Environmental Impact Assessment

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Uzbekistan: Samarkand 1 Solar PV and BESS Project

Critical Habitat Assessment (CHA)

PART 1

Prepared by ACWA Power for the Asian Development Bank (ADB).

Samarkand I Solar PV and BESS Project

Republic of Uzbekistan

Critical Habitat Assessment (CHA)

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5Cs Project Manager	Catherine Sarunday
5Cs Project Director	Ken Wade

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LIST OF ABBREVIATIONS

ABBREVIATION	MEANING
ADB	Asian Development Bank
AoI	Area of Influence
AZE	Alliance for Zero Extinction
BESS	Battery Energy Storage System
BMEP	Biodiversity Monitoring and Evaluation Programme
CHA	Critical Habitat Assessment
CO	Collapsed, IUCN Red List of Ecosystems Category
CR	Critically Endangered, IUCN Red List of Threatened Species Category
DD	Data Deficient, IUCN Red List of Threatened Species Category
EAAA	Ecologically Appropriate Area of Analysis
EOO	Extent of Occurrence
EN	Endangered, IUCN Red List of Threatened Species Category
IBA	Important Bird Areas
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Areas
LC	Least Concern, IUCN Red List of Threatened Species Category
NG	Net Gain
NNL	No Net Loss
NT	Near Threatened, IUCN Red List of Threatened Species Category
OHTL	Overhead Transmission Line
PR	Performance Requirement
PS	Performance Standard
RDB	Red Data Book
SAC	Special Areas of Conservation
SPA	Special Protection Areas
SBV	Significant Biodiversity Value
VP	Vantage Point
VU	Vulnerable, IUCN Red List of Threatened Species Category

1 INTRODUCTION

1.1 Project Background

Uzbekistan is amongst the fastest growing economies in the Central Asian region, with a steady demand for energy. In 2018, the country's power consumption reached 50 million TWh, and the domestic demand for power is projected to rise at an annual rate of 4%, due to continued population growth and industrial expansion. In 2019, the installed capacity of electricity generation in Uzbekistan totalled 63 TWh, with natural gas fired thermal power plants accounting for 85% of this production. The emergence of a dire energy crisis at the height of recent peak-demand periods in Uzbekistan has been met with urgent measures to augment the country's installed power capacity. This agenda will largely involve the establishment of additional renewable energy sources, with a view to attaining a solar power capacity of 10,000 MW by 2030, amongst other targets.

On 19 March 2023, the Ministry of Energy and National Electric Grid Joint Stock Company of Uzbekistan (NEGU) entered into a Power Purchase Agreement (PPA) with ACWA Power (hereinafter Project Developer), for the implementation of the Samarkand I Solar PV and BESS Project, which includes the development and operation of the following project facilities:

- 100 MW Photo-Voltaic (PV) power plant
- 400 MW PV power plant
- Nurobod (500 MWh) Battery Energy Storage System (BESS) with underground interconnection cable
- 4.9-km Overhead Transmission Line (OTL)
- 70-km OTL
- Two 11-km OTLs constituting a Loop-In-Loop-Out (LILO) interconnection
- Two 19-km OTLs constituting a Loop-In-Loop-Out (LILO) interconnection

In the same period, a parallel PPA was established with the Project Developer, for the implementation of the Samarkand II Solar PV and BESS Project, which includes the development and operation of the following project facilities:

- 500 MW PV power plant
- Nurobod sub-station
- 70-km OTL
- 350-km OTL
- Karakul (500 MWh) BESS with underground interconnection cable (220 kV)

As shown in the maps below, the majority of the power generation and storage facilities planned under the projects are located in Nurobod District, Samarkand Region.

The interconnection facilities constituting the projects, which include an electrical sub-station and multiple overhead and underground powerlines are also concentrated in Nurobod District. The OTLs largely radiate from the Nurobod sub-station, towards the grid.

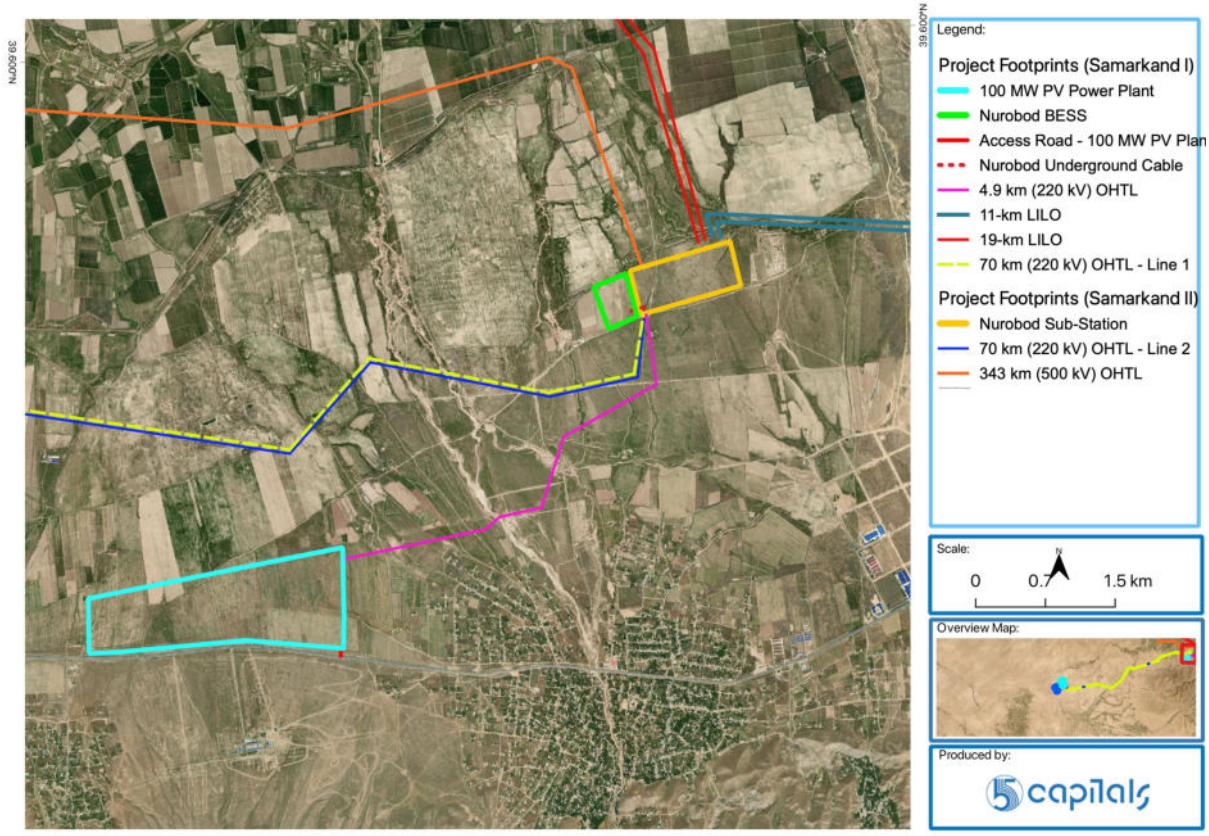

Figure 1-1 First cluster of facilities planned under the Samarkand I and II solar projects in Nurobod District

