baseline surveys conducted within the Project area did not result in the detection of this species, and the national ornithologist who conducted the survey concluded that the growth of Saxaul and other shrubs within the Project site is generally too tall to support breeding of this species. According to M. Koshkin and etc. ³³, in which the authors identified a prevalence of males in shorter vegetation and flatter terrain may have several explanations, not necessarily mutually exclusive. Probably most important are the needs to be visible to females and to have enough open ground in which to conduct their display, which involves a fast run, sometimes for long distances. Apparent selection for gravel is likely a consequence of the sparse short-statured shrub vegetation in such areas. Moreover, an unhindered view of the surrounding terrain allows the detection of both predators and approaching/passing females, but it is also possible that flat terrain also reduces the locomotion cost for these large cursorial birds. The combination of medium to short shrubs and flat terrain seems to be the most favourable habitat for male houbara.

Because this species is classified as IUCN VU, the pertinent CH subcriterion is b, which requires that the loss of the EAAA population of the species would cause the species to be globally uplisted to CR or EN. The data collected for the baseline characterization suggests that this is unlikely, therefore, it was concluded that this species does not trigger a CH determination. Nonetheless, because of its possible occurrence as a rare breeder or migrant within the EAAA, it is classified as a PBF for the Project.

³² IUCN Red List of Threatened Species accessed 20 May 2023.

³³ Koshkin, M.A., Burnside, R.J., Collar, N.J. et al. Effects of habitat and land use on breeding season density of male Asian Houbara *Chlamydotis macqueenii*. *J Ornithol* 157, 811–823 (2016). <https://doi.org/10.1007/s10336-015-1320-4>

5.5.1.7 Sociable Lapwing (*Vanellus gregarius*, IUCN CR, nationally VU)

The EAAA for this species (EAAA #1) was defined to include all of the drainage channels and ponds within 2 km of the Project area, including both the ABIS canals that surround the Project on 3 sides, and the strip of small saline channels located roughly 1 km to the west of the Project area, as any of these habitats could possibly be used by Sociable Lapwing as stopover habitat during migration.

Baseline surveys conducted within the Project area, which covered this species' spring migratory period, did not result in the detection of this species, and none of the limited wetland habitats within the EAAA appear to provide a significant amount of suitable migratory stopover habitat for this species. The IUCN minimum global population estimate for this species is 11,200 individuals³⁴. Therefore, at least 56 individuals and five reproductive units (pairs) would need to be present within the EAAA for the Project to trigger a CH determination for this species under subcriterion a. The data collected for the baseline characterization suggests that this is unlikely, therefore, it was concluded that this species does not trigger a CH determination. Nonetheless, because of its possible occurrence as a rarity within the EAAA, it is classified as a PBF for the Project.

5.5.1.8 Dalmatian Pelican (*Pelecanus crispus*, IUCN NT, nationally EN)

The EAAA delineated for the Dalmatian Pelican (EAAA #1, Table 3) included the small wetlands to the west of the Project area, as well as the Project area, and surrounding ABIS canals.

Baseline ornithological surveys conducted at the Project area and nearby wetlands did not result in the detection of this species, though it is considered possible for migratory flocks or individuals of this species to pass through the area during migration. The IUCN minimum global population estimate for this species is 11,400 individuals³⁵. To trigger a CH determination as a CR/EN species under subcriterion c, the EAAA would need to contain an "important concentration." The data collected for the baseline characterization suggests that this is unlikely. Therefore, it was concluded that this species does not trigger a CH determination. Nonetheless, because of its possible occurrence as a rarity within the EAAA, it is classified as a PBF for the Project.

5.5.1.9 Egyptian Vulture (*Neophron percnopterus*, IUCN EN, nationally VU)

The EAAA for this species (EAAA #2, Table 3) was defined to include the Project area plus a 10 km buffer, accounting for this species' large home range size, high capacity for dispersal, and the relatively homogeneous distribution of upland desert vegetation within the landscape surrounding the Project site.

In a limited baseline survey effort that overlapped the beginning of this species arrival and breeding period within Uzbekistan, this species was not observed at the site. The relatively small size of the Project area, and the lack of mountains or rocky massifs in close proximity to the Project suggest that the area is not likely to support a high concentration of breeding of this species, though it is possible that the species could occur as a rare migrant or scarce breeder within the

³⁴ IUCN Red List of Threatened Species accessed 20 May 2023.

³⁵ IUCN Red List of Threatened Species accessed 20 May 2023.

region. The IUCN minimum global population estimate for this species is 12,400 individuals³⁶. Therefore, at least 62 individuals and five reproductive units (breeding pairs) would need to be present within the EAAA for the Project to trigger a CH determination under subcriterion a. The data collected for the baseline characterization suggests that this is unlikely, therefore, it was concluded that this species does not trigger a CH determination. Nonetheless, because of its possible occurrence as a rarity within the EAAA, it is classified as a PBF for the Project.

