

Environmental and Social Impact Assessment

PUBLIC

Project Number: 57342-001
Draft
December 2023

Uzbekistan: Kungrad 1 Wind Power BESS Project

PART 3

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

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11. BIODIVERSITY

This section provides an assessment of baseline conditions within the Project site and surrounds in relation to biodiversity. The section then presents an assessment of potential impacts during the various Project phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

11.1 Assessment of Baseline Conditions

11.1.1 Standards and Regulatory Requirements

(i) National Requirements

The management of protected areas in the RUz depends on different bodies, from the Cabinet of Ministers at national level to regional and local authorities. The main institutions responsible of managing these sites and for protection nature resources, biodiversity and hunting are:

- Ministry of Ecology, Environmental Protection, and Climate Change¹⁰;
- Department of Protection of Water, Land Resources and Subsoil under the Ministry;
- Department of Biodiversity and Protected Areas under the Ministry;
- Department for Monitoring the Implementation of Forest Legislation Requirements under the State Forestry Committee;
- Ministry of Water Resources;
- The State Committee on Geology and Mineral Resources; and
- Regional administrations (“Khokimiyat”).

Protected areas fall under the law “On Natural Protected Areas” (updated 2014) that follow the IUCN classification of Protected Areas Management (IUCN 1994); these account for a total 10,634,666 ha. There are 7 types of Protected Areas under Uzbekistan law, as follows:

- State Sanctuary;
- Complex (landscape) Reserves;
- Natural Parks;
- State Natural Monuments;
- Territories for the preservation, reproduction and restoration of individual natural objects and complexes;
- Protected Landscape; and
- Territories for the management of individual natural resources.

¹⁰ As noted earlier this was previously known as State Committee on Ecology and Environmental Protection (SCEEP)

(ii) Lender Requirements

European Bank for Reconstruction and Development (EBRD)

EBRD PR6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources establishes general requirements for the conservation of biodiversity and sustainable management of living natural resources covering aspects such as the assessment of issues and impacts on biodiversity.

Where applicable the Project will follow the EBRD's E&S Eligibility Criteria for Onshore Wind Power Projects which includes targets set out by the EU Biodiversity Strategy including the Habitats Directive (92/43/ECC), the Birds Directive (2009/147/EC), the Bern Convention (June 1973) and the EU Regulation on Invasive Alien Species (1143/2014).

The Birds Directive (2009/147/EC)¹¹

Often migratory, wild bird species can only be protected by cooperating across borders. Urban sprawl and transport networks have fragmented and reduced their habitats, intensive agriculture, forestry, fisheries and the use of pesticides have diminished their food supplies, and hunting needs to be regulated in order not to damage populations. Concerned with their decline, Member States unanimously adopted the Directive 79/409/EEC in April 1979. It is the oldest piece of EU legislation on the environment and one of its cornerstones. Amended in 2009, it became the Directive 2009/147/EC PDF.

Habitat loss and degradation are the most serious threats to the conservation of wild birds. The Directive therefore places great emphasis on the protection of habitats for endangered and migratory species. It establishes a network of Special Protection Areas (SPAs) including all the most suitable territories for these species. Since 1994, all SPAs are included in the Natura 2000 ecological network, set up under the Habitats Directive 92/43/EEC.

500 wild bird species across Europe are protected under the five annexes to the Birds Directive as explained in the table below.

Table 26: Annexes to the EU Birds Directive

Annex	Explanation
I	194 species and sub-species are particularly threatened. Member States must designate Special Protection Areas (SPAs) for their survival and all migratory bird species.
II	82 bird species can be hunted. However, the hunting periods are limited and hunting is forbidden when birds are at their most vulnerable: during their return migration to nesting areas, reproduction and the raising of their chicks.
III	Overall, activities that directly threaten birds, such as their deliberate killing, capture or trade, or the destruction of their nests, are banned. With certain restrictions, Member States can allow some of these activities for 26 species listed here.
IV	The directive provides for the sustainable management of hunting but Member States must outlaw all forms of non-selective and large scale killing of birds, especially the methods listed in this annex.
V	The directive promotes research to underpin the protection, management and use of all species of birds covered by the Directive, which are listed in this annex.

The Habitats Directive (92/43/EEC)¹²

Adopted in 1992, the Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora aims to promote the maintenance of biodiversity, taking account of economic,

¹¹ Source: http://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm

¹² Source: http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm

social, cultural and regional requirements. It forms the cornerstone of Europe's nature conservation policy with the Birds Directive and establishes the EU wide Natura 2000 ecological network of protected areas, safeguarded against potentially damaging developments.

Annex I list 233 European natural habitat types, including 71 priorities (*i.e.* habitat types in danger of disappearance and whose natural range mainly falls within the territory of the European Union).

All in all, over 1,000 animal and plant species, as well as 200 habitat types, listed in the directive's annexes are protected in various ways:

Annex II species (about 900): core areas of their habitat are designated as sites of Community importance (SCIs) and included in the Natura 2000 network. These sites must be managed in accordance with the ecological needs of the species.

Annex IV species (over 400, including many annex II species): a strict protection regime must be applied across their entire natural range within the EU, both within and outside Natura 2000 sites.

Annex V species (over 90): Member States must ensure that their exploitation and taking in the wild is compatible with maintaining them in a favorable conservation status.

Definition of EBRD Critical Habitat and Priority Biodiversity Features

PR6 defines critical habitat and priority biodiversity features as:

Critical Habitat:

The most sensitive biodiversity features; which comprise one of the following:

- Highly threatened or unique ecosystems;
- Habitats of significant importance to endangered or critically endangered species;
- Habitats of significant importance to endemic or geographically restricted species;
- Habitats supporting globally significant migratory or congregatory species;
- Areas associated with key evolutionary processes; or
- Ecological functions that are vital to maintaining the viability of biodiversity features described in this paragraph

Priority Biodiversity Features (PBF):

This concept replaces the previous definition of natural habitat and encompasses a sub-set of biodiversity that is particularly irreplaceable or vulnerable, but at a lower priority level than critical habitats; which include

- Threatened habitats;
- Vulnerable species;
- Significant biodiversity features identified by a broad set of stakeholders or governments (such as Key Biodiversity Areas or Important Bird Areas); and
- Ecological structure and functions needed to maintain the viability of priority biodiversity features.

The criteria for the determination of Critical Habitat Features and those defined as Priority Biodiversity Features are shown in the table below.

Table 27: Criteria and Conditions for Identifying Critical Habitats and Priority Biodiversity Features*

Criterion	Priority Biodiversity Feature	Critical Habitat
1. Priority ecosystems		
<i>Threatened ecosystems</i> (a) Habitats listed in Annex 1 of EU Habitats Directive (EU members only) or Resolution 4 of Bern Convention (signatory nations only) (b) IUCN Red-List EN or CR ecosystems	(PR6 para. 12-i) (a) EAAA is habitat type listed in Annex 1 of EU Habitats Directive or Resolution 4 of Bern Convention (b) EAAA** < 5% of the global extent of an <i>ecosystem</i> type with IUCN status of CR or EN	(PR6 para. 14-i) (a) EAAA is habitat type listed in Annex 1 of EU Habitats Directive marked as “priority habitat type” (b) EAAA ≥5% of global extent of an ecosystem type with IUCN status of CR or EN (c) EAAA is ecosystem determined to be of high priority for conservation by national systematic conservation planning
2. Priority Species and their Habitats		
<i>Threatened species</i> (a) Species and their habitats listed in EU Habitats Directive and Birds Directive (EU members only) or Bern Convention (signatory nations only) (b) IUCN Red List EN or CR species (c) IUCN Red List VU species (d) Nationally or regionally (e.g., Europe) listed EN or CR species	(PR6 para. 12-ii) (a) EAAA for species and their habitats listed in Annex II of Habitats Directive, Annex I of Birds Directive, or Resolution 6 of Bern Convention (b) EAAA supports < 0.5% of global population OR < 5 reproductive units of a CR or EN species. (c) EAAA supports VU species (d) EAAA for regularly occurring nationally or regionally listed EN or CR species	(PR6 para. 14-ii) (a) EAAA for species and their habitats listed in Annex IV of the Habitats Directive (See EU restrictions) (b) EAAA supports ≥ 0.5% of the global population AND ≥ 5 reproductive units of a CR or EN species (c) EAAA supports globally significant population of VU species necessary to prevent a change of IUCN Red List status to EN or CR, and satisfies threshold (b) (d) EAAA for important concentrations of a nationally or regionally listed EN or CR species
<i>Range-restricted species</i>	(PR6 para 12-ii) (a) EAAA for regularly occurring range-restricted species	(PR6 para. 14-iii) (a) EAAA regularly holds ≥ 10% of global population AND ≥ 10 reproductive units of the species***
<i>Migratory and congregatory species</i>	(PR6 para 12-ii) (a) EAAA identified per Birds Directive or recognized national or international process as important for migratory birds (esp. wetlands)	(PR6 para. 14-iv) (a) EAAA sustains, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population at any point of the species’ lifecycle (b) EAAA predictably supports ≥10 percent of global population during periods of environmental stress

*Quantitative thresholds derived from IUCN Key Biodiversity Area Standard and aligned with International Finance Corporation’s (IFC) Guidance Note 6 (rev. 2019)

**EAAA = *ecologically appropriate area of analysis*, as defined above

***The IUCN Key Biodiversity Areas standard cites the following definition for reproductive unit: “the minimum number and combination of mature individuals necessary to trigger a successful reproductive event at a site. Examples of five reproductive units include five pairs, five reproducing females in one harem, and five reproductive individuals of a plant species.”

International Finance Corporation (IFC)

The biodiversity section of this ESIA also follows the IFC PS6 (2012) and associated Guidance Note (GN6 published on January 1, 2012 and last updated June 14, 2021) on biodiversity conservation and sustainable management of living natural resources.

The IFC PS6 main objectives are:

- To protect and conserve biodiversity
- To maintain the benefits from ecosystem services
- To promote the sustainable management of living natural resources through the adoption of practices that integrates conservation needs and development priorities

IFC PS6 requires that a conservation value is allocated to the ecological features (protected areas, habitats and species) which are likely to be directly or indirectly impacted in the Project Area of Influence (AOI). Under the IFC guidance, the requirements of PS6 apply to projects in all habitats, whether or not those habitats have been previously disturbed and whether or not they are legally protected. Specifically, a project is required to:

- Assess significance of project impacts on all levels of biodiversity as an integral part of the social and environmental assessment process
- Take into account differing values attached to biodiversity by specific stakeholders
- Assess major threats to biodiversity, especially habitat destruction and invasive alien species

In accordance with IFC PS6, habitats are divided into modified, natural and critical habitats. Critical habitats can be either modified or natural habitats supporting high biodiversity value, including:

- Habitat of significant importance to critically endangered and/or endangered species (International Union for Conservation of Nature and Natural Resources (IUCN) Red List)
- Habitat of significant importance to endemic and/or restricted-range species
- Habitat supporting globally significant concentrations of migratory species and/or congregatory species
- Highly threatened and/or unique ecosystems
- Areas associated with key evolutionary processes

Since habitat destruction is recognized as a major threat to the maintenance of biodiversity and to assess likely significance of impacts, IFC PS6 requires the following depending on habitat status:

Modified Habitat: exercise care to minimize any conversion or degradation of such habitat, depending on scale of project, identify opportunities to enhance habitat and protect and conserve biodiversity as part of operations.

Natural Habitat: developer will not significantly convert or degrade such habitat unless no financial/technical feasible alternatives exist, or overall benefits outweigh cost (including those to biodiversity), and conversion or degradation is suitably mitigated. Mitigation must achieve no net loss of biodiversity where feasible; offset losses through creation of ecologically comparable area that is managed for biodiversity, compensation of direct users of biodiversity.

Critical Habitat: in areas of critical habitat the developer will not implement project activities unless there are no measurable adverse impacts on the ability of the critical habitat to support established populations of species described or on the functions of the critical habitat; no reduction in population of a recognized critically endangered or endangered species and lesser impacts mitigated as per natural habitats.

IUCN Red List of Threatened Species¹³

The IUCN Red List of Threatened Species is the world's most comprehensive information source on the extinction risk of animals, fungi and plants. Assessors place species into one of the IUCN Red List Categories, based on a series of assessment criteria. For each species, The IUCN Red List provides information about its range, population size, habitat and ecology, use and/or trade, threats and conservation actions. The IUCN Red List Categories indicate how close a species is to becoming extinct.

Species are assessed against five criteria based on geographic range, population size and population decline/increase, in addition to extinction probability analyses. These criteria determine which category is most appropriate for the species.

Species in the Vulnerable, Endangered and Critically Endangered categories are collectively described as 'threatened'. The IUCN Red List does not include Not Evaluated species. Critically Endangered species may also be tagged as Possibly Extinct or Possibly Extinct in the Wild.

11.1.2 Critical Habitat Assessment

(i) Introduction

'Critical Habitat' is a concept applicable to several international financial lending institutions, designed to enable the identification of areas of high biodiversity value in which development would be particularly sensitive and require special attention. The concept has been developed in consultation with numerous international conservation organizations and thus takes into account many pre-existing conservation approaches, such as Key Biodiversity Areas, Important Bird Areas, and Alliance for Zero Extinction Sites.

The concept is further defined in the following documents:

- EBRD PR6 Biodiversity Conservation and Sustainable Management of Living Natural Resources
- IFC PS 6 on Biodiversity Conservation and Sustainable Management of Living Resources.
- Asian Development Bank (ADB) Safeguard Policy Statement (SPS) 2009, ADB Environment Safeguards A Good Practice Sourcebook Draft Working Document

¹³ <https://www.iucnredlist.org/>

- A number of multilateral banks have policies closely aligned with PS6, and more than 75 private banks signed up to the Equator Principles have an implicit commitment to PS6.

The CHA comprises several steps in order to ensure the process is robust:

- Initial Screening – which involves making stakeholder consultation and/or an initial published and grey literature IUCN Red List of Threatened Species; IFC PS6 GN6 (IFC, 2012); EBRD PR6; Biodiversity Conservation and Sustainable Management of Living Natural Resources Guidance Note (EBRD 2022) and; World Database of Key Biodiversity Areas.
- Establishment of baseline which includes field data collection and verification of available information e.g. Habitat Survey; Bird Survey; Bat Survey; Invertebrate Survey; Reptile Survey.
- Critical habitat determination:
 - a) Identification of appropriate scale for assessment
 - b) Determination of Ecologically Appropriate Area of Analysis.
 - c) Assessment against Critical Habitat criteria.

(ii) Literature Review and Stakeholder Consultation

The Critical Habitat Assessment was based on existing literature in addition to global and regional datasets, including Integrated Biodiversity Assessment Tool (IBAT, 2020). All species classified as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) in the IUCN Red List have been screened within the CHA, as well as those species considered to be endemic, near-endemic or range restricted and those of elevated in-country conservation status (e.g. UzRDB CR or EN Species).

The assessment has been conducted using the best recent and available information at the time of its production and the full results of the Critical Habitat Screening and Assessment are included as a standalone document – **Kungrad 1.5GW Wind Farm Critical Habitat Assessment (CHA)**.

(iii) Scale of Assessment

A Critical Habitat Assessment is usually carried out at a landscape scale, using Ecologically Appropriate Areas of Analysis (EAAA) for determining the presence or absence of Critical Habitat qualifying features under PS6 Criteria 1 – 3 and PR6 Criterion 2 – Priority Species and their Habitats. They are identified at a landscape scale, considering large-scale ecological processes where appropriate, and can therefore be much larger than the project concession or lease area itself. The principles of determination of EAAA only apply to terrestrial areas and cannot be applied to airspace above a site unless it is associated directly with the utilization of a terrestrial habitat.

The Critical Habitat Assessment (CHA) methodology described in IFC’s Guidance Note 6 heavily draws on the IUCN’s Key Biodiversity Area (KBA) Standard, which focuses on geographic areas of land and water that are amenable to site-based conservation. It is for this reason that, for birds, the CHA methodology can be readily applied to terrestrial and water areas, such as stopover points and breeding grounds where concentrations of birds are dependent on the conservation of the habitat at these areas. Considering the airspace in a CHA is more challenging.

Birds utilizing important terrestrial areas will naturally also use the airspace above and around it. Under certain circumstances, this airspace should be considered as part of the habitat and part of the EAAA of a CHA.

Using this approach, a CHA would not be conducted with respect to the airspace where there is no associated important terrestrial area used by birds (or concentrations of them) and no intersection with the Project footprint, which will often be the case for long-distance migrants using high altitude airspace between continents or countries. In this scenario, it would be difficult or impossible to delineate the airspace EAAA at this large scale, recalling that “critical habitat boundaries should be equivalent in scale to areas mapped for practical site-based conservation management activities” PS6 GN59). Without an EAAA, the Critical Habitats thresholds cannot be applied. It is also important to note that the location of a project within a recognized bird migratory corridor (flyway) does not automatically generate high collision risk, not trigger CH determination, because most bird migration activity occurs in a diffuse “broad front” pattern, and recognized bird migration corridors are as ubiquitous as bird migration activity itself, and collectively covers most terrestrial land areas. The migratory/congregatory species criterion described in the CHA sections of IFC PS6 and EBRD PR6 is intended to trigger CH determination only in areas that host continentally significant concentrations of migratory activity. In many cases, these sites have already been designated as IBAs based on the KBA criteria and thresholds¹⁴.

(iv) Outcome of Critical Habitat Assessment

The Critical Habitats Screening and, where relevant, subsequent Assessment has been completed for all species returned on the IBAT Search as being listed by the IUCN as Critically Endangered, Endangered or Vulnerable within 50km of the Project AoI as well as on other species identified as being present within the AoI as a result of on-site surveys.

Range-restricted that are not of international conservation concern have been discounted from the Critical Habitats Assessment, as they are considered to be very unlikely present within the AoI or the habitats in which they are found will not be impacted by the proposals.

Critical Habitat has been triggered for White-headed Duck as a result of the EAAA supporting a significant proportion of the global population of this IUCN Endangered species and whilst the Project will not affect any areas of terrestrial habitats (e.g. lakes) it is considered likely that this species will regularly move across the Project AoI. Critical Habitat has also been determined for MacQueen’s Bustard as a significant proportion of the global population of this species are likely to be utilizing the airspace occupied by the Project (OHTL).

There are also a number of other species that are considered to be PBF species and these are detailed in further in this Chapter.

The Project will therefore need to develop a Biodiversity Action Plan which will include all relevant species mitigation included within the ESIA to ensure No Net Loss to these valued ecological receptors as well as Net Gain for White-headed Duck. All mitigation and monitoring, included in the ESIA will also be included in the Biodiversity Action Plan which will include a robust Adaptive Management Strategy should the results of monitoring indicate a significant impact on species of conservation concern.

With appropriate mitigation it is highly unlikely that the Project will result in impacts on White-headed Duck and therefore, at this stage off-sets for this species may not be required. The BAP will however include potential off-set measures to be undertaken if any impacts are identified in order that the Project results in a Net Gain to this CH species. It is however likely that even with mitigations applied off-sets will be required to achieve No Net Loss of MacQueen’s Bustard as industry standard mitigations have been shown to be largely ineffective for this species and significant residual negative impacts will remain.

¹⁴ *Memorandum Determining Biodiversity Management Requirements Related to Airspace around Wind Energy Facilities (EBRD, June 2023)*

The Biodiversity Action Plan will also include a robust Biodiversity Monitoring Evaluation Plan (BMEP) and this will include details of Post Construction Fatality Monitoring, which will be based on the latest EBRD Handbook for such post-construction studies.

No habitats, plant, reptile or invertebrate species were recorded that are of significant international or national conservation concern (CR or EN) nor are they considered to be present within the Project Aol. IUCN Vulnerable species are present (e.g. Central Asian Tortoise) however predicted impacts are not such that unmitigated they would result in a change of conservation status to IUCN CR or EN.

Of the mammals recorded two species are listed on the UzRDB as Critically Endangered (Caracal and Honey Badger) however both are listed by the IUCN of being Least Concern globally. In addition, the thresholds for conservation status for species included in the UzRDB are not aligned with the IUCN criteria and as such neither species was screened within the CHA.

Critical Habitat Assessment was undertaken in line with GIIP and relevant guidance notes.

11.1.3 Stakeholder Consultation and Engagement Activities

Stakeholder consultation and engagement activities were undertaken with the following entities in specific.

- Ministry of Ecology, Environmental Protection and Climate Change of the Republic of Karakalpakstan
- Uzbekistan Society for the Protection of Birds / Main Office Uzbekistan and Karakalpakstan Branch
- Birdlife International (response outstanding)

In addition, a workshop was held on 24 August 2023 in Tashkent for key biodiversity experts and specialists and which included the following:

- Institute of Zoology to include but not limited to the following departments: (i) Laboratory of Vertebrate Animals; (ii) Laboratory of Entomology; and (iii) Laboratory of Accounting and Cadaster of Endangered Species
- Parliament of the Republic of Karakalpakstan (*Jokari Kenes*)
- Ministry of Ecology, Environmental Protection and Climate Change of the Republic of Uzbekistan to include the following departments:
 - Department of Protected Areas
 - Biodiversity Department
 - Cadaster Department
 - Centre for State Ecological Expertise
- Department for Protected Areas of the State Committee of the Republic of Uzbekistan for Forestry
- Uzbekistan Society for the Protection of Birds (including Karakalpakstan branch)
- Falcon Hunting Solution LLC
- International Fund for Houbara Conservation in Abu Dhabi (OAE)

The outcomes of the consultation were presented in “Section 6.3.1 and 6.3.2” earlier and were considered throughout assessment.

11.1.4 Ecological Impact Assessment Methodology

(i) Ecological Area of Influence

The Ecological Area of Influence (Aoi) was determined to include the areas directly and permanently affected by the Project and areas which will be temporarily affected during construction as follows:

- Project Area which encompasses the whole of the Wind Farm territory and at least 500m buffer around the proposed turbines;
- Access Road from Kirkkiz, which is approximately 100km from the nearest surfaced road to the Project site;
- Internal site roads, internal MV buried transmission lines and communication;
- Internal site facilities including permanent structures such as site offices, sub-stations as well as temporary laydown areas and site worker accommodation;
- The total Aoi of the Wind Farm is 950 km²; and
- An OHTL is planned in order to export generated energy to the National Grid. The OHTL is being considered under a separate chapter of this ESIA. All medium-volt transmission lines within the wind farm Aoi to export generated power to on-site sub-stations will be buried along with communication cables. Therefore, the Aoi will not support OHTL and impacts (construction and operation) associated with OHTL are not discussed in this document.
- It is possible that the Project (WF and OHTL) could affect a much larger area than the ‘Aois’ due to interruption of migration patterns or could affect populations of birds that breed and winter outside of the Aois as a result of mortality with active turbines or with the OHTL whilst on annual migrations.

The assessment of impacts on valued ecological receptors follows the methodology as set out in “Section 3.4” of this ESIA. The sensitivity of the identified valued ecological receptors has been determined by the parameters as set out in the table below.

Table 28: Criteria for Determining the Sensitivity of Valued Ecological Receptors

Conservation Value (Sensitivity)	Species Criteria	Habitat or Site Criteria
High	IUCN Critically endangered, endangered and Vulnerable species. UzRDB Critically Endangered or Endangered species Nationally protected species of significant population size and importance. Local endemic flora species Bird species with elevated conservation concern; species with declining local population; breeding residents.	Internationally designated sites (or equal status). Nationally designated sites (or equal status). Critical habitats of significant international or national ecological importance.

Medium	IUCN Near Threatened species. Nationally protected species or rare species, but not a significant population size and not of national importance. Regional endemic flora species	Regionally important natural habitats. Priority habitats listed under Annex I of the Habitats Directive. Natural or Modified habitats with high biodiversity or under significant threat of loss within the region.
Low	IUCN Least Concern. Widespread species Non-breeding and non-resident bird species	Undesignated sites and habitats of natural habitats of some local biodiversity and cultural heritage interest. Modified habitats with limited ecological value. Other sites with little or no local biodiversity and cultural interest. Modified habitats with limited biodiversity value.
Negligible	Species of no national importance / no relevance to the site	Highly modified habitats of no biodiversity value.

11.1.5 Baseline Conditions

(i) Desktop Review

IBAT Search - Protected Areas

The location of Protected Areas within 50 km of the site boundary were taken from a search of the Integrated Biodiversity Assessment Tool (IBAT) database. The results of the search are as follows:

- Protected Areas
 - South Ustyurt National Nature Park
- Sites of Biodiversity Importance
 - Northern Part of the Assake-Audan Depression
 - Sarykamysh Lake and Surrounding Ustyurt Plateau 68km from redline, 49km from originally proposed boundary.

South Ustyurt National Nature Park

This protected area is approximately 2 km south of the Project site and is designated for:

- The NNP is legally protected by the Law of the Republic of Uzbekistan on Protected National Territories.
- On November 11, 2020, by Decree of the Cabinet of Ministers of the Republic of Uzbekistan No. 707, the national nature Park (NNP) "Southern Ustyurt" was established, with an area of 1,447,143 hectares. Its creation was approved by the Council of Ministers of the Republic of Karakalpakstan, the State Committee of Ecology of the Republic and the Forest State Committee of the Republic of Uzbekistan.
- The National Park was created preserve the biodiversity of the region's unique Ustyurt plateau, which is considered a critical habitat for over 700 species of plants and 300 species of vertebrates, including the Critically Endangered Saiga Antelope, which according to the IUCN Red List has a decreasing population trend.

- As discussed in “Section 6.3.1” initially the State Committee required a 10km setback distance from the Park. However, during the workshop undertaken by the ‘E&S Team’ with various biodiversity experts (refer to Section 6.3.2) where site specific data was presented, it was agreed that this setback distance will be reduced to be based on existing international standards and best practice (around 2-3km). This is expected to be confirmed through a formal letter from the Ministry of Ecology, Environmental Protection and Climate Change.

Northern Part of the Assake-Audan Depression¹⁵

This site is also included as an Important Bird Area and is approximately 48 km south-west of the Project site. The IBA is located in the south of the Karakalpak Ustyurt in the Assake-Audan depression. There are several artesian wells with brackish water in the depression along with dense thickets of Common Reed (*Phragmites australis*) and Tamarisk (*Tamarisk sp.*) around these wells. The IBA includes part of the depression and the adjoining highlands in the north and north-west with Haloxylon forests.

Key biodiversity of the IBA is not accurately known due to the difficulties in accessing the site. The Assake-Audan depression is however known to be a stop-over for many species passing through the Ustyurt Plateau and it likely to be a staging post for birds of several intersecting flyways. The presence of species within the IBA is highly dependent on the availability of water. Two days of IBA fieldwork in 2007 recorded Grey Heron (*Ardea cinerea*), Eurasian Sparrowhawk (*Accipiter nisus*), Hen Harrier (*Circus cyaneus*), Water Rail (*Rallus aquaticus*), Lesser Short-toed Lark (*Calandrella rufescens*) subsequently split in to Turkestan Short-toed Lark, (*Alaudala heinei*), Barn Swallow (*Hirundo rustica*), White Wagtail (*Motacilla alba*), Bluethroat (*Luscinia svecica*), Cetti’s Warbler (*Cettia cetti*), Lesser Whitethroat (*Sylvia curruca*), Common Chiffchaff (*Phylloscopus collybita*), Common Chaffinch (*Fringilla coelebs*), Brambling (*Fringilla montifringilla*), Desert Finch (*Rhodospiza obsoletus*), House Sparrow (*Passer domesticus*), Common Starling (*Sturnus vulgaris*), Red-headed Bunting (*Emberiza bruniceps*) and Rook (*Corvus frugilegus*). The remains of a dead gull were also found.

Table 29: Populations of IBA Trigger Species

Species		IUCN Category	Season	Year(s) of Estimate	Population at Site	IBA Criteria Triggered
Common Name	Scientific Name					
Pallas’s Sandgrouse	<i>Syrrhaptes paradoxus</i>	LC	Breeding	2007	10 – 15 inds	A3
MacQueen’s Bustard ¹⁶	<i>Chlamydotis macqueenii</i>	VU	Breeding	2007	2 – 4 inds	A3
Saker Falcon	<i>Falco cherrug</i>	EN	Breeding	2007	2 – 4 inds	A1
Turkestan Ground Jay	<i>Podoces panderi</i>	LC	Breeding	1937 – 2007	3 – 6 inds	A3
Brown-necked Raven	<i>Corvus ruficollis</i>	LC	Breeding	2007	2 – 4 inds	A3
Asian Desert Warbler	<i>Curruca nana</i>	LC	Breeding	2007	20 – 40 inds	A3
Desert Finch	<i>Rhodospiza obsoletus</i>	LC	Breeding	2007	10 – 50 inds	A3
Red-headed Bunting	<i>Emberiza bruniceps</i>	LC	Breeding	2007	15 – 30 inds	A3

¹⁵ BirdLife International (2023) Important Bird Area factsheet: Northern part of the Assake-Audan depression. Downloaded from <http://datazone.birdlife.org/site/factsheet/22283> on 12/06/2023.

¹⁶ MacQueens Bustard will be used throughout this report for this species and it will not be referred to as Asian Houbara or Houbara Bustard.

The mammal fauna present within the IBA is very similar to that of the Ustyurt. Typical species are likely to include Urial (*Ovis vignei*) (IUCN: VU and UzRDB:CR), which was present in 1956, Goitered Gazelle (*Gazella subgutturosa*) (IUCN: VU and UzRDB:VU), Saiga Antelope (*Saiga tatarica*) (IUCN: CR and UzRDB:CR although considered likely extirpated from much of their previous range) and Central Asian Tortoise (*Testudo horsfieldii*) (IUCN:VU and UzRDB:VU). Two plant species are also present which are included in the National Red Book. These are *Malocarpus crithmifolius* and *Euphortia sclerocyathium*.

During the 2023 site visit completed by Turnstone Ecology, a site visit to the Assake-Audan Depression, where the northern shore of the depression was surveyed on the 24th April 2023. During the site visit it was noted that the main area of the depression was largely dry however a well / spring was located, around which was thick vegetation including Common Reed and Tamarisk. The footprints and scats of Grey Wolf (*Canis lupus*) were recorded along with a dead Brandt’s Hedgehog (*Hemiechinus hypomelas*) (IUCN LC and UzRDB:NT) and Central Asian Tortoise (IUCN:VU and UzRBD:VU). The following bird species were recorded around the small area of open water and associated vegetation included; Common Kestrel (*Falco tinnunculus*), Red-necked Phalarope (*Phalaropus lobatus*), Wood Sandpiper (*Tringa glareola*), Green Sandpiper (*Tringa ochropus*), Little-ringed Plover (*Charadrius dubius*), Black-winged Stilt (*Himantopus himantopus*), Bluethroat, Citrine Wagtail (*Motacilla citreola*) and Western Yellow Wagtail (*Motacilla flava*).

Sarykamys Lake and Surrounding Ustyurt Plateau¹⁷

This site is also included as an IBA and is approximately 68 km to the south of the redline site boundary (this site was previously 49 km from the original site boundary (see “Section 4.1.1” for Project Alternatives) and was therefore included in the data search area. The IBA includes Sarykamys Lake, the Ustyurt Plateau and the Eastern Cliffs (Chink) of Ustyurt. The lake is a closed brackish lake located in the central part of the Sarykamys depression about halfway between the Caspian and Aral seas. It is a cross-border site and the Turkmen portion of the lake is also designated as an IBA. The deep northern part of the lake belongs to Uzbekistan and the remainder to Turkmenistan. It is one of the largest water bodies in Central Asia. The Eastern Cliffs of Ustyurt are located along the east and north-eastern shores of the lake and are of special importance for breeding birds of prey including Egyptian Vulture (*Neophron percnopterus*) and Saker Falcon (*Falco cherrug*). The lake has been rarely surveyed so there is not much data available however it is known to support, or has previously supported, breeding MacQueen’s Bustard (*Chlamydotis macqueenii*) and Pin-tailed Sandgrouse (*Pterocles alchata*). Since 2007 three short surveys (spring 2007 and summer and autumn 2010) have been undertaken and 108 species of birds were recorded.

Table 30: Populations of IBA Trigger Species

Species		IUCN Category	Season	Year(s) of Estimate	Population at Site	IBA Criteria Triggered
Common Name	Scientific Name					
White-headed Duck	<i>Oxyura leucocephala</i>	EN	Passage	2010	2 inds	A1
Common Goldeneye	<i>Bucephala clangula</i>	LC	Passage	2010	95 – 595 inds	A4i
Egyptian Vulture	<i>Neophron percnopterus</i>	EN	Passage	2010	2 breeding pairs	A1

During the Turnstone Ecology site visit this IBA was visited on the 24th and 25th April 2023, with the western shores visited on the 24th and the northern and eastern shores, including the Chinks on the 25th. Shorebirds were very abundant around the margins of the lake and species recorded included passage flocks of Red-necked Phalarope, Little Stint (*Calidris minuta*), Dunlin (*Calidris alpina*), Common Ringed

¹⁷ BirdLife International (2023) Important Bird Area factsheet: Sarykamys lake and surrounding Ustyurt Plateau. Downloaded from <http://datazone.birdlife.org/site/factsheet/29791> on 20/06/2023.

Plover (*Charadrius hiaticula*) and Curlew (*Numenius arquata*) along with gulls and terns. Along the northern and eastern shores, a nest of a Golden Eagle (*Aquila chrysaetos*) and Egyptian Vulture were recorded along with an individual Steppe Eagle (*Aquila nipalensis*). A possible nest of Saker Falcon was also noted as well as individual European Roller (*Coracias garrulus*).

Species of Conservation Concern

The table below shows the species of global conservation concern (IUCN Critically Endangered, Endangered and Vulnerable) considered to be present within the 50 km IBAT search area.

Table 31: Species of Global Conservation Concern

Species		IUCN Category
Common Name	Scientific Name	
Saiga	<i>Saiga tatarica</i>	CR
Sociable Lapwing	<i>Vanellus gregarius</i>	CR
White-headed Duck	<i>Oxyura leucocephala</i>	EN
Pallas's Fish-eagle	<i>Haliaeetus leucoryphus</i>	EN
Egyptian Vulture	<i>Neophron percnopterus</i>	EN
Saker Falcon	<i>Falco cherrug</i>	EN
Eurasian Carp	<i>Cyprinus carpio</i>	VU
Depressed River Mussel	<i>Pseudanodonta complanata</i>	VU
Bulatmai Barbel	<i>Luciobarbus capito</i>	VU
Lesser White-fronted Goose	<i>Anser erythropus</i>	VU
Yellow-eyed Pigeon	<i>Columba eversmanni</i>	VU
Greater Spotted Eagle	<i>Clanga clanga</i>	VU
Eastern Imperial Eagle	<i>Aquila heliaca</i>	VU
Cheetah	<i>Acinonyx jubatus</i>	VU
Goitered Gazelle	<i>Gazella subgutturosa</i>	VU
Marbled Polecat	<i>Vormela peregusna</i>	VU
European Turtle Dove	<i>Streptopelia turtur</i>	VU
Great Bustard	<i>Otis tarda</i>	VU
MacQueen's Bustard	<i>Chlamydotis macqueenii</i>	VU
Urial	<i>Ovis vignei</i>	VU

(ii) Scoping Site Visit

In April 2023 the 'E&S Team' and particularly Turnstone Ecology completed a 14-day Scoping Visit to the Project Aol as well as visiting the adjacent Sudoche Lake, Northern Part of the Assake-Audan Depression IBA and Sarykamysh Lake IBA.

During the Scoping Survey all bird Vantage Points (VPs) were visited and viewsheds verified, static bat detectors were set-up and placed around the site and Turnstone Ecology also undertook training sessions in the use of SM4BAT detectors and data management. All of the selected transects were also driven. Any baseline survey data collected as part of the scoping visit has been used within this assessment.

(iii) Habitats and Flora

Methods

The field surveys to record habitats, flora and vegetation were undertaken over two field visits to the Project Aol completed between 3rd and 7th April 2023 (spring survey) and between June 28th to July 6th 2023 (summer survey) by experienced in-country botanists. A survey protocol was devised by Turnstone Ecology and the surveys consisted of traditional survey transects across the Aol in addition to which the structure of plant communities was studied on 2x2 m sample plots (quadrats). All plant species present within each quadrat were recorded (including their abundance and % of cover), in particular, threatened species, weeds and invasive species. For each sample plot, photographs of the landscape and plants were taken using a digital camera. During the spring surveys a total of 50 quadrat plots were surveyed along with transects across the Aol and in the summer surveys, 81 quadrats were surveyed along with transect surveys.

The vegetation communities were identified on the basis of composition of dominant species in accordance with four-volume “Vegetation cover of Uzbekistan” (1971–1984) and the International Code of Phytosociological Nomenclature (2019).

Herbarium specimens of each plant species present within the Project area were collected and identified in the National Herbarium of Uzbekistan (TASH) using Bresser Advance ICD 10x-160x zoom stereo-microscope and special literature, including “Conspectus Florae Asiae Mediae” (1963–1993), “Flora of Uzbekistan” (1941–1963, 2016, 2017, 2019, 2022), “Flora of USSR” (1934–1964), “An identification guide of vascular plants of the Karakalpakia” (Bondarenko, 1964), “An illustrated identification guide of vascular plants of the Karakalpakia and Xorazm” (Korovina et al., 1982, 1983) and the herbarium collections of TASH, and a summary check-list of the flora was compiled. Species in the checklist are arranged in alphabetic order of their scientific names. Families are given in accordance with the APG system (APG IV, 2016). The accepted scientific names of plant species are given according to the new edition of the “Flora of Uzbekistan” (2016, 2017, 2019, 2022) and global taxonomic databases Plants of the World Online (www.powo.science.kew.org) and Global Biodiversity Information Facility (www.gbif.org), Russian names are given according “Conspectus Florae Asiae Mediae” (1963–1993), English names (if exist) are given according Global Biodiversity Information Facility (www.gbif.org) and the IUCN Red List (www.iucnredlist.org).

Relevant publications and online databases (Nikitin, 1983; IUCN/ISSG, 2014; CABI, 2017; Sennikov et al., 2018) were used for identification of alien species, while the Red Data Book of Uzbekistan (1984, 1998, 2006, 2009, 2019) and the IUCN Red List (www.iucnredlist.org) were used for identification of threatened species. The results of the survey were used to categorize the habitats present as Modified or Natural and a Condition Score was determined based on the parameters set out in the table below. Habitat condition scores will be used to inform net loss / gain calculations.

Table 32: Calculation of Habitat Condition Scores

Habitat	Condition Rating	Condition Score	Summary
Site Definition	Habitat Lost	0.0	Habitat that is irreversibly damaged. For example, by concrete, roads, hard standing quarrying etc. Habitat indicator species are not present
	Very Poor	0.2	Habitat that has been significantly damaged by anthropogenic factors (e.g. agriculture / construction / vehicle). Low number of species present, 10 % of expected coverage for the habitat type present, presence of invasive / non-native species. Habitat indicator species are rare.
	Poor	0.4	Poor quality habitat. Some evidence of anthropogenic factors (e.g. presence of herders or livestock droppings). Low plant species composition and 25% of expected vegetation coverage for the habitat type present. Very low rates of invasive / non-native species. Habitat indicator species are occasional.

Habitat	Condition Rating	Condition Score	Summary
	Moderate	0.6	Habitat is improved from Poor but still not supporting a diverse community of plants and coverage 40 – 60% of the expected vegetation coverage for the habitat type present. Invasive / non-native species absent. Habitat indicator species frequent.
	Good	0.8	Site supports a more diverse community of plants with a good 60 - 80% of the expected vegetation coverage for the habitat type present. Habitat indicator species are abundant.
	Very good	1.0	Represents the best quality habitat in the region. 80 – 100% of the amount of plant cover expected for the habitat type present. Habitat indicator species are dominant.

Dominant, Abundant, Frequent, Occasional and Rare are taken from the DAFOR scale which is a quantitative measurement of the abundance of plant species within the quadrats.

Results

During the spring 2023 surveys a total of eleven plant species were recorded across the Project AoI (check table below) and during the summer 2023 surveys a total of 84 plant species were recorded (check table that follows).

