Environmental Impact Assessment

PUBLIC

Project Number: 58290-001
Draft
August 2024

Uzbekistan: Samarkand 1 Solar PV and BESS Project

Critical Habitat Assessment (CHA)

PART 2

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

6 AVIFAUNA

Eleven bird species were identified during CHA Screening that pertain to the CH criteria for threatened species, and potentially migratory/congregating species:

- IFC PS6 Criterion 1: Critically Endangered and Endangered Species
- IFC PS6 Criterion 3: Migratory and Congregatory Species

6.1 Bird Baseline Survey Method

The landscape of the Project area supports a range of habitats and species, some of which are globally threatened, nationally protected and/or may be particularly sensitive to the impacts of the Project facilities. For this reason, a multi-level approach to avifauna surveys was undertaken to characterise the avifauna communities present at the sites and specifically target species or groups likely to be most impacted. The surveys undertaken are as follows:

- Spring and Autumn Migration Vantage Point Surveys
- Raptor Nest Search
- Asian Houbara Surveys
- Wintering Bird Surveys with a focus on Great Bustard populations

6.1.1 Migration Vantage Point Survey Methodology

Migration Vantage Point (VP) surveys were conducted in Spring and Autumn to capture key avifauna migration periods in the region, post-breeding season. The surveys were conducted between 13th September to 12th November 2023 (Autumn migration), and again between 28th February and 30th April 2024 (Spring migration).

The VP survey methods followed the guidelines outlined by Scottish Natural Heritage (SNH) in 2017 for bird assessments, except for elements specifically related to collision risk modelling for wind farms. These surveys aimed to monitor bird species within the survey area, gathering data on their presence, behaviour, and abundance. Binoculars (at or over 8x magnification) and a 300mm Digital camera 300mm were used to observe and document avifauna species.

A total of six VP locations (VP14-VP19) were selected to cover elements of the Project facilities and associated OHTLs, as detailed in the table below.

Table 6-1 Vantage Point Locations Sampled during Avifauna Migration Surveys

VP	PROJECT FACILITY	CO-ORDINATES	LOCATION DESCRIPTION	SURVEY HOURS

VP14	70km OHTL footprint	39.69826 66.552972	Agro-landscape	7 days, 20 hours per VP per season.
VP15	Nurobod BESS	39.577843 66.742028	Sazagan_1. Clay desert	7 days, 20 hours per VP per season.
VP16	70-km OHTL	39.532496 66.509101	Clay hills with rain fed fields	7 days, 20 hours per VP per season.
VP17	70-km OHTL	39.431038 66.131799	Djam-1. Clay hills with rain fed fields	7 days, 20 hours per VP per season.
VP18	70-km OHTL	39.427017 65.976201	Tym. Clay desert. Solar site	7 days, 20 hours per VP per season.
VP19	11-km OHTL	39.579068 66.79814	Clayed foothills	7 days, 20 hours per VP per season.

The 70km and 4.9km OHTLs are surrounded by several Important Bird Areas (IBA's). Whilst these areas range from 25km to 50km away, they support several migratory species which would likely pass over the OHTL site.

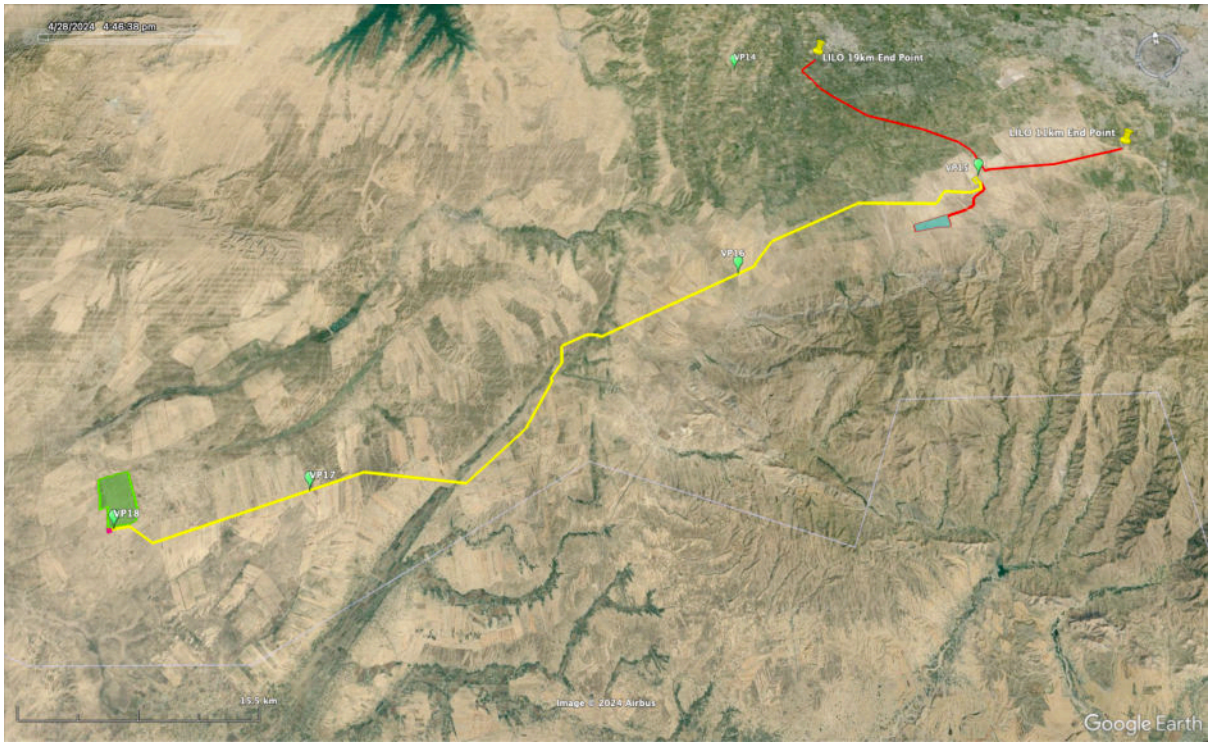

Figure 6-1 Map of Vantage Point Locations surveyed during Migration Surveys

6.1.2 Raptor Nest Search Methodology

The raptor nest survey was conducted in accordance with the raptor/vulture nesting (RVN) methodology, developed based on Good International Industry Practice (REF?). This methodology aims to characterise the potential for the Project to adversely impact the nesting/breeding activity of the targeted species.

The survey was conducted by a local expert between April 26th – 28th 2024 and covered the main Project Facilities and OHTL's including a 5km buffer from the Project footprint. This footprint and buffer zone was considered the "core" area for the raptor nest survey. Within this area, a total of 15 locations were determined to be suitable habitats for raptor nests and observed during surveys, shown on the figure below.

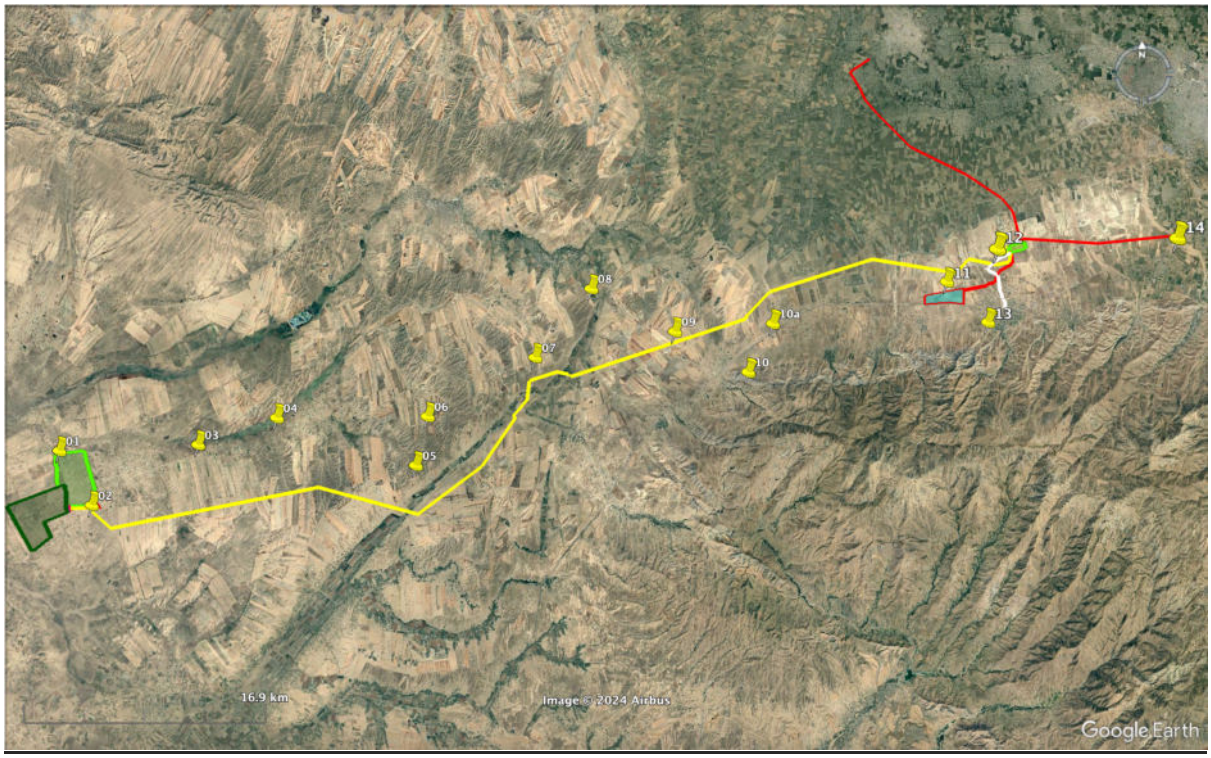

Figure 6-2 Map of Locations surveyed during Raptor Nest search

6.1.3 Asian Houbara Survey Methodology

The methodology implemented for this survey effort consisted of spring season point counts, following a method that has been developed by Houbara researchers in Uzbekistan, and taking advantage of the visual and acoustic observability of males' courtship displays, as Houbara are shy and difficult to see at other times of year. During the peak courtship season in Uzbekistan (March–May) displaying males (and also floating males) are conspicuous and can be apparent from long distances. This provides an opportunity for male population assessments with a relatively high degree of accuracy (Koshkin et al, 2016a).

Houbara point count surveys were conducted within the project area and surroundings, during the optimal period, March 20-21 and March 29, 2024.

Surveyors with good knowledge of the region identified the most suitable survey locations. The following figure shows the locations of points used for surveying.

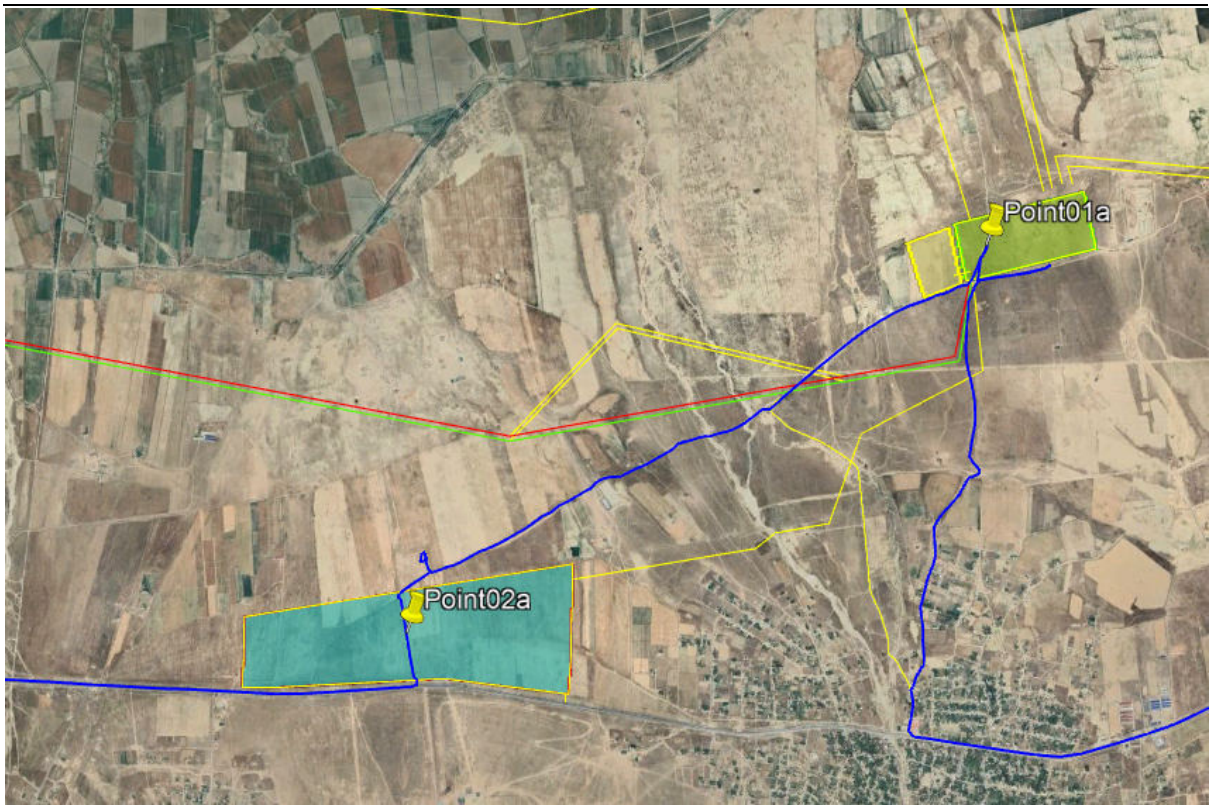

Figure 6-3 Survey point location in Nurabad BESS and SS and 100 MW Solar

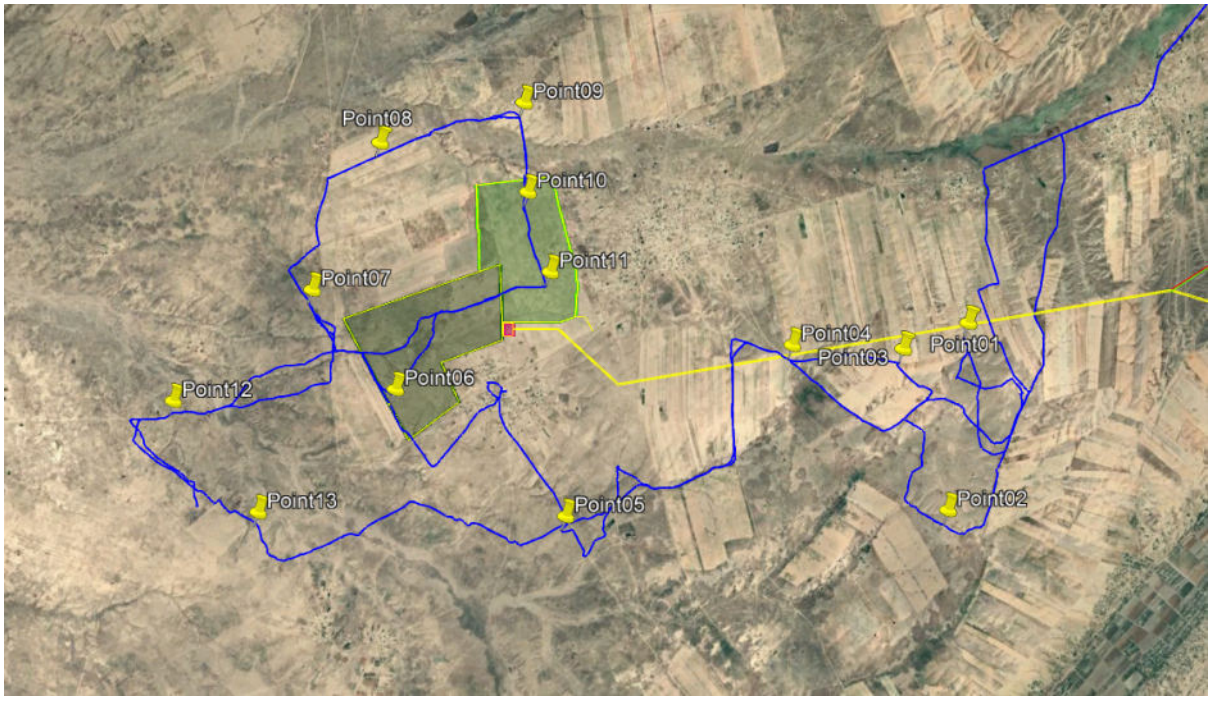

Figure 6-4 Survey point locations in Nurabad BESS and SS and 100 MW Solar

Optical instruments – binoculars Nikon x8, telescope x60 Swarowski and laser rangefinder, compass were used. Birds were registered on video and photo with mobile phone using dj-scoping and a Nikon D20 digital camera with a 300mm lens.

All surveys were conducted by Valentin Soldatov, who has extensive previous experience conducting Houbara surveys using this same methodology. Each point count survey lasted 20-30 minutes and was undertaken by a single observer during the period of peak male display activity, i.e. within 3 h after sunrise or 2 h before sunset (Combreau and Launay 1996). The weather conditions during survey period were generally good for counts, however at 10 sites conditions were insufficient due to high winds. Surveys were repeated at these sites when weather conditions were more optimal.

Table 6-2 Breeding bird survey point locations

POINT	N	E	1ST ROUND	2ND ROUND	NOTES
Point01a	39.575788	66.743553	20/03/2024		territory is non suitable for breeding A houbara
Point02a	39.546636	66.686862	20/03/2024		territory is non suitable for breeding A houbara
Point01	39.425704	66.112718	20/03/2024		territory is non suitable for breeding A houbara
Point02	39.381274	66.106821	20/03/2024		territory is non suitable for breeding A houbara
Point03	39.419487	66.092786	21/03/2024		territory is non suitable for breeding A houbara
Point04	39.420208	66.058907	21/03/2024	29/03/2024	
Point05	39.379254	65.989839	21/03/2024	29/03/2024	
Point06	39.409087	65.937431	21/03/2024	29/03/2024	
Point07	39.432394	65.912392	21/03/2024	29/03/2024	
Point08	39.4676	65.932175	21/03/2024	29/03/2024	
Point09	39.477331	65.97628	21/03/2024	29/03/2024	
Point10	39.456114	65.977649	21/03/2024	29/03/2024	
Point11	39.437161	65.984657	21/03/2024	29/03/2024	
Point12	39.405917	65.869277	21/03/2024	29/03/2024	
Point13	39.379658	65.895582	21/03/2024	29/03/2024	

6.2 Species Assessments

6.2.1 Egyptian Vulture

The Egyptian Vulture (*Neophron percnopterus*) is a native breeder and possible passage migrant in much of Uzbekistan. It is listed as Endangered (EN) on the Global IUCN Red List and Vulnerable (VU) in the National Uzbekistan Red Data Book.

The CHA Screening exercise found that this species should be further investigated in the CHA against **Criteria 1 and Criterion 3**.

6.2.1.1 ECOLOGY & CONSERVATION

The species inhabits extensive open areas mainly in dry or arid regions, although sometimes around fringe areas of wet or cold climates; steppe, desert, scrub, pastures and fields of cereals; requires rocky sites for nesting. Range greatly affected by species' dependence on livestock and human waste for food.

Northern breeders conduct long-distance intercontinental migrations, leaving breeding grounds in mid Sept to mid Oct/Nov, returning in Feb–Apr/May (Botha et al 2017). Numbers passing migration watchpoints are usually small.

This species typically nests on ledges or in caves on cliffs (Sarà and Di Vittorio 2003), crags and rocky outcrops, but occasionally in large trees, electricity pylons (Naoroji 2006) and exceptionally on the ground (Gangoso and Palacios 2005).

It forages in lowland and montane regions over open, often arid, country, and also scavenges at human settlements. It has a broad diet including carrion, tortoises, organic waste, insects, young vertebrates, eggs and even faeces (Margalida *et al.* 2012, Dobrev *et al*. 2015, 2016).

Usually solitary, individuals congregate at feeding sites, such as rubbish tips, or vulture restaurants (i.e. supplementary feeding stations), and form roosts of non-breeding birds (Ceballos and Donázar 1990).

Poisoning is the most important threat to this species. This is usually accidental through the ingestion of wildlife that have been intentionally poisoned. Hunting and electrocution/collision with powerlines are also significant threats to the species.

6.2.1.2 DISTRIBUTION

Egyptian Vultures have a broad distribution across Central Asia, Europe and Africa. The species is a breeding resident in Uzbekistan but may also occur as a passage migrant (Burnside et al 2023).

It has an extremely large EOO of 50,100,000 km^2.

A very preliminary estimate of the global population size is 12,400-36,000 mature individuals (BirdLife, 2021). In 2010 it was estimated that the population in Uzbekistan numbers 135 breeding pairs (Kashkarov & Lanovenko 2011).

Satellite tracking has been carried out to assess migratory routes of Egyptian Vultures in Uzbekistan. These have shown individuals tracked from breeding sites in the Qashqadaryo region, south of Samarkand, moving South to India.

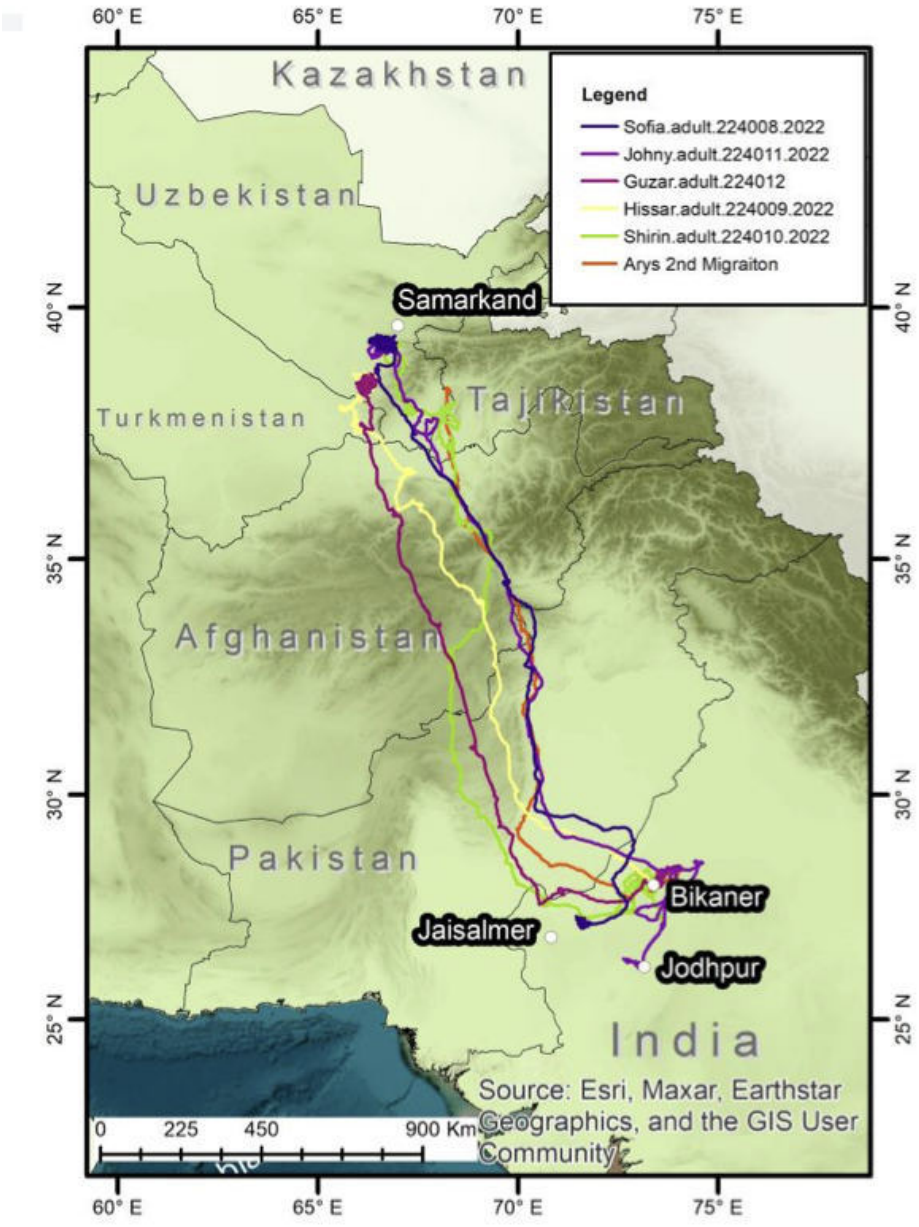

Figure 6-5 Autumn 2022 migration routes of 6 sub-adult Egyptian Vultures from Central Asia to India[2]

The following figures show the distribution of Egyptian Vultures in Uzbekistan and globally.

[2] Burnside, R. J., Ten, A., Soldatov, V. and Dobrev, V. 2023. Identifying migration routes and wintering sites of Egyptian Vultures breeding in Uzbekistan. Project Report 2022/23.