5.5.1.10 Pallas's Fish-Eagle (*Haliaeetus leucoryphus*, IUCN EN, nationally unlisted)

The EAAA for this species (EAAA #2, Table 3) was defined to include the Project area plus a 10 km buffer, accounting for this species' large home range size, high capacity for dispersal, and the relatively homogeneous distribution of upland desert vegetation within the landscape surrounding the Project site.

This species was not observed during the baseline survey effort for the Project, and it is generally considered a very rare species in the region, which is located at the western extreme of its global distribution. The IUCN minimum global population estimate for this species is 1,000 individuals³⁷. Therefore, at least 5 individuals and five reproductive units (breeding pairs) would need to be present within the EAAA for the Project to trigger a CH determination for this species. The data collected for the baseline characterization suggests that this is unlikely, therefore, it was concluded that this species does not trigger a CH determination. Nonetheless, because of its possible occurrence as a rarity within the EAAA, it is classified as a PBF for the Project.

5.5.1.11 Steppe Eagle (*Aquila nipalensis*, IUCN EN, nationally VU)

The EAAA for this species (EAAA #2, Table 3) was defined to include the Project area plus a 10 km buffer, accounting for this species' large home range size, high capacity for dispersal, and the relatively homogeneous distribution of upland desert vegetation within the landscape surrounding the Project site.

Two individuals, presumed to be spring migrants engaged in migration activity, were observed within the EAAA, roughly 6 km from the Project area, on 02 March 2023 during the baseline survey effort for the Project. The IUCN minimum global population estimate for this species is 50,000 individuals³⁸. Therefore, at least 250 individuals and five reproductive units (breeding pairs) would need to be present within the EAAA for the Project to trigger a CH determination under subcriterion a. The data collected for the baseline characterization suggests that this is unlikely, therefore, it was concluded that this species does not trigger a CH determination, but because of its known occurrence within the EAAA, it is classified as a PBF for the Project.

³⁶ IUCN Red List of Threatened Species accessed 20 May 2023.

³⁷ IUCN Red List of Threatened Species accessed 20 May 2023.

³⁸ IUCN Red List of Threatened Species accessed 20 May 2023.

5.5.1.12 Saker Falcon (*Falco cherrug*, IUCN EN, nationally EN)

The EAAA for this species (EAAA #2, Table 3) was defined to include the Project area plus a 10 km buffer, accounting for this species' large home range size, high capacity for dispersal, and the relatively homogeneous distribution of upland desert vegetation within the landscape surrounding the Project site. This species was not observed during the baseline surveys for the Project, but it could possibly occur within the EAAA as a rarity in any season. The IUCN minimum global population estimate for this species is 12,200 individuals³⁹. Therefore, at least 61 individuals and five reproductive units (breeding pairs) would need to be present within the EAAA for the Project to trigger a CH determination for this species under subcriterion a. The data collected for the baseline characterization suggests that this is unlikely, therefore, it was concluded that this species does not trigger a CH determination, but because of its possible occurrence within the EAAA, it is classified as a PBF for the Project.

5.5.1.13 Central Asian Tortoise (*Testudo horsfieldii*, IUCN VU, nationally VU)

The EAAA for this species (EAAA #1) was defined to include not only the Project area, but also adjacent upland desert habitat extending to the nearest waterway or wetland habitat, as such habitats may represent a barrier to tortoise dispersal. Based on the evidence compiled in desktop review and field surveys of the site, it was determined that Central Asian Tortoise does not trigger a CH determination, as CH determination under subcriterion b would only be triggered if the loss of the population of this species contained within the EAAA would likely result in the species' uplisting to globally EN or CR. This is considered unlikely, given the species' broad distribution across 12 central Asian countries, and its low abundance within (or even possibly total absence from) the Project site, as noted in the baseline survey report and baseline section of the ESIA. This species is classified as a PBF for the Project, given its global VU status, and possible occurrence within the Project's EAAA.

5.5.1.14 Central Asian Otter (*Lutra lutra*, IUCN NT, nationally EN)

The EAAA delineated for this species (EAAA #1, Table 3) included the small wetlands to the west of the Project area, as well as the Project area, and surrounding ABIS canals, as this species was considered to possibly utilize any wetland habitats within close proximity to the Project area.