Table 33: Results of Spring 2023 Survey

Species Scientific Name	% plants in studied quadrat	UZB Red book	IUCN list sp
<i>Alyssum turkestanicum</i> Regel & Schmalh.	11,30%	No	No
<i>Astragalus</i> sp.	16,24%	No	No
<i>Anabasis eriopoda</i> (Schrenk) Paulsen	25,03%	No	No
<i>Artemisia terrae-albae</i> Krasch.	48,29%	No	No
<i>Atraphaxis spinosa</i> L.	43,35%	No	No
<i>Caragana grandiflora</i> (M. Bieb.) DC.	13,68%	No	No
<i>Ephedra lomatolepis</i> Schrenk	31,66%	No	No
<i>Eremopyrum bonaepartis</i> (Spreng.) Nevski.	13,77%	No	No
<i>Lagochilus acutilobus</i> (Ledeb.) Fisch. Fisch. & C. A. Mey.	17,59%	No	No
<i>Onosma staminea</i> Ledeb.	10,06%	No	No
<i>Haplophyllum versicolor</i> Fisch. & C.A. Mey.	17,05%	No	No

Table 34: Results of Summer 2023 Survey

Species	Family	life form (habit)	Endemism	number of records (quadrats)	occurrence rate (% of quadrats)	native status	quarantine status	UZB Red book	IUCN Red List	CITES
<i>Aeluropus litoralis</i> (Gouan.) Parl.	Poaceae	perennial		1	1.23	native	no	no	LC	no
<i>Alhagi pseudalhagi</i> (M. Bieb.) Desv	Fabaceae	perennial		3	3.70	native	no	no	no	no
<i>Allium sabulosum</i> Steven ex Bunge	Amaryllidaceae	perennial		2	2.47	native	no	no	no	no
<i>Amberboa turanica</i> Iljin	Asteraceae	annual		1	1.23	native	no	no	no	no
<i>Anabasis cretacea</i> Pall.	Amaranthaceae	subshrub		17	20.99	native	no	no	no	no
<i>Anabasis eriopoda</i> (Schrenk) Paulsen	Amaranthaceae	subshrub		15	18.52	native	no	no	no	no
<i>Arnebia decumbens</i> (Vent.) Coss. & M. Král.	Boraginaceae	annual		1	1.23	native	no	no	no	no
<i>Artemisia terrae-albae</i> Krasch.	Asteraceae	subshrub		55	67.90	native	no	no	no	no
<i>Asparagus breslerianus</i> Schult. & Schult. f.	Asparagaceae	perennial		5	6.17	native	no	no	no	no
<i>Astragalus commixtus</i> Bunge	Fabaceae	annual		6	7.41	native	no	no	no	no
<i>Astragalus erioceras</i> Fisch. & C.A. Mey.	Fabaceae	perennial	endemic to Central Asian deserts	4	4.94	native	no	no	no	no
<i>Atraphaxis spinosa</i> L.	Polygonaceae	shrub		29	35.8	native	no	no	no	no
<i>Atriplex dimorphostegia</i> Kar. & Kir.	Amaranthaceae	annual		2	2.47	native	no	no	no	no
<i>Bassia eriantha</i> (Fisch. & C.A. Mey.) Kuntze	Amaranthaceae	annual		2	2.47	native	no	no	no	no
<i>Bassia prostrata</i> (L.) Beck	Amaranthaceae	subshrub		1	1.23	native	no	no	no	no
<i>Capparis spinosa</i> L.	Capparaceae	perennial		6	7.41	native	no	no	LC	no
<i>Caragana grandiflora</i> (M. Bieb.) DC.	Fabaceae	shrub		1	1.23	native	no	no	no	no
<i>Caroxylon orientale</i> (S.G.Gmel.) Tzvelev	Amaranthaceae	subshrub		30	37.04	native	no	no	no	no
<i>Ceratocarpus arenarius</i> L.	Amaranthaceae	annual		6	7.41	native	no	no	no	no
<i>Chaenorhinum spicatum</i> Korovin ex Popov	Plantaginaceae	annual		1	1.23	native	no	no	no	no
<i>Cithareloma lehmannii</i> Bunge	Brassicaceae	annual		4	4.94	native	no	no	no	no
<i>Cleome fimbriata</i> Vicary	Cleomaceae	annual		1	1.23	native	no	no	no	no
<i>Climacoptera lanata</i> (Pall.) Botsch.	Amaranthaceae	annual		2	2.47	native	no	no	no	no

Species	Family	life form (habit)	Endemism	number of records (quadrats)	occurrence rate (% of quadrats)	native status	quarantine status	UZB Red book	IUCN Red List	CITES
<i>Clypeola jonthlaspi</i> L.	Brassicaceae	annual		4	4.94	native	no	no	no	no
<i>Convolvulus fruticosus</i> Pall.	Convolvulaceae	subshrub		20	24.69	native	no	no	no	no
<i>Cuminum setifolium</i> (Boiss.) Koso-Pol.	Apiaceae	annual		4	4.94	native	no	no	no	no
<i>Cuscuta campestris</i> Yunck.	Convolvulaceae	parasite		1	1.23	alien	quarantine weed	no	no	no
<i>Cuscuta epithimum</i> (L.) L.	Convolvulaceae	parasite		2	2.47	Prob native	quarantine weed	no	no	no
<i>Cynanchum acutum</i> subsp. <i>sibiricum</i> (Willd.) Rech.f.	Apocynaceae	liana, perennial		1	1.23	native	no	no	LC	no
<i>Ephedra distachya</i> L.	Ephedraceae	dwarf shrub		11	13.58	native	no	no	LC	no
<i>Epilasia hemilasia</i> (Bunge) C.B. Clarke	Asteraceae	annual		3	3.70	native	no	no	no	no
<i>Eremopyrum orientale</i> (L.) Jaub. & Spach	Poaceae	annual		30	37.04	native	no	no	no	no
<i>Euphorbia inderiensis</i> Less ex Kar. & Kir.	Euphorbiaceae	annual		1	1.23	native	no	no	no	no
<i>Ferula dubjanskyi</i> Korovin ex Pavlov	Apiaceae	perennial		4	4.94	native	no	no	no	no
<i>Frankenia pulverulenta</i> L.	Frankeniaceae	annual		1	1.23	native	no	no	no	no
<i>Glycyrrhiza triphylla</i> Fisch. & C.A. Mey. (<i>G. erythrocarpa</i> (Vass.) M.N. Abdull.)	Fabaceae	perennial		1	1.23	native	no	no	no	no
<i>Goldbachia pendula</i> Botsch.	Brassicaceae	annual		1	1.23	native	no	no	no	no
<i>Gypsophila diffusa</i> Fisch. & C.A.Mey. ex Rupr.	Caryophyllaceae	perennial		6	7.41	native	no	no	no	no
<i>Halocnemum strobilaceum</i> (Pall.) M. Bieb.	Amaranthaceae	subshrub		38	46.91	native	no	no	no	no
<i>Halothamnus glaucus</i> (M. Bieb.) Botsch.	Amaranthaceae	subshrub		11	13.58	native	no	no	no	no
<i>Haloxylon ammodendron</i> (C.A.Mey.) Bunge ex Fenzl	Amaranthaceae	small tree or shrub		4	4.94	native	no	no	no	no
<i>Haplophyllum bungei</i> Trautv.	Rutaceae	perennial		11	13.58	native	no	no	no	no

Species	Family	life form (habit)	Endemism	number of records (quadrats)	occurrence rate (% of quadrats)	native status	quarantine status	UZB Red book	IUCN Red List	CITES
Haplophyllum ramosissimum (Paulsen) Vved.	Rutaceae	perennial	endemic to Central Asian deserts	9	11.11	native	no	no	no	no
Heteroderis pusilla (Boiss.) Boiss.	Asteraceae	annual		1	1.23	native	no	no	no	no
Hyoscyamus pusillus L.	Solanaceae	annual		10	12.34	native	no	no	no	no
Inula multicaulis Fisch. & C.A. Mey.	Asteraceae	perennial	endemic to Central Asian deserts	10	12.34	native	no	no	no	no
Iris songarica Schrenk ex Fisch. & C.A.Mey.	Iridaceae	perennial		2	2.47	native	no	no	no	no
Jurinea persimilis Iljin	Asteraceae	perennial	endemic to Central Asian deserts	1	1.23	native	no	no	no	no
Karelinia caspia (Pall.) Less.	Asteraceae	perennial		1	1.23	native	no	no	no	no
Lachnoloma lehmannii Bunge	Asteraceae	annual		1	1.23	native	no	no	no	no
Lactuca undulata Ledeb.	Asteraceae	annual		1	1.23	native	no	no	no	no
Lagochilus acutilobus (Ledeb.) Fisch. & C.A.Mey.	Lamiaceae	perennial	endemic to Central Asian deserts	18	22.22	native	no	no	no	no
Lappula semiglabra (Ledeb.) Gürke	Boraginaceae	annual		2	2.47	native	no	no	no	no
Lappula spinocarpos (Forssk.) Asch. ex Kuntze	Boraginaceae	annual		38	46.91	native	no	no	no	no
Limonium suffruticosum (L.) Kuntze	Plumbaginaceae	subshrub		1	1.23	native	no	no	no	no
Lomelosia rhodantha (Kar. & Kir.) Soják (Scabiosa rhodantha Kar. & Kir.)	Caprifoliaceae	annual		2	2.47	native	no	no	no	no
Matthiola tatarica (Pall.) DC.	Brassicaceae	perennial		2	2.47	native	no	no	no	no
Nonea caspica (Willd.) G. Don	Boraginaceae	annual		3	3.70	native	no	no	no	no
Onosma staminea Ledeb.	Boraginaceae	perennial		6	7.41	native	no	no	no	no

Species	Family	life form (habit)	Endemism	number of records (quadrats)	occurrence rate (% of quadrats)	native status	quarantine status	UZB Red book	IUCN Red List	CITES
<i>Orobanche cumana</i> Wallr.	Orobanchaceae	parasite		6	7.41	native	no	no	no	no
<i>Paracaryum intermedium</i> (Fresen.) Lipsky	Boraginaceae	annual		13	16.05	native	no	no	no	no
<i>Peganum harmala</i> L.	Nitrariaceae	perennial		1	1.23	native	no	no	no	no
<i>Phragmites australis</i> (Cav.) Trin. ex Steud.	Poaceae	perennial		1	1.23	native	no	no	no	no
<i>Plantago lagocephala</i> Bunge	Plantaginaceae	annual		14	17.28	native	no	no	no	no
<i>Plantago minuta</i> Pall.	Plantaginaceae	annual		4	4.94	native	no	no	no	no
<i>Puccinellia dolicholepis</i> (V.I.Krecz.) Pavlov	Poaceae	perennial		8	9.88	native	no	no	no	no
<i>Ranunculus platyspermus</i> Fisch. ex DC.	Ranunculaceae	perennial		1	1.23	native	no	no	no	no
<i>Rhaponticum repens</i> (L.) Hidalgo (<i>Acroptilon repens</i> (L.) DC.)	Asteraceae	perennial		1	1.23	native	quarantine weed	no	no	no
<i>Rheum tataricum</i> L.	Polygonaceae	perennial		1	1.23	native	no	no	no	no
<i>Rosa persica</i> Michx. ex Juss.	Rosaceae	subshrub		9	11.11	native	no	no	no	no
<i>Senecio subdentatus</i> Ledeb.	Asteraceae	annual		2	2.47	native	no	no	no	no
<i>Sisymbrium subspinescens</i> Bunge	Brassicaceae	perennial		1	1.23	native	no	no	no	no
<i>Strigosella intermedia</i> (C.A.Mey.) Botsch.	Brassicaceae	annual		2	2.47	native	no	no	no	no
<i>Strigosella scorpioides</i> (Bunge) Botsch.	Brassicaceae	annual		1	1.23	native	no	no	no	no
<i>Takhtajaniantha pusilla</i> (Pall) Nazarova.	Asteraceae	annual		1	1.23	native	no	no	no	no
<i>Tamarix ramosissima</i> Ledeb.	Tamaricaceae	shrub		2	2.47	native	no	no	LC	no
<i>Trigonella arcuata</i> C.A. Mey.	Fabaceae	annual		4	4.94	native	no	no	no	no
<i>Trigonella stellata</i> Forssk.	Fabaceae	annual		2	2.47	native	no	no	no	no
<i>Zygophyllum oxianum</i> Boriss.	Zygophyllaceae	perennial		1	1.23	native	no	no	no	no
<i>Zygophyllum pinnatum</i> Cham.	Zygophyllaceae	perennial		17	20.99	native	no	no	no	no
<i>Zygophyllum turcomanicum</i> Fisch. ex. Bunge	Zygophyllaceae	perennial	endemic to Central Asian deserts	12	14.81	native	no	no	no	no

Species	Family	life form (habit)	Endemism	number of records (quadrats)	occurrence rate (% of quadrats)	native status	quarantine status	UZB Red book	IUCN Red List	CITES
<i>Stipa hohenackeriana</i> Trin. & Rupr.	Poaceae	perennial		outside quadrats		native	no	no	no	no
<i>Salsola arbusculiformis</i> Drobow	Amaranthaceae	shrub		outside quadrats		native	no	no	no	no
<i>Xylosalsola arbuscula</i> (Pall.) Tzvelev	Amaranthaceae	shrub		outside quadrats		native	no	no	no	no

During the summer 2023 surveys 84 plant species of 30 families and 73 genera were recorded (81 species of them were recorded within quadrats and 3 species outside quadrats). Among them, one species is a small tree (Black Saxaul), six species are shrubs, ten subshrubs, 30 species are perennial herbs, 34 annuals, and three species are parasites. Leading families are Amaranthaceae (13 species), Boraginaceae (13), Asteraceae (12 species), Fabaceae (8) and Poaceae (5). Families Convolvulaceae, Plantaginaceae and Zygophyllaceae are represented with 3 species each; Apiaceae, Polygonaceae and Rutaceae includes 2 species, and remaining 19 families are represented with single species. Small stands of Black Saxaul are also scattered sporadically across the Aol, with some denser areas of Saxaul scrub located along small gullies in the center and eastern parts of the Aol.

No species that are listed on the IUCN Red List as Critically Endangered, Endangered, Vulnerable or Near Threatened were recorded during the spring and summer 2023 surveys. In addition no species listed on the UzRDB were recorded.

Three species were recorded in the summer 2023 surveys that are included on the Uzbekistan list of ‘quarantine’ weeds (*Rhaponticum repens* (L.) Hidalgo (*Acroptilon repens* (L.) DC.), *Cuscuta campestris* Yunck. and *Cuscuta epithymum*) and of these *Cuscuta campestris*, is a non-native species and is potentially invasive.

All other plant species recorded over the two survey visits are native and typical for the flora of the Ustyurt Plateau and Central Asian deserts and no endemic (range-restricted) species were recorded. Six species which are regionally endemic to Central Asian Deserts were recorded and these are:

- *Astragalus erioceras* Fisch. & C.A. Mey.;
- *Haplophyllum ramosissimum* (Paulsen) Vved.;
- *Inula multicaulis* Fisch. & C.A.Mey.;
- *Jurinea persimilis* Iljin;
- *Lagochilus acutilobus* (Ledeb.) Fisch. & C. A. Mey.; and
- *Zygophyllum turcomanicum* Fisch. ex. Bunge.

The habitats within the Project area are natural habitats and belong to the Type 8 (Desert) and Sub-type 8.2 (Temperate Desert) according to IUCN Habitats Classification Scheme, or Stony (gypsum) Desert, according to National Strategy of Biodiversity Conservation. The landscape is represented with almost flat, slightly inclined and undulating plains, and gently sloping hills, dissected with numerous shallow dry erosion gullies, small saline depressions, and small plots of takyrs (periodically inundated loamy depressions with very sparse vegetation). The soils are gypsaceous and sometimes saline loamy or stony gray-brown desert soils. Habitats across the Aol are considered to be natural habitats in accordance with IFC PS6.

The vegetation of the Project area is represented with sagebrush, Halocnemum-Anabasis-saltwort-sagebrush, Anabasis-saltwort-sagebrush and saltwort-sagebrush communities, sometimes with solitary trees of Black Saxaul (*Haloxylon ammodendron* (C.A.Mey.) Bunge) or shrubs (*Atraphaxis spinosa* L., *Caragana grandiflora* (M. Bieb.) DC.). These associations belong to the type Gypsophyta (vegetation of gypsum, or stony deserts). The main dominant species are sagebrush (*Artemisia terrae-albae* Krasch.) and perennial saltworts (*Anabasis eriopoda* (Schrenk) Paulsen, *A. cretacea* Pall., *Caroxylon orientale* (S.G.Gmel.) Tzvelev, *Halocnemum strobilaceum* (Pall.) M.Bieb.), forming a monotonous greyish-green aspect. Subdominants are *Atraphaxis spinosa* L., *Halothamnus glaucus* (M. Bieb.) Botsch., *Convolvulus*

fruticosus Pall., *Ephedra distachya* L. Other species, as Tamarisk (*Tamarix ramosissima* Ledeb.), Camel Thorn (*Alhagi pseudalhagi* (M. Bieb.) Desv.), annual saltworts (*Bassia eriantha* (Fisch. & C.A. Mey.) Kuntze, *Ceratocarpus arenarius* L., *Climacoptera lanata* (Pall.) Botsch.), *Lagochilus acutilobus* (Ledeb.) Fisch. & C.A.Mey., species of family Boraginaceae and Brassicaceae, genera Astragalus, Trigonella, Haplophyllum and Zygophyllum, grasses (*Aeluropus littoralis* (Gouan.) Parl., *Eremopyrum orientale* (L.) Jaub. & Spach, *Phragmites australis* (Cav.) Trin. ex Steud., *Puccinellia dolicholepis* (V.I.Krecz.) Pavlov), occur sporadically, and their abundance is low. Additionally, 3 species were recorded outside quadrats – *Salsola arbusculiformis* Drobow, *Xylosalsola arbuscula* (Pall.) Tzvelev, and *Stipa hohenackeriana* Trin. & Rupr.

The vegetation coverage across the Aol is sparse (mostly with typically 20–30 % cover or less, rarely 40–50 %). Plants are scattered or occur in patches, or sometimes form an interrupted canopy, and the diversity of species is rather low (2 to 12 species per sample quadrat), however this is typical of vegetation within gypsum deserts. Taking into account above mentioned habitat condition scores, the habitats of the Project area can be assessed as natural habitat of good quality with a score of 0.8 as it consists of typical habitat for the Ustyurt Plateau and supports a typical vegetation community with relatively low abundance of weed / non-native species and sparse vegetation coverage.

There are also areas of very degraded habitats across the Project Aol and in these areas the habitats would be assessed as being Modified and would be Condition Score 0.0 (habitat lost), or 0.2 (very poor). These habitat areas are associated with existing vehicle tracks and areas where blasting has been completed for geological exploration (this issue is discussed further under “Section 9”). The upper soil layer is very fragile and once lost the likelihood of habitat recovery is very low and the modification of the habitat and poor condition is further exacerbated by continuous erosion both natural (wind and rain) and unnatural (repeated vehicle movements). This is especially true of the Project’s haul road which will follow the wide (up to 50m in places) and deeply rutted existing vehicle track from Kirkkiz to the Project Aol. There are also regularly used vehicle tracks crossing the Project Aol and, in these areas, habitat has also been lost.

The habitats present on the site are not listed as Annex 1 or Priority Habitats and as such are not considered as Critical Habitat. On-site habitats are good condition natural habitats which are assessed as being of Moderate Sensitivity. Areas where habitats have been modified and heavily degraded (lost) are assessed as being of Low to Negligible Sensitivity.



Figure 48: Anabasis-saltwort-sagebrush community (*Artemisia terrae-albae* Krasch., *Anabasis eriopoda* (Schrenk) Paulsen, *A. cretacea* Pall., *Caroxylon orientale* (S.G.Gmel.) Tzvelev)



Figure 49: Saltwort-sagebrush community (*Artemisia terrae-albae* Krasch., *Caroxylon orientale* (S.G.Gmel.) Tzvelev) with *Atraphaxis spinosa* L.

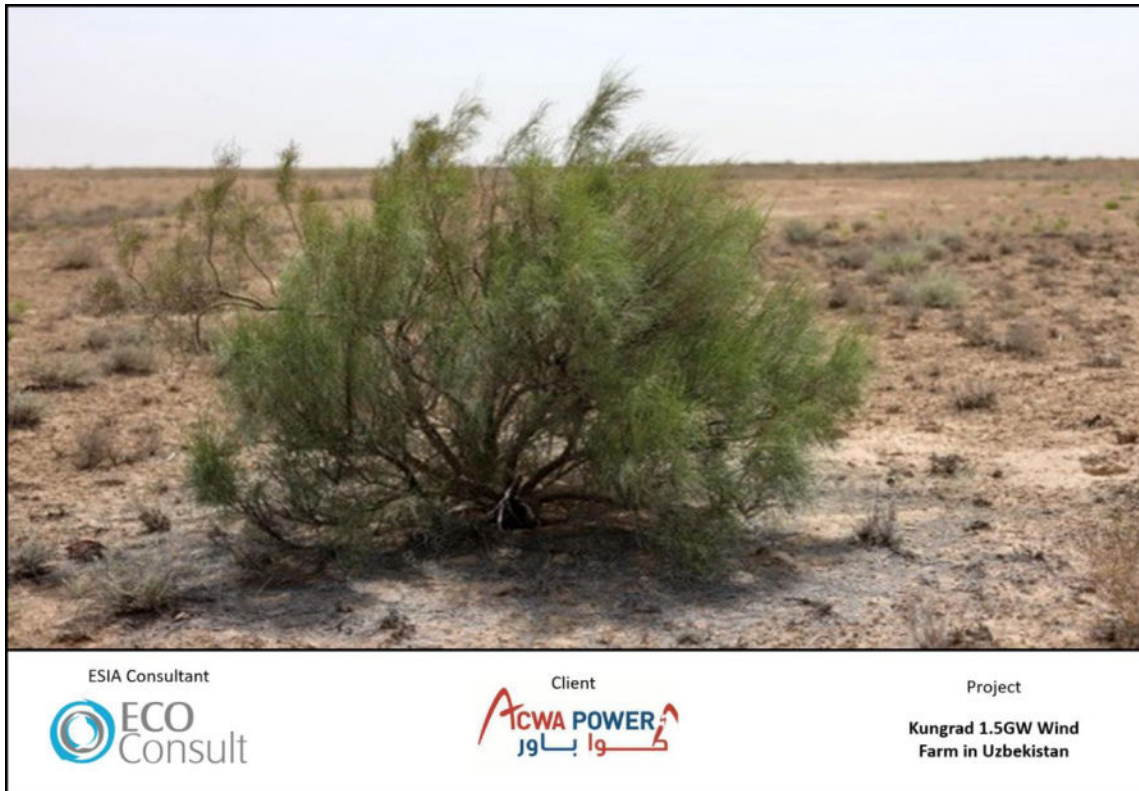


Figure 50: Solitary tree of Black Saxaul (*Haloxylon ammodendron* (C.A.Mey.) Bunge) among the gypsum desert



Figure 51: Takyr (periodically inundated loamy depressions with very sparse vegetation)



Figure 52: Takyr (periodically inundated loamy depressions with very sparse vegetation)



Figure 53: White saltwort (*Xylosalsola arbuscula* (Pall.) Tzvelev)



Figure 54: Vehicle tracks modified (lost) habitat within the Project AoI



Figure 55: Vehicle tracks modified (lost) habitat along track from Kirkkiz to site

(iv) Reptiles and Amphibians

Methods

Field studies were carried out according to generally accepted zoological methods for identifying species composition. The following methodological guidelines were used in the survey: L. G. Dinesman, M. L. Kaletskaya (1978), V. M. Makeev, A. T. Bozhansky (1988) and N. N. Shcherbak (1989), D. A. Bondarenko, Chelintsev, (1996).

The field research methodology reflects the following aspects:

- Species composition in the study area;
- Distribution across habitats; and
- Daily and seasonal changes in activity.

Thus, the method of quantitative assessment was based on the ecology of the species under consideration, landscape and geographical conditions, season, and type of work.

The quantitative assessment of reptiles was mainly based on the transect survey, although some point counts were completed. The transect method consists of counting individuals along a fixed long line (transect), with surveyors recording on both sides of the transect. All individuals encountered on the transect are registered and the distance is measured between the transect axis and each individual. The results obtained are used to calculate the density of recorded reptiles.

The reptile's population density (D) was calculated using the following formula (Bondarenko, Chelintsev, 1996):

$$D = \frac{n}{2LB}$$

where n – number of animal individuals recorded on the transect; L – length of the transect; B – formula to calculate an effective width of the survey strip:

$$B = W(0,79F + 0,21F^4)$$

where W – width of the limited strip on both sides of the transect axis; F :

$$F = \frac{2y}{W}$$

The recording of the distance of animals recorded and the transect excludes underestimation of the population density of the reptiles caused by a decrease in their detectability in remote parts of the survey strip, regardless of the degree of its limitation (Bondarenko and Chelintsev, 1996).

The abundance of the reptiles in habitats was estimated using the following population density scale for one/ha (Kuzyakin, 1962): 0.1 – 0.9 – rare, 1.0 – 9.9 – common, 10.0 and higher – abundant.

Two surveys were completed across the Project Aol to record populations of reptiles:

- Spring Survey - 13th to 16th April 2023, and
- Summer Survey – 20th to 24th June 2023.

The spring surveys were however conducted under sub-optimal conditions with very low (-3^oc) night-time temperatures and low (+6^oc) daytime temperatures. As a result of this it was not possible to estimate

spring population density of reptiles within the Project AoI. A total of 38.3 km of transects were walked / driven, along with additional drives around the site. However, during the summer surveys the weather conditions were ideal and population estimates could be calculated. Due to the poor spring conditions additional reptile transects were completed at the Vantage Points (VP) to increase the survey coverage across Project AoI such that accurate population estimates of reptiles’ present could be calculated. A total of 36 summer transect surveys were conducted at the Project Site, with a total length of 67.8 km (check figure below). Tortoises were active across the Project AoI until the end of July 2023 possibly as a result of delaying aestivation due to summer rains and lower spring temperatures. Additional records of reptiles present on the site were returned as incidental sightings from the ornithological survey team when they were conducting VP and transect surveys.

Surveys completed in late spring / early summer, when tortoises and other reptiles were active were able to reliably inform population density estimates across the AoI.

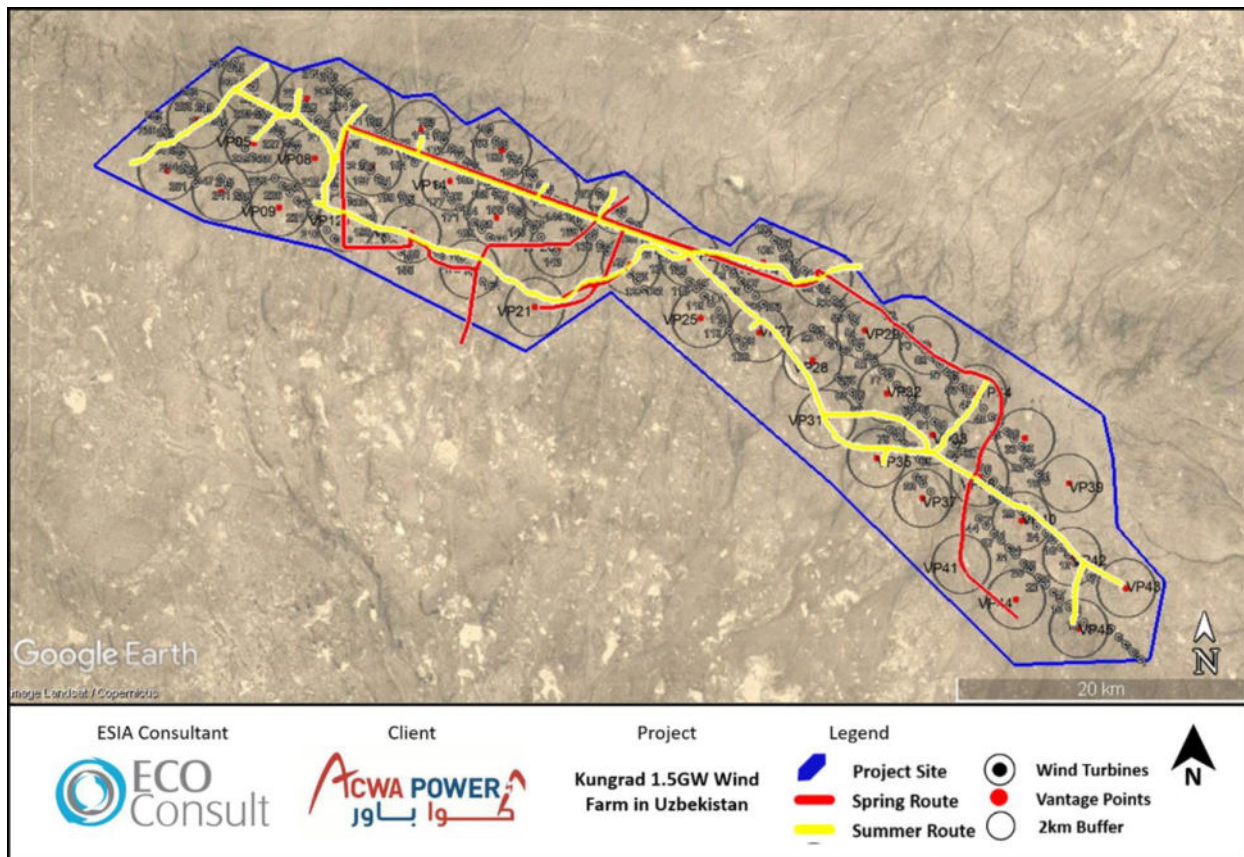


Figure 56: Reptile Survey Transects – Spring Routes Blue, Summer Routes Yellow

Results

The results of the reptile surveys completed in Spring and Summer 2023 are shown in the table below and are summarized below.

In general, the composition of the herpetofauna within the Project AoI is typical of the Ustyurt Plateau and the site supports fairly low densities of common and widespread species. Five species of reptile were recorded during the sub-optimal surveys completed in Spring 2023 and eleven species were recorded during optimal conditions during the Summer 2023 surveys. Of the species recorded, one is of international conservation concern:

- Central Asian Tortoise (*Testudo horsfieldii*) – IUCN: Vulnerable

Of the species of reptile recorded within the Project AoI, three are of national conservation importance and are included on the Uzbekistan Red Data Book. These are:

- Central Asian Tortoise (*Testudo horsfieldii*) – UzRDB: Vulnerable (2), declining
- Desert Sand Boa (*Eyrx miliaris*) – UzRDB: Near Threatened (3)
- Blotched Rat-snake (*Elaphe sauromates*) – UzRDB: Vulnerable, Naturally Rare

The density of Central Asian Tortoise across the Project AoI is relatively low with population densities considered to be no greater than 0.3 individuals/hectare.

There are no habitats within the Project AoI suitable for amphibians and as such amphibians were not recorded during the survey effort. As such amphibians are therefore not discussed further in this report.

Table 35: Results of the Spring and Summer Reptile Surveys

Common Name	Scientific Name	Present		Population Density+	Abundance	Conservation Status		
		Spring	Summer			IUCN	UzRDB	CITES
Family Testudinidae (Tortoises)								
Central Asian Tortoise	<i>Testudo horsfieldii</i>	Y	Y	0.17 / 0.3	Widespread / Common	VU	2 (VU)	II
Family Gekkonidae (Geckos)								
Caspian Even-fingered Gecko	<i>Alsophylax pipiens</i>	N	Y	7.02 (VP23 only – 7 inds)	Common where present but very patchy distribution			
Transcaspien bent-toed Gecko	<i>Mediodactylus russowi</i>	N	Y	3.1 (VP19 only – 2 inds)	Uncommon Very patchy distribution			
Caspian Bent-Toed Gecko	<i>Tenuidactylus caspius</i>	N	Y	3.61 / 6.1	Widespread / Common			
Family Agamidae (Agamas)								
Steppe Agama	<i>Trapelus sanguinolentus</i>	Y	Y	1.8 / 6.9	Widespread / Common			
Sunwatcher Toad-headed Agama	<i>Phrynocephalus helioscopus</i>	Y	Y	4.7 / 6.1	Widespread / Common			
Family Lacertidae (True Lizards)								
Steppe Racerunner	<i>Eremias arguta arguta</i>	Y	Y	0.7 (VP33 only – 1 ind)	Uncommon, very patchy distribution			
Rapid Lizard	<i>Eremias velox</i>	Y	Y	1.99 / 3.1	Widespread / Common			
Family Boidae (Boas)								
Desert Sand Boa	<i>Eryx miliaris</i>	N	Y	0.4 (VP27 only – 1 ind)	Uncommon, very patchy distribution		3 (NT)	II
Family Colubridae (Colubrid Snakes)								
Sand Racer	<i>Psammodphis lineolatus</i>	N	Y	0.54 / 0.6	Uncommon, very patchy distribution			
Blotched Rat-snake	<i>Elaphe sauromates</i>	N	Y	0.28 / 0.3	Uncommon, very patchy distribution		2(VU:R)	

+ - Population densities (individuals/hectare) shown; firstly Average Density and secondly Peak Density from the Summer 2023 survey.

Notes: UzRDB – species/subspecies listed in the Red Data Book of Uzbekistan (2019) (2 (VU) – vulnerable; 2 (VU:D) – vulnerable, declining; 3 (NT) – near-threatened); IUCN – species included in the Red List of the International Union for Conservation of Nature (EN – endangered; VU - vulnerable); CITES I, II – species listed in the appendices (I, II) to the Convention on International Trade in Endangered Species of Wild Fauna and Flora

(v) Mammals (excluding bats)

Methods

Two surveys were undertaken by in-country mammal specialists in 2023, the first between 30th March and 3rd April 2023 and the second between 1st and 6th August 2023. The terrestrial mammals survey included a full walkover/drive of the Project AoI during which time any signs of mammals including scat, footprints, direct observations, burrows, or other signs was recorded in full. Where mammals of international or national conservation concern were recorded, they were mapped and their location recorded on to a GPS device.

In addition to transect surveys, 50 camera traps were deployed across the site in February 2023 and were left in situ until the 28th March. 30 camera traps were then deployed at the end of April and remain on site. The results of the camera trapping up to the end of July 2023 are included in this Section. The locations of the camera traps are shown on the figures below and cameras were deployed at the Vantage Points (VPs) during the first deployment and during the second deployment the locations were changed so that they were overlooking prominent landscape features that were likely to be regularly used by mammals within the AoI (e.g. gully, high points). The memory cards and batteries in the camera traps were managed by the Ornithological Survey Team.

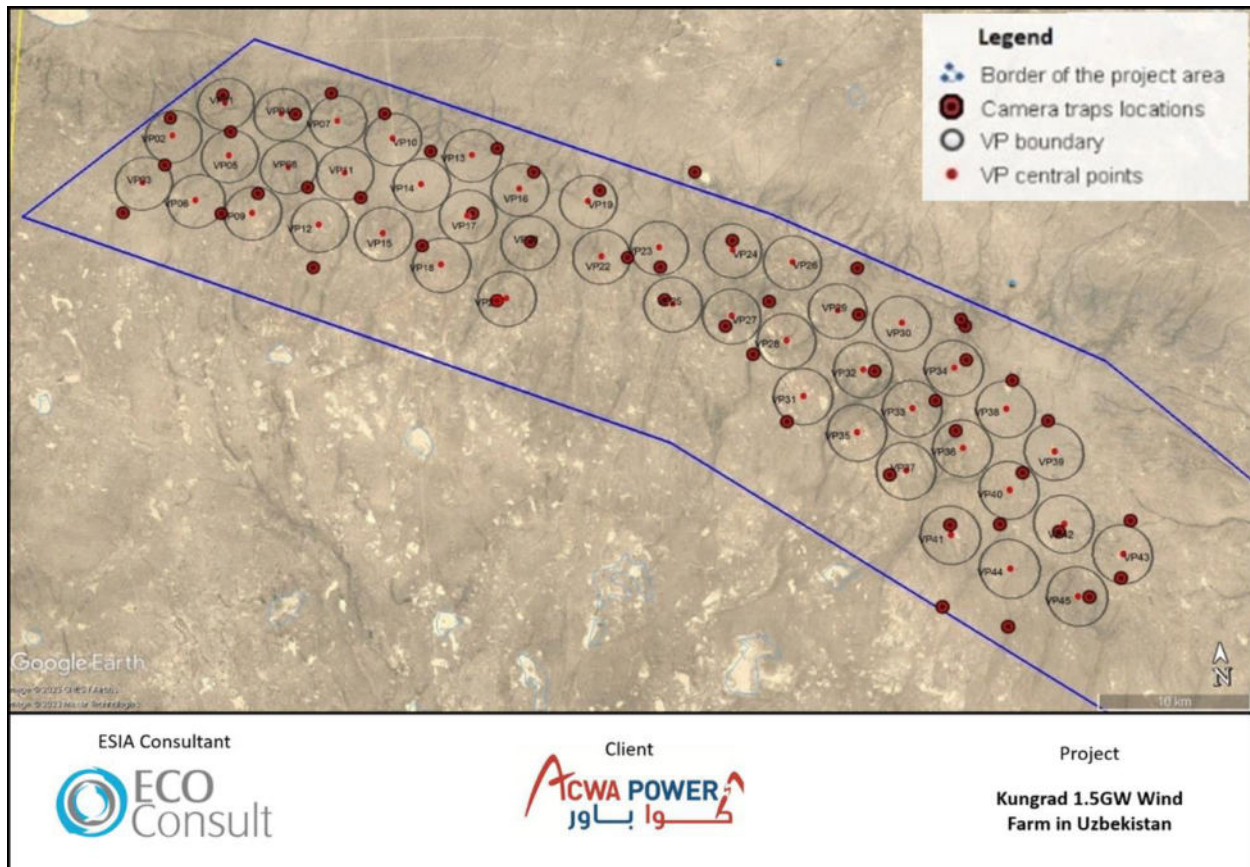


Figure 57: Location of Camera Traps – First Deployment (February to March 2023)

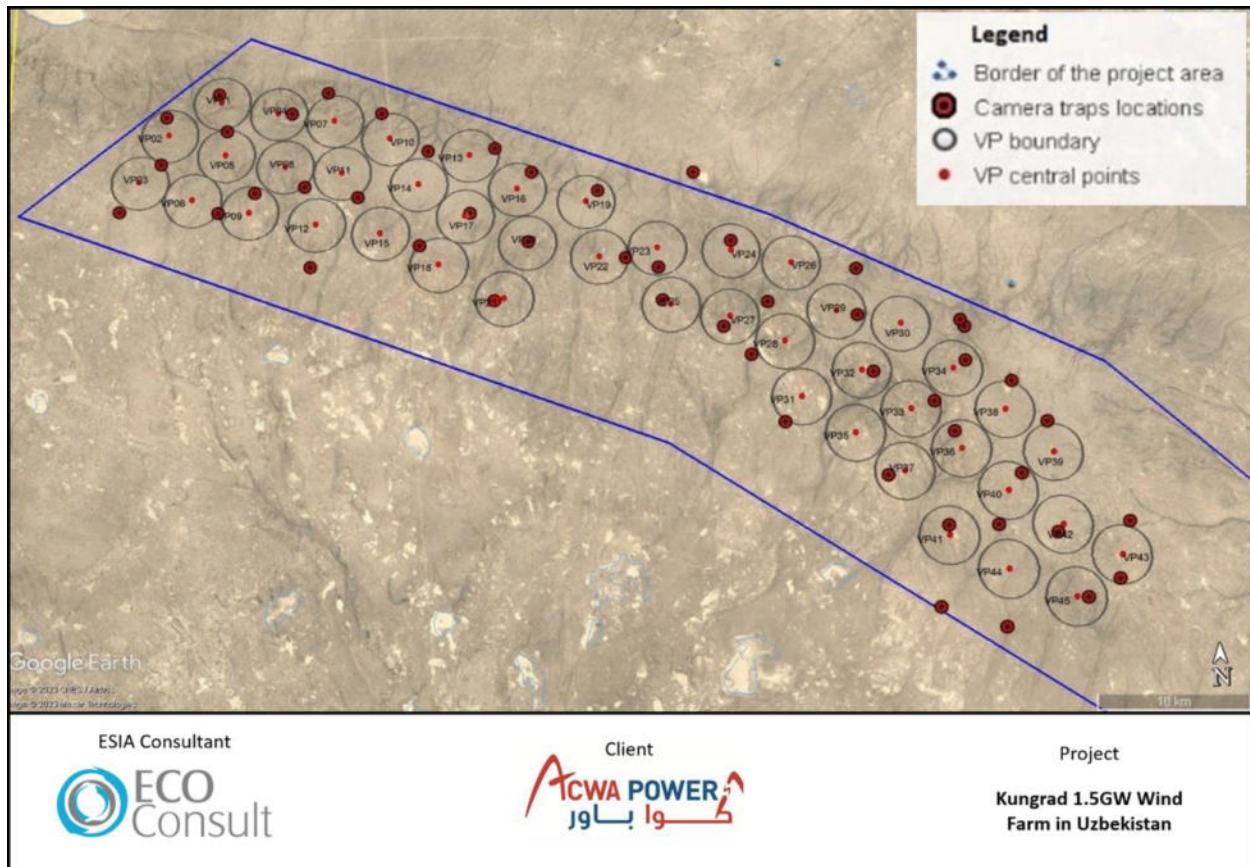


Figure 58: Location of Camera Traps – Second Deployment (April to ongoing)

Further to these surveys, the Ornithological Survey Team recorded all incidental sightings of mammals seen whilst undertaking the avifauna surveys and also completed population size class counts of mammals at each of the VPs. This was completed by undertaking 500m x 500m quadrat surveys from each of the 45 Vantage Points. Count estimates of colonies (gerbil sp.) and towns (Mole-voles), as well as individual burrows (jerboas, Red Fox and Corsac Fox) were recorded. Registrations of Tolai Hare, foxes and Goitered Gazelle were recorded, where encountered. The ornithological survey team have been on site from January to November 2023 and as such it is considered that any more mobile species (e.g. Goitered Gazelle) would have been recorded if they were present on the Project site.