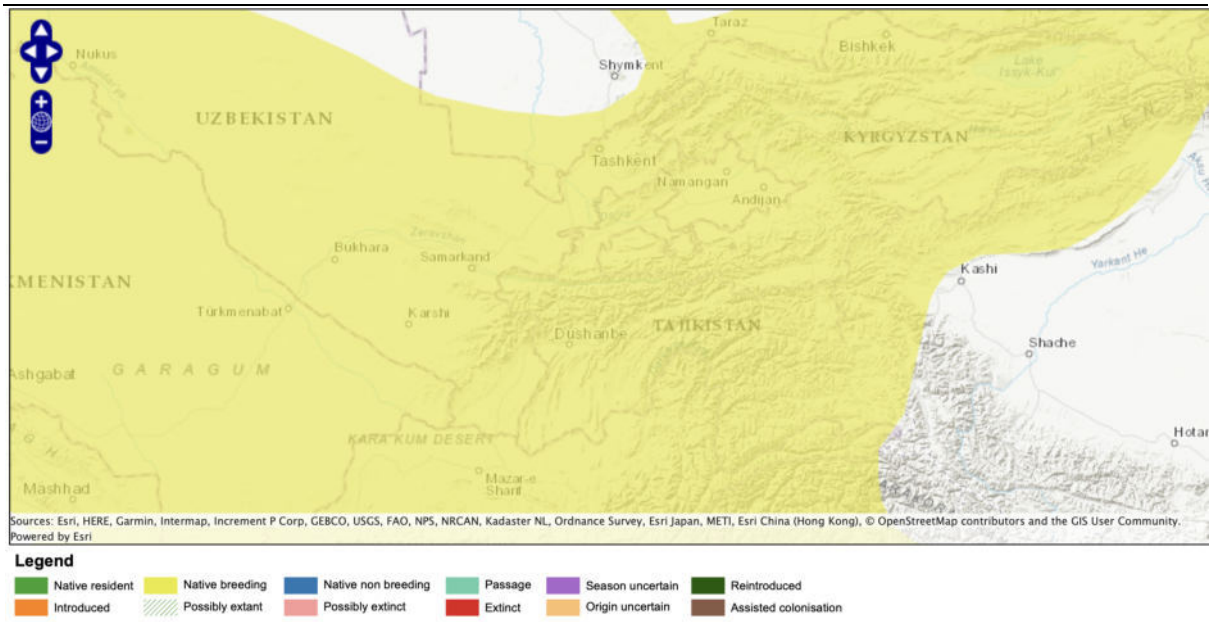

Figure 6-6 Geographic Distribution of Egyptian Vulture within Uzbekistan [3]

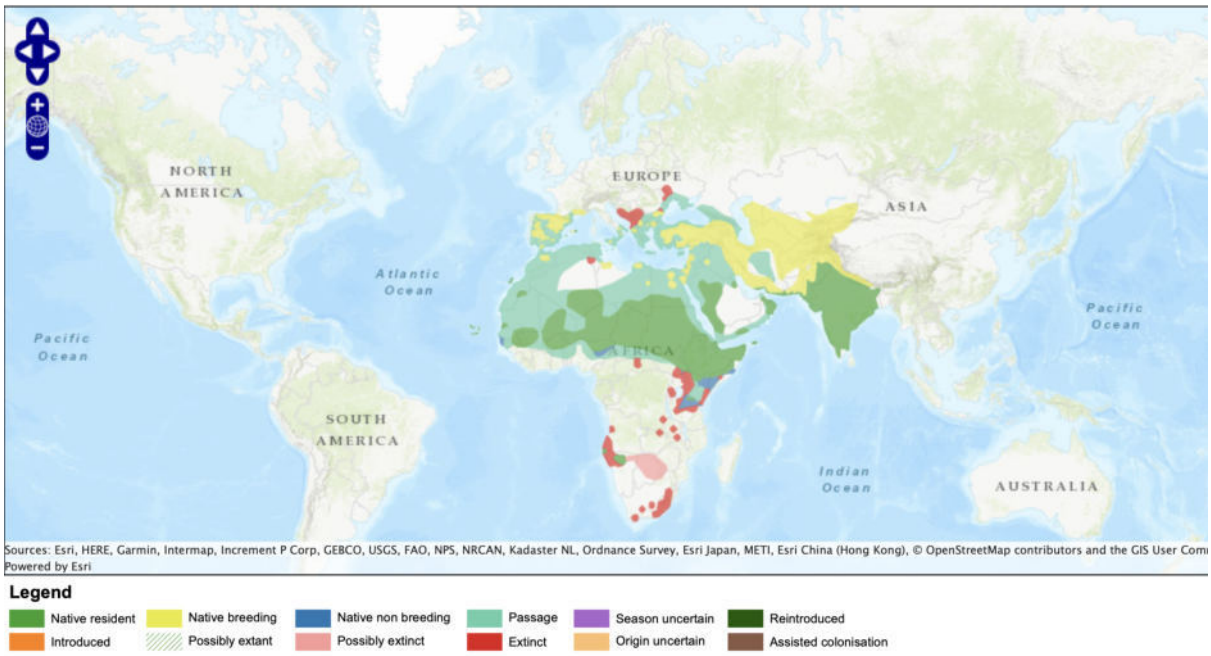

Figure 6-7 Geographic Distribution of the Egyptian Vulture

[3] BirdLife International (2024) Species factsheet: *Neophron percnopterus*. Downloaded from https://datazone.birdlife.org/species/factsheet/egyptian-vulture-neophron-percnopterus on 02/05/2024

6.2.1.3 BASELINE SURVEY RESULTS

In the Autumn VP surveying undertaken during September-November, **one individual** was observed along the 70km OHTL (VP17).

Three individuals were recorded migrating during the Spring VP survey: two individuals near the Nurobad BESS facility (VP15) and one along the 70km OHTL (VP16).

6.2.1.4 ANALYSIS

6.2.1.4.1 EAAA

The total EAAA for resident breeding birds is applied as all suitable breeding habitat that overlaps the project footprint and exists within a reasonable buffer, determined by species specific ecology.

The Egyptian Vulture requires rocky sites for nesting, typically nesting on ledges or in caves on cliffs crags and rocky outcrops, but occasionally in large trees and electricity pylons. .It forages in lowland and montane regions over open, often arid, country, although sometimes around fringe areas of wet or cold climates; steppe, desert, scrub, pastures and fields of cereals; and also scavenges at human settlements.

A 25 km buffer from the project footprint was applied based on the known home range of a breeding populations in Spain [4]. This area was then further extended to encompass the abovementioned surrounding suitable foraging habitats as well as the mountainous areas (potential breeding habitat) that extends towards the north, south and east of the project site. This should provide an adequate accounting of the population of birds likely to regularly utilize the project area.

The resulting EAAA been mapped in the following figure.

[4] López-López, P., García-Ripollés, C. and Urios, V. (2014), Food predictability determines space use of endangered vultures: implications for management of supplementary feeding. Ecological Applications, 24: 938-949. https://doi.org/10.1890/13-2000.1

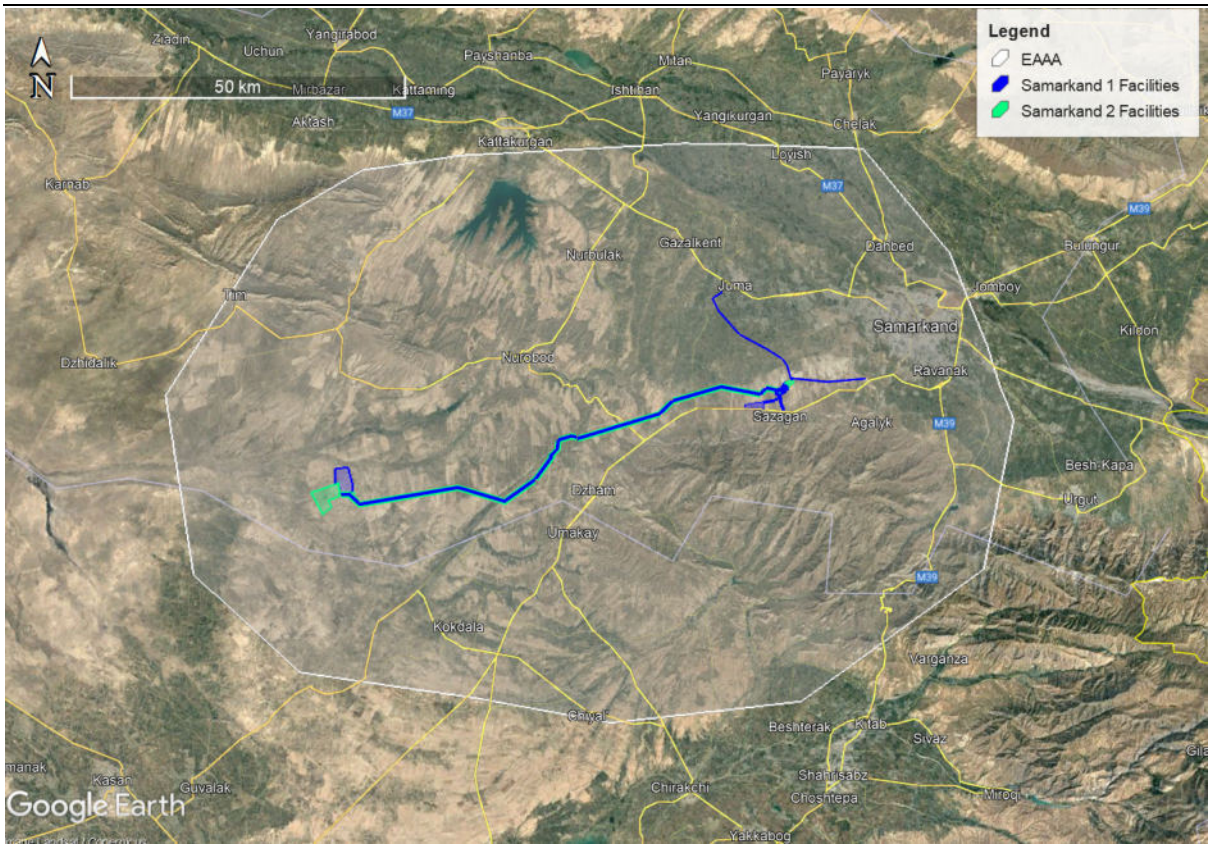

Figure 6-8 EAAA and potential habitats for the Egyptian Vulture in the PV plant site

6.2.1.4.2 Criticality

The global population of this species is estimated to range from 12,400-36,000 mature individuals. Taking a precautionary approach, the lower range is used to apply the thresholds.

Under **Criteria 1**, the threshold for Endangered (EN) species is 0.5% of the global population, therefore the 0.5% criticality threshold would be 62 individuals.

Under **Criteria 3**, the threshold is 1% of the global population using the EAAA on a regular/cyclical basis during migrations. This would amount to 124 individuals.

A total of 4 observations of Egyptian Vulture were recorded at 3 Vantage Points during the baseline studies spanning across Autumn and Spring migration seasons indicating species presence in the EAAA.

The relatively low number of observations, combined with the lack of evidence of breeding in the AoI which is considered as a 20km buffer from the project footprint to account for habitat displacement (Egyptian Vulture is not listed as a breeding species or a trigger species in the surrounding IBAs nor were nests found during raptor nest surveying), result in the conclusion that it is considered unlikely that that the EAAA population comprises of more than 62 individuals and therefore does not triggers criticality under **Criteria 1 nor under Criteria 3**.

Therefore, this species does not trigger CH status but is considered a Significant Biodiversity Value due to its IUCN Endangered (EN) designation and Vulnerable (VU) in the National Uzbekistan Red Data Book.

Due to its EN status, No Net Reduction is required, ensuring no significant residual impact that could lead to a material change in the population. The ESIA will address this via the biodiversity impact assessment, mitigation program and residual significance analysis.

6.2.2 Steppe Eagle

The Steppe Eagle (*Aquila nipalensis*) is a passage migrant and winter visitor in much of Uzbekistan and is listed as Endangered (EN) on the Global IUCN Red List. It is also listed as Vulnerable (VU) in the National Uzbekistan Red Data Book.

The CHA Screening exercise found that this species should be further investigated in the CHA against **Criteria 1 & 3**.

6.2.2.1 Ecology & Conservation

The Steppe Eagle inhabits extensive open areas such as steppes, deserts, scrublands, and agricultural fields, often in dry or arid regions but sometimes near wet or cold climates. It requires rocky sites for nesting and its range is influenced by its reliance on livestock and human waste for food.

Migration is a significant aspect of its life cycle, with northern breeders undergoing long-distance intercontinental migrations. They depart from their breeding grounds from mid-September to mid-November, returning from February to April or May. While in Uzbekistan, these eagles are observed mainly during these migration periods

Nesting typically occurs on cliffs, ledges, or in caves, and less commonly on large trees, electricity pylons, or exceptionally on the ground. The Steppe Eagle forages over open, often arid landscapes and scavenges near human settlements. Its diet is varied, including carrion, insects, small vertebrates, and organic waste.

In Uzbekistan, Steppe Eagles are solitary but may gather at feeding sites such as rubbish tips or supplementary feeding stations. Poisoning, primarily from ingesting carrion contaminated with toxins, poses the greatest threat to their survival. Additionally, hunting and fatal interactions with power lines are significant concerns in the region.

6.2.2.2 Distribution

Steppe Eagles have a broad distribution across Central Asia, Eastern Europe, and parts of Africa. In Uzbekistan, the species primarily occurs as a passage migrant, utilizing the country's extensive steppes and desert regions during its migratory periods. This pattern aligns with its

migration from northern breeding grounds to southern wintering areas, making Uzbekistan an important corridor in its annual migration cycle.

It has a very large EOO of 12,600,000 km2. The global population size is estimated at 50,000-75,000 mature individuals (BirdLife, 2021), with the whole population represented by < 37,000 pairs (Karyakin et al. 2016).

Steppe Eagles utilize the region of Samarkand as a key route during their extensive migratory journeys. This area's landscape, characterized by open and semi-arid environments, provides essential habitat conditions that support the eagles. Samarkand offers critical resting sites and abundant feeding opportunities, which are vital for the energy-intensive migration process. These features make Samarkand a strategic stopover that facilitates the seasonal movement of Steppe Eagles between their northern breeding areas and southern wintering grounds. However, specific and detailed local data on their migration patterns in Samarkand remain relatively under documented in the literature.

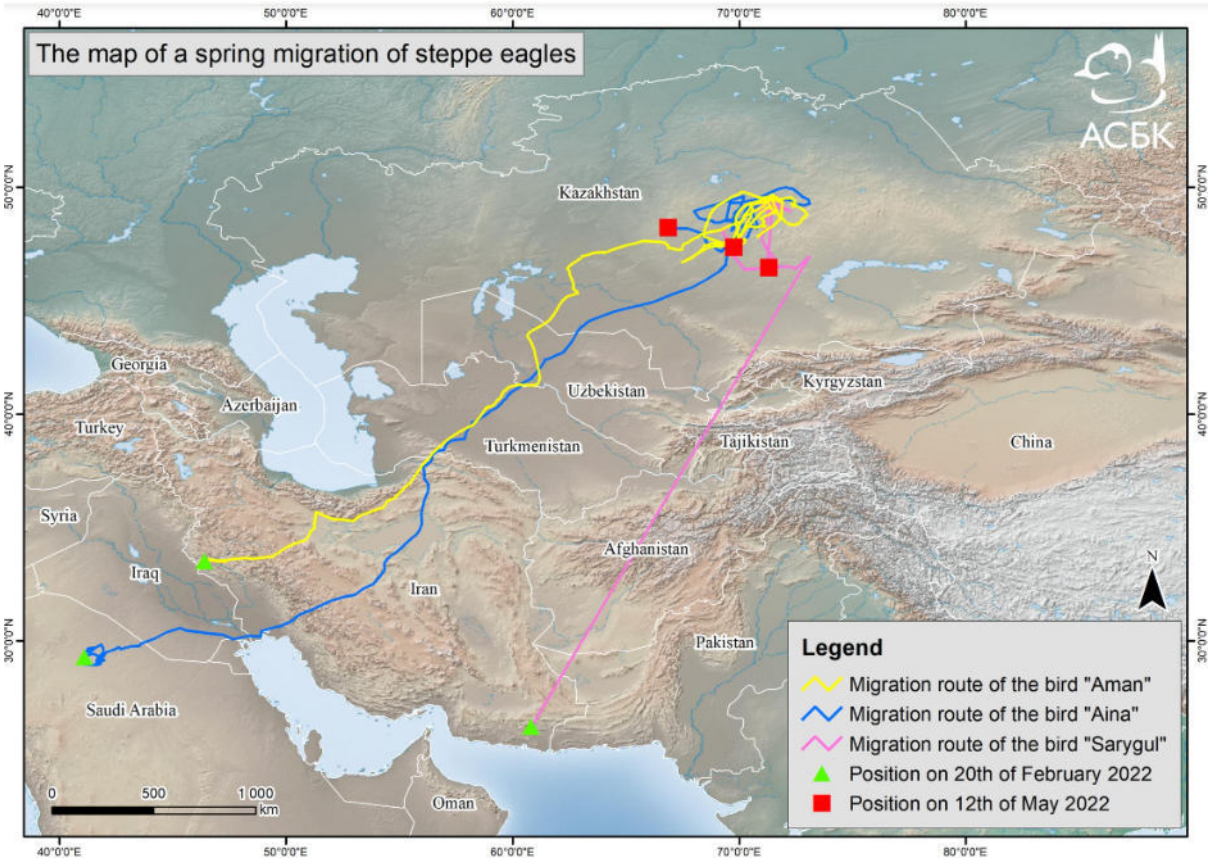

Figure 6-9 Spring 2021 migration routes of 3 sub-adult Steppe Eagle tagged in Central Kazakhstan in 2018 [5]

[5] Association for the Conservation of Biodiversity of Kazakhstan (2021) Map of a spring migration of steppe eagles. Available at: https://www.facebook.com/photo/?fbid=5154174388007530&set=a.202354996522852&locale=hi_IN

The above figure depicts the migration paths and winter locations of three Steppe Eagles tagged in Central Kazakhstan in 2018. Aman and Sarygul wintered in Iran, while Aina was in Saudi Arabia. They started their return journey to Kazakhstan on February 20th, traversing Iran, Turkmenistan, and Uzbekistan. Aman crossed into Kazakhstan on March 3, and Aina on March 20. Sarygul's data was temporarily lost but has resumed; all are now in Karaganda, their natal region

The following figures show the distribution of the Steppe Eagle in Uzbekistan and globally.

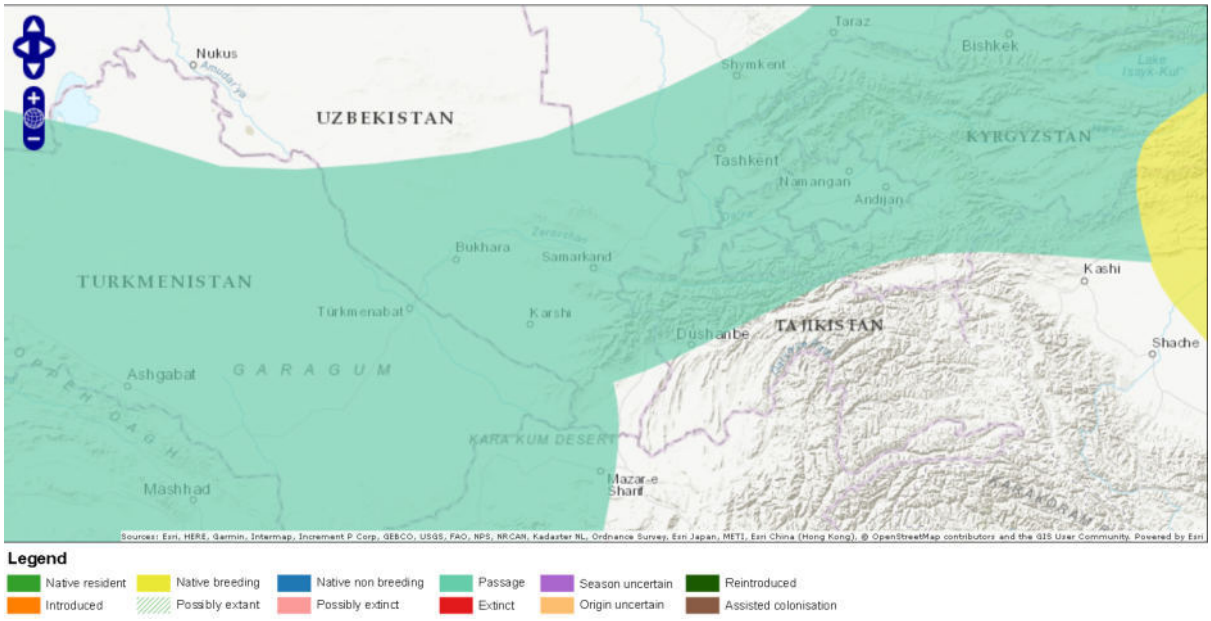

Figure 6-10 Geographic Distribution of Steppe Eagle within Uzbekistan[6]

[6] BirdLife International (2024) Species factsheet: *Neophron percnopterus*. Downloaded from https://datazone.birdlife.org/species/factsheet/egyptian-vulture-neophron-percnopterus on 02/05/2024

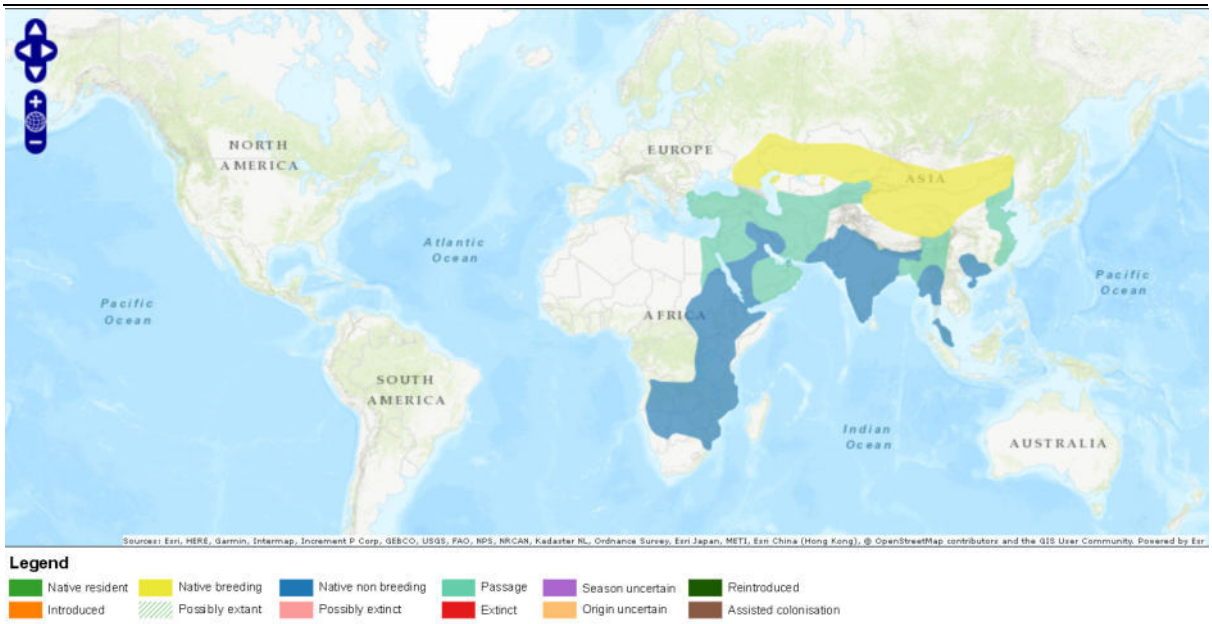

Figure 6-11 Geographic Distribution of Steppe Eagle within Uzbekistan

6.2.2.3 BASELINE SURVEY RESULTS

Five individuals were recorded during Autumn VP surveying undertaken between September and November 2023, at VP's 15, 16 and 17.

In subsequent Spring VP surveys in 2024, **four individuals** were recorded at VP's 16, 18, and 19.

6.2.2.4 ANALYSIS

6.2.2.4.1 EAAA

The EAAA is a difficult concept to apply to long-range migratory species, as encompassing the full geographic range of such species would result in extremely large population extrapolations. *(Refer to Section 3.1.4 for detailed explanation of how EAAA is being developed for long-distance migratory species)*.

The Steppe Eagle inhabits extensive open areas such as steppes, deserts, scrublands, and agricultural fields, often in dry or arid regions but sometimes near wet or cold climates. Its range is influenced by its reliance on livestock and human waste for food.

Based on studies of migrating individuals using satellite telemetry [7] an estimate of mean daily flight distance of 200km is considered. The EAAA is applied as all of the above-mentioned

[7] Meyburg, Bernd-Ulrich & Meyburg, Christiane & Paillat, Patrick. (2012). Steppe Eagle migration strategies - Revealed by satellite telemetry. British Birds. 105. 506-519.

suitable habitats within the project boundaries as well as within a buffer of 200km around the project footprint.

The resulting EAAA has been mapped in the following figure.

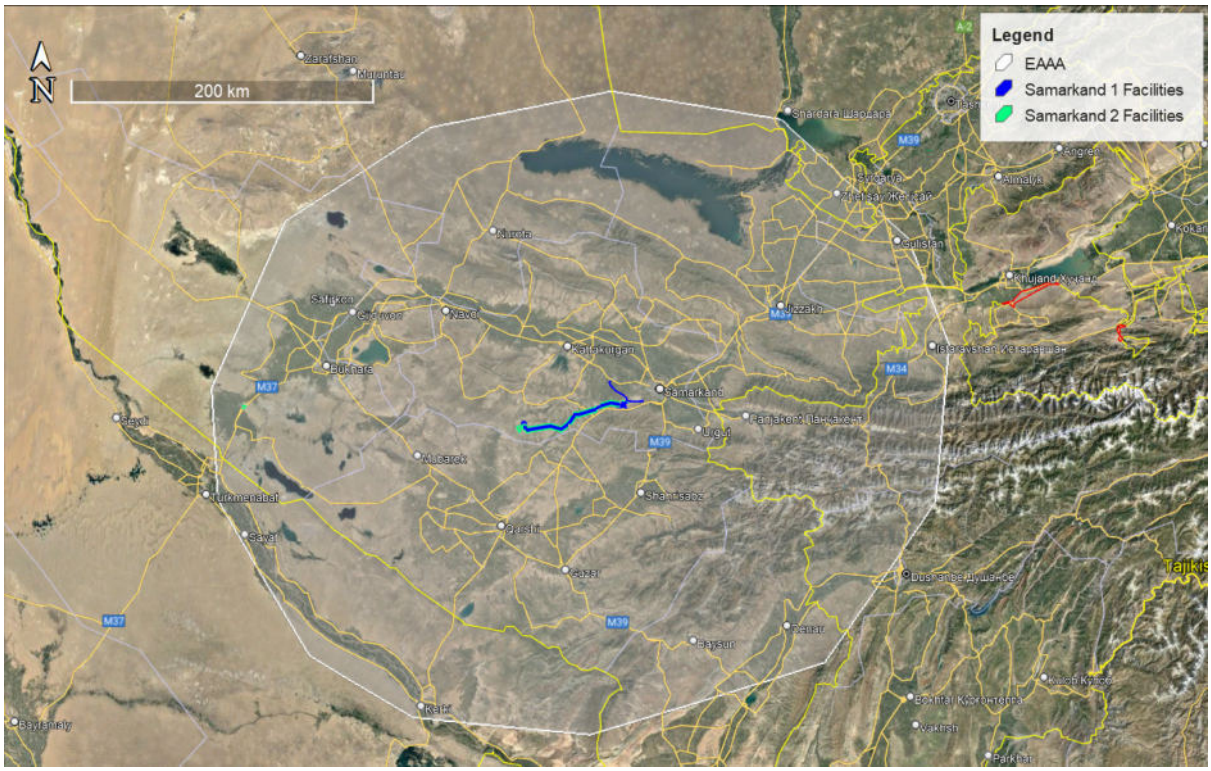

Figure 6-12 EAAA and potential habitats for the Steppe Eagle in the PV plant site

6.2.2.4.2 Criticality

The global population of this species is estimated to range from 50,000-75,000 mature individuals. Taking a precautionary approach, the lower range is used to apply the thresholds.

Under **Criteria 1**, the threshold for Endangered (EN) species is 0.5% of the global population, therefore the 0.5% criticality threshold would be 250 individuals.

Under **Criteria 3**, the threshold is 1% of the global population using the EAAA on a regular/cyclical basis during migrations. This would amount to 500 individuals.

A total of 9 observations were recorded at 5 Vantage Points during baseline studies spanning across Autumn and Spring migration seasons indicating species presence within the EAAA. However, there are no known congregating areas or bottle neck sites mapped as IBAs for Steppe Eagle within the EAAA. Based on the known migratory corridors for this species, it is unlikely that such areas exist within the EAAA. Although this is not a quantitative extrapolation, the context indicates that this species likely does not have an EAAA population of more than 250 individuals.

Therefore, this species does not trigger CH status but is considered a Significant Biodiversity Value (SBV) due to its IUCN Endangered (EN) designation and Vulnerable (VU) in the National Uzbekistan Red Data Book.

Due to its EN status, No Net Reduction is required, ensuring no significant residual impact that could lead to a material change in the population. The ESIA will address this via the biodiversity impact assessment, mitigation program and residual significance analysis.