Baseline mammal surveys conducted at the Project area and nearby wetlands included focused searches of riparian areas for signs of otters (tracks, scat), but did not result in the detection of any signs of the presence of this species, though the habitat seemed potentially suitable. To trigger a CH determination as a CR/EN species under subcriterion c, the EAAA would need to contain an "important concentration" of this species. The data collected for the baseline characterization suggests that this is unlikely. Therefore, it was concluded that this species does not trigger a CH determination. Nonetheless, because of its possible occurrence as a rarity within the EAAA, it is classified as a PBF for the Project.

³⁹ IUCN Red List of Threatened Species accessed 20 May 2023.

5.5.1.15 Goitered Gazelle (*Gazella subgutturosa*, IUCN VU, nationally VU)

The EAAA for this species (EAAA #2) was defined to include the Project area plus a 10 km buffer, accounting for this species' wide-ranging and dispersive nature. Because this species is classified by IUCN as VU, the pertinent subcriterion for CH determination is b, which is only triggered if the loss of the population of this species contained within the EAAA would likely result in the species' uplisting to globally EN or CR. This is considered unlikely, given the species' broad distribution across central Asia, and its low abundance within the EAAA, as reflected in the baseline survey results, which included the detection of a single hoofprint as the only evidence for the presence of this species within the EAAA. According to interviews with local herders conducted by the mammologist in conjunction with the mammal baseline survey, Goitered Gazelles do not use the sandy desert habitat, but occasionally come into the wetlands to drink, especially during the hottest times of year. According to the national mammal expert who conducted the baseline surveys, the vegetation type that covers most of the Project area, itself, is not suitable for gazelles, as the shrubs are tall, and gazelles prefer more open habitats (i.e., with lower stature shrubs). This species is classified as a PBF for the Project, given its confirmed occurrence within the Project's EAAA.

5.5.1.16 Fish (four IUCN CR/EN species)

The baseline characterization and CHA for fish species relied on information provided by Uzbek ichthyologist, Akbarjon Rozimov, who performed a walkover survey of fish habitats in the ABIS canals that surround this site on March 2-3, 2023, and who was able to access recent information from the State Committee on Ecology and Environmental Protection (SCEEP) regarding fish survey results from the ABIS canals, as well as recent records of the release of poached fish into the ABIS canal system. The CHA for CR/EN fish species conservatively assumed that any fish species documented to occur in the ABIS canals in SCEEP's records from within the past 5 years (2018 or later) was present at the site, if suitable habitat was present.

Desktop review determined that there are four species of globally CR/EN fish that could potentially occur within the ABIS canals in the vicinity of the Project site, as follows:

- Amu-Darya Shovelnose Sturgeon *Pseudoscaphirhynchus kaufmanni* (IUCN RL CR, UzRDB CR)
- Small Amu-Darya Shovelnose Sturgeon *Pseudoscaphirhynchus hermanni* (IUCN RL CR, UzRDB CR)
- *Capoetobrama kuschakewitschi* (IUCN EN, UzRDB VU)
- *Aspiolucius esocinus* (IUCN EN, UzRDB EN)

The scoping site visit, conducted on March 2, 2023 confirmed that suitable habitat for all four of these species is present in the ABIS canals that border the Project site on three sides, as well as nearby connecting canals within the ABIS system, and review of SCEEP records indicated that all four species have been documented within the ABIS canals system within the past 5 years (Volume III, Technical Annex, TA05), hence all four species were considered present within the Project's EAAA, for the purpose of the CHA. All four of these fish species share a common habitat type: fast-

flowing turbid waters, and all four of them are globally restricted to the Amu Darya river system⁴⁰, hence a single spatial analysis was conducted to assess whether or not these fish trigger a CH determination under subcriterion a. For these four species, the EAAA was defined as all portions of the ABIS canal system within 5 km of the Project area, except for one northern channel that is cut off from the others by a pumping station (Figure 6). The length of ABIS canal contained within this EAAA, 31 km, was taken as a proxy for the EAAA's population of the four fish species.

In order to trigger a CH determination under CH criterion 1a (IFC, equivalent to EBRD CH criterion 2a), the population contained within the Project's EAAA must comprise at least 0.5% of the species' global population, and the EAAA must contain at least 5 reproductive units. In order to evaluate these species against the 0.5% threshold, we developed a proxy for the four species' global populations that was comparable to the proxy for their EAAA populations, based on the linear extent of habitat contained within their current global distributions (equivalent to Extent of Occurrence, or EOO). All four of these species may occur both in the main channel of the Amu Darya, and in smaller side channels, such as the canals of the ABIS system, yet these two types of areas are not equivalent in terms of habitat availability or extent, as the ABIS canals are simple, linear canals, usually no more than 10m in width, while the Amu Darya is a very large river, which, in addition to being much wider than the ABIS canals, also consists of multiple water channels running in an irregular, parallel, braided pattern through the main Amu Darya channel.