Separate work was carried out on the analysis of species according to the composition of Eurasian Eagle Owl pellets.

The results field surveys are shown in the table below.

Table 36: Results of the 2023 Mammal Survey, Incidental Survey, Eagle Owl Pellet Analysis and Camera Trap Survey

Common Name	Scientific Name	Survey Type				Field Notes	Conservation Status			National Trends
		Field	Incidental	Pellet	Camera		IUCN	UZRDB	CITES	
Long-eared Hedgehog	<i>Hemiechinus auritus</i>	Y	Y	Y	N	Widespread and common throughout Aol	LC			Stable
Brandt's Hedgehog	<i>Hemiechinus hypomelas</i>	Y	Y	Y	N	Two skins found	LC	3 (NT)		Stable
Piebald Shrew	<i>Diplomesodon pulchellum</i>	N	N	Y	N	One lower jaw in owl pellet, not recorded on survey	LC			Stable
Yellow Ground Squirrel	<i>Spermophilus fulvus</i>	Y	Y	N	N	Widespread and common throughout Aol	LC			Stable
Great Gerbil	<i>Rhombomys opimus</i>	Y	N	N	N	Burrows only recorded, 90% of colonies were uninhabited, not found in pellets	LC			Natural fluctuations
Libyan Gerbil	<i>Meriones libycus</i>	Y	Y	Y	N	Burrows only recorded and small number of bones in pellets, very low numbers (indicating a dry year in 2021-2022)	LC			Natural fluctuations
Midday Gerbil	<i>Meriones meridianus</i>	Y	Y	Y	N	Both adult and young bones in pellets, colonies recorded. Large population	LC			Natural fluctuations
Severtzov's Jerboa	<i>Allactaga severtzovi</i>	Y	N	N	N	Only one hole seen, not occupied	LC			Stable
Great Jerboa	<i>Allactaga major</i>	Y	N	Y	N	Single burrow recorded and bones recorded in pellets. Patchy distribution	LC			Stable
Small Five-toed Jerboa	<i>Allactaga elater</i>	Y	Y	Y	N	Holes found across the Aol and bones in pellets	LC			Stable
Northern Three-toed Jerboa	<i>Dipus sagitta</i>	Y	N	N	N	Single hole recorded at VP15	LC			Natural fluctuations
Dwarf Fat-tailed Jerboa	<i>Pygeretmus pumilio</i>	N	N	Y	N	Only recorded in pellets. Widespread across Ustyurt	LC			Natural fluctuations
Mole Vole	<i>Ellobius talpinus</i>	Y	Y	Y	N	Widespread across Aol within all VPs. Bones in pellets	LC			Stable

Common Name	Scientific Name	Survey Type				Field Notes	Conservation Status			National Trends
		Field	Incidental	Pellet	Camera		IUCN	UZRDB	CITES	
Grey Hamster	<i>Cricetulus migratorius</i>	Y	Y	Y	N	Widespread across Aol. Bones in pellets	LC			Natural fluctuations
Tolai Hare	<i>Lepus tolai</i>	Y	Y	Y	Y	Widespread and common across Aol. Regularly encountered during surveys. Bones in pellets	LC			Stable
Fox	<i>Vulpes vulpes</i>	Y	Y	N	Y	Abundant and widespread across Aol	LC			Stable
Corsac Fox	<i>Vulpes corsak</i>	Y	N	N	N	Uncommon, burrows noted along with pug marks	LC	2 (VU:D)		Stable
Caracal	<i>Caracal caracal</i>	N	N	N	Y	Not recorded on field survey, up to three individuals recorded on camera traps in the northern part of the Aol. ~	LC	CR	Cites I	Stable
Marbled Polecat	<i>Vormella pereguzna</i>	Y	N	N	N	Tracks recorded at VP40. This species uses the burrows of <i>Spermophilus fulvus</i>	VU	2 (VU:D)		Unknown
Honey Badger	<i>Millivora capensis</i>	Y	Y	N	Y	Burrows at VP 19 and 20 as well as at 43.06344, 56.28244 (1.3km south of Aol boundary). Recorded very sporadically on camera traps. Likely between 4 and 8 individuals within the Aol.	LC	1 (CR)		Stable
Goitered Gazelle	<i>Gazella subgutturosa</i>	N	Y	N	Y	Rare within Uzbekistan and severe recent declines. Single adult (possibly calving female) recorded at VP45, April 2023. Dung, tracks, bones and horns recorded sporadically. Camera traps recorded individuals or small herds (up to three animals) on the western and eastern edges of the Aol. Sporadic records over survey period.	VU	2 (VU:D)	Cites II, CMS II	Stable

Common Name	Scientific Name	Survey Type				Field Notes	Conservation Status			National Trends
		Field	Incidental	Pellet	Camera		IUCN	UZRDB	CITES	
Saiga	<i>Saiga tatarica</i>	N	N	N	N	Considered recently extinct from Aol. Horn found at VP27 (approx. 3 to 5 years old) humerus at VP42 (5 to 7 years old)	CR	1 (CR)	Cites II, MoU CMS, CMS II	Extinct ¹⁸

¹⁸ The southern part of the Ustyurt Plateau includes Karabaur which was historically inhabited by Saiga which migrated from the north part of its historic range. However, the number of Saiga in Uzbekistan has been steadily declining (E.J. Milner-Gulland et al., 2020). The last mass migration to the south was noted in 2004/2005 (Bykova et al., 2010). After this, the animals did not migrate deeply to south of Uzbekistan (Bykova, Esipov, 2011; 2015; Bykova et al., 2018). Most likely, the remaining individuals were killed by poachers and died from natural reasons. The latest Saiga records in Karabaur and the adjacent territories of Southern Ustyurt refer to 2012-2013 (Karabaur, Shakhpakhty, Asake-Audan Depression, Lake Sarykamysh) (Cadastre of rare and endangered animal species of the Republic of Karakalpakstan. Ed. by E.A. Bykova (in press). In the opinion of the mammal experts the South Ustyurt Saiga population is now extinct. Single individuals may enter from the territory of Kazakhstan (pers.comm. by Maksim Mitropolsky, 2023), but a stable group does not exist more.

Discussion of Notable Records

Honey Badger (*Mellivora capensis*) – IUCN LC, UzRDB CR

Within Uzbekistan, this species is only found within the central and southern parts of the Ustyurt Plateau, however records are rare. Five Honey Badger holes were found at VP19 (3 holes) and VP20 (2 holes) as well as another hole 1.3 km south of the Project AoI.

Honey Badger was recorded seven times during the camera trap surveys with distribution within the northern and eastern parts of the Project AoI (check figure below). It is estimated that the population of Honey Badger within the Project AoI is between 4 and 8 individuals.

In addition to registrations of this species the remains of predated Central Asian Tortoise were found across the AoI, indicating that this species is a very important prey item for Honey Badger.

Based on the results of the surveys completed to date it is considered that the Project AoI is likely to be of national importance for Honey Badger, which is listed as being Critically Endangered on the Uzbekistan Red Data Book.

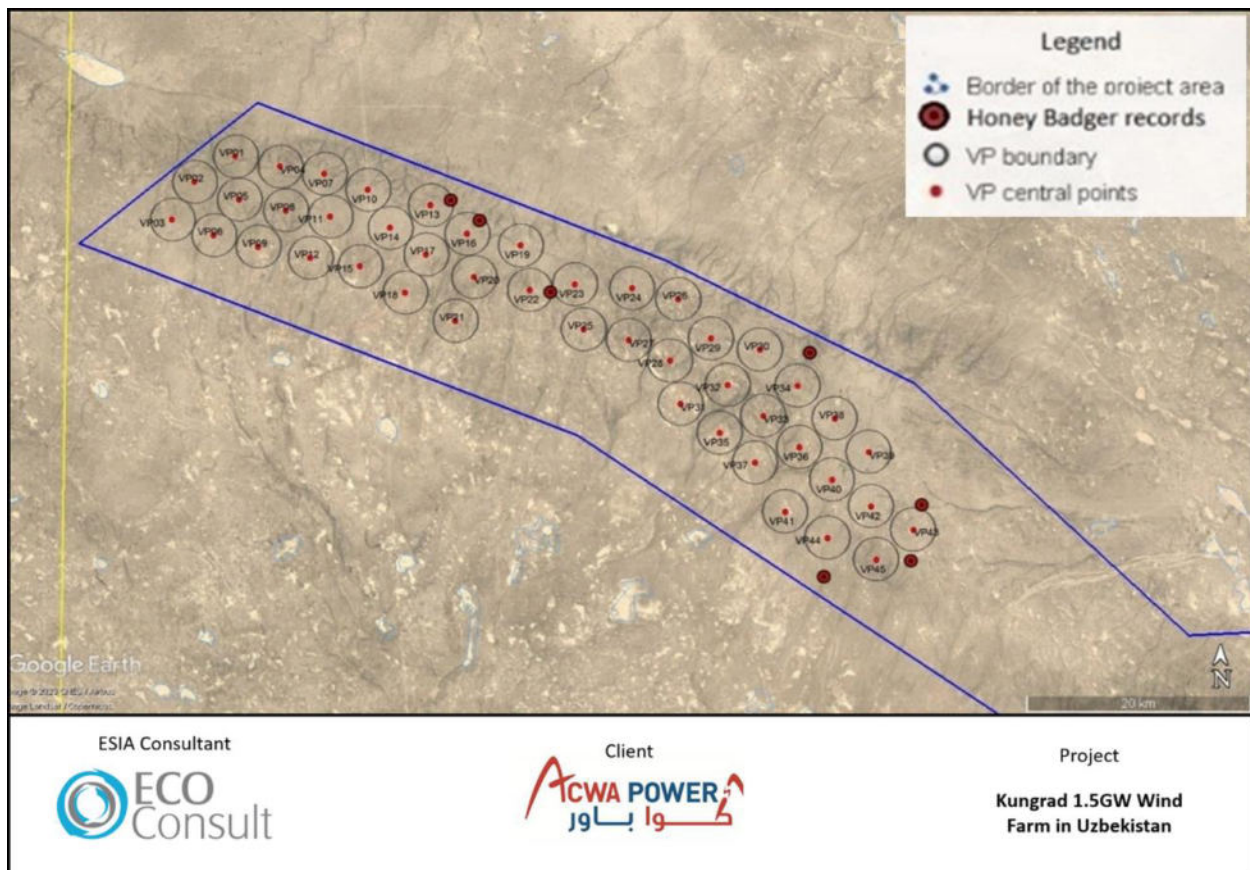


Figure 59: Location of Honey Badger Camera Trap Records

Honey Badger Camera Trap Pictures



Saiga (*Saiga tatarica*) – IUCN CR, UzRDB CR

The Project Aol is no longer used by this species during its migration however the whole of the Ustyurt Plateau would have formerly been part of the range of this species. There are no recent records from within the Project Aol and this species has not been recorded, other than one old bone and one old horn, from surveys completed to date. This species has suffered significant recent population declines as a result of severe winter conditions, viral infection and also suffers significant poaching losses. In addition, it has suffered significant disruption to traditional migration routes as a result of cross-border fencing.

This species is considered to be absent from the Project Aol and potentially extinct from Uzbekistan.

Goitered Gazelle (*Gazella subgutturosa*) – IUCN VU, UzRDB VU:D

This species is found throughout the Ustyurt Plateau, however, is considered to be nationally rare and there have been significant declines in the national population over recent years as a result of poaching and habitat loss, which are the two main threats to this species. The population within the Ustyurt Plateau is considered to be around 500 animals. The Project Aol is however sub-optimal for this species, mainly due to the lack of permanent water sources. Small numbers were however recorded on the camera traps on the western and eastern edges of the Aol and an adult was recorded during the avifauna surveys along with evidence of presence (dung, horns, tracks etc.) during the mammal surveys. The location of camera trap records is shown on figures below and as a result of all of the surveys it is estimated that the population within the Aol likely to be up to 25 individuals.

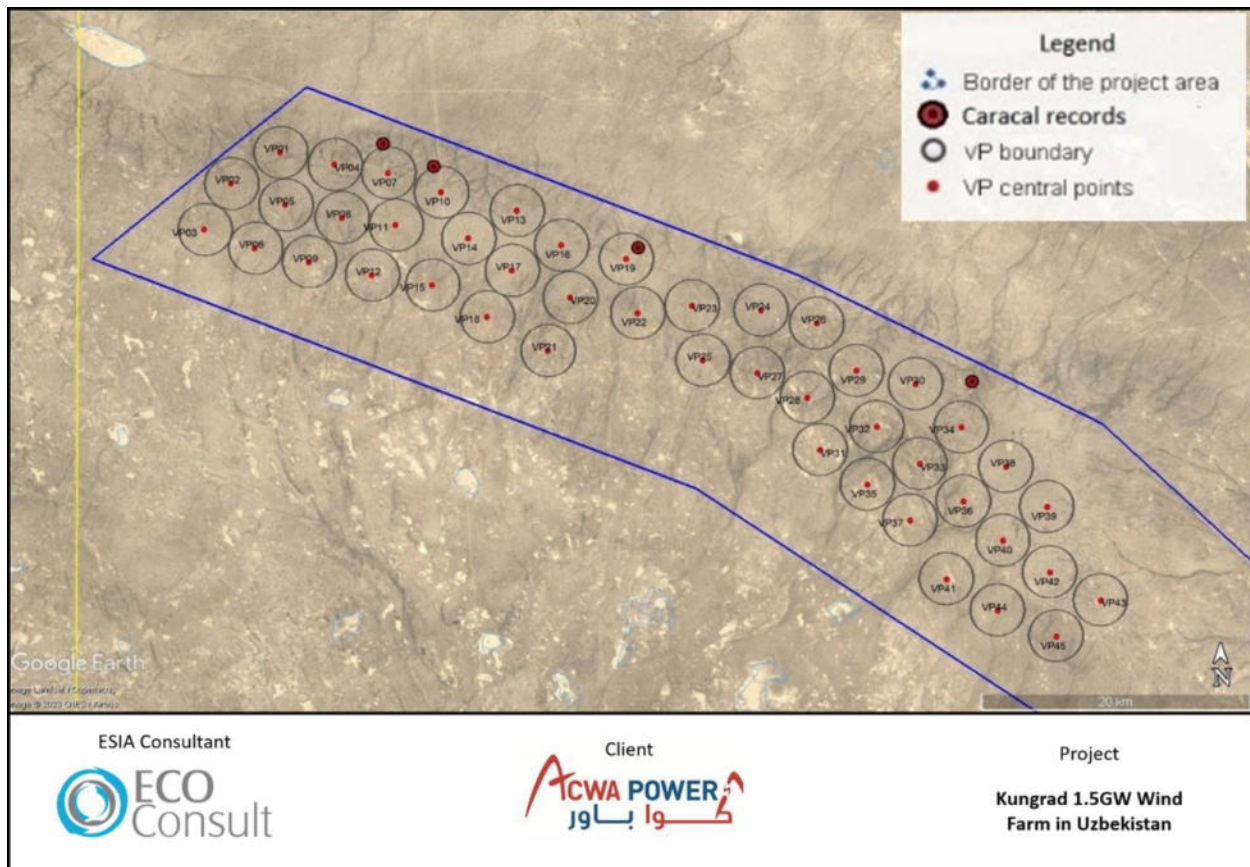
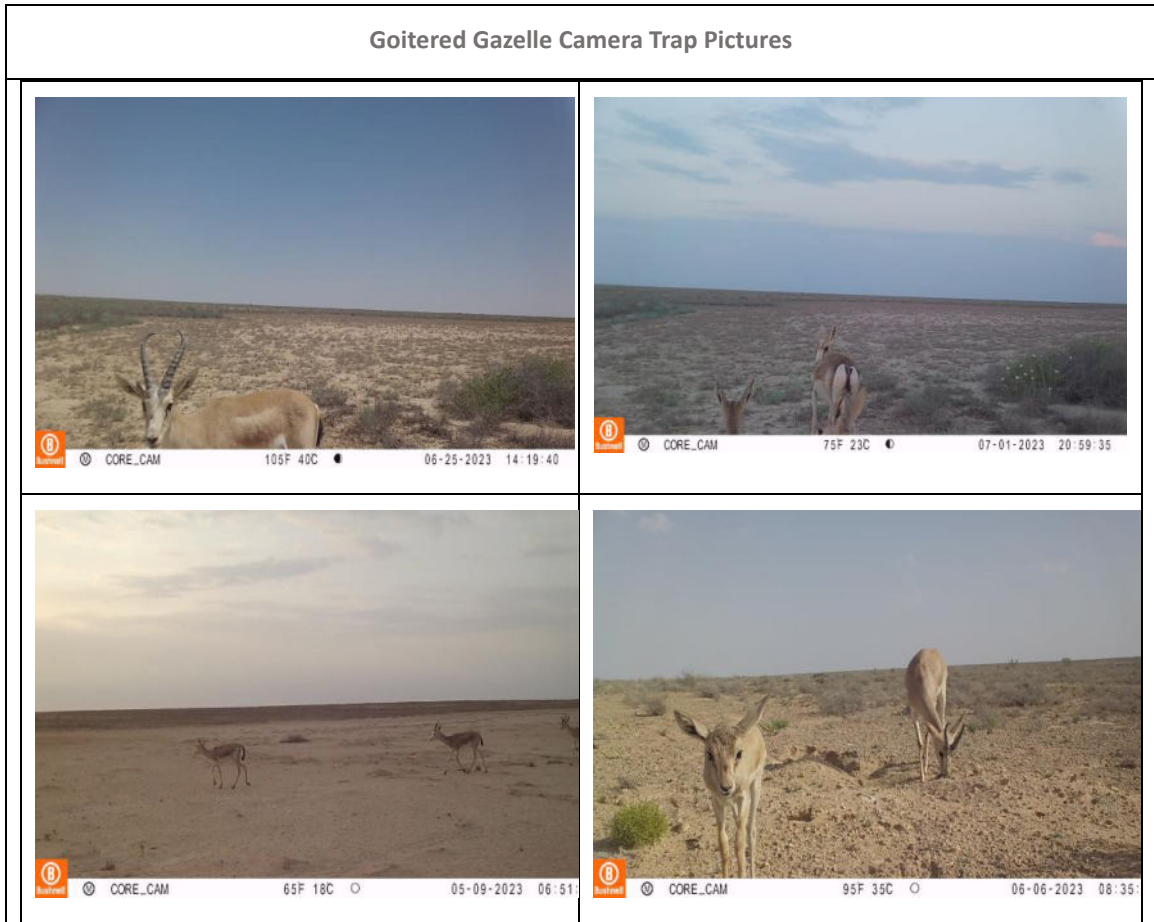


Figure 60: Goitered Gazelle records by camera traps



Caracal (*Caracal caracal*) – IUCN LC (global, regional status unclear), UzRDB CR

This species is rare in Uzbekistan and is only found in the western parts of the country. According to the IUCN, within Central Asia population density of this species is likely to be low which makes it extremely vulnerable to local extinction. Caracal was only recorded during the camera trapping surveys with four registrations between March and May 2023. Based on analysis of the camera trap data it is considered likely that up to three individuals are present within the Aol, with records from areas of rougher terrain which could offer shelter, however den locations have not been recorded. The location of the registrations of this species within the Aol is shown on figure below.

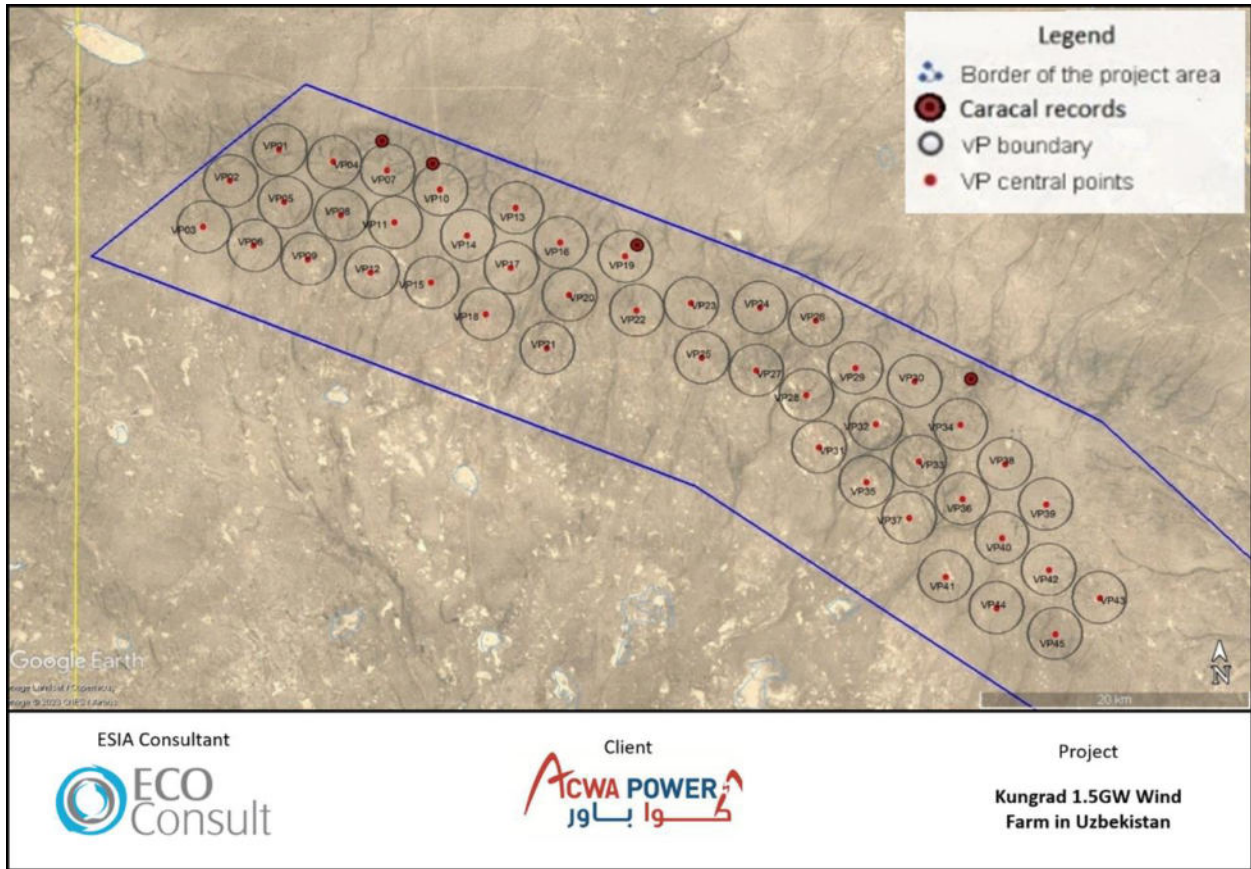
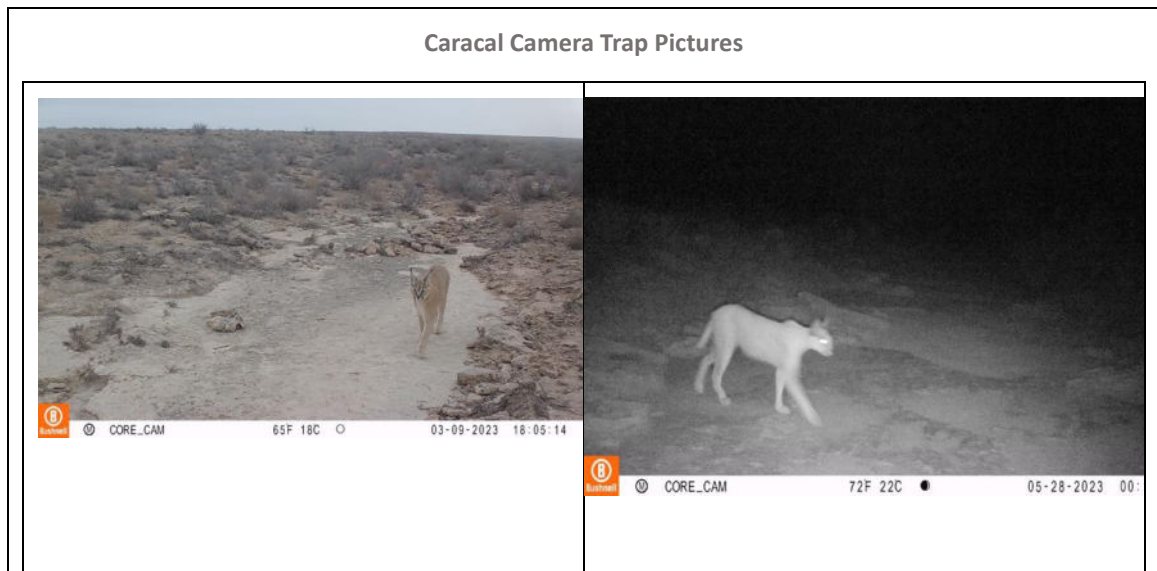
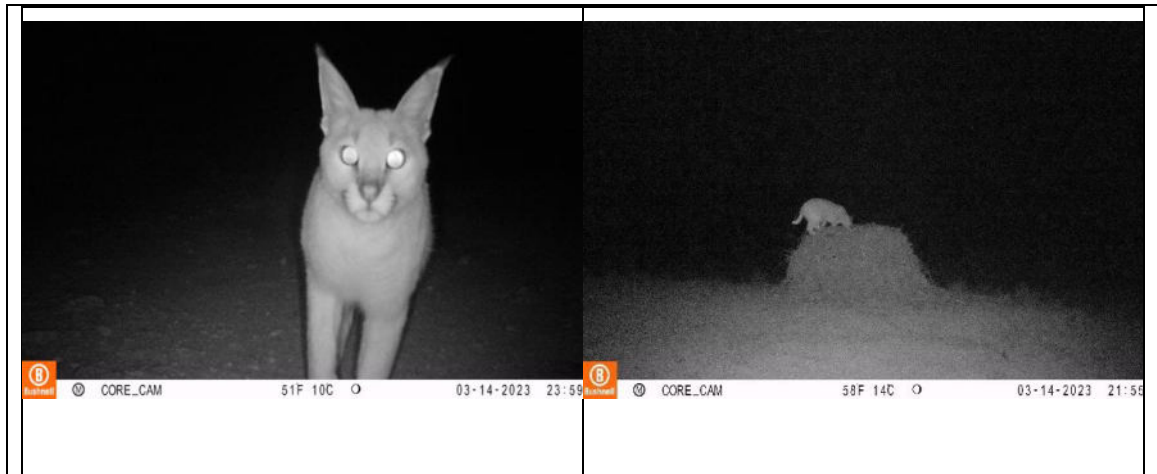


Figure 61: Caracal Records by Camera Traps





(vi) Bats

Methods

Bat surveys consisted of Nocturnal Acoustic Survey along with a search for suitable roosting features within the Project Aol. Due to the size of the Project Aol and the difficulty moving around the site, especially at night, bat transect surveys were not undertaken and it is considered that the use of static detectors would give robust data pertaining to the bat species present within the Aol, along with a reasonable estimation of the amount of flight activity.

Thirty-five Wildlife Acoustic SM4BAT detectors were deployed at 28 ground locations and seven 'at-height' locations, as shown on figure below. The survey protocol adapts methods protocols set out in guidelines published by NatureScot 2021 (formerly Scottish Natural Heritage) and Eurobats Publication 6, 2015. Fixed point locations were selected at the avifauna survey Vantage Points as the ornithological survey team were responsible for managing the bat detectors. At height detectors have been placed at the seven met masts present within the Project area and give a good east-west coverage and the microphones were installed at a height of 50m.

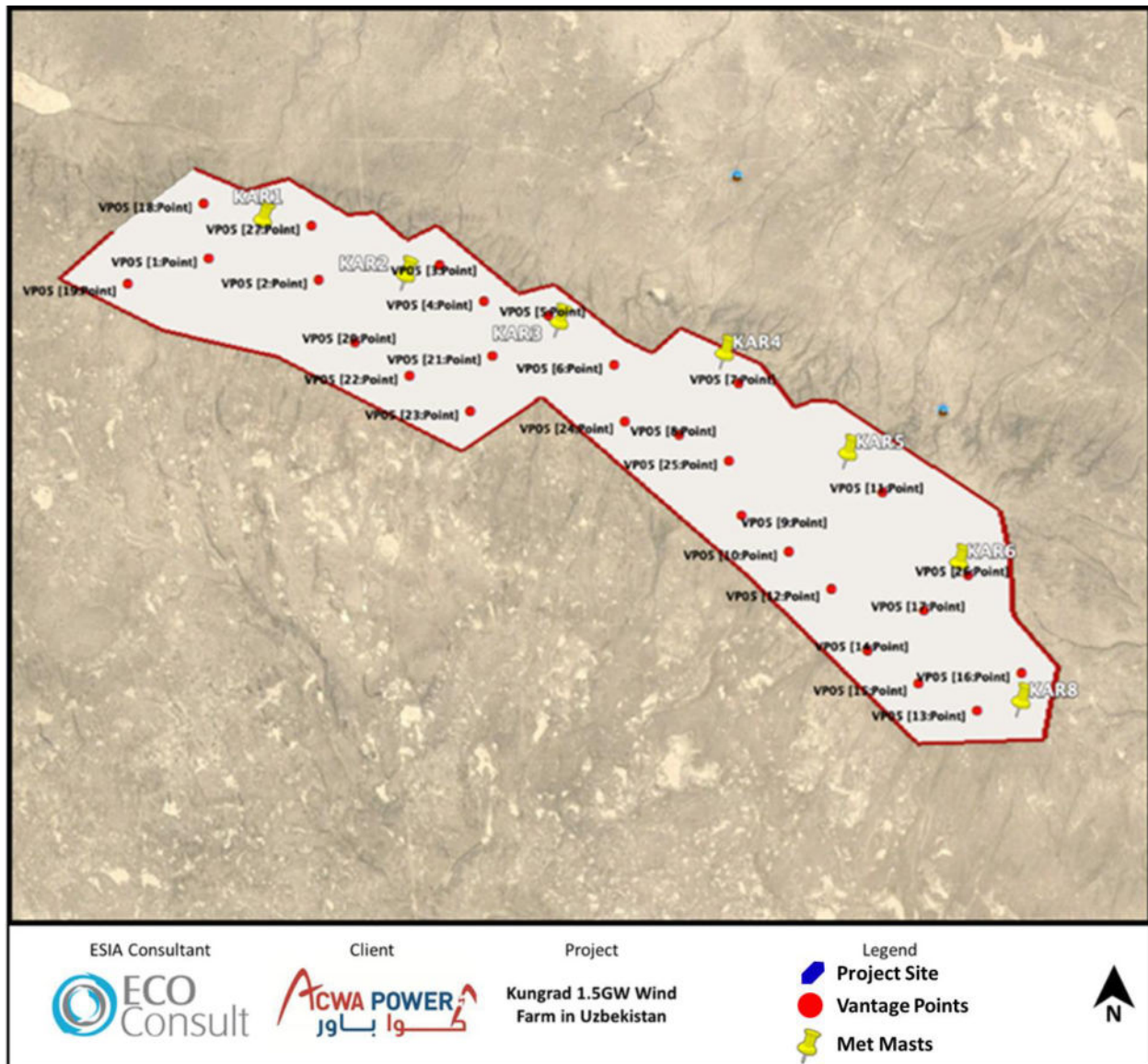


Figure 62: Location of Static Bat Detectors (red dots – ground location, yellow pins – at height)

The static detectors were deployed during the Turnstone Ecology Scoping Visit in April 2023 and have been continually recording since. They will remain in situ until the end of October 2023. The detectors were programmed to start recording 30 minutes before sunset until 30 minutes after sunrise. Data was downloaded approximately once per month and batteries changed as necessary.

The ground detectors were dug into the ground to reduce the likelihood of theft with just the microphone protruding from the ground at a height of approximately 30 – 50cm (figure below)



Figure 63: SM4BAT microphone

None of the detectors have been stolen however some of the microphone cables were damaged by mammals nibbling through the cables and six of the deployed detectors have not recorded any data or have only recorded some data. The total amount of recording nights completed to date, and corresponding size of data files collected are shown on the tables below.

Table 37: Total Number of Recording Nights and Number of Data Files (April to August)

Installation location	Number of detectors	Recording Nights	Files	Size, Gb
Met Masts	7	402	16125	37,1
View points	28	1634	22782	58,2
Total:	35	2036	38907	95,3

Table 38: Recording Nights and Data by At Height Detector

Met Mast	Start date	End date	Nights	Files	Size, Gb	Notes
1st Period						
1 (KAR 1)	20.04.2023					No data
2 (KAR 2)	20.04.2023	19.05.2023	29	1295	2,83	
3 (KAR 3)	20.04.2023	19.05.2023	29	891	1,88	
4 (KAR 4)	21.04.2023	20.05.2023	29	2443	5,6	
5 (KAR 5. 7.06.23)	20.04.2023	10.05.2023	19	601	1,3	
6 (KAR 6. 7.06.23)	20.04.2023	22.05.2023	32	976	2,04	
8 (KAR 8)	20.04.2023	24.05.2023	34	4245	9,4	
2 - Period						
1 (KAR 1)	21.05.2023	30.06.2023	40	369	0,9	
2 (KAR 2)	20.05.2023	29.06.2023	39	169	0,3	
3 (KAR 3)	20.05.2023	28.06.2023	39	1095	2,51	
4 (KAR 4)	22.05.2023	24.06.2023	35	3414	9,16	
5 (KAR 5. 7.06.23)	22.05.2023	30.06.2023	39	282	0,5	
6 (KAR 6. 7.06.23)	24.05.2023	28.06.2023	37	166	0,3	
8 (KAR 8)	402	25.05.2023	1	179	0,4	

Table 39: Recording Nights and Data by Ground Detector (Period 1) (April to May)

№ VP	Start date	End date	Days	Files	Size, Gb	Notes
1	21.04.2023	24.05.2023	33	351	0,8	
3	19.04.2023	20.05.2023	31	2265	5,65	
5	25.04.2023	18.05.2023	23	538	1,11	
7	23.04.2023	20.05.2023	27	461	1	
9	26.04.2023	20.05.2023	24	847	1,85	
11	27.04.2023	21.05.2023	24	438	1	
13	20.04.2023	21.05.2023	31	1105	2,4	
15			0	0	0	No data
16	20.04.2023	24.05.2023	34	210	0,5	
18	20.04.2023	24.05.2023	34	216	0,5	
19	20.04.2023	20.05.2023	30	309	0,7	
20	25.04.2023	24.05.2023	29	200	0,4	
21	19.04.2023	24.05.2023	35	341	0,7	
22	21.04.2023	24.05.2023	33	874	1,95	
23	26.04.2023	24.05.2023	28	590	1,26	
25	27.04.2023	20.05.2023	23	573	1,26	
26	22.04.2023	02.05.2023	10	211	0,5	
28			0	0	0	No data
30	21.04.2023	21.05.2023	30	965	2,03	
31	20.04.2023	22.05.2023	32	568	1,21	
34	26.04.2023	21.05.2023	25	277	0,6	
35	22.04.2023	22.05.2023	30	882	1,91	
37	26.04.2023	23.05.2023	27	763	1,65	
40			0	0	0	
41	02.05.2023	23.05.2023	21	501	1,06	
43	28.04.2023	22.05.2023	24	174	0,4	
44	21.04.2023	23.05.2023	32	1046	2,19	

No VP	Start date	End date	Days	Files	Size, Gb	Notes
45	21.04.2023	21.05.2023	30	378	0,8	
Total:			700	15083	33,43	

Table 40: Recording Nights and Data by Ground Detector (Period 2) (May – July)

No VP	Start date	End date	Days	Files	Size, Gb	Notes
1	27.05.2023	05.07.2023	39	55	0,3	
3	21.05.2023	03.07.2023	43	740	1,94	
5	20.05.2023	28.06.2023	39	219	0,5	
7	22.05.2023	06.07.2023	45	79	0,2	
9	20.05.2023	17.06.2023	28	469	1,06	
11						the cable to the microphone is damaged
13	21.05.2023	13.06.2023	23	101	0,2	
15	21.05.2023	02.07.2023	42	2059	8,85	
16	25.05.2023	14.06.2023	20	12	0,03	
18	25.05.2023	30.06.2023	36	78	0,2	
19	21.05.2023	29.06.2023	39	698	2,01	
20	26.05.2023	05.07.2023	40	440	1,79	
21	25.05.2023	01.07.2023	37	396	1,49	
22	24.05.2023	03.07.2023	40	475	1,3	
23	26.05.2023	01.07.2023	36	112	0,4	
25	22.05.2023	02.07.2023	41	78	0,2	
26						No data
28	22.05.2023	02.07.2023	41	433	0,9	
30	22.05.2023	01.07.2023	40	54	0,1	
31	22.05.2023	29.06.2023	38	58	0,1	
34	23.05.2023	05.07.2023	43	237	1,04	
35	22.05.2023	01.07.2023	40	258	0,6	
37	23.05.2023	26.06.2023	34	148	0,3	
40	23.05.2023	04.07.2023	42	132	0,4	
41	23.05.2023	01.07.2023	39	70	0,1	
43	24.05.2023	30.05.2023	6	5	0,02	No data
44	23.05.2023	15.06.2023	23	131	0,2	
45	24.05.2023	03.07.2023	40	162	0,5	
Total:			934	7699	24,73	

Table 41: Number of Recorded Files (Period 3 July to August)

Installation location	Number of detectors	Files
Meteomasts	7	326
Viewpoints (ground-based detectors)	28	2961
Total:	35	3287

During June, July and August the number of recording nights and corresponding files were significantly reduced and this is likely due to the extreme high temperatures on the Kungrad WF site which affected the recorders.

Results

According to the literature data on bats of Uzbekistan (Bogdanov, 1953; Benda et al., 2011; Gritsina et al., 2013) and arid ecosystems, nine species of bats are most likely to inhabit Karakalpakstan Project area (table below): *Rhinolophus bocharicus*, *Eptesicus bottae*, *Eptesicus gobiensis*, *Eptesicus serotinus*, *Hypsugo savii*, *Myotis davidii*, *Nyctalus noctula*, *Pipistrellus pipistrellus*, *Vespertilio murinus*.

Table 42: Bat Species Most Likely to Occur in the Project Aol

Species	IUCN Red List	UzRDB (2019)	Basic flight information (estimated flight height; presence of migrations)	Level of collision risk (Rodrigues et al., 2015)
<i>Rhinolophus bocharicus</i>	LC	Not Listed	Most likely, <i>R. bocharicus</i> is a sedentary species, foraging low from the ground (like other horseshoe bats (Bogdanov, 1953; Rodrigues et al., 2015)).	low
<i>Eptesicus bottae</i>	LC	Not Listed	<i>E. bottae</i> ranks among small- to medium-sized bats hunting its prey mostly in a slow hawking flight (Benda et al., 2012); probably sedentary.	medium
<i>Eptesicus gobiensis</i>	LC	Not Listed	no data	medium
<i>Eptesicus serotinus</i>	LC	Not Listed	Medium height (Roemer et al., 2017); usually sedentary (Dietz, Kiefer, 2016)	medium
<i>Hypsugo savii</i>	LC	Not Listed	Medium height (Roemer et al., 2017); no data on migration (Dietz, Kiefer, 2016)	high
<i>Myotis davidii</i>	LC	Not Listed	Low height (Roemer et al., 2017); probably sedentary	low
<i>Nyctalus noctula</i>	LC	Not Listed	High height (Roemer et al., 2017); migrate (Dietz, Kiefer, 2016)	high
<i>Pipistrellus pipistrellus</i>	LC	Not Listed	Medium height (Roemer et al., 2017; Wellig et al., 2018); sedentary (Bogdanov, 1953; Dietz, Kiefer, 2016)	high
<i>Vespertilio murinus</i>	LC	Not Listed	High height (Roemer et al., 2017); usually migrate (Dietz, Kiefer, 2016)	high

A further eleven species are known to occur within Uzbekistan and neighboring countries and have the potential to occur within the Project Aol (Benda et al., 2011; Benda et al., 2012; Dietz, Kiefer, 2016): These are *Rhinolophus ferrumequinum*, *Rhinolophus hipposideros*, *Plecotus* sp. (Gritsina et al., 2013), *Myotis bucharensis*, *Myotis emarginatus*, *Myotis blythii*, *Myotis capaccinii*, *Barbastella caspica*, *Pipistrellus kuhlii*, *Otonycteris leucophaea*, *Tadarida teniotis*. Species with the potential to occur within the Project Aol along with their relevant conservation statuses are shown in table below. Estimated collision risk is also included below and is based on flight characteristics by genera as set out in Eurobats Publication 6 (Rodrigues et al. 2015).

