EVALUATION OF POTENTIAL IMPACTS OF WIND FARM PROJECTS ON SAKER FALCON AND OTHER RAPTORS IN UZBEKISTAN

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LITERATURE OVERVIEW

The research and literature on Saker Falcon (*Falco cherrug*) in Uzbekistan are very limited. Older literature – dated back to the Soviet times – indicates that the species was widely distributed across the country, breeding along the southern and eastern escarpments of the Ustyurt Plateau, the Kyzylkum Desert, the Bukantau Mountains of central Uzbekistan, through the Naratau to the Zarev Mountain ridge in the southeast, and in the Talass Mountains of the northeast (Mitropolsky et al., 1987). The number of breeding pairs apparently closely follow the peaks and lows of rodent populations. Just like in Central Europe, Sakers have started to breed on electricity pylons since the mid 1970's (once the transmission lines were built) in the plains of the Kyzylkum Desert. The breeding population was estimated to 100-150 breeding pairs in the late 1990s and early 2000 (Kreuzberg-Mukhina et al., 2001), but a decade later that decreased to only 60-70 pairs (Kashkarov & Lanovenko 2011). The Red Data Book of the Republic of Uzbekistan (State Committee of the Republic of Uzbekistan on Ecology and Environmental Protection 2019) also estimates the Saker population to about 70 pairs, of which 12 can be found in Kyzylkum, and 4 in Turkestan/Zarafshan region, although the clear reference of information is missing. Although those numbers suggest a large decline in only ten years, it must be noted that estimates were likely based on limited and sporadic data.

In fact, there is no published, countrywide population count or a systematic monitoring of sample sub-populations in various regions, suggesting that a countrywide baseline survey is missing.

After the collapse of the Soviet Union many people started to trap falcons to get "quick and easy money", encouraged by reports of the high prices of falcons. This high level of indiscriminate trapping had diminished by the late 1990's. During the 1990's many falcon trappers from Pakistan were also active in Uzbekistan (Dixon 2009). Unfortunately, although the species is under legal protection in Uzbekistan, illegal trapping has not ceased, and especially affects the population near larger cities like Tashkent and Samarkand.

As a conclusion, according to the last estimate, and to the Convention on Migratory Species' Raptors Memorandum of Understanding's Saker Falcon Global Action Plan (Kovács et al. 2014), Uzbekistan hosts ~0.6% of the Asian population of the species. However, no reliable estimate is available for the Saker population in Uzbekistan, and old literature data is moderately reliable. Recent observations made during various surveys related to large scale infrastructure developments (mostly wind farms) show that

Uzbekistan still may have a healthy Saker population, and the actual population size may be larger than previously estimated. However, a well-planned baseline survey must be conducted to determine that.

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RESULTS FROM THE FIELD VISITS IN THE KYZYLKUM DESERT

Bash and Dzhankeldy wind farms – were visited in the period between 26 May 2025 and 5 June 2025. The aim was to do a general field assessment on the habitats and breeding raptor populations in those areas, with special regard to the endangered Saker Falcon (*Falco cherrug*), as well as estimate the potential impact of the wind farms on raptors.

Based on the results, raptors are still present and provenly or likely breeding in all areas. Despite the large-scale infrastructure constructions, the habitats – meaning the main ecological characteristics affecting the presence of raptors, like nest availability, vegetation, and presence of prey species populations and foraging grounds – did not change significantly on short term. As a result, raptor species – including Saker Falcons – listed in the baseline surveys are still present in the area.

However, it is important to note that we do not know if those constructions are going to have mid- or long-term effects. Therefore, continuous monitoring is essential in case of all three sites. The potentially negative factors are

- *Habitat loss on long-term* – it means mainly the loss of prey species and foraging grounds due to a yet unknown reason;
- *Collision with wind turbines*;
- *Collision with transmission (high-voltage) grid wires*;
- *Electrocution* on uninsulated distribution (mid and low-voltage) grid poles;
- *Disturbance* due to human presence close to nests.