6.2.3 Eastern Imperial Eagle

The Eastern Imperial Eagle (*Aquila heliaca*) is a passage migrant in Uzbekistan, listed as Vulnerable (VU) species on the IUCN Global Red List, and Vulnerable (VU) in the Uzbekistan National Red Data Book.

The CHA Screening exercise found that this species should be further investigated in the CHA against **Criteria 1 and 3**.

6.2.3.1 Ecology

This is a lowland species that has been pushed to higher altitudes by persecution and habitat loss in Europe. Eastern populations breed in natural steppe and agricultural habitats but migrate South for winter. Wetlands are apparently preferred on the wintering grounds (Meyburg and Kirwan, 2020.

The species is mostly migratory, leaving breeding areas mid Sept to mid Oct/Nov, returning in Feb–Apr/May. Numbers passing migration watchpoints usually small.

Its main diet is small to medium-sized mammals (Handrinos and Akriotis 1997) but may eat larger prey (e.g. foxes and sheep) birds, including domestic chickens, and reptiles. Prey caught mainly on ground by perch hunting or by soaring, and pair members often hunt co-operatively.

Birds are usually seen singly or in pairs, with small groups sometimes forming on migration or at sources of food or water (Ferguson-Lees and Christie 2001). In exceptional cases large groups of up to 200 have been known to form on autumn migration (Snow and Perrins 1998).

Breeding sites are threatened primarily by intensive forestry, a shortage of large indigenous trees in the lowlands and the presence of humans (Karyakin 2011; M. Horváth in litt. 2016). Other threats include loss of feeding habitats, prey shortages, nest robbing and illegal trade, shooting, poisoning and collisions with vehicles. An average of c.450 Eastern Imperial Eagles were killed by powerlines during the 2009 breeding season in the Altai region – 25% of the total population of the region (Karyakin et al. 2009).

6.2.3.2 DISTRIBUTION

The species is known to breed from Central and Eastern Europe continuously East through Russia, Mongolia and Kazakhstan. It may breed in Uzbekistan, but this has not been confirmed. It is migratory, and uses Uzbekistan as a wintering site, as well as passing over the region during migrations from Kazakhastan to the Middle East (Poessel et al 2018). Satellite tracking has eluded to some winter site faithfulness (Meyburg and Meyburg, 2011).

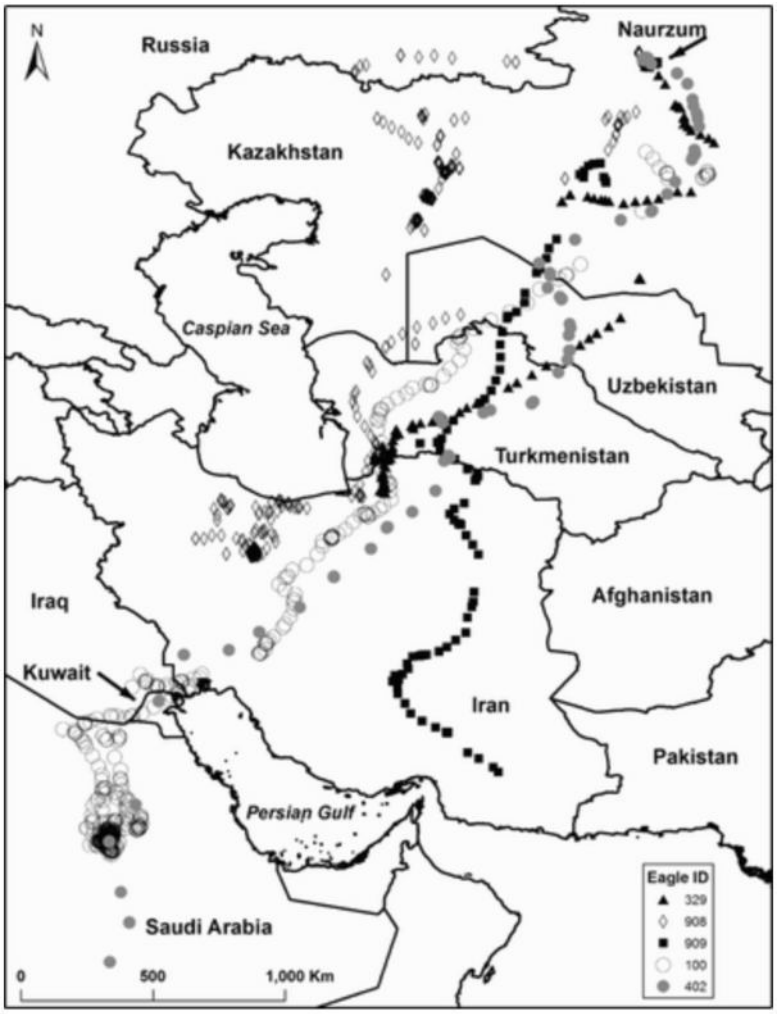

Figure 6-13 Migration routes of Eastern Imperial Eagles captured in Kazakhstan [8]

It has a large EOO of 14,900,000 km^2.

[8] Poessel, S. A., Bragin, E. A., Sharpe, P. B., Garcelon, D. K., Bartoszuk, K., & Katzner, T. E. (2018). Movements and landscape use of Eastern Imperial Eagles Aquila heliaca in Central Asia. Bird Study, 65(2), 208–218. https://doi.org/10.1080/00063657.2018.1447907

Currently the population has been estimated at 2,500-3,800 mature individuals. Recent estimates from Russia and Kazakhstan suggest the global population is much higher, but these estimates have been criticised (BirdLife, 2019).

The figures below show the species distribution.

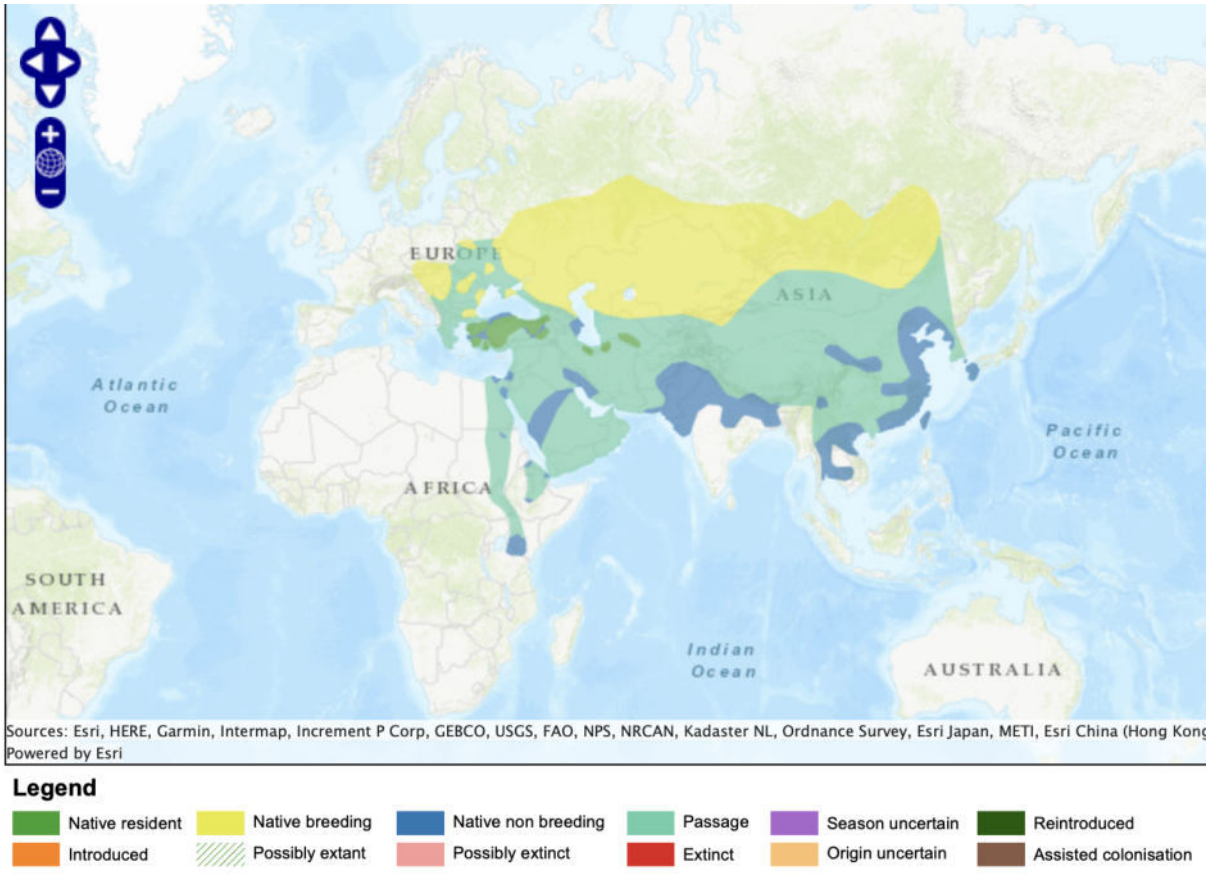

Figure 6-14 Distribution Map of Eastern Imperial Eagle [9]

[9] BirdLife International (2024) Species factsheet: Aquila heliaca. Downloaded fromhttps://datazone.birdlife.org/species/factsheet/eastern-imperial-eagle-aquila-heliaca on 24/04/2024.

Figure 6-15 Distribution Map of Eastern Imperial Eagle

6.2.3.3 BASELINE SURVEY RESULTS

Two individuals were recorded during the Spring migration surveys conducted between March and April 2024. One individual was observed along the proposed 70km OHTL (VP16, approximately 3km from Sarikul) and one along the proposed 11km LILO (VP19).

In subsequent VP surveying undertaken during September-November 2023, **one individual** was observed, again along the 70km OHTL (VP16).

6.2.3.4 ANALYSIS

6.2.3.4.1 EAAA

The EAAA is a difficult concept to apply to long-range migratory species, as encompassing the full geographic range of such species would result in extremely large population extrapolations. *(Refer to Section 3.1.4 for detailed explanation of how EAAA is being developed for long-distance migratory species)*.

The dominant habitat types used during migration includes agricultural areas, bare areas and sparsely vegetated areas. The wintering daily movement (during stopover) has been measured at approximately 20km distance in a day. The EAAA is applied as all of the above-mentioned suitable habitats within the project boundaries as well as within a buffer of 20km around the project footprint.

The resulting EAAA has been mapped in the following figure.

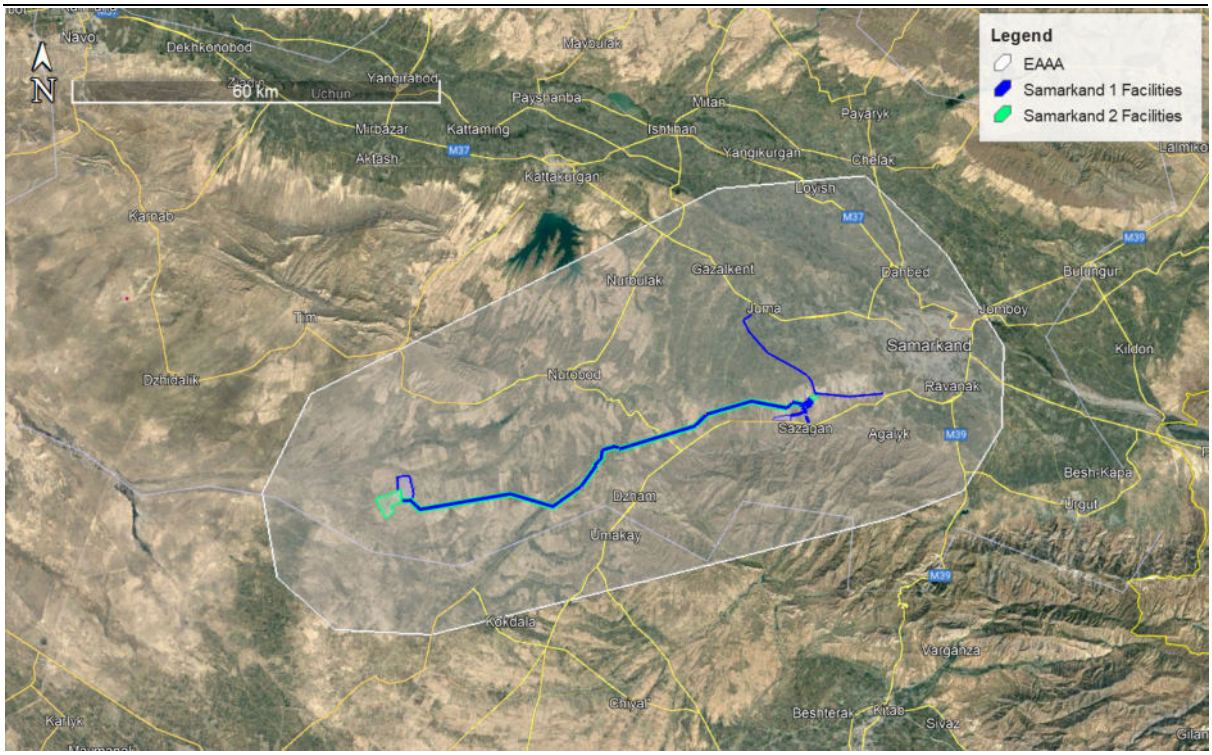

Figure 6-16 EAAA and potential habitats for the Eastern Imperial Eagle in the PV plant site

6.2.3.4.2 Criticality

The global population of this species is estimated to range from 2,500-3,800 mature individuals. Taking a precautionary approach, the lower range is used to apply the thresholds.

Under **Criteria 1**, the threshold for VU species is EAAAs that support a globally important concentration of the global population such that the loss of the EAAA population would result in uplisting to CR/EN status and meet the quantitative thresholds of Criterion 1.

Under **Criteria 3**, the threshold is 1% of the global population using the EAAA on a regular/cyclical basis during migrations. This would amount to 25 individuals.

A total of 3 observations were recorded at 2 Vantage Points during the baseline studies spanning across Autumn and Spring migration seasons indicating species presence within the EAAA.

However, there are no known congregating areas mapped as IBAs within the EAAA for which Eastern Imperial Eagle is a trigger species. Based on the known migratory corridors for this species, it is unlikely that such areas exist within the EAAA. Although this is not a quantitative extrapolation, the context indicates that this species likely does not have an EAAA population of more than 25 individuals nor does the EAAA population contain an important concentration the loss of which would trigger uplisting to CR/EN status. Therefore, CH is not triggered under Criteria 3 or Criterion 1.

Although this species does not trigger CH status, it is considered a Significant Biodiversity Value due to its Vulnerable (VU) designated conservation status on IUCN and in the National Uzbekistan Red Data Book.

The ESIA will address impacts on this species as a Sensitive Receptor, via the biodiversity impact assessment, mitigation program and residual significance analysis.

6.2.4 Greater Spotted Eagle

The Greater Spotted Eagle (*Clanga clanga*) is a passage migrant in Uzbekistan, listed as Endangered (EN) species on the IUCN Global Red List, and Vulnerable (VU) in the Uzbekistan National Red Data Book.

The CHA Screening exercise found that this species should be further investigated in the CHA against **Criteria 1 and 3**.

6.2.4.1 Ecology

The species inhabits large wet forests bordering humid meadows, bogs, marshes and other wetlands including mangroves (Rasmussen and Anderton, 2005) occasionally on mudflats associated with large rivers and estuaries, probably mainly in winter (Khan, 2005). Visits paddyfields and rubbish dumps, especially in winter (Rasmussen and Anderton 2005), and other man-made habitats such as sewage farms, reservoirs and irrigated cultivation (Lobley, 2007).

It is a migratory species, with birds leaving their breeding grounds in October/November to returning North in February to March (del Hoyo et al. 1994). Birds migrate on a broad front, tending to pass in singles, twos and threes with the occasional larger group (Ferguson-Lees and Christie 2001).

It feeds on unretrieved quarry, small mammals, waterbirds, frogs and snakes, hunting over swamps, wet meadows and, in Europe, over extensively managed agricultural land (A. Lõhmus in litt. 1999); birds soar to c.100 m high when hunting.

Hybridisation is a major threat to this species, with strong evidence of inter breeding with the Lesser Spotted Eagle, *Clanga pomarina* (Bergmanis et al. 1997; Lõhmus and Väli 2001; Dombrovski 2002; Vali et al. 2010). Habitat destruction poses a significant threat, as do forestry operations causing disturbance, as birds are intolerant of human presence in their territories (Maciorowski et al. 2014). Wintering habitats are also being lost (P. D. Round in litt. 2016). On migration and at wintering grounds, electrocution, collision with wind turbines, shooting and poisoning are major causes of mortality (Perlman and Granit 2012; Maciorowski et al. 2014).

6.2.4.2 DISTRIBUTION

This species occupies a fragmented range, breeding primarily in Eastern Europe and the Northern regions of Central Asia (Meyburg et al. 1999; Keller et al. 2020). Passage or wintering birds occur in small numbers over a vast area, including Uzbekistan.

The figure below shows a migratory route for Greater Spotted Eagle from Kazakhstan to Pakistan through Eastern Uzbekistan, with a stopover that appears to be just West of Samarkand.

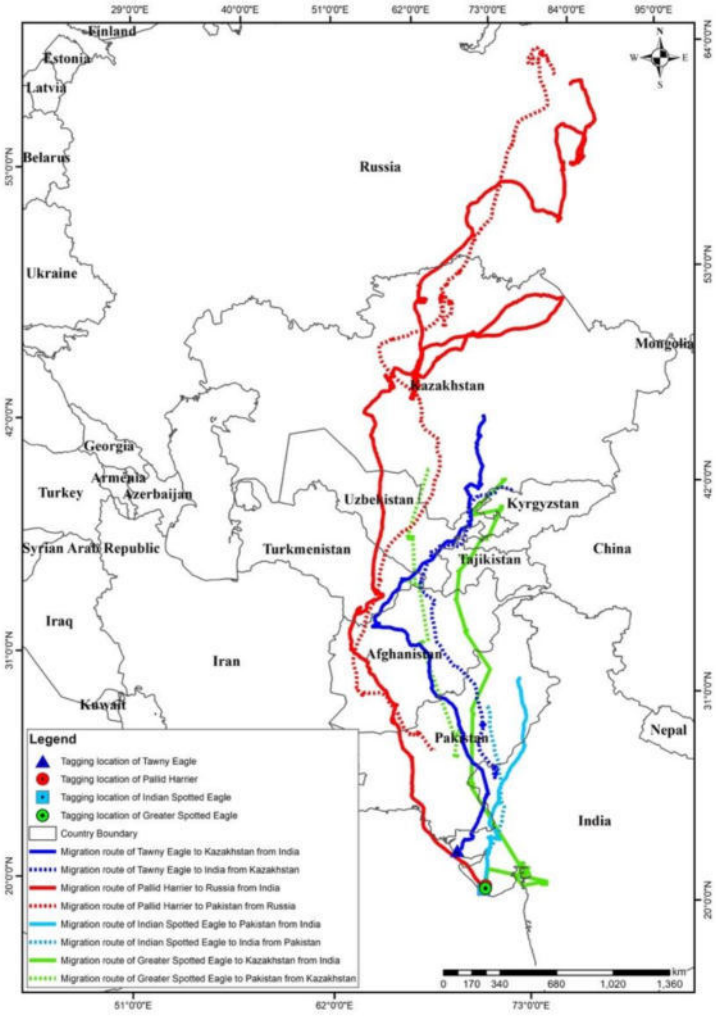

Figure 6-17 Migratory routes of raptor species through Central Asia. Green tracks indicate Greater Spotted Eagle routes [10]

The species has an EOO of 15,300,000km^2.

[10] Ram, M., Sahu, A., Tikadar, S., Gadhavi, D., Rather, T. A., Jhala, L., and Zala, Y. (2022) Home Ranges and Migration Routes of Four Threatened Raptors in Central Asia: Preliminary Results. Birds, 3, 293–305. https://doi.org/10.3390/birds3030020

Based on European population estimates (1,900-2,500 equating to 25-49% of the global range) a very preliminary estimate of the global population size is 3,900-10,000 mature individuals. There is very little data available on population sizes further east in the species' range.

The figures below show the species distribution.

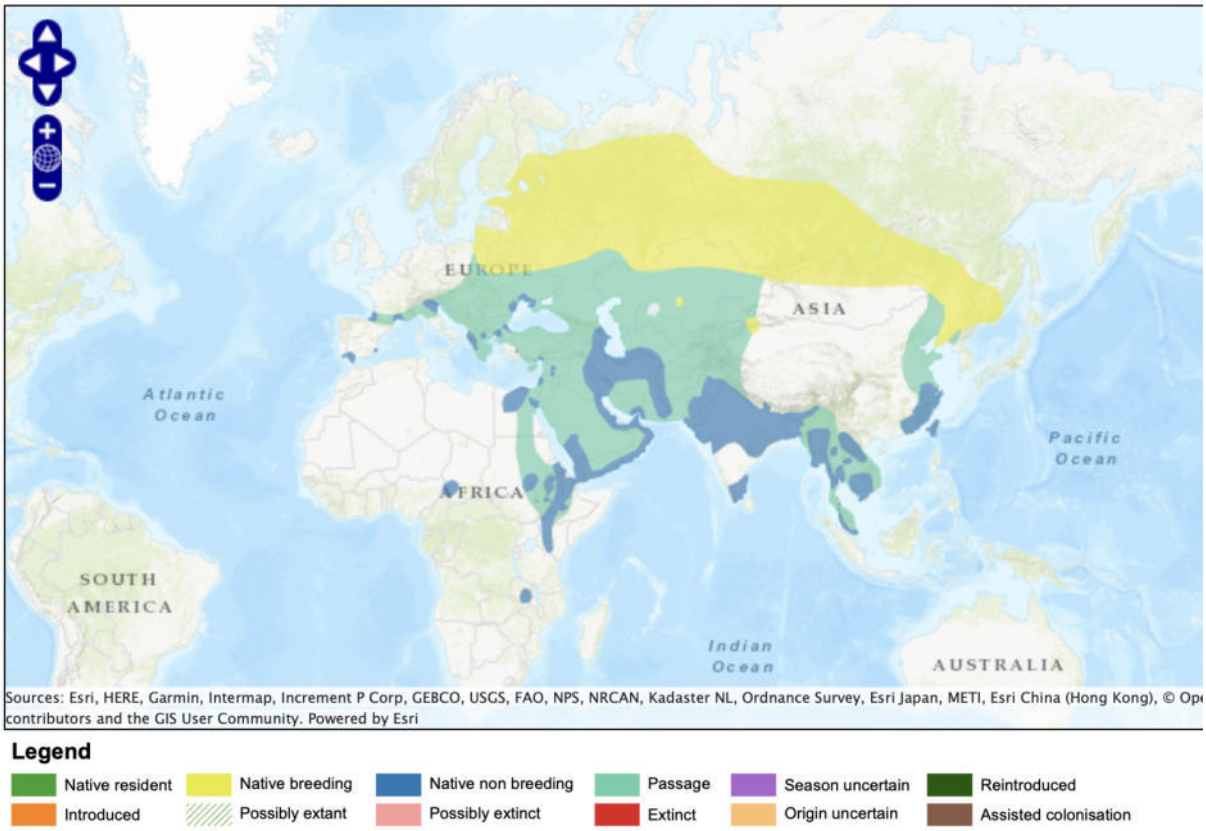

Figure 6-18 Distribution Map of Greater Spotted Eagle [11]

[11] BirdLife International (2024) Species factsheet: *Clanga clanga*. Downloaded from https://datazone.birdlife.org/species/factsheet/greater-spotted-eagle-clanga-clanga on 24/04/2024.

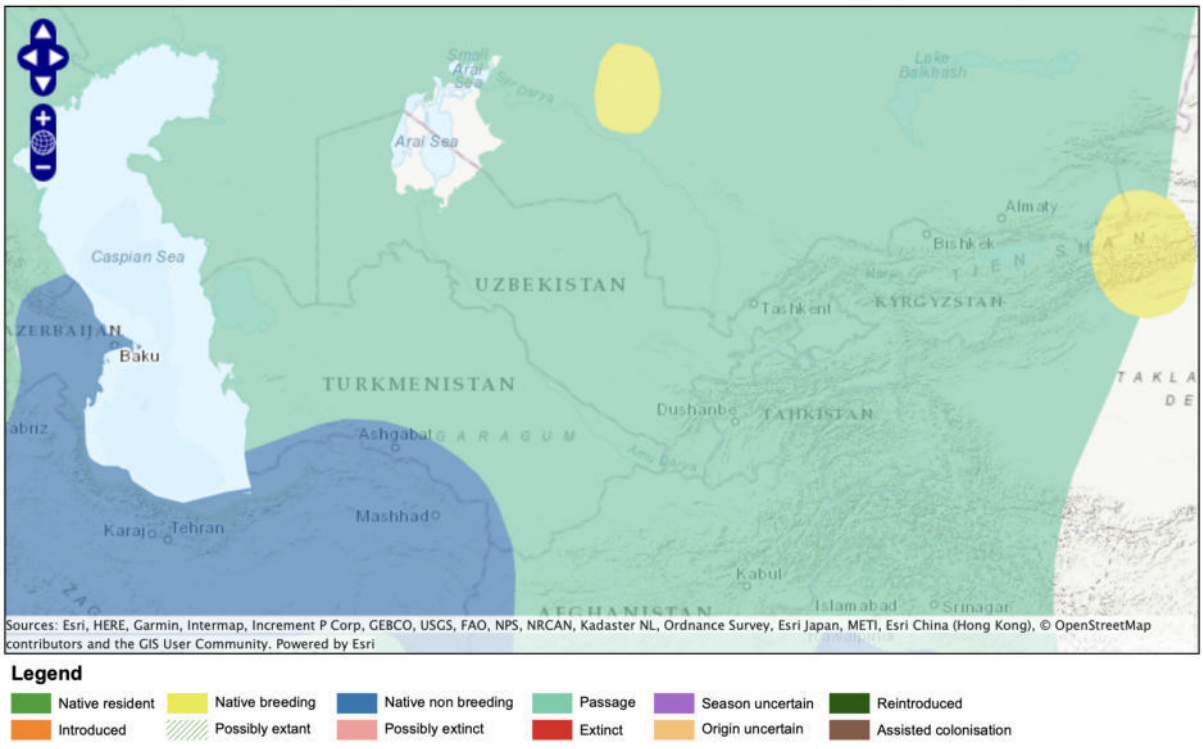

Figure 6-19 Distribution Map of Greater Spotted Eagle

6.2.4.3 BASELINE SURVEY RESULTS

This species was not recorded within the Project area during any of the baseline surveys conducted in 2023 and 2024.

6.2.4.4 ANALYSIS

6.2.4.4.1 EAAA

The EAAA is a difficult concept to apply to long-range migratory species, as encompassing the full geographic range of such species would result in extremely large population extrapolations. *(Refer to Section 3.1.4 for detailed explanation of how EAAA is being developed for long-distance migratory species)*.