Table 43: Bat Species Most Likely to Occur in the Project Aol

Species	IUCN Red List	UzRDB (2019)	Basic flight information (estimated flight height; presence of migrations)	Level of collision risk (Rodrigues et al., 2015)
<i>Rhinolophus ferrumequinum</i>	LC	Not Listed	Low height (Roemer et al., 2017); sedentary (Dietz, Kiefer, 2016)	low
<i>Rhinolophus hipposideros</i>	LC	Vulnerable, declining 2(VU:D)	Low height (Roemer et al., 2017); sedentary (Dietz, Kiefer, 2016)	low

Species	IUCN Red List	UzRDB (2019)	Basic flight information (estimated flight height; presence of migrations)	Level of collision risk (Rodrigues et al., 2015)
Plecotus sp. (Gritsina et al., 2013)	? ¹⁹	Not Listed	Low height (Roemer et al., 2017); sedentary	low
Myotis bucharensis	DD (data deficient)	Critically Endangered 1(CR)	Low height (Roemer et al., 2017); probably sedentary	low
Myotis emarginatus	LC	Not Listed	Low height (Roemer et al., 2017); sedentary (Dietz, Kiefer, 2016)	low
Myotis blythii	LC	Not Listed	Low height (Wellig et al., 2018); sedentary (Dietz, Kiefer, 2016)	low
Myotis capaccinii (?) ²⁰	VU	Not Listed	Low height; short to middle-range migrant (Dietz, Kiefer, 2016)	low
Barbastella caspica (Barbastella leucomelas)	LC	Not Listed	Probably low height; probably sedentary	medium
Pipistrellus kuhlii	LC	Not Listed	Low height (Roemer et al., 2017); sedentary (Dietz, Kiefer, 2016)	high
Otonycteris leucophaea ²¹	DD	Vulnerable, naturally rare 2(VU: R)	Low height (Benda et al., 2012), probably sedentary	unknown
Tadarida teniotis	LC	Vulnerable, naturally rare 2(VU: R)	High height (Wellig et al., 2018); no seasonal migration, foraging area up to 100 km distant from summer roost (Dietz, Kiefer, 2016)	high

The Project Aol consists of flat open desert with generally fairly low suitability for bats due to the lack of suitable roosting features within the Aol and also lack of permanent waterbodies. In terms of roosting two bunker structures were located outside of the Aol and it is possible that they support roosting bats and apart from these features there are no other obvious features within the Aol or within the vicinity of the Project site. There are no buildings or trees within the Aol nor are there bridges, culverts or wells which could support roosting bats.

Bat call analysis has not yet been completed for data collected up to the end of September, but the data up to the end of August are presented below. The final bat report is expected on December 20th 2023.

During the spring and summer up to three species of bats have been recorded at the windfarm area and only infrequently. *Eptesicus species* - Serotine (*Eptesicus serotinus*) and Ognev's Serotine (*Eptesicus ognevi*) are currently not clearly separated by their call parameters. An *Eptesicus species* (one of the two

19 The taxonomy of long-eared bats is still poorly developed for Uzbekistan. Previously, it believed that one species lived in all of Eurasia, but later the several species of long-eared bats were identified. Maria Gritsina, et.al. indicated Plecotus sp. as a long-eared sp. but which one is still unknown. More research is required. The question mark states that it is unknown what species of long-eared bat it is.

20 The habitat of *Myotis capaccinii* is very remote from Uzbekistan. But one recording it was indicated for Uzbekistan. A question mark given in the sense that it is not yet known what kind of species it was in reality.

21 *Otonycteris hemprichi* does not inhabit Uzbekistan (Benda et al., 2011). It was indicated for Uzbekistan in the 20th century (Bogdanov, 1953), when the species *Otonycteris hemprichi* and *Otonycteris leucophaea* were not distinguished. Only *Otonycteris leucophaea* lives in Uzbekistan according to the modern concepts of taxonomists. From a formal point of view, this is a different species. Most likely, the authors of the essays in the Red Book of Uzbekistan (2019), have not being familiar with modern data (for example, Benda et al., 2011), and wrote down an "outdated" name that currently refers to other animals found, for example, in Iran (Benda et al., 2012). Both of these species are found in Iran.

noted above) was recorded 1,222 times in spring from across the whole wind farm and on all 35 bat detectors and 103 times in summer from the whole wind farm on 25 of the ground level detectors only. Kuhl's Pipistrelle was only recorded twice (e.g. two passes) in the spring.

Table 443: Calls per Night from Ground-based Detectors (Period 1 and 2)

No VP	Calls	Nights	Calls/night	No VP	Calls	Nights	Calls/night
VP 1	41	37	1.1	VP 23	48	33	1.5
VP 3	48	41	1.2	VP 25	54	32	1.7
VP 5	30	34	0.9	VP 26	16	10	1.6
VP 7	33	36	0.9	VP 28	1	9	0.1
VP 9	47	35	1.3	VP 30	39	39	1.0
VP 11	23	24	1.0	VP 31	38	41	0.9
VP 13	47	41	1.1	VP 34	36	33	1.1
VP 15	7	10	0.7	VP 35	50	39	1.3
VP 16	36	40	0.9	VP 37	47	42	1.1
VP 18	42	40	1.1	VP 40	3	8	0.4
VP 19	37	40	0.9	VP 41	33	29	1.1
VP 20	24	34	0.7	VP 43	24	30	0.8
VP 21	40	41	1.0	VP 44	39	40	1.0
VP 22	39	40	1.0	VP 45	30	37	0.8
Total					952	915	1.0

Table 454: Calls per Night from Met Mast Detectors (Period 1 and 2)

No VP	Calls	Nights	Calls/night
KAR 1	23	39	0.6
KAR 2	36	39	0.9
KAR 3	86	40	2.2
KAR 4	28	41	0.7
KAR 5	20	28	0.7
KAR 6	40	41	1.0
KAR 8	37	34	1.1
Total	270	262	1.0

Table 464: Calls per Night from Met Mast Detectors (Period 3)

Date	Calls	Detectors with bat calls	Calls/detector
01.06.2023	21	14	1.5
02.06.2023	20	11	1.8
03.06.2023	5	3	1.7
04.06.2023	8	7	1.1
05.06.2023	8	7	1.1
06.06.2023	2	2	1.0
07.06.2023	2	2	1.0
08.06.2023	9	8	1.1

Date	Calls	Detectors with bat calls	Calls/detector
09.06.2023	15	10	1.5
10.06.2023	1	1	1.0
16.06.2023	1	1	1.0
24.06.2023	1	1	1.0
25.06.2023	1	1	1.0
11.07.2023	1	1	1.0
20.07.2023	1	1	1.0
08.08.2023	1	1	1.0
09.08.2023	1	1	1.0
22.08.2023	2	1	2.0
23.08.2023	1	1	1.0
27.08.2023	1	1	1.0
31.08.2023	1	1	1.0
Total:	103		1.2

As can be seen from the data bat activity across the site was very low during all recording periods with bat passes by detector or calls per night being generally less than 2 calls per night (Periods 1 and 2) and on average 1 calls/detector during Period 3. It is therefore concluded that bat activity at the Kungrad WF site is minimal likely as a result of very low habitat suitability and lack of available roosting habitat.

All bat species recorded at the WF are classified as Least concern on the IUCN red list and are not considered threatened or included in the UzRDB.

(vii) Invertebrates

Methods

Surveys for invertebrates were completed in late April 2023 and also in June with each survey effort lasting five days. During each survey the four-bird survey transects were used to sample the invertebrate fauna across the site along with additional random sampling (e.g. at the camp) to provide survey information from habitats that are representative of the Project AoI.

Methodologies used for the survey followed those as written by Kirichenko (1951) and Golub et al. (1980). Surveyors used an entomological net with a diameter of 30 cm and a depth of 80 cm as well as using light traps and screen traps. The materials were collected from 6 AM to 6 PM during the day and from 9 PM to 11 PM at night. The samples were preserved in 96% ethanol and analyzed using an MBS-109 microscope. Surveyors identified the species using key books by Khamraev (2012), Davletschina et al. (1979), relevant scientific articles as well as consultation with external experts.

Results

No species of national or international conservation concern were recorded within the Project AoI and no species considered to be range-restricted, endemic or near-endemic were recorded. The invertebrate

assemblage is considered typical for the Ustyurt Plateau and the habitats present within the AoI and are of negligible sensitivity.

(viii) Avifauna

Methods

Bird surveys have been completed in order to quantify the impact of the Project on key Avifauna species to subsequently inform final turbine layout, to develop additional mitigation (e.g. turbine shut down, habitat/species management plan) and to form the baseline for any future required supplementary surveys and operational monitoring. Survey information has also been used to inform a Collision Risk Model.

Bird surveys have been undertaken involving Vantage Point (VP) surveys, transects, raptor nest searches, and, where necessary, specialist surveys. The following surveys have / will be undertaken through the year:

- Winter Bird Surveys – January to March 2023
- Spring Migration VP surveys – 18th March to 1st June 2023.
- Summer VP surveys – 1st June to 15th August 2023.
- Autumn Migration VP surveys – 15th August to 15th November 2023.
- Transect surveys – four transect surveys to be completed once every two weeks throughout the survey period (18th March to 15th November 2023). These surveys were also completed in the breeding bird season accounting for breeding bird activity across the site.
- MacQueen’s Bustard (*Chlamydotis macqueenii*), Great Bustard (*Otis tarda*), Sociable Lapwing (*Vanellus gregarius*) and Pin-tailed Sandgrouse (*Pterocles alchata*) surveys – March 18th to 23rd May 2023.
- Raptor Nest searches – March, April and May 2023.

The protocol for surveys at VPs has been based on the methodology developed by Scottish Natural Heritage “Survey Methods for Use in Assessing the Impacts of Onshore Wind farms on Bird Communities” (2005, and most recently updated in 2017. However, where appropriate, the protocol has been adapted to be suitable for the location of the site and the additional risks of impacts the project may have on birds. Adaptions to the survey protocol included the use of two-person 360° VPs and permanent presence of observers on site during migration periods. There were no reductions in the accepted GIIP survey protocol and the minimum number of hours per VP in each of the survey seasons was achieved.

Wind farms present four main potential risks to birds:

- Direct habitat loss and disturbance through construction of wind farm infrastructure;
- Displacement (sometimes called indirect habitat loss) if birds avoid the wind farm and its surrounding area due to turbine construction and operation. Displacement may also include barrier effects in which birds are deterred from using normal routes to feeding or roosting grounds;
- Death through collision or interaction with turbine blades and other infrastructure (i.e. collision risk).

- Death through collision or electrocution associated with transmission lines (either internal lines transferring power to on-site sub-station or external lines transferring power to the national grid). This issue is discussed further in “Section 23”.

For each of these four risks, detailed knowledge of bird distribution and flight activity is necessary in order to predict the potential effects of the wind farm on birds.

Vantage Point (VP) Survey

Background

Vantage Point survey is designed to quantify the level of flight activity and the distribution of birds over the survey area. Its primary purpose is to provide input data for the Collision Risk Model (CRM), which is used to inform the Collision Risk Assessment (CRA) to predict likely mortalities from collision with operational turbines. Data can also be used to provide an overview of bird usage of the site to further inform an assessment of the likely impacts of habitat loss, disturbance, displacement and barrier impacts.

Surveyors

A team of suitably experienced ornithologists undertook the surveys and were able to identify all birds seen and heard within the Project Aol. During the surveys they used the following equipment:

- Field survey sheets;
- Weatherproof Clipboard;
- At least two stopwatches / timer watches;
- Compass / GPS unit;
- Binoculars (at least 8x magnification);
- Telescope (minimum 60mm x 25 magnification) with tripod;
- Radios / walkie-talkies; and
- Digital camera

VP Selection

Forty-five (paired) Vantage Points were selected for use during the winter bird survey campaign completed from January to mid-March 2023. The same Vantage Points will be used from mid-March until mid-November 2023 and the location of the Vantage Points is shown in the figure below.

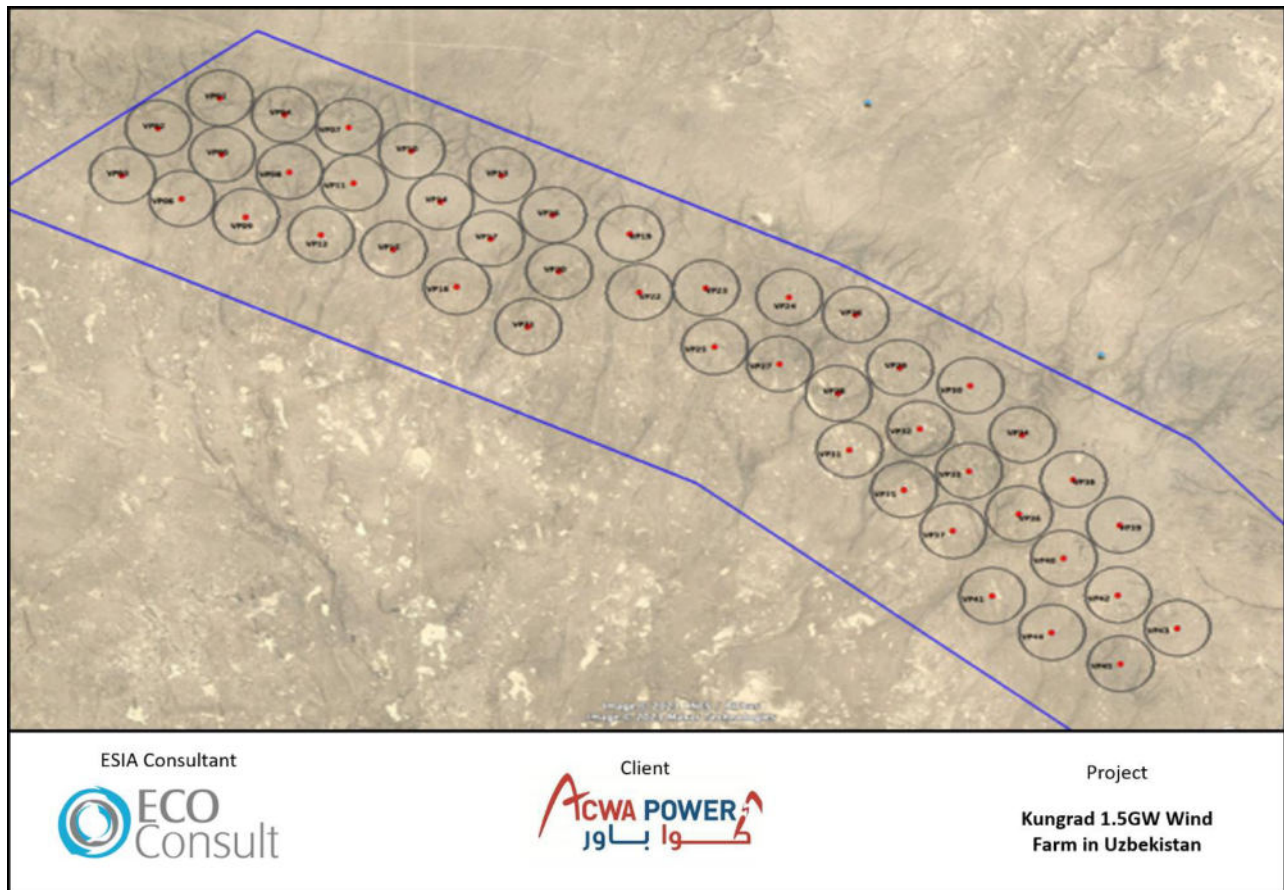


Figure 64: Location of Vantage Points

Vantage Point surveys were undertaken by three teams of two people with each team positioned at a single Vantage Point such that each observer was recording all bird activity within a 180 arc. Each Vantage Point session lasted three hours, so that the observers did not become fatigued and bird activity is recorded in full. Vantage Point surveys were not completed at times of reduced visibility (e.g. fog or heavy rain) and any surveys that were missed were completed on alternative days.

VP Survey Recording

During each VP survey, two recording methods are used to record data: focal bird sampling for Target Species; and activity summaries for Secondary Species.

Target Species and Secondary Species

Target species (shown below) represent the species of greatest sensitivity and/or conservation concern and these species were the primary focus of the surveys.

The Target Species (Tier 1) list is based upon current knowledge and was based on the one used for the 2023 winter bird survey effort (taken from Juru Energy 2023 Bird Monitoring Plan). It should be noted however that for the winter bird surveys species such as Common Kestrel and Long-legged Buzzard were considered as Tier 2 species and full flight information (including at risk flight seconds) was not recorded. The Collision Risk Model and subsequent assessment has considered this and average flight times that were recorded for Common Kestrel and Long-legged Buzzard recorded in the spring and summer periods were used as a proxy for the assessment of collision risk for at risk flights recorded in the winter survey

period. No Harrier species (considered Tier 2 in the winter period) were recorded in the winter period at risk height.

Table 47: Target (Tier 1) Species²²

Latin name	English name	IUCN status	Uzbek status	Notes on Likely Occurrence/Risk
<i>Oxyura leucocephala</i>	White-headed Duck	EN	EN	Rare migrant in Sarygamysh lake. Recorded in 2010 (Ten et al, 2012)
<i>Pelecanus onocrotalus</i>	Great White Pelican	LC	VU:D	Common migrant in Sarygamysh lake (Ten, 2017)
<i>Pelecanus crispus</i>	Dalmatian Pelican	NT	EN	Common migrant in Sarygamysh lake. Observed in 2010. (Ten et al, 2012)
<i>Plegadis falcinellus</i>	Glossy Ibis	LC	VU	Common migrant in Sarygamysh lake (Ten, 2017)
<i>Platalea leucorodia</i>	Eurasian Spoonbill	LC	VU	Common migrant in Sarygamysh lake (Ten, 2017)
<i>Aquila nipalensis</i>	Steppe Eagle	EN	VU	Common migrant and rare breeding species. In May and September 2017 observed on project area (Ten, 2017)
<i>Aquila chrysaetos</i>	Golden Eagle	LC	VU	Common breeding species in Ustyurt (Ten, 2017)
<i>Aquila heliaca</i>	Imperial Eagle	VU	VU	Common migrant. In May 2017 observed on project area (Ten, 2017)
<i>Neophron percnopterus</i>	Egyptian Vulture	EN	VU	Common nesting species in cliffs of Chink (Ten, 2017)
<i>Aquila clanga</i>	Greater Spotted Eagle	VU	VU	Common migrant (Ten, 2017)
<i>Falco cherrug</i>	Saker Falcon	EN	EN	Common nesting species in cliffs of Chink (Ten, 2017)
<i>Aegypius monachus</i>	Cinereous Vulture	NT	NT	Rare breeding in the Southern Ustyurt (Ten, 2017)
<i>Circaetus gallicus</i>	Short-toed Snake- Eagle	LC	VU	Rare migrating bird. 1 bird was recorded near Barsakelmes (Mitropolskiy, 2012)
<i>Haliaeetus albicilla</i>	White-tailed Eagle	LC	VU	Common migrant and wintering in Sarygamysh lake (Ten, 2017)

Latin name	English name	IUCN status	Uzbek status	Notes on Likely Occurrence/Risk
Pandion haliaetus	Osprey	LC	VU	Common migrant in Sarygamysh lake (Ten et al, 2012)
Circus aeruginosus	Eurasian Marsh-Harrier	LC	LC	Fairly common in Sarygamysh lake (Ten, 2017)
Circus cyaneus	Hen Harrier	LC	LC	Common migrating species in region (Ten, 2017)
Circus macrourus	Pallid Harrier	NT	NT	Common migrating species in region (Ten, 2017)
Accipiter nisus	Eurasian Sparrowhawk	LC	LC	Common migrating species in region (Ten, 2017)
Buteo rufinus	Long-legged Buzzard	LC	LC	Fairly common in region (Ten, 2017)
Buteo buteo vulpinus	Common (Steppe) Buzzard	LC	LC	Common migrating species in region (Ten, 2017)
Milvus migrans	Black Kite	LC	LC	Common migrating species in region (Ten, 2017)
Falco tinnunculus	Common Kestrel	LC	LC	Common in region (Ten, 2017)
Falco naumanni	Lesser Kestrel	LC	NT	Recorded near Chink of Ustyurt (Ten, 2017)
Tetrax tetrax	Little Bustard	NT	VU	Rare migrant in Ustyurt Observed in 2010. (Ten et al, 2012)
Otis tarda	Great Bustard	VU	CR	Rare migrant. The footprints were recorded in May 2017 at Kaplankyr depression (Ten, 2017)
Chlamydotis macqueenii	MacQueen's Bustard	VU	VU	Rare nesting and migration species in project area (Burnside oral comm., Ten, 2017) sensitive to displacement, as well as collision

Latin name	English name	IUCN status	Uzbek status	Notes on Likely Occurrence/Risk
<i>Limosa limosa</i>	Black-tailed Godwit	NT	VU	Common migrant in Sarygamysh lake (Ten, 2017)
<i>Limosa lapponica</i>	Bar-tailed Godwit	NT	LC	Rare migrant in Sarygamysh lake ⁹
<i>Numenius arquata</i>	Eurasian Curlew	NT	VU	Common migrant in Sarygamysh lake (Ten, 2017)
<i>Calidris ferruginea</i>	Curlew Sandpiper	NT	LC	Common migrant and summering in Sarygamysh lake (Ten, 2017)
<i>Glareola nordmanni</i>	Black-winged Pratincole	NT	VU	Rare migrant in Sarygamysh lake (Mitropolskiy, 2012)
<i>Larus ichthyaetus</i>	Pallas's Gull	LC	VU	Common migrant in Sarygamysh lake (Ten, 2017)
<i>Pterocles alchata</i>	Pin-tailed Sandgrouse	LC	VU	Common breeding species and numerous migrants in the region (Ten, 2017)
<i>Syrrhaptes paradoxus</i>	Pallas's Sandgrouse	LC	LC	Common breeding species and migrant in the regional, (Ten et al, 2012)

Focal Bird Sampling

The area in view was scanned until a Target Species was detected at which point it is followed until it ceases flying or is lost from view.

The time the target bird was detected, and the flight duration were recorded and the route the bird followed was plotted in the field onto the maps. The bird's flight height is estimated at the time of detection and then at 15 second intervals thereafter.

Flight heights were recorded in height bands, i.e. below the rotor- swept area, the rotor-swept area and above the rotor-swept area, allowing for observer error. Height bands are as follows:

- 0 – 15m
- 15 – 30m
- 30 – 200m
- 200 – 240m
- 240m+ (with notes on flight height)

Data Recording Methods

Data for Target Species was recorded on to survey forms and mapped onto field maps specific to each Vantage Point and the following information was recorded:

- The location of the VP used.
- Date of survey.
- Surveyor name.
- Start and End time of the VP session.
- Flight lines of target species
- Reference number of each flight line corresponding to that on the form.
- Species
- Age / sex (if known)
- Estimation of flight height
- Duration of at-risk flight

The data from the Vantage Point surveys has been collated on to seasonal Excel workbooks and the data used to inform the Collision Risk Model and subsequent assessment.

Transect Survey

Transect Surveys (with point counts) has been undertaken during the Spring and Summer survey seasons and will also be completed in the Autumn migration season.

Four transects were selected these are shown on figure below. Each transect is approximately 17 km long and was driven twice per month. On each transect survey a point count survey was completed every 1 km and the surveyor scanned up to 500m from the point count location and all birds seen / heard were recorded in full.

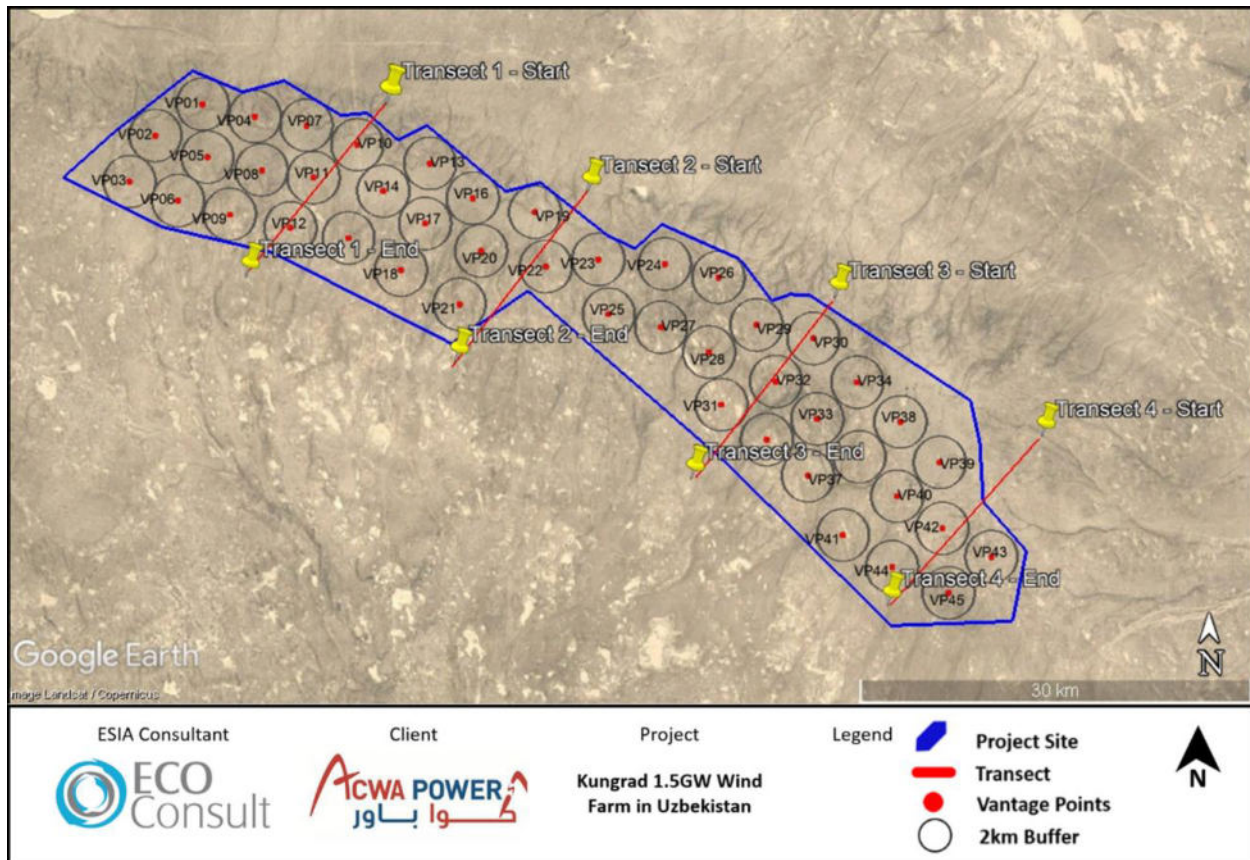


Figure 65: Location of Bird Survey Transects

MacQueen’s Bustard and Other Species of Conservation Concern

Specialized surveys for breeding MacQueen’s Bustard or migrating Great Bustard and Sociable Lapwing. These surveys would have been completed where MacQueen’s Bustard, Great Bustard or Sociable Lapwing were recorded on other surveys (including incidental sightings) and would have involved additional point count or transect sampling to record species activity in full (including breeding activity). Sociable Lapwing and Great Bustard were not recorded on any survey and MacQueen’s Bustard were only recorded infrequently and when observed no nesting / lekking activity was recorded thus negating the need for additional survey.

Raptor Nest Searches

The purpose of specialized raptor nest surveys was to survey the AoI and up to 10 km buffer to accurately record the breeding locations of raptors.

The potential list of breeding raptors in the AoI and buffer area is as follows:

- Steppe Eagle (IUCN EN, UzRDB:VU)
- Imperial Eagle (IUCN and UzRDB VU)
- Saker Falcon (IUCN and UzRDB EN)
- Egyptian Vulture (IUCN and UzRDB EN)
- Cinereous Vulture (IUCN and UzRDB VU)

- Common Kestrel (IUCN and UzRDB LC)
- Lesser Kestrel (IUCN LC, UzRDB NT)
- Golden Eagle (IUCN LC, UzRDB VU)
- Long-legged Buzzard (IUCN and UzRDB LC)
- Eagle Owl (IUCN LC)
- Little Owl (IUCN LC)

The breeding season of these species starts in February / March and continues up to August. Typical nesting substrates for most of these species include cliffs or bluffs, saxaul bushes, karst sinkholes or caves, OHTL poles, or abandoned buildings or other human structures. All of these types of features are very rare within, or absent from the Aol and buffer zone and therefore raptor nesting activity is expected to be extremely limited. Nonetheless, in this environment, Steppe Eagles may nest on the ground, and harriers are frequently ground nesters, hence the raptor nest search effort included comprehensive searching for the typical (non-ground) nesting substrates, plus limited and selective searching for ground nests of key species (based on observations of birds engaged in behaviors indicative of nesting activity).

Results

General

A total of 36 hours Vantage Point observation was completed at each Vantage Point in Winter, Spring and Summer resulting in a cumulative total of 9,720 hours observation over the three survey seasons completed so far. A further 3,240 hours observation will be completed during the autumn migration season.

The results from the Winter, Spring Migration and Summer survey periods are presented in the following sections. An interim data set for Autumn migration surveys has been provided and headline results, where relevant, are presented in this ESIA. Further iterations of the ESIA (e.g. an addendum) will be provided once the full autumn data set has been processed.

Winter Bird Surveys

During the winter season, 46 bird species were recorded during Vantage Point monitoring, including six species with elevated IUCN status, and seven with national protected status. These were:

- Mute Swan (UzRDB NT),
- White-tailed Sea-eagle (UzRDB VU),
- Pallid Harrier (IUCN and UzRDB VU),
- Greater Spotted Eagle (IUCN and UzRDB VU),
- Steppe Eagle (IUCN EN and UzRDB VU),
- Eastern Imperial Eagle (IUCN and UzRDB VU),
- Golden Eagle (UzRDB VU),

- Northern Lapwing (IUCN NT),
- Pallas's Gull (UzRDB VU), and
- Pin-tailed Sandgrouse (UzRDB VU).

Spring Migration Surveys

During the Spring Migration Surveys a total of 80 species were recorded as a result of the Vantage Point and transect surveys as well as those species recorded as incidental sightings (e.g. travelling between VPs or to and from the surveyor's camp). Registrations of note during the Spring Migration Surveys include the following species of conservation concern:

- Golden Eagle (UzRDB VU)
- Eastern Imperial Eagle (IUCN and UzRDB VU)
- Steppe Eagle (IUCN EN and UzRDB VU),
- MacQueen's Bustard (IUCN VU and UzRDB VU)
- Short-toed Eagle (IUCN LC and UzRDB VU)
- Pallid Harrier (IUCN and UzRDB NT),
- Lesser Kestrel (UzRDB NT),
- Pallas's Fish Eagle (IUCN EN)

Summer Surveys

A total of 54 species were recorded during the summer bird surveys. Of these only five were 'target' species of the VP surveys and these were Golden Eagle, Steppe Eagle, Long-legged Buzzard, MacQueen's Bustard and Egyptian Vulture. Recorded activity during the summer period was very low when compared to winter and spring.

The table below provides a summary of Vantage Point Data for the winter, spring, summer and autumn surveys and includes details of relevant species conservation status, total number of individuals recorded, and total number of at-risk flights recorded.

Table 48: Results of Winter, Spring, Summer and Interim Autumn Vantage Point Surveys – Notable Species or Registrations

Common Name	Scientific Name	IUCN	UzRDB	Winter		Spring			Summer			Autumn	
				Tot Recorded	Inds Flight (inds)	Tot Recorded	Inds Flight (inds)	Tot at Risk	Tot Recorded	Inds Flight (inds)	Tot at Risk	Tot Recorded	Inds Flight (inds)
Northern Goshawk	<i>Accipiter gentilis</i>	LC	N/A	0	0	0	0	0	0	0	2	0	
Eurasian Sparrowhawk	<i>Accipiter nisus</i>	LC	N/A	0	0	0	0	0	0	0	17	5	
Cinereous Vulture	<i>Aegypius monachus</i>	NT	NT	0	0	0	0	0	0	0	20	12	
Golden Eagle	<i>Aquila chrysaetos</i>	LC	VU:R	25	15	1 (out)	1 (out)	1	0	0	39	8	
Eastern Imperial Eagle	<i>Aquila heliaca</i>	VU	VU:D	10	7	1	1	0	0	0	164	72	
Steppe Eagle	<i>Aquila nipalensis</i>	EN	VU:D	404	202	27	20	7	4	4	558	198	
Eurasian Eagle Owl	<i>Bubo bubo</i>	LC	N/A	0	0	0	0	0	0	0	2	0	
Common (Steppe) Buzzard	<i>Buteo buteo vulpinus</i>	LC	N/A	0	0	1	0	0	0	0	1	1	
Long-legged Buzzard	<i>Buteo rufinus</i>	LC	LC	11	5	35	28	26	20	20	42	27	
MacQueen's Bustard	<i>Chlamydotis macqueenii</i>	VU	VU:D	0	0	6	3	8	3	3	21	5	
Short-toed Eagle	<i>Circaetus gallicus</i>	LC	VU:D	0	0	1	1	0	0	0	0	0	
Greater Spotted Eagle	<i>Clanga clanga</i>	VU	VU:R	3	2	0	0	0	0	0	0	0	
Western Marsh Harrier	<i>Circus aeruginosus</i>	LC	LC	0	0	2	2	0	0	0	4	3	
Hen Harrier	<i>Circus cyaneus</i>	LC	LC	4	0	12	0	0	0	0	17	2	
Pallid Harrier	<i>Circus macrourus</i>	NT	NT	1	0	14	9	0	0	0	25	7	
Montagu's Harrier	<i>Circus pygargus</i>	LC	LC	0	0	1	0	0	0	0	7	6	
Mute Swan	<i>Cygnus olor</i>	LC	NT	2	0	0	0	0	0	0	0	0	
Merlin	<i>Falco columbarius</i>	LC	LC	5	0	0	0	0	0	0	11	1	
Lesser Kestrel	<i>Falco naumanni</i>	LC	NT	0	0	2	1	0	0	0	13	10	
Eurasian Hobby	<i>Falco subbuteo</i>	LC	LC	0	0	1	0	0	0	0	3	1	
Common Kestrel	<i>Falco tinnunculus</i>	LC	LC	1	1	33	17	0	0	0	90	57	
Black-winged Pratincole	<i>Glareola nordmanni</i>	NT	VU	0	0	20	8	0	0	0	0	0	
White-tailed Eagle	<i>Haliaeetus albicilla</i>	LC	VU:R	3	1	0	0	0	0	0	1	0	

Common Name	Scientific Name	IUCN	UzRDB	Winter			Spring			Summer			Autumn			
				Tot Recorded	Inds	Tot at Risk Flight (inds)	Tot Recorded	Inds	Tot at Risk Flight (inds)	Tot Recorded	Inds	Tot at Risk Flight (inds)	Tot Recorded	Inds	Tot at Risk Flight (inds)	
Pallas's Fish Eagle	<i>Haliaeetus leucoryphus</i>	EN	-	0		0	1		1	0		0		0		0
Booted Eagle	<i>Hieraaetus pennatus</i>	LC	VU	0		0	0		0	0		0		1		1
Pallas's Gull	<i>Ichthyaetus ichthyaetus</i>	LC	VU:D	1		0	0		0	0		0		0		0
Egyptian Vulture	<i>Neophron percnopterus</i>	EN	VU:D	0		0	0		0	1		1		0		0
Black Kite	<i>Milvus migrans</i>	LC	LC	3		3	13		1	0		0		18		17
Honey Buzzard	<i>Pernis apivorus</i>	LC	-	0		0	0		0	0		0		6		5
Pin-tailed Sandgrouse	<i>Pterocles alchata</i>	LC	VU:D	21		3	0		0	0		0		50		0
Black-bellied Sandgrouse	<i>Pterocles orientalis</i>	LC	LC	0		0	20		20	0		0		834		378
Pallas's Sandgrouse	<i>Syrrhaptes paradoxus</i>	LC	LC	10,686		1,484	0		0	0		0		405		192
Northern Lapwing	<i>Vanellus vanellus</i>	NT	LC	3		0	0		0	0		0		0		0

Table 49: Combined (Yearly) Counts of Notable Species and Records and Number of at-Risk Flights Recorded by Species

Common Name	Scientific Name	IUCN	UzRDB	Combined Totals (Year)	
				Tot Inds Recorded	Tot at Risk Flight (inds)
Northern Goshawk	<i>Accipiter gentilis</i>	LC	N/A	2	0
Eurasian Sparrowhawk	<i>Accipiter nisus</i>	LC	N/A	17	5
Cinereous Vulture	<i>Aegypius monachus</i>	NT	NT	20	12
Golden Eagle	<i>Aquila chrysaetos</i>	LC	VU:R	66	24
Eastern Imperial Eagle	<i>Aquila heliaca</i>	VU	VU:D	175	80
Steppe Eagle	<i>Aquila nipalensis</i>	EN	VU:D	996	424
Eurasian Eagle Owl	<i>Bubo bubo</i>	LC	N/A	2	0
Common (Steppe) Buzzard	<i>Buteo buteo vulpinus</i>	LC	N/A	2	1
Long-legged Buzzard	<i>Buteo rufinus</i>	LC	LC	114	80
MacQueen's Bustard	<i>Chlamydotis macqueenii</i>	VU	VU:D	35	11
Short-toed Eagle	<i>Circaetus gallicus</i>	LC	VU:D	1	1
Greater Spotted Eagle	<i>Clanga clanga</i>	VU	VU:R	3	2
Western Marsh Harrier	<i>Circus aeruginosus</i>	LC	LC	6	5
Hen Harrier	<i>Circus cyaneus</i>	LC	LC	33	2
Pallid Harrier	<i>Circus macrourus</i>	NT	NT	40	16
Montagu's Harrier	<i>Circus pygargus</i>	LC	LC	8	6
Mute Swan	<i>Cygnus olor</i>	LC	NT	2	0
Merlin	<i>Falco columbarius</i>	LC	LC	16	1
Lesser Kestrel	<i>Falco naumanni</i>	LC	NT	15	11
Eurasian Hobby	<i>Falco subbuteo</i>	LC	LC	4	1
Common Kestrel	<i>Falco tinnunculus</i>	LC	LC	124	75
Black-winged Pratincole	<i>Glareola nordmanni</i>	NT	VU	20	8
White-tailed Eagle	<i>Haliaeetus albicilla</i>	LC	VU:R	4	1
Pallas's Fish Eagle	<i>Haliaeetus leucoryphus</i>	EN	-	1	1
Booted Eagle	<i>Hieraetus pennatus</i>	LC	VU	1	1
Pallas's Gull	<i>Ichthyaetus ichthyaetus</i>	LC	VU:D	1	0
Egyptian Vulture	<i>Neophron percnopterus</i>	EN	VU:D	1	1
Black Kite	<i>Milvus migrans</i>	LC	LC	34	21
Honey Buzzard	<i>Pernis apivorus</i>	LC		6	5
Pin-tailed Sandgrouse	<i>Pterocles alchata</i>	LC	VU:D	71	3
Black-bellied Sandgrouse	<i>Pterocles orientalis</i>	LC	LC	854	398
Pallas's Sandgrouse	<i>Syrhaptes paradoxus</i>	LC	LC	11091	1676
Northern Lapwing	<i>Vanellus vanellus</i>	NT	LC	3	0

Summary of Notable Records from Vantage Point Survey, Transect Surveys, and Camera Trapping Surveys

The following section provides a summary of registrations of species of national or international conservation concern recorded during the Winter, Spring, Summer and) Autumn Migration Vantage Point Surveys.

Mute Swan (UzRDB NT)

Two birds recorded during the Winter surveys only. Not at-risk flight seconds recorded.

White-tailed Sea-eagle (UzRDB VU)

Three individual birds recorded during the Winter surveys with one at-risk flight registered. This species regularly occurs in Uzbekistan, generally in the Aral Sea region and the wintering population is considered to be between 300 and 400 individuals. Regularly occurs on migration however is a very rare breeding species. Not recorded in the Spring Migration season. A single bird was recorded on the Autumn Migration surveys however this flight was above rotor swept area.

Pallid Harrier (IUCN and UzRDB NT)

1 individual recorded in the Winter season (not at-risk height) and 14 individuals recorded during the Spring Migration surveys with nine flights registered at-risk height. 40 individuals were also recorded during the Autumn Migration surveys, with 16 of these flights registered at risk height.

Greater Spotted Eagle (IUCN and UzRDB VU)

Only recorded during the Winter bird surveys and registrations are likely to be of early migrating birds or birds that may have over-wintered within Uzbekistan. Three individuals were recorded with two at-risk flights registered.