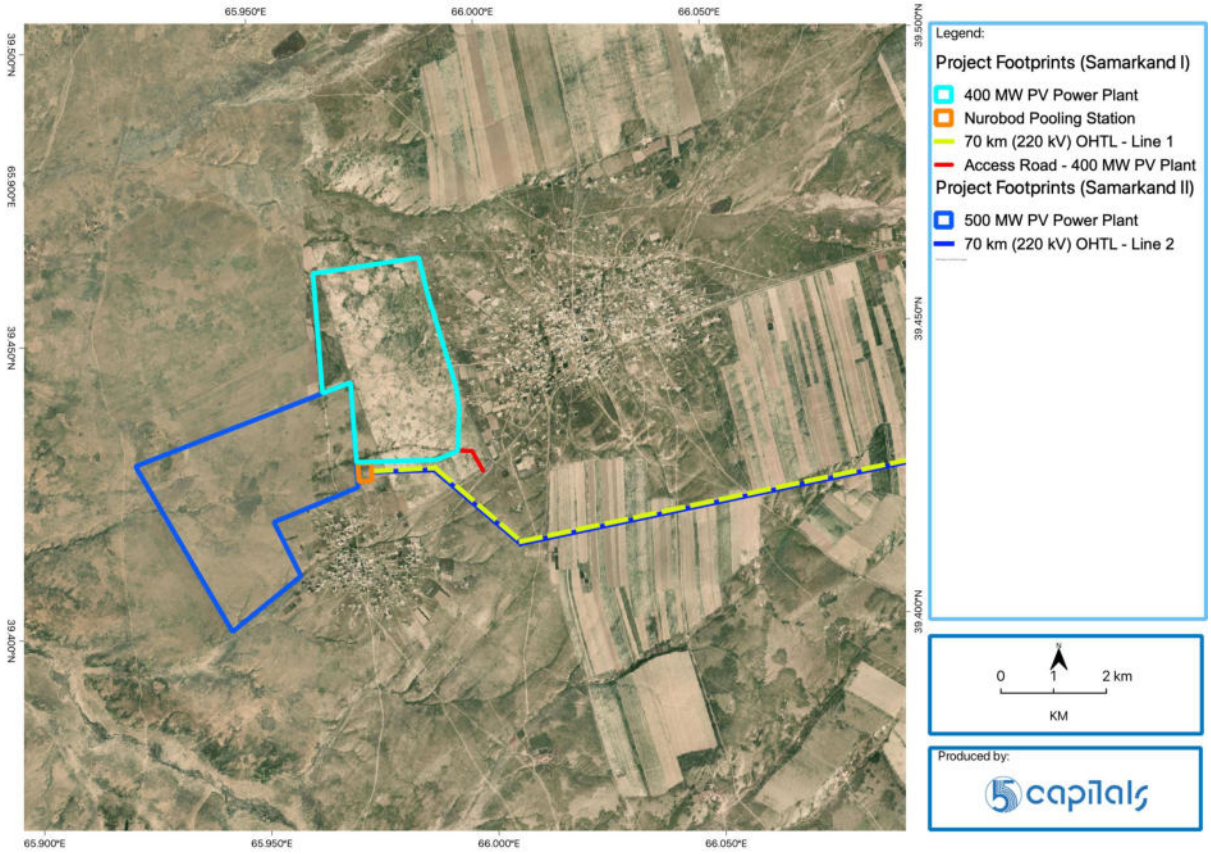

Figure 1-2 Second cluster of facilities planned under the Samarkand I and II solar projects

In preparation for the Project, the Project Developer is seeking international financing from Development Finance Institutions (DFIs) including the Asian Development Bank (ADB), International Finance Corporation (IFC), and Japan Bank for International Cooperation (JBIC) (hereinafter Project Lenders).

Accordingly, 5 Capitals (hereinafter the Consultant) has been assigned to undertake an Environmental and Social Impact Assessment (ESIA) study for the Project, in line with E&S performance standards stipulated by the Project Lenders. With regard to the identification, assessment and management of potential impacts on biodiversity, the ESIA process includes a Critical Habitat Assessment (CHA).

1.2 Purpose and Scope of Report

This CHA Report presents the process used to conduct the critical habitat assessment, the findings of which inform the ESIA study for the Samarkand I Solar PV and BESS Project, in line with E&S performance standards stipulated by the Project Lenders, including but not limited to the IFC PS 6 and ADB Environmental Safeguards.

The general purpose of the CHA is the identification habitats that are subject to elevated conservation concern (i.e., critical habitats or significant biodiversity values), in relation to the project's potential impacts on threatened, resident species.

This report provides the results of detailed baseline studies (encompassing desktop review, relevant stakeholder engagement, and field survey work) to assess the conservation status of species against IFC criteria and associated thresholds for critical habitats resulting from the Project's potential impacts on biodiversity.

> **Note:** The Critical Habitat Assessment (CHA) for the Samarkand I and II solar PV and BESS Projects was carried out on a cumulative and holistic basis, in instances where facilities from different projects have common locations and coincident implementation timeframes.
>
> While project-specific CHA and ESIA studies have been developed, to enable separate Environmental and Social Due Diligence (ESDD) for the Projects' respective lender consortiums, a combined analysis (accounting for both projects) has been adopted where potential impacts from these projects fall within the same EAAA (i.e., areas of influence co-occurring within the same habitat).
>
> For sections where the CHA analysis encompasses both the Samarkand I and Samarkand II solar PV and BESS projects, the analytical discussion should be reviewed with reference to the project scope outline provided in Section 1.1 of this Report.

1.3 Limitations

A working draft of the CHA is presented in this document, for the purpose of early public disclosure of the project ESIA. This assessment will be updated with complete coverage of the following aspects, prior to the next round of public disclosure:

- Known migration routes, landscape features, that may promote concentrations of specific types of species such as migratory raptors that may trigger criticality
- Little Bustard, which was not originally included, and which needs to be assessed against Criteria 3, which may trigger criticality
- A comprehensive assessment of botanical receptors that could trigger criticality under Criterion 1, 2 or 3
- A thorough assessment of all protected areas which might trigger criticality including Mubarek State Wildlife Sanctuary

- Review of all species against criticality thresholds to ascertain more confidence if criticality is triggered

1.4 Critical Habitat

1.4.1 Habitat Designations

As per IFC PS 6 (2012) and associated GN (2019):

Habitats can be divided into natural habitats (which are land and water areas where the biological communities are formed largely by native plant and animal species, and where human activity has not essentially modified the area's primary ecological functions) and modified habitats (where there has been apparent alteration of the natural habitat, often with the introduction of alien species of plants and animals, such as agricultural areas). Both types of habitat can support important biodiversity at all levels, including endemic or threatened species.

Critical habitat is a subset of both natural and modified habitat that deserves particular attention. Critical habitat includes areas with high biodiversity value, including habitat required for the survival of critically endangered or endangered species; areas having special significance for endemic or restricted-range species; sites that are critical for the survival of migratory species; areas supporting globally significant concentrations or numbers of individuals of congregatory species; areas with unique assemblages of species or which are associated with key evolutionary processes or provide key ecosystem services; and areas having biodiversity of significant social, economic or cultural importance to local communities.