During migration the Greater Spotted Eagle uses paddy fields and rubbish dumps, also other man-made or man-modified habitats such as sewage farms, reservoirs and irrigated cultivation. Based on studies of migrating individuals using satellite telemetry, an estimate of 250km/day is considered as the maximum daily flight distance during migration [12]. The EAAA is

[12] Ram, Mohan, Aradhana Sahu, Shyamal Tikadar, Devesh Gadhavi, Tahir Ali Rather, Lahar Jhala, and Yashpal Zala. 2022. "Home Ranges and Migration Routes of Four Threatened Raptors in Central Asia: Preliminary Results" *Birds* 3, no. 3: 293-305. https://doi.org/10.3390/birds3030020

applied as all of the above-mentioned suitable habitats within the project boundaries as well as within a buffer of 250km around the project footprint.

The resulting EAAA has been mapped in the following figure.

Figure 6-20 EAAA and potential habitats for the Greater Spotted Eagle in the PV plant site

6.2.4.4.2 Criticality

The global population of this species is estimated to range from 3,900-10,000 mature individuals. Taking a precautionary approach, the lower range is used to apply the thresholds.

Under **Criteria 1**, the threshold for VU species is EAAAs that support a globally important concentration of the global population such that the loss of the EAAA population would result in uplisting to CR/EN status and meet the quantitative thresholds of Criterion 1.

Under **Criteria 3**, the threshold is 1% of the global population using the EAAA on a regular/cyclical basis during migrations. This would amount to 39 individuals.

To date, zero observations of this species was made during baseline studies spanning across Autumn and Spring migration seasons.

Among the 41 IBAs within the 250km buffer, Greater Spotted Eagle is listed as a trigger species for Dalverzin State Forestry and Hunting Management Area and Zaravshan State Nature Reserve. 15 individuals were recorded on passage in 2005 in the Zaravshan Reserve located

20km from the project while 3-9 adults were recorded in the winter of 2006 in the Dalverzin area located approximately 225 km from the project footprint. Given that zero observations were recorded during the baseline surveys and that only 18-24 individuals were recorded across a span of 2 years in the EAAA, it is not likely that that the EAAA population comprises of more of 39 individuals nor does the EAAA population contain an important concentration the loss of which would trigger uplisting to CR/EN status. Therefore, CH is not triggered under Criteria 3 or Criterion 1.

Since the species did not occur during any baseline surveying of the main facilities, it is not considered as a SBV either for the Main Facilities component(s) of the Samarkand 1 project. However, given the status of this species, if were to be observed during future monitoring efforts it would be assessed under the framework of adaptive management.

6.2.5 Pallas's Fish -eagle

The Pallas's Fish-eagle (*Haliaeetus leucoryphus*) is a large bird of prey, fully migrant, that primarily inhabits the riparian and lacustrine environments across Central and East Asia. This species is classified as Endangered (EN) on the IUCN Red List, mainly due to habitat destruction, pollution, and overfishing, which reduce its food sources. The Pallas's Fish-Eagle is recognized for its distinctive call and impressive stature, making it a key species of interest in avian conservation efforts.

The Pallas's Fish-eagle is listed as a nationally protected species in Uzbekistan according to the 2019 edition of the Red Book of Uzbekistan (UzRDB), appointed the conservation status of Endangered (EN).

The CHA Screening exercise found that this species should be further investigated in the CHA against **Criterion 1 & 3**.

6.2.5.1 ECOLOGY

Pallas's Fish-Eagle favors extensive wetland habitats, including lakes, rivers, and floodplains, from lowlands to areas around 5,000m altitude. These areas provide ample fishing opportunities and suitable conditions for nesting. The species is often found in environments that maintain a balance between open water and vegetative cover, which is crucial for both feeding and breeding.

The breeding season for the Pallas's Fish-Eagle typically begins in early spring, with nesting sites commonly located in large trees near water bodies. During this period, the species lays 1-3 eggs per breeding season, with both parents actively involved in incubation and caring for the young. Breeding occurs from September to February in northern India and Myanmar

(BirdLife International 2001), while in Bangladesh, the species returns to nest sites in late August (Sourav et al. 2011).

As its name suggests, the Pallas's Fish-Eagle predominantly feeds on fish. However, its diet can also include waterfowl and small mammals, adapting based on availability and environmental conditions. The eagle employs a powerful and skilled hunting technique, often swooping down to snatch prey directly from the water.

This eagle species is territorial during the breeding season, often seen patrolling water bodies to defend its fishing grounds. Outside of breeding, Pallas's Fish-Eagles may be observed either alone or in pairs, rarely forming larger groups.

Major threats to the Pallas's Fish-Eagle include habitat degradation through the alteration of wetland areas, pollution of water bodies which impacts fish populations, and direct disturbance from human activity. Additionally, the illegal trade of birds and their eggs poses a significant risk to population stability.

Conservation efforts for the Pallas's Fish-Eagle focus on protecting wetland habitats and ensuring sustainable fish populations. Environmental education and stricter enforcement of wildlife protection laws are also critical to mitigating the impacts of human disturbance and illegal trade.

6.2.5.2 DISTRIBUTION

The Pallas's Fish-Eagle is distributed across a broad area, stretching from Kazakhstan and Mongolia through to parts of South Asia, including Bangladesh and Northern India. The species is largely resident throughout its range, though some northern populations may move short distances southward during the harshest winter months.

The EOO of resident/breeding population of Pallas's Fish-eagle is 1,740,000 km2 (Birdlife Datazone, 2024).

Based on available surveys and data, the population of this species is estimated to be below 2,500 mature individuals (M. Steele, 2017), placing it within the range of 1,000 to 2,499 mature individuals. It is regarded as a single migratory population rather than consisting of isolated subpopulations (M. Steele, 2017).

The following figures shows the geographical range of this species.

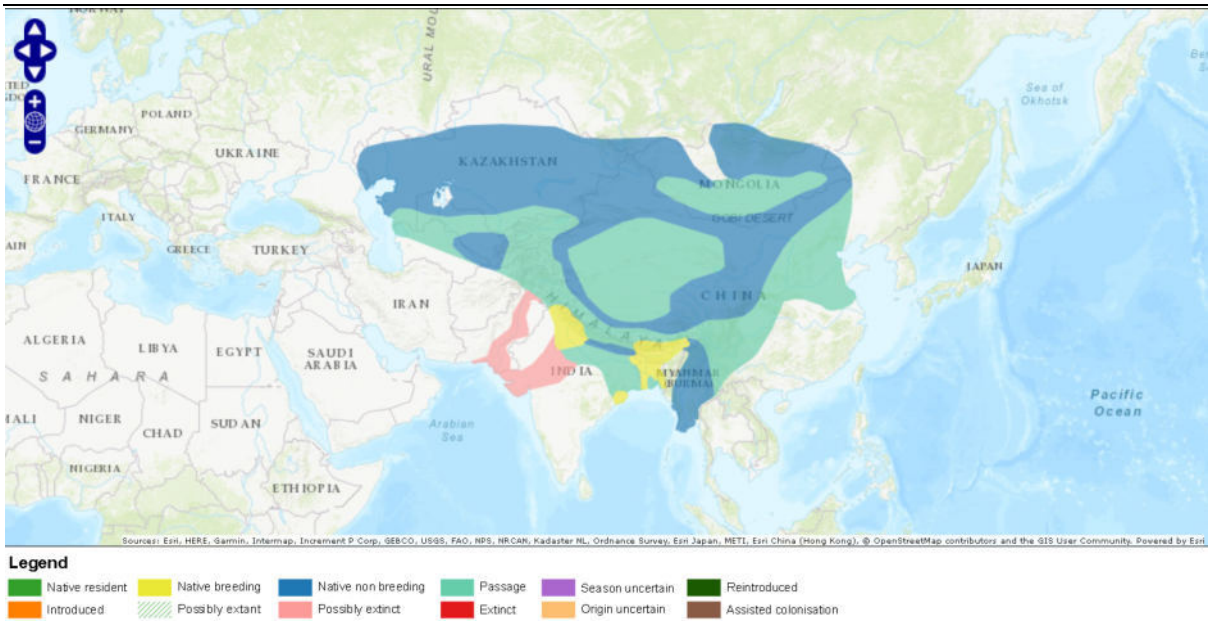

Figure 6-21 Geographical Distribution of Pallas's Fish-eagle [13]

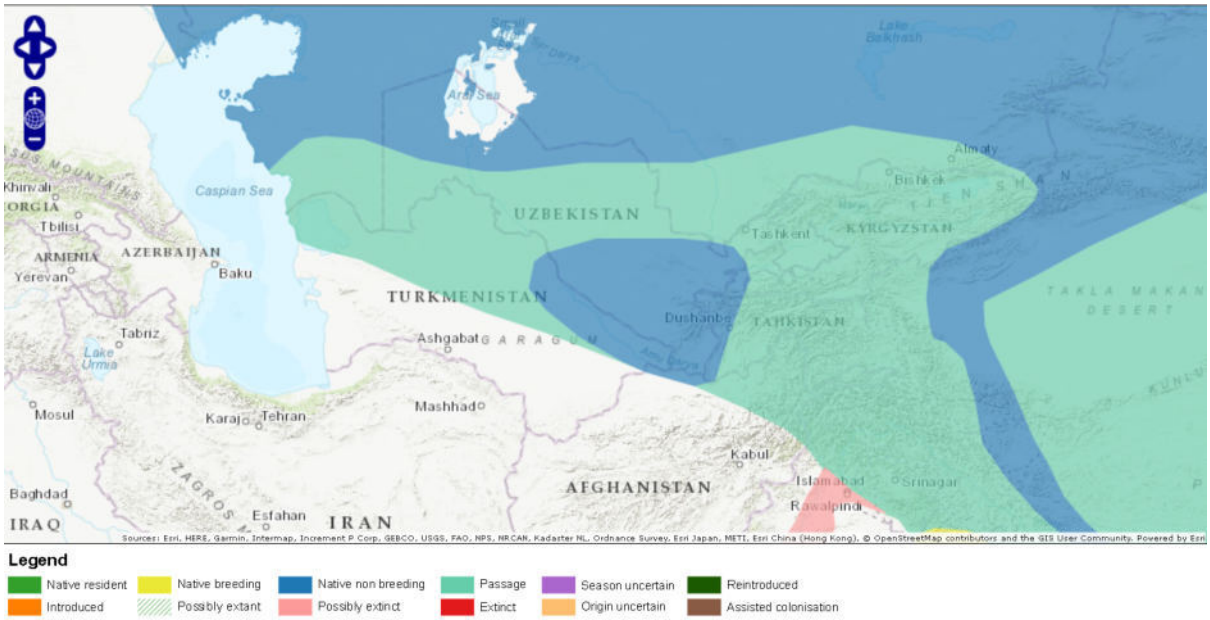

Figure 6-22 Geographical Distribution of Pallas's Fish-eagle

Recent studies and re-evaluations of historical data have significantly reshaped our understanding of the breeding patterns of this species. Previously believed to be a migratory breeder north of the Himalayas, especially in Mongolia, with a resident population in the Indian subcontinent, recent surveys in Mongolia from 2005 to 2009 and subsequent studies from 2012

[13] BirdLife International (2024) Species factsheet: Haliaeetus leucoryphus. Downloaded from https://datazone.birdlife.org/species/factsheet/pallass-fish-eagle-haliaeetus-leucoryphus on 29/04/2024.

to 2015 found no evidence of breeding at 13 of 21 historically known sites (Gilbert et al. 2014)[14]. Current evidence suggests a shift in breeding range, with the species primarily breeding in northern India, particularly in Assam and Uttarakhand, as well as in Bangladesh and Myanmar. During the non-breeding season (May to September), the species disperses north of the Himalayas to Kazakhstan, Russia, and Mongolia. The breeding status in Afghanistan is uncertain, and historical breeding in central China is questioned due to incongruent records with the breeding season and lack of nest documentation. Telemetry studies corroborate these findings, demonstrating connectivity between populations in India and Mongolia (M. Steele, 2017).

Furthermore, recent satellite tracking of three individuals unveiled extensive seasonal migrations spanning over 4,000 km from India to Mongolia and Russia. Notably, these tracked birds exhibited the remarkable ability to fly directly over the Himalayas at altitudes surpassing 6,000 m (M. Steele, 2017).

6.2.5.3 BASELINE SURVEY RESULTS

This species was not recorded within the Project area during any of the baseline surveys conducted in 2023 and 2024.

6.2.5.4 ANALYSIS

The EAAA is a difficult concept to apply to long-range migratory species, as encompassing the full geographic range of such species would result in extremely large population extrapolations. *(Refer to Section 3.1.4 for detailed explanation of how EAAA is being developed for long-distance migratory species)*.

The Pallas's Fish-Eagle favors extensive wetland habitats, including lakes, rivers, and floodplains which present ample feeding opportunities. Pallas's Fish Eagle is listed as a trigger species for Tuzkan in Uzbekistan since 6 adults were recorded during the winter of 2004. This site is located approximately 120 km from the project footprint and is 107,732 ha in size. Habitat suitability for this species specifically indicate requirement for extensive wetlands of which there are none within the project AoI (considered as areas within a 20km buffer from the project footprint for birds). Furthermore, consultations with regional ornithologists confirm that it is unlikely to observe this species in the project AoI due to lack of suitable habitat.

Therefore, due to the unlikelihood of presence in the project AoI, an EAAA cannot be applied as a result of which CH will be not further assessed for this species. However, given the status

[14] Gilbert, M., Tingay, R., Losolmaa, J,. Sureda, N., Gilbert, C., Batmunkh, D. and Gombobaatar, S. 2014. Distribution and status of the Pallas's Fish Eagle Haliaeetus leucoryphus in Mongolia: a cause for conservation concern? Bird Conservation International 24: 379-388.

of this species, if were to be observed during future monitoring efforts it would be assessed under the framework of adaptive management.

6.2.6 Saker Falcon

The Saker Falcon (*Falco cherrug*) is a large species of falcon, fully migratory, that inhabits open grasslands, semi-desert areas, and steppes in Eurasia from central Europe to western China. It is currently listed as Endangered (EN) on the IUCN Red List due to significant threats from habitat degradation, illegal trade, and collisions with power lines. Known for its impressive size and powerful flight, the Saker Falcon is also highly valued in falconry, which has contributed to its decline in the wild due to poaching for the sport.

The Saker Falcon is listed as a nationally protected species in Uzbekistan according to the 2019 edition of the Red Book of Uzbekistan (UzRDB), appointed the conservation status of Endangered (EN).

The CHA Screening exercise found that this species should be further investigated in the CHA against **Criterion 1 and Criterion 3**.

6.2.6.1 Ecology

The Saker Falcon thrives in expansive open environments such as steppes and semi-desert areas, which facilitate its hunting across wide territories. Adapted for hunting close to the ground in open terrain, it combines rapid acceleration with high maneuverability, specializing in capturing mid-sized diurnal terrestrial rodents like ground squirrels (Spermophilus) that inhabit grassy landscapes, including desert edges, semi-deserts, steppes, agricultural fields, and arid montane areas. During the breeding season, this species nests on cliffs, in tree hollows, and may also use old nests of other large birds. Its ability to adapt to modified landscapes is notable, provided there are adequate hunting grounds available.

The breeding season for Saker Falcons commences in early spring, during which they typically lay between 3 to 5 eggs per clutch, although occasionally the number may range from 2 to 6. The eggs are primarily incubated by the female, while the male is responsible for provisioning food. Chicks generally fledge by late summer. Saker Falcons adapt various nesting sites, including copses, cliffs, and occasionally even the ground, often utilizing old nests of other birds. Clutch size and breeding success can vary depending on environmental conditions, particularly in regions where prey, such as rodents, experience population fluctuations (Ferguson-Lees and Christie 2001).

Saker Falcons predominantly hunt rodents and small birds, engaging in high-speed aerial pursuits to capture their prey in flight. Their diet is highly adaptable and varies significantly with the availability of prey species within their environment. In certain regions, especially those near water bodies and in urban settings, Saker Falcons have shifted their primary prey from

rodents to birds, including domestic pigeons, particularly in parts of Europe (Snow and Perrins 1998).

Saker Falcons are known for their territorial behaviour during the breeding season but may gather in loose flocks for migration. These birds are formidable fliers, engaging in high-speed aerial hunts. While their social dynamics outside of the breeding season are less understood, they are typically observed either alone or in pairs. Despite their broad distribution, Saker Falcons face significant population pressures, particularly from colder regions where they migrate to the Middle East and Africa during winter. These migrations span extensive distances across multiple countries, underscoring the need for international conservation efforts. In areas like Hungary and Mongolia where the species is resident, localized management and protection strategies are essential to mitigate threats and support population stability.

Key threats to the Saker Falcon include habitat loss due to agricultural expansion and urbanization, electrocution by power lines, and illegal trapping for the falconry trade. Conservation efforts are crucial to mitigate these threats, with measures including habitat protection, enforcement of anti-poaching laws, and the installation of falcon-safe power infrastructure.

6.2.6.2 DISTRIBUTION

The Saker Falcon is widely distributed across its range but is facing population pressures in many areas. It is resident in some parts of its range, such as Hungary and Mongolia, but populations in colder regions migrate to the Middle East and Africa during the winter. The migration patterns involve traveling extensive distances across multiple countries, highlighting the need for international cooperation in conservation efforts.

Smaller numbers or vagrant individuals reach many other countries, underscoring its wide-ranging migratory patterns (Kovács et al. 2014).

The EOO of resident/breeding population of Saker Falcon is 19,100,000 km2 (Birdlife Datazone, 2024).

The global population is estimated to number 12,200-29,800 Mature Individuals.

The following figures shows the geographical range of this species.

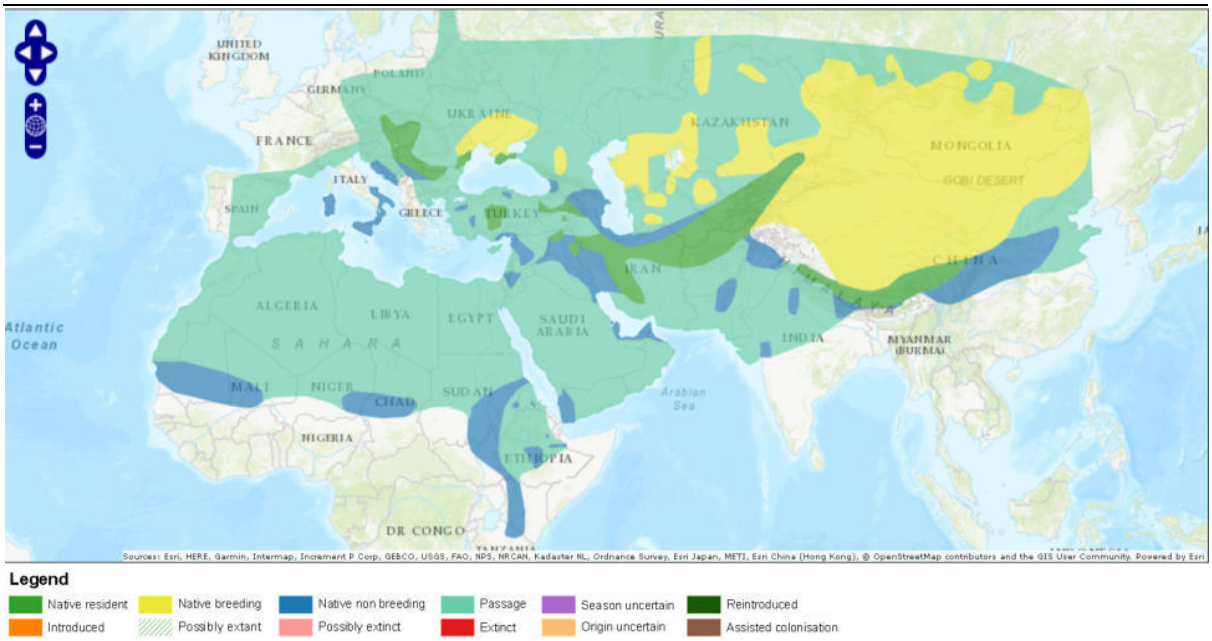

Figure 6-23 Geographical Distribution of the Saker Falcon [15]

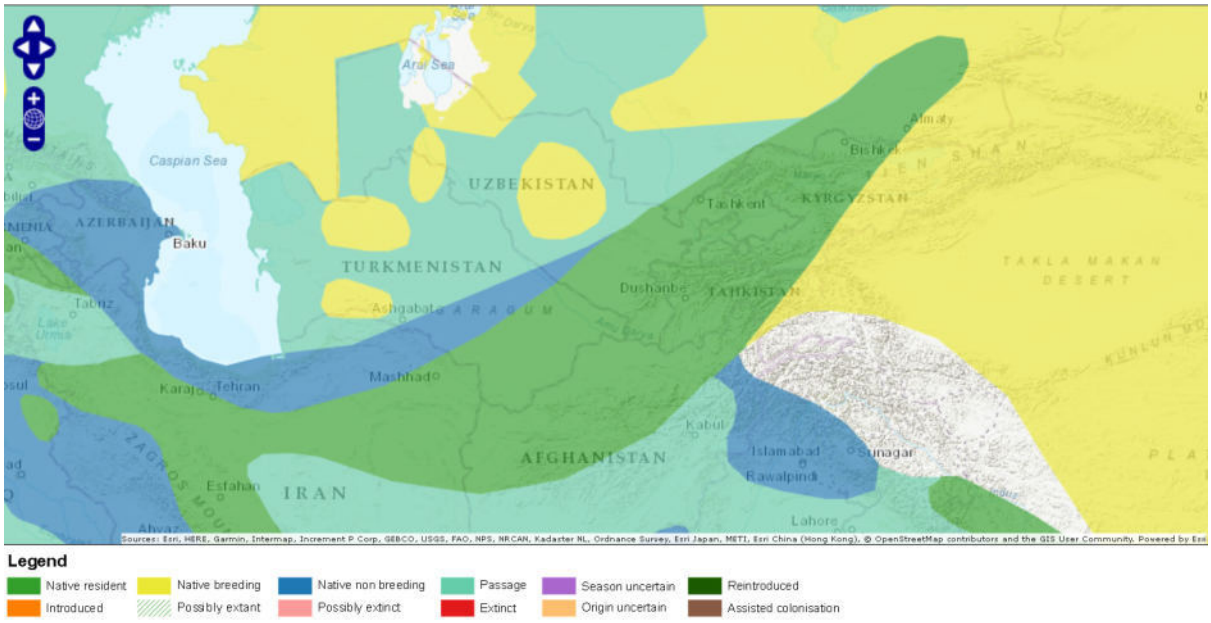

Figure 6-24 Geographical Distribution of the Saker Falcon

Birds exhibit varying migratory behaviors—sedentary, part-migratory, or fully migratory—largely influenced by the availability of food in their breeding territories during winter (Snow and Perrins 1998). Migrant birds typically winter in East Africa, southern Europe, and southern Asia. Notably, between 25-50% of the global population winters on the Qinghai-Tibetan Plateau (Dixon et al.

[15] BirdLife International (2024) Species factsheet: Falco cherrug. Downloaded from https://datazone.birdlife.org/species/factsheet/saker-falcon-falco-cherrug on 29/04/2024.

2015b). These migratory birds generally depart their breeding grounds in September and October and return between February and May (del Hoyo et al. 1994).

Migration is the biannual movement of Sakers between their breeding and wintering areas. Saker Falcons are partial migrants, meaning that while some individuals within a population migrate, others do not. Adult territory holders often show less inclination to migrate than younger individuals, especially juveniles. The factors influencing variations in migration behavior within and between populations remain unclear, though they are likely influenced by a combination of genetic and environmental factors.

The following figures provide detailed visualizations related to the migration and distribution of Saker Falcons. The first figure maps the general direction of the autumn migration routes of the Saker Falcon, illustrating the paths these birds take as they migrate southward. The second figure presents the general distribution of Saker Falcons, showing their widespread presence across their range. Each figure aims to offer insights into the migration behaviors and habitat utilization of this species, which are crucial for targeted conservation efforts.

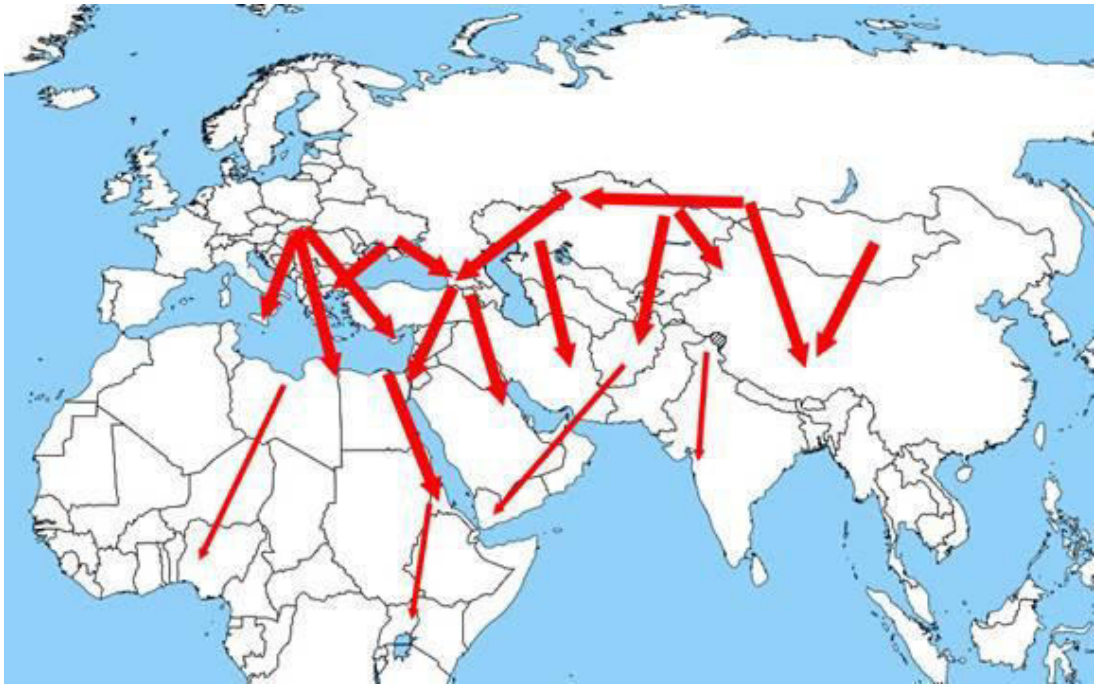

Figure 6-25 General direction of autumn migration routes of the Saker Falcon [16]

[16] International Wildlife Consultants (2024) Autumn migration of Saker Falcons, Available at: https://www.falcons.co.uk/conservation-research-and-welfare/the-saker-falcon/migration/ Accessed on 24 April, 2024.

6.2.6.3 BASELINE SURVEY RESULTS

This species was not recorded within the Project area during any of the baseline surveys conducted in 2023 and 2024.

6.2.6.4 ANALYSIS

6.2.6.4.1 EAAA

The total EAAA for resident breeding birds is applied as all suitable breeding habitat that overlaps the project footprint and exists within a reasonable buffer, determined by species specific ecology.

The Saker Falcon nests on cliffs, in tree hollows, and may also use old nests of other large birds. It forages in grassy landscapes, including desert edges, semi-deserts, steppes, agricultural fields, and arid montane areas. Its ability to adapt to modified landscapes is notable, provided there are adequate hunting grounds available.