Steppe Eagle (IUCN EN and UzRDB VU)

Significantly more Steppe Eagles were recorded during the Winter surveys than on the Spring Migration surveys, indicating that ‘spring’ migratory movement for this species through the Project AoI occurs earlier in the ‘migration season’, in February and March (Figure 66). A total of 404 individuals were recorded in the Winter season with a significant peak in movements between the 10th and 14th March when 358 individuals were recorded. Of the 404 individuals recorded, 202 were at risk height.

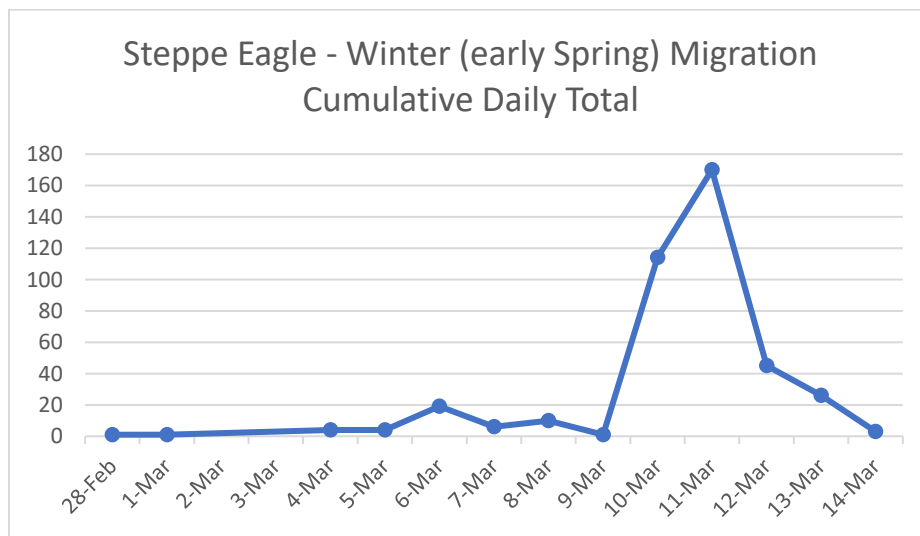


Figure 66: Cumulative Daily Totals – Steppe Eagle Winter Survey Period

There were 31 recorded flights in the breeding bird season and these are likely to be of locally breeding birds, as there was one active nest of this species within the AoI in 2023. Seven flights were recorded during the summer surveys with four at risk flights registered. Spring / summer activity of this species is considered to be minimal.

During the Autumn migration surveys a total of 538 individuals were recorded with a total of 198 birds recorded at risk height. There was a significant peak of migration in October (Figure 67) with the majority of the autumn records being recorded between the 13th and 15th October when 359 flights were recorded. There was also a smaller peak in activity on the 14th September when 60 individuals were recorded.

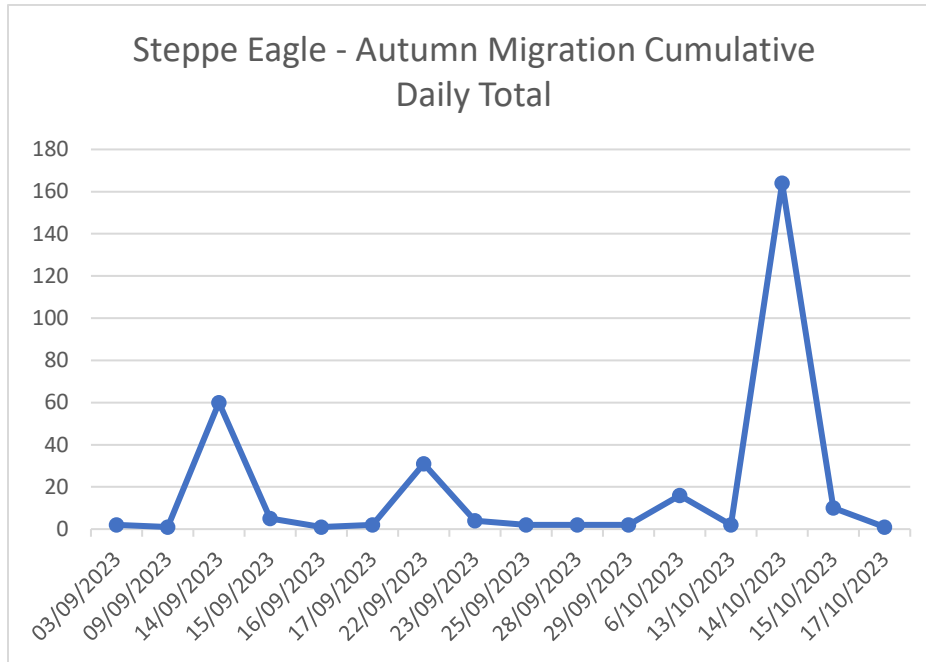


Figure 67: Cumulative Daily Totals – Steppe Eagle Autumn Migration Survey Period

Eastern Imperial Eagle (IUCN and UzRDB VU)

Recorded in the Winter (10 individuals), Spring Migration (1 individual) and Autumn Migration (164 individuals) survey seasons and it is likely that all individuals recorded were migrating through the Ustyurt Plateau. Of the birds recorded in the autumn surveys, 72 individuals were recorded at risk height. As shown on the graph below there was a peak in movement on the 14th October 2023, with a smaller spike in migratory behavior towards the end of October.

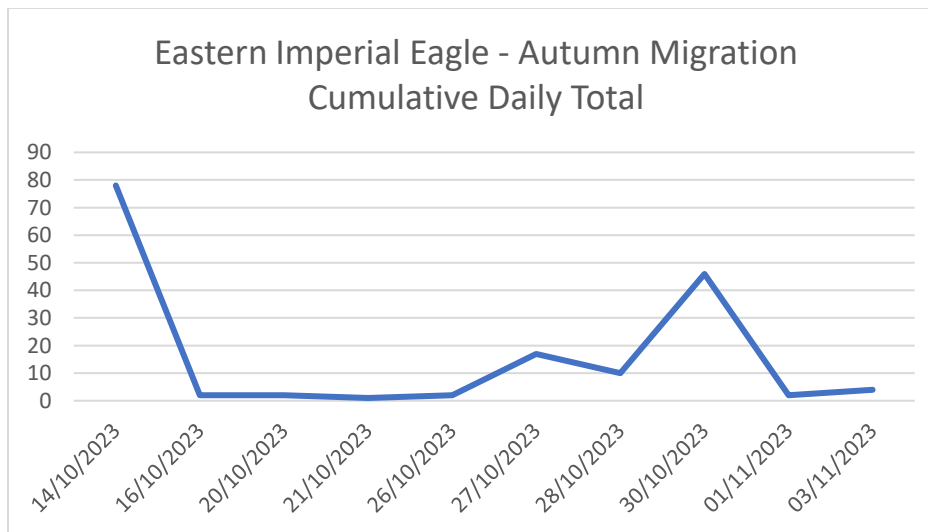


Figure 68: Cumulative Daily Totals – Eastern Imperial Eagle Autumn Migration Survey Period

Golden Eagle (UzRDB VU)

Recorded in both the Winter (25 individuals), Spring Migration (1 individual), Summer (1 individual) and Autumn Migration (39 individuals) survey seasons and it is likely that all individuals recorded were migrating through the Ustyurt Plateau. This species did not breed in the vicinity to the wind farm however one active nest was recorded on the shores of Sarygamysh Lake IBA by Turnstone Ecology in April 2023.

Pallas's Gull (UzRDB VU)

A single registration of a single bird in the Winter bird surveys.

Pin-tailed Sandgrouse (UzRDB VU)

A total of 23 individuals were recorded flying through the Project AoI during the Winter bird surveys. Of these, only three flights were recorded at-risk height. In Autumn 2023 a total of 50 individuals were recorded flying through the wind farm and of these none were at risk height.

Pallas's Sandgrouse (IUCN and UzRDB LC)

During the winter bird survey period a total of 10,686 individual Pallas's Sandgrouse were recorded flying through the wind farm and approximately 14% of these were at-risk height. 405 birds were recorded during the Autumn migration surveys and of these 192 were recorded at risk height. This is a species of Least Concern (IUCN and UzRDB) and are a fast flying and highly mobile species. It is not considered further in this assessment.

MacQueen's Bustard (IUCN VU and UzRDB VU)

No MacQueen's Bustard were recorded during the winter period. A total of six birds were recorded during the Spring Migration Vantage Point surveys and of these only three were at-risk height. This level of low flight activity in the spring mirrored general recorded activity across the AoI during the survey period. This species was encountered very sporadically during the transects surveys or registered as incidental sightings and where encountered only individual birds were observed (check table below). A single bird was also recorded on one occasion on the camera traps deployed within the AoI.

MacQueen's Bustard are not considered to have bred within the Project AoI as no evidence of breeding (e.g. lekking, or presence of chicks). Surveyors were present on site for the entire breeding period and due to the size of the survey team (three teams of two observers) and number of surveys being completed daily, site coverage was very good. Each VP would have been subject to survey every five days and observers were driving from camp to the VPs and between VPs daily. In addition, transects were completed every two weeks during the breeding bird season.

Given the extent of the site coverage as well as the fact that other cryptic species (e.g. Greater Sandplover) were recorded with chicks it is considered that if MacQueen's Bustard were breeding on site some evidence of this activity would likely have been recorded.

Table 50: Registration of MacQueen's Bustard during the Spring Migration Period

Date	VP Number	Coordinates
24/03/2023	VP-7	43.21355, 56.28072
26/03/2023	VP-30	43.07023, 56.75256
05/04/2023	-	43.04595, 56.88765
10/04/2023	-	42.96186, 56.78958
11/04/2023	VP-45	42.88260, 56.87791
13/04/2023	VP-20	43.14260, 56.44649

26/04/2023	-	42.98802, 56.83836
27/04/2023	-	43.16439, 56.44223
29/04/2023	VP-18	43.11842, 56.36441
17/05/2023	VP-17	43.14658, 56.39265

There were also 8 individuals (3 at risk height) recorded in the Summer and 9 individuals (2 at risk height) recorded in the Autumn Migration Vantage Point surveys.

Twenty-one birds were recorded on the Autumn migration VP surveys and of these five at risk flights were recorded. In addition, a small flock of five birds was also recorded during the transect surveys completed during the Autumn Migration surveys.

MacQueen's Bustard are being released in the northern part of the Ustyurt Plateau (outside of the Project Aol), with birds thought to be from Kazakhstan.

Based on consultations undertaken (refer to "Section 6.3.1"), it was indicated that there are release programs for the MacQueen's Bustards into Karakalpakstan. MacQueen's Bustard release programs are undertaken mainly the International Fund for Houdara Conservation in Abu Dhabi (OAE) and brought to the framework of the partnership between Ministry of Ecology, Environmental Protection and Climate Change. In addition, Falcon Hunting Solutions (private sector company) is involved in organizing hunting expeditions in Karakalpakstan for the bustards in Uzbekistan by Arab state royalty whom use a private civil airport within the area.

Based on consultations it was indicated that no activities (release programs or hunting expeditions) are undertaken within the Project specific area. However, no further details were provided on specific inquiries stating that it is confidential information.

It is however clear from the survey data collected in winter, spring, summer and autumn that the Project Aol is not of significance for this species (both wild or released birds).

Short-toed Eagle (IUCN:LC and UzRDB VU:D)

Single individuals recorded on both the Winter and Spring Migration bird surveys. Neither flight was recorded at risk height.

Pallas's Fish Eagle (IUCN EN)

A single bird was recorded during the Spring Migration surveys.

Egyptian Vulture (IUCN EN and UzRDB VU)

Single bird seen flying through the wind farm during the summer surveys.

Booted Eagle (IUCN LC and UzRDB VU)

A single individual was recorded (at risk height) during the Autumn Migration surveys.

Cinereous Vulture (IUCN NT and UzRDB NT)

20 individuals (12 at risk height) recorded during the Autumn Migration surveys.

Notable Incidental Records (e.g. not during VP or transect surveys)

Incidental records of note recorded during the Spring Migration period include:

- Cinereous Vulture (IUCN NT and UzRDB NT) – one registration of two birds seen on 26th April 2023 and a single bird was recorded on the camera trap near VP38 on the 10th March 2023. Not recorded during the Vantage Point Surveys.
- Eurasian Griffon Vulture (IUCN LC and UzRDB VU) – one registration of a single bird seen on 26th April with the two Cinereous Vultures. Not recorded during the Vantage Point surveys.
- White-tailed Eagle (IUCN LC and UzRDB VU) – one recorded on a camera trap near VP28 on the 13th March 2023. This species was not recorded during the Vantage Point surveys.
- Eagle Owl – a dead Eagle Owl was found under the low voltage power line running through the Project Aol on the 12th April 2023. Individual birds were seen occasionally across the site during the survey period including one adult bird recorded during the Turnstone Ecology field visit.
- Eagle Owl Pellet Analysis – the following species were recorded from analysis of Eagle Owl pellets; Great Bittern, Glossy Ibis, Common Shelduck, Common Teal, Common Quail, Black-headed Gull, Common Kingfisher, Kentish Plover, Jack Snipe, White-tailed Lapwing, Black-winged Stilt, Eurasian Collared Dove, Eurasian Hoopoe, and Eurasian Wryneck.

Nesting Raptor Surveys

A single active nest of Steppe Eagle was identified within the Project Aol however despite laying two eggs the nest failed mid-way through the season and the bird abandoned the nest. The reasons for abandonment are unknown however it is possible that the nest was predated by Caracal as there is a camera trap picture of a Caracal visiting the nest in the early spring period. The nest was constructed on the ground and given its size is obviously a regularly used nesting location that had been used for a number of years. A further three abandoned / damaged nests considered to be Steppe Eagle nests were located within the Project Aol (refer to table and figure below).

Table 51: Coordinates of Active and Abandoned Steppe Eagle Nests in the Project Area

Coordinates	Active status of nest
43.110958, 56.772628	Destroyed old nest (collapsed)
43.217536, 56.321941	Active eagle nest. they had 2 eggs, but nest failed in 2023
43.12683, 56.354670	Old raptor nest on the tomb (considered to be Steppe Eagle)
43.218124, 56.136120	Old raptor nest on the ground (considered to be Steppe Eagle)

A total of 57 Long-legged Buzzard nests were recorded in the Project Aol and breeding raptor survey areas however of these only seven were active in 2023 (Table below). The majority of the 57 nests found were former nests that were irreparably damaged or the bushes they were constructed on had fallen over and are unlikely to be used in the future.

Table 52: Coordinates of Active Long-legged Buzzard Nests in the Project Area

Coordinates	Active status of nest
42.901177, 56.952580	Active nest with 3 eggs
43.06162, 56.791980	Active nest with 2 eggs
42.902186, 56.873672	Active nest with two chicks
43.0243, 56.700912	Active nest with two eggs, 1 chick hatched

42.95276, 56.962870	Active nest with three eggs
43.05565, 56.660021	Active nesting, chicks/eggs not recorded
42.96727, 56.737315	Active nest with two chicks

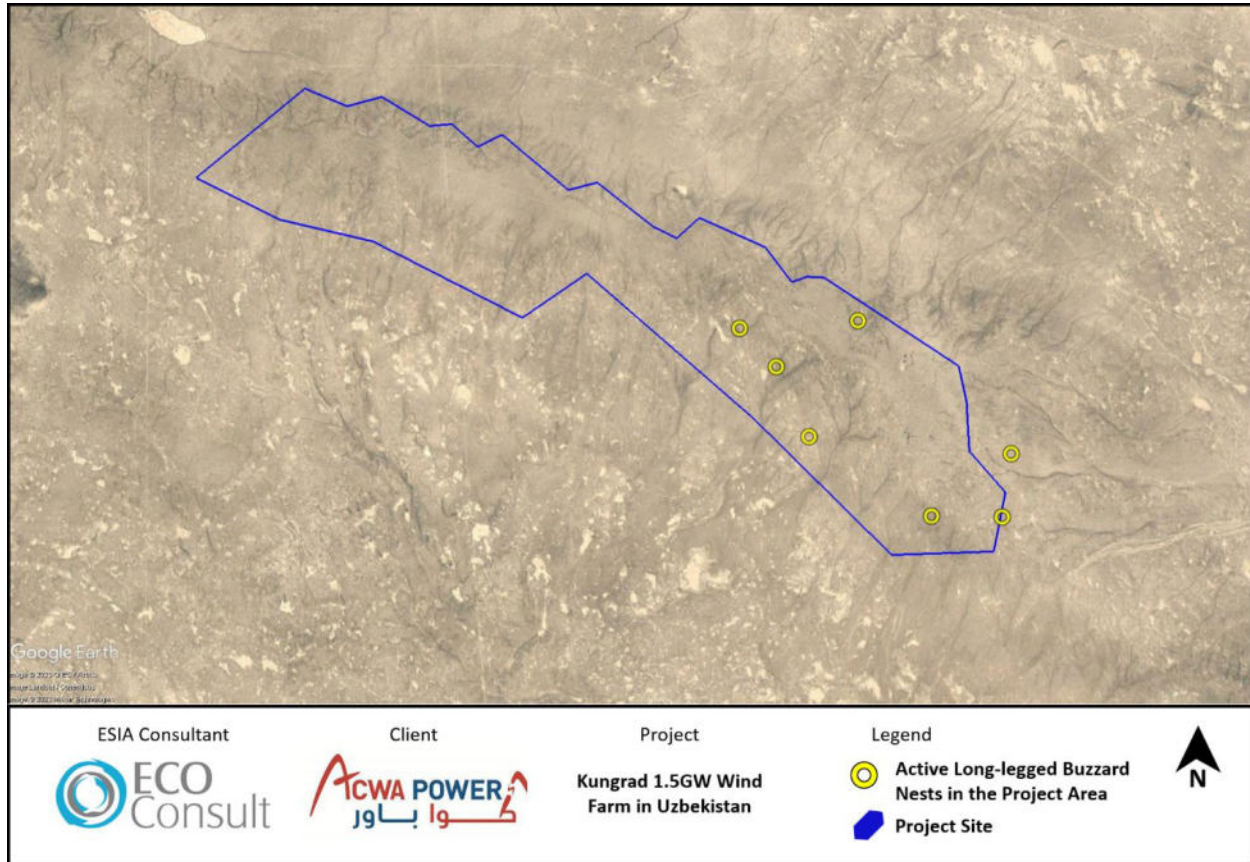


Figure 69: Location of Active Long-legged Buzzard Nests in the Project Area

An old Eagle Owl nest was found near to VP27; however, this species is not considered to have bred within the Aol during the 2023 season.

Breeding Bird Surveys

The breeding bird assemblage, not including Steppe Eagle and Long-legged Buzzard consists of a very small assemblage of common and widespread passerine species of low conservation concern including Greater Short-toed Lark and Turkmenistan Short-toed Lark. Greater Sand plover were also confirmed as breeding with an estimated population of up to nine breeding pairs identified across the Aol. It is considered that recent droughts within the Ustyurt Plateau have likely reduced the suitability of the Aol for this species. In addition, the general lack of taller vegetation and general sparsely vegetated site likely limits the breeding bird assemblage. Excluding raptors, the breeding bird assemblage is of negligible sensitivity.

(ix) Sensitive Receptors

A table is provided below which details the sensitivities of the receptors recorded within the Project Aol that may be impacted by the construction and operation of the proposed wind farm and will therefore be considered within the impact assessment.

Any species recorded during surveys, but which are not listed in the sensitive receptor table are considered to be of Low/lower value.

- Impacts on Low/Lower value species are expected to be of low to moderate magnitude and are therefore not significant; and
- Mitigation for higher value receptors will also alleviate impacts on these lower value receptors.

Therefore, these Low/lower value species have not been listed out in detail and the impact assessment section will not include assessments on these receptors.

Species identified as Priority Biodiversity Features (PBFs) are also identified in the table below.

Table 53: Summary of Sensitive Receptors Species

Receptor	Conservation Status		Justification	PBF (Yes or No)	Sensitivity
	IUCN	UZBDB			
Natural Habitat	-	-	<p>Natural Habitat – Type 8 Desert, sub-type 8.2 Temperate Desert (IUCN Habitats Classification) or Stony (Gypsum) Desert (National Classification). This habitat is not listed in Annex I or included as a Priority Habitat. Good condition natural habitat dominates the Project AoI.</p> <p>No plant species present of international or national conservation concern and no endemic or range-restricted species considered to be present (based on surveys completed to date and in-country expert opinion).</p> <p>Areas of modified or highly degraded natural habitat (irrecoverably lost) this is the dominant habitat along the access road from Kirkkiz. Existing access tracks crisscross the Project site and in these areas that habitat is also considered highly degraded natural habitat.</p> <p>Should pre-clearance / pre-construction surveys find presence of IUCN VU/EN/CR or RR plant species, appropriate mitigations will be completed</p>	No	Low to Medium
Central Asian Tortoise	VU	VU	Present across the AoI in low population density. Species is IUCN and UzRDB VU	Yes	High
Desert Sand Boa	LC	VU	Present across the AoI in very low densities. Species in not included on the IUCN Red List and is UzRDB VU only	No	Medium
Blotched Rat-snake	LC	VU	Present across the AoI in very low densities. Species in not included on the IUCN Red List and is UzRDB VU only	No	Medium
Brandt’s Hedgehog	LC	NT	Two skins found indicating presence in AoI in low density. UzRDB NT species only	No	Medium
Corsac Fox	LC	VU	Individual burrows noted along with pug marks indicating presence in low densities. UzRDB VU species only.	No	Medium
Marbled Polecat	VU	VU	Single hole of this species located within VP40 viewshed. Presence confirmed in very low density in AoI. IUCN and UzRDB VU species.	Yes	High
Honey Badger	LC	CR	Two active burrows within AoI and additional single burrow 1.3 km south of AoI. Likely between 4 and 8 individuals and possible nationally important population within the AoI. IUCN LC but UzRDB CR	Yes	High
Caracal	LC	CR	No den sites identified however individuals recorded on the camera traps. Possibly up to three individuals present along the northern edge of the AoI. IUCN LC but UzRDB CR.	Yes	High

Goitered Gazelle	VU	VU	Recorded sporadically on the camera traps and one individual seen as an incidental sighting. Population within Aol between 20 and 25 individuals. A nationally rare species that is both IUCN and UzRDB VU.	Yes	High
Bats			Site support two possibly three bat species in very low densities, none of which are of global or significant conservation concern, and none included on Annex II of the Habitats Directive. Some of these species have elevated collision. It is however considered that the site is of low suitability for bats due to the general characteristics of the habitats present as well as lack of suitable roosting sites and this is reflected with very low recorded activity. There is only one suitable structure within the Aol that could support roosting bats (a bunker along an existing transmission line running north to south through the Aol between VP 15 and 18. The site does not support large trees and does not support geological features (e.g. cliffs, rock faces) or other features (e.g. wells) that could support roosting bats. In addition, recorded activity indicates that the site is not subject to significant movements of bats at particular times of the year (e.g. no peaks in activity during spring migration)	No	Low to Medium
Sociable Lapwing	CR	VU	A widespread species within Uzbekistan during spring and autumn migration periods. Not recorded on the Wind Farm surveys however migration through the Aol is likely, discussed further in the CHA document.	Yes	High
White-headed Duck	EN	EN	Breeding, passage and wintering species in Uzbekistan and known to occur in adjacent IBA and non-IBA wetlands. Not recorded on the Wind Farm surveys however migration through the Aol is likely. Discussed further in the CHA document and CH is triggered for wintering / passage populations.	Yes	High
Steppe Eagle	EN	VU	435 individual flights recorded in the winter and spring survey seasons. Confirmed as a nesting species within the Aol with one confirmed nest (unsuccessful attempt in 2023). Seven individuals recorded during the summer survey period. 304 individuals recorded during the autumn migration period (interim results). IUCN EN and UzRDB VU.	Yes	High
Pallas’s Fish Eagle	EN	EN	Single bird seen on spring migration and just in airspace above the project. IUCN EN	Yes	High
Egyptian Vulture	EN	VU:D	Single bird seen (at risk height) in the summer season. No suitable nesting habitat within the Project Aol.	Yes	High
Saker Falcon	EN	NT	Approximately 70 breeding pairs in Uzbekistan however breeding habitat is not present within the Project Aol (e.g. cliff faces, chinks). Migration through the Aol is likely, discussed further in the CHA document.	Yes	High
Lesser White-fronted Goose	VU	VU	Wintering and passage species within Uzbekistan within plainland water reservoirs of the Amu Darya and Syr Darya river basins including Lake	Yes	High

			Dengizkul. Wintering is irregular and populations fluctuate between 200 and 2,000 individuals. Migration through the Aol is likely, discussed further in the CHA document.		
Common Pochard	VU	-	Widely distributed species with large global population and known to occur in adjacent IBA and non-IBA wetlands. Migration through the Aol is likely, discussed further in the CHA document.	Yes	High
Yellow-eyed Pigeon	VU	VU	A nesting and migratory mosaically distributed species. Migration through the Aol is likely and breeding possible.	Yes	High
Eastern Imperial Eagle	VU	VU:D	A total of 11 registered flights in winter and spring and birds on migration above the Aol. 8 individuals recorded in the autumn migration period IUCN and UzRDB VU	Yes	High
Greater-spotted Eagle	VU	VU:R	Three individual birds recorded in the winter bird season of birds migrating over the Aol. IUCN and UzRDB VU	Yes	High
European Turtle Dove	VU	VU	Widely distributed species with large global population. Migration through the Aol is likely, discussed further in the CHA document.	Yes	High
Great Bustard	VU	CR	Formerly a breeding species within Uzbekistan, however current status is as a wintering species and usually in colder winters only. Migration through and overwintering in the WF Aol is however unlikely, discussed further in the CHA document.	Yes	High
MacQueen's Bustard	VU	VU	Recorded in low numbers in the Wind Farm Aol and not considered to have bred in 2023. Likely significant migration through the Project Aol, discussed further in the CHA document and Critical Habitat triggered under Criterion 3.	Yes	High
Pallid Harrier	NT	NT	Fourteen birds recorded in both the spring and autumn migration periods. IUCN and UzRDB NT	No	Medium
White-tailed Eagle	LC	VU:R	Three birds seen during the Winter Vantage Points and an additional single individual on the camera traps. UzRDB VU only	No	Medium
Pallas's Gull	LC	VU:D	Single individual bird seen during the Winter Vantage Point surveys. UzRDB VU only	No	Medium
Pin-tailed Sandgrouse	LC	VU:D	Only recorded in the winter with total of 21 birds observed. UzRDB VU only	No	Medium
Northern Lapwing	NT		Three birds seen during winter bird surveys. IUCN NT and not listed on UzRDB	No	Medium

11.2 Assessment of Impacts

This section identifies and assesses the anticipated impacts from the Project activities on identified ecological receptors during the construction and operation phase. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

Impact assessment summary tables are relevant, however for some impacts the assessment is provided within the accompanying text and where impact significance is clear (e.g. similar impacts affecting multiple receptors), no table has been provided to avoid significant levels of repetition.

All mitigation measures contained in this section will be included in a Project specific construction Biodiversity Action Plan (BAP) which will also include details of pre-clearance, pre-construction, and during-construction monitoring. **This BAP will be provided as a standalone document.**

The BAP will be a live document however it will initially include all of the below mitigation and monitoring requirements to be undertaken during the construction and operation of the WF facility. The Project Company or EPC will be required to appoint a Full Time Ecologist / Biodiversity Manager to ensure that all agreed mitigation and monitoring is fully implemented. The Project Ecologist will be supported by in-country ecologists as well as being supported by an independent International Ecological Expert (IOE) who will assist with updating the BAP and Adaptive Management Strategy, where necessary. The IOE will also be responsible for setting up and auditing the PCFM surveys, processing collected data, undertaking relevant analysis of the data (e.g. GenEst) and providing annual reports.

11.2.1 *Potential Impacts during the Construction Phase*

Habitat Loss, Fragmentation and Degradation

Site clearance and subsequent construction activities will result in the direct loss of areas of natural habitats over the full construction footprint of the Project including internal site roads, turbine bases, crane pads, substations, and permanent site structures (e.g. offices). Natural habitats are valued as being of Low to Moderate sensitivity. There is also likely to be temporary habitat loss and degradation of habitats as a result of temporary lay-down areas and other temporary facilities (e.g. worker accommodation) as well as cabling and communication routes.

Habitat loss associated with the access road from Kirkkiz to the site will affect areas of highly degraded (irrecoverably lost) natural habitat or modified habitat. The existing access track will be upgraded to an access road. Existing tracks within the wind farm AoI have also been mapped and internal access roads will be constructed on to the existing network of tracks across the wind farm AoI (as discussed previously under “Section 4.1.1”). Actual loss of natural habitat will therefore be very minor.

The area of habitat within the total project footprint is 950 km² or 95,000ha. The total project footprint including the access road will be 5.5 km² or 550ha, which equates to 0.58% of the total project area being affected by the proposed works.

Table 54: Habitat Areas being Affected by Construction

Component	Footprint	Duration	Description
Turbines	0.48km ² / 48ha	Permanent	This includes the footprint for the foundation and the crane pad area for each of the 260 turbines. Typically, each crane pad is around 1,500m ² in area, whereas each

			foundation typically consists of a circular footing of 20m diameter
Substation and Warehouse and Storage Facilities	0.21km ² / 21ha	Permanent	Typically, footprint for each substation and building facilities is around 0.07km ² . The Project has 3 internal substations.
Trenches for MV cables and communication cables	2.4km ² / 240ha	Temporary	This includes trenches with a calculated length of around 400km and a width of 6m (worse case).
Road Networks	2.4km ² / 24ha	Permanent	This includes the road network with a total length of 400km and a width of 6m.
Total Project Footprint	5.5km ² / 550ha	Mix	
Total Project Site Boundary Area	950 km² / 95,000ha	-	Project footprint is around 0.6% of the total boundary of the Project area

For the purpose of habitat loss calculations, it has been assumed that 30% of the network will be constructed in areas of good condition natural habitat, which will be permanently lost. The remaining 70% will be constructed in areas of existing tracks where the habitat is modified (very poor) or has already been permanently lost. Turbines are likely to be in areas of natural habitat as will storage, substations, laydown areas and warehouse facilities and will result in the loss of good natural habitat. Cable routes will be excavated adjacent to roads and will also result in the temporary loss habitat which has been estimated as being 30% natural habitat and 70% of modified or lost habitat. In the table below temporary habitat loss is shown *italics* and permanent habitat loss is indicated in **bold**.

Component	Footprint	Habitat Score	Habitat Hectares
Turbines	0.48km² / 48ha	Natural 0.8	38.4
Substation and Warehouse and Storage Facilities	0.21km² / 21ha	Natural 0.8	16.8
<i>Trenches for MV cables and communication cables</i>	<i>2.4km² / 240ha</i>	<i>Natural 0.8</i>	<i>57.6</i>
		<i>Modified 0.2</i>	<i>33.6</i>
Road Networks	2.4km² / 240ha	Natural 0.8	57.6
		Modified 0.2	33.6

Therefore, a total of 146.6 habitat hectares will be permanently lost and 91.2 habitat hectares will be temporarily lost. Therefore, a loss of 237.6 habitat hectares will occur, of which 170.4 habitat hectares is likely to be good condition natural habitat (condition score 0.8) and 67.2 hectares poor quality (condition score 0.2) modified habitat or degraded natural habitat (existing tracks). For the purpose of the habitat hectares lost the area of temporary loss has been considered permanent as a result of reduction in habitat quality in areas temporarily affected by the works.

NOTE: THE ABOVE CALCULATIONS HAVE BEEN MADE BASED ON WORST-CASE PROJECT LAYOUT AND COMPONENTS. AS DISCUSSED EARLIER UNDER “SECTION 2” FINAL DETAILED DESIGN WILL INCLUDE LOWER NUMBER OF TURBINES AND THEREFORE SMALLER ASSOCIATED INFRASTRUCTURE (E.G. INTERNAL ROADS). THEREFORE, ABOVE NUMBER ARE CONSIDERED PRELIMINARY AND FINAL NUMBERS SHOULD BE DETERMINED ONCE FINAL DETAILED DESIGN IS COMPLETE.

Construction Phase – Habitats		
Type	Negative	N/A
Duration	Short-term	Limited to construction. Construction phased over four years so impacts assessed as short-term
Magnitude	Medium	Minimal permanent loss of habitat within the overall project Aol. 309ha out of total Aol of 95,000ha (0.325%).
Reversibility	Irreversible	Permanent habitat loss is irreversible
Sensitivity	Medium	Undesignated site supporting natural (and degraded natural and modified) habitat with some High Sensitivity Ecological Receptors
Likelihood	High	Habitat loss both permanent and temporary are certain to occur
Significance	Moderate	

Mitigation Measures

The following mitigation measures will be employed to reduce the significance of habitat loss, fragmentation, and degradation during the construction period. Mitigation measures are largely based on avoidance of impact through selection of the working areas to favor areas of degraded natural habitat or those areas where habitats have been modified. Where impacts cannot be avoided the following will be completed

- All site workers will undertake a Project induction before working on site. The induction will include a comprehensive biodiversity element where the baseline ecological value and sensitivity of the site will be discussed.
- Prior to construction works, working areas will be clearly demarked so that site workers fully understand the working area. Encroachment into areas outside of agreed working areas will be prohibited and working areas will be subject to regular check by the EPC Contractor to check enforcement of working areas.
- Prior to clearance of vegetation, pre-clearance surveys will be undertaken by a suitably qualified ecologist.
- The project will result in the loss of 237.6 habitat hectares. Mitigation will be undertaken in all areas of the site subject to temporary habitat loss in the form of habitat rehabilitation / restoration. Temporary habitat loss totals 91.2 habitat hectares and if all of this area (240ha in total) is restored to a condition score of 0.4 then a total of 96 habitat hectares will be created. This is a minor gain in 4.8 habitat hectares in those areas subject to temporary habitat loss.
- The above are considered mitigation measures to be implemented for such impacts. However, with this, the Project will not meet the requirements of no net loss of natural habitat and therefore off setting will be required. Such requirements are discussed further in “Section 11.4”.

Direct Impacts on Sensitive Receptors (Habitats and Flora) – Non-native Species and Introduced Flora

It is possible that non-native or introduced flora could be imported in to the Aol on vehicles or within any imported soil material. The impacts of non-native and introduced flora could potentially be significant in absence of any mitigation as these species could become established and out-compete native flora.

In addition, three species listed on the national quarantine list were identified during the botanical assessment and these are *Cuscuta campestris* (non-native), *Cuscuta epithymum* (probably native) and *Rhaponticum repens* (native). Construction works could improve conditions for these species, and it is possible earth moving could increase the distribution of these species across the AoI.

Impacts associated with non-native, invasive or introduced flora could result in long-term negative impacts, irreversible (if allowed to become established) and potentially of medium magnitude and sensitivity .

Construction Phase – Direct Impacts on Sensitive Receptors (Habitats and Flora) – Non-native Species and Introduced Flora		
Type	Negative	N/A
Duration	Long Term	During construction phase of the project
Magnitude	Low to Medium	Potential change to natural habitat and species composition across the Project AoI.
Reversibility	Irreversible	Invasive species can be controlled, if identified
Sensitivity	Low to Medium	Habitats are assessed as being of low to medium sensitivity
Likelihood	Low to Medium	Introduction of invasive non-native species is possible
Significance	Minor to Moderate	

Mitigation Measures

- Soil imports to be taken from licensed local quarries or borrow pits to avoid importing non-native and invasive species.
- Construction vehicles will be clean prior to being taken to site and once on-site they will be left in-situ for the duration of the construction period. Cars and other worker transportation vehicles will be driven along proper roads to the site so the risk of being contaminated with mud etc. is considered very low. Regular site walkover surveys throughout the construction period by a suitably qualified botanist to check to the presence and abundance of non-native or invasive species. In case such areas are identified, Areas of non-native or invasive species will be mapped and a program of mechanical control will be completed over the construction period in order to remove these species from the AoI. Chemical control will be avoided however, if necessary, will be used but in accordance with national and international guidelines as well as proper risk assessment and will only be used with prior approval of the Lenders.

Direct Impacts on Sensitive Receptors (Vertebrates) - Site Clearance and Earthworks

As well as impacts to habitats it is near-certain that site preparation works and construction activities will negative impact sensitive ecological receptors (e.g. reptiles, mammals, breeding birds) as a result of direct mortality.

Central Asian Tortoise (PBF, IUCN and UzRDB VU) are likely to be particularly exposed to impacts during construction as they are cryptic and slow-moving. In addition, their life cycle means that they will be particularly exposed to construction related mortality. Central Asian Tortoise are only typically active for 8 – 12 weeks per year, in the early Spring, after which they enter a period of summer aestivation followed,

in most years, by winter hibernation. In some years, with warm autumn temperatures, there may be a second period of activity but this is sometimes very short-lived and very hard to predict. Unmitigated impacts on Central Asian Tortoise could potentially be medium-term and irreversible (e.g. loss of a generation of breeding animals or a period of lower recruitment due to loss of eggs).

Construction Phase – Direct Mortality Central Asian Tortoise		
Type	Negative	N/A
Duration	Short-term	Limited to construction. Construction phased over four years so impacts assessed as short-term
Magnitude	Medium	Habitat loss limited to 0.58% of the Project Aol and as such direct impacts are very limited in their extent
Reversibility	Irreversible	Permanent mortality
Sensitivity	High	IUCN Vulnerable species are of high sensitivity
Likelihood	High	Unmitigated mortality and injury are certain
Significance	Moderate	

Two other species of reptile; Desert Sand Boa and Blotched Rat-snake (both UzRDB VU) are receptors of medium sensitivity and are also exposed to similar impacts during construction. Both species are more active during the year and the magnitude of likely impacts are slightly less than for Central Asian Tortoise.

Construction Phase – Direct Mortality Desert Sand Boa and Blotched Rat-snake		
Type	Negative	N/A
Duration	Short-term	Limited to construction. Construction phased over four years so impacts assessed as short-term
Magnitude	Medium	Habitat loss limited to 0.58% of the Project Aol and as such direct impacts are very limited in their extent
Reversibility	Irreversible	Permanent mortality
Sensitivity	Medium	Receptors of medium sensitivity due to their status
Likelihood	High	Unmitigated mortality and injury are certain
Significance	Moderate	

Ground clearance and earthworks are also very likely to negatively impact ground nesting birds (passerines and Greater Sandplover) through direct mortality of adult birds as well as loss of nests, eggs and chicks. The ground nesting bird assemblage is not of conservation importance and therefore sensitivity is low and impacts are likely to be short-term (1 year in each phase of the project) and reversible (generally higher fecundity species).

Construction Phase – Direct Mortality Ground and Tree Nesting Birds (passerines / waders)		
Type	Negative	N/A
Duration	Short-term	Limited to construction. Construction phased over four years so impacts assessed as short-term
Magnitude	Medium	Habitat loss limited to 0.58% of the Project Aol and as such direct impacts are very limited in their extent
Reversibility	Reversible	Direct mortality of adults very unlikely, loss of nests, eggs and chicks near-certain but high fecundity species.
Sensitivity	Low	Receptors are not of elevated international or national conservation concern
Likelihood	High	Unmitigated loss of nests and chicks is certain
Significance	Minor	

Ground clearance and earthworks could also potentially result in disturbance to breeding MacQueen’s Bustard as well as destruction of nests and eggs. It is however not thought, based on the 2023 surveys, that this species is breeding in the Aol and as such impacts on this species are very unlikely to negatively

affect significant populations of this species. The main breeding range for MacQueen’s Bustard in Uzbekistan is the Kyzyl-Kum Desert which is outside wind farm Aol.

Construction Phase – Direct Mortality MacQueen’s Bustard)		
Type	Negative	N/A
Duration	Short-term	Limited to construction. Construction phased over four years so impacts assessed as short-term
Magnitude	Low	Species is not breeding in the Aol and impacts on this species are very unlikely to negatively affect significant populations of this species
Reversibility	Reversible	Direct mortality of adults very unlikely, loss of nests, eggs and chicks near-certain.
Sensitivity	High	UzRDB Vulnerable are receptors of high sensitivity as they are CH qualifying species
Likelihood	Low	Unmitigated loss of nests and chicks is certain
Significance	Minor	

Ground and tree-nesting raptors (Steppe Eagle and Long-legged Buzzard) are of high and low sensitivity respectively and unmitigated impacts are near-certain to be negative with, at worst, major levels of significance. Impacts will include loss of breeding habitat (nesting sites) and a reduction in quality of adjacent foraging habitats. Impacts are likely to be short-term (1 year in each phase of the project) and reversible (long-lived species). Impacts on Steppe Eagle are presented in the table below and significance of impacts on Long-legged Buzzard (low sensitivity) will be lower. Other species of birds of lower sensitivity that nest in trees or on the ground could be potentially negatively affected by habitat loss and disturbance however impacts are likely to be short-term (single breeding season) and not significant due to their conservation status and high rates of fecundity.

