Environmental and Social Impact Assessment

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Uzbekistan: Samarkand 1 Solar PV and BESS Project

Appendixes – Part 12

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

6. Findings

The Griffon vulture (Gyps fulvus) was found collided in 2km from planned 70 km OHTL line during Asian Houbara surveys (21 March 2024, N39.39473 E66.00725).

Figure 8: Collided Griffon vulture (photo by Valentin Soldatov)

7. Summary

1. **Absence of Asian Houbara**: Despite the surveys, no Asian Houbara was observed during the research.
2. **Breeding Activity**: The survey did, however, identify breeding activity of several other bird species, including Crested larks, Northern wheatear, Greater Sand Plover, and Black-bellied Sandgrouses.

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Contact Us

Phone: +998 78 202 0440

Email: info@juru.org

Website: www.juru.org

Bird survey report 2024: Raptor nest survey

Environmental and Social Impact Assessment (ESIA) for the development of a solar power project in Samarkand Region, Uzbekistan

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Disclaimer

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1. Introduction

In accordance with the Resolutions of the President of the Republic of Uzbekistan No. PP-207 dated July 4, 2023, "On measures for the implementation of the investment project 'Construction of a 500 MW Solar Photovoltaic Power Station, a 334 MW Electric Energy Storage System, and a Substation to support its operation in the Nurabad District of the Samarkand Region — Sazagan Solar 1'," and No. PP-208 dated July 4, 2023, "On measures for the implementation of the investment project 'Construction of a 500 MW Solar Photovoltaic Power Station, a 334 MW Electric Energy Storage System, and a Substation to support its operation in the Nurabad District of the Samarkand Region — Sazagan Solar 2'," investment agreements were signed on April 19, 2023, between the Ministry of Investments, Industry, and Trade of the Republic of Uzbekistan, the company "ACWA Power Company" (Investor), and the companies "ACWA Power Sazagan Solar 1" and "ACWA Power Sazagan Solar 2" (hereinafter referred to as the "Project Companies") (Figure 1).

Under the aforementioned investment agreements, the Project Companies are implementing the projects "Sazagan Solar 1" and "Sazagan Solar 2," within which three solar photovoltaic power stations with a total capacity of 1000 MW and a substation with a capacity of 500/220 kV will be constructed in the Nurabad District of the Samarkand Region. Additionally, two energy storage systems will be built — one in the Nurabad District of the Samarkand Region and another in the Karakul District of the Bukhara Region. Furthermore, two parallel overhead power transmission lines with a voltage of 220 kV and a length of 70 km will be constructed to connect the main project facilities. 360 km overhead transmission line will also connect stations located in Samarkand region with the Khalka substation, located in Tashkent region.

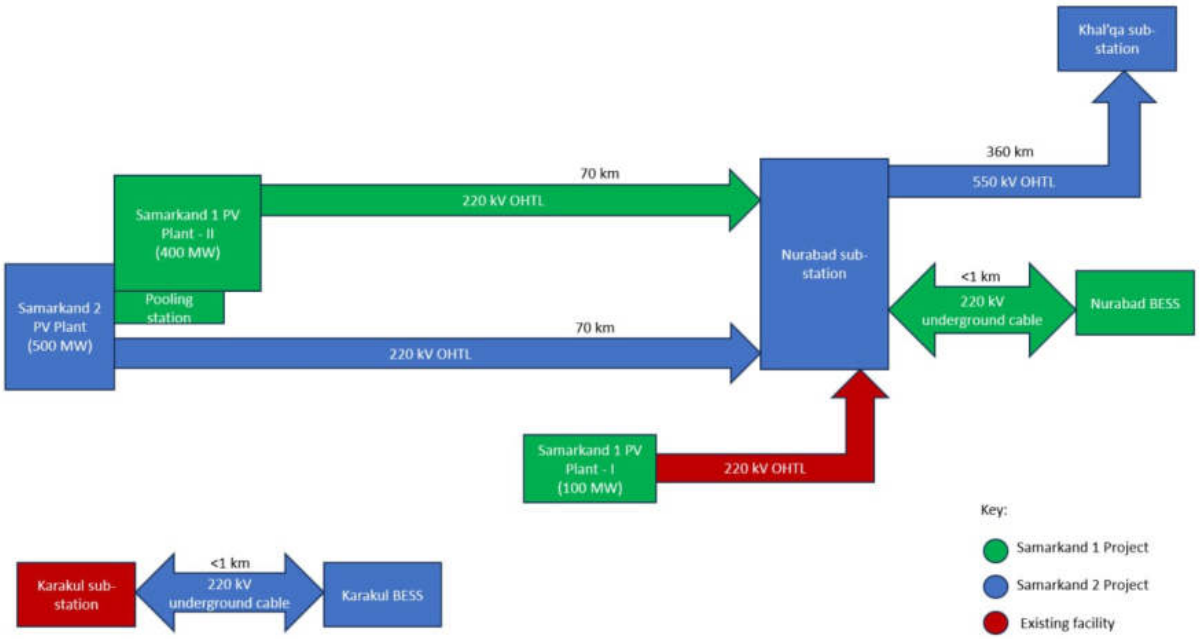

Figure 1: The scheme of project sites

As part of the Environmental and Social Impact Assessment (ESIA), biodiversity baseline surveys are needed to validate assumed status as well as fill any information gaps. The Environmental and Social Impact Assessment process might further identify the need for the project to undergo a Critical Habitat Assessment (CHA) to meet international lender requirements.

The report presents data and materials from field bird surveys on breeding raptors. This report details the findings of the 2024 spring survey period, which included point surveys conducted between April 26-28 2024.

2. Materials and methods

The raptor nest survey was conducted in accordance with the raptor/vulture nesting (RVN) methodology, which was developed based on Good International Industry Practice. This methodology is oriented toward the objective of characterizing the potential for the Projects to adversely impact the nesting/breeding activity of target species. The RVN protocol does not focus on collecting a certain number of hours of survey data at a certain number of points. Instead, it is more flexible and strategic, focusing on the final objective of discovering and documenting the locations of all active nests of potentially sensitive species within a certain proximity to the OHTL.

The survey took place on April 26-28, 2024, covering the project main facilities and OHTL route (Figure 2). The total area of the project main facilities and OHTL route and the 5 km buffer area from the project footprint was considered the "core" area for the raptor nesting survey effort. Within the core area, we conducted repeated, strategically timed observations. Observation methods included a combination of foot surveys, vehicle stopovers, and observations of suitable nesting sites. The survey area was carefully inspected for suitable nesting habitats such as cliffs, rocky outcrops, trees, and man-made structures like powerline poles, which are preferred nesting sites for many raptor species known to occur in the region. Whenever territorial birds were detected, observation was conducted for an extended period of 0.5 hours.

Figure 2 shows the 34 preliminary point locations in 5 km buffer zone where surveys were conducted.

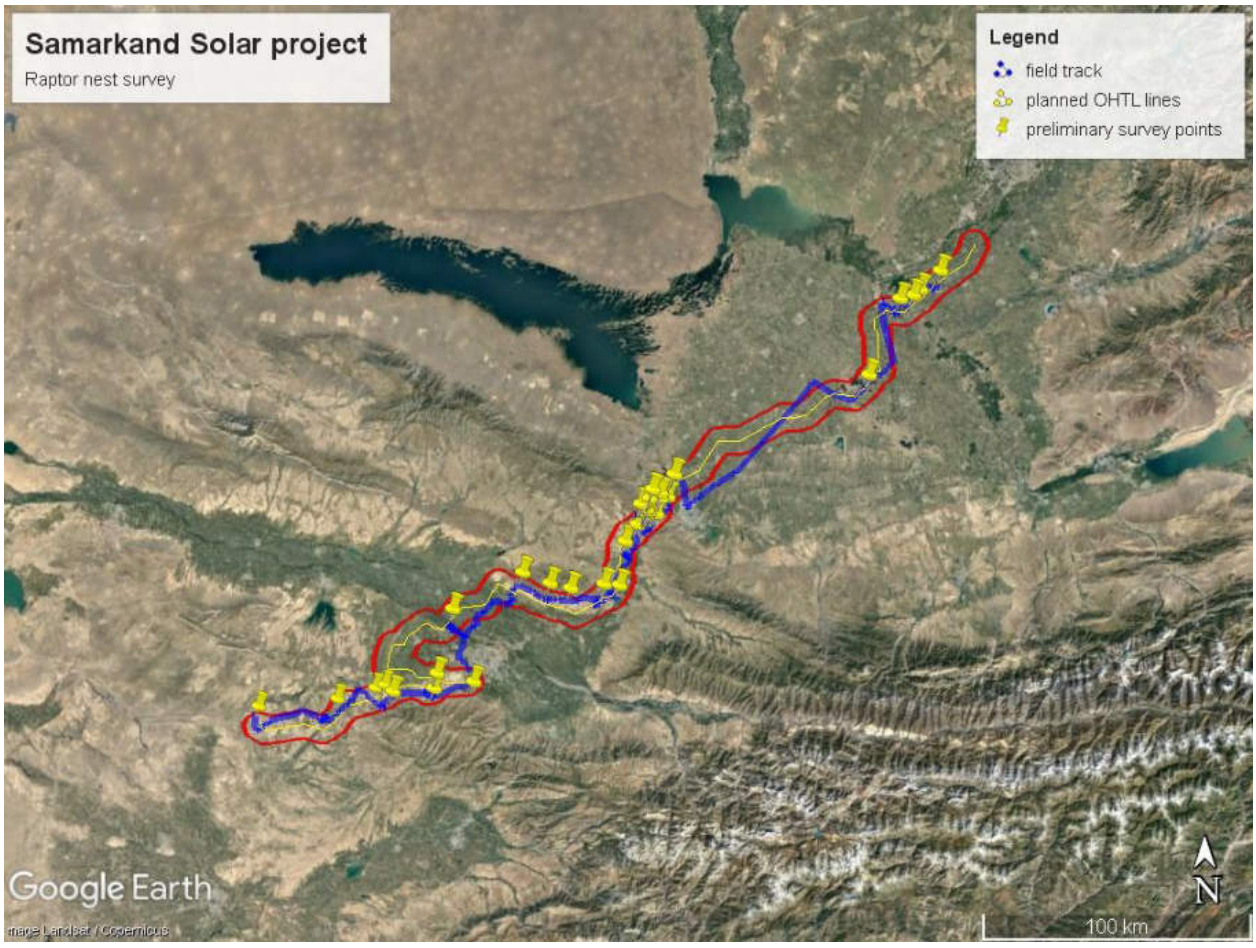

Figure 2: Preliminary 34 survey point locations in potential breeding habitat

Optical instruments – binoculars Nikon x8, telescope x60 Swarowski and laser rangefinder, compass were used. Birds were registered 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 in raptor nest search and monitoring.

Table 1: The checklist of breeding raptors for the surveyed area

№	Species	Common name	IUCN status	Uzbek Red Databook (2019)
1	*Falco cherrug*	Saker Falcon	EN	EN
2	*Falco peregrinus pelegrinoides*	Barbary falcon	LC	VU
3	*Falco subbuteo*	Hobby	LC	not listed
4	*Falco naumanni*	Lesser Kestrel	LC	NT
5	*Falco tinnunculus*	Common Kestrel	LC	not listed
6	*Aquila chrysaetos*	Golden Eagle	LC	2 (VU:R)
7	*Neophron percnopterus*	Egyptian Vulture	EN	2 (VU:D)
8	*Aegypius monachus*	Cinereous Vulture	NT	3 (NT)
9	*Gyps fulvus*	Eurasian Griffon	NT	2 (VU:D)
10	*Circaetus gallicus*	Short-toed Snake-Eagle	LC	2 (VU:D)
11	*Circus aeruginosus*	Eurasian Marsh-Harrier	LC	not listed
12	*Accipiter badius*	Shikra	LC	not listed
13	*Accipiter nisus*	Eurasian Sparrowhawk	LC	not listed
14	*Buteo rufinus*	Long-legged Buzzard	LC	not listed
15	*Bubo bubo*	Eurasian eagle-owl	LC	not listed
16	*Athene noctua*	Little owl	LC	not listed
17	*Otus scops*	Eurasian scops owl	LC	not listed
18	*Otus brucei*	Pallid scops owl	LC	not listed
Other species				
15	*Ciconia ciconia*	White Stork	LC	not listed

Data Recording Methods

The following data was recorded on the survey forms:

- The location of survey point (coordinates in DD format)
- Date of survey
- Start time
- Weather condition: wind (0-4), wind haze (0-4)
- Surveyor name
- Biotope
- Species
- Distance (m) for each nest from observer
- Bearing (°) for each nest
- Behaviour (displaying, flying, standing, et al.)
- Notes

Weather

In general, the weather conditions during the survey period were suitable for bird survey.

Time schedule

The surveys were conducted in April 26-28, March 2024 (Figure 3).

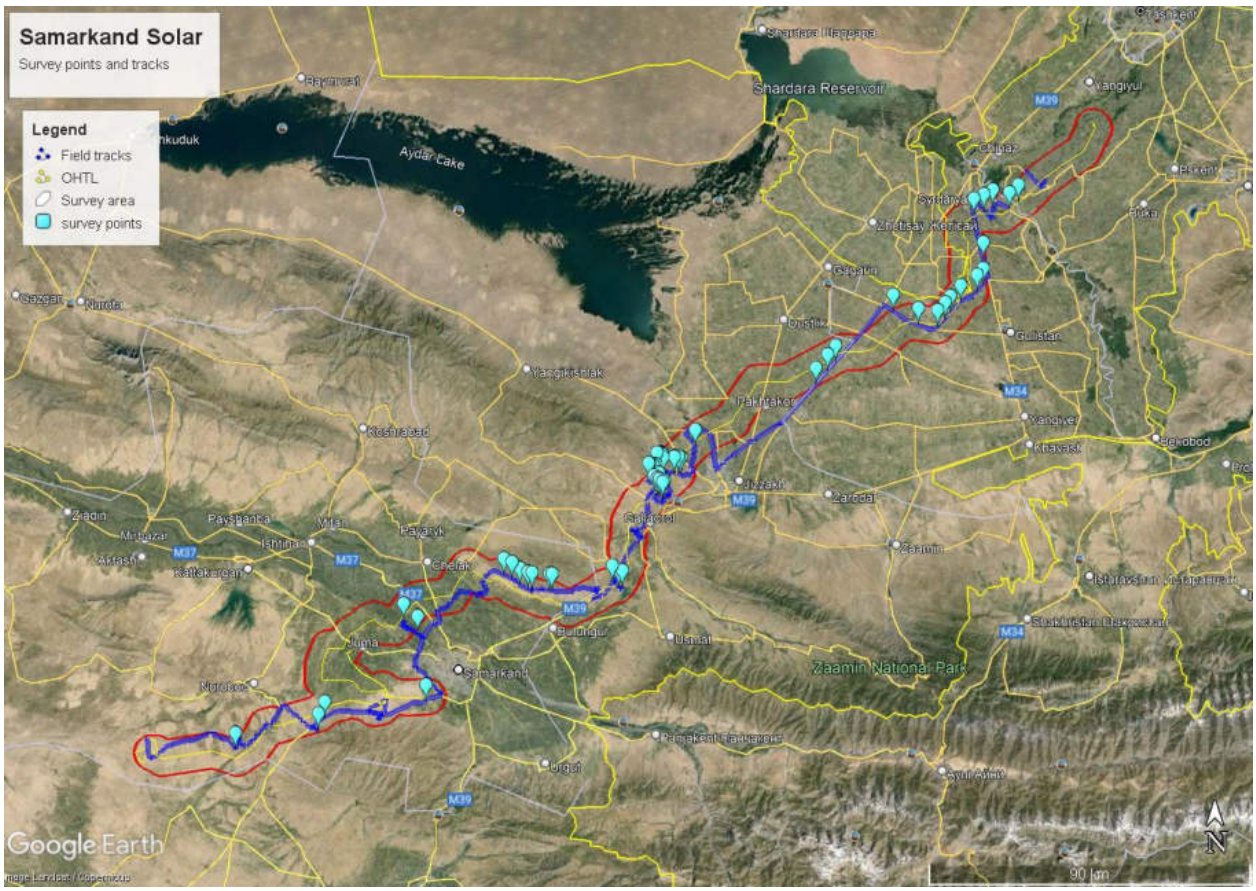

Figure 3: Field survey tracks

3. RESULTS

In total of 15 bird species were observed, 2 listed in the Red Book of Uzbekistan (2019), 6 are included in the IUCN Red List (2023-1) (Table 2).