A 20 km buffer from the project footprint was applied based on the largest known home range of a breeding population in Hungary [17]. This area was then further extended to encompass the abovementioned surrounding suitable foraging habitats as well as the mountainous areas (potential breeding habitat) that extends towards the north, south and east of the project site. This should provide an adequate accounting of the population of birds likely to regularly utilize the project area.

The resulting EAAA has been mapped in the following figure.

[17] Prommer, Matyas & János, Bagyura & Fehérvári, Péter & Miklós, Váczi. (2018). Home Range Size and Habitat Use of Adult Saker Falcons Falco cherrug in the Breeding Season in Hungary. 10.13140/RG.2.2.19501.95204.

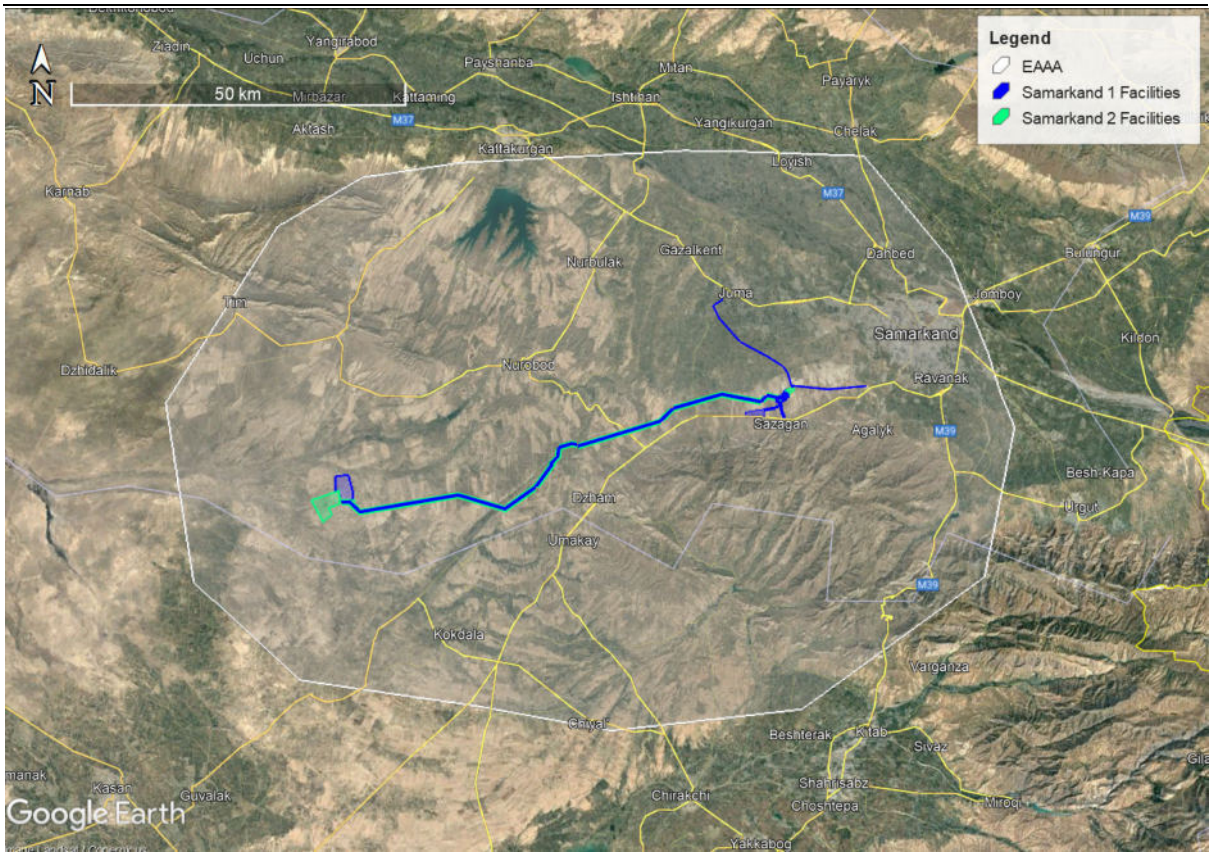

Figure 6-26 Estimated EAAA for the Saker Falcon species

6.2.6.4.2 Criticality

The global population of this species is estimated to range from 12,200-29,800 mature individuals. Taking a precautionary approach, the lower range is used to apply the thresholds.

Under **Criteria 1**, the threshold for Endangered (EN) species is 0.5% of the global population, therefore the 0.5% criticality threshold would be 561 individuals.

Under **Criteria 3**, the threshold is 1% of the global population using the EAAA on a regular/cyclical basis during migrations. This would amount to 122 individuals.

To date, zero observations of this species was made during baseline studies spanning across Autumn and Spring migration seasons.

Among the IBAs within EAAA, Saker Falcon is listed as a trigger species for Karnabchul Steppe in Uzbekistan as 1-5 adults were recorded in the winter between 1967-1980. This site is located approximately 30 km from the project footprint and indicates presence of suitable habitat. However, given that zero observations were recorded during the baseline surveys and that historical records show only 1-5 individuals were recorded in the EAAA area, it is not likely that that the EAAA population comprises of more of 561 individuals. Therefore, CH is not triggered under Criterion 1.

Since the species did not occur during any baseline surveying of the main facilities, it is not considered as a SBV either for the Main Facilities component(s) of the Samarkand 1 and 2 projects. However, given the status of this species, if were to be observed during future monitoring efforts it would be assessed under the framework of adaptive management.

6.2.7 Great Bustard

The Great Bustard (*Otis tarda*) is a passage migrant in Uzbekistan, listed as Endangered (EN) species on the IUCN Global Red List, and Critically Endangered (CR) in the Uzbekistan National Red Data Book.

The CHA Screening exercise found that this species should be further investigated in the CHA against **Criteria 1 and 3**.

6.2.7.1 ECOLOGY

This species was originally associated with Eurasian steppe, but it has acclimated to agricultural landscapes (M. Kessler in litt. 2016), and can now be found in open, flat or somewhat rolling landscapes, usually with short sward height and a mixture of low-intensity farmland activities and crops (J. C. Alonso in litt. 2012, Collar and Garcia 2020). In Asia, it can also be found in Artemisia and Stipa steppes, mountain foothills and in semi-desert habitats (Gubin 2007 per Kessler and Batbayar 2023).

The species exhibits highly variable migratory behaviour across populations, including obligate winter migrants across the majority of Asia (Morales et al. 2000, Alonso et al. 2000; Palacín et al. 2009, 2011; Kessler 2022). In Uzbekistan it is primarily a passage migrant, occasionally overwintering, rarely breeding.

Breeding occurs in April–May, also June in colder NE parts of its range. It nests on ground with or without scrape, where 2-3 eggs are laid (Rocha et al. 2013).

Its diet is mainly plant material and invertebrates, although small mammals, amphibians and nestling birds sometimes taken (Collar and Garcia 2020, Kessler and Batbayar 2023).

Poaching remains the main threat in Uzbekistan. According to AS Nuridjanov's observations in winter 1999, around 200 Great Bustards appeared near Aidar lake after a cold snap (Kashkarov et al 2002). Over the course of several days, practically all of these birds were shot by poachers (Kreitsberg-Mukhina 2003).

6.2.7.2 DISTRIBUTION

The species breeds in discrete 'pockets' from Spain, East through Eastern Europe, the Middle East to China. Most populations of the western subspecies are at least partially migratory,

depending on weather conditions, and occur on passage or in winter in Ukraine, Iraq, Kazakhstan and Uzbekistan (Y. Andryushchenko in litt. 1999, 2017; Kessler 2015, 2022; M. Kessler in litt. 2016, K. Ararat in litt. 2023).

A recent review of the species in Uzbekistan showed three key areas used by Great Bustard for wintering; the northern foothill plain of the Nuratau range and the Zaravshan nature reserve and adjacent foothill plains of the Zaravshan range, but during the migratory period they are also occasionally seen on the Karnabchul steppe (Figure 5-11). In recent years it has disappeared as a nesting species (Kashkarov et al 2002).

The species globally has a large EOO of 14,400,000 km^2.

The most recent global population estimate Alonso and Palacín 2022; Kessler, 2022; Alonso et al 2023). A review by Kashkrov et al (2002) estimated that the wintering population in Uzbekistan is between 100 to 500 individuals, depending on the severity of the winter.

In 1983, the species was added to the Red Data Book of the Uzbekistan SSR with the status 'extinct as a nesting species, very rare on migration and wintering' (Sadykov 1983); with this designation hunting of the species became illegal. In all subsequent editions of the Red Data Book of Uzbekistan (Azimov 2003, 2006, 2009, 2019), the Great Bustard was assessed on the national level as 'Critically Endangered – 1(CR) – migratory European subspecies on the verge of complete extinction.'

The figures below show the species distribution, both global and within Uzbekistan.

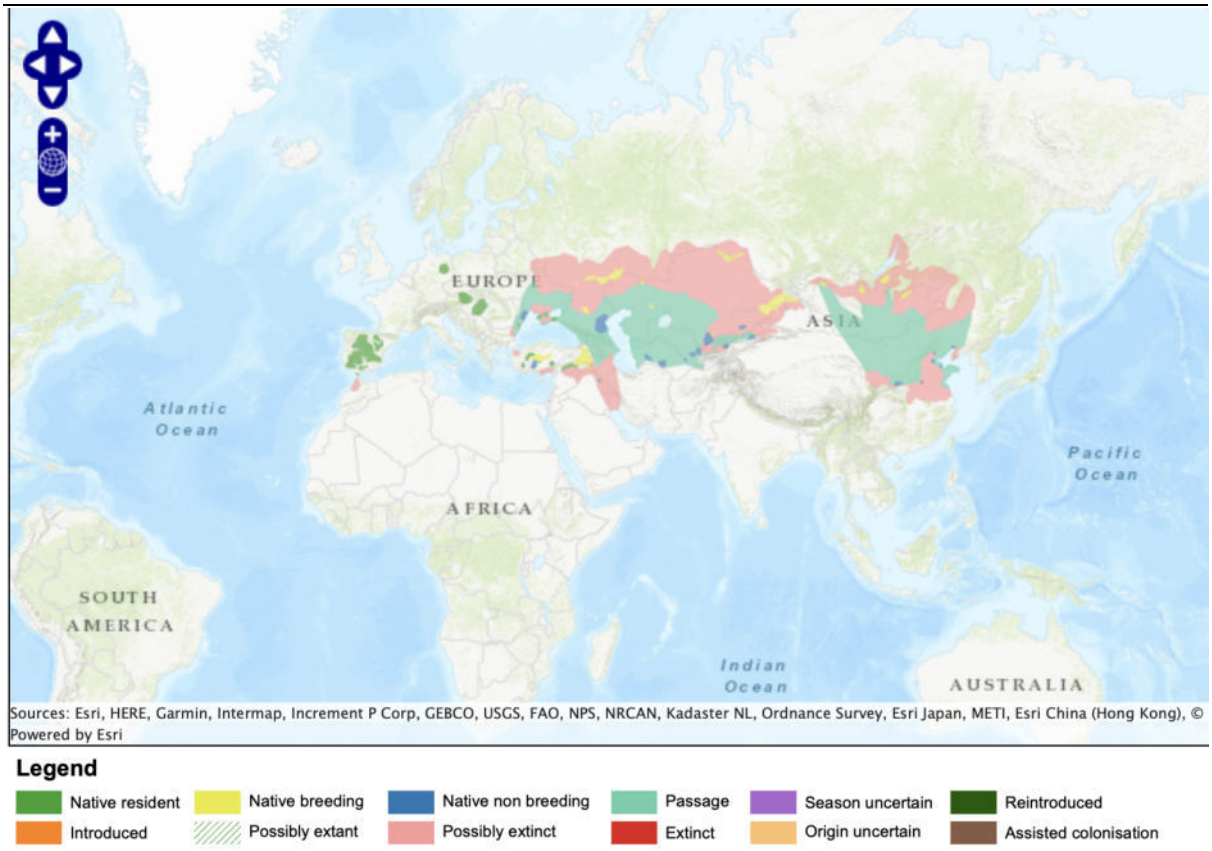

Figure 6-27 Distribution Map of Great Bustard [18]

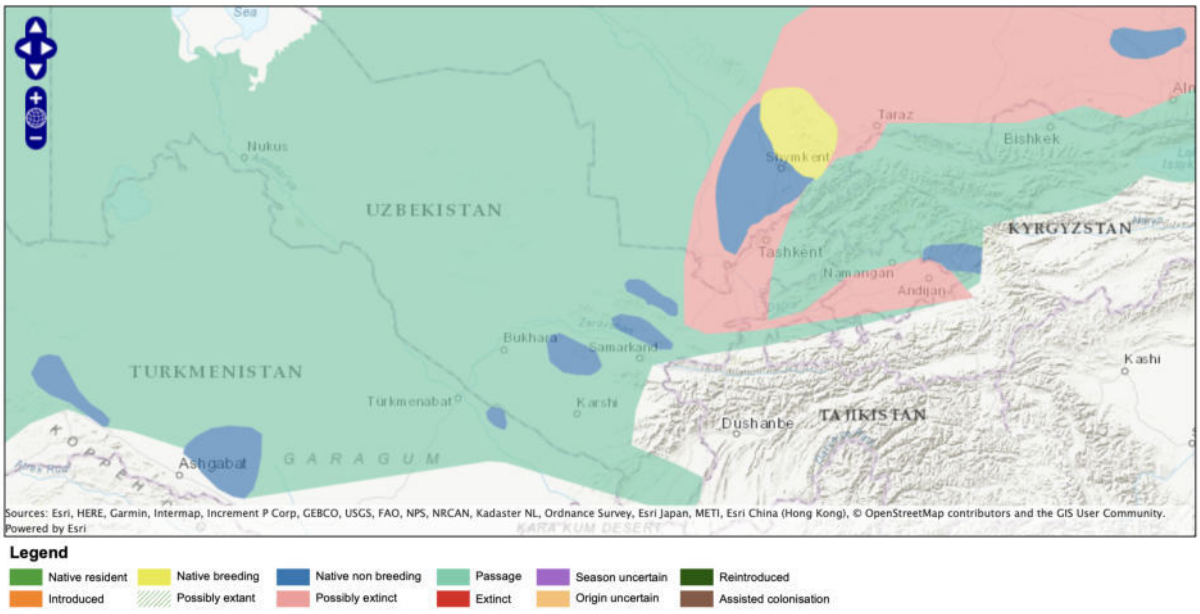

Figure 6-28 Distribution Map of Great Bustard

[18] BirdLife International (2024) Species factsheet: *Otis tarda*. Downloaded from https://datazone.birdlife.org/species/factsheet/great-bustard-otis-tarda on 25/04/2024.

6.2.7.3 BASELINE SURVEY RESULTS

One individual Great Bustard was observed migrating on 20th March 2024 along the 70km OHTL (near VP17).

6.2.7.4 ANALYSIS

6.2.7.4.1 EAAA

The EAAA is a difficult concept to apply to long-range migratory species, as encompassing the full geographic range of such species would result in extremely large population extrapolations. *(Refer to Section 3.1.4 for detailed explanation of how EAAA is being developed for long-distance migratory species)*.

Wintering habitat preferences of the Great Bustard are fields of lucerne, cereal and fallow fields. A high diversity of low-intensity land use and lack of disturbance are generally important for year-round needs. While winter home ranges of female bustards in Spain were less than 5 km in diameter the bustards monitored in China occupied a series of locations 30 to 95 km in diameter [19]. Therefore, the EAAA is applied as all of the above-mentioned suitable habitats within the project boundaries as well as within a buffer of 100km around the project footprint. Given the shy and cryptic nature of the species, density populated areas were excluded and only areas with known sightings were included.

The resulting EAAA has been mapped in the following figure.

[19] Kessler, Mimi & Batbayar, Nyambayar & Natsagdorj, Tseveenmyadag & Batsuuri, Dashnyam & Smith, Andrew. (2013). Satellite telemetry reveals long-distance migration in the Asian great bustard Otis tarda dybowskii. Journal of Avian Biology. 85287. 10.1111/j.1600-048X.2013.00072.x.

Figure 6-29 EAAA and potential habitats for The Great Bustard in the PV plant site

6.2.7.4.2 Criticality

The global population of this species is estimated to range from 29,600-33,000 mature individuals. Taking a precautionary approach, the lower range is used to apply the thresholds.

Under **Criteria 1**, the threshold for Critically Endangered (CR) species is 0.5% of the global population, therefore the 0.5% criticality threshold would be 148 individuals.

Under **Criteria 3**, the threshold is 1% of the global population using the EAAA on a regular/cyclical basis during migrations. This would amount to 296 individuals.

One individual was recorded at Vantage Point 17 along the 70 km OHTL baseline studies spanning across Autumn and Spring migration seasons.

The Great Bustard is not listed as a trigger species among the IBAs within the EAAA. However, 24 individuals were recorded wintering is the Zaravshan Nature Reserve between 2007 and 2008. During the migratory period Great Bustards are also occasionally seen on the Karnabchul steppe (6 birds in 2009 and 2 birds in 2013) [20]. Therefore, as only 1 individual was recorded during the baseline surveys and a total of 32 individuals were recorded between 2007 and 2013 in the EAAA, it is considered unlikely that that the EAAA population comprises of more than 148 individuals under **Criteria 1**, or more than 296 individuals under **Criteria 3**.

[20] Mitropolskaya, Yuliya & Kashkarov, Roman & Ten, Anna. (2022). The historical and current status of the Great Bustard Otis tarda tarda in Uzbekistan, a key winter refuge. 44. 26-34.

Therefore, this species does not trigger CH status but is considered a Significant Biodiversity Value due to its Endangered (EN) designated conservation status on IUCN and Critically Endangered (CR)in the National Uzbekistan Red Data Book.

Due to its EN status, No Net Reduction is required, ensuring no significant residual impact that could lead to a material change in the population. The ESIA will address this via the biodiversity impact assessment, mitigation program and residual significance analysis.

6.2.8 Yellow-eyed Pigeon

The Yellow-eyed Pigeon (*Columba eversmanni*) is a fully migrant species primarily found in the semi-arid regions of Central Asia. It is classified as Vulnerable (VU) on the IUCN Red List, primarily due to habitat loss, hunting, and agricultural intensification. This pigeon species is distinctive for its pale yellow eyes and greyish-blue plumage, making it a subject of interest both ecologically and ornithologically.

The Yellow-eyed Pigeon is listed as a nationally protected species in Uzbekistan according to the 2019 edition of the Red Book of Uzbekistan (UzRDB), appointed the conservation status of Vulnerable (VU).

The CHA Screening exercise found that this species should be further investigated in the CHA against **Criterion 1**.

6.2.8.1 ECOLOGY

The Yellow-eyed Pigeon primarily inhabits open, semi-desert regions with sparse vegetation and scattered trees, essential for breeding. The species nests in trees and occasionally on abandoned buildings, thriving at various elevations but predominantly at lower altitudes. It prefers areas minimally affected by human activities, though it sometimes ventures into agricultural lands to forage. During winter, the pigeon is found in open areas with scattered trees, often amid agricultural crops or near fruiting trees where it feeds and roosts in groups. Notably, its population is on the rise in the western Thar Desert, characterized by extreme temperatures and sparse thorny vegetation and grasses (D. L. Bohra, 2014).

The breeding season of *Columba eversmanni* typically spans from late April to July. These birds are monogamous, frequently returning to the same nesting sites each year, where they usually lay 1-2 eggs per clutch. Both parents contribute to incubating the eggs and raising the young (Baptista et al. 2020). They exhibit a broad range of nesting preferences, utilizing holes in trees, buildings, cliffs, earth banks, and potentially power lines. The species is found in diverse habitats including steppe, semi-arid and desert areas, often near human settlements and, in regions like Kazakhstan, within woodland environments. They are also known to breed in mountain valleys close to water sources (D. L. Bohra, 2014; Baptista et al. 2020).

Primarily granivorous, the Yellow-eyed Pigeon's diet consists mostly of seeds collected from the ground, including grass seeds, arable crop seeds and the fruit of trees and shrubs, including Zizyphus and mulberry *Morus alba*. During the breeding season, they may also consume insects and small invertebrates to meet the increased nutritional demands.

Yellow-eyed Pigeons are gregarious outside of the breeding season, often forming large flocks that can include other pigeon species. Their flight is fast and direct, with regular glides and the characteristic sharp wing claps typical of pigeons when taking off.

Key threats to *Columba eversmanni* include habitat degradation due to agricultural expansion and intensification, which reduces their feeding and nesting sites. Hunting and trapping for sport and food also significantly impact their populations. Environmental pollutants and the use of pesticides in agriculture pose additional risks by contaminating their food sources.

In terms of conservation, there is a pressing need for targeted actions such as habitat preservation, sustainable agricultural practices, and strict regulation of hunting activities to ensure the survival of this unique species.

6.2.8.2 DISTRIBUTION

The Yellow-eyed Pigeon primarily resides within its range but exhibits migratory behavior, moving southward to Pakistan and northwestern India during the colder months from breeding grounds in Kazakhstan, Turkmenistan, and Uzbekistan. Although the species is considered rare throughout most of its range, it has historically faced declines due to hunting pressure and habitat loss in both breeding and wintering areas. While there have been reports of local population increases (Bohra and Vyas 2014[21]; D. L. Bohra, 2014), it is unclear if these reflect global population trends. Consequently, the species is suspected to be experiencing a rapid decline over the past decade (Baptista et al. 2020).

The EOO of resident/breeding population of Yellow-eyed Pigeon is 3,080,000 km^2 (Birdlife Datazone, 2024).

The following figures shows the geographical range of this species.

[21] Bohra, D. L.; Vyas, S. 2014. Large wintering flocks of Yellow-eyed Pigeon Columba eversmanni at Jorbeer, Bikaner District Rajasthan, India. BirdingASIA 21: 64-65.

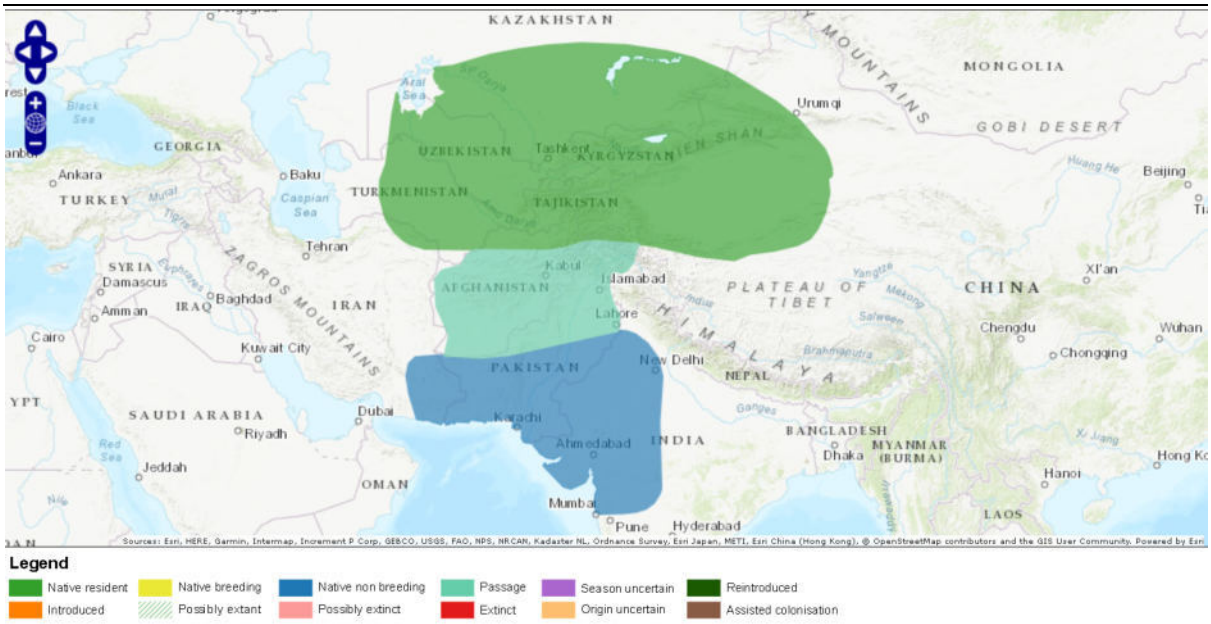

Figure 6-30 Geographical Distribution of the Yellow-eyed Pigeon [22]

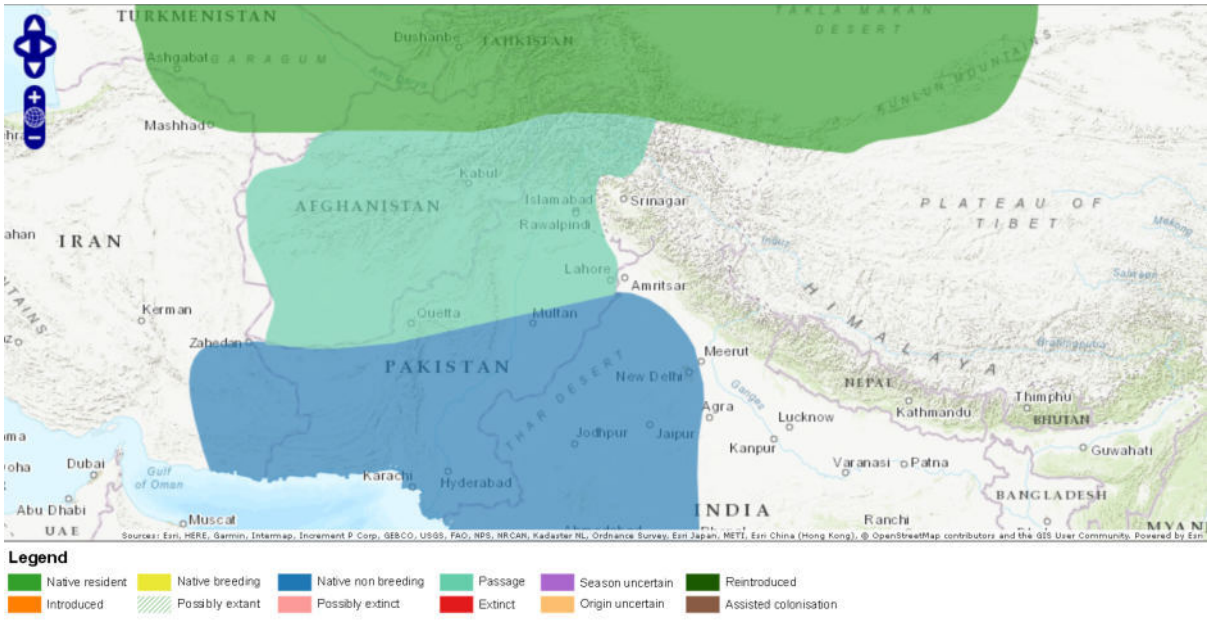

Figure 6-31 Geographical Distribution of the Yellow-eyed Pigeon

The Yellow-eyed Pigeon, breeds across southern regions of Kazakhstan, Uzbekistan, Turkmenistan, Tajikistan, Kyrgyzstan, Afghanistan, northeast Iran, and extreme northwest China. Its detailed status and distribution within these areas remain largely undocumented (BirdLife International 2001). The species winters in Pakistan and northwest India, historically extending as far as Bihar, southern Xinjiang, and western Gansu in China.