Those are the most important threats that must be monitored and targeted to prevent loss of raptors.

DETAILED SITE ACCOUNTS

Place: Bash wind farm

Location: 40.657597°, 64.675754° (central coordinate)

Surveyors: Mátyás Prommer

Wind farm area and wind turbines

The 6.5 MW EN-171 turbines are large (the blades reach 206 m upwards when vertical). Most of them are operational. The turbines are organized in lines, and there is at least 440m between them, and distance between lines is much more - so not densely packed, therefore they impact on the habitat less. The habitat between turbines is an appropriate foraging place for various species[1]. There is one broken turbine, operational failure after blade hit the mast.

Identiflight system is in place, apparently working. In addition, we saw people doing carcass search, as part of the monitoring efforts.

We observed several raptor species nesting and foraging in the project site and the adjacent areas. We found an Egyptian Vulture nest, and a colony of kestrel sp. (*Falco* sp.) at a cliff (40.667350°, 64.565651°), only 2 km far from the south of the closest wind turbine. One Saker Falcon was observed at the same cliff, and we also found fresh whitewash at an empty nest site on the cliff. That could easily be the nest site of the Saker Falcons (as breeding was observed here earlier), but fledglings are out this time of the year, and thus we do not have clear evidence for breeding. We found another active Egyptian Vulture nest a few kilometers away (40.668852°, 64.529807°). A few kilometers further, at another part of the project site, near the road, we also saw a pair of adult Golden Eagles (40.561312°, 64.786542°). We saw both the Saker and an Egyptian Vulture heading towards the wind turbines from the cliffs.

[1] Page 151: low number of ground squirrels is incorrect, no proper survey and dry years 2020-2022.

Apart from raptors, the cliffs were also used by Ruddy Shelducks (*Tadorna ferruginea*), Rock Pigeons (*Columba livia*), Rock Sparrows (*Petronia petronia*), Common Swifts (*Apus apus*). At the lake, a lot of breeding Greater Sand (*Anarhynchus leschenaultii*) and Kentish Plovers (*Anarhynchus alexandrinus*). Slender-billed Gulls (*Chroicocephalus genei*), Gull-billed Terns (*Gelochelidon nilotica*) and other gulls are also present at the lake, and they can be impacted by the turbines.

In conclusion, the species in interest are present in the area, actively using the project site and the adjacent areas. Similarly to Zarafshan area, to learn more about the interaction between those species and the wind farm, several research and monitoring activities should be conducted:

- annual population (nest) monitoring, and direct observations of birds' behavior in the field;
- processing data from Identiflight system;
- satellite-tracking resident adults and fledglings of species of interest;
- Post-construction Fatality Monitoring.

The ideal situation would be if a study exploited all those information sources.