Table 2: List of birds observed during the Raptor nest survey 2024.

N	Species name	Common name	IUCN status	Uzbekistan Red Data Book (2019)
1	Nycticorax nycticorax	Black-crowned Night Heron		
2	Egretta garzetta	Little Egret		VU:D
3	Ciconia ciconia	White Stork		NT
4	Plegadis falcinellus	Glossy Ibis		VU:D
5	Falco tinnunculus	Common Kestrel		
6	Falco subbuteo	Eurasian Hobby		
7	Aegypius monachus	Cinereous Vulture	NT	NT
8	Neophron percnopterus	Egyptian Vulture	EN	VU:D
9	Buteo rufinus	Long-legged Buzzard		
10	Aquila chrysaetos	Golden Eagle		VU:R
11	Coracias garrulus	European Roller		
12	Merops apiaster	European Bee-eater		
13	Pica pica	Eurasian Magpie		
14	Corvus frugilegus	Rook		
15	Corvus corax	Common Raven		

During the surveys, **the only 2 active raptors nests were found** (Table 3,).

1. Golden Eagle (Aquila chrysaetos) (UzRDB VU). One individual was observed sitting in a nest on a rock at point 35. Later 2 flying Golden eagles were observed in this area. The active nest is located in 2,8 km from planned OHTL line (350 km).
2. Long-legged Buzzard (Buteo rufinus): One individual was observed sitting in a nest on a rock at point 33. This nest is located in 3.9 km from planned OHTL line (350 km). Several old nests, potentially former buzzard nests, were also noted at points 26, 28, and 32.

Around 166 nests of White storks were observed on existing OHTL and powerlines in Samarkand, Jizzakh and Syrdarya regions.

Table 3: Field data: observations, nest and bird species records.

Point	N	E	Date	Species	Common name	Status	number	Activity	Nest	Distance to the nest from observer	Azimuth to the nest
1	39.442348	66.251825	2024-04-26	Corvus corax	Common Raven		1	resident	nest on TL with 2 chicks	220	180
2	39.49444	66.342812	2024-04-26	Egretta garzetta	Little Egret	UzRDB NT	1	feeding on the channel	no nests		0
3	39.495672	66.523439	2024-04-26	observation point			0		not suitable breeding habitat		0
4	39.52562	66.54422	2024-04-26	observation point			0		not suitable breeding habitat		0
5	39.522936	66.718856	2024-04-26	observation point			0		not suitable breeding habitat		0
6	39.571127	66.873747	2024-04-27	observation point			0		not suitable breeding habitat		0
7	39.74273	66.845033	2024-04-26	Egretta garzetta	Little Egret	UzRDB NT	3		Colony	outside from survey area	0
8	39.74273	66.845033	2024-04-26	Nycticorax nycticorax	Black-crowned night heron		10		Colony	outside from survey area	0

9	39.900577	67.095023	2024-04-27	observation point			0		not suitable breeding habitat		0
10	39.889338	67.126028	2024-04-27	observation point			0		not suitable breeding habitat		0
11	39.880292	67.15279	2024-04-27	observation point			0		not suitable breeding habitat		0
12	39.855762	67.204655	2024-04-27	observation point			0		not suitable breeding habitat		0
13	39.773843	66.799107	2024-04-26	Ciconia ciconia	White stork		0	birds in the nest	16 nests in 1 km buffer		0
14	39.854631	67.218295	2024-04-27	Columba palumbus			1		no nests		0
15	39.851648	67.274537	2024-04-27	Pica pica	Magpie		0	no birds	nest on tree		0
16	39.851415	67.283258	2024-04-27	Falco subbuteo	Hobby		1	sitting on the ground	no nests		0
17	39.872386	67.479377	2024-04-27	Corvus frugilegus	Rook		0	Colony aroung 200 nests along road	no nests		0
18	39.86045	67.500778	2024-04-27	Merops apiaster	European Bee-eater		0		no nests		0
19	40.08971	67.670049	2024-04-27	observation point			0		not suitable breeding habitat		0
20	40.085197	67.649208	2024-04-27	observation point			0		old nest of Long legged buzzard	140	88
21	40.081333	67.644448	2024-04-27	observation point			0		no nests		0

22	40.088548	67.63338	2024-04-27	old nest			0		potentially former Long legged buzzard's nest	55	96
24	40.090135	67.631352	2024-04-27	old nest			0		potentially former Long legged buzzard's nest	200	23
25	40.090595	67.626462	2024-04-27	Falco tinnunculus	Common Kestrel		1	breeding	nest	178	346
26	40.103543	67.631613	2024-04-27	observation point			0		not suitable breeding habitat		0
27	40.097517	67.615397	2024-04-27	observation point			0		not suitable breeding habitat		0
28	40.125587	67.62115	2024-04-27	Neophron percnopterus	Egyptian Vulture	IUCN EN UzRDB 2 VU:D	1	in flight	known nest in 11 km from project site outside of the survey area		0
29	40.12232	67.612993	2024-04-27	Corvus corax	Common Raven		2		2 chicks in the nest	201	137
30	40.088548	67.63338	2024-04-27	old nest			0		potentially former Long legged buzzard's nest	55	102
31	40.12726	67.600872	2024-04-27	old nest			0		potentially former Raven's nest	166	107
32	40.128363	67.598475	2024-04-27	Buteo rufinus	Long-legged buzzard		1	sitting in the nest	nest on the rock	256	65

33	40.142963	67.645465	2024-04-28	Aquila chrysaetos	Golden Eagle	UzRDB VU	1	sitting in the nest	nest on the rock	600	9
34	40.149135	67.645287	2024-04-28	two old nest			0		potentially former Golden Eagle's nest		0
35	40.151588	67.642532	2024-04-28	observation point			0		no nests		0
36	40.153475	67.640673	2024-04-28	observation point			0		no nests		0
37	40.12726	67.600872	2024-04-27	old nest			0		potentially former Long legged buzzard's nest	160	106
38	40.15631	67.637593	2024-04-28	Aegypius monachus	Cinereous Vulture		1	in flight	no nests		0
39	40.154617	67.625888	2024-04-28	roosting			0		no nests or birds		0
40	40.143888	67.682013	2024-04-28	Corvus corax	Common Raven		15		no nests		0
41	40.147082	67.679085	2024-04-28	observation point			0		no nests		0
42	40.1445	67.69234	2024-04-28	observation point			0		not suitable breeding habitat		0
43	40.144875	67.696377	2024-04-28	observation point			0		no nests		0
44	40.142736	67.704225	2024-04-28	observation point			0		no nests		0
45	40.211277	67.751503	2024-04-28	Coracias garrulus	European Roller		0		no nests		0
45	40.211277	67.751503	2024-04-28	Merops apiaster	European Bee-eater		0		no nests		0
46	40.365375	68.14945	2024-04-28	Ciconia ciconia	White Stork	UzRDB NT	2		1 active nest		0
47	40.399263	68.18805	2024-04-28	Ciconia ciconia	White Stork	UzRDB NT	0		20 active nests		0
49	40.421376	68.214297	2024-04-28	Ciconia ciconia	White Stork	UzRDB NT	0		13 active nests		0

49	40.547869	68.406946	2024-04-28	Ciconia ciconia	White Stork	UzRDB NT	0		18 active nests		0
50	40.513109	68.489268	2024-04-28	Ciconia ciconia	White Stork	UzRDB NT	0		14 active nests		0
51	40.507931	68.553177	2024-04-28	Plegadis falcinellus	Glossy Ibis	UzRDB VU	15		no nests		0
52	40.527426	68.578489	2024-04-28	Ciconia ciconia	White Stork	UzRDB NT	0		5 active nests		0
53	40.543017	68.596487	2024-04-28	Plegadis falcinellus	Glossy Ibis	UzRDB VU	4		no nests		0
54	40.569873	68.630987	2024-04-28	Ciconia ciconia	White Stork	UzRDB NT	0		11 active nests		0
55	40.595617	68.686163	2024-04-28	Ciconia ciconia	White Stork	UzRDB NT	0		6 active nests		0
56	40.611657	68.706256	2024-04-28	Ciconia ciconia	White Stork	UzRDB NT	0		10 active nests		0
57	40.677397	68.708519	2024-04-28	Ciconia ciconia	White Stork	UzRDB NT	0		2 active nests		0
58	40.787932	68.679307	2024-04-28	Ciconia ciconia	White Stork	UzRDB NT	0		15 active nests		0
59	40.798573	68.712754	2024-04-28	Ciconia ciconia	White Stork	UzRDB NT	0		1 active nest		0
60	40.809434	68.742944	2024-04-28	Ciconia ciconia	White Stork	UzRDB NT	0		1 active nest		0
61	40.80262	68.797995	2024-04-28	Ciconia ciconia	White Stork	UzRDB NT	0		32 active nests		0
62	40.821658	68.829386	2024-04-28	Ciconia ciconia	White Stork	UzRDB NT	0		6 active nests		0

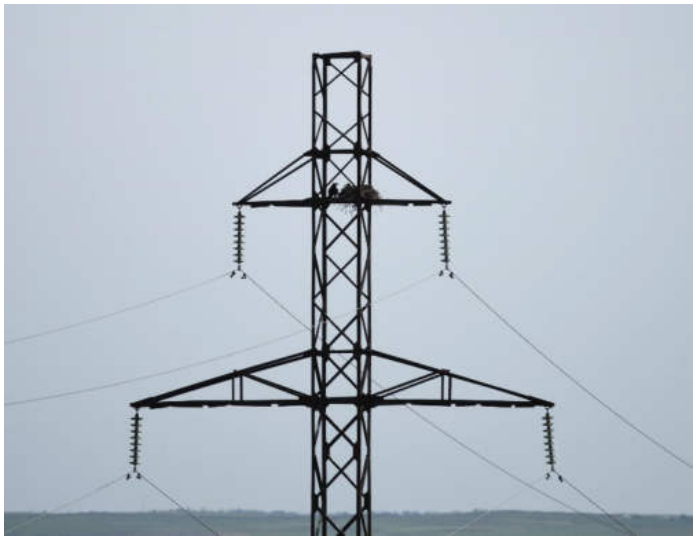

Figure 4: Raven's nest with 2 chicks (N39.442348 E66.251825; 26April, 2024). Photo by Soldatov V.

Figure 5: Overview on point 10 – no nest was found

Figure 6: Suitable breeding habitat at point 30 – no nest found

Figure 7: Old nest (potentially Long legged buzzard) (point 26 - April 27, 2024)

Figure 8: Old nest (Point 28 – April 27, 2024)

Figure 9: Active nest of Raven with two chicks (Point 38 – April 27, 2024)

Figure 10: Long legged buzzard in the nest (neat point 33 - 27.04.2024)

Figure 11: Cinereous Vulture

Figure 12: Two old nests of Golden Eagle (point 35 – April 28, 2024)

Figure 13: Active nest of Golden Eagle (point 35 – April 28, 2024)

Figure 14: Colony with Rollers and European Bee-eaters (near point 37, April 28, 2024)

Figure 15: Active nests of White storks on poles of TL in Syrdarya and Jizzakh regions