1.4.2 Determining Critical Habitat

As per IFC PS 6 (2012) and associated GN (2019):

Critical habitats are areas of high biodiversity value that include at least one or more of the five values specified in paragraph 16 of Performance Standard 6 and/or other recognized high biodiversity values. There is no one criterion that is more important than any other for making critical habitat designations or for determining compliance with Performance Standard 6. For ease of reference, these values are referred to as "critical habitat criteria" for the remainder of this document. Each criterion is described in detail in paragraphs GN70–GN83. Critical habitat criteria are as follows and should form the basis of any critical habitat assessment:

The below provides an overview of all applicable criteria as per IFC and ADB:

- IFC PS6 Criterion 1: Critically Endangered and Endangered Species /// ADB criterion "habitat required for the survival of critically endangered or endangered species";

- IFC PS6 Criterion 2: Endemic and Restricted-range Species /// ADB criterion "areas with special significance for endemic or restricted-range species";
- IFC PS6 Criterion 3: Migratory and Congregatory Species /// ADB criteria "sites that are critical for the survival of migratory species" and "areas supporting globally significant concentrations or numbers of individuals of congregatory species";
- IFC PS6 Criterion 4: Highly Threatened or Unique Ecosystems
- IFC PS6 Criterion 5: Key Evolutionary Processes /// ADB criterion "areas with unique assemblages of species that are associated with key evolutionary processes or provide key ecosystem services";
- Additionally, ADB criterion "areas with biodiversity that has significant social, cultural or economic importance to local communities"; and
- ADB criterion "Critical habitats include those areas either legally protected or officially proposed for protection, such as areas that meet the criteria of the Word Conservation Union classification, the Ramsar List of Wetlands of International Importance, and the United Nations Educational, Scientific, and Cultural Organization's world natural heritage sites"

Projects that are located within internationally and/or nationally recognized areas of high biodiversity value may require a critical habitat assessment. Examples include the following:

• Areas that meet the criteria of the IUCN's Protected Area Categories Ia, Ib and II.

• Key Biodiversity Areas (KBAs), GN10 which encompass Important Bird and Biodiversity Areas (IBAs).

Quantitative and qualitative thresholds are provided in IFC PS 6 which determine if criticality is met for any particular criterion.

1.4.3 Critical Habitat Assessment Process

On the broad scale, the overall process of a CHA can be divided into three main stages:

1. CHA Screening – identify the study area (potentially affected landscape/seascape/ecosystem) & conduct a desktop study of literature review and stakeholder consultation to obtain an understanding of biodiversity within the landscape from the perspective of all relevant stakeholders. This also informs the scoping of primary data collection (surveys and monitoring) requirements.
2. Data Collection – physical field data collection as well as engagement with relevant expert stakeholders to collate all the requisite data that will support the assessment.
3. Critical Habitat Assessment – biodiversity values of the site assessed against critical habitat criteria and thresholds at an appropriate ecological scale, as defined in GN59. By carrying out these steps, the client should be in a position to determine if the project

is located in a critical habitat based on identified high biodiversity values. This determination is independent of the project type, impacts or its mitigation strategy.

The following chapter presents the methodology and findings of the CHA Screening Stage.

2 CHA SCREENING

2.1 Methodology

A desktop-based screening exercise was undertaken as the initial step to identify a preliminary list of potentially sensitive biodiversity features.

The outcome of the CHA Screening will narrow down the species/features of concern that will need further assessment, both in the ESIA as well as in the CHA against thresholds. This step also allows for the determination of the appropriate level of field survey effort that may be required to provide sufficient information for the ESIA and CHA, and thus should be undertaken during the ESIA Scoping phase (or as early as possible).

2.1.1 Define the Study Area

An overarching Study Area was first defined, looking from a regional scale. As the project is a solar farm, and the area supports a broad front of migratory bird activity during specific times of the year, a buffer of approximately 50km was added around the project footprint to generate the study area polygon below.

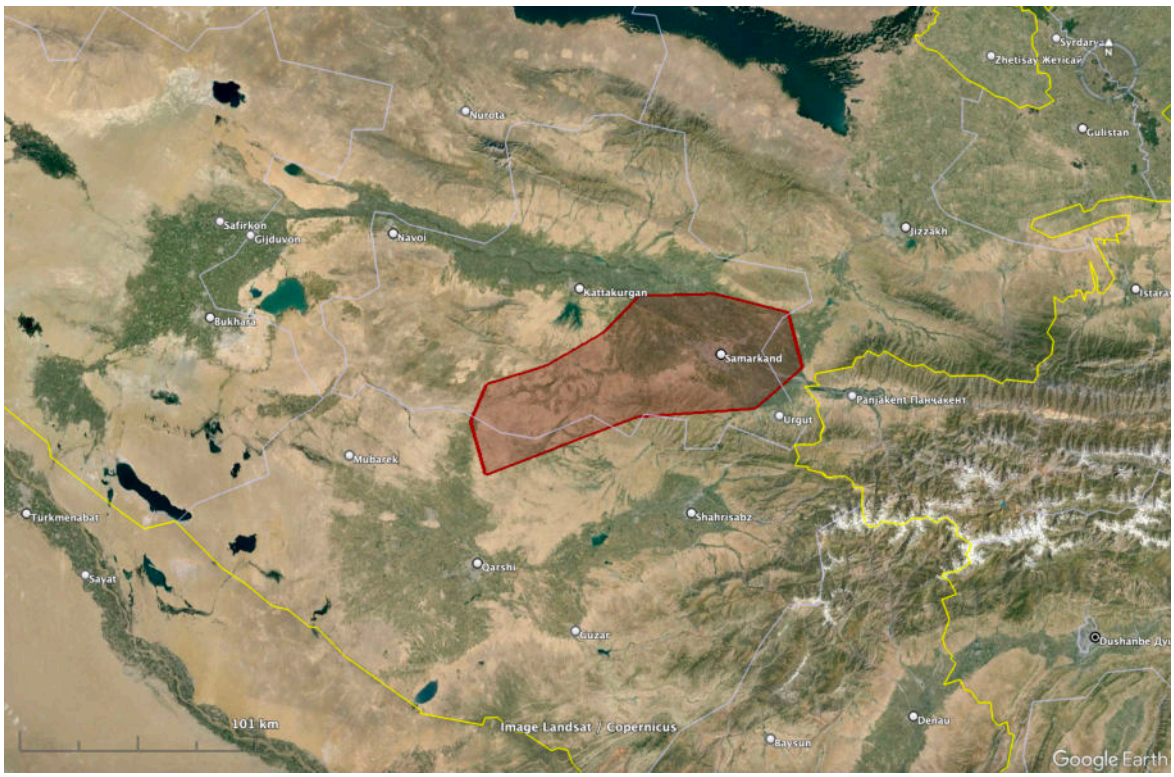

Figure 2-1 Study Area

2.1.2 Desktop Review and Scoping

Once the study area is delineated, the scoping process begins.

A list of all species from the IUCN Red List and, where relevant, categorized ecosystems from the Red List of Ecosystems is generated by cross-referencing the Study Area with known spatial distributions from the IUCN Global database. This list of all possible species/ecosystems (biodiversity features) is then supplemented by a review of Key Biodiversity Areas (and other recognised biodiversity areas of importance), national or regional level Red Lists / Red Data Books, contextual connectivity of flyways and habitats across the landscape, and any other verified sources of available existing ecological information. Migratory bird species lists are obtained from Birdlife International and other reputable public sources and databases.

At this stage, a set of **CHA Screening Tables** has been created with a full list of species that should be further investigated under specific criterion, and whose known range may overlap with the project AoI. Each species is assessed to determine the likelihood of its presence based on habitat requirements compared to the known habitat types within the Project AoI.

As a precautionary stance, even if a species is screened out, it may be deemed necessary to later consult expert stakeholders and survey results and revisit those species before the CHA is completed, especially if a species is recorded during field surveys.

The final **CHA Screening Tables** list all identified species/elements as to why it was screened in for further assessment or screened out due to unsuitable habitat or other available information indicating lack of regular presence.