[22] BirdLife International (2024) Species factsheet: Columba eversmanni. Downloaded from https://datazone.birdlife.org/species/factsheet/yellow-eyed-pigeon-columba-eversmanni on 29/04/2024.

Historically noted for forming large flocks in the 19th and early 20th centuries, especially in Punjab, India, the Yellow-eyed Pigeon has experienced a sharp decline. Wintering populations have decreased from thousands to generally tens or a few hundreds, though a significant count in 1995 recorded up to 2,000 individuals in a single flock. The current trend of the population is not definitively known, but there is evidence suggesting a potential increase at one site in India (Jorbeer dead animal dump) since 2011 (Bohra and Vyas 2014; D. L. Bohra in litt. 2016).

The following figure illustrates the autumn migration paths and stopover locations of two Yellow-eyed Pigeons, distinguished by the colors Orange and Blue, using GSM/GPS tracking data from 2020 (. It traces the routes taken by these pigeons as they migrated southward. The capture location at Shakpak Pass is indicated by a green circle, while the various dots along the migration paths represent the estimated sizes of stopover sites, calculated using an OUF motion model.

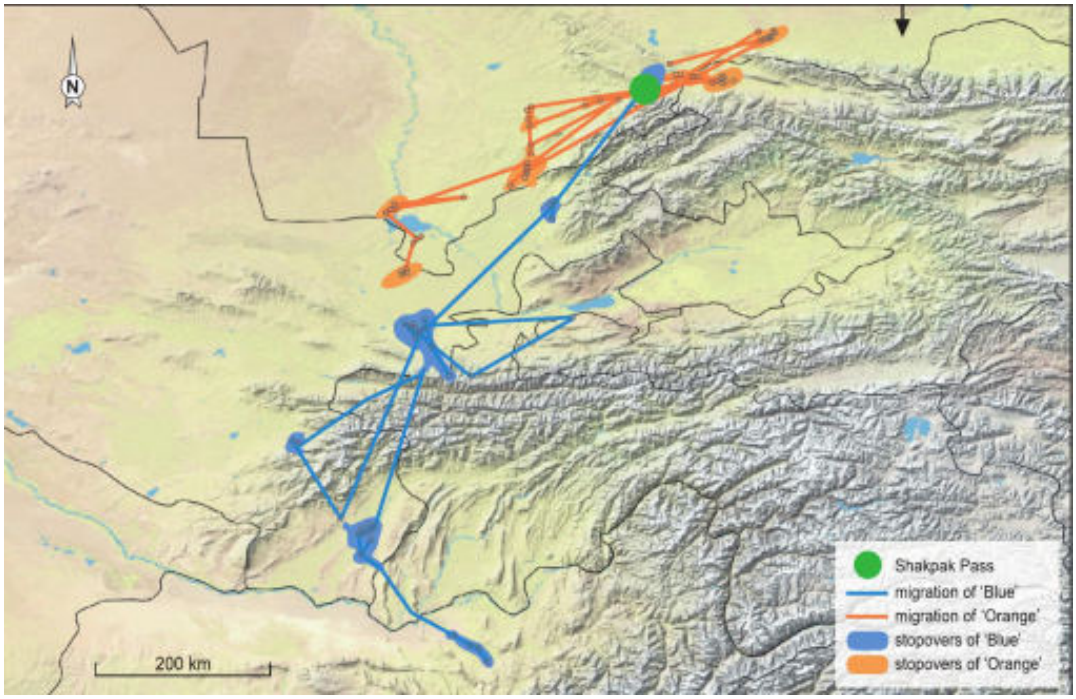

Figure 6-32 Autumn migration Paths of the Yellow-eyed Pigeon [23]

[23] Berdikulov B.T., Gavrilov, A.E., Ilina, V.O., Song, G., Lei, F.M., (2024) Autumn Migration of the Rare Yellow-Eyed Pigeon Columba eversmanni from Western Tian Shan (Tanyrtau), Kazakhstan, *BioOne Digital Library*, Ardea, 112(1):1-10, Available at: https://bioone.org/journals/ardea/volume-112/issue-1/arde.2023.a12/Autumn-Migration-of-the-Rare-Yellow-Eyed-Pigeon-Columba-eversmanni/10.5253/arde.2023.a12.full

6.2.8.3 BASELINE SURVEY RESULTS

This species was not recorded within the Project area during any of the baseline surveys conducted in 2023 and 2024.

6.2.8.4 ANALYSIS

6.2.8.4.1 EAAA

The total EAAA for breeding birds is applied as all suitable breeding habitat that overlaps the project footprint and exists within a reasonable buffer, determined by species specific ecology.

The Yellow-eyed Pigeon uses open semi-desert region with spare vegetation and scattered trees which are required for breeding. This species also occasionally nests in abandoned buildings and may fly 5-10km from nesting site to forage[24]. Therefore, EAAA is applied as all of the above-mentioned suitable habitats within the project boundaries as well as within a buffer of 10km around the project footprint. This should provide an adequate accounting of the population of birds likely to regularly utilize the project area.

The resulting EAAA has been mapped in the following figure.

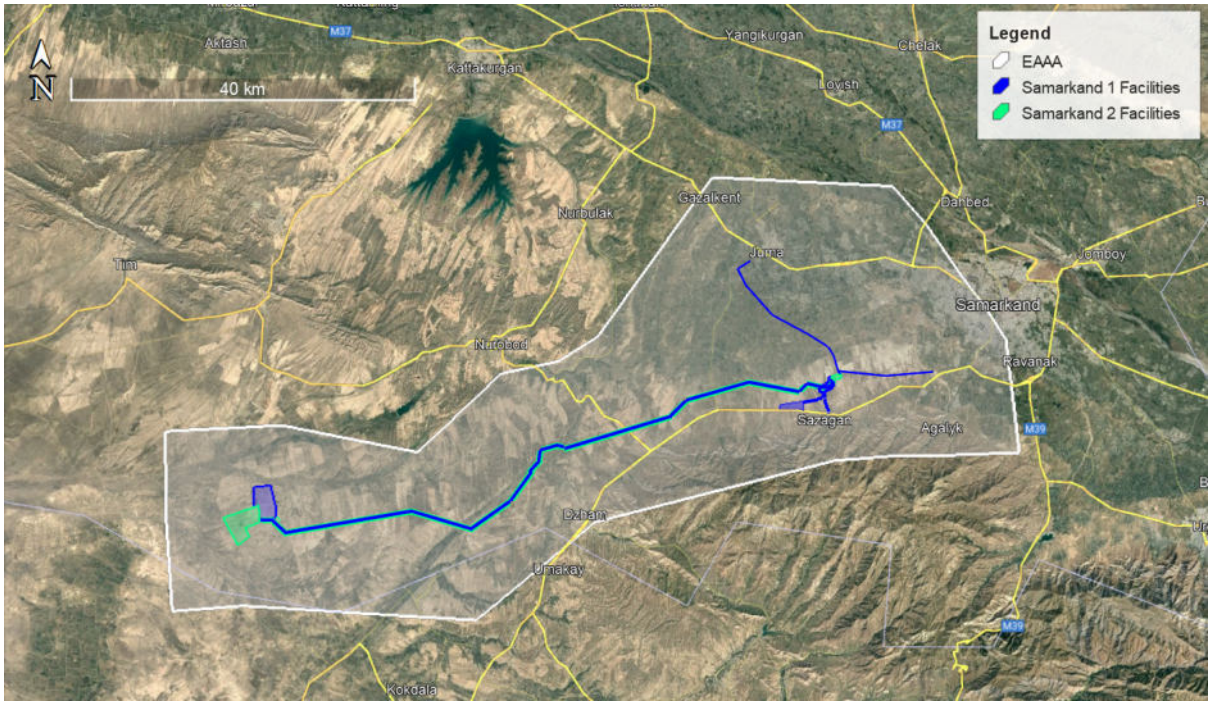

Figure 6-33 Estimated EAAA for the Yellow-eyed Pigeon at the PV Site.

[24] Baptista, L. F., P. W. Trail, H. M. Horblit, E. de Juana, P. F. D. Boesman, and E. F. J. Garcia (2020). Yellow-eyed Pigeon (*Columba eversmanni*), version 1.0. In Birds of the World (J. del Hoyo, A. Elliott, J. Sargatal, D. A. Christie, and E. de Juana, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.pabpig1.01

6.2.8.4.2 Criticality

The global population of this species is estimated to range from 10,000-19,999 mature individuals. Taking a precautionary approach, the lower range is used to apply the thresholds.

Under **Criteria 1**, the threshold for Endangered (EN) species is 0.5% of the global population, therefore the 0.5% criticality threshold would be 50 individuals.

To date, zero observations of this species was made during baseline studies spanning across Autumn and Spring migration seasons.

There are no IBAs within the EAAA and AoI for which the Yellow-eyed Pigeon is a trigger species which indicates potential lack of suitable breeding habitat. The lack of baseline observations and evidence of breeding in the AoI (considered as a 20km buffer from the project footprint due to habitat displacement for birds) result in the conclusion that it is considered unlikely that that the EAAA population comprises of more than 50 individuals and therefore does not trigger criticality under **Criteria 1**.

Since the species did not occur during any baseline surveying of the main facilities, it is not considered as a SBV either for the Main Facilities component(s) of the Samarkand 1 project. However, given the status of this species, if were to be observed during future monitoring efforts it would be assessed under the framework of adaptive management.

6.2.9 European Turtle-Dove

The European Turtle-dove (*Streptopelia turtur*) is a full migrant member of the Columbidae family, known for its distinctive gentle purring calls and striking appearance. It is currently classified as Vulnerable (VU) on the IUCN Red List due to significant declines across its range, primarily resulting from habitat loss, hunting, and changes in agricultural practices.

The European Turtle-dove is listed as a nationally protected species in Uzbekistan according to the 2019 edition of the Red Book of Uzbekistan (UzRDB), appointed the conservation status of Vulnerable (VU).[25]

The CHA Screening exercise found that this species should be further investigated in the CHA against **Criterion 1 and Criteria 3**.

[25] Red Book of Uzbekistan (2019) Animal World Red Book of the Republic of Uzbekistan. Available at: https://drive.google.com/file/d/19wwTZ6Ubk2zut9xwjG0dMRdSbBZKMJv0/view Accessed on 24 April, 2024.

6.2.9.1 ECOLOGY

The European Turtle-Dove thrives in a varied landscape that includes arable fields, open woodlands, hedgerows, and diverse woodland types, as well as steppe and semi-desert regions. These environments offer critical resources such as nesting sites and a diverse diet, which are essential during the breeding season (Baptista et al. 2015)[26]. Additionally, the species relies heavily on agricultural lands for feeding and utilizes a range of other habitats including forest borders, groves, spinneys, coppices, young tree plantations, scrubby wastelands, and woody marshes (Tucker and Heath 1994)[27]. Non-breeding habitats are located primarily in sub-Saharan Africa, where they inhabit wooded savannas and similar open wooded areas.

The European Turtle-Dove's breeding season typically spans from late April to July, during which it produces one to two broods per season, with each clutch containing usually two eggs. This species prefers breeding at low altitudes, generally not exceeding 500 meters in temperate zones and up to 1,000-1,300 meters in Mediterranean areas (Tucker and Heath 1994). The nests, small platforms of twigs lined with plant material, are strategically placed in the lower parts of trees and in shrubs and hedges. While the species tolerates human presence, it avoids breeding near towns or villages (Baptista et al. 2015). The nesting and parental care phases, extending potentially until September, are critical periods when the birds are particularly vulnerable to disturbances.

The European Turtle-Dove primarily feeds on seeds from grasses, cereals, and occasionally herbaceous plants, focusing significantly on small invertebrates during the breeding season to satisfy the heightened nutritional needs for chick rearing. Additionally, the species commonly forages on the ground, consuming seeds and fruits from weeds and cereals, and less frequently berries, fungi, and invertebrates. This diet supports their energy needs throughout their lifecycle, particularly during critical breeding periods.

The European Turtle-Dove is strongly migratory, undertaking extensive journeys between its breeding grounds in Europe and wintering sites in sub-Saharan Africa, from Senegal east to Eritrea and Ethiopia. This migration is critical to its lifecycle but comes with risks such as hunting and habitat degradation along the routes (Baptista et al. 2015; Tucker and Heath 1994). Socially, the species typically forms pairs or small flocks, with a tendency towards more solitary or paired behavior during the breeding season. The distinctive soft, purring coo of the doves is a characteristic sound in rural European landscapes during early summer. Their survival during

[26] Baptista, L.F., Trail, P.W., Horblit, H.M., Boesman, P. and Sharpe, C.J. 2015. European Turtle-dove (Streptopelia turtur). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. and de Juana, E. (eds), Handbook of the Birds of the World Alive, Lynx Edicions, Barcelona.
[27] Tucker, G.M. and Heath, M.F. 1994. Birds in Europe: their conservation status. BirdLife International, Cambridge, U.K.

the winter is closely linked to cereal production, highlighting the impact of agricultural practices on their habitats (Eraud et al. 2009)[28].

Major threats include intensive farming and the consequent reduction of food resources and nesting sites. Hunting during migration also significantly impacts populations, with millions estimated to be harvested annually. Furthermore, drought conditions in wintering areas exacerbate the decline by reducing available resources and habitat quality.

The species' populations are showing increasingly patchy distributions, particularly in Western Europe, where declines have been most notable. Conservation efforts focus on habitat management, legal protection, and reducing hunting pressures along migratory pathways to stabilize and eventually increase the population numbers.

6.2.9.2 DISTRIBUTION

The European Turtle-Dove, a breeding visitor throughout Europe, migrates annually to winter in Africa south of the Sahara. During its breeding season, it frequents suitable habitats like lightly wooded landscapes, traditional orchards, and areas scattered with trees and shrubs. However, significant population declines have been noted in various regions. In Central Asia, including countries like Afghanistan, Kazakhstan, and Uzbekistan, the species has shown moderate to severe declines over the past few decades, with Uzbekistan experiencing a particularly drastic reduction. Similarly, the once large population in European Russia has plummeted by more than 80% since 2000 and more than 90% since 1980 (BirdLife International 2015). Declines have also been observed in east and southeast Kazakhstan, notably in the Manrak Mountains where the species is now rare or absent (Wassink and Oreel 2008). These declines underscore the vulnerability of this species across its range.

The EOO of resident/breeding population of the European Turtle-dove is 35,700,000 km2 (Birdlife Datazone, 2024).

The estimated European population of the species stands at approximately 3.15 to 5.94 million pairs, translating to between 6.31 and 11.9 million mature individuals. This accounts for 25-49% of the species' global range, leading to a preliminary global population estimate of 19.3 to 71.4 million individuals, or about 12.8 to 47.6 million mature individuals. However, this estimate requires further validation.

The following figures shows the geographical range of this species.

[28] Eraud, C.; Boutin, J.-M.; Riviere, M.; Brun, J.; Barbraud, C.; Lormee, H. 2009. Survival of Turtle Doves Streptopelia turtur in relation to western Africa environmental conditions. Ibis 151: 186-190.

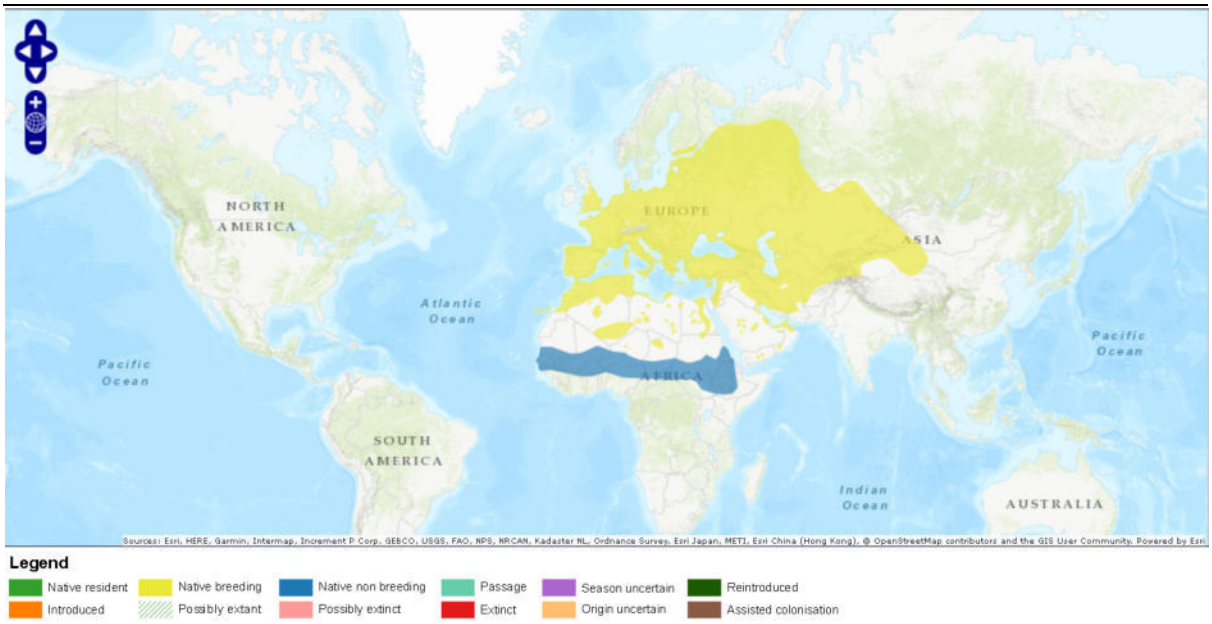

Figure 6-34 Geographical Distribution of the European Turtle-dove [29]

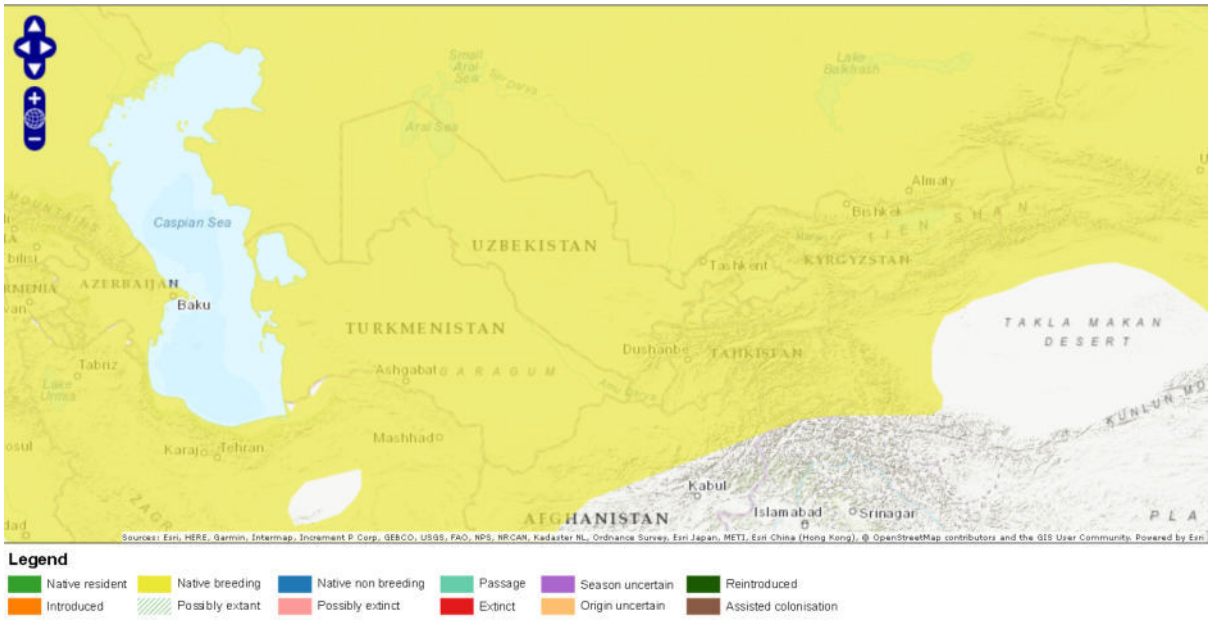

Figure 6-35 Geographical Distribution of the European Turtle-dove

The European Turtle-Dove is a widespread migrant breeder found across central and southern Europe, Central Asia, the Middle East, and North Africa, predominantly wintering in the Sahel zone of Africa. Despite its extensive range, the species has experienced significant declines, particularly in northwest Europe, including the Netherlands and the U.K., where large range declines have been documented (e.g., Balmer et al. 2013). Overall, the population continues

[29] BirdLife International (2024) Species factsheet: Streptopelia turtur. Downloaded from https://datazone.birdlife.org/species/factsheet/european-turtle-dove-streptopelia-turtur on 29/04/2024.

to decrease across Europe, indicating ongoing conservation challenges (BirdLife International 2015).

6.2.9.3 BASELINE SURVEY RESULTS

This species was not recorded within the Project area during any of the baseline surveys conducted in 2023 and 2024.

6.2.9.4 ANALYSIS

6.2.9.4.1 EAAA

The total EAAA for breeding birds is applied as all suitable breeding habitat that overlaps the project footprint and exists within a reasonable buffer, determined by species specific ecology.

The European-turtle Dove uses varied landscapes that includes arable fields, open woodlands, hedgerows, and diverse woodland types, as well as steppe and semi-desert regions. This species relies heavily on agricultural lands for foraging.

Assuming that this species has a similar home range size as the Yellow-eyed Pigeon, the EAAA is applied as all of the above-mentioned suitable habitats within the project boundaries as well as within a buffer of 10km around the project footprint. This should provide an adequate accounting of the population of birds likely to regularly utilize the project area.

The resulting EAAA encompasses has been mapped in the following figure.

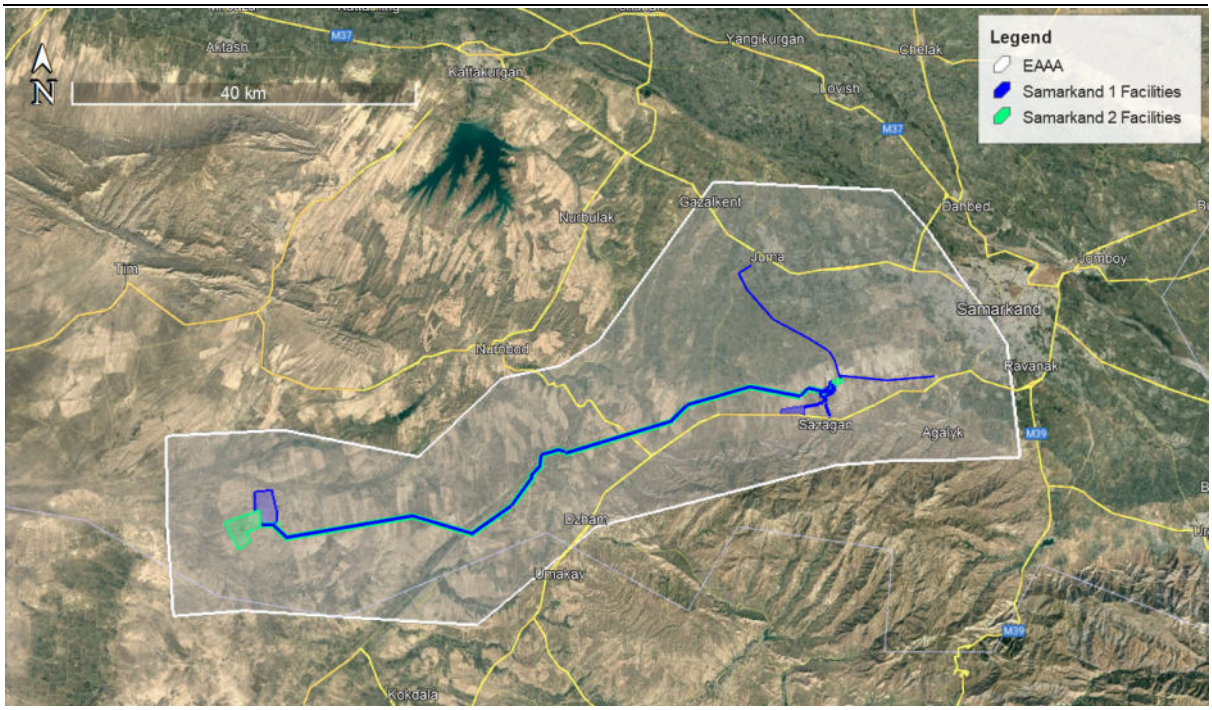

Figure 6-36 EAAA and potential habitats for the European Turtle-Dove in the PV plant site

6.2.9.4.2 Criticality

The global population of this species is estimated to range from 6,310,000-11,900,000 mature individuals. Taking a precautionary approach, the lower range is used to apply the thresholds.

Under **Criteria 1**, the threshold for VU species is EAAAs that support a globally important concentration of the global population such that the loss of the EAAA population would result in uplisting to CR/EN status and meet the quantitative thresholds of Criterion 1.

Under **Criteria 3**, the threshold is 1% of the global population using the EAAA on a regular/cyclical basis during migrations. This would amount to 63,100 individuals.

To date, zero observations of this species was made during baseline studies spanning across Autumn and Spring migration seasons. Furthermore, there are no IBAs within the EAAA and AoI for which the European Turtle-dove is a trigger species which indicates potential lack of suitable breeding habitat. The lack of baseline observations and evidence of breeding in the AoI (considered as a 20km buffer from the project footprint due to habitat displacement for birds) result in the conclusion that it is considered not likely that that the EAAA population comprises of more than 63,1300 individuals nor a globally important concentration the loss of which would trigger uplisting to CR/EN status. Therefore, CH is not triggered under Criteria 1 or Criterion 3.

Since the species did not occur during any baseline surveying of the main facilities, it is not considered as a SBV either for the Main Facilities component(s) of the Samarkand 1 projects. However, given the status of this species, if were to be observed during future monitoring efforts it would be assessed under the framework of adaptive management.

6.2.10 Sociable Lapwing

The Sociable Lapwing (*Vanellus gregarius*) is a critically endangered bird belonging to the Charadriidae family. Known for its distinctive appearance and social behaviour, the species faces severe threats due to habitat loss and degradation, primarily driven by agricultural expansion and disturbance during the breeding season. The IUCN Red List categorizes it as Critically Endangered (CR), reflecting urgent conservation concerns.

The Sociable Lapwing is not listed as a nationally protected species in Uzbekistan according to the 2019 edition of the Red Book of Uzbekistan (UzRDB).

The CHA Screening exercise found that this species should be further investigated in the CHA against **Criterion 1**.

6.2.10.1 Ecology

The Sociable Lapwing prefers open steppes and agricultural fields as its breeding habitat, which are found in its breeding range across Kazakhstan and parts of southern Russia. During migration, it uses a variety of stopover sites, including agricultural fields, grasslands, and wetlands, which are crucial for resting and feeding. Its wintering grounds are typically in the grasslands and semi-arid regions of Sudan, northwest India, and Pakistan.

Breeding generally occurs from late April to June. The Sociable Lapwing nests on the ground in shallow scrapes, often forming loose colonies. The reproductive success of this species is highly sensitive to disturbance and predation, which are exacerbated by habitat changes such as land cultivation and increased human activity.