Construction Phase – Direct Mortality, Loss of Nesting Sites and Reduction in Habitat Quality – Raptors (Steppe Eagle)		
Type	Negative	N/A
Duration	Short	Limited to construction. Construction phased over four years so impacts assessed as short-term
Magnitude	High	Habitat loss limited to 0.58% of the Project Aol and as such direct impacts are very limited in their extent. Suitable nesting sites are very limited with the Aol so loss of nesting sites is very unlikely, although if lost magnitude would be high
Reversibility	Reversible	Direct mortality of adults very unlikely, loss of nests, eggs and chicks near-certain but high fecundity species.
Sensitivity	High	IUCN EN receptor of High sensitivity
Likelihood	Medium	Limited nesting opportunities within the Aol, so even unmitigated loss of nesting sites is unlikely.
Significance	Major	

Terrestrial mammals could also be impacted as a result of habitat clearance works resulting in direct mortality of small mammals (e.g. rodents, ground-squirrel) as well as larger species including Marbled Polecat (IUCN: VU) as well as Honey Badger and Caracal which are both high sensitivity species (UzRDB CR). Impacts to high sensitivity receptors shown in the table below and significance of receptors of lower sensitivity will be lower.

Direct mortality of Goitered Gazelle is considered to be highly unlikely.

Construction Phase – Direct Mortality and Reduction in Habitat Quality – Mammals (Honey Badger, Caracal and Marbled Polecat)		
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Type	Negative	N/A
Duration	Short	Construction likely to take four years, but phased approach
Magnitude	High	Habitat loss limited to 0.58% of the Project Aol and as such direct impacts are very limited in their extent. Suitable denning sites are very limited with the Aol so loss of actual sites is very unlikely, although if lost magnitude would be high
Reversibility	Irreversible	Direct mortality of adults in underground denning sites is possible however loss of dependent young likely. Any mortality of adults or young would be irreversible.
Sensitivity	High	UzRDB Critically Endangered Species and IUCN VU (e.g. Goitered Gazelle).
Likelihood	Medium	Direct mortality unlikely as burrows of Honey Badger will be avoided. Direct mortality of Caracal and Goitered Gazelle unlikely.
Significance	Major	

Mitigation Measures

A summary of mitigation measure to avoid and mitigate for direct impacts on sensitive vertebrate receptors is included below. These measures will be included (and expanded upon) in a Construction Biodiversity Management Plan.

- All site workers will undertake a Project induction before working on site. The induction will include a comprehensive biodiversity element where the baseline ecological value and sensitivity of the receptors within the Aol will be discussed.
- Prior to construction works, working areas will be clearly demarked so that site workers fully understand the working area. Encroachment into areas outside of agreed working areas will be prohibited and working areas will be subject to regular check by the EPC Contractor to check enforcement of working areas.
- Working areas should avoid trees / shrubs as these are likely, due to their sporadic distribution across the Aol to be of importance to breeding birds (e.g. passerines, raptors).
- An exclusion zone of 500m will be incorporated around the Honey Badger burrows and single Marbled Polecat hole within the Aol.
- Construction is programmed to start in Q4:2024 so pre-clearance works will include the following:
 - Pre-clearance camera trapping surveys across the site to target for the presence of Honey Badger, and Caracal, including at previously known holes or areas of activity. Where additional presence identified on camera traps, additional surveys will be completed in the vicinity of the camera trap to check for active burrow of these species and, where identified, additional camera traps to be deployed to confirm presence. Where active burrows are identified an exclusion zone of 500m will be set up and enforced and no construction works will be undertaken within the exclusion zone. Camera trap and walkover surveys will commence in Q1 2024 and will continue throughout 2024, including surveys in the ‘peak’ activity months up to the start of construction in Q4 as construction activity in the wind farm area will not commence until at least Q3/Q4 2024 (i.e. after the construction of the access road).
 - Pre-clearance mammal surveys (camera traps and walkover surveys) will commence in Q1 2024 and will continue throughout 2024 up to the start of construction activities to identify and map any active Marbled Polecat burrows and if identified within working areas they will be recorded, mapped and exclusion zones will be set up and works may require careful planning to avoid most

sensitive times for species identified. Whilst Marbled Polecat are a high sensitivity receptor they are considered to occur at very low densities (1 confirmed track identified in the whole of the AoI) and disturbance impacts are therefore likely to be negligible, minor at worst and therefore not significant.

- All construction areas will be subject to full walkover surveys and camera trapping surveys will be used to supplement the results of the walkover surveys (e.g. where a burrow is identified that could be of a PBF species, camera traps will be deployed to record activity) and are not designed to replace physical surveys of all of the working areas. Working areas will be determined by the EPC.
- Pre-clearance surveys and translocation will be completed for Central Asian Tortoise, Desert Sand Boa and Blotched Rat-snake prior to commencement of construction activities in any given area with a tentative suggested approach below (however this will depend on actual Project timeline which is to be identified by the EPC Contractor).
 - o Translocation works will commence in Q2 2024 along the access road as well as in areas that will be subject to works at any point in 2024 up to Q2 2025.
 - o Along the access road any animals found during the spring season of 2024 will be captured, tortoises will be marked on the carapace as being 2024 animals and moved approximately 2 km from the route of the access road (avoiding the areas of the proposed Kungrad OHTL).
 - o The workers compound within the wind farm area will also be subject to a translocation exercise in Q2 2024 and on completion of this exercise the workers compound will be fenced (it is being fenced for security purposes) and this fence will be dug into the ground (to a depth of 30cm) to prevent access by tortoise. Any animals caught within the workers compound will be moved outside of the compound area. These animals will also be marked with the 2024 scute mark.
 - o Animals within the project area that will be subject to construction activities prior to 2025 will also be subject to translocation with animals moved outside of working areas. Burrows within these working areas will also be checked during the active season and they will be blocked / destroyed. Any animals caught will be moved out of working areas, up to a maximum of 2km away.
 - o Marking of captured animals will ONLY include a mark / notch on the scute which will identify the animal as one caught and moved in 2024. No paints or other obvious marking will be applied to captured tortoises that could make them potentially more vulnerable to predation. Unique scute marks/notches will be applied to animals caught and removed in subsequent years.
 - o Animals will be moved to areas of suitable habitat and will be distributed evenly and in areas adjacent to where they were found. This will therefore not impact on the likely foraging territory of any Honey Badgers present within areas that will be subject to translocation.
 - o Translocation will be completed throughout the spring 'active season' so that the population along the access road is significantly reduced, thus reducing the likelihood of animals aestivating and hibernating along the access road. The erosion caused by regular vehicle movements has increased the suitability of roadside habitats for aestivating and

hibernating tortoise due to access to softer sub-soil and as such during the translocation exercise all burrows that could potentially support tortoises (they have a characteristic shape) will be fully investigated using an endoscope. All burrows will be destroyed / blocked once confirmed they are free of tortoises. Translocation efforts will only take place during the tortoise active season and will cease as soon as aestivating behavior is recorded. Only active animals will be translocated.

- If occupied burrows are found after the active season, then the burrows will be clearly marked (using colored flags) and the working areas adjusted to avoid direct impacts on aestivating / hibernating tortoise.
 - In the event that a tortoise is dug up or disturbed during works in periods of inactivity (i.e. aestivation / hibernation) then they will be carefully transported to a temporary holding facility that will be set up by the project. Transportation to a suitable holding facility will be undertaken by a suitably trained ecologist / species specialist. The holding facility will be operational for accidental findings of tortoises during construction.
 - The mitigation strategy has been devised such that it is not anticipated that a significant number of tortoise will be held temporarily.
 - In 2025 the eastern part of the wind farm will be subject to spring walkovers to search for and capture tortoises within all marked working areas, including a buffer of up to 200m from the works area. Any animals caught will be marked on the scute as 2025 animals and moved further to the east, approximately 2 km. All works areas will be subject to searches prior to land being cleared / levelled and if burrows are located, they will be checked, dug out / destroyed by hand.
 - The same process will occur in 2026 in the central area and animals will be moved to the already constructed eastern area, and in 2027 where animals will be moved from the western area to the central area.
 - At the end of construction in 2028 a repeat tortoise survey will be completed across the whole of the wind farm AoI (including the 2025 receptor site) and animals will be moved back to where they were originally found (all animals will be scutemarked in the year of capture). By the end of 2028 it is considered that the tortoise population across the wind farm AoI will be similar to that prior to construction. Repeat surveys will be completed in Year 1, 3 and 5 post-construction to ensure population levels across the project site are comparable to baseline population levels. Where encountered during all pre-clearance and pre-construction surveys Desert Sand Boa and Blotched Rat-snake will be caught and moved away from construction zone. All other species of reptile on the site are highly mobile species and are likely to move out of construction zones during the active season. Any mortality of other species of reptile is certain to not be significant due to their favorable conservation status.
- An exclusion zone of 2 km from the active and abandoned Steppe Eagle nest and 500m from all active Long-legged Buzzard nests has been factored into the design of the scheme and it is certain that there will not be a loss of active nesting sites for breeding raptors. A repeat breeding raptor nesting survey will be completed in 2024 and any active new nests will be marked on to a constraints map and exclusion zones (the same to those previously stated) applied during the construction period. The buffer zone for Long-legged Buzzard is considered appropriate as this is based on buffer zone guidance published by NatureScot which sets displacement distances of

between 100 and 200m for Common Buzzard. 500m is also considered appropriate for a species which is listed as IUCN LC and one that is not included on the UzRDB.

- Construction is due to start in Q4 2024 so is likely to be well under way at the commencement of the breeding bird season 2025 and as such it is unlikely that sensitive species of ground nesting birds (e.g. Greater Sandplover) will start to breed in areas subject to construction works

It is possible that small, ground-nesting birds could nest within or very close to construction areas and nests could therefore be abandoned (disturbance) or destroyed. Where nests are lost any impact would be negligible, short-term (one breeding season only) and the species potentially affected are not of elevated international or national conservation concern. For this reason, no additional mitigations or exclusion zones will be applied for commonly occurring ground (or tree) nesting species. Mitigations need to be realistic and it is not realistic that site infrastructure or the construction of a turbine will be delayed for up to three months for an active nest of a commonly occurring bird of no particular conservation concern, especially where there is no in-country legal protection for such species.

- In the unlikely event that MacQueen’s Bustard are recorded breeding in the project AoI a buffer of 500m will be applied around all active nests and lekking sites. Once hatched, chicks are mobile so construction buffers can be lifted.

Direct Impacts on Sensitive Receptors (Vertebrates) – Vehicle Collisions

Vehicle related collision is possible for all vertebrate species present within the Project’s AoI and this will result in direct mortality on receptors of low to high sensitivity. Any such impact would be negative, long-term and irreversible and would be of medium to high magnitude and therefore of moderate to major significance (depending on the receptor killed).

Larger mammals including Goitered Gazelle are more likely to disperse away from construction areas due to their sensitivity to disturbance and thus the risk of collision with vehicles will be small. Honey Badger and Caracal are mostly nocturnal and as such the likelihood of collision is significantly reduced. Small mammals and slower moving species such as Central Asian Tortoise, Desert Sand Boa and Blotched Rat-snake are at higher risk of collision with vehicles and machinery. Small, mobile, nidifugous chicks (e.g. MacQueen’s Bustard) could also be at risk of collision with vehicles when crossing roads.

It is possible that carcasses on the road could attract scavenging animals, including birds of prey which in turn would increase their risk of collision with vehicles and machinery.

Construction Phase – Direct Impacts on Sensitive Receptors (Vertebrates) – Vehicle Collisions		
Type	Negative	
Duration	Long-term	During construction
Magnitude	Medium to High	Dependent on receptor impacted
Reversibility	Irreversible	Impact could result in death or injury to sensitive receptors
Sensitivity	Low to High	Dependent on receptor impacted
Likelihood	Medium to High	Direct mortality of sensitive receptors is possible
Significance	Moderate to Major	

Mitigation Measures

- Appropriate speed limits will be enforced on access road (60kph), internal road network and working areas (40kph).
- Speed limits will be enforced by regular speed checks to be undertaken by the EPC Contractor and workers will be fined. This measure has been employed on other ACWA sites in Uzbekistan. GPS trackers will be placed on all vehicles (e.g. cars and worker transport) that will utilize the access road (and wider road network) and data analyzed by the EPC Contractor. Any driver caught breaking the speed limit will be fined. GPS trackers are to monitor vehicles that are leaving the wind farm site to monitor speeds along the access road. Regular speed checks will be completed on all roads within the wind farm site. The results of monitoring will be included in annual reports.
- Regular signage will be installed along the site access roads and internal roads informing all drivers of the speed limit
- Speed limits on the access road and internal site roads will be reduced to 20kmph and 10kmph respectively during the breeding bird season if MacQueen’s Bustard are recorded nesting. Changes in speed limits will be enforced through updated signage and speed checks will be regularly completed in these areas.
- A ban of driving at night will be enforced and if absolutely necessary the speed limit will be reduced to acceptable limits
- Ban against off-road driving at all times of the day
- Regular checks of the road for carcasses and if found these will be moved to at least 50m from the road to reduce the likelihood of hitting scavengers, including birds of prey.
- An incidental / chance find procedure will be included in the BMP so that all workers report any road collisions so that any such incident can be investigated in full.
- Ensure that no open water bodies are created on the site which could potentially attract sensitive receptors on to the site which would in turn increase the potential for wildlife: vehicle conflict.

Refer to “Section 14.2.6” for additional details on impacts and mitigations on traffic and transport.

Direct Impacts on Sensitive Receptors (Habitats, Vertebrates) – Poaching, Collection etc.

It is possible that site worker may poach or take plants and animals from the site, either for firewood, as food (e.g. hares, eggs), as a trophy (Goitered Gazelle, Honey Badger, Caracal) to sell (Central Asian Tortoise, other reptiles or small mammals) or persecution (e.g. snakes, large carnivores).

Any of the identified receptor are potentially at risk from this long-term, irreversible negative impact. The likelihood of this occurring is low to medium and the magnitude of this impact ranges from Low to High depending on the receptor affected.

Construction Phase – Direct Impacts on Sensitive Receptors (Habitats, Vertebrates) – Poaching, Collection etc.		
Type	Negative	
Duration	Long-term	During Construction
Magnitude	Low to High	Dependent on receptor impacted

Reversibility	Irreversible	Loss of receptor would be permanent
Sensitivity	Low to High	Dependent on receptor affected
Likelihood	Low to Medium	Unlikely to occur based on previous ACWA projects in Uzbekistan however it is still possible
Significance	Major	

Mitigation Measures

- The Project will enforce strict controls on hunting, gathering, poaching and otherwise disturbing flora and fauna within the Project Aol. Any breaches of this ban will be strictly enforced, and any workers found in breach of this control measure will be subject to disciplinary procedures which will entail instant dismissal where species of international conservation concern (IUNC CR/EN/VU) or high in-country conservation concern (UzRDB CR/EN) are affected. For more common species a formal warning will be issued, followed by dismissal if the offence is repeated. On other ACWA projects in Uzbekistan there have not been issues with hunting and poaching and therefore this impact is considered unlikely.
- The ban on hunting etc. will be included in the site induction along with discussions about the sanctions for breaches of this control measure.
- A chance find procedure will be implemented should any site worker find a wild animal, especially one that has become a nuisance (e.g. scavenger in the works camp, presence of small mammals in worker accommodation, presence of snake or scorpion on the works site) and the EPC Contractor will arrange for an appropriately qualified person to capture and relocate. Where scavengers have been identified within the works site additional housekeeping measures may be required.
- Ensure that no open water bodies are created on the site which could potentially attract sensitive receptors on to the site which would in turn increase the potential for wildlife: worker conflict

Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Disturbance

The presence of site workers and machinery can result in disturbance related impacts to all terrestrial ecological receptors present within the Aol. These impacts are not certain, and the magnitude of such impacts will vary depending on the sensitivity of each receptor to disturbance. For example, disturbance distances for large and more secretive or nocturnal species such as Honey Badger, Caracal and Goitered Gazelle are likely to be significantly greater than for smaller mammals, Central Asian Tortoise, and other species of reptiles. The significance of any such disturbance impacts is likely to range from Low to Moderate / Major, depending on the sensitivity of the affected receptor. The duration of impact will also likely vary from very short-term (e.g. running away from a vehicle using the access road), to short to medium term in areas adjacent to construction areas or worker accommodation. It is likely that any disturbance impacts, irrespective of duration will be reversible once the disturbance event has passed.

Construction Phase – Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Disturbance		
Type	Negative	
Duration	Short-term	During construction period
Magnitude	Low to Medium	Dependent on receptor affected
Reversibility	Reversible	During construction period only

Sensitivity	Low to High	Dependent on receptor affected
Likelihood	Low to Medium	Impacts are not certain to occur
Significance	Minor to Moderate	

Mitigation Measures

- Site wide induction to include information regarding disturbance of ecological receptors.
- Chance find procedure to report sightings of potentially sensitive receptor (e.g. Goitered Gazelle, MacQueen’s Bustard) and investigation of any such sightings by the EPC Contractor in order that additional buffer areas can be agreed, where necessary.
- Ensure that no open water bodies are created on the site which could potentially attract sensitive receptors on to the site which would in turn increase the potential for disturbance of sensitive receptors.

Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Reduced Air Quality / Dust

The soil across the Aol is very fragile and the Aol is very dusty. It is likely that constructed related disturbance to upper soil layers will likely increase the amount of dust in the air which in turn could result in negative impacts on plants and vertebrate receptors. In addition, air pollution from site vehicles from the concrete batching plant could also result in negative impacts on valued receptors. These impacts are possible, short-term and reversible and are considered to be of minor to moderate significance.

Construction Phase – Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Reduced Air Quality / Dust		
Type	Negative	
Duration	Short-term	During construction period
Magnitude	Low to Medium	Dependent on receptor affected
Reversibility	Reversible	During construction period only
Sensitivity	Low to High	Dependent on receptor affected
Likelihood	Low to Medium	Impacts are not certain to occur
Significance	Minor to Moderate	

Mitigation Measures

- Where necessary tracks will be damped down to reduce the risk of dust. Damping down will also include areas of soil / bare earth adjacent to roads. These measures will be implemented where necessary.
- Vehicles will be properly maintained to reduce emissions.
- Emissions from the batching plant will be monitored in line with control plans to minimize air pollution

Refer to “Section 13” for additional details on impacts and mitigations on air quality.

Direct Impacts on Sensitive Receptors (Vertebrates) – Noise and Vibration

Noise as a result of construction can result in direct impacts on valued ecological receptors (vertebrates) due to acoustic masking, disturbance and displacement thereby reducing survivorship and reproductive success. It is also possible that blasting maybe required during construction, although this is yet to be determined by the EPC Contractor. The following mitigations will be applied however will be updated in the Construction BAP when working methods have been confirmed.

Any impacts are likely to be short- to medium term (for the duration of construction) and reversible. The magnitude of impact ranges from low to medium and is likely to be of minor to moderate significance.

Construction Phase – Direct Impacts on Sensitive Receptors (Vertebrates) – Noise and Vibration		
Type	Negative	
Duration	Short-term	During construction period
Magnitude	Low to Medium	Dependent on receptor affected
Reversibility	Reversible	During construction period only
Sensitivity	Low to High	Dependent on receptor affected
Likelihood	Low to Medium	Impacts are not certain to occur
Significance	Minor to Moderate	

Mitigation Measures

- Vehicles will be properly maintained to noise emissions.
- Maintain buffer zones around Steppe Eagle and Long-legged Buzzard nests and know denning sites of Honey Badger (and Caracal) as well as know burrows of Marbled Polecat and Corsac Fox.
- Use of available technology and management practices with construction methodologies to reduce noise and vibration.
- Regular monitoring of noise and vibration levels within works compounds and works areas as far as possible and apply corrective measures as necessary.

Refer to “Section 13” for additional details on impacts and mitigations on noise quality.

Direct Impacts on Sensitive Receptors (Vertebrates) – Lighting

Lighting could potentially result in negative impacts of a range of ecological receptors including those of high sensitivity such as Honey Badger, Caracal, Marbled Polecat and Goitered Gazelle. In addition, lighting could impact foraging and commuting routes for bats.

Any impacts are likely to be short- to medium term (for the duration of construction) and reversible. The magnitude of impact ranges from low to medium and is likely to be of minor to moderate significance.

Construction Phase – Direct Impacts on Sensitive Receptors (Vertebrates) – Lighting		
Type	Negative	
Duration	Short-term	During construction period
Magnitude	Low to Medium	Dependent on receptor affected
Reversibility	Reversible	During construction period only
Sensitivity	Low to High	Dependent on receptor affected

Likelihood	Low to Medium	Impacts are not certain to occur
Significance	Minor to Moderate	

Mitigation Measures

- Limit the amount of lighting, especially within the wider Aol (e.g. at turbine construction sites). This will be achieved by ensuring that night-time working is limited and is only completed when strictly necessary. Some night-time working may however be required (e.g. turbine installation is influenced by wind conditions which may be better at night) but any such work would be limited and not permanent or regular (over extended periods). Any lighting required for such activities will be low intensity and will be shielded to reduce light spill. Any such impact on sensitive species (e.g. migrating birds) would be short-term and reversible. Night-time working will be monitored to ensure minimal impacts (e.g. looking for grounded birds) and if significant impacts are identified, night-time working will be banned.
- Where lighting is required within worker compounds, site offices etc. ensure that any lighting is shielded protected and lights angled downwards to reduce light-spill and glare. Low intensity UV lighting should also be used, where possible, to further reduce light spill.
- For external security lights PIR trigger units should be used and these should be timed to automatically switch off after five minutes.
- No lighting will be installed along the access road from Kirkkiz.

Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Littering, Waste Management

Unmitigated it is possible that poor waste management could result in the proliferation of litter across the Project Aol including plastic containers, plastic bags and glass. This waste could result in negative impacts to sensitive receptors through ingestion or entanglement. Any such impact could be long-term and irreversible, and the significance of this impact would be minor to moderate depending on the receptor effected.

In addition, poor management of other solid wastes, including food waste could result in the presence of pest species such as rats and mice, which could outcompete wild rodents and feral cats and dogs which could increase the risk of predation of wild rodents and other prey species (e.g. Tolai Hare, ground-squirrel, reptiles. ground nesting birds, and MacQueen’s Bustard). It is reported in the UzRDB that disturbance by feral dogs is one of the main threats to Honey Badger as a result of disturbance.

Construction Phase – Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Littering, Waste Management		
Type	Negative	
Duration	Long-term	During construction period
Magnitude	Low to Medium	Dependent on receptor affected
Reversibility	Irreversible	During construction period only
Sensitivity	Low to High	Dependent on receptor affected
Likelihood	Low to Medium	Impacts are not certain to occur

Significance	Minor to Moderate	
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Mitigation Measures

- Waste Management will be included in the Site Induction so that all site workers understand their responsibilities to maintaining a clean and tidy site. Where possible all materials than can be recycled will be.
- Zero tolerance to littering on the works site and within the worker compound. This zero-tolerance approach should also be applied to smoking and workers must use appropriate smoking areas (supplied with ‘butt bins’) at all times, even when on construction sites. Litter must not be thrown out of vehicle windows when driving to and from or around the site.
- Daily inspections of working areas and worker compound should be completed, and corrective actions applied, where necessary.
- Additional mitigation measures for pest species, including feral cats and dogs are included below.

Refer to “Section 10.2.2” for additional details on impacts and mitigations on waste management.

Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Pest Species

As discussed above it is possible that pest species become established within the Project as a result of increased littering or poor waste management as well as the propensity of certain species (e.g. rats, cats and dogs) to associate with human habitation.

An increase in pest species could result in long-term negative impacts on wild animals through direct and indirect competition for food resources, direct mortality through predation, and direct impacts as result of disturbance impacts. Such impacts could be reversible or irreversible, will be between low to high magnitude and as such significance will vary from minor to major depending on the receptor being affected.

Construction Phase – Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Pest Species		
Type	Negative	
Duration	Long-term	During construction period
Magnitude	Low to High	Dependent on receptor affected
Reversibility	Reversible or irreversible	During construction period only however pest species could persist within the Project Aol
Sensitivity	Low to High	Dependent on receptor affected
Likelihood	Low to Medium	Impacts are not certain to occur
Significance	Minor to Major	

Mitigation Measures

- Where pest species are identified the EPC Contractor / Ecologist will be notified and an appropriate course of action taken. For small mammal pest’s live traps will be used, in order to reduce the risk of by-catch. Poison baits should be avoided, unless it can be certain that non-target species will be affected, and any such use should be in accordance with national and international best practice. If

poison baits are to be used it must be certain that any poisoned animal cannot move out on to the wider Aol to reduce the risk of natural predators eating poisoned animals.

- Where feral cats and dogs are identified the EPC Contractor / Ecologist must be notified and efforts made to catch these animals and transport them to appropriate animal shelters away from the site. Guard dogs for the works site (e.g. security for site offices, workers accommodation) must not be used. These measures are in place to ensure no direct or indirect impacts to Honey Badger.

11.2.2 Potential Impacts during the Operation Phase

Direct Impacts on Sensitive Receptors (Vertebrates and Birds) – Habitat Fragmentation and Barrier Impact

The Project Aol is not on a major migration route for birds and as such any impacts associated within the barrier effect is unlikely to be significant. The Project Aol is largely flat or gently undulating and as such birds will be able to naturally avoid the turbines by making minor adjustments to their flight paths and they will not be forced in to major changes or forced to fly over landscape features that would greatly increase energy expenditure (e.g. forced over a large waterbody or mountains). **As mentioned earlier in “Section 2.3”, the included layout at this point is the maximum worst-case layout whereas in reality the proposed layout is more likely to consist of 188 to 201 turbines which would result in a less of the Aol being within the swept area of turbines.**

The Project Aol will not be fenced and as such there will be no barriers to free movement of mammals across the Aol.

Operation Phase – Direct Impacts on Sensitive Receptors (Vertebrates and Birds) – Habitat Fragmentation and Barrier Impact		
Type	Negative	
Duration	Permanent	Impact throughout operation of the wind farm
Magnitude	Low	Dependent on receptor affected
Reversibility	Irreversible	Barrier impact would persist through operation. No site wide fencing so impact on terrestrial receptors unlikely
Sensitivity	Medium	Dependent on receptor affected
Likelihood	Low	
Significance	Minor	

Mitigation Measures

- Significant negative impacts are not predicted and as such no mitigation is suggested.

Direct and Indirect Impacts on Sensitive Receptors (Birds) – Collision with Turbines

Collision Risk Modelling Methodology

Collision Risk Modelling (CRM) is ultimately completed to further inform the magnitude (extent) of collision impacts on bird populations recorded flying within the proposed Wind Farm area. The collision risk model used in this assessment has been developed by Scottish Natural Heritage (SNH) and the British

Wind Energy Association (BWEA) and has been accepted as representative of industry best practice.^{23,24,25} In depth details of the model are given in the cited publications but a brief description is provided below.

The model runs as a two-stage process. Firstly, the risk is calculated assuming that flight patterns and behaviors are unaffected by the presence of the WTGs i.e. that no avoidance action is taken. This is essentially a mechanistic calculation, with the collision risk calculated as the product of (i) the probability of a bird flying through the rotor swept area, and (ii) the probability of a bird colliding if it does so. This probability is then multiplied by the estimated numbers of bird movements through the WTG rotors at the risk height (i.e. the height of the rotating rotor blades) in order to estimate the theoretical numbers at risk of collision if they take no avoiding action.

A bird is simplified in shape to flying cross with length, wingspan, and speed, and always flying perpendicularly towards the rotor. A bird may be ‘gliding’ i.e. with the arms of the cross fixed, or ‘flapping’ i.e. with the arms of the cross flapping so as to occupy a space similar to that of a spinning top, with the length of the bird being the axis of spin. ‘Gliding’ flight has a marginally lower collision risk than ‘flapping’ flight – notably for passage at points level with the rotor hub, where the wings lie parallel with potentially colliding blades. However, the difference is rarely sufficient to warrant detailed consideration of different bird behaviors. As a ‘worst case’ scenario, all flight data entered into the collision risk model is set to ‘flapping’ flight.

The second stage of the collision risk model incorporates the probability that the birds, rather than flying blindly into the WTGs, will actually take a degree of avoiding action. The most recent SNH guidelines²⁶ advise that the default avoidance rates for all species is 98% with the exception of a small number of species. Golden Eagle is considered to have a moderately higher avoidance rate of 99%, based on the size and flight characteristics Steppe Eagle is also considered to have the same avoidance rates. Common Kestrel and Lesser Kestrel are considered to have a relatively low avoidance rate of 95%. Recent published literature^{27 28 29} based on research at operational wind farms in the UK, Europe and the United States, indicates that the above approach is likely to be conservative and accordingly alternative realistic figures are also presented. The risk of collision of White-tailed Eagle has been extensively studied at the Smøla Wind Farm in coastal Norway, and such we used an avoidance rate of 95% as SNH. We also used these same parameter values for Pallas’s Fish Eagle and Vulture species. Therefore, the following avoidance rates have been applied:

- Aquila Eagles Buzzards – 99%
- White-tailed and Pallas’s Fish Eagle and Vultures – 95%
- Common and Lesser Kestrels and MacQueen’s Bustard – 95%
- Other species (e.g. Harriers) – 98%

²³ Percival *et al.* (1999)

²⁴ Band *et al.* (2005) Developing field and analytical methods to assess avian collision risk at wind farms. In De Lucas, M., Janss, G. and Ferrer, M., eds. *Birds and Wind Power*. www.quercus.pt

²⁵ Scottish Natural Heritage (2014) <https://www.nature.scot/wind-farm-impacts-birds-flight-speeds-and-biometrics-collision-risk-modelling>

²⁶ Avoidance Rates for the onshore SNH Wind Farm Collision Risk Model: SNH (July 2017)

²⁷ Vasilakis, D. P., Whitfield, D. P., Schindler, S., Poirazidis, K. S., & Kati, V. (2016). Reconciling endangered species conservation with wind farm development: Cinereous vultures (*Aegypius monachus*) in south-eastern Europe. *Biological Conservation*, 196, 10–17

²⁸ Whitfield, D. P. & M. Madders. (2006a). Deriving collision avoidance rates for Red Kites (*Milvus milvus*). Natural Research Information Note 3. Banchory, UK.

²⁹ Whitfield, D. P. (2009). Collision avoidance of golden eagles at wind farms under the ‘Band’ collision risk model. Report to Scottish Natural Heritage. Natural Research. Ltd. Banchory, UK

Once the avoidance rate is incorporated, the model then predicts the likely number of annual collisions of each particular species.

The number of predicted collisions (i.e. the extent) is then assessed against the total local, national or international populations as appropriate to ascertain the magnitude and hence significance of any impacts along with fatality thresholds for these priority species as appropriate.

Collision Risk Model Input Data

The Collision Risk Model requires data relating to the species of birds occurring at the proposed Project and data on the type and specification of the proposed WTGs.

Collision Risk Modelling (CRM) (and subsequent Collision Risk Assessment (CRA)) has been completed based on the 260-wind turbine layout as presented in this ESIA (again taking into account a worst-case scenario as noted within “Section 2.3” earlier).

At the time of reporting, the proposed scheme is to construct and operate 260 8 MW turbines with a hub height of 130m and a rotor diameter of 204m, resulting in a tip height of 232m. The rotation period is variable dependent upon wind speed and its rated speed used in the CRM was taken from its technical specification brochure. The blade pitch is also variable depending on wind speed, however the worst case of 90° was used in the CRM.

Parameters specific to the Project and survey include the area of the Project, the mean day length during the survey period and the number of day’s activity over the length of the survey period.

Bird Size and Flight Speed

The biometric data, including body size, wing length, as well as flight speed used in the collision risk model has been taken from various sources^{30 31 32 33} and was populated with correct data prior to running the CRM.

Bird Flight Activity and Flight Height

Data on bird flight activity through the proposed Project area and on the proportion of those birds flying at rotor height are taken from the field surveys completed by in-country ornithologists between January and early November (e.g. winter, spring, summer and autumn seasons) .

Data relating to birds flying above or below the blade swept area was not included in the collision risk analysis. It is important to note that, to ensure a precautionary approach to the assessment, buffers around the blade tip reach were implemented, both above and below the predicted swept area.

Flight data was not collected for Long-legged Buzzard and Common Kestrel during the winter surveys as these were, at the time of the survey considered to be Tier 2 species and as such, such data was not collected for them. An average flight time through the VP from the spring and summer surveys for these two species was applied to winter registrations of birds recorded flying with the risk window.

³⁰ Bird body size data from: The complete birds of the Western Palearctic Cramp (1998)

³¹ Flight speed data from: A dictionary of birds. Campbell and Lack (1985)

³² Bird Guide: Collins (2001)

³³ Birds of the western palearctic / BTO fact sheets

The results of the CRM are shown on the table below, along with a cumulative prediction for combined winter, spring summer and autumn collisions (i.e. predicted annual collisions using the previously stated avoidance rates).

Results of Collision Risk Assessment

The following table shows the results of the Collision Risk Model for at-risk species recorded flying through the wind farm during the winter and spring survey seasons. The majority of migratory bird activity was recorded between mid-February and the end of March 2023.

Table 55: CRM Output

Common Name	Scientific Name	Conservation Status		Collisions per Season				Cumulative
		IUCN	UZBDB	Winter	Spring	Summer	Autumn	
Golden Eagle	<i>Aquila chrysaetos</i>	LC	VU:R	0.019	-	-	0.027	0.046
Eastern Imperial Eagle	<i>Aquila heliaca</i>	VU	VU:D	0.006	0.0009	-	0.223	0.230
Steppe Eagle	<i>Aquila nipalensis</i>	EN	VU:D	0.165	0.052	0.007	0.494	0.718
Long-legged Buzzard	<i>Buteo rufinus</i>	LC	-	0.005	0.029	0.018	0.082	0.134
MacQueen's Bustard	<i>Chlamydotis macqueenii</i>	VU	VU:D	-	0.011	0.007	0.025	0.043
Western Marsh Harrier	<i>Circus aeruginosus</i>	LC	-	-	0.007	-	0.006	0.013
Pallid Harrier	<i>Circus macrourus</i>	NT	NT	-	0.006	-	0.022	0.028
Greater Spotted Eagle	<i>Clanga clanga</i>	VU	VU	0.001	-	-	-	0.001
Common Kestrel	<i>Falco tinnunculus</i>	LC	-	0.004	0.069	-	0.517	0.521
White-tailed Eagle	<i>Haliaeetus albicilla</i>	LC	VU-	0.002	-	-	-	0.002
Pallas's Fish Eagle	<i>Haliaeetus leucoryphus</i>	EN	-	-	0.015	-	-	0.015
Black Kite	<i>Milvus migrans</i>	LC	-	0.005	0.002	-	0.094	0.101
Egyptian Vulture	<i>Neophron percnopterus</i>	EN	VU	-	-	0.001	-	0.001
Cinereous Vulture	<i>Aegypius monachus</i>	NT	NT	-	-	-	0.229	0.229
Lesser Kestrel	<i>Falco naumanni</i>	LC	NT	-	-	-	0.061	0.061
Eurasian Hobby	<i>Falco subbuteo</i>	LC	-	-	-	-	0.001	0.001
Merlin	<i>Falco columbarius</i>	LC	-	-	-	-	0.001	0.001
Booted Eagle	<i>Hieraaetus pennatus</i>	LC	VU	-	-	-	0.000	0.000

Collision Risk Assessment – Discussion

As mentioned earlier, the above CRM results are based on a turbine layout of 260 turbines however it is considered more likely that only 188 to 201 turbines will be installed and operated and as such the predicted levels of mortality would be reduced accordingly as a result of less airspace within the AoI being occupied by turbines.

Steppe Eagle

Steppe Eagle is predicted to have an annual mortality rate of 0.718 birds per year which would equate to approximately 17.95 birds over the lifetime of the Project.

The global population of Steppe Eagle is declining and is currently estimated to be between 50,000 and 75,000 individuals and the population in central Asia has been estimated to be between at least 22,000 and 35,500 pairs. Steppe Eagle is a rare breeding bird within the Ustyurt Plateau and a single pair is known to breed (although unsuccessfully in 2023) within the Project AoI. Significantly more flight activity was recorded during the late winter survey and early spring surveys. After mid-April activity of Steppe Eagle had reduced to occasional movements through the AoI, presumably by the locally breeding pair. Recorded activity in the summer period was minimal and this is likely as a result of the failed nesting attempt. Activity significantly increased in the autumn period with two ‘spikes’ in activity; one in mid-September (14th: 60 birds) and the other in mid-October (13th – 15th: 330 birds). During the Autumn migration season only 35% of recorded flights were at risk height.

Therefore, the majority of activity of this species is migration over the Project AoI and birds were (apart from the breeding pair) generally not settling within the AoI as foraging resources are generally very low and there are no major attractants (e.g. shepherds, livestock and carcass dumps) within the AoI. In addition, the landscape is flat and open with no geographic features actively funneling birds towards or within the Project site. It is therefore very likely that natural avoidance behaviors will be high, and annual mortality is likely to be lower than predicted by the collision risk model.

Recent PBR analysis³⁴ for this species in Uzbekistan indicated that ‘take’ limits of this species is zero and as such the predicted level of mortality of approximately 2 birds every 3 years is significant and these impacts would be permanent and irreversible. Mortality of zero is unlikely to be achieved even with additional mitigation (e.g. SDOD) and off-sets will be required.

Golden Eagle

Predicted annual mortality of this species is 0.046 collisions per year and this will result in 1.15 collisions over the lifetime of the project. Golden Eagle is an IUCN LC species and is listed as Vulnerable on the UzRDB

Recent PBR analysis for Golden Eagle in Uzbekistan indicated that ‘take’ limits of this species is zero and as any collision would be significant and any such impact would be permanent and irreversible. That said the likelihood of collisions occurring are unlikely based on predicted collisions of 0.046 per year. Mortality of zero is unlikely to be achieved even with additional mitigation and if collisions of this species are recorded off-sets will be required.

³⁴ Bash 500MW & Bash 52MW Wind Farms Republic of Uzbekistan Potential Biological Removal Analysis. Juru and 5 Capitals, November 2023

Eastern Imperial Eagle

Predicted annual mortality of this species is 0.230 collisions per year and this will result in 5.75 collisions over the lifetime of the project. Eastern Imperial Eagle is an IUCN VU species and is listed as Vulnerable on the UzRDB

Recent PBR analysis for Eastern Imperial Eagle in Uzbekistan indicated that ‘take’ limits of this species is zero and as any collision would be significant and any such impact would be permanent and irreversible. That said the likelihood of collisions occurring is low based on predicted collisions of 0.230 per year. Mortality of zero is unlikely to be achieved even with additional mitigation and if collisions of this species are recorded off-sets will be required.

Cinereous Vulture

Predicted mortality of this species is 0.229 birds per year or approximately 6 birds over the lifetime of the Project. Birds were only recorded flying over the site in the Autumn migration period with no flights recorded in the other seasons, although there was an incidental spring record of four birds on the ground (with a single Eurasian Griffon Vulture) during a period of very strong winds. There are no likely attractants present within the Project site (e.g. livestock, large herds of ungulates) and the Project area is flat and open with no geographic features actively funneling birds towards or within the Project site. It is therefore very likely that natural avoidance behaviors will be high and annual mortality is likely to be lower than predicted by the collision risk model.

Cinereous Vulture is an IUCN and UzRDB Near-threatened (NT) species and recent PBR analysis for this species in Uzbekistan indicated that ‘take’ limits of this species is zero and as such the predicted level of mortality is significant and these impacts would be permanent and irreversible. Mortality of zero is unlikely to be achieved even with additional mitigation (e.g. SDOD) and off-sets may be required.

Long-legged Buzzard and Black Kite

Predicted mortality of these species is approximately 2.5 to 3.5 collisions over the 25-year period of the Project. None of these species are of significant global conservation concern and mortality at this level is near-certain to not result in significant long-term impacts on either of these species.

Other Species

All of the other species included in the table above have predicted mortality of less than one bird over the 25-year lifetime of the Project and this would result in very minor negative impacts that would not be significant. Levels of predicted mortality of other species, including MacQueen’s Bustard are well below in-country PBR thresholds and are therefore not considered significant. Other species not included in the table had a negligible amount of flights at risk height or CRM output.