The culmination of Scoping results in an understanding of the biodiversity elements of concern, current gaps in knowledge, and the appropriate field surveying methods (and/or secondary information gathering from stakeholders, etc) that will be required in order to:

(i) provide appropriate levels of detail to ascertain if any CH thresholds are surpassed and;

(ii) allow the biodiversity impact assessment within the ESIA to be conducted accordingly.

2.2 Results

2.2.1 Desktop Screening

A desktop-based screening exercise was undertaken as the preliminary step to review what is considered as potentially sensitive biodiversity features.

The CHA desktop-based screening exercise included all taxa. The scoping process determined the likelihood of occurrence in the study area and potential for triggering criticality as per IFC PS6 Critical Habitat criteria.

Initially, a total of twenty-four species were identified as potential elements of concern, predominantly Avifauna and Chiroptera (Bats). This included ten bird species, eleven insectivorous bat species, two ichthyofauna species and one herptile. With the exclusion of volant mammals i.e., insectivorous bat species, no IUCN Red Listed mammals, flora or insects have been identified as biodiversity features of concern with the potential to trigger critically under any of the CH criteria.

It is important to note that non-volant mammals, fish, and flora (and relevant habitats) were included in the CHA screening. The assessment was comprehensive, covering all potential taxa to ensure no significant biodiversity feature was overlooked.

Refer to the **CHA Screening Table** for a comprehensive database, including species-specific rationale to screening out (descoping) prior to the CHA.

Table 2-1 Species Screened In for further investigation in the CHA

FAMILY	SPECIES	COMMON NAME	IUCN RED LIST	NATIONAL UzRDB	CRITERION
Aves	*Aquila heliaca*	Eastern Imperial Eagle	VU	VU	Criterion 1 & 3
Aves	*Clanga clanga*	Greater Spotted Eagle	VU	VU	Criterion 1 & 3
Aves	*Falco cherrug*	Saker Falcon	EN	EN	Criterion 1 & 3
Aves	*Haliaeetus leucoryphus*	Pallas's Fish-eagle	EN	EN	Criterion 1 & 3
Aves	*Otis tarda*	Great Bustard	EN	CR	Criterion 1 & 3
Aves	*Columba eversmanni*	Yellow-eyed Pigeon	VU	VU	Criterion 1
Aves	*Streptopelia turtur*	European Turtle-Dove	VU	VU	Criterion 1 & 3
Aves	*Vanellus gregarius*	Sociable Lapwing	CR		Criterion 1 & 3
Aves	*Oxyura leucocephala*	White-headed Duck	EN	EN	Criterion 1 & 3
Aves	*Anser erythropus*	Lesser White-fronted Goose	VU	VU	Criterion 1 & 3
Aves	*Pelecanus crispus*	Dalmatian Pelican	NT	EN	Criterion 1 & 3
Aves	*Marmaronetta angustirostris*	Marbled Teal	NT	EN	Criterion 1
Chiroptera	*Myotis bucharensis*	Bokhara Whiskered Bat	DD	VU	Criterion 1, 2 and 3
Chiroptera	*Eptesicus gobiensis*	Gobi Big Brown Bat	LC		Criterion 3

FAMILY	SPECIES	COMMON NAME	IUCN RED LIST	NATIONAL UzRDB	CRITERION
Chiroptera	*Eptesicus ognevi*	Ognev's Serotine	LC		Criterion 3
Chiroptera	*Eptesicus serotinus*	Serotine Bat	LC		Criterion 3
Chiroptera	*Myotis blythii*	Lesser Mouse-eared Myotis	LC		Criterion 3
Chiroptera	*Myotis emarginatus*	Geoffroy's Bat	LC		Criterion 3
Chiroptera	*Myotis nipalensis*	Nepal Myotis	LC		Criterion 3
Chiroptera	*Pipistrellus aladdin*	Turkestan Pipistrelle	LC		Criterion 3
Chiroptera	*Pipistrellus pipistrellus*	Common Pipistrelle	LC		Criterion 3
Chiroptera	*Rhinolophus bocharicus*	Bokhara horseshoe bat	LC		Criterion 3
Chiroptera	*Vespertilio murinus*	Particoloured Bat	LC		Criterion 3
Herpetofauna	*Testudo horsfieldii*	Central Asian Tortoise/Russian Tortoise	VU	VU	Criterion 1
Ichtyofauna	*Luciobarbus brachycephalus*	Aral Barbel	VU	EN	Criterion 1
Ichtyofauna	Cyprinus carpio	Eurasian Carp	VU	EN	Criterion 1
Plant	*Tulipa micheliana*		VU	-	Criterion 1

2.2.2 Stakeholder Information

To further refine the scoping exercise, desktop derived secondary data, survey results and guidance from local experts was used to ensure all species were appropriately considered.

Two ichthyofauna species listed as Vulnerable on the IUCN Red List were originally identified as potential elements of concern, however further stakeholder engagement with an ichthyologist familiar with the Syrdayra and Zaravshan river systems has confirmed that these species are not present within the reaches of the Syrdarya and Zaravshan rivers, located within the project AoI.

A botanical expert undertook a regional literature review to assess the habitats and associated botanical communities expected to occur within the study area. As a result, the botanist confirmed that no specific flora species of concern was anticipated to occur in significant regular amounts (i.e. IUCN or UzRDB listed species). This aligns with what IUCN and UzRDB literature showed.

In addition, two avifauna species, Egyptian Vulture and Steppe Eagle, were initially screened out pending ecology surveys and stakeholder consultation. These are migratory species, and whilst the majority of the dominant habitat types in the AOI are unsuitable and no known bottlenecks or stopovers are known in the Project area, small areas of suitable stopover habitat were recorded. It was deemed appropriate to screen in these species only if they were recorded during surveys or following expert consultations. As such, the Egyptian Vulture and Steppe Eagle were screened in following direct observations within the AOI during Autumn and Spring Migrations.

As a result of literature reviews a further 8 bat species were screened in and assessed.

Table 2-2 Species Screened in at a later stage

FAMILY	SPECIES	COMMON NAME	IUCN RED LIST	NATIONAL UzRDB	CRITERION
Aves	*Neophron percnopterus*	Egyptian Vulture	EN	VU	Criterion 1 & 3
Aves	*Aquila nipalensis*	Steppe Eagle	EN	VU	Criterion3
Chiroptera	*Rhinolophus ferrumequinum*	Greater Horseshoe Bat	LC		Criterion 3
Chiroptera	*Myotis davidii*	David's Myotis	LC		Criterion 3
Chiroptera	*Plecotus strelkovi*	Long-eared Bat	LC		Criterion 3
Chiroptera	*Nyctalus noctula*	Noctule Bat	LC		Criterion 3
Chiroptera	*Hypsugo savii*	Savi's Pipistrelle	LC		Criterion 3
Chiroptera	*Otonycteris hemprichi*	Hemprich's Long-eared Bat	LC	2(VU:R)	Criterion 3
Chiroptera	*Rhinolophus hipposideros*	Lesser Horseshoe Bat	LC	2(VU:D)	Criterion 3

Accordingly, it was determined that bat acoustic monitoring, roost searching, tortoise surveys, and bird surveys would be needed to further inform the ESIA and CHA (in addition to what would typically be done for biodiversity surveys).

3 CHA METHODOLOGY

3.1 CHA Criteria

The concept of Critical Habitat is widely utilized and the principles for protection of critical habitat widely applied by DFIs. A specific screening and assessment process is undertaken to identify if any CH criteria are triggered by the project. This requires scoping to assess potential species candidates for triggering CH, and subsequently using information obtained from surveys, secondary sources, and stakeholders to extrapolate a population estimate for the individual species/species group's "Ecologically Appropriate Area of Analysis" which may in many cases be overlapping but not 100% aligned with a project impacts' Area of Influence. If any extrapolated population estimates (extrapolated from existing information across the qualified EAAA) meet the appropriate CH thresholds, then CH will have been triggered.