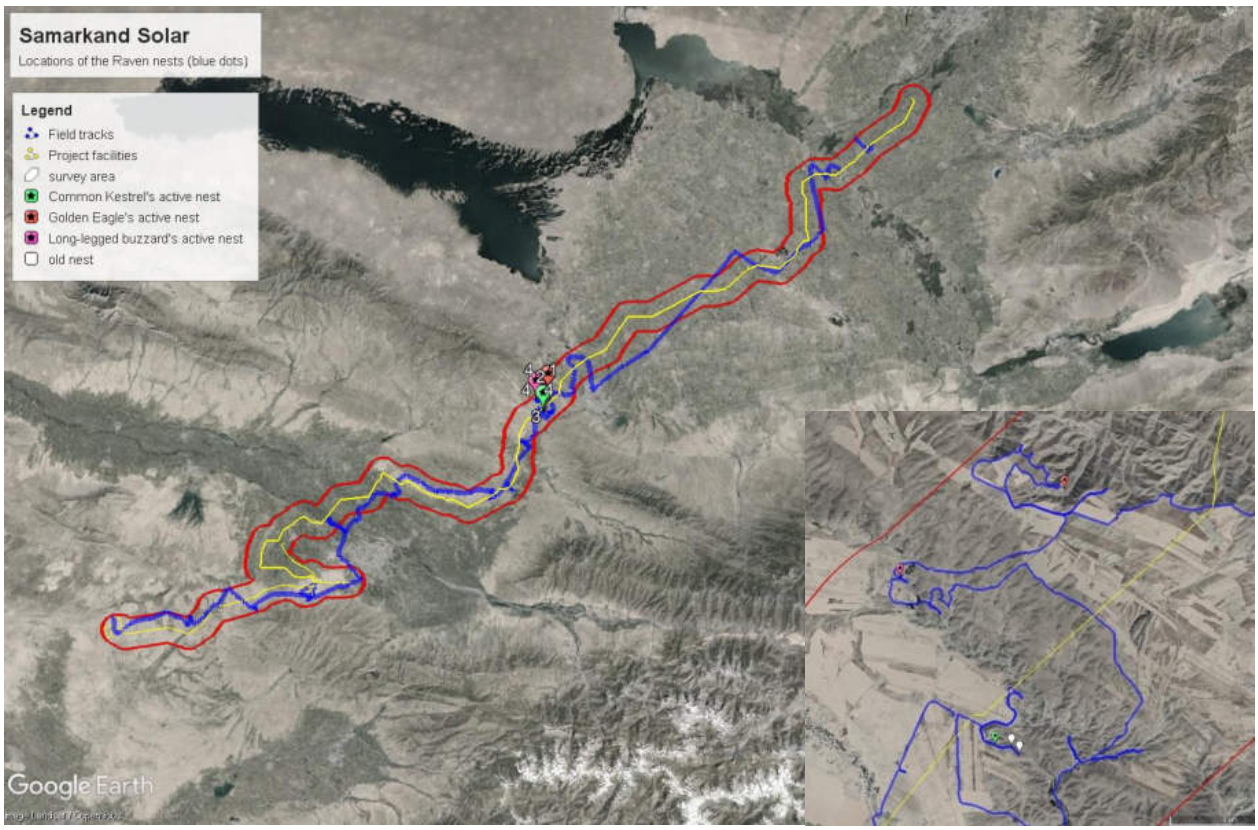

Figure 16: Raptor nests locations

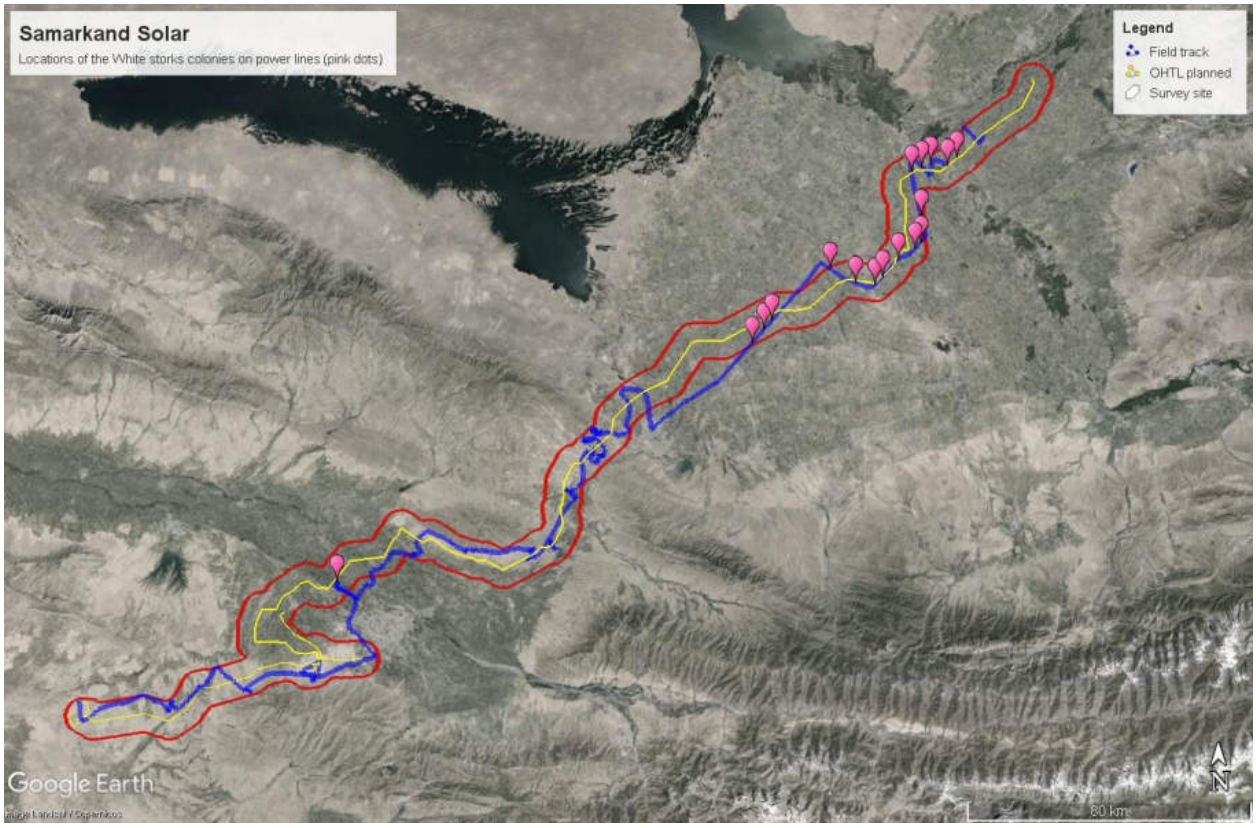

Figure 17: Locations of white stork's colonies

4. Summary

During surveys next raptor species were found along main facilities and OHTL lines:

1. Golden Eagle *Aquila chrysaetus* (Uzbekistan Red data book – 2VU) - 1 active nest,
2. Long legged buzzard *Buteo rufinus* - 1 active nest,
3. Common kestrel *Falco tinnunculus* - 1 active nest.

The identification of active nests, particularly of the Golden Eagle, highlights the importance of preserving suitable nesting habitats along the planned OHTL route. However, it's important to note that these species are located far from the project area and will not be directly impacted by the project.

The abundance of White Stork nests indicates the significance of existing powerline structures as nesting sites for this species. While these nests will not be directly impacted by the project, their presence underscores the importance of considering existing infrastructure in conservation planning efforts.

Overall, the survey findings contribute to a better understanding of avian biodiversity in the project area and provide valuable information for guiding conservation efforts and mitigating potential adverse impacts on bird populations during project implementation.

Contact Us

Phone: +998 78 202 0440

Email: info@juru.org

Website: www.juru.org

Bird survey report 2024: Great bustard and wintering bird survey

Environmental and Social Impact Assessment (ESIA) for the development of a solar power project in Samarkand Region, Uzbekistan

Client: 5Capitals

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1. Introduction

In accordance with the Resolutions of the President of the Republic of Uzbekistan No. PP-207 dated July 4, 2023, "On measures for the implementation of the investment project 'Construction of a 500 MW Solar Photovoltaic Power Station, a 334 MW Electric Energy Storage System, and a Substation to support its operation in the Nurabad District of the Samarkand Region — Sazagan Solar 1'," and No. PP-208 dated July 4, 2023, "On measures for the implementation of the investment project 'Construction of a 500 MW Solar Photovoltaic Power Station, a 334 MW Electric Energy Storage System, and a Substation to support its operation in the Nurabad District of the Samarkand Region — Sazagan Solar 2'," investment agreements were signed on April 19, 2023, between the Ministry of Investments, Industry, and Trade of the Republic of Uzbekistan, the company "ACWA Power Company" (Investor), and the companies "ACWA Power Sazagan Solar 1" and "ACWA Power Sazagan Solar 2" (hereinafter referred to as the "Project Companies") (Figure 1).

Under the aforementioned investment agreements, the Project Companies are implementing the projects "Sazagan Solar 1" and "Sazagan Solar 2," within which three solar photovoltaic power stations with a total capacity of 1000 MW and a substation with a capacity of 500/220 kV will be constructed in the Nurabad District of the Samarkand Region. Additionally, two energy storage systems will be built — one in the Nurabad District of the Samarkand Region and another in the Karakul District of the Bukhara Region. Furthermore, two parallel overhead power transmission lines with a voltage of 220 kV and a length of 70 km will be constructed to connect the main project facilities. 360 km overhead transmission line will also connect stations located in Samarkand region with the Khalka substation, located in Tashkent region.

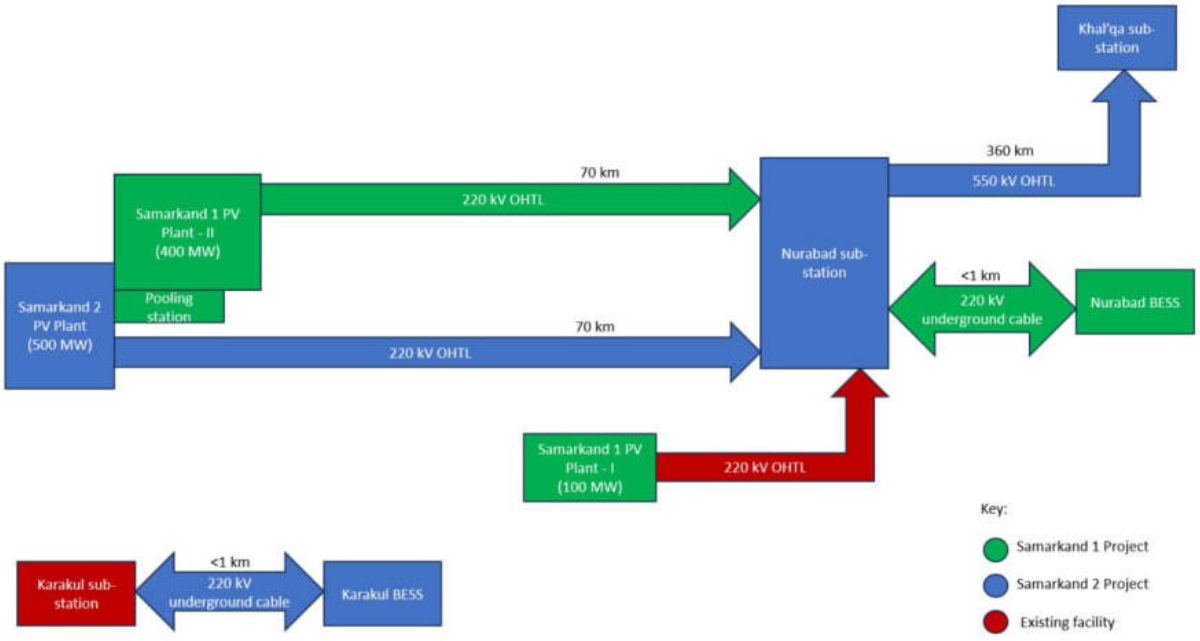

Figure 1: The scheme of project sites

As part of the Environmental and Social Impact Assessment (ESIA), biodiversity baseline surveys are needed to validate assumed status as well as fill any information gaps. The Environmental and Social Impact Assessment process might further identify the need for the project to undergo a Critical Habitat Assessment (CHA) to meet international lender requirements.

OHTL can cause fatal collisions of birds in certain heavy-bodied (high wing-loading) birds, sometimes referred to as “poor flyers”. In the case of the Samarkand OHTLs, collision risk for bustards, and especially wintering Great bustards will be a prime concern, but collision risk could also be significant for other bustards, cranes, and certain other sensitive water bird species that migrate. Furthermore,

OHTL can cause electrocutions of raptors, vultures, and other large birds that tend to perch and/or nest on towers, particularly if pylons are constructed with hazardous designs and sited in high-risk areas.

The report presents data and materials from both field and desktop bird surveys on wintering Great Bustard (Otis tarda IUCN EN) and other wintering species.

This report details the findings of the 2024 winter survey period, which included transect surveys conducted between January 6 –February 13 2024.

2. Materials and methods

The Great Bustard (*Otis tarda* Linnaeus 1758) is a rare species listed in the Red Data Book of Uzbekistan[1] with status 1 (CR) – critically endangered, a migratory European subspecies. It is included in the IUCN Red List as endangered (EN) (BirdLife 2022[2]) .

Historically, the species' breeding range extended across the Eurasian steppes, from Portugal all the way to the Pacific coast of Russia and the Korean Peninsula (Kessler 2022, Kessler and Batbayar 2023). Despite occupying a large proportion of the species' range, the population in Central Asia now only represents 1% of the global population (Kessler 2022). These declines have been accompanied by a range contraction, due to the disappearance of smaller populations across the species' range, as recently highlighted in Keller et al. (2020). 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). Southern Central Asian breeding grounds in southern and south-eastern Kazakhstan, and areas in Uzbekistan, however, still serve as staging grounds and sometimes as overwintering sites, and these currently hold the largest numbers of Great Bustards during migration (Kessler 2022).

Two revised estimates of the global population were published in 2022. Alonso and Palacín (2022) collated national estimates from across the species' range, producing a total of 30,693–35,402 birds. Kessler (2022) did the same but included the results of more recent surveys in Asia and elsewhere, reporting a total of 29,060–32,449 birds. Combining these sources by using the most recent national estimates from them both, and an even more recent estimate from Morocco (Alonso et al. 2023), yields a figure of 29,638–33,027, rounded to a range of 29,600-33,000.

Historically, Great Bustards in Kazakhstan and Tajikistan used to migrate southwards, to Uzbekistan, Turkmenistan, Afghanistan, and Pakistan for wintering (Bostanjoglo 1911; Gubin 2010). Prior to the development of Kazakhstan's virgin lands, the Great Bustard was mainly a passage bird in Uzbekistan, with smaller numbers staying in the country for the winter and on very rare occasions – to breed in steppe areas (Meklenburtsev 1990). As the steppes in Jizzakh, Tashkent, and Syrdarya regions of Uzbekistan had been developed, the species completely stopped breeding there (Meklenburtsev 1990; Kreuzberg-Mukhina 2003). In the 1970s and 1980s, individual passage birds were recorded in Uzbekistan (Meklenburtsev 1990). That period, when the development of agriculture peaked in the USSR, proved to be the most critical for the Great Bustard (Kashkarov et al. 2022). R. Meklenburtsev (1990) associated the decrease in the numbers of the Great Bustard in wintering grounds in Uzbekistan with a sharp decline in the Great Bustard population in Kazakhstan and its disappearance from Tajikistan. After the disintegration of the Soviet Union and changes in the land use system in

[1] Uzbekistan Red data book. Vol.II. Animals. Tashkent: Chinor ENK, 2019

[2] BirdLife International. 2023. Otis tarda. The IUCN Red List of Threatened Species 2023: e.T22691900A226280431. https://dx.doi.org/10.2305/IUCN.UK.2023-1.RLTS.T22691900A226280431.en. Accessed on 29 December 2023.

Kazakhstan, when a large portion of developed steppe territories became neglected, the situation changed somewhat for the better (Berezovikov et al. 2002). Based on her personal records and interviews with hunters, rangers, and colleagues, E. Kreuzberg-Mukhina (2003) came to the conclusion that the numbers of migrating and wintering Great Bustards in Uzbekistan have increased slightly in recent decades. The modern data on the distribution of Great Bustards in Uzbekistan during migration and in winter are very scarce and comprise rare and occasional records or oral reports from hunters. These data were brought together in a paper on the specification of the Great Bustard's status in Uzbekistan completed by Kashkarov et al. (2022). These studies have shown that the area of land suitable for the habitation of the species has decreased more than 15 times.

Figure 2: Global area of the Great bustard (resource: IUCN Red list https://www.iucnredlist.org/species/22691900/226280431#geographic-range)

No special census of the Great Bustard has been made in the country in recent decades (Kreuzberg-Mukhina 2003; Kashkarov et al. 2022). Only in 2019, with the support of the Eurasian Bustard Alliance, probably, the first targeted survey of Great Bustards was conducted, which confirmed them wintering in the foothills of the Pistalitau Range area (Forish District, Jizzakh region) (Ten et al. 2020[3]).