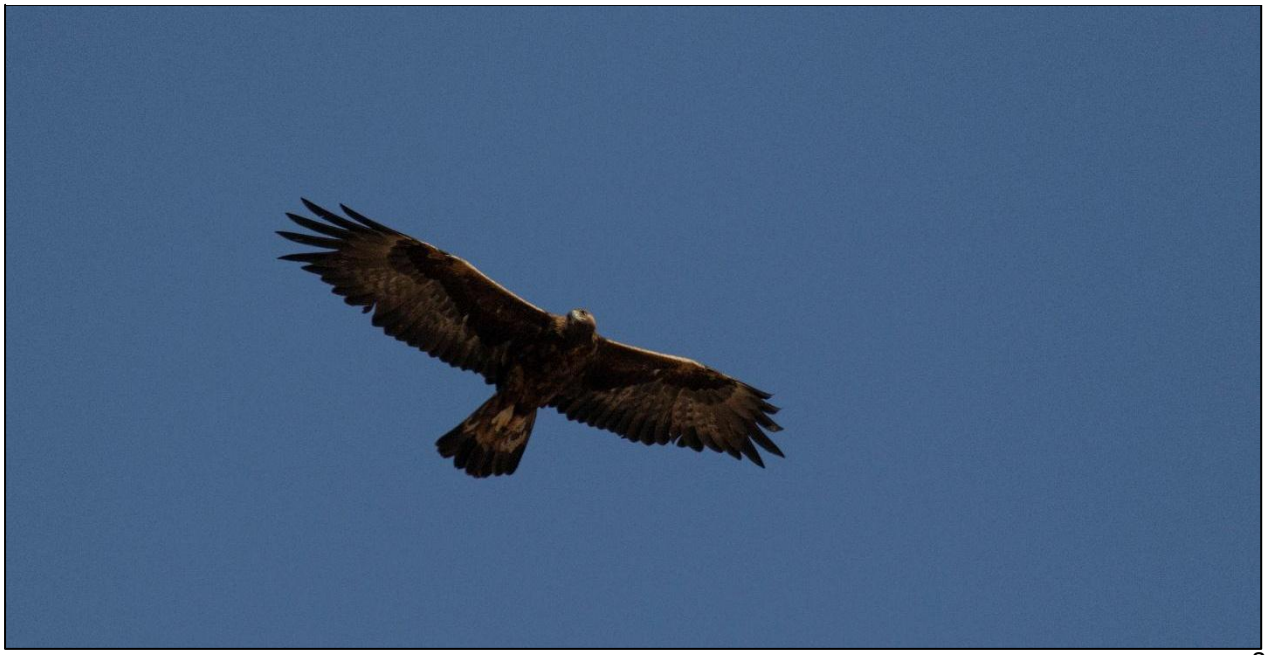
Grid

All old and newly built transmission (high-voltage) lines that we observed were without bird diverters. There may be sections where that equipment is applied, but we did not find any while travelling along those power lines hundreds of kilometers. The grid is dense in some areas, and we do not know, if there is any monitoring being carried out along the lines. Again, that is especially problematic, because those lines (e.g. the new line towards Zarafshan and the lines connecting Bash and Dzhankeldy wind projects to the grid) run hundreds of kilometers long, and we know from satellite-tracking that one of the major causes of Asian Houbara mortality is collision with power lines. In March 2025, a dead Houbara was found under the new transmission line for the Bash wind project. The approximate location was 40.313694°,

64.338694° and there were no diverters in this section of the line (information provided by CEE Bankwatch Network).

There is also a distribution (low and mid-voltage) grid in the project area; we could not assess if these are somehow connected to the wind farm complex. Most of the poles in the grid are uninsulated, “killer” type poles – it means that the cross-arm is metal, and the cables are not insulated by a plastic cover, thus touching both at the same time (by a bird) produces short-circuit and subsequently electrocution – that pose serious risk on any mid-sized or larger bird perching on them.

Wind turbines near Bash Lake (©CEE Bankwatch Network)



Golden Eagle (Aquila chryasaetos) near Bash Lake (©CEE Bankwatch Network)

Bash wind turbines with old and new transmission lines (©CEE Bankwatch Network)

Transmission line at Bash wind project with no bird diverters (©CEE Bankwatch Network)

“Killer” type mid-voltage power line poles at Bash wind project area (©CEE Bankwatch Network)

Place: Dzhankeldy wind farm

Location: 40.877822°, 63.387630° (central coordinate)

Surveyors: Mátyás Prommer, Róbert Kazi, Borbála Major, Gábor Zvara

Wind farm area and wind turbines

The farm consists of large 6.5 MW turbines, similar to Bash wind farm. The wind turbines are built on top of a small mountain range elevating above the adjacent lower and relatively flat area. Due to the geography, this area also hosts breeding pairs of Saker Falcons, Egyptian Vultures, Golden Eagles, and Common/Lesser Kestrels (*Falco tinnunculus/naumanni*).

On one hand, the turbines are organized in lines, thus posing less risk from habitat loss point of view compared to a densely configured wind farm with many turbines. On the other hand, the wind turbines surround the edges of the mountain, blocking free flight of raptor to/from the mountain almost entirely, which increases the risk of collision.