The below provides an overview of all applicable criteria as per IFC and ADB:

- IFC PS6 Criterion 1: Critically Endangered and Endangered Species /// ADB criterion "habitat required for the survival of critically endangered or endangered species";
- IFC PS6 Criterion 2: Endemic and Restricted-range Species /// ADB criterion "areas with special significance for endemic or restricted-range species";
- IFC PS6 Criterion 3: Migratory and Congregatory Species /// ADB criteria "sites that are critical for the survival of migratory species" and "areas supporting globally significant concentrations or numbers of individuals of congregatory species";
- IFC PS6 Criterion 4: Highly Threatened or Unique Ecosystems
- IFC PS6 Criterion 5: Key Evolutionary Processes /// ADB criterion "areas with unique assemblages of species that are associated with key evolutionary processes or provide key ecosystem services";
- Additionally, ADB criterion "areas with biodiversity that has significant social, cultural or economic importance to local communities"; and
- ADB criterion "Critical habitats include those areas either legally protected or officially proposed for protection, such as areas that meet the criteria of the Word Conservation Union classification, the Ramsar List of Wetlands of International Importance, and the United Nations Educational, Scientific, and Cultural Organization's world natural heritage sites"

Some of the CH criteria listed above have quantitative thresholds associated with them, defined in lender policy, while others can only be assessed using more qualitative evaluation of the criterion.

3.1.1 Critical Habitat Criteria and Associated Thresholds

Some of the CH criteria listed above have quantitative thresholds associated with them, defined in lender policy, while others can only be assessed using more qualitative evaluation of the criterion. Refer to the IFC PS 6 2019 for the quantitative thresholds for each criterion.

3.1.2 Significant Biodiversity Values

Natural habitat and species may still be of elevated concern even if critical thresholds are not met. Significant Biodiversity Values (SBVs) may include species of conservation concern (for example, species that are threatened, legally protected, or otherwise identified as important by stakeholders) and ecological features in the landscape that are important to stakeholders. SBVs may occur in natural or modified habitat.

3.2 Ecologically Appropriate Area of Analysis

The Ecologically Appropriate Area of Analysis (EAAA) is a concept that was introduced with the 2019 revision of IFC PS6, and is currently considered by IFC, and ADB as the basis for spatial delimitation of the area of analysis for the purpose of performing CHA.

Unlike other "area of influence" concepts, the EAAA concept is species-specific. Therefore, differently configured EAAA may be drawn for different species for the same project, based on the species' differing ecological characteristics, especially habitat preference and movement patterns. EAAA considered for CHA should not be confused with other spatial delineations of the Project area, or Project's area of influence for other purposes elsewhere within the Project's ESIA and other documentation (for example, the AoI considered for the evaluation of noise impacts)[1].

[1] The Project Study Area as determined during CHA Screening outlines the total spatial area within which potential species distribution overlaps are examined utilizing global databases.

The Area of Influence is specific to impacts. For example, the AoI for noise impacts on fauna may be inclusive of the noise-generating activity footprint and a 500m buffer; whilst the AoI for Habitat Fragmentation impact may be much more broad, encompassing a wider region than the impacting activity itself. The impact-specific AoIs are discussed in relation to impacts and receptors within the ESIA.

The EAAA for a particular species or species group encompasses the total area within which the species or species group may be impacted by the Project. The EAAA is based on habitat configurations, locations of ecological features, and the typical home range of species.

The EAAA has been delineated for species and species-groups for which the possibility of criticality must be examined. The estimated population of the entire EAAA is used as the basis to determine if criticality has been met, in relation to the quantitative thresholds associated with some of the CH criteria, as described above.

3.2.1 Defining EAAA

Defining the EAAA is an integral step in determining criticality. The critical thresholds must be measured against the population of the species present within the "EAAA", which on a practical level roughly translates into the full range covered by members of a population regularly utilizing or occurring within a particular area.

Therefore, to determine EAAA and assess criticality, the following steps must be followed:

1. Determine the largest Area of Influence for the species based on the project's identified impacts and the species' ecology (habitat affiliation, dispersal , etc.)
2. Determine the likely home range inhabited by members of the species population which utilize the area of influence. This is based on mobility and habitat distribution.
3. Map the EAAA by taking the area of influence, adding the decided buffer, and mapping based on contiguous habitat (if there is a strong habitat preference/need).
4. The next step is calculating the estimated population present within the EAAA (where quantification is possible) and comparing these ratios to the thresholds for determination of criticality status. This can be done using population extrapolations where sufficient baseline data is available and a global population is known; or by using Extent of Occurrence where the size of the EAAA is compared to the size of the global EOO.

This is a relatively straight-forward concept when considering residential, sedentary populations. For example, for a terrestrial species with limited mobility and specific habitat requirements, the largest applicable area of influence would amount to the full construction footprint (as the primary concern is direct loss and disturbance during construction). Based on this, the home range regularly occupied by the population probably does not exceed a specified buffer around the project boundaries. The size of the most appropriate buffer for a given species can be estimated on the basis of the species' dispersal ecology (home range size). The EAAA would be considered as the project boundaries (equivalent to the AoI in this case) plus the determined ecological buffer.

However, the entire project footprint need not be considered as part of the EAAA if a portion of that footprint contains habitat unsuitable for the species. This type of restriction of the EAAA is especially important when areal coverage of a species is used as proxy for population size, as extrapolation of the population of a species occurring within a Project's EAAA based on the entire acreage of the Project footprint would result in a significant exaggeration if only a small portion of the Project's footprint is utilised by the species. The number of individuals making up the population within that EAAA in relation to the global population of the species (or the areal coverage of the species EAAA in relation to the species global Extent of Occurrence (EOO) would then be compared to the critical thresholds.

For species with extremely large home ranges, long-ranging nomadic species, and/or migratory species, this approach is difficult to utilize. For example, migrant waterbirds may be impacted on a large scale by the project as a result of macro-avoidance resulting in habitat fragmentation or migration route impacts, during the operation of the project. Or, long-distance migrant species which are at risk of wind turbine collision may be on a migratory journey of hundreds of thousands of kilometres.

If we are to apply the concept of ascertaining the entire home range of the long-distance migratory species that pass through the area of influence then this 'EAAA' in this case could easily become an entire geographical region.

It is recognized that the EAAA is intended as a project specific concept, and therefore it is not intended to span multiple continents, or very large regional scale area, e.g., to cover the entire ranges of individual long-distance migratory birds. With migratory birds, CHA generally follows the IUCN KBA standard, emphasizing areas that function as significant migratory stopover sites and/or bottleneck, with EAAA delineated to include the Project footprint plus a reasonable buffer based on the scale of the species' typical daily foraging movements, rather than its entire migratory route.

Each species analysis section includes the reasoning followed to ascertain the EAAA, the likely population within the EAAA (where it can be estimated), and the final assessment of criticality.

<u>The following summarizes the general framework/starting point used to assign EAAA for various taxa, (most will have a more specific species-dependent EAAA assigned and explained):</u>

- For bats, (unless otherwise specified for a species-specific rationale) the EAAA has been set as the footprint of the project site, including a buffer of up to 20km. This would be considered to encompass the area regularly traversed by the majority of sedentary bats that may utilize the site.
- For tortoises, the EAAA has been set as the footprint of the project site, including a buffer of up to 20km. This would be considered to encompass the area regularly traversed by the majority of tortoises that may utilize the site.