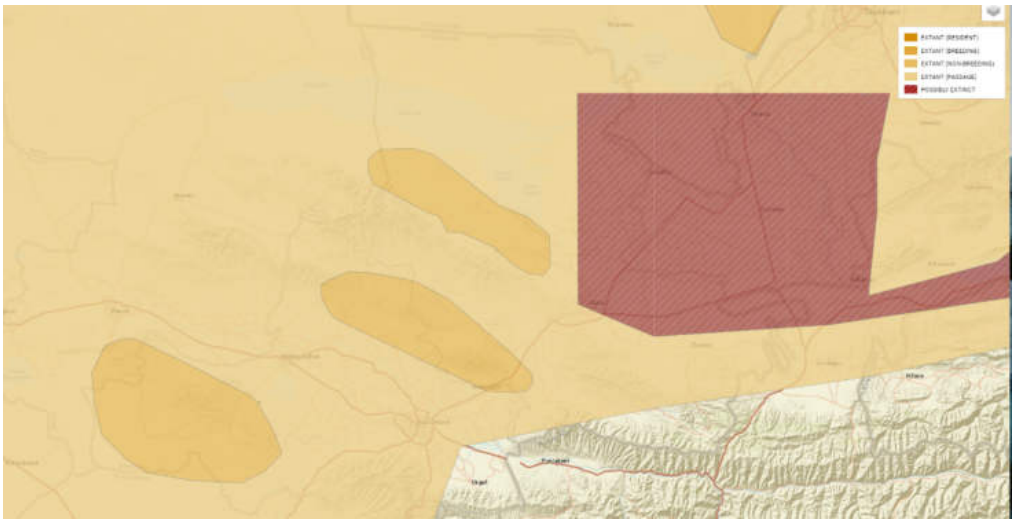

Figure 3: The potential area of wintering Great bustards near OHTL line (resource: IUCN Red list https://www.iucnredlist.org/species/22691900/226280431#geographic-range)

[3] Ten A.G., Tulayev J.A., Soldatov V.A., Khaydarov A. (2020). Wintering grounds of Great Bustard Otis tarda in the Jizzakh region and threats // Zoological science of Uzbekistan: modern problems and development prospects. Materials of II national science conf., 281-283. Tashkent, Uzbekistan: FAN publishing house (in Russian with English summary).

Surveys in Jizzakh, Samarkand, Kashkadarya, and, partially, Bukhara regions conducted in winters 2019-2020 and 2020-2021 (Kashkarov et al., 2022) show that key wintering sites for the Great Bustard species are located in Forish and Gallaaral Districts of Jizzakh region. In these sites we recorded 455 individuals in winter 2020-2021 (Figure 4).

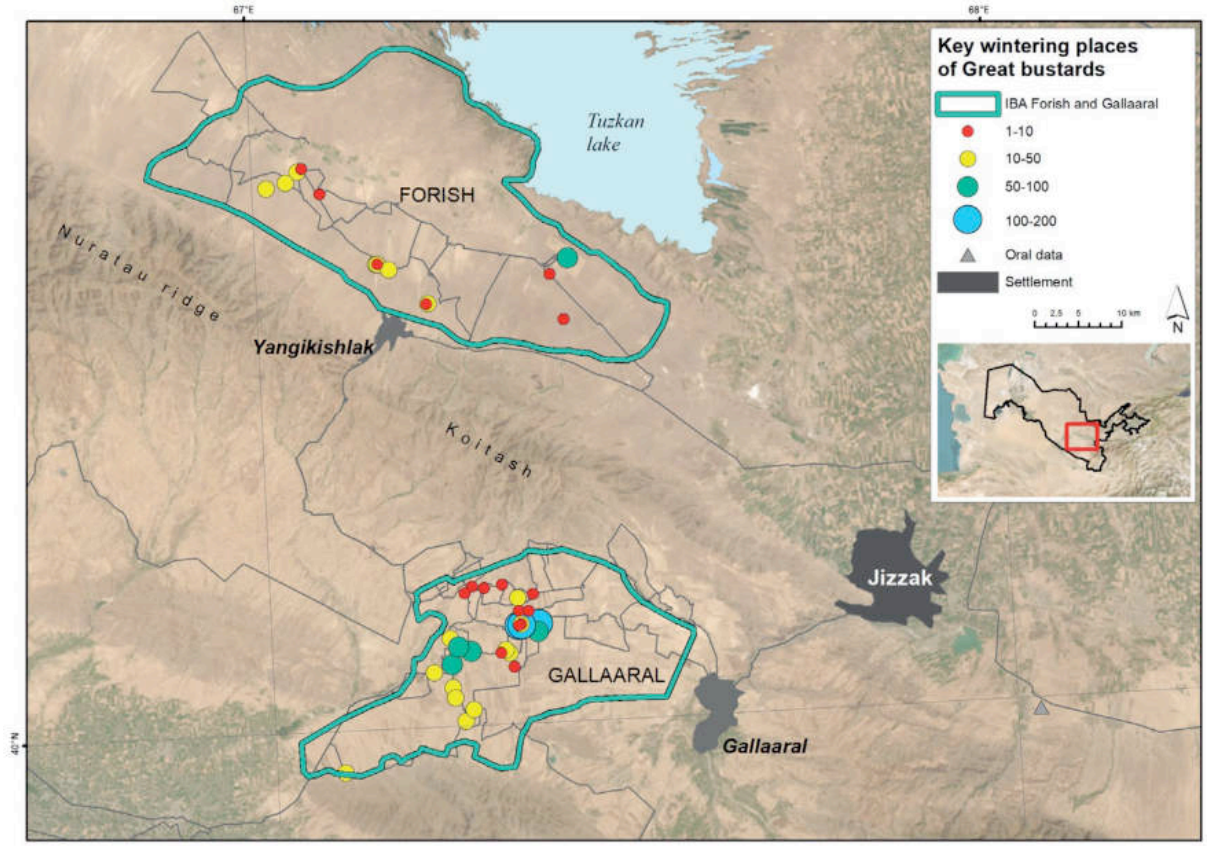

Figure 4: Wintering grounds of the Great bustards (Resource: Kashkarov et al., 2022[4]

The goal of the survey is to monitor wintering population of Great bustards in Gallaaral and check the potential presence of the Great bustards on OHTL lines and additional facilities of Samarkand project (Figure 5).

[4] Kashkarov R. D., Ten A., Mitropolskaya Y. O., Soldatov V. (2023). Changes In The Modern Range Of The Great Bustard Otis Tarda In Uzbekistan Under The Influence Of Agricultural Transformation Of Landscapes And Climate. Geography, Environment, Sustainability, 1(16), 140-149 https://DOI-10.24057/2071-9388-2022-091

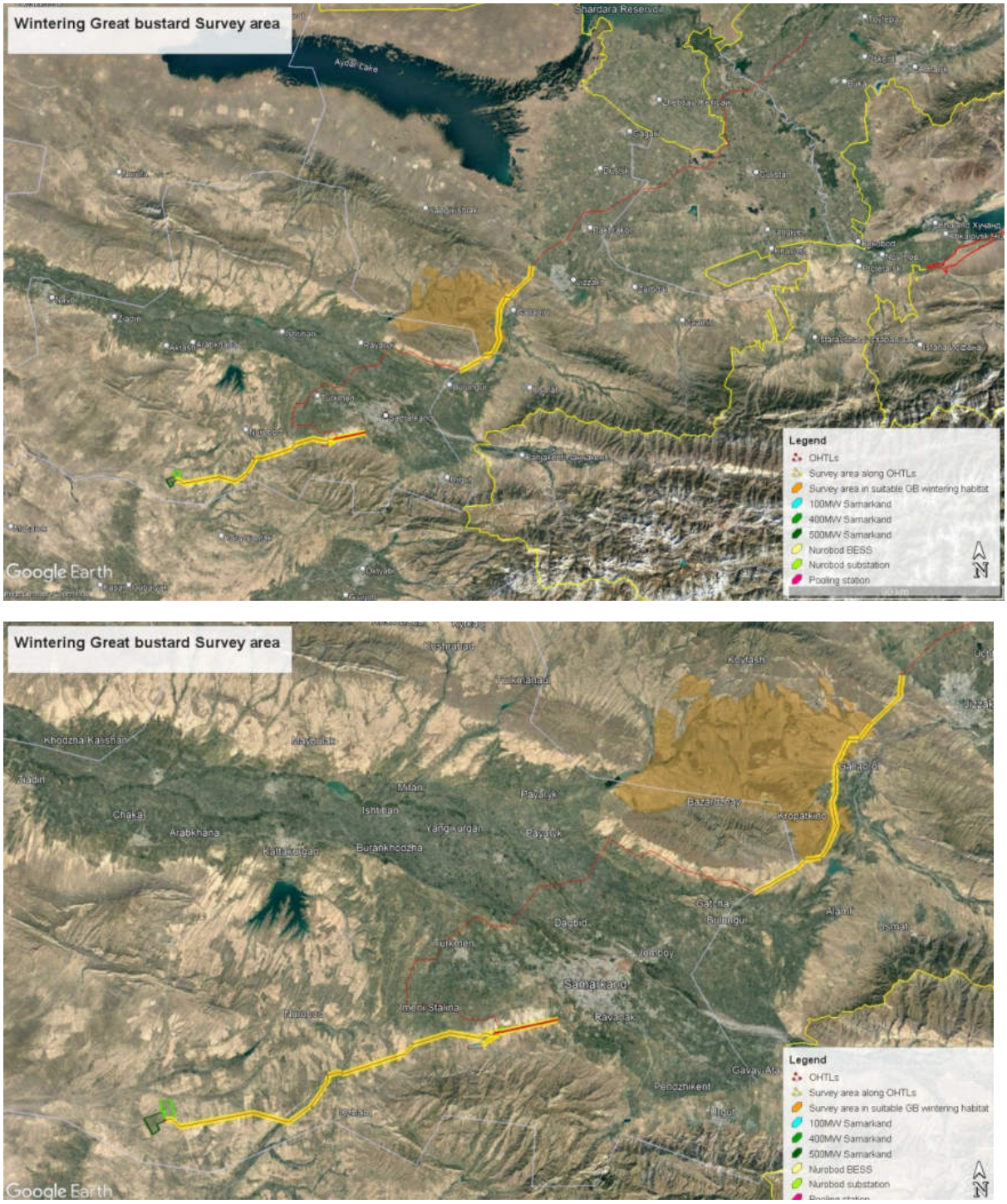

Figure 5: Project facilities and survey area (yellow areas)Figure 5

Figure 5: Project facilities and survey area (yellow areas)

Data Recording Methods

The Great Bustard is a rare species, which is hard to record due to its behavior, extremely low numbers, and fragmented distribution. This is the reason why experts recommend to count its numbers in situ without extrapolation. The survey design was based on the recommendations by Dr. Mimi Kessler (co-chief IUCN Bustard Specialist Group), it was most comprehensively standardized in Spain (Alonso et al. 1990) and is generally applicable across the range of the species.

The field survey of the Great Bustard will be carried out using 2 methods: combine method – auto transect count with regular stops every 1-3 km. In this method, observers will drive through the survey area slowly (max. 30 km/h) with frequent stops (about once every 1-3 km, but this depends on the weather, terrain, density of birds, and vegetation structure). The second method is point count from elevated spots.

It is recommended to identify the social and age composition of the group because these data allow to assess the structure of the population, but also to differentiate groups from each other to prevent the counting of the same groups. However, in 2019–2021, we observed the birds from an average distance of 800-1,000 m, which made it difficult to identify the sex and almost impossible to identify the age.

Weather

In general, the weather conditions during the survey period were suitable for winter bird survey.

Time schedule

Winter surveys were conducted in 3 rounds between January 5- February 13, 2024:

- 5-15 January 2024,
- 27-31 January 2024,
- 10-13 February 2024.

3. Results

This section provides information on the data obtained as a result of the study, focusing on Great bustards and rare species sensitive to adverse impacts from powerlines (collision, electrocution), and species that have Redlist status on the national and/or IUCN global redlists. In total of 9 bird species were observed, 7 listed in the Red Book of Uzbekistan (2019), 7 are included in the IUCN Red List (2023-1) (Table 1).

Table 1: Check list of wintering birds

№	Species	Common name	IUCN RL	UzRDB
1	Anas crecca	Common Teal		
2	Falco cherrug	Saker Falcon	EN	EN
3	Aegypius monachus	Cinereous Vulture	NT	NT
4	Gypaetus barbatus	Bearded Vulture	NT	VU:R
5	Buteo rufinus	Long-legged Buzzard		
6	Aquila nipalensis	Steppe Eagle	EN	VU:D
7	Aquila heliaca	Eastern Imperial Eagle	VU	VU:D
8	Otis tarda	Great Bustard	EN	CR
9	Tetrax tetrax	Little Bustard	NT	VU:D
	Total		7	7

Detailed records of Great Bustards and other bird species can be found in Table 2**Error! Reference source not found.** and Figure 6.

Table 2: The records of Great bustards and other rare species

N	Date	N	E	Species	Number	Note
1	05/01/2024	40.12543	67.285483	Great bustard	3	on the ground
2	05/01/2024	40.126357	67.305677	Great bustard	17	in flight
3	05/01/2024	40.103117	67.336527	Great bustard	8	disturbed from vehicles
4	05/01/2024	40.074328	67.305505	Great bustard	9	flew from car
5	05/01/2024	40.07842	67.271465	Great bustard	15	feeding
6	06/01/2024	40.051677	67.528278	Great bustard	oral data	from herder
7	06/01/2024	40.074472	67.308172	Great bustard	29	feeding
8	06/01/2024	40.082422	67.290633	Great bustard	36	
9	15/01/2024	40.084287	67.264948	Great bustard	4	flew from observers
10	15/01/2024	40.054888	67.514783	Great bustard	8	in flight
11	28/01/2024	39.831352	67.376172	Great bustard	oral data	from herder - he observed 21 GB 10 days ago
12	29/01/2024	40.078668	67.272345	Great bustard	2	
13	29/01/2024	40.083436	67.265403	Great bustard	4	
14	29/01/2024	40.078668	67.272345	Great bustard	2	
15	29/01/2024	40.083436	67.265403	Great bustard	4	
16	10/02/2024	40.123607	67.379157	Great bustard	8	
17	10/02/2024	40.075283	67.28674	Great bustard	9	
18	10/02/2024	40.12342	67.320613	Great bustard	oral data	from herder - he observed GBs
19	10/02/2024	40.123607	67.379157	Great bustard	8	in flight
20	10/02/2024	40.075283	67.28674	Great bustard	9	in flight from east to west
21	11/02/2024	40.12352	67.341135	Great bustard	5	
22	11/02/2024	40.12352	67.341135	Great bustard	5	
23	05/01/2024	40.126357	67.305677	Imperial eagle	1	
24	10/02/2024	40.142223	67.288437	Imperial eagle	1	
25	06/01/2024	40.077132	67.616395	Little bustard	1	
26	27/01/2024	40.0547	67.515517	Little bustard	30	
27	28/01/2024	39.92656	67.519253	Little bustard	50	
28	28/01/2024	39.831352	67.376172	Little bustard	30	
29	28/01/2024	39.856317	67.376575	Little bustard	200	
30	11/02/2024	40.067571	67.48328	Little bustard	1	
31	12/02/2024	40.092632	67.32245	Little bustard	40	
32	10/02/2024	40.123573	67.379001	Long legged buzzard	1	
33	11/02/2024	40.025855	67.648872	Long legged buzzard	1	
34	12/02/2024	40.058642	67.553036	Long legged buzzard	1	