We found that the Identiflight system is in place and working. However, it was not clear if the system covers all turbines or only the ones closest to previously known nest sites.

We have checked three Saker Falcon, Egyptian Vulture, and Golden Eagle nest sites that were located and found active a few years ago according to the ESIA. None of them were active in 2025. However, we found previously unknown (or unreported) nests of Saker Falcon (40.940046°, 63.307520°; with two fledglings) and Golden Eagle (roughly: 40.933260°, 63.300519°; three alternative nests on the same cliff, but apparently no nestlings in any of the newly discovered nests, although we observed the pair flying around and perching on the cliff). We also saw an Egyptian Vulture pair actively using the mountain and even crossing the operation zone of a wind turbine, which was by then stopped by the Identiflight system. However, we did not find any active Egyptian Vulture nest. All observations were made on the northern edge of the wind farm. The presence of raptors was obviously known by the operator, as two post signs were announcing the presence of breeding Saker Falcons and Golden Eagles on the top of a hill at the last turbine. The signs probably referred to the nests found years ago

and mentioned in the EISA, however, we did not see any raptor movement in that area. The signs might attract poachers.

We also found the already known Golden Eagle nest in the southern part of the wind farm site (roughly: 40.854755°, 63.401312°), and although we found three alternative nests, none of them appeared to be active. We did not see any bird of prey around.

Grid

The situation is partly similar to what we found in Bash wind farm. All old and newly built transmission (high-voltage) lines that we observed were without bird diverters. There may be sections where that equipment is applied, but we did not find any while travelling along those power lines from the wind farm to the main road no. A379 (~120 km). That may pose the same risk on breeding and migration of Asian Houbara as discussed above.

In Dzhankeldy wind farm, there is also a distribution (mid-voltage) grid in the project area feeding the various units of the wind farm complex. Contrary to Bash wind farm, all poles are insulated here to prevent risk of bird electrocution. However, either the insulation was not done proper, or the used material is not of proper quality, because we observed quite a few insulators already displaced and not covering the critical parts of the wires (where they meet the pole head structure), thus they are dysfunctional. It is especially alarming, because the wind farm has become fully operational only recently, and it is likely that many more insulators will become displaced in the next years. That will leave the wires and poles unprotected and posing the risk of electrocution on birds, already in short term. From administrative point of view, it is likely that the insulated, bird-friendly pole structure has already been reported and approved by the authorities, even though it will not work and be safe for birds on the long-term.