- For migratory birds: The EAAA is a difficult concept to apply to long-range migratory species, as encompassing the full geographic range of such species would result in extremely large population extrapolations. Instead, CHA generally follows the IUCN KBA standard, emphasizing areas that function as significant migratory stopover sites and/or bottlenecks with EAAAs delineated to include the Project footprint plus a reasonable buffer based on the scale of the species' typical daily or foraging movements, rather than its entire migratory route.
- For breeding/resident birds: The total EAAA for breeding birds has been applied as all connected suitable habitat overlapping with the project footprint as well as within a reasonable buffer (the buffer is based on the breeding ecology or typical localized home range of the species and may include recognition of localized foraging or hunting movements). This should provide an adequate accounting of birds likely to regularly utilize the project area during respective breeding seasons.

3.3 Analysing and Assessing

The final stage of the CHA process is the analysis of the collated data to prepare a rationale for why or why not a species population within the EAAA would qualify as triggering criticality under any of the relevant criteria. This can include a review of information such as baseline findings, habitat preferences, distribution, seasonality, reported population, previous records, known migration routes, known stopover or otherwise important locations within the region, and any information known about breeding and migratory behaviour relevant to the area.

4 ASSESSMENT

4.1 Overview of Study Area

4.1.1 Geographical and climatic overview

Eastern Uzbekistan, where the project is primarily located, contrasts sharply with the arid deserts of the country's western and central parts. The area is predominantly characterized by its semi-arid climate, with significant seasonal variations that influence the ecological dynamics of the region. Summers are typically hot and dry, with temperatures soaring up to 40°C, making it the driest period of the year. In contrast, the winter months from November to January see temperatures dipping below freezing, accompanied by higher precipitation levels, which are crucial for maintaining the local ecosystems during the dry spells.

The region's geography is marked by significant mountain ranges such as the Tian Shan near Tashkent, extending eastward for about 2,900 km, and the smaller Nuratau mountains northwest of Samarkand. These mountains are not only pivotal in defining the area's climate by blocking or channelling air masses but also serve as critical habitats for a myriad of species.

4.1.2 Recognized Biodiversity Areas

A number of state-declared reserves/protected areas are located within a 50km radius of the project site.

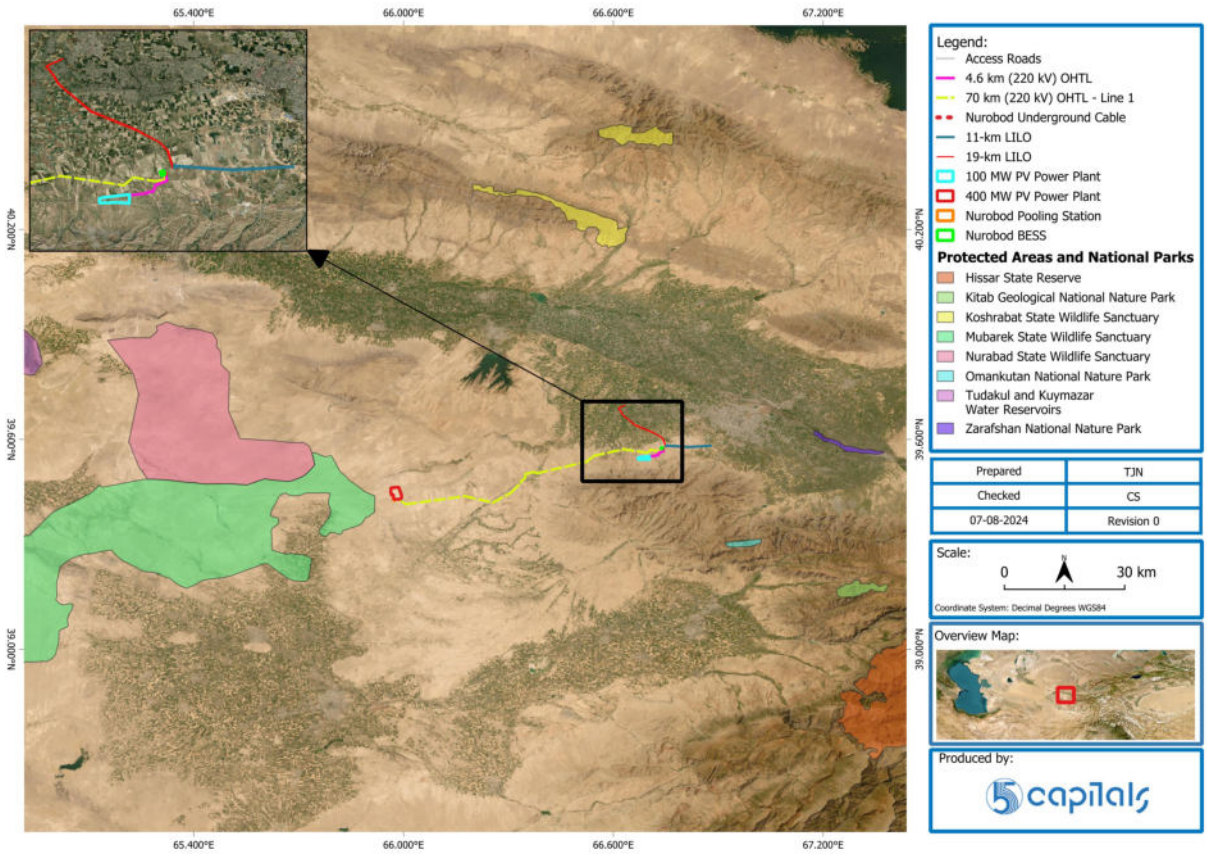

Figure 4-1 Map of the Protected Areas

The closest of the designated national sanctuary is the Mubarek State Wildlife Sanctuary, which is approximately 1.5km from the 400MW PV Site. Unfortunately no data is currently available on what types of biodiversity are of elevated significance for any of the state-designated protected areas at this time.