35	10/02/2024	40.081347	67.334845	Merlin	1	
36	10/02/2024	40.126355	67.29168	Saker Falcon	1	
37	11/02/2024	40.092952	67.337545	Saker Falcon	1	
38	28/01/2024	40.143822	67.667618	Steppe Eagle	3	
39	28/01/2024	40.046233	67.57205	Steppe Eagle	4	
40	28/01/2024	39.999267	67.529063	Steppe Eagle	1	
41	10/02/2024	40.07445	67.306928	Steppe Eagle	1	
42	12/02/2024	40.085032	67.416668	Steppe Eagle	1	
43	12/02/2024	40.340812	67.110847	Bearded vulture	1	
44	06/01/2024	40.10373	67.667422	Cinereous vulture	1	
45	28/01/2024	40.143842	67.683333	Cinereous vulture	6	
46	10/02/2024	40.344902	67.112227	Cinereous vulture	2	
47	11/02/2024	40.388985	67.153272	Cinereous vulture	1	
48	11/02/2024	40.386648	67.149408	Cinereous vulture	9	
49	10/02/2024	40.180955	67.150942	Common teal	2	pair
50	05/01/2024	40.097878	67.614093	observation point	0	
51	06/01/2024	40.10373	67.667422	observation point	0	
52	06/01/2024	40.077132	67.616395	observation point	0	
53	06/01/2024	40.058887	67.580227	observation point	0	
54	06/01/2024	40.049405	67.531385	observation point	0	
55	27/01/2024	40.182752	67.26339	observation point	0	
56	27/01/2024	40.139785	67.264213	observation point	0	
57	27/01/2024	40.125538	67.285125	observation point	0	
58	27/01/2024	40.08602	67.335875	observation point	0	
59	20/03/2024	39.431247	66.119518	Great bustard	1	in flight

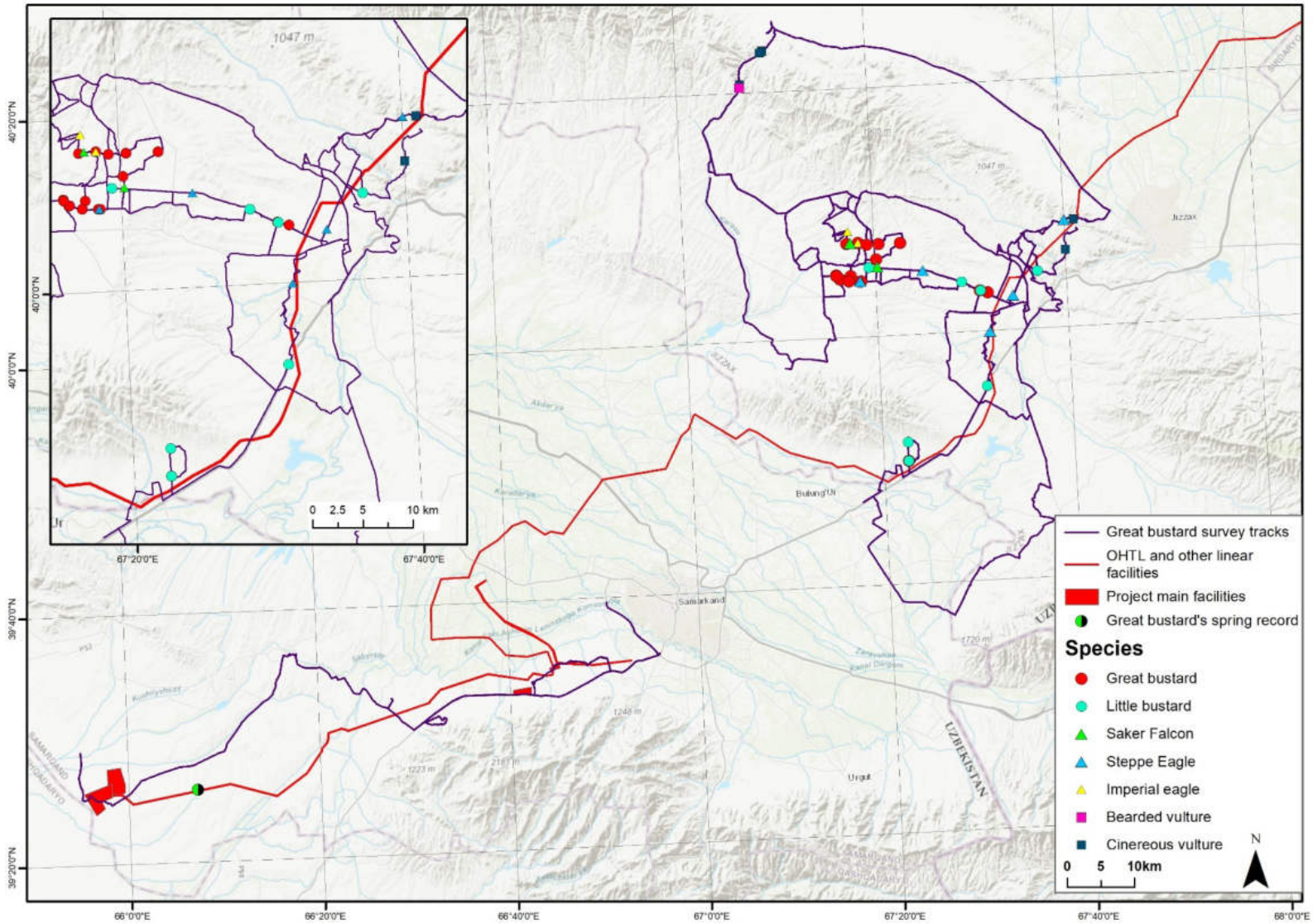

Figure 6: Winter survey tracks and Great bustard and other bird records

4. Key species descriptions

Great bustard (*Otis tarda*) - UzRDB 1(CR), IUCN EN

Status: Critically endangered, migratory European subspecies.

Distribution: In Uzbekistan, on migration they are found on the Usturt plateau, in the South-Western Kyzylkum, the valleys of the Syrdarya, Zeravshan rivers, the lower reaches of the Surkhandarya, Sherabaddarya rivers, in the Golodnaya and Dalverzinskaya steppes, at the foot of the ridge Nuratau (winter in past - nesting). On rainfed fields, in the foothills of the northern part of the Samarkand region the Central Asian population.

The important wintering aggregation was found along OHTL near Gallaaral town in 20200-2021, which was estimated as 450-500 birds[4]. To reduce the impact the route of 360 km OHTL was changed (first option crossed the main wintering site) and now it goes along the border of this site.

Habitats: Foothill plains with tall grass vegetation, semi-deserts, rainfed wheat fields and alfalfa.

During the surveys, 19 sightings of Great Bustards in flocks ranging from 2 to 36 birds were documented. The majority of these sightings occurred in typical wintering habitats near Gallaaral, with only one flock of 8 Great Bustards observed close to the planned OHTL line, approximately 3 km to the west. Additionally, local herders reported sightings of Great Bustards in three separate locations in the surrounding area. During Asian Houbara surveys, started on March 20th, a migrating Great Bustard was sighted near OHTL 70 km. Detailed records of Great Bustards can be found in Table 2**Error! Reference source not found.**.

Figure 7: The Great bustard flock in flight

Little bustard (*Tetrax tetrax*) - UzRDB 2(VU:D), IUCN NT

Status: Vulnerable, decreasing, migratory and wintering species.

Distribution: Breeds in the central and southern regions of Uzbekistan. They regularly winter in the south, flying across the plains regions of the republic. Winters in small numbers in the foothills of Turkestan ridge. On migration it is occasionally found in the flat part of the Samarkand region.

Habitats: Areas of deserts, semi-deserts, foothill plains with sparse herbaceous and shrub vegetation. Winter crops, alfalfa fields (wintering)[Error! Bookmark not defined.].

Little bustard is numerous wintering species in Djizzakh pass. During surveys we observed as single birds and flocks with numbers up to 200 birds. The detailed records of Little Bustards can be found in Table 2**Error! Reference source not found.**.

Figure 8: Little bustard

Saker Falcon (*Falco cherrug)* - IUCN and UzRDB EN

Breeding, migratory, wintering, and locally resident bird.

Spring migration occurs in March.

Nests in low rocky sky islands, on precipitous slopes in river valleys on flatland, in rocky areas, on utility poles and in the mountains up to 2,500 m ASL. May nest on just an empty flat piece of ground, where the eggs are laid right on the surface or in a small hollow; however, much more often occupies the nests of other raptors (Golden Eagle, Long-legged Buzzard, Egyptian Vulture) or ravens, and always uses them when nests on utility poles. Never builds a nest for itself.

The clutch is made in February—April and consists of 3-5 eggs. The female incubates eggs alone, while the male feeds it. The incubation lasts 28 days. Chicks fledge in May—June. Autumn migration lasts from September to November, wintering – from December to February. The diet includes rodents and birds.

We observed 2 single birds Saker Falcon during surveys (Table 2).

Cinereous vulture (*Aegypius monachus*) - UzRDB 2(VU:D); IUCN NT

Status: Classified as near threatened, sedentary, and a mosaic widespread species.

Distribution: The species is found in the Western Tien Shan, Western Pamir-Alai, mountains of Bukantau, and Tamdytau. It is a sedentary species characterized by regular seasonal short-distance migrations. In the Samarkand region, it is found in the foothills and mountainous parts of Zeravshan, Turkestan, and Nurata ridges, including their spurs. It is rare in the western part of the Zeravshan range where it nests, if at all (Bogdanov, 1956; Mitropolsky et al., 1987). The species is regularly seen along the wooded northern slopes of the Turkestan ridge (Abdusalyamov, 1971; Mitropolsky et al., 1987). During the non-breeding period, sightings of vultures in the vicinity of Samarkand and near Samarkand have been reported by N.V. Marmazinskaya (2011) and S.E. Fundukchiev (2018).

Habitats: It primarily occupies the lower and middle mountain belt and feeds on carrion from ungulates.

This species was enough abundant during surveys we observed vultures 5 times as single birds and groups with numbers up to 9 birds (Table 2).

Figure 9: Cinereous vulture

Steppe eagle (*Aquila nipalensis*) - UzRDB 2(VU:D); IUCN EN

Status: Vulnerable, decreasing species. There are two subspecies present in Uzbekistan: the eastern (1) and migratory European (2).

Breeds only in the northern part of the Karakalpak part of the Ustyurt Plateau. Occasional wintering individuals were recorded in the Golodnaya Steppe, near Samarkand, in the Kyzylkum desert, the lower reaches of the Zeravshan and in Kashkadarya and Surkhandarya Provinces. During migration widespread in the lowlands[Error! Bookmark not defined.].

Habitats: lowlands and low mountains. Spring migration: March—April. Autumn migration: September—November. Wintering: December—February. Individual birds or groups of 2-3 individuals are recorded during migration, with up to several hundred individuals observed on some days.

Wintering Steppe eagles was observed 5 times as single birds and groups with numbers up to 4 birds (Table 2).

Eastern Imperial eagle (*Aquila heliaca*) - UzRDB 2(VU:D), IUCN VU

Ustyurt Plateau, northern part of the Kyzylkum desert (breeding). During seasonal migrations occurs throughout Uzbekistan.

Inhabits lowlands and foothills. Spring migration occurs in February—April, when birds fly individually or form groups of up to 15 individuals. Eggs are laid in February—May. The clutch consists of 1-2 eggs. Both parents take part in the incubation, which lasts 43 days. Chicks fledge in July—August. The diet consists of rodents, hedgehogs, tortoises and carrion. Autumn migration: October—November[Error! Bookmark not defined.].

2 single birds were observed during surveys (Table 2).

5. Summary

The survey conducted between January 5 and February 13, 2024 was focused on the Great Bustard (Otis tarda) and some wintering species, assessing their populations in relation to the potential impact of overhead power transmission lines (OHTLs) and other project facilities. Here are the key findings from the results section:

- A total of 9 bird species were observed during the survey.
- 7 species are listed in the Red Book of Uzbekistan (2019), and 7 are included in the IUCN Red List (2023-1).

Great Bustard Sightings:

- 19 sightings of Great Bustards were documented in flocks ranging from 2 to 36 birds.
- The majority of these sightings occurred in typical wintering habitats near Gallaaral.
- One flock of 8 Great Bustards was observed close to the planned OHTL line, approximately 3 km to the west.
- Local herders reported sightings of Great Bustards in three separate locations in the surrounding area.
- During Asian Houbara surveys on March 20th, a migrating Great Bustard was sighted near OHTL, 70 km away.

Other Significant Observations:

- Little Bustards were observed as single birds and in flocks, with numbers up to 200 birds.
- Saker Falcon, Steppe Eagle, Imperial Eagle, Bearded vulture and Cinereous Vulture were also observed during the surveys, highlighting the area's importance for various bird species, especially those sensitive to the impacts of powerlines.

The survey's findings underscore the importance of careful planning and mitigation measures to minimize the impact on these species, particularly the endangered Great Bustard.

6. References

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Contact Us

Phone: +998 78 202 0440

Email: info@juru.org

Website: www.juru.org

Client: 5Capitals

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Juru

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1. Introduction

In accordance with the Resolutions of the President of the Republic of Uzbekistan No. PP-207 dated July 4, 2023, "On measures for the implementation of the investment project 'Construction of a 500 MW Solar Photovoltaic Power Station, a 334 MW Electric Energy Storage System, and a Substation to support its operation in the Nurabad District of the Samarkand Region — Sazagan Solar 1'," and No. PP-208 dated July 4, 2023, "On measures for the implementation of the investment project 'Construction of a 500 MW Solar Photovoltaic Power Station, a 334 MW Electric Energy Storage System, and a Substation to support its operation in the Nurabad District of the Samarkand Region — Sazagan Solar 2'," investment agreements were signed on April 19, 2023, between the Ministry of Investments, Industry, and Trade of the Republic of Uzbekistan, the company "ACWA Power Company" (Investor), and the companies "ACWA Power Sazagan Solar 1" and "ACWA Power Sazagan Solar 2" (hereinafter referred to as the "Project Companies") (Figure 1).

Under the aforementioned investment agreements, the Project Companies are implementing the projects "Sazagan Solar 1" and "Sazagan Solar 2," within which three solar photovoltaic power stations with a total capacity of 1000 MW and a substation with a capacity of 500/220 kV will be constructed in the Nurabad District of the Samarkand Region. Additionally, two energy storage systems will be built — one in the Nurabad District of the Samarkand Region and another in the Karakul District of the Bukhara Region. Furthermore, two parallel overhead power transmission lines with a voltage of 220 kV and a length of 70 km will be constructed to connect the main project facilities. 360 km overhead transmission line will also connect stations located in Samarkand region with the Khalka substation, located in Tashkent region.