Its diet mainly consists of insects, which are abundant in its steppe habitat, along with seeds and other plant material. During the breeding season, the increased need for protein to rear chicks sees a higher consumption of invertebrates.

The Sociable Lapwing is known for its gregarious nature, often seen in flocks during migration and in its wintering areas. It exhibits strong migratory behavior, traveling long distances between breeding and wintering sites. This species is also characterized by a distinctive loud call, often used to maintain flock cohesion.

Major threats include habitat degradation through the intensification of agriculture, land conversion, and disturbance during breeding. Hunting and trapping at migratory and

wintering sites also contribute to their decline. Conservation efforts are focused on habitat protection, management, and raising awareness to mitigate hunting pressures.

The species' population is declining sharply, with current estimates suggesting severe fragmentation and small, isolated groups outside the main breeding areas. Active international cooperation is crucial to monitor and manage the habitats across its migratory routes to improve the species' survival prospects.

6.2.10.2 DISTRIBUTION

The Sociable Lapwing breeds in Kazakhstan and southern Russia, migrates through countries such as Turkey, Syria, and Iran, and winters primarily in Sudan, Pakistan, and northwest India. Its presence varies significantly with the seasons, being primarily a passage migrant in many parts of its range outside the breeding season.

Despite a historical decline—40% from 1930 to 1960 and a further halving by 1987 in northern Kazakhstan—recent surveys suggest a stabilizing, though still vulnerable, population. In 2006, 376 breeding pairs were counted in Kazakhstan, indicating a potential population of 11,200 mature individuals (Sheldon et al. 2006). Key stopover sites include the Manych depression in south Russia and areas in Turkey such as the Muş Plain and Ceylanpınar, where significant flocks have been recorded (Sheldon 2014).

Significant numbers have also been recorded in Uzbekistan and Turkmenistan as recently as 2015, with counts suggesting these areas may support half of the global population (Donald et al. 2016). However, recent surveys noted fewer birds passing through traditional areas in autumn 2015, possibly due to adverse weather conditions. Satellite tracking has revealed new migratory patterns and confirmed the importance of Middle Eastern sites as stopovers en route to Africa. Despite extensive survey work, no birds have been located in Iraq as of the latest reports (Sheldon 2014).

The EOO of resident/breeding population of the Sociable Lapwing is 1,670,000 km^2 (Birdlife Datazone, 2024).

Surveys in 2006 within a 145,000 km^2 area in Kazakhstan recorded 376 breeding pairs of the Sociable Lapwing. Extrapolation of these figures suggests a potential total breeding population of 5,600 pairs, or about 11,200 mature individuals, equivalent to 16,000-17,000 individuals overall. This estimate is under ongoing refinement but aligns with subsequent observations, including a count of 3,200 individuals in Turkey in October 2007 and between 6,000-8,000 individuals on the Uzbekistan/Turkmenistan border in more recent counts (Donald et al. 2016). The European population, however, remains extremely small, estimated at 0-10 pairs, translating to 0-20 mature individuals (BirdLife International 2015).

The Sociable Lapwing has experienced a significant decline and range contraction, particularly noted in northern Kazakhstan with a 40% decline from 1930 to 1960, followed by a further halving from 1960 to 1987. However, more recent fieldwork, particularly in central Kazakhstan around Korgalzhyn and Pavlodar, indicates a potentially stabilizing or even increasing population trend. For instance, nest counts in Korgalzhyn rose from 85 in 2005 to 113 by 2007, and in Pavlodar, numbers increased from 55 in 1991 to 140 in 2007 (Sheldon et al. 2006). Despite these localized signs of recovery, a global decline of over 50% is still suspected for the past 27 years, with a steeper decline anticipated for the next three generations due to ongoing severe threats. In Europe, the population has decreased by more than 80% over the same 27-year period, and by more than 25% in the last nine years alone (BirdLife International 2015). Further fieldwork is needed to confirm these trends and potentially revise these estimates.

The following figures shows the geographical range of this species.

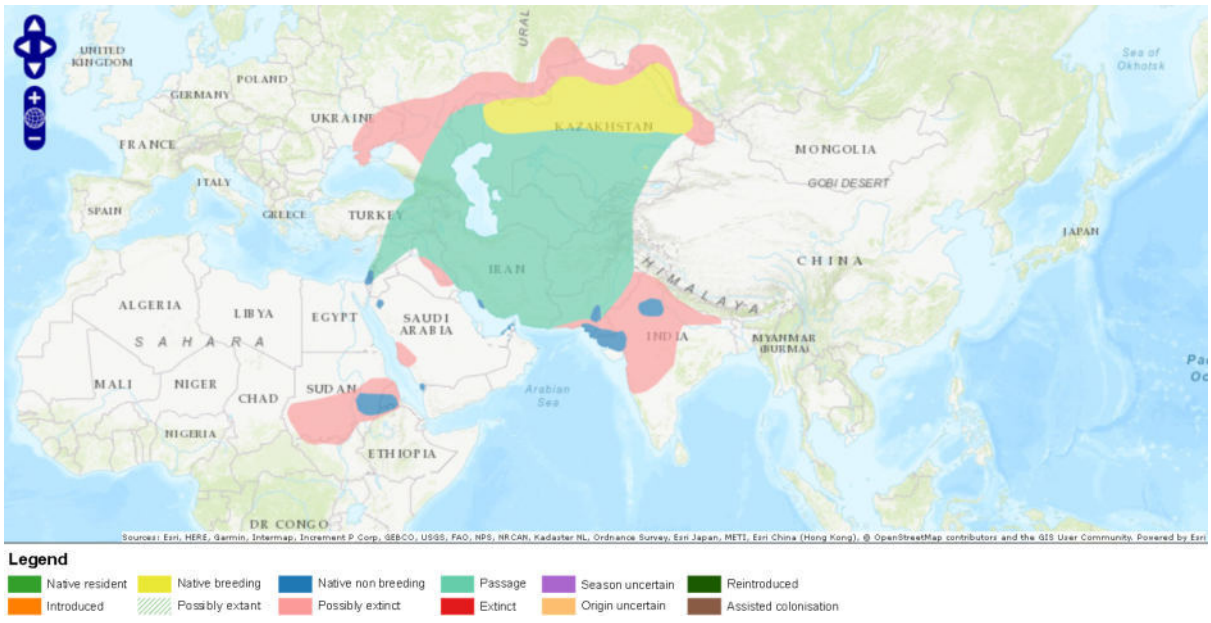

Figure 6-37 Geographical Distribution of the Sociable Lapwing [30]

[30] BirdLife International (2024) Species factsheet: Vanellus gregarius. Downloaded from https://datazone.birdlife.org/species/factsheet/sociable-lapwing-vanellus-gregarius on 29/04/2024.

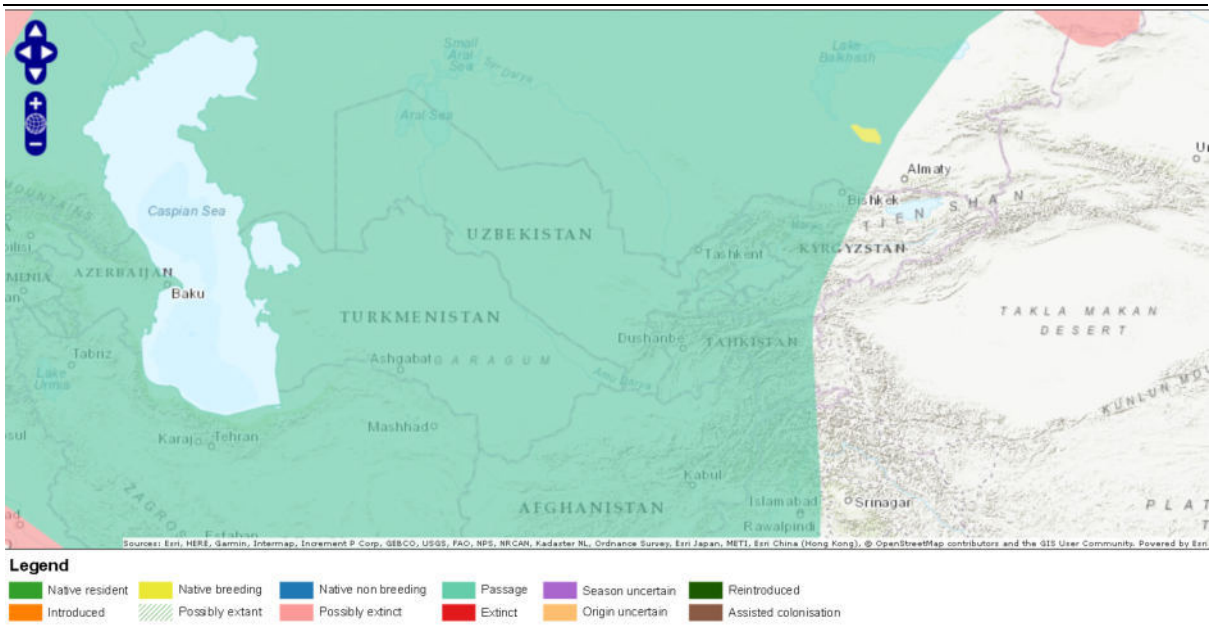

Figure 6-38 Geographical Distribution of the Sociable Lapwing

The Sociable Lapwing breeds primarily in northern and central Kazakhstan and south-central Russia, with historical records from western China (Kamp et al. 2010). After breeding, it disperses widely across Central Asia, the Middle East, and into key wintering sites in Sudan, Pakistan, and north-west India. Notable recent sightings include a flock of 28 birds near Ahmedabad village, Pakistan in 2015, and several large flocks in India between 2007 and 2012, with up to 90 birds observed (Sheldon 2013; Deomurari 2007). Smaller numbers winter regularly in Saudi Arabia, Oman, and the UAE, with vagrant records across Europe and potential overwintering in Iberia (de Juana 2011).

The figures below illustrate the migration pathways of the Sociable Lapwing from Central Kazakhstan, showcasing two primary routes: the western route, which extends west across Kazakhstan to the Arabian Peninsula and northeastern Africa, and the eastern route, which heads directly south through Central Asia to the Indian subcontinent. The data highlight the distances travelled, key stopover sites, and differences in migration strategies between the two routes.

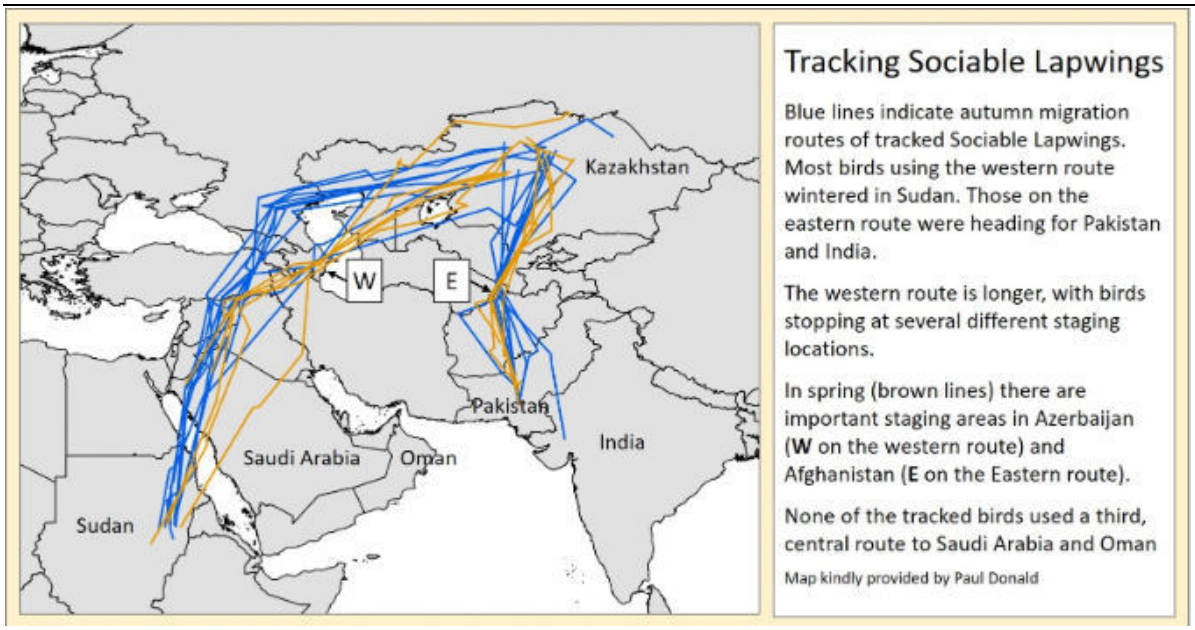

Figure 6-39 Migration Routes of the Sociable Lapwing: Western and Eastern Pathways from Central Kazakhstan [31]

Figure 6-40 Identified Migration Routes and Population Estimates of Sociable Lapwing Based on Historical and GPS Tracking Data

[31] Graham, A., (2021) Following Sociable Lapwings, *Watertales*, Available at: https://wadertales.wordpress.com/2021/01/03/following-sociable-lapwings/ Accessed 24 April, 2024.

6.2.10.3 BASELINE SURVEY RESULTS

This species was not recorded within the Project area during any of the baseline surveys conducted in 2023 and 2024.

6.2.10.4 ANALYSIS

A long-term study of the species movements using satellite tagging shows that the migration strategy of this species is characterised by infrequent long-distance movements followed by lengthy stopovers in a small number of staging areas that are used consistently across years. Based on the data presented in the study, this species travels an average of 534km per day and is likely to use the project airspace on migration to the closest stopover site, at Lake Talimarzhan located 115km to the south [32]. Records on eBird data also show that a number of observations have been noted in Karnachabul located 30km west in 2020 and 2021 [33].

During migration, the species appears to be strongly associated with areas of agriculture, particularly along rivers. Though such habitats are present, to date no known observations of this species have been made within project footprint and AoI (considered as a 20km buffer from the project footprint due to habitat displacement for birds) which possibly suggests a lack of interaction with the project site. Consults with the regional ornithologist imply that this species is unlikely to be observed in the AoI. Moreover, the presence of this species 30 km west and 115km south of the project footprint potentially indicate a preference for these areas over the habitat conditions found within the project AoI.

Therefore, due to the unlikelihood of presence in the project AoI, an EAAA cannot be applied as a result of which CH will be not further assessed for this species. However, given the status of this species, if were to be observed during future monitoring efforts it would be assessed under the framework of adaptive management.

6.2.11 Lesser White-fronted Goose

The Lesser White-fronted Goose (*Anser erythropus*) is a passage migrant in Uzbekistan, listed as Vulnerable (VU) species on the IUCN Global Red List, and Vulnerable (VU) in the Uzbekistan National Red Data Book.

[32] Donald, Paul & Kamp, Johannes & Green, Rhys & Urazaliyev, Ruslan & Koshkin, Maxim & Sheldon, Rob. (2021). Migration strategy, site fidelity and population size of the globally threatened Sociable Lapwing Vanellus gregarius. Journal of Ornithology. 162. 10.1007/s10336-020-01844-y.
[33] Wiersma, P., G. M. Kirwan, and C. J. Sharpe (2020). Sociable Lapwing (*Vanellus gregarius*), version 1.0. In Birds of the World (J. del Hoyo, A. Elliott, J. Sargatal, D. A. Christie, and E. de Juana, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.soclap1.01

The CHA Screening exercise found that this species should be further investigated in the CHA against **Criteria 1 and 3**.

6.2.11.1 ECOLOGY

During winter and on migration, this species frequents open short grassland in the steppe and semi-arid zones, particularly in sodic (e.g. seashore) pastures, arable farmland, pastures and meadows (Cramp and Simmons 1977, Madsen 1996, Kear 2005). Winter roosting colonies are also formed on large lakes and rivers, or in reedbeds and rushes (Cramp and Simmons 1977, Madge and Burn 1988).

Breeding generally occurs in late May/June and depart breeding grounds in mid-August to mid-September (Kear, 2005). Young remain with parents throughout most of first winter (Kear, 2005).

Feeds mostly by grazing on land, primarily on green parts of grasses, plants and small bushes. During winter it will supplement feeding with agricultural grains (Kear, 2005).

Climate change and associated habitat shifts are expected to impact negatively on this species. Illegal hunting, particularly in wintering sites, is also a major threat.

6.2.11.2 DISTRIBUTION

The species breeds in a discontinuous narrow band across Arctic Eurasia from Norway to Eastern Siberia. There are four subpopulations recognised, where the Western Asian main population is known to winter around the Black and Caspian Seas, mainly in Azerbaijan, Iraq, Iran and Uzbekistan (V. Morozov in litt. 2016, N. Mikander, I. Øien and T. Aarvak in litt. 2016).

The figure below shows the mapped migratory routes across the Western Palearctic.

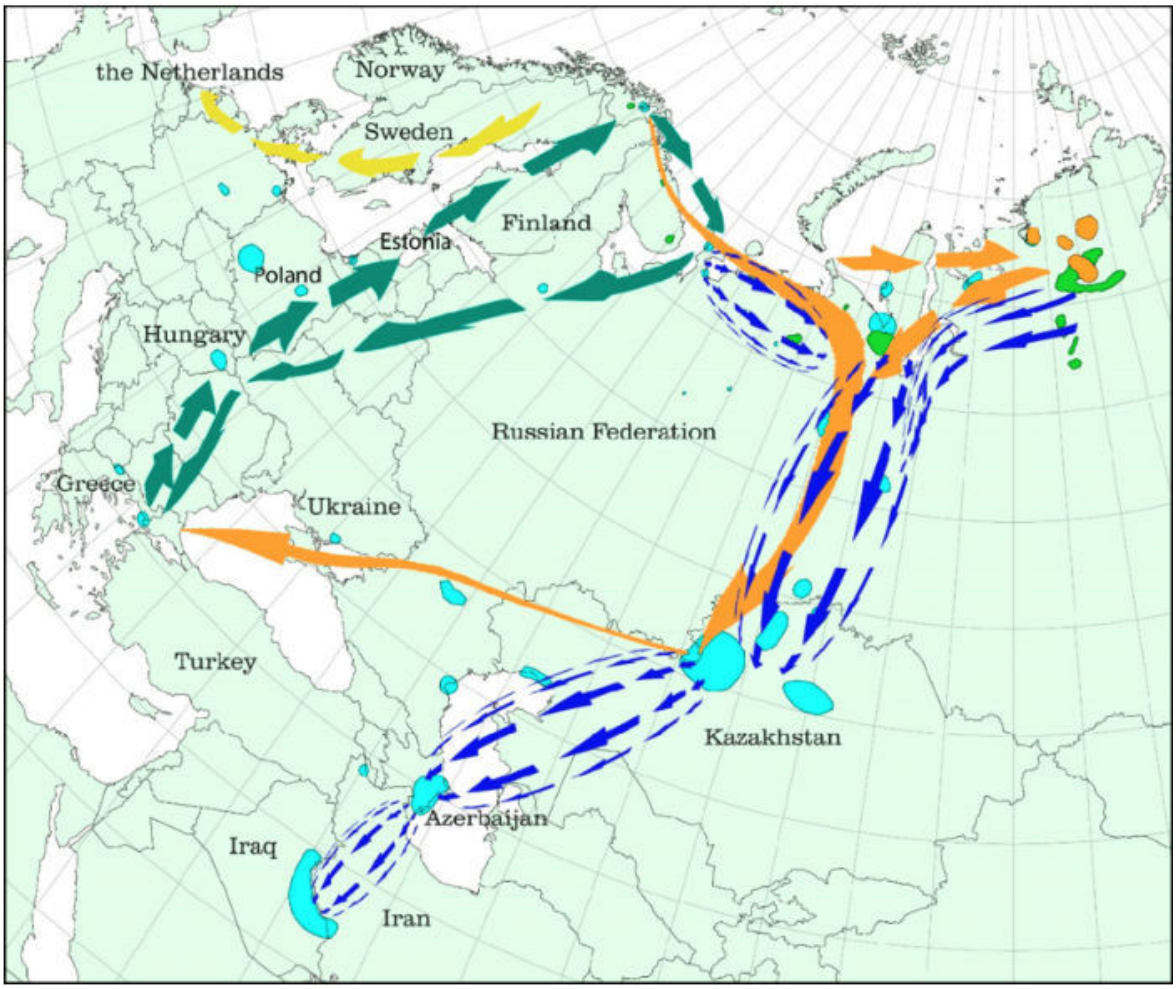

Figure 6-41 Mapped Migratory Routes of the Lesser White-fronted Goose in the Western Palearctic [34]

The species has a large EOO of 7,060,000km^2.

The global population is estimated at 24,000 – 40,000 individuals, which includes 14,000 – 19,000 individuals from the East Asian Flyway (Jia et al 2016; Lei per A. Fox *in litt.* 2016).

The figures below show the species distribution.

[34] Aarvak, Tomas & Øien, Ingar & Shimmings, Paul. (2016). A critical review of Lesser White-fronted Goose release projects. NOF-BirdLife Norway. Report 6.

Figure 6-42 Distribution Map of Lesser White-fronted Goose[35]

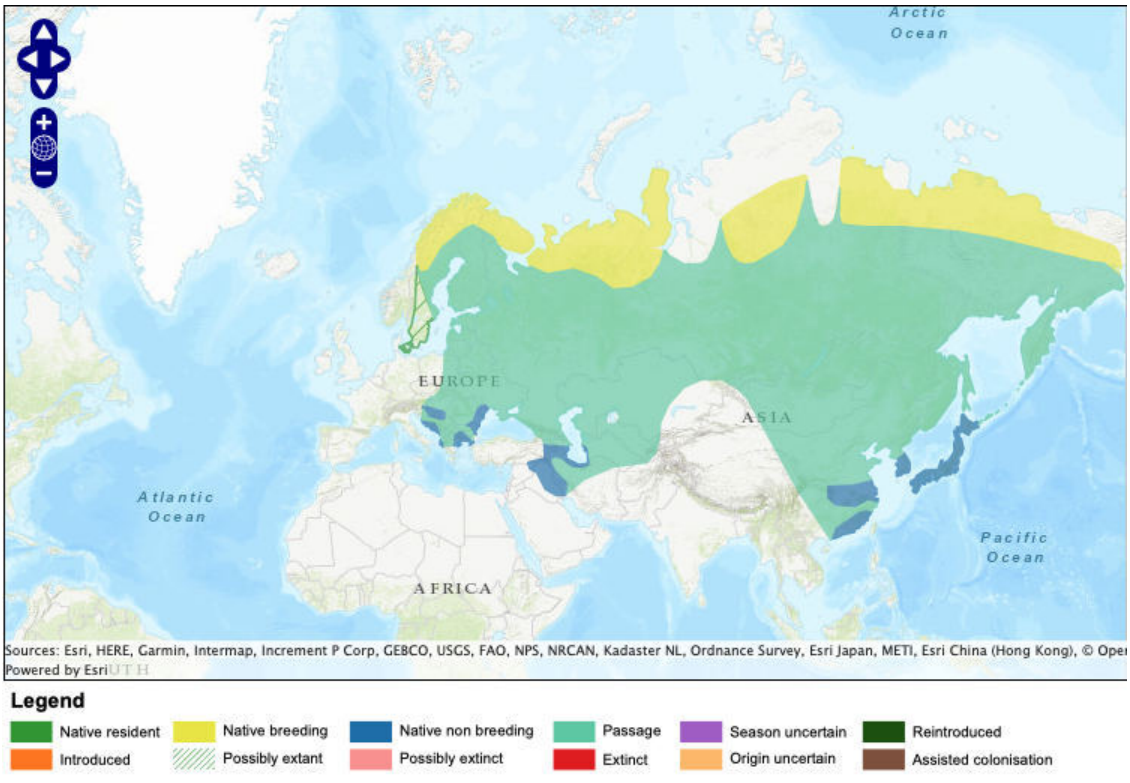

Figure 6-43 Distribution Map of Lesser White-fronted Goose

[35] BirdLife International (2024) Species factsheet: *Anser erythropus*. Downloaded from https://datazone.birdlife.org/species/factsheet/lesser-white-fronted-goose-anser-erythropuson 24/04/2024.

6.2.11.3 BASELINE SURVEY RESULTS

This species was not recorded within the Project area during any of the baseline surveys conducted in 2023 and 2024.

6.2.11.4 ANALYSIS

During winter and at stopover sites, the Lesser White-fronted Goose, roosts on lakes and frequents adjacent open short grassland in the steppe and semi-arid zones, particularly in sodic (e.g. seashore) pastures, arable farmland, pastures and meadows. Such habitats i.e. lakes with adjacent grassland, farmland, pastures and meadows are not present within the project footprint nor within AoI (considered as a 20km buffer from the project footprint due to habitat displacement for birds).

The closest known records of Lesser White-fronted Goose is the Karnachabul Steppe IBA for which it is a trigger species. The IBA located approximately 30km from the project area. This may suggest the lack of suitable habitat within project footprint and AoI (considered as a 20km buffer from the project footprint due to habitat displacement for birds). Therefore, due to the unlikelihood of presence in the project AoI, an EAAA cannot be applied as a result of which CH will be not further assessed for this species. However, given the status of this species, if were to be observed during future monitoring efforts it would be assessed under the framework of adaptive management.

6.2.12 White-headed Duck

The White-Headed Duck (*Oxyura leucocephala*) is a resident (possibly breeding) and a passage migrant in Eastern Uzbekistan and has been noted to winter in some regions. It is listed as Endangered (EN) species on the IUCN Global Red List, and Endangered (EN) in the Uzbekistan National Red Data Book.

The CHA Screening exercise found that this species should be further investigated in the CHA against **Criteria 1 and 3**.

6.2.12.1 ECOLOGY

The White-headed Duck is a highly aquatic species that is found in a variety of wetlands throughout the year, including natural and man-made habitats (Salvador 2023). During passage migration, they have been recorded in a variety of habitats, including sea bays and rivers (Anstey, 1998). In Uzbekistan during spring migration, the species was recorded in the Syrdaria and Zeravshan rivers, and during autumn migration on lakes (Kreuzberg-Mukhina et al 2001). Whilst wintering the species inhabits larger, deeper alkaline or saline waters which often have less emergent vegetation than in the breeding season, but still support algae and

pondweeds (Johnsgard and Carbonell 1996). White-headed Ducks were observed wintering during 2020–2021 in a reservoir (Tudakul) and in lakes (Dengizkul, Karakir, Xadicha, and Zikri) of Bukhara Region, Uzbekistan (Yorkulov & Azimov 2021).

Migrating birds breed from April to July (Sánchez et al. 2000, Kear 2005). After breeding it begins migration to its wintering grounds in late August to arrive September-October, and the return journey occurs between February and early May (Johnsgard and Carbonell 1996, Kear 2005).

In Uzbekistan, breeding birds were observed in July on the Sudochye Wetland (Kreuzberg-Mukhina, in press; Lanovenko et al., in press). It breeds on small, enclosed, semi-permanent or temporary freshwater, brackish or eutrophic lakes with a fringe of dense emergent vegetation. The nest is constructed over water in emergent vegetation (usually Phragmites spp. or Typha spp.) ((Sánchez et al. 2000, Sebastián-González et al. submitted; Kear 2005).