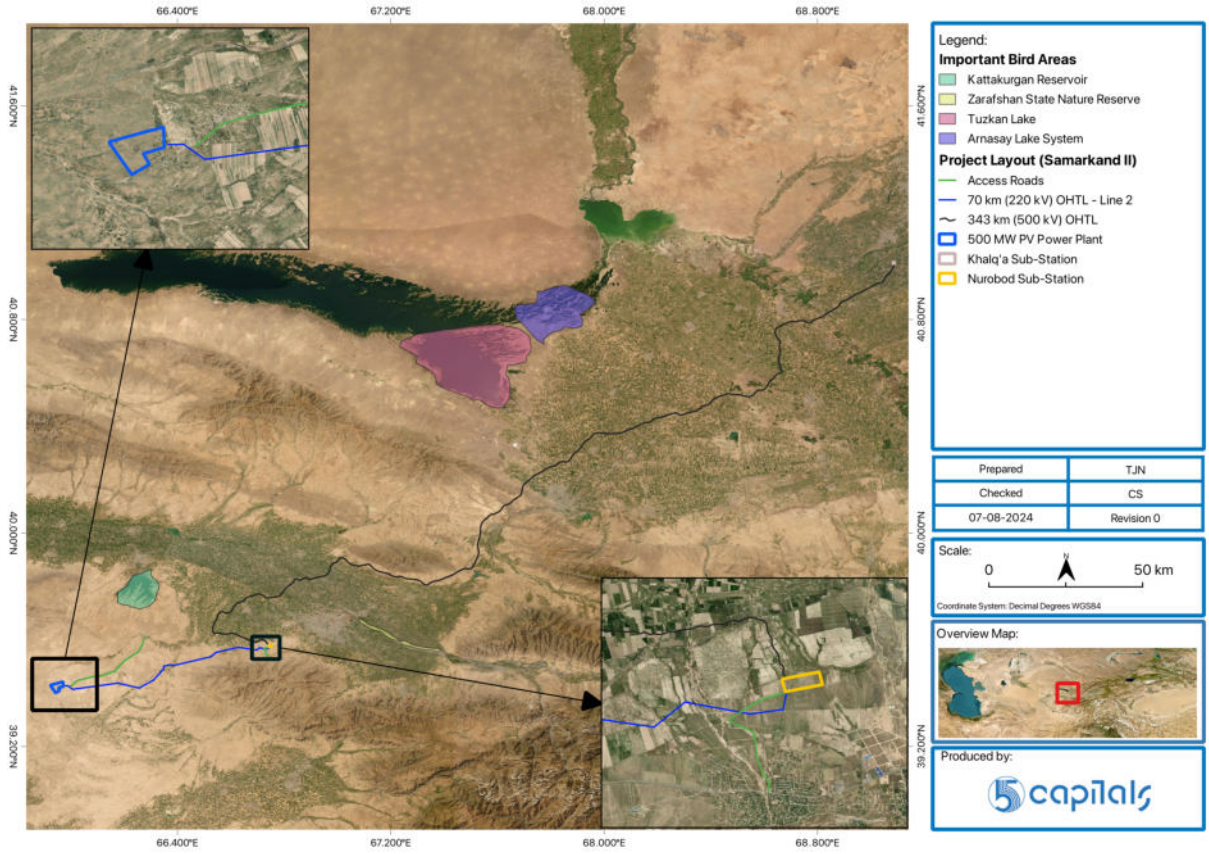

Figure 4-2 Map of the KBA/IBAs (50km)

A review of the Datazone on BirdLife.org shows a number of Key Biodiversity Areas (KBAs)/Important Bird Areas (IBAs) are located within 50-100km radius of the proposed site.

Tuzkan Lake — UZ035

Summary | Text account | Data table and detailed info | Map | Reference and further resources

IBA Justification

The site was identified as important in 2006 because it was regularly supporting significant populations of the species listed below, meeting ('triggering') IBA criteria.

Populations meeting IBA criteria ('trigger species') at the site:

Species	Red List[1]	Season	Year(s)	Size	IBA criteria
Greylag Goose *Anser anser*	LC	winter	2009	4,014 individuals	A4i
Ruddy Shelduck *Tadorna ferruginea*	LC	winter	2003	7-15,304 adults	A4i
Ferruginous Duck *Aythya nyroca*	NT	breeding	2006	5-146 adults	A1
Great Crested Grebe *Podiceps cristatus*	LC	winter	2003-2006	9-571 adults	A4i
Black-necked Grebe *Podiceps nigricollis*	LC	winter	2003-2004	157-1,034 adults	A4i
Common Coot *Fulica atra*	LC	winter	2003-2006	487-22,867 adults	A4i
Common Crane *Grus grus*	LC	winter	2003-2006	848 individuals	A4i
Dalmatian Pelican *Pelecanus crispus*	NT	winter	2003-2006	3-111 adults	A1, A4i
Pygmy Cormorant *Microcarbo pygmaeus*	LC	winter	2003-2006	495-894 adults	A4i
Great Cormorant *Phalacrocorax carbo*	LC	winter	2003	52-13,573 adults	A4i
Asian Dowitcher *Limnodromus semipalmatus*	NT	passage	2006	6 adults	A1
Cinereous Vulture *Aegypius monachus*	NT	non-breeding	2003	4 adults	A1
Pallas's Fish-eagle *Haliaeetus leucoryphus*	EN	winter	2004	6 adults	A1
A4iii *Species group - waterbirds*	n/a	winter	2003-2004	26,047-61,582 individuals	A4iii

1. The current IUCN Red List category. The category at the time of the IBA criteria assessment (2006) may differ.

BirdLife International (2024) Important Bird Area factsheet: Tuzkan Lake. Downloaded from https://datazone.birdlife.org/site/factsheet/tuzkan-lake-iba-uzbekistan on 08/08/2024.

Tuzkan Lake IBA/KBA is of note as records of Pallas's Fish-eagle, Dalmatian Pelican are listed as trigger species; both of which will be assessed.

Arnasay Lake System — UZ030

Summary | Text account | Data table and detailed info | Map | Reference and further resources

IBA Justification

The site was identified as important in 2016 because it was regularly supporting significant populations of the species listed below, meeting ('triggering') IBA criteria.

Populations meeting IBA criteria ('trigger species') at the site:

Species	Red List[1]	Season	Year(s)	Size	IBA criteria
Northern Lapwing *Vanellus vanellus*	NT	breeding	2016	14-51 individuals	A1

1. The current IUCN Red List category. The category at the time of the IBA criteria assessment (2016) may differ.

BirdLife International (2024) Important Bird Area factsheet: Arnasay Lake System. Downloaded from https://datazone.birdlife.org/site/factsheet/arnasay-lake-system-iba-uzbekistan on 08/08/2024.

Zarafshan State Nature Reserve — UZ039

Summary | Text account | Data table and detailed info | Map | Reference and further resources

IBA Justification

The site was identified as important in 2008 because it was regularly supporting significant populations of the species listed below, meeting ('triggering') IBA criteria.

Populations meeting IBA criteria ('trigger species') at the site:

Species	Red List[1]	Season	Year(s)	Size	IBA criteria
Egyptian Nightjar *Caprimulgus aegyptius*	LC	breeding	2007	1 individuals	A3
Black-crowned Night-heron *Nycticorax nycticorax*	LC	breeding	1976-2006	50-1,000 individuals	A4i
Pallid Scops-owl *Otus brucei*	LC	breeding	2006-2007	20 individuals	A3
Greater Spotted Eagle *Clanga clanga*	VU	passage	2004	15 individuals	A1
European Roller *Coracias garrulus*	LC	breeding	2002-2007	60 individuals	A1
White-winged Woodpecker *Dendrocopos leucopterus*	LC	resident	2002-2007	10 breeding pairs	A3
Great Tit *Parus major*	LC	resident	2002-2009	20-27 breeding pairs	A3
Red-headed Bunting *Emberiza bruniceps*	LC	breeding	2007	1 individuals	A3

1. The current IUCN Red List category. The category at the time of the IBA criteria assessment (2008) may differ.

BirdLife International (2024) Important Bird Area factsheet: Zarafshan State Nature Reserve. Downloaded from https://datazone.birdlife.org/site/factsheet/zarafshan-state-nature-reserve-iba-uzbekistan on 08/08/2024.

Zarafshan State Nature Reserve IBA/KBA is of note as records of Greater Spotted Eagle is listed as a trigger species; which will be assessed.

Kattakurgan Reservoir — UZ038

Summary | Text account | Data table and detailed info | Map | Reference and further resources

IBA Justification

The site was identified as important in 2017 because it was regularly supporting significant populations of the species listed below, meeting ('triggering') IBA criteria.

Populations meeting IBA criteria ('trigger species') at the site:

Species	Red List[1]	Season	Year(s)	Size	IBA criteria
Common Pochard *Aythya ferina*	VU	winter	2011-2017	5-93 individuals	A1

1. The current IUCN Red List category. The category at the time of the IBA criteria assessment (2017) may differ.

BirdLife International (2024) Important Bird Area factsheet: Kattakurgan Reservoir. Downloaded from https://datazone.birdlife.org/site/factsheet/kattakurgan-reservoir-iba-uzbekistan on 08/08/2024.