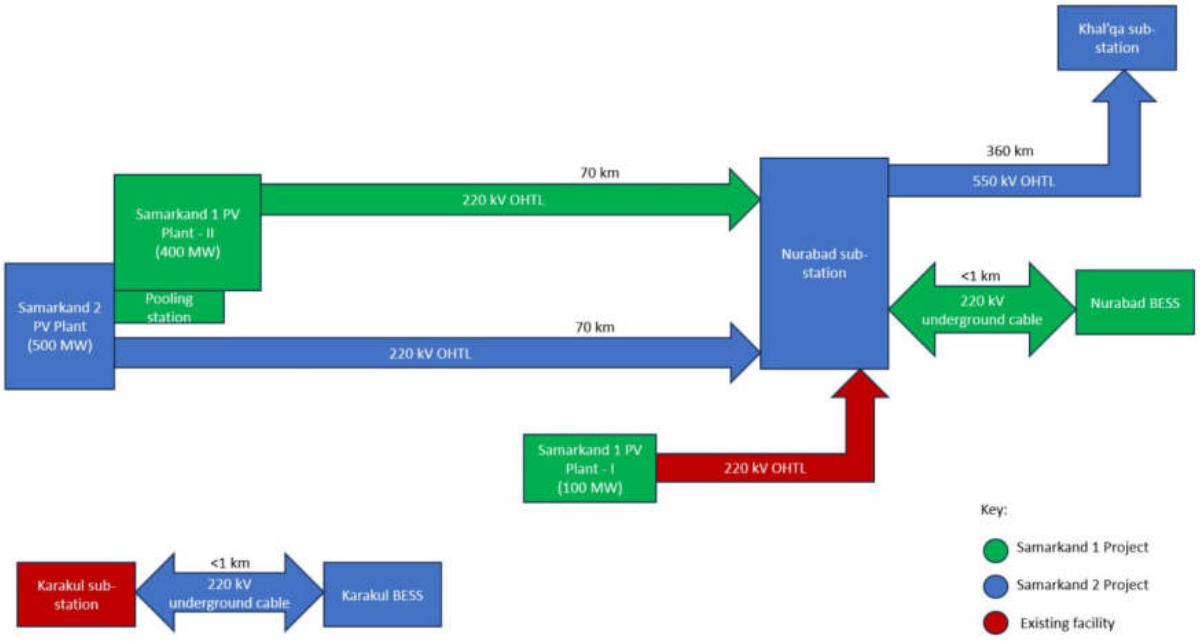

Figure 1: The scheme of project sites

This report details the findings of the 2024 Spring migration survey period, which included VP surveys conducted between February, 28 – May 1, 2024.

2. Materials and methods

Throughout the spring survey period, which extended from February 28 to April 30, 2024, 2-3-hour VP surveys were conducted at each of the 19 points. On an average day, three to four VP surveys were completed, resulting in a total of 20 survey hours over the course of the season.
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 valuable data on their presence, behavior, and abundance.
The information collected through the VP surveys contributes to a broader understanding of bird populations and supports conservation efforts to protect and manage bird species in the region.
The distribution of the VP along project facilities has shown on Figure 2 and covered next project sites:

- VP01-VP14 are locates on OHTL "Nurabad SS-Khalka SS" (360 km),
- VP 15 covered Nurabad SS. Nurabad BESS and Nurabad 100 MW Solar, OHTL 4.9 km
- VP16-17 covered OHTLs "Pooling station – Nurabad SS" (70 km),
- VP18 – covered 400 and 500 MW Solar sites.
- VP19 OHTL LILO 11 km

The OHTL "Nurabad SS-Khalka SS" (360 km), OHTLs "Pooling station – Nurabad SS" (70 km), OHTL 4.9 km, with a total length of 446 km mainly lay on agrolandscape, but the route crosses Syrdarya and Zarafshan rivers, Djizak pass (between Koitash and Malguzar ridges), slopes of Gobduntau mounts, Agalyk plain, foothills near Djam settlement, Karnabchul steppe near Tym settlement (modern Koshrabad). These areas could be important for migrating birds.

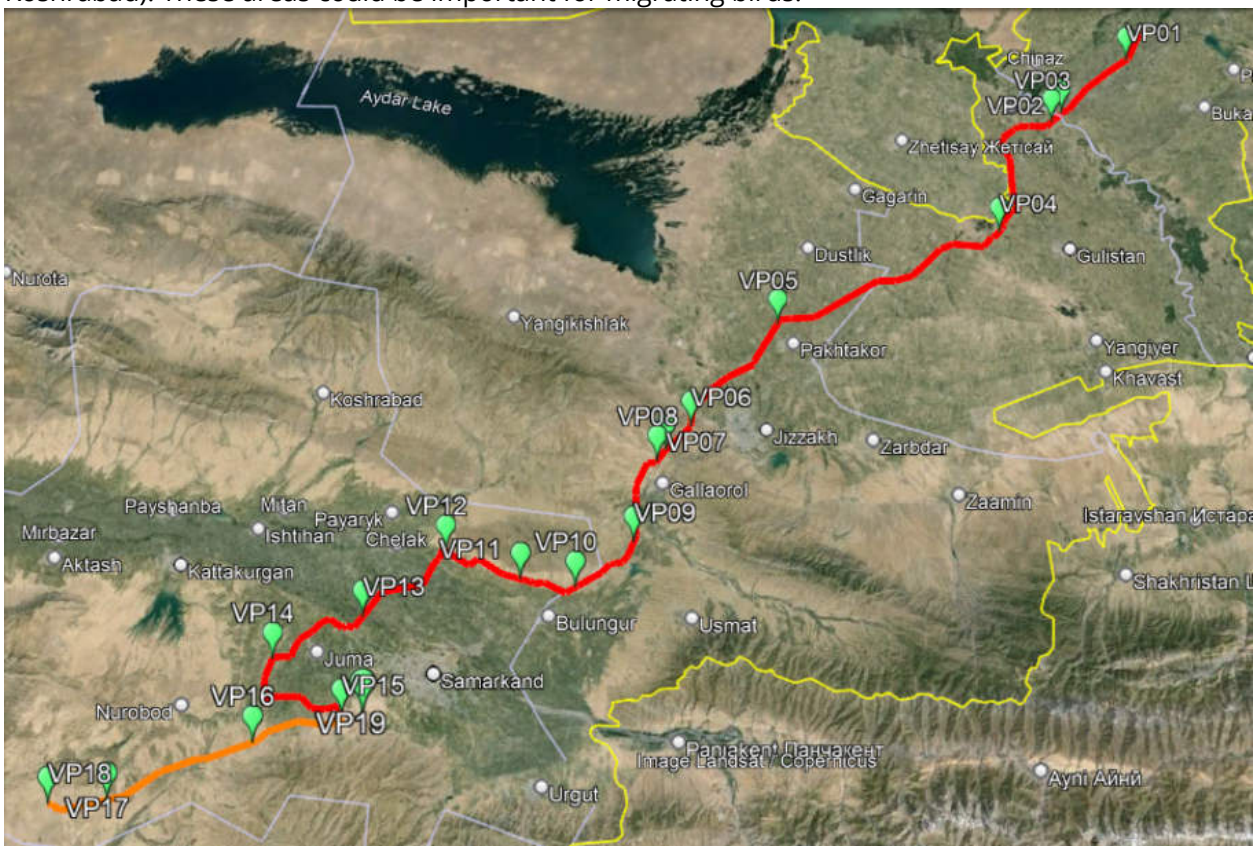

Figure 2: VP locations

Table 1: VP locations

№	VP	Project part	N	E	Location
1	VP01	Nurabad SS-Khalka SS	40.937088	69.033505	Agrolandscape
2	VP02	Nurabad SS-Khalka SS	40.819372	68.826185	Syrdarya river
3	VP03	Nurabad SS-Khalka SS	40.798054	68.79279	Agrolandscape with ponds
4	VP04	Nurabad SS-Khalka SS	40.544184	68.602296	Agrolandscape near ponds
5	VP05	Nurabad SS-Khalka SS	40.361165	67.947682	Agrolandscape
6	VP06	Nurabad SS-Khalka SS	40.144112	67.69065	Djizzak pass-1. Northern slopes of Koitash ridge
7	VP07	Nurabad SS-Khalka SS	40.096298	67.61901	Djizzak pass-2. Rain fed fields
8	VP08	Nurabad SS-Khalka SS	40.072616	67.593899	Djizzak pass-3. Rain fed fields
9	VP09	Nurabad SS-Khalka SS	39.903015	67.523184	Djizzak pass-4. Rain fed fields
10	VP10	Nurabad SS-Khalka SS	39.81531	67.363407	Southern slopes of Gobduntau-1. Rain-fed fields.
11	VP11	Nurabad SS-Khalka SS	39.838152	67.216359	Southern slopes of Gobduntau-2. Gardens
12	VP12	Nurabad SS-Khalka SS	39.904251	67.013635	Southern slopes of Gobduntau-3. Rain-fed fields.
13	VP13	Nurabad SS-Khalka SS	39.776289	66.791105	Riparian vegetation and Zarafshan river
14	VP14	Nurabad SS-Khalka SS	39.69826	66.552972	Agrolandscape
15	VP15	Nurabad SS-Khalka SS	39.577843	66.742028	Sazagan_1. Clay desert
16	VP16	Pooling station-Nurabad SS	39.532496	66.509101	Clay hills with rain fed fields
17	VP17	Pooling station-Nurabad SS	39.431038	66.131799	Djam-1. Clay hills with rain fed fields
18	VP18	Pooling station-Nurabad SS	39.427017	65.976201	Tym. Clay desert. Solar site
19	VP19	Option 11 km - Agalyk plain	39.579068	66.79814	Clayed foothills

Data Recording Methods

The following data is recorded on the survey forms:

- The location of a VP used
- Date of survey
- Surveyor name
- Start and end time of a VP session
- Weather conditions
- Bird species, number,

- For threatened species, including raptors, cranes, geeses and pelicans- time of record,flight altitude and direction

Notes

- Equipment
- The equipment utilized to complete these surveys included:
- Field notebook and writing implements;
- Field survey sheets;
- Weatherproof clipboard;
- Compass / GPS unit;
- Binoculars (at or over 8x magnification);
- Digital camera 300mm;

Weather

In general, the weather conditions during the survey period were suitable for bird observation.

Time schedule

Spring season surveys were conducted between February 28 and April 30, 2024. The following number of days (or hours) was completed during the season:

- 14 VPs (VP01...VP15), 35 days for the OHTL “Nurabad SS-Khalka SS” (360 km), 20 hours per VP per season.
- 1 VP (VP15) for the 4.9 km OHTL, 20 hours per VP per season.
- 3 VPs (VP16...VP18), 7 days for the OHTL "Pooling station – Nurabad SS" (70 km), 20 hours per VP per season.
- 1 VP (VP19) for the OHTL LILO 11 km, 20 hours per season

Table 2: Dates of observations during Spring 2024

DATE	Feb, 28	Feb, 29	Mar, 01	Mar, 02	Mar, 03	Mar, 04	Mar, 05	Mar, 06	Mar, 07	Mar, 08	Mar, 09	Mar, 10	Mar, 11	Mar, 12	Mar, 13	Mar, 14	Mar, 15	Mar, 16	Mar, 17	Mar, 18	Mar, 19	Mar, 20	Mar, 21	Mar, 22	Mar, 23	Mar, 24	Mar, 25	Mar, 26	Mar, 27	Apr,13	Apr,14	Apr,15	Apr,16	Apr,17	Apr,18	Apr,19	Apr,20	Apr,21	Apr,22	Apr,23	Apr,24	Apr,25	Apr,26	Apr,27	Apr,28	Apr,29	Apr,30	May, 1	TOTAL hours
VP01	3													3		3												3	3															3	2	20
VP02	3													3		3												3	3														3			3	21
VP03	3													3		3												3	3														2		3		20
VP04		3											3				3										3			3													3	2				20
VP05		3											3				3										3			3													2		3			20
VP06		3											3				3										3			3													3		2			20
VP07			3									3						3								3					3													3			20
VP08			3									3						3								3					3							3									20
VP09			3									3						3								3					3							3									20
VP10				3				3											3				3									3					3									20
VP11				3				3											3				3									3			3					2						20
VP12				3				3											3				3									3			3					2						20
VP13							3				3											3				3									4					4						20
VP14							3				3											3				3							3				2									20
VP15							3				3											3				3							3				2									20
VP16					3				3											3				3										3				2								20
VP17					3				3											3				3										3				2								20
VP18					3				3											3				3										3				2								20
VP19							2			4											3				3										3				2								20

3. Results

In total of 120 bird species were observed, 22 listed in the Red Book of Uzbekistan (2019), 11 are included in the IUCN Red List (2024-1) (Table 3).

Detailed field data in presented in Excel file attached to this report – 'Samarkand OHTL-Spring VP bird_FieldDB.xlsx'.

Table 3: Checklist of birds species observed during the Spring VP Monitoring 2024.

NN	Species	Common name	IUCN status	Uzbekistan Red Data Book (2019)
	Galliformes	Gallinaceous		
1	Alectoris chukar	Chukar		
2	Phasianus colchicus	Common Pheasant		NT
	Anseriformes	Geese & allies		
3	Mareca penelope	Eurasian Wigeon		
4	Mareca strepera	Gadwall		
5	Anas crecca	Common Teal		
6	Anas platyrhynchos	Mallard		
7	Anas acuta	Northern Pintail		
8	Spatula querquedula	Garganey		
9	Spatula clypeata	Northern Shoveler		
10	Aythya ferina	Common Pochard	VU	
	Pelecaniformes	Pelicans & allies		
11	Microcarbo pygmaeus	Pygmy Cormorant		NT
12	Phalacrocorax carbo	Great Cormorant		
	Ciconiiformes	Storks & allies		
13	Nycticorax nycticorax	Black-crowned Night Heron		
14	Egretta garzetta	Little Egret		VU:D
15	Casmerodius albus	Great White Egret		
16	Ardea cinerea	Grey Heron		
17	Ardea purpurea	Purple Heron		
18	Ciconia nigra	Black Stork		VU:R
19	Ciconia ciconia	White Stork		NT
20	Plegadis falcinellus	Glossy Ibis		VU:D
21	Platalea leucorodia	Eurasian Spoonbill		VU:D
	Falconiformes	Falcons & allies		
22	Falco naumanni	Lesser Kestrel		NT
23	Falco tinnunculus	Common Kestrel		
24	Falco columbarius	Merlin		
25	Falco subbuteo	Eurasian Hobby		
26	Milvus migrans	Black Kite		
27	Haliaeetus albicilla	White-tailed Sea-eagle		VU:R
28	Gyps fulvus	Griffon Vulture		VU:D

29	Aegypius monachus	Cinereous Vulture	NT	NT
30	Neophron percnopterus	Egyptian Vulture	EN	VU:D
31	Circaetus gallicus	Short-toed Snake-eagle		VU:D
32	Circus aeruginosus	Western Marsh Harrier		
33	Circus cyaneus	Hen Harrier		
34	Circus macrourus	Pallid Harrier	NT	NT
35	Accipiter badius	Shikra		
36	Accipiter nisus	Eurasian Sparrowhawk		
37	Accipiter gentilis	Northern Goshawk		
38	Buteo buteo	Eurasian Buzzard		
39	Buteo japonicus	Japanese Buzzard		
40	Buteo rufinus	Long-legged Buzzard		
41	Buteo hemilasius	Upland Buzzard		
42	Clanga clanga	Greater Spotted Eagle	VU	VU:R
43	Aquila nipalensis	Steppe Eagle	EN	VU:D
44	Aquila heliaca	Eastern Imperial Eagle	VU	VU:D
45	Aquila chrysaetos	Golden Eagle		VU:R
46	Hieraaetus pennatus	Booted Eagle		VU:D
	Gruiformes	Cranes, Rails, And Relatives		
47	Anthropoides virgo	Demoiselle Crane		
48	Otus tarda	Great bustard	EN	CR
49	Tetrax tetrax	Little Bustard	NT	VU:D
	Charadriiformes	Shorebirds		
50	Haematopus ostralegus	Eurasian Oystercatcher	NT	
51	Himantopus himantopus	Black-winged Stilt		
52	Vanellus vanellus	Northern Lapwing	NT	
53	Charadrius dubius	Little Ringed Plover		
54	Gallinago gallinago	Common Snipe		
55	Tringa nebularia	Common Greenshank		
56	Tringa ochropus	Green Sandpiper		
57	Tringa glareola	Wood Sandpiper		
58	Actitis hypoleucos	Common Sandpiper		
59	Glareola pratincola	Collared Pratincole		
60	Larus cachinnans	Caspian Gull		
61	Larus ichthyaetus	Pallas's Gull		VU:D
62	Larus ridibundus	Black-headed Gull		
63	Larus genei	Slender-billed Gull		
64	Hydroprogne caspia	Caspian Tern		
65	Sterna hirundo	Common Tern		
	Pterocliformes	Sandgrouses		
66	Pterocles orientalis	Black-bellied Sandgrouse		
	Columbiformes	Pigeons		
67	Columba livia	Rock Pigeon		
68	Streptopelia decaocto	Eurasian Collared-dove		