This is a diving duck. Its diet consists predominantly of midge (chironomid) larvae and other aquatic invertebrates, but seeds and aquatic plants may also be taken (Johnsgard and Carbonell 1996; Sánchez et al. 2000; Kear 2005).

The greatest long-term threat to the species is competition and introgressive hybridisation with the non-native North American Ruddy Duck *Oxyura jamaicensis* (Green and Hughes 1996, Green and Hughes 2001, Muñoz-Fuentes et al. 2007). Both male Ruddy Ducks and male hybrids are socially dominant over male White-headed Ducks during courtship (Johnsgard and Carbonell 1996). Droughts in Kazakhstan and Uzbekistan may have caused poor breeding seasons in 2002 and 2003 (Li and Mundkur 1993, B. Hughes in litt. 1999).

6.2.12.2 DISTRIBUTION

This species is distributed across Central Asia, parts of Europe and the middle east. Across much of Uzbekistan it is noted as a resident but breeds in some localities primarily in the West. Important passage concentrations also occur in Uzbekistan (E. Kreuzberg-Mukhina in litt. 1999), particularly near Jizzkah and Tashkent. It has also been recorded to overwinter in recent years, although no regular wintering sites have been found (Li and Mundkur 2003).

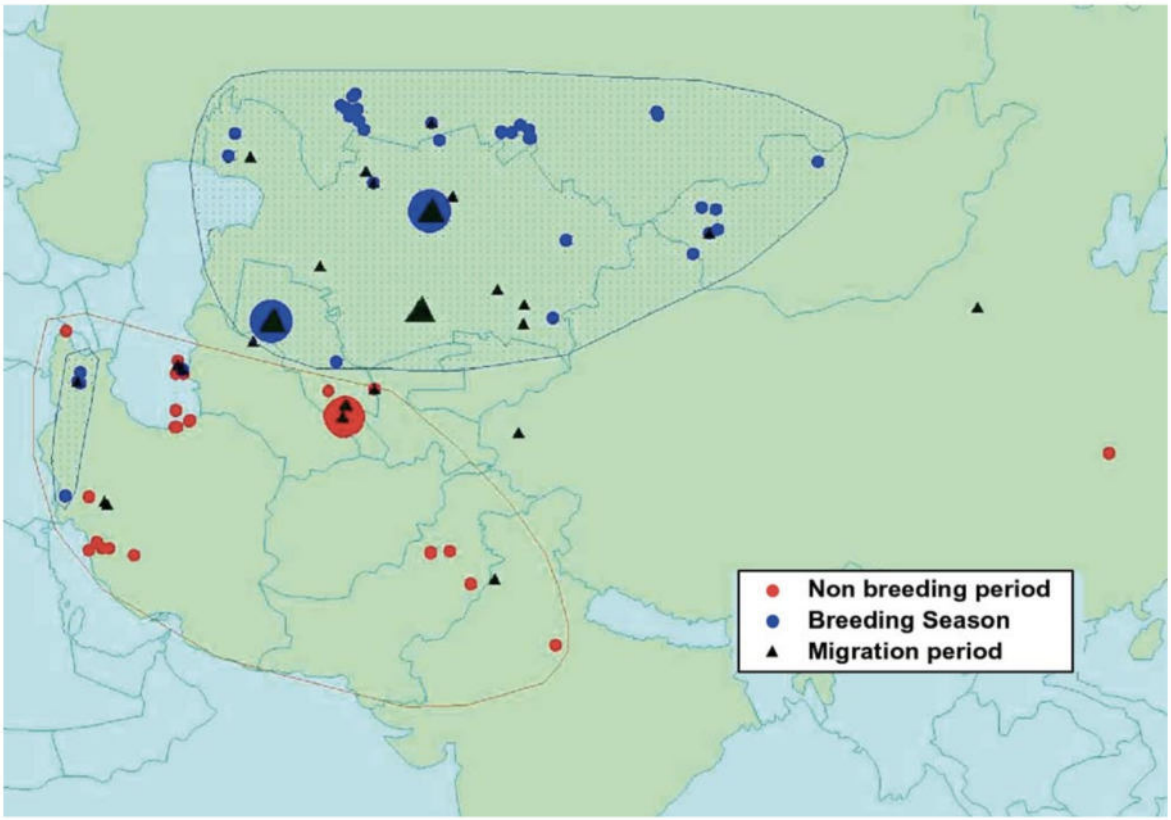

Figure 6-44 Distribution of White-headed Duck in Central and South Asia in 1990-2004 [36]

It's EOO is 14,100,000km^2.

The global population is estimated to number 7,900-13,100 individuals. In Uzbekistan the breeding populations in Sudochye Wetlands numbered 2,835 and 1,149 in 2001 and 2002 respectively. Numbers of non-breeding individuals may increase in Autumn. Migrating and wintering populations are more common in Eastern Uzbekistan, near the project AoI for example, 1,192 individuals were recorded at several wetlands in Bukhara Province in Uzbekistan in 2004 (Li and Mundkur 2003; Li et al 2006)

The following figures show the species distribution.

[36] Li, Z.W.D., Mundkur, T., Kreuzberg-Mukhina, E.A., Yerokhov, S., Solokha, A., Ali, Z. & Chaudhry, A.A. 2006. Conservation of the White-headed Duck *Oxyura leucocephala* in Central and South Asia. *Waterbirds around the world.* Eds. G.C. Boere, C.A. Galbraith & D.A. Stroud. The Stationery Office, Edinburgh, UK. pp. 624-628.

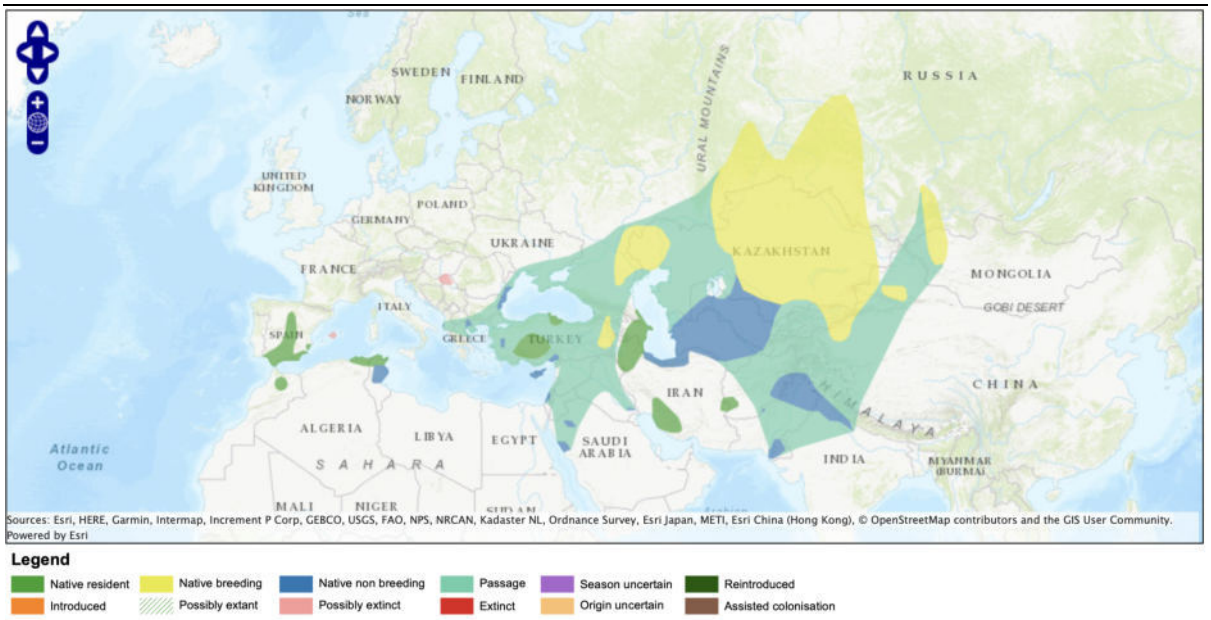

Figure 6-45 Distribution Map of White-Headed Duck[37]

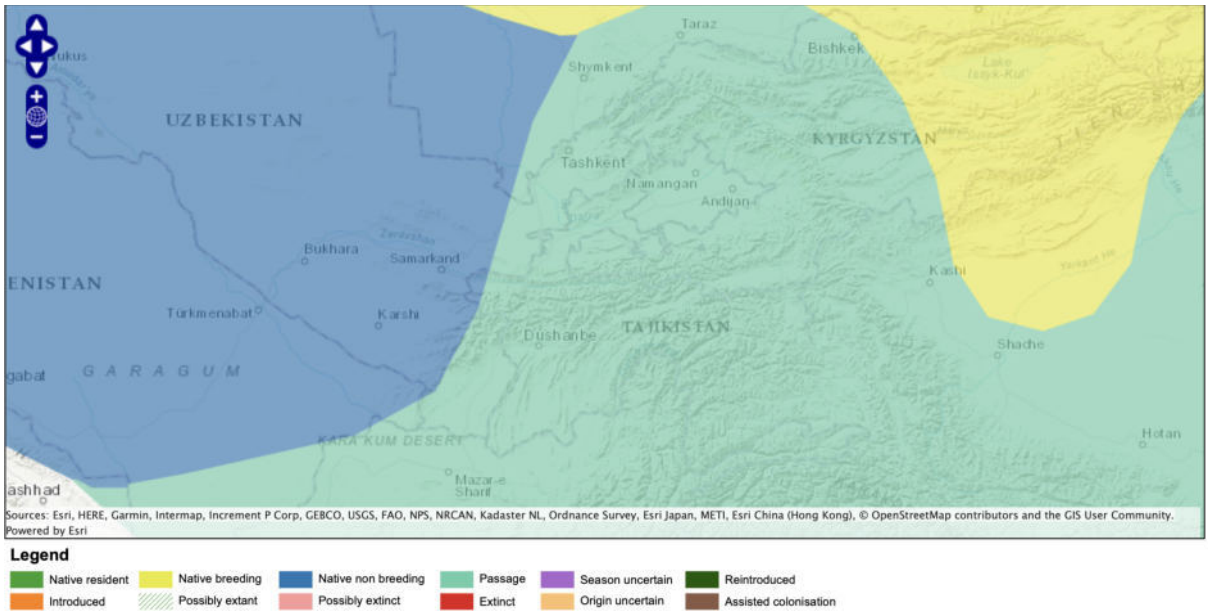

Figure 6-46 Distribution Map of White-Headed Duck

6.2.12.3 BASELINE SURVEY RESULTS

This species was not recorded within the Project area during any of the baseline surveys conducted in 2023 and 2024.

[37]BirdLife International (2024) Species factsheet: *Oxyura leucocephala*. Downloaded from https://datazone.birdlife.org/species/factsheet/white-headed-duck-oxyura-leucocephalaon 01/05/2024

6.2.12.4 ANALYSIS

The total EAAA for resident birds has been applied as all connected suitable habitat that overlaps the project footprint as well as exists within a reasonable buffer, determined by species specific ecology.

During the wintering season, the species inhabits larger, deeper alkaline or saline waters such as Karakyr Lakes, Dengikul Lake and the northern shore of Ayadarkul Lake all of which are IBAs, for which White-headed duck is a trigger species, located more than 150km from the project footprint.

The most important sites for White-headed Duck in Uzbekistan are the Sudochye Wetlands and Dengizkul Lake located approximated 760km and 140km from the project site. During spring migration 1903, the species was recorded in the Syrdarya and Zeravshan rivers (near the Karmana and Ziadin areas which located just over 80km from the project footprint), and during autumn migration on lakes[38].

There are no known known wintering or passage areas mapped as IBAs within the project footprint and AoI (considered as a 20km buffer from the project footprint due to displacement). Therefore, due to the lack of suitable habitats and unlikelihood of presence in the project AoI, an EAAA cannot be applied as a result of which CH will be not further assessed for this species. However, given the status of this species, if were to be observed during future monitoring efforts it would be assessed under the framework of adaptive management.

6.2.13 Marbled Teal

The Marbled Teal (*Marmaronetta angustirostris*) is a breeding resident and possible passage migrant in much of Uzbekistan and is listed as Near Threatened (NT) on the Global IUCN Red List. It is also listed as Vulnerable (VU) in the National Uzbekistan Red Data Book.

The CHA Screening exercise found that this species should be further investigated in the CHA against **Criteria 1 and Criteria 3**.

6.2.13.1 ECOLOGY

This species inhabits temporary or semi-permanent wetlands although it is tolerant of many types of wetland provided there are shallow areas.

Marbled Ducks are omnivorous and feeds on aquatic plant seeds and also invertebrates.

[38] Li, Z. W. D. and Mundkur, T. 2003. Status Overview and Recommendations for Conservation of the White-headed Duck Oxyura leucocephala in Central Asia. Wetlands International Global Series 15, Kuala Lumpur, Malaysia

This species is gregarious, non-territorial and non-aggressive and socially monogamous. This species is a late breeder with broods ranging from April to September. Nests are constructed by the female and are sited on the ground, not far from water, under a low shrub or herbaceous cover.

Threats faced by this species include destruction and degradation of wetland habitats, illegal hunting and trapping, lead poisoning and pollution and the spread of invasive species.

6.2.13.2 DISTRIBUTION

The Marbled Teal has a fragmented global population across central and southwest Palearctic, as well as Central Asia in the east to northwest Africa and the Iberian Peninsula in the west.

The estimates global population is 10,000 to 42,0000 mature individuals, with an estimated EOO of 13,500,000 km^2.

The following figures show the distribution of Marbled Teal in Uzbekistan and globally.

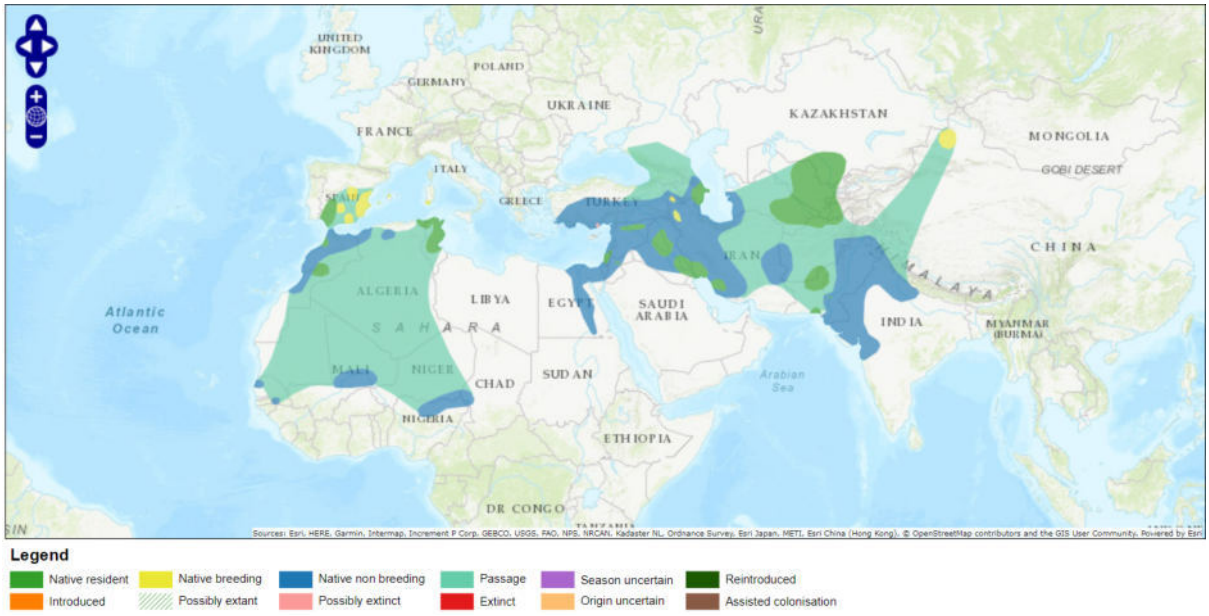

Figure 6-47 Geographical Distribution of the Marbled Teal [39]

[39] BirdLife International (2024) Species factsheet: Marbled Teal *Marmaronetta angustirostris*. Downloaded from https://datazone.birdlife.org/species/factsheet/marbled-teal-marmaronetta-angustirostris on 07/08/2024.

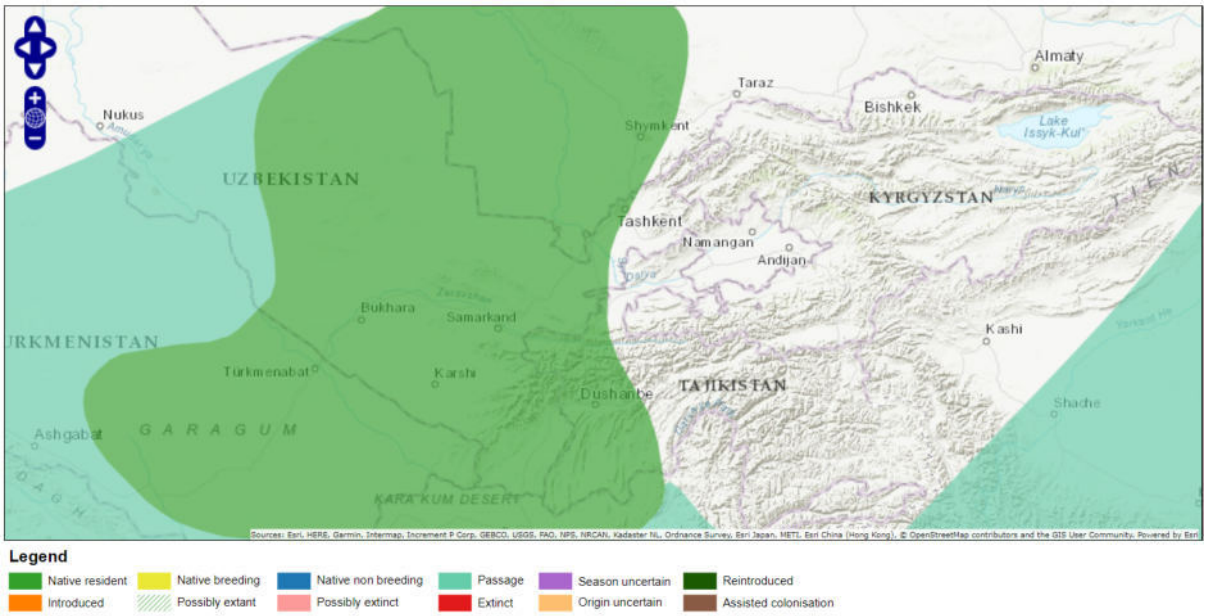

Figure 6-48 Geographical Distribution of the Marbled Teal

6.2.13.3 BASELINE SURVEY RESULTS

This species was not recorded within the Project area during any of the baseline surveys conducted in 2023 and 2024.

6.2.13.4 ANALYSIS

The total EAAA for resident birds is applied as all suitable habitat that overlaps the project footprint and exists within a reasonable buffer, determined by species specific ecology. With migratory populations, CHA generally follows the IUCN KBA standard, emphasizing areas that function as significant migratory stopover sites and/or bottleneck, with EAAA delineated to include the Project component(s) footprint plus a reasonable buffer based on the scale of the species' typical daily foraging movements, rather than its entire migratory route.

The closest known records of Marbled Teal is the Amudarya Floodlands near Termez IBA for which it is a trigger species. The IBA is located approximately 245km southeast from the project area. Habitat requirement for this species are temporary or semi-permanent wetlands although it is tolerant of many types of wetlands provided there are shallow areas with emergent vegetation. This may suggest the lack of suitable habitat within project footprint and AoI (considered as a 20km buffer from the project footprint due to habitat displacement for birds). Therefore, due to the lack of suitable habitat and unlikelihood of presence in the project AoI, an EAAA cannot be applied as a result of which CH will be not further assessed for this species. However, given the nationally important status of this species, if were to be

observed during future monitoring efforts it would be assessed under the framework of adaptive management.

6.2.14 Dalmatian Pelican

The Dalmatian Pelican (*Pelecanus crispus*) is a passage migrant in much of Uzbekistan and is listed as Near Threatened (NT) on the Global IUCN Red List. It is also listed as Vulnerable (VU) in the National Uzbekistan Red Data Book.

The CHA Screening exercise found that this species should be further investigated in the CHA against **Criteria 1 and 3**.

6.2.14.1 ECOLOGY

This species inhabits rivers, lakes, deltas and estuaries. It occurs mainly at inland, freshwater wetlands as well as coastal lagoons, river deltas and estuaries. During migration, large lakes form important stop-over sites.

This species feed mainly on fish, especially carp, perch, rudd, pike and eels.

Adults form monogamous pairs. It departs from the colonies between the end of July and September, although a few remain until November. On migration, large lakes form important stop-over sites. It is gregarious during the winter, often occurring in large flocks and foraging communally and cooperatively in small groups, although occasionally singly. The birds return to their breeding sites in late-January to April, depending on the region. Immature birds and non-breeders may remain in the wintering grounds year round, or may stay with the breeding colonies. They are often nomadic, especially in the Caspian Sea.

6.2.14.2 DISTRIBUTION

This species breeds in Southeast Europe, to the east they breed in Asia to Kazakhstan and in the west to Mongolia. The Asian populations of this species tend to migrate and arrive in the Danube Delta during March and depart again in August.

The estimates global population is 11,400 to 13,400 mature individuals, with an estimated EOO of 12,600,000 km^2.

The following figures show the distribution of Dalmatian Pelican in Uzbekistan and globally.

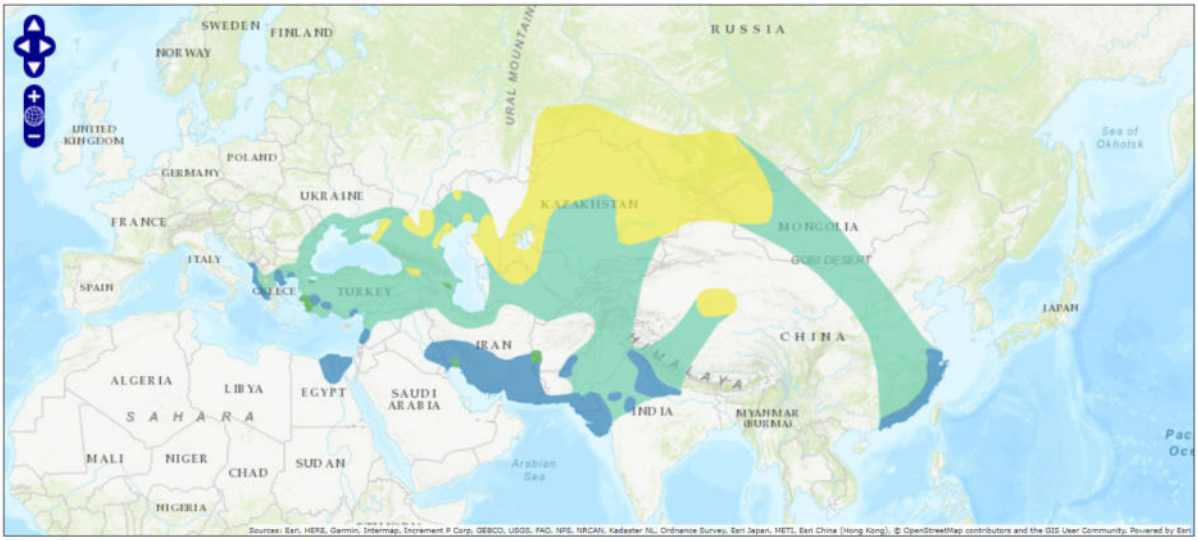

Figure 6-49 Distribution Map of Dalmatian Pelican[40]

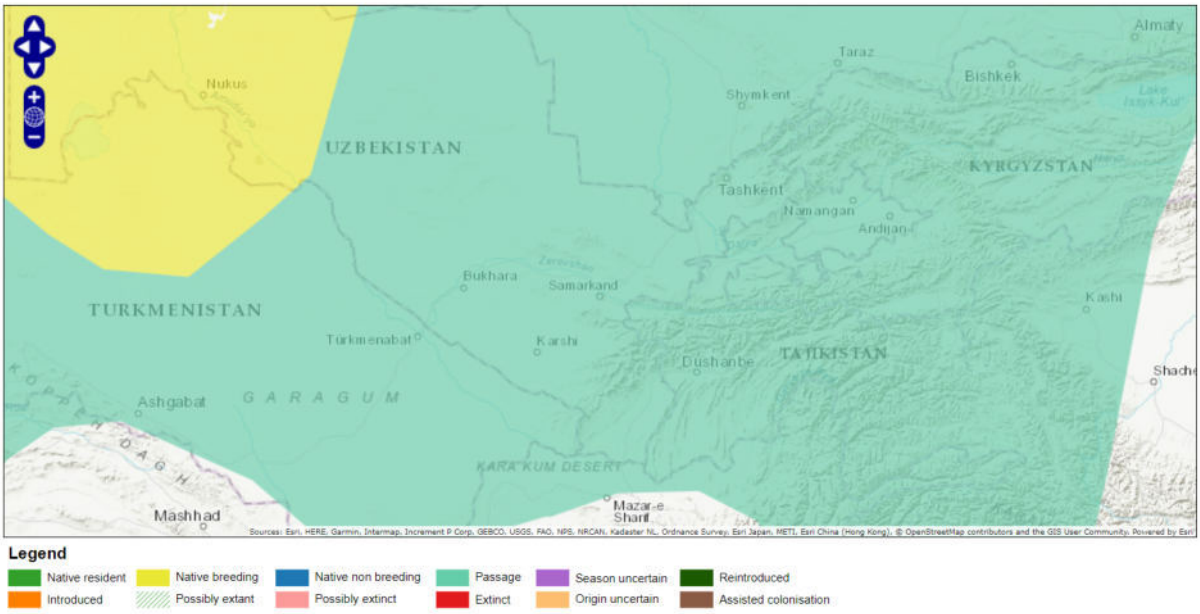

Figure 6-50 Distribution Map of Dalmatian Pelican

6.2.14.3 BASELINE SURVEY RESULTS

This species was not recorded within the Project area during any of the baseline surveys conducted in 2023 and 2024.

[40]BirdLife International (2024) Species factsheet: Dalmatian Pelican *Pelecanus crispus*. Downloaded from https://datazone.birdlife.org/species/factsheet/dalmatian-pelican-pelecanus-crispus on 07/08/2024.

6.2.14.4 ANALYSIS

The EAAA is a difficult concept to apply to long-range migratory species, as encompassing the full geographic range of such species would result in extremely large population extrapolations. *(Refer to Section 3.1.4 for detailed explanation of how EAAA is being developed for long-distance migratory species)*.

Large lakes present important stopover sites during migration. No such habitats exist within the project footprint and AoI (considered as a 20km buffer from the project footprint due to habitat displacement for birds).

The closest known stopover sites of Dalmatian Pelican is the Dzheiran Ecocentre and Tuzkan Lakes IBAs for which it is a trigger species. These IBAs are located approximately 100km west and 120km north from the project site.

Therefore, due to the absence of suitable habitat and subsequent unlikelihood of presence in the project AoI, an EAAA cannot be applied as a result of which CH will be not further assessed for this species. However, given the nationally important status of this species, if were to be observed during future monitoring efforts it would be assessed under the framework of adaptive management.