This relationship between length of the primary channel, and total length of all available water channels in the Amu Darya is illustrated in Figure 15. Accounting for the presence of multiple, parallel water channels in the main Amu Darya river channel, we estimated the total length of habitat within the four fish species' global EOO as 6410 km. Therefore, it was determined that the Project does not trigger CH for these fish species, as the EAAA is estimated to contain no more than 0.484% of the global population.

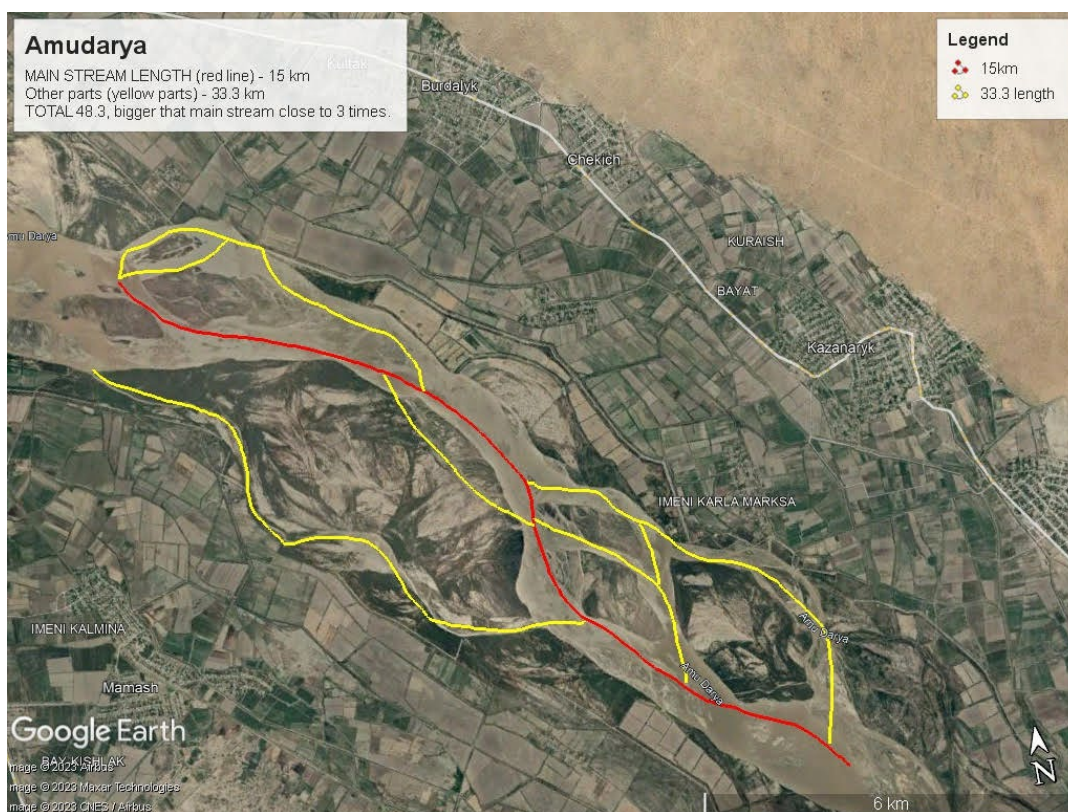
It is also important to note that the ecological value of the four CR/EN species' populations contained within the ABIS canal system is limited and questionable, given that the fish located in the canals may be completely cut off from their source populations. In the ABIS system, water is pumped from the main Amu Darya river channel through the canals in order to supply agricultural areas in the Bukhara region with water for irrigation. The pumping stations that actively generate this flow of water, may represent "one-way doors" for fish, causing fish that pass through a pumping station and wind up in the ABIS canal system to be permanently cut off from their source population within the main Amu Darya channel (A. Rozimov, pers. comm.).

If all individuals of these fish species located within the Project's EAAA are effectively cut off from the species' main populations in this way, then it is debatable whether or not these individuals

⁴⁰ The two species of *Pseudoscaphyrhynchus* shovelnose sturgeons are 100% endemic to the Amu Darya river system; *Aspiolucius esocinus* formerly occurred in the Zarafshan and Syr Darya river systems as well as the Amu Darya, but is currently believed to have been extirpated from the Zarafshan River system, as well as most of its former range in the Syr Darya River system (IUCN Red List of Threatened Species, accessed 22 May, 2023); *Capoetobrama kuschakewitschi* historically occurred in the Zarafshan, Syr Darya, and Chu (Kazakhstan) river systems, in addition to the Amu Darya, but is believed extinct in all but the Amu Darya system currently (IUCN Red List of Threatened Species, accessed 22 May, 2023).

should be considered part of the species' global population, or whether or not the ABIS canals should be considered to constitute viable habitats sustaining these species' global populations. Therefore, even though the estimation of EAAA populations in relation to global populations is only slightly below the threshold for triggering CH, we consider the determination of no CH for these fish to be robust and conservative, as it does not account for any difference in value between the ABIS canals and their populations of CR/EN fish in relation to the habitats and fish populations contained within the main Amu Darya channel. All four species are classified as PBF for the Project, based on their presumed occurrence within the Project's EAAA.