	Cuculiformes	Cuckoos		
69	Cuculus canorus	Common Cuckoo		
	Strigiformes	Owls		
70	Athene noctua	Little Owl		
	Apodiformes	Swifts		
71	Apus apus	Common Swift		
	Coraciiformes	Rollers		
72	Coracias garrulus	European Roller		
73	Alcedo atthis	Common Kingfisher		
74	Merops persicus	Blue-cheeked Bee-eater		
75	Merops apiaster	European Bee-eater		
	Bucerotiformes	Hoopoes		
76	Upupa epops	Common Hoopoe		
	Passeriformes	Passerins		
77	Melanocorypha calandra	Calandra Lark		
78	Melanocorypha bimaculata	Bimaculated Lark		
79	Calandrella brachydactyla	Greater Short-toed Lark		
80	Galerida cristata	Crested Lark		
81	Alauda arvensis	Eurasian Skylark		
82	Riparia riparia	Collared Sand Martin		
83	Hirundo rustica	Barn Swallow		
84	Cecropis daurica	Red-rumped Swallow		
85	Anthus richardi	Richard's Pipit		
86	Anthus campestris	Tawny Pipit		
87	Motacilla flava	Yellow Wagtail		
88	Motacilla flava feldegg	Western Yellow Wagtail		
89	Motacilla citreola	Citrine Wagtail		
90	Motacilla alba	White Wagtail		
91	Motacilla alba personata	Masked Wagtail		
92	Troglodytes troglodytes	Wren		
93	Turdus atrogularis	Black-throated Thrush		
94	Cyanecula svecica	Bluethroat		
95	Saxicola torquatus	Common Stonechat		
96	Oenanthe oenanthe	Northern Wheatear		
97	Oenanthe pleschanka	Pied Wheatear		
98	Oenanthe deserti	Desert Wheatear		
99	Oenanthe isabellina	Isabelline Wheatear		
100	Phylloscopus collybita	Common Chiffchaff		
101	Curruca curruca	Lesser Whitethroat		
102	Parus major [bokharensis]	Great Tit (Turkestan)		
103	Lanius collurio	Red-backed Shrike		
104	Lanius schach	Long-tailed Shrike		
105	Lanius excubitor	Great Grey Shrike		
106	Pica pica	Eurasian Magpie		
107	Corvus monedula	Eurasian Jackdaw		

108	Corvus frugilegus	Rook		
109	Corvus cornix	Hooded Crow		
110	Corvus corone	Carrion Crow		
111	Corvus corax	Common Raven		
112	Acridotheres tristis	Common Myna		
113	Pastor roseus	Rosy Starling		
114	Sturnus vulgaris	Common Starling		
115	Passer montanus	Eurasian Tree Sparrow		
116	Fringilla coelebs	Common Chaffinch		
117	Fringilla montifringilla	Brambling		
118	Emberiza calandra	Corn Bunting		
119	Emberiza bruniceps	Red-headed Bunting		
120	Emberiza schoeniclus	Reed Bunting		

VP data

The analysis of bird species distribution across various VPs presented in Table 4 underscores the significance of these locations for migrating bird species. The dataset reveals that bird migration occurs across a broad front.

Table 4: The distribution of bird species on VPs

VP	Number of records	Number of species	IUCN	UzRDB	Threatened species
VP01	43	25	1	1	White stork
					Northern Lapwing
VP02	141	52	3	7	Eastern Imperial Eagle
					Steppe Eagle
					Common Pochard
					White Stork
					Pallas's Gull
					Little Egret
					Pygmy Cormorant
					Glossy Ibis
VP03	98	39		3	Glossy Ibis
					Pygmy Cormorant
					White Stork
VP04	102	38	1	5	Glossy Ibis
					Pygmy Cormorant
					Steppe Eagle
					White Stork
					White-tailed Sea-eagle
VP05	66	34	1	5	Black Stork
					Eurasian Spoonbill
					Lesser Kestrel
					Steppe Eagle
					White Stork

VP06	70	34	3	7	Cinereous Vulture
					Egyptian Vulture
					Griffon Vulture
					Lesser Kestrel
					Pallas's Gull
					Short-toed Snake-eagle
					Steppe Eagle
VP07	38	17	1	2	Egyptian Vulture
					Griffon Vulture
VP08	69	34	4	7	Black Stork
					Booted Eagle
					Demoiselle Crane
					Eastern Imperial Eagle
					Glossy Ibis
					Griffon Vulture
					Lesser Kestrel
					Northern Lapwing
					Steppe Eagle
VP09	42	17	1	2	Cinereous Vulture
					Griffon Vulture
VP10	51	23		1	Black Stork
VP11	48	28	4	7	Black Stork
					Eastern Imperial Eagle
					Egyptian Vulture
					Golden Eagle
					Lesser Kestrel
					Northern Lapwing
					Short-toed Snake-eagle
					Steppe Eagle
VP12	59	27	2	5	Common Pheasant
					Demoiselle Crane
					Glossy Ibis
					Griffon Vulture
					Northern Lapwing
					Pallas's Gull
					White Stork
VP13	138	56	4	7	Common Pheasant
					Demoiselle Crane
					Eurasian Oystercatcher
					Glossy Ibis
					Greater Spotted Eagle
					Northern Lapwing
					Pallas's Gull
					Pochard
					Steppe Eagle

					White Stork
VP14	52	22	1	1	Common Pheasant
					Demoiselle Crane
					Northern Lapwing
VP15	45	19	1	2	Egyptian Vulture
					Griffon Vulture
VP16	40	22	3	6	Eastern Imperial Eagle
					Egyptian Vulture
					Griffon Vulture
					Lesser Kestrel
					Pallid Harrier
					Steppe Eagle
VP17	51	23		2	Demoiselle Crane
					Griffon Vulture
					Lesser Kestrel
VP18	43	24	2	2	Griffon Vulture
					Northern Lapwing
					Steppe Eagle
VP19	53	24	2	3	Eastern Imperial Eagle
					Short-toed Snake-eagle
					Steppe Eagle

The distribution of threatened bird species is presented on Table 5.

Table 5: The distribution of threatened bird species on VPs

Common name	IUCN RL	UzSPB (2019)	VP 01	VP 02	VP 03	VP 04	VP 05	VP 06	VP 07	VP 08	VP 09	VP 10	VP 11	VP 12	VP 13	VP 14	VP 15	VP 16	VP 17	VP 18	VP 19	Out of VP survey
Common Pheasant		NT												1	1	3						
Common Pochard	VU			1																		
Pygmy Cormorant		NT		5	5	2																
Little Egret		VU:D		2																		
Black Stork		VU:R					1			1		1	1									
White Stork		NT	3	8	8	7	5							1	7							
Glossy Ibis		VU:D		5	2	6				1				1	4							
Eurasian Spoonbill		VU:D					1															
Lesser Kestrel		NT					1	1		1			1					1	1			
White-tailed Sea-eagle		VU:R				1																
Griffon Vulture		VU:D						4	1	2	1			1			1	1	2	1		
Cinereous Vulture	NT	NT						4			1											
Egyptian Vulture	EN	VU:D						4	2				1				2	1				
Short-toed Snake-eagle		VU:D						1					1								1	
Pallid Harrier	NT	NT																1				
Greater Spotted Eagle	VU	VU:R													1							
Steppe Eagle	EN	VU:D		1		1	1	1		1			1		1			1		1	2	
Eastern Imperial Eagle	VU	VU:D		1						1			2					1			1	

Golden Eagle		VU:R											1									
Booted Eagle		VU:D								1												
Demoiselle Crane										1				4	2	2			2			
Great bustard	EN	CR																				1
Little Bustard	NT	VU:D																				1
Eurasian Oystercatcher	NT														2							
Northern Lapwing	NT			3						1			2	1	2	1				1		
Pallas's Gull		VU:D						1						1	1							

4. Key species descriptions

- **Zaravshan Ring-necked pheasant (Phasianus colchicus zeravshanicus) - UzRDB: 3 (NT)**

Status: Close to the vulnerable, sedentary Zeravshan subspecies.
Distribution: Endemic subspecies living in Uzbekistan and Tajikistan. A sedentary species, common in the valley of the Zeravshan River and in Kashkadarya oasis. Found in Samarkand, Bukhara, Navoi and Kashkadarya areas. Distributed throughout the Samarkand region, including in the floodplain the Zeravshan River. In 1960-1970 bird numbers sharply decreased and disappeared in the south of its range. After 1990 due to the reduction in area cotton crops and replacing them with grain and vegetable crops, pheasant widely settled in agricultural landscapes, where it became a common species[1].
Habitats: Tugai forests, coastal reed thickets and agricultural landscape.
This endemic subspecies was observed in Zerafshan valley on points: VP12, VP13, VP14.

- **Common Pochard (Aythya ferina); IUCN VU**

Common, locally abundant bird of passage, possible breeder. Spring migration begins early, sometimes in early February, and lasts until mid-April. Migration and winter habitats: floodplain lakes, artificial reservoirs, more rarely rivers. Summer habitats: large lakes with abundant reed and cat's-tail thickets, shoals and occasional islands and open gentle shores. Most often flocks of foraging birds are recorded on large salt bodies of water overgrown with algae and abundant in invertebrates. When stopping during migration and in winter birds keep together, forming large flocks. Autumn migration: late August to the second half of November. Forages mainly during the day; no mass foraging has been recorded in the night hours.[2]
The species was recorded on VP2 (Syrdarya river) and VP3 (Zerafshan river).

- **Pygmy cormorant (*Phalacrocorax pygmaeus*) - UzRDB: 3 (NT)**

Status: Near threatened, migratory and nesting, occasionally wintering species.
Distribution: In the past, this species nested on the islands of the Aral Sea in Uzbekistan, but it has since disappeared from there. It has extended its range to new habitats in the Amu Darya and Syr Darya river basins. Until 2000, 30-35% of the world population nested in the Amu Darya interfluve and Syr Darya. In the Samarkand region, it is observed in the river basin of Zeravshan and on the Kattakurgan reservoir. Autumn migration occurs in October, with wintering from October to March. S.E. Fundukchiev and B.Sh. Muhammadiev (2018) have repeatedly observed it in the winter and early spring months at the Kattakurkan reservoir [3].
Habitats: The species predominantly occupies plain lakes, reservoirs, and irrigation system. Due to a shortage of food resources in wintering grounds, it has been observed in recent years on canals and large collectors. The little cormorant feeds on small fish and nests in colonies on reeds and flooded bushes.

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[1] Abduraupov, Timur; Mansurhodzaeva, Mahmuda; Vashetko, Emiliya; Esipov, Alexander & Bykova, Elena. (2021). The cadastre of threatened vertebrate animals in Samarkand province (reptiles, mammals and birds).

[2] Kreuzberg-Mukhina, E. A., Kashkarov, D. Yu., Lanovenko, Ye. N., Shernazarov, E. Sh., Peregontsev, Ye. A. (2005) Birds on the water bodies of Uzbekistan and the Central Asian region // Field guide to aquatic and semi-aquatic birds. Tashkent-Almaty, 230 p. [in Russian]

Species was recorded on VP02, VP03, VP04 – connected with Syrdarya river.

- **Little egret (*Egretta garzetta garzetta*) - UzRDB: 2 (VU:D)**

Status: Vulnerable, decreasing, migratory nesting nominate subspecies.
Distribution. In Uzbekistan it is found in the southern Aral Sea region and the middle reaches the Amu Darya River, the valley of the Chirchik River and in the middle reaches of the Syr Darya River. In the Samarkand region it is observed during nesting and during migration valley of the Zeravshan river. Autumn migration is noted in September-October.
Habitats: It predominantly inhabits salty flat reservoirs with reed thickets.
During spring migration this egret was observed only on VP02 (Syrdarya river).

- **Black stork (*Ciconia nigra*) - UzRDB: 2 (VU:R)**

Status: vulnerable, this species is naturally rare and migratory.
Distribution: During nesting, it is primarily found in the mountainous regions of Uzbekistan, specifically on the Western Tien Shan and Western Pamir-Alai. During migration and wintering, it visits lowland and low-mountain regions of the republic. The black stork nests in the mountainous parts of the Samarkand region. It descends to flat water bodies after nesting period and during seasonal migrations. In years with warm, little snow winters, a small portion of the black stork population may remain for the winter on the Zeravshan River.
Habitats: During the nesting period, the Black stork inhabits mountain valleys, after the nesting period and during migration, it can be found near lowland reservoirs and rivers.
Migrating Black storks were observed on VP05, VP08, VP10, VP11.

- **Asian white stork (*Ciconia ciconia asiatica*) - UzRDB: 3 (NT)**

Status: near threatened, partially settled Turkestan subspecies of migratory species.
Distribution: in Uzbekistan, the main part of the population is concentrated in the plains parts of the Chirchik-Akhangaran interfluve, the middle reaches of the Syr Darya River and in the Fergana Valley. Within 10 years it spreads the flat part of the Jizzakh region. This population is resident.
Single nests have been preserved in the foothills of the Turkestan Range and along the Kashkadarya River, where previously the stork was common. Part of the population winters in the middle reaches of the river Syr Darya. In the Samarkand region it is found in the valley of the Zeravshan River to Ziadine. Stork nesting along the middle reaches of Zarafshan was noted at the following points: Samarkand city, surroundings of Samarkand, villages of Chardzhi, Laish, Tailak, Iski Dzhambay, Bagrinkul, Urgut, Karatepa, Daul, Guz, surroundings of Kattakurgan. The largest number of nests are now observed in the territory of Kattakurgan (12 nests), Pakhtachinsky (7 nests), Akdarinsky (6 nests), Ishtykhansky (5 nests), Narpaisky (4 nests), Pasdargomsky (3 nests) districts.
Habitats: River banks, moist, swampy areas along irrigation canals within agricultural lands and fish farms. As nesting sites uses power lines.
Breeding White storks were recorded on the part of OHTL between VP01-VP05, and VP12-13.

- **Glossy ibis (*Plegadis falcinellus*) -UzRDB: 2 (VU:D)**

Status: Classified as vulnerable and decreasing, this species represents a nesting migratory nominate subspecies of the cosmopolitan species.
Distribution: In Uzbekistan, it nests in the lower reaches of the Amu Darya and Zeravshan rivers. In other reservoirs and the valleys of the Amu Darya and Syr Darya rivers, it is observed as a migratory species. Few sightings have been recorded in the Samarkand region, with instances of mining near the village of Dagbet (1948, 1950) and near the settlement Ravathuzha (1956).
Habitats: The species prefers shallow flat reservoirs with reed thickets. Spring migration occurs in April-May, while autumn migration is noted in July-September.