Additionally, the following IBA/KBAs are within a 100km radius:

Nuratau Range UZ037

Summary | Text account | Data table and detailed info | Map | Reference and further resources

IBA Justification

The site was identified as important in 2006 because it was regularly supporting significant populations of the species listed below, meeting ('triggering') IBA criteria.

Populations meeting IBA criteria ('trigger species') at the site:

Species	Red List[1]	Season	Year(s)	Size	IBA criteria
Egyptian Vulture *Neophron percnopterus*	EN	breeding	2003-2004	5-10 breeding pairs	A1
Cinereous Vulture *Aegypius monachus*	NT	breeding	2006	90 individuals	A1, A4ii
Saker Falcon *Falco cherrug*	EN	breeding	2004	2 adults	A1
Eastern Rock Nuthatch *Sitta tephronota*	LC	resident	2006	abundant	A3
White-throated Robin *Irania gutturalis*	LC	breeding	2006	common	A3
Variable Wheatear *Oenanthe picata*	LC	breeding	2006	uncommon	A3
White-capped Bunting *Emberiza stewarti*	LC	breeding	2006	uncommon	A3

1. The current IUCN Red List category. The category at the time of the IBA criteria assessment (2006) may differ.

BirdLife International (2024) Important Bird Area factsheet: Nuratau Range. Downloaded from https://datazone.birdlife.org/site/factsheet/nuratau-range-iba-uzbekistan on 08/08/2024.

Nuratau Range Conservation Area is of note as records of Egyptian Vulture and Saker Falcon are listed as trigger species; both of which will be assessed.

Sarmysh Nature Park UZ013

Summary | Text account | Data table and detailed info | Map | Reference and further resources

IBA Justification

The site was identified as important in 2007 because it was regularly supporting significant populations of the species listed below, meeting ('triggering') IBA criteria.

Populations meeting IBA criteria ('trigger species') at the site:

Species	Red List[1]	Season	Year(s)	Size	IBA criteria
European Roller *Coracias garrulus*	LC	breeding	2007	62-86 individuals	A1
Eastern Rock Nuthatch *Sitta tephronota*	LC	resident	2007	150-250 individuals	A3
Variable Wheatear *Oenanthe picata*	LC	breeding	2007	30-50 individuals	A3
Finsch's Wheatear *Oenanthe finschii*	LC	breeding	2007	400-700 individuals	A3
Grey-necked Bunting *Emberiza buchanani*	LC	breeding	2007	600-1,200 individuals	A3

1. The current IUCN Red List category. The category at the time of the IBA criteria assessment (2007) may differ.

BirdLife International (2024) Important Bird Area factsheet: Sarmysh Nature Park. Downloaded from https://datazone.birdlife.org/site/factsheet/sarmysh-nature-park-iba-uzbekistan on 08/08/2024.

Northern shore of Aydarkul Lake UZ029

Summary | Text account | Data table and detailed info | Map | Reference and further resources

IBA Justification

The site was identified as important in 2008 because it was regularly supporting significant populations of the species listed below, meeting ('triggering') IBA criteria.

Populations meeting IBA criteria ('trigger species') at the site:

Species	Red List[1]	Season	Year(s)	Size	IBA criteria
White-headed Duck *Oxyura leucocephala*	EN	winter	2004	8 individuals	A1
Greylag Goose *Anser anser*	LC	winter	2000-2007	794-6,091 individuals	A4i
Red-crested Pochard *Netta rufina*	LC	winter	1997-2007	560-2,500 individuals	A4i
Ferruginous Duck *Aythya nyroca*	NT	winter	2000-2007	33-295 individuals	A1
Gadwall *Mareca strepera*	LC	winter	1997-2007	350-2,800 individuals	A4i
Mallard *Anas platyrhynchos*	LC	winter	1997-2007	1,500-8,750 individuals	A4i
Great Crested Grebe *Podiceps cristatus*	LC	passage	1997-2007	260-350 individuals	A4i
Pallas's Sandgrouse *Syrrhaptes paradoxus*	LC	breeding	2007	181 individuals	A3
Egyptian Nightjar *Caprimulgus aegyptius*	LC	breeding	1997-2002	8 individuals	A3
Common Coot *Fulica atra*	LC	winter	2000-2007	31,522-189,181 individuals	A4i
Asian Houbara *Chlamydotis macqueenii*	VU	breeding	1997-2007	4-41 individuals	A1, A3
Great White Egret *Ardea alba*	LC	winter	2000-2007	186-6,011 individuals	A4i
Dalmatian Pelican *Pelecanus crispus*	NT	winter	2000-2007	9-107 individuals	A1, A4i
Great White Pelican *Pelecanus onocrotalus*	LC	passage	1997-2007	38-400 individuals	A4i
Pygmy Cormorant *Microcarbo pygmaeus*	LC	winter	1997-2007	500-2,500 individuals	A4i
Great Cormorant *Phalacrocorax carbo*	LC	resident	2000-2007	1,551-7,076 individuals	A4i
Brown-necked Raven *Corvus ruficollis*	LC	breeding	1997-2007	max 8 individuals	A3
Great Tit *Parus major*	LC	resident	1997-2007	92 individuals	A3
Streaked Scrub-warbler *Scotocerca inquieta*	LC	resident	1997-2002	13 individuals	A3
Asian Desert Warbler *Curruca nana*	LC	breeding	1997-2002	57 individuals	A3
Desert Finch *Rhodospiza obsoleta*	LC	breeding	2007	145 individuals	A3
Red-headed Bunting *Emberiza bruniceps*	LC	breeding	1997-2002	60 individuals	A3
A4iii *Species group - waterbirds*	n/a	winter	2000-2007	24,782-192,658 individuals	A4iii

1. The current IUCN Red List category. The category at the time of the IBA criteria assessment (2008) may differ.

BirdLife International (2024) Important Bird Area factsheet: Northern shore of Aydarkul Lake. Downloaded from https://datazone.birdlife.org/site/factsheet/northern-shore-of-aydarkul-lake-iba-uzbekistan on 08/08/2024.

Nuratau Range Conservation Area is of note as records of White-headed Duck, Asian Houbara, and Dalmatian Pelican are all listed as trigger species; all of which will be assessed.

Further details will be discussed in the assessment and analysis portion of the report where data of the IBAs/KBAs are utilized in the decision-making process of determining criticality. This section serves to provide an overview only.

4.2 Approach to CHA

The CHA was undertaken in accordance with the methodology outlined in preceding sections. We have separated the analysis narrative by taxa instead of by criteria because both CH and SBV criteria have been examined.

Criteria pertaining to ecosystems, key evolutionary processes, and ecosystem function are not mentioned in the subsequent sections, as the CHA Screening did not find any potential features/elements that needed to be further investigated (no habitats/ecosystems on the Red List or otherwise considered as extremely sensitive).

5 ASSESSMENT

The CHA was undertaken in accordance with the methodology outlined in preceding sections. We have separated the analysis narrative by taxa instead of by criteria because both CH criteria have been examined.

Criteria pertaining to ecosystems, key evolutionary processes, and ecosystem function are not mentioned in the subsequent sections, as the CHA Screening did not find any potential features/elements that needed to be further investigated (no habitats/ecosystems on the Red List or otherwise considered as extremely sensitive).