Figure 10: Portion of the Amu Darya river channel, illustrating the multiple, parallel channels that carry water within the overall river channel. In the segment illustrated above, the length of the primary channel (red) is 15 km, but the total length of water channel available as fish habitats along this stretch of the Amu Darya is 48.3 km.



5.5.2 Restricted Range Species (IFC CH criterion #2, EBRD CH criterion #3)

Both IFC and EBRD include a CH criterion for Restricted Range (RR) species. Only IFC includes a quantitative definition of what constitutes an RR species, defining them as species with a total global EOO $\leq 50,000 \text{ km}^2$ ⁴¹. EBRD PR6 generally follows a parallel approach and offers a second tier of protection to RR species that occur within a Project's EAAA but do not trigger a CH determination, classifying them as PBF if they are "regularly occurring" within the EAAA⁴². Neither

⁴¹ International Finance Corporation (IFC), 2019. International Finance Corporation's Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. Originally published January 1, 2012, updated June 27, 2019. IFC, World Bank Group, Washington, DC.

⁴² European Bank of Reconstruction and Development (EBRD), 2022. EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources: Guidance Note. September, 2022. EBRD.

the literature review nor the field surveys conducted as part of the biodiversity baseline characterization for the Project yielded any suggestion that any RR species are potentially present within the Project region, hence it is concluded that the Project contains no CH triggers or PBF related to RR species.

5.5.3 Migratory/Congregatory Species (IFC CH criterion #3, EBRD CH criterion #4)

According to both IFC and EBRD policies, the primary threshold for triggering this CH criterion (subcriterion a) is that the EAAA must sustain at least 1% of the global population of a migratory or congregatory species on a cyclical, or otherwise regular basis. This criterion may also be triggered if the EAAA supports at least 10% of the global population under periods of environmental stress (subcriterion b).

It is important to note that the quantitative threshold for triggering CH (1% of the global population occurs within EAAA) is higher than it is for IUCN CR/EN species (0.5% of the global population within the EAAA). For this reason, bird species that are migratory, but that are also IUCN CR/EN species are not considered in this section, as they cannot trigger this CH criterion if they did not trigger the CR/EN criterion.

Several migratory bird species that were assessed under the more qualitative CR/EN subcriteria b and c could, in principle, trigger the migratory/congregatory CH criterion even if they did not trigger the CR/EN criterion. Bird species in this category for this Project include Marbled Teal, MacQueen's Bustard, and Dalmatian Pelican. The minimum global population estimates for these three species are 10,000, 33,000, and 11,400, respectively⁴³. Thus, to trigger this CH criterion, the Project's EAAA would need to sustain, on a cyclical, or otherwise regular basis, 100, 330, and 114 individuals of these species, respectively. None of these species were detected within the Project area during the baseline survey effort, which included focused surveys designed to detect the presence of the Teal and Bustard. The Project area could be used by all three species during migration, but due to its relatively small size and the absence of any feature that would be likely to attract a concentration high enough to cross the 1% threshold for any of these species, it is concluded that the Project does not trigger a CH determination for these migratory species.

A wide variety of migratory bird species could occur within the Project area, including numerous species documented at the site during the baseline field surveys (ESIA Volume III: TA 9: Avifauna Survey report). However, whereas EBRD classifies any CR/EN or RR species present within a Project's EAAA as a PBF, migratory/congregatory species present within a Project's EAAA are not classified as PBF under EBRD PR6 unless the area is recognized nationally or internationally as an important area for migratory birds⁴⁴. The Nur-Bukhara Solar Project area is not located within and Important Bird Area (IBA), nor is it recognized as an important area for migratory birds. All of the migratory bird species that have been documented or could potentially occur regularly at the

⁴³ <https://www.iucnredlist.org/> accessed 1 July, 2023.

⁴⁴ European Bank of Reconstruction and Development (EBRD), 2022. EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources: Guidance Note. September, 2022. EBRD.