Operation Phase – Direct and Indirect Impacts on Sensitive Receptors (Birds) – Collision with Turbines		
Type	Negative	N/A
Duration	Long-term	Impacts will be occurring throughout the entire operation phase
Magnitude	Medium	CRM results indicate low level of collision risk for sensitive species but some will exceed PBR thresholds
Reversibility	Irreversible	Fatalities of birds are considered irreversible impacts
Sensitivity	High	Given that there are species with ‘take’ limits for collision risks

Likelihood	Low	Given avoidance rates considered throughout the assessment it is deemed to be low
Significance	Minor	

Mitigation Measures

- Based on the outputs and results of the CRM as well as the results of the surveys completed to date upfront mitigation including observer- or technology-led Shut Down on Demand **is not considered necessary** as predicted mortality for all species is not likely to result in moderate or major negative impacts.
- Due to the size of the proposed wind farm and the relatively low predicted collisions of species of global and national conservation concern it is considered that the costs and logistics of observer- or technology-led Shut Down on Demand is disproportionate to the actual predicted impact. Recourses are probably better used to further conservation projects within Uzbekistan including funding and resourcing conservation benefits within the South Ustyurt National Park and the IBAs closest to the AoI. These projects would have measurable conservation benefits for a range of species including bird species of conservation concern as well as benefits for mammals which are globally and / or nationally Critically Endangered. More details of this suggested mitigation are presented further in this section.
- Operational monitoring will be completed for at least the first three years of operation (so if clusters are commissioned before others are constructed, each turbine or cluster of turbines will have a minimum of three years PCFM surveys), to monitor actual levels of mortality. Post construction fatality monitoring will be completed at all of the turbines and the program of post construction monitoring will include carcass searching, searcher efficiency trials and carcass persistence trials. The results of the post-construction fatality monitoring will be used to inform a GenEst Analysis. Post-construction monitoring will follow the latest international best practice including the recently published PCFM Handbook (EBRD, IFC, KFW 2023). Full details of the PCFM Protocol will be included in an Operational Biodiversity Action Plan (BAP) document.
- An adaptive management strategy will be developed (in line with the PCFM Handbook), and additional mitigation will be undertaken where necessary. If significant impacts are recorded targeted SDOD during key spring and autumn migration periods would be triggered and these would be completed. Significant impact would clearly include any mortality of Steppe Eagle, Eastern Imperial Eagle and Golden Eagle and Cinereous Vulture as PBR thresholds for these species are zero. Adaptive management options for other species would be undertaken including targeted SDOD, if the results of the post-construction fatality monitoring indicate higher than predicted mortality, especially in relation to species of elevated conservation concern. Adaptive management could include undertaking specific observer-led shut down programs if PCFM surveys indicate particular peak periods of bird activity through the AoI (e.g. specific windows of higher migratory activity, specific meteorological conditions causing spikes in bird activity at particular times of the year). Technology-led shut-down on demand could also be retrofitted within the AoI if actual mortality is significantly higher than predicted or if observer led SDOD is not shown to be fully effective (e.g. at reducing Steppe and Golden Eagle collisions to zero).
- On completion of the three-year post-construction fatality monitoring a decision will be taken to continue or cease this survey effort or reduce it to specific times of the year. Cessation or modification of the PCFM surveys will only be completed with prior agreement with the Lenders. If monitoring is

ceased site workers will continue to record any carcasses they find and this information will be passed on to the Project team.

- A chance find procedure will be implemented and any carcasses seen by site workers will be reported to the Project Ecologist (Project Rangers) so that they can investigate. In addition, any prey species carcasses found within the Project site will be removed to reduce the likelihood of scavenging birds landing within the Project site.
- It is also possible that with increased access to the site that changes in the amount of grazing activity within the AoI changes over time and this will be monitored by the Project Ecologist as this could potentially change activity patterns of raptors and possibly vultures (Cinereous (2) and Griffon Vulture (1) recorded once as incidental sightings in Spring and migrating Cinereous Vulture recorded in the autumn) over time. Grazing will however be banned from within the WF AoI and this will be monitored by full time Project Ranger staff.

Direct Impacts on Sensitive Receptors (Bats) – Collision with Turbines

Bats are known to suffer negative impacts from wind turbines both through direct contact with turbine blades and through barotrauma and resulting mortality. Certain species are known to be more negatively affected by turbine due to their flight heights and behaviors.

Data from the bat detectors has been analyzed and it is considered that two, possibly three bat species are present across the wind farm. Recorded bat activity is however extremely low and this is likely due to poor habitat suitability and lack of available roosting sites within the Project AoI. To that end upfront mitigation for bats is not recommended however the PCFM Year 1 program will include weekly searches at the wind farm so that bat carcasses are more likely to be encountered and the impact of mortality on bats can be understood. Increases in search frequency in Years 2 and beyond will be agreed with the Lenders prior to changing the PCFM protocols. In addition to the PCFM program, static detectors will be deployed at active turbines (both ground-based and at height) to further understand the use of the site by foraging, commuting and migrating bats.

Adaptive management of the turbines will be considered if mortality is significantly higher than expected and or higher levels of bat usage are recorded.

Operation Phase – Direct Impacts on Sensitive Receptors (Bats) – Collision with Turbines		
Type	Negative	
Duration	Long-term / permanent	During operation period (25 years)
Magnitude	Low to Medium	Minimal bat activity recorded across the site. Only 2 possibly 3 species recorded in very low numbers
Reversibility	Irreversible	Mortality of individual bats is irreversible
Sensitivity	Low to Medium	Dependent on bat species affected
Likelihood	Low	Minimal bat activity recorded across the site. Only 2 possibly 3 species recorded in very low numbers.
Significance	Minor / Not significant	

Indirect Impacts on Sensitive Receptors (terrestrial mammals and breeding / resident birds) – Disturbance

During the operation of the wind farm disturbance impacts are likely to be very minor as the site will not be subject to regular activity other than occasional vehicle movements and maintenance operations around the site, including turbine locations. Certain species including Honey Badger, Caracal, Goitered Gazelle and MacQueen’s Bustard are likely to be more susceptible to such impacts as a result of their natural behaviors. It is possible other receptors including breeding Greater Sandplover, breeding passerines and other mammals (e.g. Tolai Hare) may experience disturbance impacts during the operation of the wind farm. Any such impact will have to be very short-term (for the duration of the disturbance impact) and reversible and is likely to only result in impacts of minor to moderate magnitude. The significance of operational disturbance is therefore considered to be minor, at worst.

Operation Phase – Indirect Impacts on Sensitive Receptors (terrestrial mammals and breeding / resident birds) – Disturbance		
Type	Negative	
Duration	Short-term but throughout operation	Impacts are short-term (i.e. disturbance event) but could occur over a long period of time (i.e. 25 years of operation)
Magnitude	Low to Medium	Dependent on receptor affected
Reversibility	Reversible	During operation. Disturbance events are reversible
Sensitivity	Low to High	Dependent on receptor affected
Likelihood	Low to Medium	Impacts are not certain to occur
Significance	Minor to Moderate	

Mitigation Measures

- Ban on off-road driving, especially during sensitive periods of the year (e.g. breeding bird season) and if off-road driving is required a check of the working area should be completed by the Project’s Ecologist.
- Speed limits to be enforced.
- Sensitive species are to be included in the site induction for all operational staff where additional control measures will be discussed including allowing animals to move around the site, not chasing after them in vehicles or approaching them on foot and what to do if they observe breeding birds within their works areas.
- If certain species (e.g. birds of prey or MacQueen’s Bustard) are accidentally flushed during operation monitoring, staff should monitor the flight of the bird to check if they are struck by turbines.
- A chance find procedure will be implemented and any sensitive species seen by site workers will be reported to the Project Ecologist.

Direct Impacts on Sensitive Receptors (Vertebrates) – Vehicle Collisions

Vehicle related collision is possible for all vertebrate species present within the Project’s AoI and this will result in direct mortality on receptors of low to high sensitivity. Any such impact would be negative, long-term and irreversible and would be of medium to high magnitude and therefore of moderate to major significance (depending on the receptor killed).

Larger mammals including Goitered Gazelle are more likely to disperse away from operational working areas due to their sensitivity to disturbance and thus the risk of collision with vehicles will be small. Honey Badger and Caracal are mostly nocturnal and as such the likelihood of collision is significantly reduced as night-time driving during operation is very unlikely. Small mammals and slower moving species such as Central Asian Tortoise, Desert Sand Boa and Blotched Rat-snake are at higher risk of collision with vehicles and any machinery.

It is possible that carcasses on the road could attract scavenging animals, including birds of prey which in turn would increase their risk of collision with vehicles and machinery.

Operation Phase – Direct Impacts on Sensitive Receptors (Vertebrates) – Vehicle Collisions		
Type	Negative	
Duration	Long-term	During operation
Magnitude	Medium to High	Dependent on receptor impacted
Reversibility	Irreversible	Impact could result in death or injury to sensitive receptors
Sensitivity	Low to High	Dependent on receptor impacted
Likelihood	Medium to High	Direct mortality of sensitive receptors is possible
Significance	Moderate to Major	

Mitigation Measures

- Speed limits will be enforced by the O&M Contractor on all site roads. This will be done by regular speed checks and fines will be issued for breaches of the speed limit. Any vehicles that are driven off-site will have GPS trackers fitted and these will be monitored by the O&M Contractor. Speed checks and GPS checks will be recorded (i.e. frequency of check) and reported and issued fines will also be reported.
- Regular signage will be installed along the site access roads and internal roads informing all drivers of the speed limit.
- A gated entrance will be staffed and any visitors or locals using the site roads will be informed of the speed limits and that there are regular checks of vehicle speeds.
- A ban on driving at night will be enforced and if absolutely necessary the speed limit will be reduced to 15kph (including on the site access road).
- Ban against off-road driving at all times of the day, and if necessary, the works area will be subject to a walkover by the Project Ecologist.
- Regular checks of the road for carcasses and if found these will be moved to at least 50m from the road to reduce the likelihood of hitting scavengers, including birds of prey.
- An incidental / chance find procedure will be included in the BMP so that all workers report any road collisions so that any such incident can be investigated in full.

Refer to “Section 14.2.6” for additional details on impacts and mitigations on traffic and transport.

Direct Impacts on Sensitive Receptors (Vertebrates) – Lighting

Lighting could potentially result in negative impacts of a range of ecological receptors including those of high sensitivity such as Honey Badger, Caracal, Marbled Polecat and Goitered Gazelle. In addition, lighting could impact foraging and commuting routes for bats.

Any impacts are likely to be short- to medium term and reversible. The magnitude of impact ranges from low to medium and is likely to be of minor to moderate significance.

Operation Phase – Direct Impacts on Sensitive Receptors (Vertebrates) – Lighting		
Type	Negative	
Duration	Short-term to medium term throughout operation	Impacts are short- to medium-term (i.e. lighting event) but could occur over a long period of time (i.e. 25 years of operation)
Magnitude	Low to Medium	Dependent on receptor affected
Reversibility	Reversible	During operation. Lighting events are reversible although lighting at site offices / compound would be permanent and irreversible during the operation phase
Sensitivity	Low to High	Dependent on receptor affected
Likelihood	Low to Medium	Impacts are not certain to occur
Significance	Minor to Moderate	

Mitigation Measures

- Site-wide lighting is not being implemented so any lighting impacts during operation will be very limited. Night-time working is not anticipated and will certainly not be a regular occurrence.
- Where lighting is required within worker compounds, site offices etc. ensure that any lighting is shielded and protected to reduce light-spill and glare. Low intensity lighting should also be used, where possible, to further reduce light spill.
- For external security lights PIR trigger units should be used and these should be timed to automatically switch off after five minutes.
- No lighting will be installed along the access road from Kirkkiz.
- Turbines will not be lit and any aviation lights will be shielded to minimize visibility from ground level to reduce the attractiveness of lights to night flying insects which in turn could attract bats.
- Lighting above turbine doors will be PIR controlled and timed so that it switches off automatically after five minutes. Again, this measure will be implemented to reduce night-flying invertebrates in proximity to turbines.

Direct Impacts on Sensitive Receptors (Habitats and Flora) – Non-native Species and Introduced Flora

It is possible that non-native or introduced flora could be imported in to the Aol on vehicles or within any imported soil material. The impacts of non-native and introduced flora could potentially be significant in absence of any mitigation as these species could become established and out-compete native flora.

In addition, three species listed on the national quarantine list were identified during the botanical assessment and these are *Cuscuta campestris* (non-native), *Cuscuta epithymum* (probably native) and *Rhaponticum repens* (native). Construction works could improve conditions for these species, and it is possible earth moving could increase the distribution of these species across the Aol.

Impacts associated with non-native, invasive or introduced flora could result in long-term negative impacts, irreversible (if allowed to become established) and moderate significance.

Operation Phase – Direct Impacts on Sensitive Receptors (Habitats and Flora) – Non-native Species and Introduced Flora		
Type	Negative	N/A
Duration	Long Term	During operational phases of the project
Magnitude	Low to Medium	Potential change to natural habitat and species composition across the Project Aol.
Reversibility	Irreversible	Invasive species can be controlled, if identified
Sensitivity	Low to Medium	Habitats are assessed as being of low to medium sensitivity
Likelihood	Low to Medium	Introduction of invasive non-native species is possible
Significance	Minor to Moderate	

Mitigation Measures

- Post-construction monitoring will be completed across the Aol to record the presence and distribution of non-native and invasive plant species and a program of mechanical control will be completed over during the operation period to remove these species from the Aol. Chemical control will be avoided however, if necessary, will be used but in accordance with national and international guidelines and only following risk assessment and approval from the Lenders. The program of control will continue until the species are absent from the Project Aol. The results of ESIA surveys, pre-clearance, pre-construction and during construction surveys will be used to inform areas that will require monitoring for NNIS. If NNIS are more widely recorded the search area for such species will be increased.
- A program of regular monitoring will be completed with surveys completed annually for the first five years post-construction and also in Years 10, 15, 20 to survey for the presence of non-native and / or invasive species and relevant control of these species will be completed, where necessary.

Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Pest Species

It is possible that pest species become established within the Project as a result of increased littering or poor waste management as well as the propensity of certain species (e.g. rats, cats and dogs) to associate with human habitation.

An increase in pest species could result in long-term negative impacts on wild animals through direct and indirect competition for food resources, direct mortality through predation, and direct impacts as result of disturbance impacts. Such impacts could be reversible or irreversible, will be between low to medium

magnitude and as such significance will vary from minor to moderate depending on the receptor being affected.

Operation Phase – Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Pest Species		
Type	Negative	N/A
Duration	Short to Long Term	During operational phases of the project
Magnitude	Low to Medium	Potential change to natural habitat and species composition across the Project Aol.
Reversibility	Reversible	Invasive species can be controlled, if identified
Sensitivity	Low to Medium	Habitats are assessed as being of low to medium sensitivity
Likelihood	Low to Medium	Introduction of invasive non-native species is possible
Significance	Minor to Moderate	

Mitigation Measures

- Where pest species are identified, the O&M Contractor / Ecologist will be notified, and an appropriate course of action taken. For small mammal pest’s live traps will be used, to reduce the risk of by-catch. Poison baits should be avoided, unless it can be certain that non-target species will be affected, and any such use should be in accordance with national and international best practice. If poison baits are to be used it must be certain that any poisoned animal cannot move out on to the wider Aol to reduce the risk of natural predators eating poisoned animals.
- Where feral cats and dogs are identified the O&M Contractor / Ecologist must be notified and efforts made to catch these animals and transport them to appropriate animal shelters away from the site. Guard dogs for the site offices (e.g. security for site offices, workers accommodation) must not be used. These measures are in place to ensure no direct or indirect impacts to Honey Badger.

11.3 Monitoring

Long term monitoring of the Project Aol will be completed as set out above and will include:

- Monitoring of mammal and herpetofauna assemblages across the Aol. Repeat of baseline surveys will be completed in Years 1, 3 and 5. Population densities recorded in Year 5 will be compared to baseline levels and if required additional work will be completed.
- Camera trapping surveys will be undertaken throughout construction and in the first five years of operation to demonstrate continued use of the site by Marbled Polecat, Caracal Honey Badger and Corsac Fox.
- Breeding bird surveys will be completed in Years 1, 3 and 5 to record the breeding bird assemblage of the site. This will include raptor nest searching.
- Post-construction fatality monitoring to be completed through the first three years of operation to record the actual impact of collisions with the turbines. Additional surveys and or mitigation measures to be implemented as part of an Adaptive Management Strategy. Any changes to the PCFM protocol will be agreed with the Lenders.

- All of the above monitoring requirements will be included within Construction and Operational Biodiversity Action Plans which will include KPIs and a BEMP against which the results of the monitoring will be assessed.

11.4 Off Setting

Based on the impact assessment undertaken earlier, as discussed, the Project will require off setting measures. Identified below are the offsetting measures that the Developer has committed to and which will be discussed in further details within the standalone BAP.

- Permanent habitat loss is 146.4 habitat hectares so the net loss of habitat without additional compensation works will be 141.6 habitat hectares. The Project is therefore committed to habitat restoration works in areas of existing damaged and poor-quality habitats along the access road as well as within the wind farm boundary (e.g. where there are existing vehicle tracks). Habitats in these areas are assessed as having a condition score of 0.2. A total 1,125ha has been identified within the figure below along the access road as well as within the wind farm. At least 800ha will be restored to condition score 0.4 which will result in 160 habitat hectares being created and as such the Project will result in at least no net loss and possibly a net gain in natural habitat.



Habitat rehabilitation will include grading of existing access tracks to remove deep ruts, seeding (with seeds collected from the AoI) and planting of shrubs and bushes (seeds or cuttings taken from the

Aol). The Project will therefore develop a seed nursery where plants can be grown from seed for replanting in habitat rehabilitation areas.

Habitat and Flora monitoring within the Aol to measure the success of habitat rehabilitation work to reasonably demonstrate a net gain in Natural Habitat as well as to record the presence of invasive / non-native flora. Monitoring will be completed annually for the first five years and also in Years 10, 15, 20. Quadrat surveys will be completed and the results compared to the baseline surveys completed to inform the ESIA.

NOTE: THE ABOVE CALCULATIONS HAVE BEEN MADE BASED ON WORST-CASE PROJECT LAYOUT AND COMPONENTS. AS DISCUSSED EARLIER UNDER “SECTION 2” FINAL DETAILED DESIGN WILL INCLUDE LOWER NUMBER OF TURBINES AND THEREFORE SMALLER ASSOCIATED INFRASTRUCTURE (E.G. INTERNAL ROADS). THEREFORE, ABOVE NUMBERS ARE CONSIDERED PRELIMINARY AND FINAL NUMBERS SHOULD BE DETERMINED ONCE FINAL DETAILED DESIGN IS COMPLETE.

- Funding of a Wind Farm Ranger service who will be responsible for patrolling the wind farm (and access road). The Project will commit to two full-time rangers who will be employed for the lifetime of the Project. The rangers will be responsible for ensuring site-wide speed limits are enforced, ensure habitats rehabilitated as discussed earlier are maintained, ensure that there is no poaching (including taking of tortoise) within the wind farm area and to ensure that the wind farm area (and areas adjacent to the access road) remain free from grazing animals. The rangers will work closely with local law enforcement. Rangers will also be responsible for recording any human/wildlife conflict (including road collisions) and to ensure any large carcasses are removed from the WF Project area to reduce potential scavenging behavior by bird species of conservation concern which in turn could increase the likelihood of collision with the operational turbines. This will be subject to local legislations and requirements.
- A cooperation agreement will be made between ACWA Power and the Emirates Bird Breeding Centre for Conservation (EBBCC). This will involve monitoring the impacts on MacQueen’s Bustards (Houbara Bustard) and working together to offset negative impacts from the development of the Project (OHTL related impacts) by release of captive bred birds. This issue is discussed further in “Section 23.9.8”.
- In the case that operational monitoring demonstrates mortality and residual impacts above PBR thresholds for the target raptors species, the Developer commits to implementing offset measures which will be identified and assessed as part of the BAP. This may include retrofitting LV and MV power lines or other measures to be assessed and identified as part of the development of the BAP.

11.5 Potential Wider Conservation Benefits of the Project (compensation / off-setting)

In the case the Project will result in a minor residual negative impacts wider conservation benefits will be considered. Such minor residual negative impacts could be on natural habitat (no net loss not achieved) as well as other possible residual negative impacts on Steppe Eagle (net loss due to mortality and possible loss of one breeding pair), residual negative impacts on Golden Eagle, Greater Spotted Eagle, White-tailed Eagle, Pallas’s Fish Eagle and Egyptian and Cinerous Vulture (mortality over PBR thresholds) and disturbance impacts to Honey Badger and Caracal (construction and operation). Residual impacts on other receptors of conservation concern are likely to be neutral.

Wider conservation benefits that could also be considered are discussed below (and the Project is committed to looking into the feasibility of these). These measures are being considered in order that the project can result in a 'net positive' impact on biodiversity:

- Funding of ecological surveys within the adjacent National Park and IBAs. This will also include funding of research grants to improve the baseline knowledge and understanding of these important areas which in turn could further inform conservation and management measures. The general lack in knowledge in these areas is highlighted for example in the paucity of baseline data used to inform the citations for the IBAs (e.g. Birdlife Datazone information).
- Funding national census surveys within Uzbekistan for other species of significant conservation concern the results of which could be used to inform additional site protection measures or management practices (e.g. Egyptian Vulture, White-headed Duck and Sociable Lapwing).
- Funding border fence removal which has resulted in significant changes to natural migratory patterns of Saiga between Kazakhstan and Uzbekistan. This is especially important as there have been recent increases in the transborder and Central Kazakhstan populations of Saiga however traditional migration routes remain largely closed off to them. The Project will commit to entering discussions with the Uzbekistan authorities on the feasibility of removing border fences and if deemed feasible then funding will be made available to remove fences. If this is not possible then the anti-poaching commitment set out below will be focused on Saiga migration routes through existing gaps in border fencing.
- Funding of the National Park authority to provide additional equipment to the ranger services to improve their anti-poaching and patrol works. Again, this is especially pertinent for Saiga as poachers know where existing gaps are within border fences and target these areas. Poachers also know that existing anti-poaching efforts for other species (e.g. Goitered Gazelle) are largely ineffective as rangers do not have access to vehicles and are left at their ranger stations with a lack of useful equipment to prevent poaching.
- Funding regional education campaigns to highlight the importance of the area for biodiversity.
- Funding national efforts to reduce the impact of wildlife crime including poaching and smuggling of specimens, notably wild tortoises.
- Supporting monitoring and conservation at Batumi, Georgia (Greater Spotted Eagle, Steppe Eagle and Golden Eagle).
- Retrofitting BFDs on existing power lines in Uzbekistan (migrating waterfowl, raptors and MacQueen's and Great Bustard)
- Retrofitting of anti-electrocution measures on existing LV and MV powerlines within Uzbekistan to reduce impact of electrocution on large soaring birds (e.g. Steppe Eagle).
- Other possibilities include: Captive breeding and release programs of species of conservation concern within Central Asia.

12. ARCHEOLOGY AND CULTURAL HERITAGE

This section provides an assessment of baseline conditions within the Project site and surrounds in relation to archaeology and cultural heritage. The section then presents an assessment of potential impacts during the various Project phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

12.1 Assessment of Baseline Conditions

12.1.1 *Methodology for Assessment*

The baseline assessment of the Project site was based on a literature review, secondary data review and a field survey, each of which is discussed in further details below.

- **Literature Review**

Literature review included a comprehensive review of archives, publications, and studies on previous archaeological and cultural heritage work and surveys undertaken in the area, and which are available through desktop review.

- **Stakeholder Consultation and Engagement**

Stakeholder consultation and engagement activities were undertaken with key entities involved in archaeology and cultural management. This included the entities below. Refer to “Section 6.3.1” earlier for addition details.

- Ministry of Culture and Tourism of Uzbekistan / Agency of Cultural Heritage
- Ministry of Culture and Tourism of Karakalpakstan / Department of Cultural Heritage of Karakalpakstan Republic
- Karakalpak Research Institute for the Human Sciences

In addition, as part of the FGD undertaken with the local communities, specific discussions were undertaken in relation to cultural heritage sites within the Project area. Refer to “Section 6.3.2”.

- **Secondary Data Review**

Prior to the archaeology and cultural heritage experts undertaking any site related surveys, a full and detailed review of up-to-date high-quality satellite images for the Project area was undertaken. Such satellite images were provided the Developer and were part of the topography study undertaken.

The objective was to identify any potential sites of interest within the entire Project footprint and boundary so that it can be inspected during the site survey.

- **Site Survey**

Archeology and cultural heritage experts from the Karakalpak Research Institute for the Human Sciences under the Academy of Science undertook a detailed site survey for the Project area from 17 July 2023 until 15 October 2023.

The team consisted of the following members:

- *Toreniyazov A.* – Head of the Expeditionary Team;
- *Iskanderova A.J.* – Deputy Chair of the archeology department;
- *Yagodin V.V.* – Head of Unique Object Department;
- *Bekbuliev A.* – Senior Researcher;
- *Kudaybergenova G.* – Laboratory Assistant;
- *Allambergenova G.* – Laboratory Assistant;
- *Tashimova E.* – Laboratory Assistant;
- *Shirazova S.* – Laboratory Assistant;
- *Paxratdinova D.* – Laboratory Assistant;

The survey was undertaken as follows:

- Detailed survey for the Project components which included the following:
 - Substation areas along with 2km buffer
 - All WTG location along with a 700m buffer
 - Access along with a 200m buffer on each side
 - Internal road network along with 500m buffer on each side
 - Internal OHTL network along with 500m buffer on each side
- Due to huge area of the Project footprint, the remaining areas (i.e. areas outside of Project components but within the project footprint) were surveyed through a combination of: (i) transect methodology (with transects every 1-2km); and (ii) observations from elevation points with an inspection radius of 1 km. Both combinations were utilized to try to cover as much ground as possible within the Project area.

The objective of the field survey was to ascertain the presence of any surface archaeological or cultural heritage sites or remains. If any sites were noted the following was recorded:

- Sketch plans;
- Areas along with GPS coordinates;
- Photograph;
- Undertake an analysis to categorize the sites and archaeological features and assessing their significance;
- Identify whether the site can be relocated or removed and if it so identify requirements that should

be undertaken and considered; and

- If site cannot be relocated / removed identify the requirements to be considered for Project design (e.g. buffer distances, fencing, etc.).

12.1.2 Results

(i) Literature Review and Stakeholder Consultation and Engagement

Based on the outcomes of the stakeholder consultation activities it was indicated that the region of the Project in general was studied for many years through the Karakalpak Research Institute for the Human Sciences under the Academy of Science

However, due to many factors, the exact footprint of the Project site in specific has not been subjected to scientific research. In 2021, an archaeological expedition team conducted partial research on the territories of the Ustyurt Plateau, as a result of which a number of archaeological sites (settlements and burial sites) were recorded. Additional information about archaeological objects is found in the publication [Amirov et al., 2022. P. 113-130].

Based on the above, the following sites were recorded (none of which are located within the Project site itself).

Finally, the FGD with local communities indicated that there are no sacred or cultural heritage sites within the Project site or its vicinity.

Table 56: Archeological and Historical Sites

Point	Site / Coordinates	Distance to Site	Direction from Project Site
1	Arrow-shaped arrangement N43°16'11,44" E56°15'44,11"	2.82 km	N
2	Sarykamysch region arrow-shaped arrangement N42°19'40,31" E57°31'05,39"	76.8 km	SSW
3	Sarykamysch region arrow-shaped arrangement N42°18'59,60" E57°32'44,21"	79.2 km	SSW
4	Sarykamysch region arrow-shaped arrangement N42°18'10,38" E57°34'35,78"	82 km	SSW
5	Sarykamysch region arrow-shaped arrangement N42°16'42,82" E57°36'12,32"	85.5 km	SSW
6	Sarykamysch region arrow-shaped arrangement N42°14'25,24" E57°38'08,34"	90.4 km	SSW
7	Sarykamysch region arrow-shaped arrangement N42°12'39,68" E57°39'09,22"	93.8 km	SSW
8	Sarykamysch region arrow-shaped arrangement N42°10'15,22" E57°45'37,19"	103 km	SSW
9	arrow-shaped arrangement N42°10'18,51" E57°47'38,87"	104.5 km	SSW
10	Aksaymak burial ground N42°31'36,69" E57°55'52,29"	89.6 km	SW

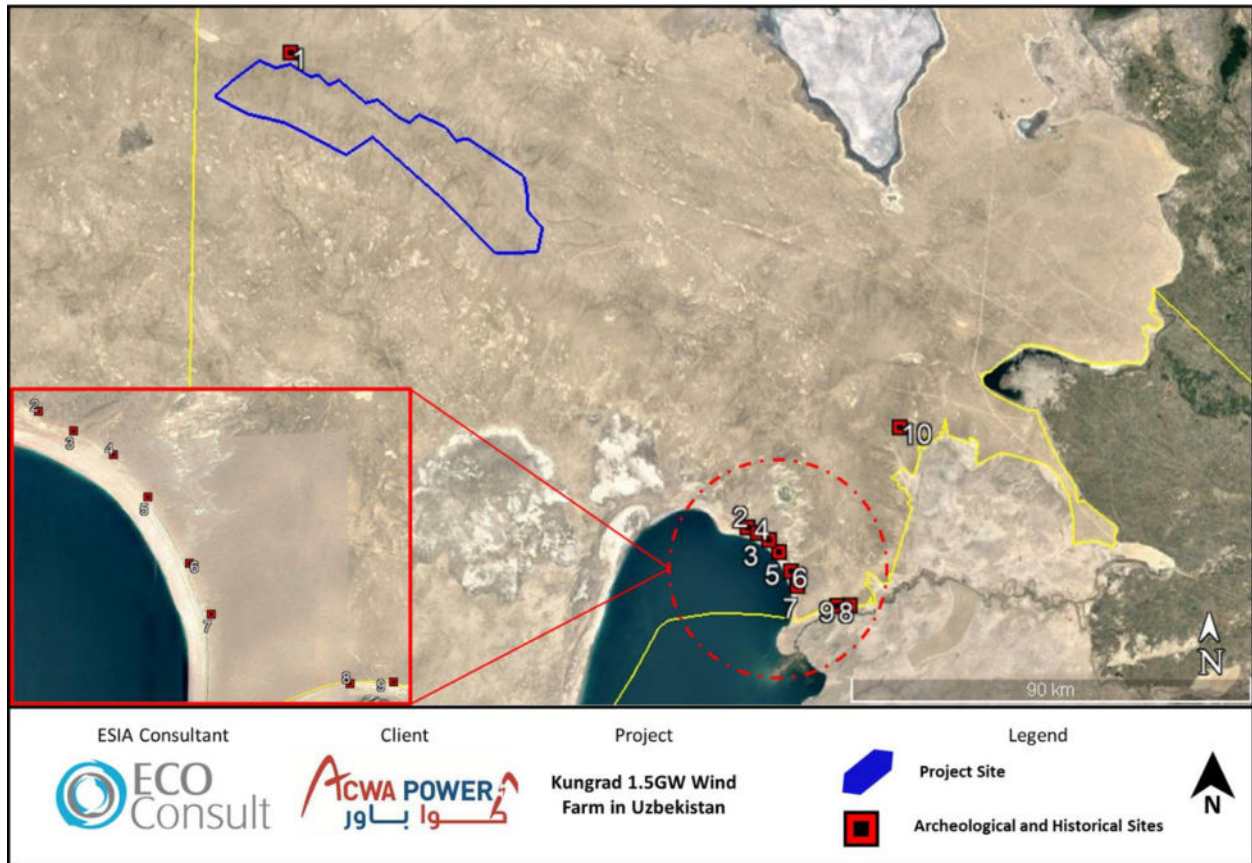


Figure 70: Project Site and Archeological Sites

(ii) Site Survey

The table below presents the key findings of the site survey undertaken for the Project site. In addition, the figure that follows presents the location of the sites within the Project area.

It is important to note that all sites recorded below have no touristic value or importance and are not considered unique nor key sites of archaeological or cultural heritage importance as such sites are found heavily within the area.

As noted in the table below, a total of 110 sites have their buffer area requirement (50m) located within Project footprints (either internal OHTL or internal road). Those are highlighted in blue in the table below.

Table 57: Outcomes of Archeology and Cultural Heritage Survey

Site	Coordinates	Area	Description and significance	Can the site be removed	Additional Requirements	Distance to Nearest Project Footprint (m)
Object 1	N42°56'27,8088" E57°00'32,0436"	4	Single burial. It is an object of burial culture of the XVIII-XIX centuries. Judging by the orientation of the burial and the tamgas on the stone gravestone, it belongs to the Kazakh clan Tabyn-shomishti.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint
Object 2	N42°56'54,5496" E56°58'37,0992"	100	It is an object of burial culture (burial ground). The object was partially destroyed under the influence of natural factors.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint
Object 3	N42°57'23,6769" E56°50'15,9153"	100	It is an object of burial culture of the XVIII-XIX centuries. Judging by the orientation of the burials and the tamgas on the stone headstone, the burial ground belongs to the Kazakh clan Tabyn-shomishti.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	350 m (internal road)
Object 4	N43°01'07,2455" E56°39'56,2979"	150	It is an object of burial culture of the XVIII-XIX centuries. Judging by the orientation of the burials and the tamgas on the stone headstone, the burial ground belongs to the Kazakh clan Tabyn-shomishti.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	3,300 m (WTG 83)
Object 5	N42°57'17,60" E56°36'21,54"	120	It is an object of burial culture (burial ground). The object was partially destroyed under the influence of natural factors.	Located outside of Project footprint.	The facility is located outside the field road and turbine construction.	Outside of Project footprint
Object 6	N43°04'12,49" E56°42'46,73	12	It is an object of the burial culture of the Muslim type.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	350 m (internal road)

Object 7	N43°06'46,09" E56°40'15,26	90	It is an object of the burial culture of the Muslim type.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	500 m (internal road)
Object 8	N43°09'10,14" E56°28'08,82"	8	It is an object of the burial culture of the Muslim type.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	200 m (substation)
Object 9	N43°05'10,78" E56°32'21,76"	12	It is an object of the burial culture of the Muslim type.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	135 m (internal OHTL)
Object 10	N43°05'05,11" E56°32'19,02"	200	It is an object of burial culture of the XVIII-XIX centuries. Judging by the orientation of the burials and the tamgas on the stone headstone, the burial ground belongs to the Kazakh clan Tabyn-shomishti.	Yes. through excavation	If it will not be removed a buffer zone of 100 m on from each side of the object is required to be maintained.	35 m (internal OHTL)
Object 11	N43°04'59,67" E56°30'15,82"	8	It is an object of the burial culture of the Muslim type.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	22 m (internal OHTL)
Object 12	N43°04'04,89" E56°25'49,63"	30	It is an object of the burial culture of the Muslim type.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint
Object 13	N43°04'10,47" E56°24'55,01"	16	Single burial, barrow. It is an object of burial culture, possibly a burial mound, the chronological framework is not determined without excavation work	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	1,100 m (internal OHTL)
Object 14	N43°04'03,05" E56°24'42,39"	16	Single burial, barrow. It is an object of burial culture, possibly a burial mound, the chronological framework is not determined without excavation work	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	1,400 m (internal OHTL)
Object 15	N43°06'40,25" E56°24'48,95"	20	Single burial, barrow. It is an object of burial culture, possibly a burial mound, the chronological framework is not	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	2,600 m (WTG 164)

			determined without excavation work.			
Object 16	N43°07'36,74" E56°21'16,60"	140	A Burial ground, it is an object of burial culture of the XVIII-XIX centuries. Judging by the orientation of the burials and the tamgas on the stone headstone, the burial ground belongs to the Kazakh clan Tabyn-shomishti.	Yes. through excavation	If it will not be removed a buffer zone of 100 m on from each side of the object is required to be maintained.	80 m (internal road)
Object 17.	N43°06'32,57" E56°20'27,00"	12	It is an object of the burial culture of the Muslim type. Single Burial ground.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	1,300 m (internal OHTL)
Object 18	N43°01'58,25" E58°04'46,61"	N/A	Settlement and dwelling	Yes, through excavation.	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	65 m (access road)
Object 19	N43°16'15,66" E56°15'36,86"	N/A	Arrow-shaped layout	Yes, through excavation.	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint
Object 20	N43° 8'36.34" E56°15'55.79"	16	It is an object of burial culture of the XVIII-XIX centuries. Judging by the orientation of the burials and the tamgas on the stone headstone, the burial ground belongs to the Kazakh clan Tabyn-shomishti.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	1,300 m (WTG 212)
Object 21	N43°14'12.22" E56°16'44.95"	4	It is an object of burial culture (burial ground). The object was partially destroyed under the influence of natural factors.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint
Object 22	N43°13'27.39" E56°11'39.61"	170	It is an object of burial culture (burial ground). The object was partially destroyed under the influence of natural factors.	Yes. through excavation	If it will not be removed a buffer zone of 100 m on from each side of the object is required to be maintained.	200 m (internal road)
Object 23	N43°13'4.74" E56° 9'4.20"	5	It is an object of burial culture (burial ground). The object was partially destroyed under the influence of natural factors.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	741 m (WTG 250)

Object 24	N43°11'39.76" E56° 6'21.73"	7	It is an object of burial culture (burial ground). The object was partially destroyed under the influence of natural factors.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	800 m (WTG 257)
Object 25	N42°55'8.82" E56°51'40.58"	50	It is an object of burial culture (burial ground). The object was partially destroyed under the influence of natural factors.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	225 m (internal road)
Object 26	N43°07'51.4524" E56°33'40.9248"	8	This object, unprocessed stone slabs forming sub-rectangular shapes, hints at burials. Muslim-type affiliation suggested by orientation.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	150 m (internal road)
Object 27	N43°09'29.7612" E56°17'54.7656"	8	This object, a subrectangular burial with unprocessed stones, includes a Muslim-associated tombstone.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	115 m (internal OHTL)
Object 28	N43°08'24.2268" E56°18'44.4060"	50	This object, a subrectangular burial with unprocessed stones, includes a Muslim-associated tombstone. Tentatively dated to late 18th-19th centuries.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	830 m (internal OHTL)
Object 29	N43°07'44.1692" E56°19'51.0189"	30	Two child burials, unprocessed stones, tombstones. Muslim type. Tentative 18th-19th centuries.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	20 m (internal road)
Object 30	N43°06'29.0160" E56°20'27.1824"	6	It is an object of Muslim burial culture	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	1,800 m (internal OHTL)
Object 31	N43°06'29.1420" E56°20'27.9492"	6	It is an object of Muslim burial culture	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	1,800 m (internal OHTL)
Object 32	N43°05'33.5616" E56°20'24.9972"	6	Perhaps an object of funerary culture is an object of funerary culture.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	3,200 m (internal OHTL)

Object 33	N43°05'31.2864" E56°20'25.8612"	6	A This object, round burial with unprocessed stones, possibly destroyed. Muslim affiliation.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	3,200 m (internal OHTL)
Object 34	N43°04'18.0588", E56°20'35.3724	8	A This object, a single burial of unprocessed stone slabs, partially destroyed. Muslim type, dated 18th-19th centuries.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint
Object 35	N43°04'13.0764" E56°20'37.9716"	6	This object, a single burial of unprocessed stone slabs, partially destroyed. Muslim type, dated 18th-19th centuries.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint
Object 36	N43°04'00.5160" E56°20'20.9796"	6	This object, a single burial with a ramp of stone slabs, possibly lost tombstone. Tentatively dated to the 18th-19th centuries, Muslim type orientation.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint
Object 37	N43°04'00.7824" E56°20'15.8676"	6	This object, a single burial with a ramp of untreated stones. Tentatively associated with 18th-19th-century burials.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint
Object 38	N43°04'00.5916" E56°20'15.8136"	8	Single burial, rectangular shape, untreated stone slabs, remnants of tombstone. Tentatively dated 18th-19th century, potential golden eagle nest.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint
Object 39	N43°04'00.5140" E56°20'15.8180"	8	Two small burials, potentially for children. The exact dating of these burials remains undetermined.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint
Object 40	N43°03'10.6668" E56°23'45.2292"	10	A round-shaped single burial, constructed with shapeless stones, lacks a tombstone. Orientation suggests Muslim affiliation.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint

Object 41	N43°03'03.4992" E56°25'25.3956"	100	Lacking a tombstone, the burial's exact dating is unknown, with nearby objects resembling funerary culture mounds.	Yes. through excavation	If it will not be removed a buffer zone of 100 m on from each side of the object is required to be maintained.	Outside of Project footprint
Object 42	N43°03'24.7248" E56°23'37.1868"	6	This object is a single child burial atop hill, shapeless stones, lacks tombstone, undetermined dating."	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint
Object 43	N43°08'39.0084" E56°15'40.2552"	8	This object, a single burial, features shapeless stone riprap, subrectangular, some slabs placed vertically.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	1,100 m (internal road)
Object 44	N43°09'14.1732" E56°12'52.4736"	6	Possibly a single burial, this object is characterized by a round riprap of shapeless stones arranged in the form of a small tower. Lacking a tombstone, the exact dating of the burial remains undetermined	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	700 m (internal road)
Object 45	N43°12'31.1868" E56°07'09.9480"	6	This object, possibly a single burial, features a rounded mound of shapeless stones, lacking a tombstone.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	300 m (internal road)
Object 46	N43°13'09.8976" E56°10'15.4164"	6	This object: possible single burial, shapeless stones, small mound, challenging confirmation.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	900 m (internal road)
Object 47	N43°13'08.8932" E56°10'18.2388"	6	The object is a single burial; without excavation work it is difficult to confirm this.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	900 m (internal road)
Object 48	N43°08'30.3864" E56°32'31.0848"	8	This object: possible small burial ground, two burials, shapeless stone slabs, lacking tombstone, deformation.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	1,600 m (substation)