Glossy ibises are common on the part of OHTL between VP02-VP04 (Syrdarya river), and VP12-13 (Zerafshan river) and VP08.

- **Eurasian Spoonbill (*Platalea leucorodia*) -UzRDB: 2 (VU:R)**

Transient and summer resident.
The Eurasian Spoonbill's habitats are stagnant lakes or those with weak water circulation. On the rivers of Uzbekistan it can be observed only on open shallows and only during seasonal migrations or short-distance migrations in summer. In these cases it can also visit the edges of reservoirs in depressions. The bird avoids deep lakes without waterside vegetation and shallows. For habitation it prefers the shoals or low shores of shallow lakes with extensive populations of reed. It forages on open shallows not deeper than 25-30 cm. The spring migration takes place in April–May. It nests in the remotest and least accessible parts of reed thickets. Eurasian spoonbills breed in mixed colonies jointly with various herons, cormorants, glossy ibises and seagulls. Nests are arranged in groups on fallen reeds. The clutch usually contains 3-5 eggs. The incubation lasts 21-25 days. Chicks fledge in June–July. Autumn migration: August-September. Diet: small fish, amphibians and aquatic invertebrates[4].
Migrating Eurasian Spoonbills were observed on VP05.

- **Lesser kestrel (*Falco naumanni*) - UzRDB: 3 (NT)**

Status: Near threatened, migratory species.
Distribution: This species is widespread, and its migration occurs throughout the entire territory of the Republic of Uzbekistan. It breeds in various regions, including the Western Tien Shan, Western Pamir-Alai, remnant mountains of the Kyzylkum desert, lower reaches of the Amu Darya River, and the river valley of Zeravshan. In the Samarkand region, the Lesser kestrel is known to nest in the Zeravshan River valley, and sightings have been reported in Urgut, Guz, Aman-Kutan, and Takhta-Karache. A.N. Bogdanov noted the species near Samarkand in different years (1956), and it is often found in Urgut, Guz, and on Aman-Kutan and Takhta-Karache according to Marmazinskaya (2011). Additionally, there have been reports of sightings in the valley of the Zeravshan River by Kreutzberg (2019).
Population decline: The world population of this species declined in the second half of the twentieth century, possibly due to factors such as habitat destruction in cliffs and rock niches.
Habitats: The Lesser kestrel primarily inhabits plain, foothill, and low mountain areas.
Migrating Lesser Kestrel were observed on points VP05, VP06, VP08, VP11, VP16, VP17.

- **Griffon vulture (*Gyps fulvus fulvus*) - UzRDB: 2 (VU:D)**

Status: Vulnerable, decreasing, sedentary, with a mosaic common nominative subspecies.
Distribution: The species is found in the mountainous part of the Republic, nesting on rocks in groups or colonies. Its seasonal movements are throughout Uzbekistan. During nesting, birds gather on the northern slopes of the Turkestan ridge and in the river basin of Zeravshan (Dal, 1936; Bogdanov, 1956; Mitropolsky et al., 1987). Near Samarkand, and within the city of Samarkand itself, sightings have been reported by A.N. Bogdanov (1956). Meetings in different years have been recorded on the Zeravshan ridge near the village of Kushtut, in the upper reaches of the river Agalyksaya, Ettiuyli saya, and on Aman-Kutan[1].
Habitats: The species inhabits the lower and middle mountain belts at altitudes of 700-2500 meters above sea level and plains, including cultivated lands.
Short-distance migrating vultures were recorded on broad area between points VP06-VP9, VP12 and VP15-18.

[4] https://birds.uz/species/30

Figure 3 Griffon vulture (Photo Relisa Grnovskaya)

- **Cinereous vulture (*Aegypius monachus*) - UzRDB: 2 (VU:D); IUCN: NT**

Status: Classified as near threatened, sedentary, and a mosaic widespread species.
Distribution: The species is found in the Western Tien Shan, Western Pamir-Alai, mountains of Bukantau, and Tamdytau. It is a sedentary species characterized by regular seasonal short-distance migrations. In the Samarkand region, it is found in the foothills and mountainous parts of Zeravshan, Turkestan, and Nurata ridges, including their spurs. It is rare in the western part of the Zeravshan range where it nests, if at all (Bogdanov, 1956; Mitropolsky et al., 1987). The species is regularly seen along the wooded northern slopes of the Turkestan ridge (Abdusalyamov, 1971; Mitropolsky et al., 1987). During the non-breeding period, sightings of vultures in the vicinity of Samarkand and near Samarkand have been reported by N.V. Marmazinskaya (2011) and S.E. Fundukchiev (2018).
Habitats: It primarily occupies the lower and middle mountain belt and feeds on carrion from ungulates.
Probably breeding in surrounding mountains Cinereous vultures were recorded on broad area between points VP06 and VP09.

- **Egyptian vulture (*Neophron percnopterus*) - UzRDB: 2 (VU:D); IUCN: EN**

Rare breeding bird. Found at lower altitudes in the mountains and in depressions throughout Uzbekistan. Most of the birds leave the country for winter, with just occasional individuals staying. Nests in the niches and cavities of rocks, on precipitous loess and sandstone slopes, more rarely on rock ledges (where also prefers some kind of rock projection above the nest as a shelter), often not far from the breeding sites of other raptors (vultures, kites, buzzards), as well as storks and ravens.
The breeding begins in April and lasts until early August. Individual clutches, probably, second ones, are made until late May. The clutch consists of 2 eggs, more rarely 1. Chicks emerge in late May—early June and fledge in mid-July—August. Autumn migration mid August – September. The diet is based on reptiles and dead small animals. Often feeds on the carcasses of large animals and forages in dumps near human settlements and slaughterhouses.
Migrating Egyptian vultures were recorded on broad area between points VP06-VP07, VP11 and VP15-16. Birds recorded near VP06-07 probably breeding, as we observed in 2023 breeding pair in 11 km from OHTL line.

Figure 4: Egyptian vulture (photo Relisa Granovskaya)

- **Short-toed Snake-eagle (*Circaetus gallicus*) - UzRDB: 2 (VU:D)**

A migratory and breeding bird, leaving the country in winter. Spring migration: March—April. Birds fly directly to their breeding grounds, but females begin laying eggs long after their arrival. Nests in shrubs and trees, on vertical slopes and rocks. Essential conditions for a breeding site: availability of large diurnal reptiles in combination with places suitable for nesting. The nest used by the Short-toed Snake Eagle for the first time is a loose structure of relatively thin bifurcating branches, often with a few leaves remaining. When used repeatedly, the structure becomes quite large. When they dwell in the old nest of some other raptor, birds make a new lining of fresh green twigs. The clutch made in April—May consists of 1, more rarely 2 eggs. The incubation lasts 35-47 days. Chicks fledge in August—September. Autumn migration: September—October. Diet: lizards, snakes, rarely small rodents.[5]
Migrating snake-eagles were recorded on points VP06, VP11 and VP19.

Figure 5: Short-toed Snake-eagle, 17.03.2024, VP11 (Photo Relisa Grnovskaya)

[5] https://birds.uz/species/99

- **Pallid harrier (*Circus macrourus*) - UzRDB: 3 (NT); IUCN: NT**

Status: Near threatened, migratory species.
Distribution: The species migrates through Uzbekistan for wintering in Africa, Iraq, South Iran, India, and Pakistan. During migration, it is found in Kyzylkum, the valleys of the Amu Darya, Syr Darya, Zeravshan, and Surkhandarya. In warm, little-snowy winters, a small quantity remains for the winter in the southern part of the republic. There are historical records, such as the killing of a steppe harrier on February 13, 1949, in the Samarkand region (Bogdanov, 1956). Near Samarkand, during autumn migration, single harriers were observed on September 8, 1929, September 18, 1948, and September 23, 1931 (Bogdanov, 1956). Another harrier was caught on February 13, 1949, in the territory of the Dzhambai district by I.M. Ananyev.
Habitats: The species is associated with plains.
Migrating bird was recorded on point VP16.

- **Greater spotted eagle (*Aquila clanga*) - UzRDB: 2 (VU:R); IUCN: VU**

Status: Vulnerable, naturally rare, migratory species.
During migration recorded throughout Uzbekistan[1]. There is very little information on wintering.
Spring migration: February—May. Autumn migration: October—November. During migration flies individually or in groups of 2-3 birds. Diet: small mammals, semi-aquatic birds, frogs and snakes.
Migrating bird was recorded on point VP13.

- **Steppe eagle (*Aquila nipalensis*) - UzRDB: 2 (VU:D); IUCN: EN**

Status: Vulnerable, decreasing species. There are two subspecies present in Uzbekistan: the eastern (1) and migratory European (2).
Breeds only in the northern part of the Karakalpak part of the Ustyurt Plateau. Occasional wintering individuals were recorded in the Golodnaya Steppe, near Samarkand, in the Kyzylkum desert, the lower reaches of the Zeravshan and in Kashkadarya and Surkhandarya Provinces. During migration widespread in the lowlands[1].
Habitats: lowlands and low mountains. Spring migration: March—April. Autumn migration: September—November. Wintering: December—February. Individual birds or groups of 2-3 individuals are recorded during migration, with up to several hundred individuals observed on some days.
Probably most observed eagle, steppe eagle was observed on many points: VP02, VP04-06, VP08, VP11, VP13, VP16, VP18 and VP19.

- **Eastern Imperial eagle (*Aquila heliaca*) - UzRDB: 2 (VU:D); IUCN: VU**

Ustyurt Plateau, northern part of the Kyzylkum desert (breeding). During seasonal migrations occurs throughout Uzbekistan.
Inhabits lowlands and foothills. Spring migration occurs in February—April, when birds fly individually or form groups of up to 15 individuals. Eggs are laid in February—May. The clutch consists of 1-2 eggs. Both parents take part in the incubation, which lasts 43 days. Chicks fledge in July—August. The diet consists of rodents, hedgehogs, tortoises and carrion. Autumn migration: October—November.
This eagle was observed on points: VP02, VP08, VP11, VP16 and VP19.

Figure 6: Eastern Imperial eagle, 16.03.2024 VP08 (Photo Relisa Grnovskaya)

- **Golden eagle (*Aquila chrysaetos*) - UzRDB: 2 (VU:R)**

Status: The golden eagle is classified as vulnerable, naturally rare, and sedentary, with locally widespread distribution, including Southern European (1) and Central Asian (2) subspecies.
Distribution: The golden eagle is distributed in Uzbekistan from the Usturt plateau to the north-eastern part of the Kyzylkum desert (Southern European subspecies) and in mountainous areas (Central Asian subspecies). The species has always been present in small numbers. In the Samarkand region, golden eagles nest in the Karatepa Mountains near the city of Samarkand. N.A. Bogdanov (1956) found a golden eagle nest with two chicks in the Agalyk mountains. In the Zeravshan Range, it is found in Agalyk, on Aman-Kutan, and Takhta-Karach. During winter, it descends to the floodplain of the Zeravshan River, Karasu, and Kattakurgan reservoir.
Habitats: Golden eagles inhabit remnant mountains of deserts, loess cliffs of foothills, and rock formations in the middle and upper mountain zones. They build nests on rocks, cliffs, trees, and structures like power transmission line supports.
Migrating bird was recorded on point VP11.

- **Booted eagle (*Hieraaetus pennatus*) - UzRDB: 2 (VU:D)**

Status: Vulnerable, decreasing, breeding, and migratory Central Asian subspecies.
Distribution: The Booted eagle is found in the Western Tien Shan, Western Pamir-Alai, and the Syr Darya River basin within the territory of Uzbekistan. Nesting sites have been registered in these regions. Nests are typically located on perennial trees. In other areas, it is observed during migration. In recent years, several individuals have been noted to remain for the winter in the Chirchik River valley. Specific locations within the Samarkand region where the species has been observed include the Zeravshan ridge near Aman-Kutan pass, the Karatepa Mountains, the Agalyk region, the valley of the river Ettiuyli sai, Ilonsay, Hazrat Dawood, the vicinity of the villages of Jam and Chindon (the middle reaches of the Zeravshan River), and in the vicinity of Samarkand and Zeravshan National Natural Park.
Habitats: The Booted eagle primarily inhabits mountain and lowland floodplain forests.
Migrating bird was recorded on point VP08.

- **Demoiselle Crane (*Anthropoides virgo*)**

Common, locally abundant bird. Rests and forages in sand and clay deserts, foothills, on lakes and artificial reservoirs, in river valleys. Spring migration begins in the second half of March and lasts until early May. Autumn migration lasts from the second half of August to late October. Forages primarily for plants and their seeds, more rarely for insects.
The huge flocks of cranes were observed on points: VP08, VP012-14 and VP18.

Figure 7: Demoiselle Crane (Photo Relisa Grnovskaya)

- **Great bustard (*Otis tarda tarda*) - UzRDB: 1 (CR); IUCN: EN**

Status: Critically endangered, migratory European subspecies.
Distribution: In Uzbekistan, on migration they are found on the Usturt plateau, in the South-Western Kyzylkum, the valleys of the Syr Darya, Zeravshan rivers, the lower reaches of the Surkhandarya, Sherabaddarya rivers, in the Golodnaya and Dalverzinskaya steppes, at the foot of the ridge. Nuratau (winter in past - nesting). On rainfed fields, in the foothills of the northern part of the Samarkand region the Central Asian winters population.
Habitats: Foothill plains with tall grass vegetation, semi-deserts, rainfed wheat fields and alfalfa.
Single migrating bird was recorded on point N39.431247 E66.119518 during Asian Houbara surveys (near point 17).

- **Little bustard (*Tetrax tetrax*) - UzRDB: 2 (VU:D); IUCN: NT**

Status: Vulnerable, decreasing, migratory and wintering species.
Distribution: Breeds in the central and southern regions of Uzbekistan. They regularly winter in the south, flying across the plains regions of the republic. Winters in small numbers in the foothills of Turkestan ridge. On migration it is occasionally found in the flat part of the Samarkand region.
Habitats: Areas of deserts, semi-deserts, foothill plains with sparse herbaceous and shrub vegetation. Winter crops, alfalfa fields (wintering)[1].
4 groups of migrating Little bustards were observed feeding near 70 km OHTL line during Asian Houbara surveys:

Table 6: The records little bustards

Species	N	E	Date	Number
Little bustard	39.419487	66.092786	21/03/2024	4

Little bustard	39.432394	65.912392	21/03/2024	2000
Little bustard	39.477331	65.97628	21/03/2024	1
Little bustard	39.379254	65.989839	29/03/2024	1

5. Summary

- Spring season surveys were conducted between February 28 and May 1, 2024, covering the entire Spring migration period.
- In total of 120 bird species were observed, 22 listed in the Red Book of Uzbekistan (2019), 11 are included in the IUCN Red List (2023-1).
- The equipment of planned TL in sensitive parts with the bird flight deflectors, diverters, and other devices will help birds to detect TL poles and wires.

6. References

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Contact Us
Phone: +998 78 202 0440
Email: info@juru.org
Website: www.juru.org