Project sites have IUCN global status of Least Concern (LC) or Near Threatened (NT), thus they are considered to have negligible chance of triggering a CH determination under this criterion, given the small size of the area and the absence of features that would likely attract globally significant concentrations of any migratory bird species. For these reasons, it is concluded that no species trigger either CH or PBF determination for this Project under the migratory/congregatory species criterion.

5.5.4 Highly Threatened or Unique Ecosystems (IFC CH criterion #4, EBRD CH/PBF criterion #1)

Outside of the European Union, both the IFC and EBRD rely exclusively on the IUCN Red List of Ecosystems⁴⁵ or formal national assessments of threatened ecosystems, as qualifying features for triggering protected status under this criterion, either for CH (IFC and EBRD) or a PBF (EBRD). The fixed sands desert shrubland ecosystem that occurs on the Project site has not been identified as a threatened ecosystem by the IUCN Red List of Ecosystems, or by any national assessment, hence it is concluded that this criterion triggers neither a CH nor a PBF designation for the Project.

5.5.5 Key Evolutionary Processes (IFC and EBRD CH criterion #5)

This criterion may trigger a CH determination under either IFC PS6 or EBRD PR6 if an area supports distinctive and important evolutionary processes, particularly where unique geological or topographic features such as islands or isolated mountains have given rise to genetically unique populations of native plants and animals, or where an area may be important for maintaining evolutionary processes by virtue of environmental gradients or connectivity, for example to provide resiliency or adaptability in the face of climate change⁴⁶. The Project area is located within a vast, relatively homogeneous, desert plain of central Asia. From a global perspective, there are no features of emergent significance with regard to evolutionary process that would warrant a determination of CH under this criterion.

5.5.6 Significant Biodiversity Features identified by a broad set of stakeholders or governments (EBRD PBF criterion #3)

EBRD does not provide specific thresholds or definitions to guide the assessment of PBF under this criterion, but GN6 emphasizes the importance of stakeholder engagement in the identification of the biodiversity features of interest that may be present within a Project area⁴⁷. In the process of conducting the environmental and social baseline characterizations for the ESIA, extensive engagement with pertinent stakeholders was undertaken, including engagement with a set of national biodiversity experts whose technical knowledge spanned a range of different biological

⁴⁵ <https://iucnrl.org/> accessed 1 July, 2023

⁴⁶ International Finance Corporation (IFC), 2019. International Finance Corporation's Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. Originally published January 1, 2012, updated June 27, 2019. IFC, World Bank Group, Washington, DC.

⁴⁷ European Bank of Reconstruction and Development (EBRD), 2022. EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources: Guidance Note. September, 2022. EBRD

taxa (see under “Stakeholder consultation/literature review” above). No biodiversity features in addition to those evaluated above were identified. In practice, this PBF criterion may also be invoked to classify any legally protected areas or internationally recognized Key Biodiversity Areas (KBA) as PBF, on the basis of the recognition of those areas by national/international biodiversity authorities or other stakeholders for the areas’ value for biodiversity conservation. The Project area does not overlap, or contain significant potential to cause adverse impacts to any legally protected areas or KBA, hence it is concluded that there are no triggers for this PBF criterion for the Project.

5.5.7 Ecological structure and functions needed to maintain the viability of Priority Biodiversity Features (EBRD PBF criterion #4)

In the 2019 revision of its Environmental and Social Policy, EBRD removed the criterion related to ecological structure and function from its list of CH criteria, but retained its ecological structure and function criterion as a potential PBF trigger, where certain ecological structures or functions are needed to maintain the viability of other PBFs⁴⁸. In principle, examples of ecological structures or functions that could trigger PBF determination under this criterion could include features affecting hydrologic dynamics of an area, or certain vegetation or geologic structures that are necessary for sustaining viable populations of species classified as PBF (e.g., cliffs, river banks, large trees, or other nesting substrates of PBF bird species, water chemistry or temperature necessary for sustaining PBF aquatic species). While all of the PBF identified in the present analysis are dependent on certain aspects of the structure and function of their ecosystems for survival, there are no specific structures or functions that have emergent value as PBFs to be protected under this criterion, particularly as the PBFs, themselves, are already subject to protection under the “no net loss” mitigation standard, hence there is already a mechanism in place to mitigate any adverse impacts to PBF that the Project may generate.

⁴⁸ European Bank of Reconstruction and Development (EBRD), 2019. Environmental and Social Policy: EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources, April, 2019. EBRD.

6 Summary of CH/PBF Determination Findings

The set of biodiversity features identified either as CH, NH, or PBF in this assessment is presented, and justifications for the determinations are briefly summarized in Table 3. These determinations of CH, NH, and PBF have been used as the basis for developing monitoring and/or mitigation plans for each biodiversity feature, as appropriate, in compliance with IFC PS 6 and EBRD PR6, as described in the ESIA (Volume II) and associated Environmental and Social Management Plan (ESMP) (Volume IV). No CH determination are made for the Project. A total of seventeen PBF and one NH are identified.