Object 49	N43°09'35.5896" E56°31'02.0460"	8	This object: potential single burial, oval arrangement of shapeless stones, no tombstone.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	2,200 m (internal road)
Object 50	N43°10'04.4328" E56°30'49.2912"	8	This object is a possible single burial with an oval arrangement of shapeless stones, lacking a tombstone. The tombstone, if present, bears the Kazakh clan Adai's arrow sign, dating the burial to the 18th-19th centuries.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project boundary
Object 51	N43°09'36.6876" E56°30'23.6772"	150	This object, among the largest on Karabaur ridge, includes 13 burials, dated 18th-19th centuries.	Yes. through excavation	If it will not be removed a buffer zone of 100 m on from each side of the object is required to be maintained.	1,600 m (internal road)
Object 52	N43°06'45.7668" E56°28'24.4272"	4	This object, possibly a single burial, displays shapeless stone slabs, resembling a tower. Confirmation awaits excavation, and it lacks a tombstone.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	1,700 m (internal road)
Object 53	N43°06'18.1368" E56°28'12.4356"	8	This object, largest on Karabaur ridge, single burial with vertical stones.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	2,500 m (internal road)
Object 54	N43°06'16.3332" E56°27'43.0812"	100	This object, features large oval burial outlined by vertical stones, two smaller children's graves, dating 18th-19th centuries.	Yes. through excavation	If it will not be removed a buffer zone of 100 m on from each side of the object is required to be maintained.	3,000 m (internal road)
Object 55	N43°07'01.0848" E56°26'19.7772"	4	Single burial, likely for a child, indicated by its small size.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	900 m (WTG 143)
Object 56	N43°06'56.2284" E56°26'22.8948"	4	Single burial, likely for a child, indicated by its small size.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	1,200 m (WTG 143)
Object 57	N43°06'56.6892" E56°26'23.0784"	8	This object, possible children's burials, includes Burial 1 with riprap destroyed naturally.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	1,200 m (WTG 143)

			Burial 2 is challenging to determine, with uncertain dating.			
Object 58	N43°08'01.2984" E56°25'41.7288"	4	This object, a possible single burial, is challenging to determine functionally. The dating remains uncertain.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	225 m (WTG 147)
Object 59	N43°11'26.3364" E56°21'43.2180"	60	Three burials, two large, vertical slabs, third with Adai tamga.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	590 m (WTG 178)
Object 60	N43°11'25.2276" E56°21'44.5104"	20	Two burials, one possibly child's, with horizontal slabs, tombstones, and clan tamga.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	595 m (WTG 178)
Object 61	N43°05'30.2172" E56°19'21.6768"	4	This object, possibly a child's burial, is visually challenging to interpret.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint
Object 62	N43°05'26.7105" E56°19'19.9709"	2	This object, possibly a child's burial, presents visual challenges in interpretation.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint
Object 63	N43°05'19.7160" E56°19'16.4640"	2	This object, possibly a burial, features challenging interpretation with stones in disarray.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint
Object 64	N43°05'20.0030" E56°19'18.9467"	2	This object, a possible single burial, challenges interpretation.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint
Object 65	N43°04'25.3776" E56°22'16.0464"	2	This object, possibly a single burial, features horizontal stones, lacking a tombstone, and surrounded by branches, possibly a bird's nest. The dating is uncertain.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint
Object 66	N43°04'16.7916" E56°22'16.8024"	2	It is an object of the burial culture	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint
Object 67	N43°04'14.8548" E56°22'16.5468"	2	It is an object of the burial culture.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint

Object 68	N43°02'18.9744" E56°31'40.7532"	16	This object, a single burial, features a collapsed oval grave without a tombstone.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint
Object 69	N43°01'45.9480" E56°40'01.9380"	4	This object, possibly a single burial, is visually challenging to determine function.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	2,200 m (Internal road)
Object 70	N43°00'56.7288", E56°45'07.5312"	4	The likelihood of a single burial is uncertain, with indications leaning towards it being a burial, making visual determination of another intended functional purpose challenging. The object is composed of horizontally placed stones forming a turret, and notably, lacks a tombstone.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	410 m (Substation)
Object 71	N43°00'31.7232", E56°47'43.9368"	4	Identifying a potential single burial as the object, likely a burial, makes it visually difficult to ascertain another intended functional purpose.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	305 m (substation)
Object 72	N43°01'01.9560", E56°48'35.9712"	2	The status of a single burial ground is uncertain, with a prevailing likelihood that it serves as a burial, making visual determination challenging for alternative functions. The structure has suffered considerable destruction from natural factors, as evident from scattered stone slabs nearby.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	43 m (internal road)
Object 73	N43°02'23.5464", E56°47'17.0376"	2	The potential identification of a single burial, however uncertain, with suggestions that it could be either a burial or another function. Visually determining its exact purpose	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	46 m (internal road)

			is challenging as it consists of horizontally placed stones, possibly in the form of a turret, but has been destroyed by natural factors, leaving stone fragments nearby. Additionally, the burial lacks a tombstone.			
Object 74	N43°01'44.5764", E56°49'52.4100"	12	A solitary burial features a grave lined with horizontally placed stone slabs; some of the stonework has collapsed around the burial. The tombstone has shifted from its original position, lying near the burial in the western part, and the ancestral tamga is absent.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	1,600 m (internal road)
Object 75	N42°55'28.6184", E56°47'03.3408"	80	Situated on the summit of a small hillock, the burial Ground comprises of several burials, with the largest one featuring a round stone masonry burial structure and a triangulation tower at the center, possibly having modern origins. Nearby, smaller burials, potentially for children, are observed, characterized by rectangular shapes and graves made with shapeless stone slabs, lacking tombstones or with displaced ones.	Yes. through excavation	If it will not be removed a buffer zone of 100 m on from each side of the object is required to be maintained.	3,900 m (internal road)
Object 76	N42°55'30.7092", E56°48'19.2024"	2	The potential identification of a single burial is uncertain, with suggestions that it could be either a burial or a road sign. Visually determining its functional purpose is challenging as it consists of horizontally placed stones	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	2,400 m (internal road)

			forming a turret-like structure, which has been partially destroyed by natural factors, leaving stone fragments nearby, and lacks a tombstone.			
Object 77	N42°55'04.2888", E56°49'25.0680"	4	The potential identification of a single burial is challenging visually, given the difficulty in determining the object's functional purpose. It consists of a round cluster of horizontally placed stones and lacks a tombstone.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	1,900 m (internal road)
Object 78	N42°55'01.3260", E56°52'15.3696"	2	The identification of a single burial is uncertain visually at present. The object appears to be a cluster of stones arranged horizontally, having lost its original shape due to destruction, and lacks a tombstone.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	760 m (WTG 17)
Object 79	N42°52'14.9088", E56°57'04.4820"	8	A single burial consists of stones arranged horizontally, including large boulders, and has lost its original shape due to destruction, with soil filling inside; notably, the tombstone is absent.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	105 m (access road)
Object 80	N42°50'56.6880", E56°58'05.9664"	6	A single burial features a ground interment with a double stele at the head and feet, the latter being partially destroyed. Notably, ancestral tamgas are not documented on the tombstones, and the burial is covered with riprap and soil, with vegetation overgrowing the surface.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint

Object 81	N42°51'26.8236", E57°00'56.1060".	4	The group of single burials, situated atop a small low mound, consists of small ground burials with riprap construction. Notably, the absence or displacement of tombstones are observed, with the smallest burial potentially indicating a child's grave. The dating of the object remains uncertain.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint
Object 81.1	N42°51'25.1208", E57°00'56.5092".	4				
Object 81.2	N42°51'24.9516", E57°00'57.7368"	4				
Object 82	N42°52'53.5512", E57°00'16.8012".	4	The group of single burials includes three, situated on the summit of a low hill—comprising one large and two small burials—with riprap construction and soil covering. Tombstones are either missing or displaced from their original positions in these burials.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint
Object 82.1	N42°52'54.3504", E57°00'11.5236".	4				
Object 82.2	N42°52'50.7792", E57°00'18.4428".	4				
Object 83	N42°55'00.0012", E57°00'18.4428"	4	A solitary burial is composed of shapeless stone slabs arranged in a round formation, possibly resembling a small tower, but external factors have caused the upper stones to shift and fall, leaving fragments. Additionally, the object's design suggests a potential alternative function as a road sign.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint
Object 84	N42°55'04.8396", E57°00'17.8452"	4	A solitary burial is characterized by a round shape and a structure composed of shapeless stone slabs, distinct from other burials at the site due to the use of thinner stone slabs in the rockfill.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint

Object 85	N43°03'57.6612", E56°48'46.4256"	40	Situated on the edge of the mound, the burial ground includes several rectangular burials, three of which are large and feature steles at the head, while smaller burials, potentially for children, have steles at the feet, all exhibiting a Muslim orientation. Nearby, additional small burials, likely for children due to their size, are observed.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	3,500 m (Internal road)
Object 86	N42°55'04.8396", E57°00'17.8452"	2	A solitary burial comprises a grouping of stone slabs, and the diminutive size of the object leads to the assumption that it is a burial for a child.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	3,500 m (Internal road)
Object 87	N43°05'24.6336", E56°26'17.7720"	6	The arrangement of stone slabs suggests that the upper stones were placed later, evidenced by a pile of branches underneath, potentially indicating a bird's nest or another animal. Despite this, the object, determined to be man-made and not natural, is concluded not to be a burial based on the presented data.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	1,157 m (internal OHTL)
Object 88	N43°05'24.9936", E56°26'10.4784"	2	A solitary burial, constructed with stone slabs forming a roof-like structure by leaning against each other, contains a rodent burrow, with some slabs damaged by natural factors and fragments scattered nearby. Although visually challenging to determine its exact purpose, the small size of the object	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	1,157 m (internal OHTL)

			suggests a potential association with a child's burial.			
Object 89	N43°05'43.4112", E56°26'01.8636"	100	On the Karabaur ridge, a notable discovery involves a line of stone slabs or unprocessed stones arranged in a semi-circle. While this alignment could suggest boundary indications, the absence of archaeological finds nearby makes it visually challenging to determine the exact functional purpose of the object.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	1,900 m (internal OHTL)
Object 90	N43°07'10.9668", E56°25'01.0200"	2	A solitary burial, constructed with stone slabs forming a ceiling-like structure, reveals a rodent burrow inside, posing challenges in determining its exact purpose; however, its small size suggests a potential association with a child's burial.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	1,200 m (internal road)
Object 91	N43°07'11.5500", E56°24'59.9832"	4	A solitary burial, composed of stone slabs arranged to create a ceiling-like structure by leaning against each other, contains a rodent burrow, making it visually challenging to determine its exact functional purpose.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	1,200 m (internal road)
Object 92	N43°06'59.2272", E56°22'03.9828"	30	Situated at the hill's summit, a burial ground comprises three graves— one large and two small—constructed with riprap in an arbitrary shape, potentially indicating poor preservation. The Muslim-	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	45 m (internal road)

			oriented burials reveal a distinct design in the central large burial. The smaller size of the two burials suggests a possibility that they could be those of children.			
Object 93	N43°05'55.1544", E56°25'04.8432"	4	Situated on the edge of a large hill, a solitary burial consists of vertically stacked outer stone slabs forming a fence, while inside, horizontally placed slabs create a turret. The object's outline, shape, and location suggest a potential burial, but fragments near it imply natural factors have led to its destruction.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	1,700 m (internal OHTL)
Object 94	N43°05'53.1096", E56°25'05.0124"	2	Positioned on the edge of a large hill, a solitary burial, consisting of haphazardly stacked stone slabs, is accompanied by several more single burials in the same hill. The visual difficulty in determining its exact purpose leads to a tentative designation as a burial, possibly a child's grave based on its small size, inferred from the outline, shape, and location of the object.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	1,700 m (internal OHTL)
Object 95	N43°05'51.5544", E56°25'05.6712"	2	It is a singular burial, and similar to object 94.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	1,700 m (internal OHTL)
Object 96	N43°05'49.1928", E56°25'08.9220"	4	A lone burial, suggests a potential rectangular shape based on the arrangement of stones, which may have stood vertically like a box or coffin,	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	1,700 m (internal OHTL)

			although many slabs have shifted from their original positions.			
Object 97	N43°05'52.4904", E56°25'04.6668"	2	A solitary burial, marks the final item among a series of single burials on the hill. The riprap arrangement of the burial appears disorderly, and the presence of a tombstone is undetermined.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	1,700 m (internal OHTL)
Object 98	N43°05'01.4424", E56°24'41.7204"	4	A solitary burial, composed of stone slabs of diverse sizes and shapes, is positioned atop a large hill; subsequently, a second burial was found on the same hill with riprap stones forming a turret, part of which has fallen, leaving fragments near the burial site.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	78 m (internal OHTL)
Object 99	N43°04'57.8448", E56°24'37.4283"	4	Situated on the peak of a large hill, a solitary burial comprises stone slabs of varying sizes and shapes, forming a round shape, making it visually challenging to determine its exact function. However, the arrangement, shape, and location suggest a potential burial, and there is also an observed rodent burrow within the site.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	70 m (internal OHTL)
Object 100	N43°04'53.3460", E56°27'58.8600"	2	Situated atop a small mound, a lone burial shares an identical design with objects 94, 95, and 97, suggesting a potential association with a child's burial.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	15 m (internal OHTL)
Object 101	N43°04'09.1164", E56°35'27.4380"	80	Burial grounds belong to the Kazakh Tabyn-Shomishti clan, is situated atop a large hill and	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	515 m (WTG 108)

			comprises four burials—two large and two small. The rectangular-shaped graves with a Muslim orientation have tombstones featuring the tamgas of the Kazakh Tabyna-Shomishti clan. Notably, the central burial distinguishes itself with horizontally laid, large, shapeless stone slabs for its fence, potentially indicating a family burial site.			
Object 102	N43°04'07.8276", E56°36'27.5508"	2	Situated on the edge of a large mound, a solitary burial shares a design identical to objects 94, 95, and 97, suggesting a potential association with a child's burial.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	560 m (WTG 106)
Object 103	N43°03'51.0840", E56°36'28.6884"	2	Atop a small mound, a single burial exhibits a design identical to objects 94, 95, 97, and 102, potentially indicating it as a child's burial.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	625 m (WTG 106)
Object 104	N43°02'25.2240", E56°37'45.3432"	4	Situated atop a small hill, a solitary burial comprises variously sized and shaped stone slabs arranged disorderly, forming a round shape. Though visually challenging to ascertain its exact function, the arrangement suggests it could possibly be a burial based on the outline, shape, and location of the stone slabs.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	4,200 m (WTG 260)
Object 105	N42°58'22.8900", E56°42'53.1612"	2	Found atop a small mound, this solitary burial shares an identical design with objects 94, 95, 97, 102, and 103, with	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	2,900 m (internal road)

			visible rodent burrows. There's a tentative suggestion that it might be a child's burial.			
Object 106	N42°58'36.0120", E56°45'05.8572".	8	Situated atop a small hill, a lone burial consists of a cluster of differently sized and shaped stone slabs arranged horizontally, forming a burial structure resembling a rectangle. The absence or displacement of the tombstone is noted in the arrangement.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	615 m (WTG 60)
Object 107	N42°56'26.1600", E56°46'02.1936"	2	A single burial is situated atop a small mound, exhibiting a design identical to objects 94, 95, 97, 102, 103, and 105. There is a tentative suggestion that this object might be a child's burial.	Yes. Through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	1,500 m (internal road)
Object 108	N43°00'56.7360", E56°45'07.6752".	2	Potentially a solitary burial atop a small mound, resembling designs of smaller burials, suggesting it might be a road sign. However, conclusive identification as a burial or road sign is challenging, and its dating remains undetermined.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	410 m (Substation)
Object 109	N43°04'08.0364", E56°41'42.3888	45	The burial site has three graves—two small and one large—all made of riprap. They're subrectangular with a Muslim orientation, lacking tombstones with tamgas. The large grave is distinctive in construction, with walls built from vertically positioned, large, shapeless stone slabs, some of which are damaged.	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	35 m

Object 110	N43°02'29.9544" E56°19'47.9316"		It is an object of the burial culture	Yes. through excavation	If it will not be removed a buffer zone of 50 m on from each side of the object is required to be maintained.	Outside of Project footprint
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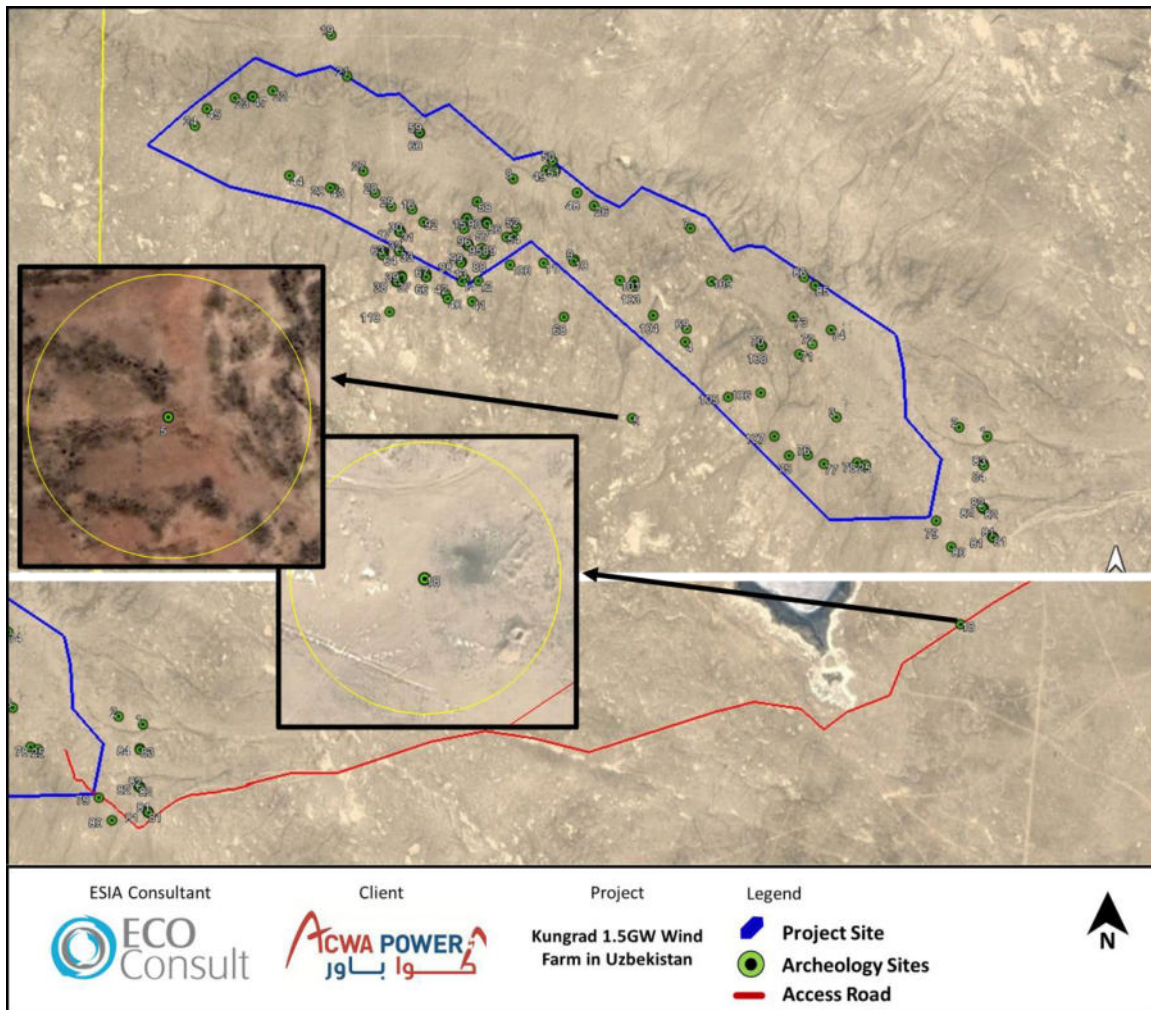


Figure 71: Archeology and Cultural Heritage



Figure 72: Sample of Burials Onsite

12.2 Assessment of Impacts

This section identifies and assesses the anticipated impacts from the Project activities on archeology and cultural heritage during the construction and operation phase. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

12.2.1 Potential Impacts during the Construction Phase

Site preparation activities which are to take place onsite by the EPC Contractor for installation of the wind turbines and the various Project components to include substation, transmission cables, access roads and internal road network, buildings, etc. are expected to include land clearing activities, levelling, excavation, grading, etc.

Although such activities are limited to the relatively small individual footprints of these facilities and the actual area of disturbance is relatively minimal, if such activities are improperly managed, they could damage or disturb archaeological remains present on the surface of the Project site. As noted earlier, there were several sites recorded within the Project area which are generally burial grounds.

In addition, there is a chance that throughout such construction activities, archaeological remains buried in the ground are discovered. Improper management (if such sites are discovered) could potentially disturb or damage such sites which could potentially be of importance.

Construction Phase		
Type	Negative	N/A
Duration	Short-term	Limited to construction
Magnitude	High	Given that there are sites within the area and activities could damage these sites in inappropriately managed.
Reversibility	Irreversible	
Sensitivity	Medium	
Likelihood	Medium	No local community activity in the area
Significance	Moderate	

Mitigation Measures

The following identifies the mitigation measures to be applied by the EPC Contractor during the construction phase and which include:

- Ensure that final detailed design to be prepared by the EPC Contractor completely avoids all sites recorded along with the buffer distance requirements.
- Should the detailed design prepared by the EPC Contractor include any additional areas outside of the current Project footprint that was surveyed in detail, follow inspections for these areas should take place by an archeology and cultural heritage expert.
- Any site located within 250 m from any Project component must be demarcated along with signage in English, Karakalpak, Russian indicating “Site of Archaeological / Cultural Heritage Importance – No Access Allowed”.
- Induction training and Toolbox Talks (TBT) should be delivered to all workers to: (i) emphasize the presence and location of the sites and their overall importance; and (ii) explain chance find procedures to ensure clarity when archaeological and cultural heritage finds are encountered on site.

- Driving will only be permitted on formal site roads and off-road driving is prohibited, unless it is driving within a working area (e.g. moving equipment or infrastructure around the site or for maintenance operations).
- Workers are only permitted within authorized working areas and moving to any offsite area is prohibited. This includes in particular movement into the sites recorded under any circumstances at any time of the day.
- Ensure all workers read, understand and sign the worker code of conduct which includes specific requirements related to such an issue and which include:
 - Respect religious sentiments and customs and traditions of co-workers.
 - Respect the local religious and/or traditional days of celebration and their restrictions.
 - Respect the religious shrines and burial sites and practices of the local population.
 - Do not disturb shrines and other religious monuments.
 - Recognize that shrines and sacred sites may include trees, sheds, piles of pebbles, and piles of offerings.
- No worker may possess or withdraw any archaeological item or remains from the Project Area (to include above or below ground) such as ceremonial jars, pottery, or similar objects. If a worker were to find such a piece inside the Project, he/she shall immediately stop working and notify his supervisor to implement the chance find procedure.
- Throughout the construction phase, and as the case with any Project development that entails such construction activities, there is a chance that potential archaeological and/or cultural heritage remains in the ground might be discovered. It is expected that appropriate measures for such chance find procedures are implemented. Those mainly require that construction activities be halted and the area fenced along with proper signage, while immediately notifying the Ministry of Culture and Tourism in Karakalpakstan. No additional work will be allowed before the Ministry of Culture and Tourism in Karakalpakstan assesses the found potential archaeological site and grants a clearance to resume the work. Construction activities can continue at other parts of the site if no potential archaeological remains were found. If found, same procedures above apply.

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

Monitoring Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the EPC Contractor during the construction phase and which include:

- In the case that a suspected site is discovered, a report should be prepared that includes the following to be submitted to Developer and upon approval it is to be submitted to the Ministry of Culture and Tourism in Karakalpakstan:
 - Photo documentation of the site including photos for delineation markers and signage
 - Location (GPS coordinates)
 - Site estimate

- Topographical description
- Description of nature and conditions of the site
- After the Ministry of Culture and Tourism in Karakalpakstan concludes their assessment of the discovered site, the above report should be updated with the findings of the Ministry with supporting formal letters to include: (i) formal letter with mitigation to be implemented as required by the Ministry (if required and applicable); (ii) formal letter from the Ministry granting permission to commence with construction work within the discovered site.
- Submission of Induction Training records of workers that includes archeology and cultural heritage model.

12.2.2 Potential Impacts during the Operation Phase

Inappropriate operational activities by the Project Operator could damage or disturb archaeological and/or cultural heritage remains present on the surface of the Project site. As noted earlier, there were several sites recorded within the Project area which are generally burial grounds. This could include the following:

- Off-roading by O&M workers and driving into the sites;
- Workers walking by foot into the areas of the sites and intentionally or unintentionally disturbing the sites;
- Collection of items from the site; and
- Other as applicable

Operation Phase		
Type	Negative	N/A
Duration	Long-term	Throughout entire operational period
Magnitude	High	Given that there are sites within the area and activities could damage these sites in inappropriately managed.
Reversibility	Irreversible	
Sensitivity	Medium	
Likelihood	Medium	No local community activity in the area
Significance	Moderate	

Mitigation Measures

The following identifies the mitigation measures to be applied by the Project Operator during the operation phase and which include:

- Induction training and Toolbox Talks (TBT) should be delivered to all workers to emphasize the presence and location of the sites and their overall importance.
- Driving will only be permitted on formal site roads and off-road driving is prohibited, unless it is driving within a working area (e.g. moving equipment or infrastructure around the site or for maintenance operations).

- Workers are only permitted within authorized working areas and moving to any offsite area is prohibited. This includes in particular movement into the sites recorded under any circumstances at any time of the day.
- Ensure all workers read, understand and sign the worker code of conduct which includes specific requirements related to such an issue and which include:
 - Respect religious sentiments and customs and traditions of co-workers.
 - Respect the local religious and/or traditional days of celebration and their restrictions.
 - Respect the religious shrines and burial sites and practices of the local population.
 - Do not disturb shrines and other religious monuments.
 - Recognize that shrines and sacred sites may include trees, sheds, piles of pebbles, and piles of offerings.
- No worker may possess or withdraw any archaeological item or remains from the Project Area and from the sites recorded in specific (to include above or below ground) such as ceremonial jars, pottery, or similar objects.

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

Monitoring Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the EPC Contractor during the construction phase and which include:

- Submission of Induction Training records of workers that includes archeology and cultural heritage model.

13. AIR QUALITY AND NOISE

This section provides an assessment of baseline conditions within the Project site and surrounds in relation to air quality and noise. The section then presents an assessment of potential impacts during the various Project phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

13.1 Assessment of Baseline Conditions

The baseline assessment of the Project site was based on an air quality and noise monitoring program. Additional details are discussed below.

13.1.1 Methodology for Assessment

(i) Selection of Parameters

Monitoring was undertaken for the following parameters: (i) gases to include Carbon monoxide (CO), Sulphur Dioxide (SO₂) and Nitrogen Dioxide (NO₂), (ii) Suspended Particulate Matter to include Total Suspended Particulate (TSP) and Respirable Particulates (i.e. Particulate Matter smaller than 10.0 (PM10) and 2.5 microns (PM2.5) in diameter); and (iii) Noise Pressure Levels (NPL).

These parameters were selected based on the following rationale:

Such parameters are likely to be present within the Project site given its characteristics and attributes. Suspended particulate matter is expected given the desert nature of the site. On the other hand, pollutants (such SO₂, NO₂,) are expected onsite but rather at minimal concentrations as the site is in a remote area; nevertheless, motor emissions particularly from vehicles passing casually through the site could be a source of such pollutants. Finally, noise levels are expected from the windy nature of the site and possibly casual vehicular movement.

Such parameters are likely to be affected mainly during the Project's construction activities. All air pollutant parameters selected are expected to be slightly impacted and increase specifically during the Project's construction activities. Emissions from vehicles and machinery used onsite and their movement onsite will increase gaseous emissions, suspended particulate matter, as well as noise pressure levels.

It is worth noting that based on a scoping site visit undertaken by the 'E&S Team' for the Project site, no key sources of anthropogenic air/pollutant or noise emissions were noted.

(ii) Selection of Locations

To assess air quality and noise baseline conditions within the Project area, four (4) monitoring points were selected as shown in the figure below. The location of the monitoring points were equally distributed across the entire Project boundary.

Monitoring was undertaken for 24 hours at each point respectively (a total of 96 hours across the 4 points). The coordinates for the monitoring points and location are presented in the table and figure that follows.

Table 58: Location of Monitoring Points

Locations	Latitude	Longitude
M1	43.223736°	56.125451°
M2	43.143847°	56.414988°
M3	43.049138°	56.697336°
M4	42.895098°	56.949024°

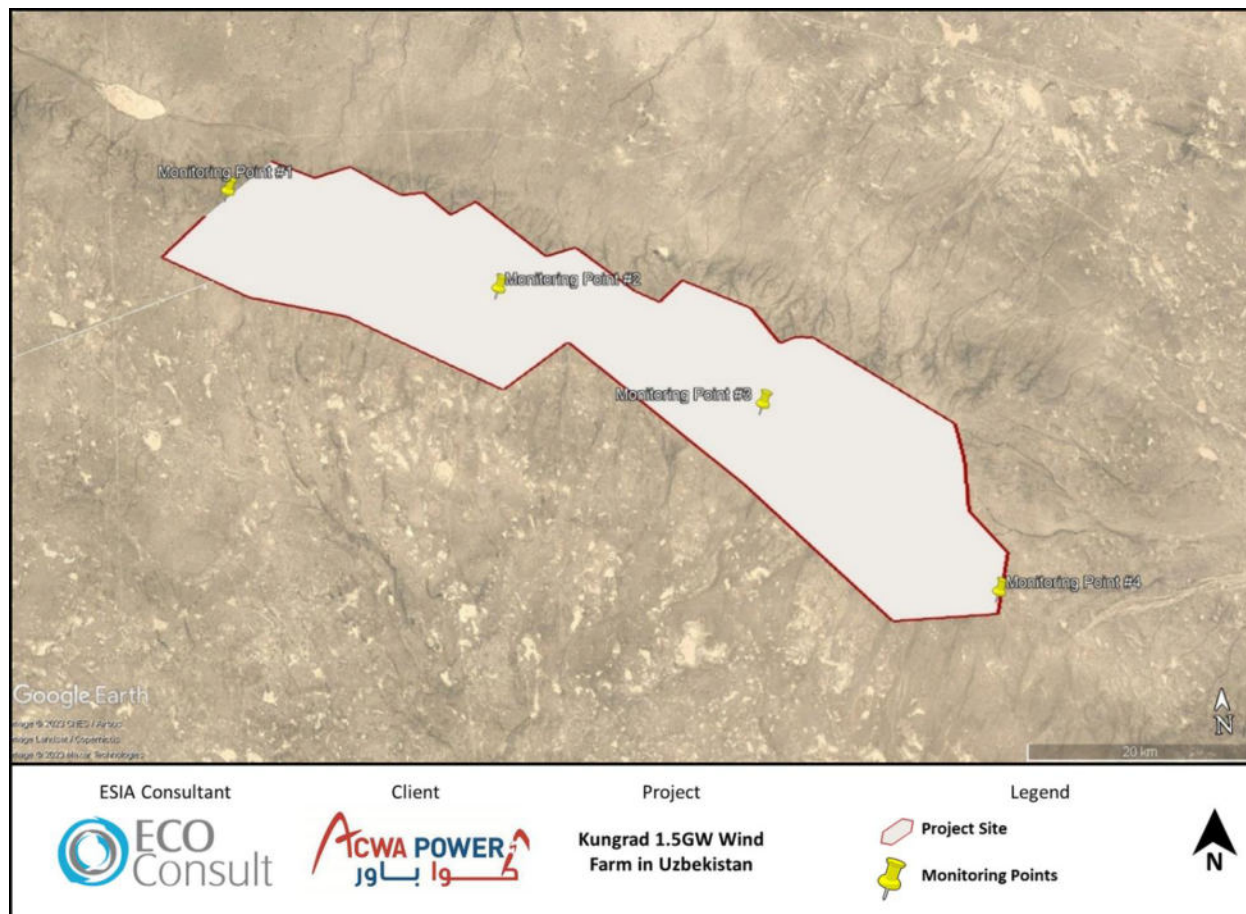


Figure 73: Location of Monitoring Points

(iii) Legislative Requirements

With regards to air quality, the results of the measurements were compared to the national limits as set within “SanR&N RUz No. 0293-11 Sanitarian Rules and Norms List of Maximum Permissible Concentrations (MPC) of Pollutants in the Atmospheric Air of Populated Areas on the Territory of the Republic of Uzbekistan”. The table below identifies the corresponding applicable national ambient air quality permissible limits.

Table 59: Applicable National Ambient Air Quality Permissible Limits

Number	Name of Substance	MPC, mg/m ³			
		Single	Daily allowance	Monthly	Annual
1	Nitrogen Dioxide	0.085	0.06	0.05	0.04
2	Sulfur Dioxide	0.5	0.2	0.1	0.05
3	Suspended Particles	0.5	0.35	0.2	0.15
4	PM ₁₀	0.5	0.3	0.1	0.05

With regards to noise, the results were compared to the national limits set in “SanR&N RUz No. 0267-09 Sanitarian Rules and Norms On admissible noise level into the living area, both inside and outside the buildings”. This legislation sets out the acceptable noise levels for habitable areas both inside and outside of buildings in Uzbekistan as shown in the table below.

Table 60: Applicable National Permissible Limits for Noise

Location	Time	National Noise Standards LAeq in dBA
Noise levels in premises of residential, public buildings and on the territory of residential areas.	7am to 11pm	55
	11pm to 7am	45

In addition to the above, identified below are the limits as included within the IFC General EHS Guideline as well as the EU Ambient air quality standards, which are also considered applicable for this Project. Similar to rationale above, limits included for ‘industrial’ areas were used for comparison given the industrial nature of the site that includes gas exploration activities in general, which is set at 70dB(A) for both night and day.

Table 61: IFC and EU Limits for Noise and Air Quality

Parameter	(SO ₂)	(PM ₁₀)	(PM _{2.5})	Noise
Maximum Permissible Limits IFC General ESH Guidelines	125 µg/m ³ (interim Target 1) 50 µg/m ³ (interim Target 2) 20 µg/m ³ (guideline)	150 µg/m ³ (interim Target 1) 100 µg/m ³ (interim Target 2) 75 µg/m ³ (interim Target 3) 50 µg/m ³ (guideline)	75 µg/m ³ (interim Target 1) 50 µg/m ³ (interim Target 2) 37.5 µg/m ³ (interim Target 3) 25 µg/m ³ (guideline)	70 LA _{eq} /dB A
EU Ambient AQ standards	350 µg/m ³ (1 hour) 125 µg/m ³ (24 hours)	50 µg/m ³ (24 hours)	25 µg/m ³ (Stage 1) 20 µg/m ³ (Stage 2)	N/A

13.1.2 Results

At the time of the preparation of this draft ESIA report, the air quality and noise monitoring program were still ongoing. The result will be updated into the subsequent version of the ESIA.

13.2 Assessment of Potential Impacts

This section identifies and assesses the anticipated impacts from the Project activities on air quality and noise during the construction phase. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

There are no anticipated impacts on air quality and noise during the operational phase. Note: impacts from noise during operation from the WTGs is discussed under community health and safety under “Section 16.2.1”.

13.2.1 Potential Impacts during the Construction Phase on Air Quality and Noise

Site preparation activities which are to take place onsite by the EPC Contractor for installation of the wind turbines and the various Project components to include substation, transmission cables, access roads and internal road network, buildings, etc. are expected to include land clearing activities, levelling, excavation, grading, etc.

Although such activities are limited to the relatively small individual footprints of these facilities and the actual area of disturbance is relatively minimal, nevertheless such activities will likely result in an increased level of dust and particulate matter emissions, which in turn will directly and temporarily impact ambient air quality. If improperly managed, there is a risk of nuisance and health effects to construction workers onsite and to a lesser extent to the surrounding receptors from windblown dust.

It is important to note that the generation and dispersion of dust depends on weather conditions; dry conditions with high wind speeds would cause excessive dust generation, while wet conditions and low wind speeds wouldn't. Given the characteristics of the site (its arid desert nature with frequent dry/windy conditions) sand and salt storms are probable. However, this is not within the control of the EPC Contractor and hence impacts from such events are not within their responsibility.

In addition, construction activities will likely entail the use of vehicles, machinery and equipment (such as generators, compressors, etc.) which are expected to be a source of other pollutant emissions (such as SO₂, NO₂, etc.) which would also have minimal direct impacts on ambient air quality.

All the above activities will likely include the use of machinery and equipment such as generators, hammers, compressors, etc. and which are expected to be a source of noise and vibration generation within the Project site and its surroundings. If improperly managed, there is risk of nuisance and health affects to construction workers onsite and to a lesser extent to the nearby surrounding receptors.

However, it is important to note as discussed in "Section 9" that there are no key receptors that are anticipated to be impacted from dust, noise and emissions. The closest receptor to the Project site would be a community settlement and which is located 110km from the Project site.

Construction Phase		
Type	Negative	
Duration	Short-term	Limited to construction period only
Magnitude	Medium	Dust and noise will be noticeable but dispersed
Reversibility	Reversible	Baseline restored after completion of construction works
Sensitivity	Low	There are no sensitive receptors impacted
Likelihood	High	Limited to construction period only
Significance	Minor	

Mitigation Measures

The following identifies the mitigation measures to be applied by the EPC Contractor during the construction phase:

- Undertake dust and noise monitoring program (as discussed in further details below) to verify the dust and noise levels and to define and implement on a case-by-case basis measures and systems to maintain dust and noise levels within allowable limits. If dust or pollutant emissions were found to be excessive due to construction activities (i.e. higher than allowable limits) the source of such emissions should be identified, and adequate control measures must be implemented;
- Ensure that for activities associated with high dust and noise levels, workers are equipped with proper

Personal Protective Equipment (PPE) to include dust masks, respirators (if required), and earmuffs;

- Apply basic dust control and suppression measures which could include:
 - Regular watering of roads for dust suppression. Only non-potable water will be used for such activities;
 - Proper planning of dust causing activities to take place simultaneously in order to reduce the dust incidents over the construction period;
 - Proper management of stockpiles and excavated material through appropriate enclosures and covers. This entails that it is of appropriate size to ensure entire coverage of the stockpile/excavated material, durable, ability to withstand exposure to weather conditions (heat, rain, and strong winds in particular);
 - Proper covering of trucks transporting aggregates and fine materials (e.g. through the use of tarpaulin);
 - All vehicles within construction areas onsite shall adhere to a speed limit of: (i) 30km/h at the main access road; (ii) 20 km/h within the Project area; and (iii) 10km/h within working areas;
 - Where practical, compact the ground in areas that are heavily used by vehicles and machinery;
 - Limit or suspend earthworks during extreme weather conditions (e.g. strong winds); and
 - Ensure periodic washing of vehicles in order to remove any dusty material in a dedicated area.
- Ensure that vehicles and trucks comply with the limits for exhaust emissions. This will be through: (i) ensure all vehicles and trucks are equipped with a catalytic convertor; (ii) ensuring that all vehicles and trucks utilized onsite are properly licensed for operation with relevant authorities;
- Apply adequate general noise suppressing measures. This could include the use of well-maintained mufflers and noise suppressants for high noise generating equipment and machinery;
- Develop a regular inspection and scheduled maintenance program for vehicles, machinery, and equipment to be used throughout the construction phase for early detection of issue to avoid unnecessary pollutant and noise emissions;
- Turn off any equipment, machine or vehicle not in use; and
- For worker accommodation onsite the following will be undertaken: (i) the site will be appropriately sited at a sufficient distance (i.e. 2-3 km at least) from any construction related activities onsite; (ii) accommodation specifications will ensure that all opening (e.g. doors, windows) as well as façade is of suitable quality that would provide sufficient insulation from outside dust and noise. Other specifications and requirements for worker accommodation is provided in “Section 15.3”.

Following the implementation of these mitigation measures, the significance of the residual impact is categorized as not significant.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the EPC Contractor during the construction phase and which include:

- Dust and noise monitoring should be undertaken on a quarterly basis during the construction phase

at key points where active construction activities are undertaken. This will include at least one (1) monitoring point which represents activities undertaken. The monitoring should include TSP, PM10 and PM2.5 and noise levels. Results should be compared with national limits or IFC standards as included within the General EHS Guidelines or EU limits, whichever is more stringent;

- Reporting on number of air quality and noise monitoring programs undertaken; and
- Reporting of any excessive levels of pollutants/dust and the measures taken to minimize the impact and prevent it from occurring again.
- Inspection on worker accommodation ensure proper siting and proper specifications for opening and façade