Table 3: Summary of the results of the Critical Habitat, Natural Habitat, and Priority Biodiversity Features Assessment for the Nur-Bukhara PV Solar Project.⁴⁹

Feature ⁵⁰	Higher taxon	IUCN global status ⁵¹	Uzbek status ⁵²	Applicable CH/PBF criterion ⁵³			EAAA	IUCN minimum global population estimate ⁵⁴	Determination ⁵⁵	Rationale
				Threatened/VU Species	RR Species	Migratory/Congregatory Species				
				CH criterion ii, PBF criterion ii	CH criterion iii, PBF criterion ii	CH criterion iv, PBF criterion ii				
<i>Calligonum matteianum</i>	Plant	EN	2 (rare)	X			1	N/A	PBF	Population in Project EAAA is <0.5% of global population
<i>Calligonum molle</i>	Plant	EN	2 (rare)	X			1	N/A	PBF	Population in Project EAAA is <0.5% of global population

⁴⁹ Status categories for the IUCN and Uzbek animal red lists are as follows: CR = Critically Endangered; EN = Endangered; VU = Vulnerable; NT = Near Threatened; (blank) = Least Concern (IUCN) or not listed (Uzbek); NA = not assessed. For the Uzbek plant red list, status category is provided as published in the red list, and the rough equivalent in terms of IUCN categories is also provided. See text for additional justification of CH/PBF determinations. Ecologically Appropriate Areas of Analysis (EAAA) were defined based on species-specific ecological considerations, per EBRD PR6, and the numbers listed in the table correspond to those listed in the table

⁵⁰ The ecosystems and habitats potentially affected by the Project did not meet any of the criteria for “priority ecosystems,” including “threatened ecosystems,” “highly threatened or unique ecosystems” (IFC CH criterion 4 = EBRD CH criterion i), “areas associated with key evolutionary processes” (CH criterion v), or “threatened habitats” (PBF criterion i) as defined in EBRD PR6 and the associated Guidance Note 6. Neither were the criteria met for any “significant biodiversity features identified by a broad set of stakeholders or governments” (PBF criterion iii), or “ecological structure and functions needed to maintain the viability of priority biodiversity features” (PBF criterion iv), hence the only biodiversity features included in this table are species (and their habitats) that met one or more of the species-specific CH or PBF criteria/thresholds, as described in the table.

⁵¹ <https://www.iucnredlist.org/> accessed 4 May 2023

⁵² Separate Uzbek national red lists for plants and animals, both published by the Uzbekistan ministry of environment in 2019.

⁵³ Uzbekistan is neither a member of the EU, nor a Bern Convention signatory, hence the specific CH/PBF criteria relating to habitats and species that receive special protection under EU nature legislation are not considered applicable, per EBRD GN6.

⁵⁴ <https://www.iucnredlist.org/> accessed 4 May, 2023

⁵⁵ PBF = Priority Biodiversity Feature, per EBRD PR6; NH = Natural Habitat, per IFC PS6

Feature ⁵⁰	Higher taxon	IUCN global status ⁵¹	Uzbek status ⁵²	Applicable CH/PBF criterion ⁵³			EAAA	IUCN minimum global population estimate ⁵⁴	Determination ⁵⁵	Rationale
				Threatened/VU Species	RR Species	Migratory/Congregatory Species				
				CH criterion ii, PBF criterion ii	CH criterion iii, PBF criterion ii	CH criterion iv, PBF criterion ii				
<i>Calligonum paletzianum</i>	Plant	VU	3 (vulnerable)	X			1	N/A	PBF	Project not likely to result in species' up-listing to globally CR/EN
White-headed Duck	Bird	EN	EN	X		X	1	5,300	PBF	Population in Project EAAA is <0.5% of global population, EAAA not likely to contain ≥ 1% of the global population at any point in species' life cycle
Marbled Teal	Bird	NT	EN	X		X	1	10,000	PBF	EAAA not likely to satisfy trigger for IFC PS6 CH criterion iic (nationally important concentration), EAAA not likely to contain ≥ 1% of the global population at any point in species' life cycle
Macqueen's (Asian Houbara) Bustard	Bird	VU	VU	X		X	2	33,000	PBF	Project not likely to result in species' up-listing to globally CR/EN, EAAA not likely to contain ≥ 1% of the global population at any point in species' life cycle

Feature ⁵⁰	Higher taxon	IUCN global status ⁵¹	Uzbek status ⁵²	Applicable CH/PBF criterion ⁵³			EAAA	IUCN minimum global population estimate ⁵⁴	Determination ⁵⁵	Rationale
				Threatened/VU Species	RR Species	Migratory/Congregatory Species				
				CH criterion ii, PBF criterion ii	CH criterion iii, PBF criterion ii	CH criterion iv, PBF criterion ii				
Sociable Lapwing	Bird	CR	VU	X		X	1	11,200	PBF	EAAA not likely to support $\geq 0.5\%$ of the global population and ≥ 5 reproductive units, nor to contain $\geq 1\%$ of the global population at any point in species' life cycle
Dalmatian Pelican	Bird	NT	EN	X		X	1	11,400	PBF	EAAA not likely to contain $\geq 1\%$ of the global population at any point in species' life cycle or satisfy trigger for CH criterion iic (nationally important concentration)
Egyptian Vulture	Bird	EN	VU	X		X	2	12,400	PBF	EAAA not likely to support $\geq 0.5\%$ of the global population and ≥ 5 reproductive units, nor to contain $\geq 1\%$ of the global population at any point in species' life cycle
Pallas's Fish-Eagle	Bird	EN	EN	X		X	2	1,000	PBF	Population in Project EAAA is $<0.5\%$ of global population, EAAA not likely to contain $\geq 1\%$ of the global population at any point in species' life cycle

Feature ⁵⁰	Higher taxon	IUCN global status ⁵¹	Uzbek status ⁵²	Applicable CH/PBF criterion ⁵³			EAAA	IUCN minimum global population estimate ⁵⁴	Determination ⁵⁵	Rationale
				Threatened/VU Species	RR Species	Migratory/Congregatory Species				
				CH criterion ii, PBF criterion ii	CH criterion iii, PBF criterion ii	CH criterion iv, PBF criterion ii				
Steppe Eagle	Bird	EN	VU	X		X	2	50,000	PBF	EAAA not likely to support $\geq 0.5\%$ of the global population and ≥ 5 reproductive units, nor to contain $\geq 1\%$ of the global population at any point in species' life cycle
Saker Falcon	Bird	EN	EN	X		X	2	12,200	PBF	EAAA not likely to support $\geq 0.5\%$ of the global population and ≥ 5 reproductive units, nor to contain $\geq 1\%$ of the global population at any point in species' life cycle
Russian Tortoise	Turtle	VU	VU	X			1	Unknown, but occurs widely across 12 Asian countries	PBF	Project not likely to result in species' up-listing to globally CR/EN
Goitered Gazelle	mammal	VU	VU	X			2	42,000	PBF	Project not likely to result in species' up-listing to globally CR/EN

Feature ⁵⁰	Higher taxon	IUCN global status ⁵¹	Uzbek status ⁵²	Applicable CH/PBF criterion ⁵³			EAAA	IUCN minimum global population estimate ⁵⁴	Determination ⁵⁵	Rationale
				Threatened/VU Species	RR Species	Migratory/Congregatory Species				
				CH criterion ii, PBF criterion ii	CH criterion iii, PBF criterion ii	CH criterion iv, PBF criterion ii				
Central Asian Otter	mammal	NT	EN	X			1	57,880	PBF	EAAA not likely to satisfy trigger for IFC PS6 CH criterion iic (nationally important concentration),
Amu-Darya Shovelnose Sturgeon	Fish	CR	CR	X			3	unknown	PBF	Population in Project EAAA is <0.5% of global population
Small Amu-Darya Shovelnose Sturgeon	Fish	CR	CR	X			3	unknown	PBF	Population in Project EAAA is <0.5% of global population
<i>Aspiolucius esocinus</i>	Fish	EN	EN	X			3	unknown	PBF	Population in Project EAAA is <0.5% of global population
<i>Capoetobrama kuschakewitschi</i>	Fish	EN	VU	X			3	unknown	PBF	Population in Project EAAA is <0.5% of global population

Feature ⁵⁰	Higher taxon	IUCN global status ⁵¹	Uzbek status ⁵²	Applicable CH/PBF criterion ⁵³			EAAA	IUCN minimum global population estimate ⁵⁴	Determination ⁵⁵	Rationale
				Threatened/VU Species	RR Species	Migratory/Congregatory Species				
				CH criterion ii, PBF criterion ii	CH criterion iii, PBF criterion ii	CH criterion iv, PBF criterion ii				
Fixed sands shrub desert habitat of Sundukli Sands region	Habitat type	N/A	N/A	N/A	N/A	N/A	N/A	NH	Baseline vegetation community of Project site contains viable assemblage of species of largely native origin, and human activity has not essentially modified the area's primary ecological functions and species composition	