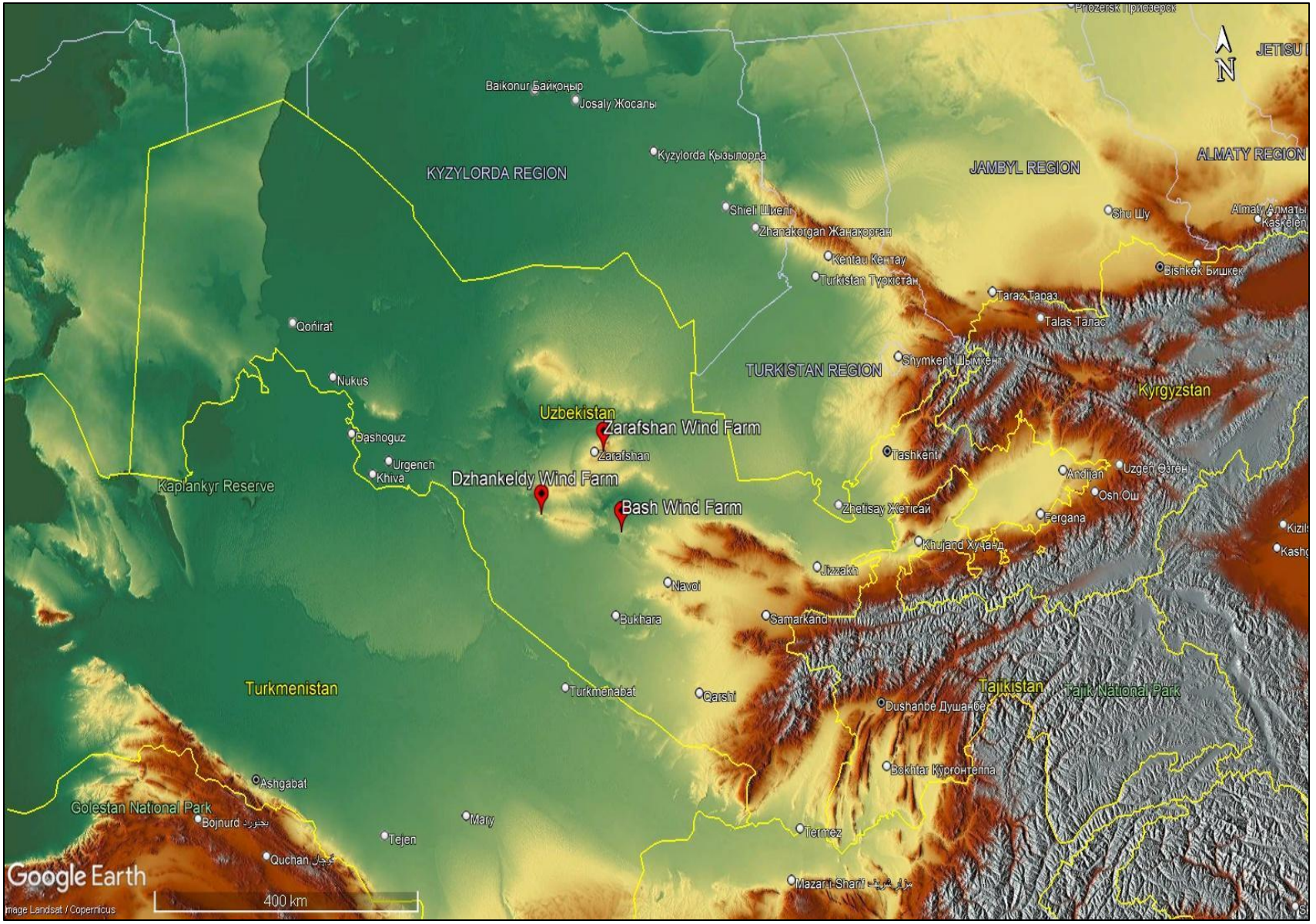
Other

As we spent the night near the wind farm, we had the chance to observe the night operation of the wind farm. It was soon very clear that the substation emits an immense and unnecessary

light pollution. It would be important to carry out a study on its impacts on the fauna with special regard to flying invertebrates, and migratory birds. Although the light pollution is immense, it would not take much to decrease it significantly by simply reducing the number of light bulbs, as proper and safe lighting of the substation could be solved with much less and much weaker bulbs. Additionally, using directional lighting (not emitting light e.g. towards the sky, but only to where it is needed), and motion triggered lighting (working only when needed) could reduce the impact on wildlife, and save energy at the same time.

Egyptian Vulture (Neophron percnopterus) immature (©CEE Bankwatch Network)

Wind turbines in Dzhankeldy wind farm (©CEE Bankwatch Network)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POTENTIAL IMPACTS OF WIND FARMS ON SAKER FALCON POPULATION IN UZBEKISTAN

The development of large-scale wind farms in Uzbekistan—particularly in key habitats such as the Kyzylkum Desert and associated low mountains and escarpments—poses several potential risks to the Saker Falcon, a globally endangered species with a declining population and estimated 60–70 breeding pairs in the country and 12 in Kyzylkum. Despite the persistence of suitable nesting and foraging conditions in current project sites, mid- and long-term impacts remain uncertain and could include direct collision with turbine blades, electrocution on poorly insulated distribution poles, disturbance and loss or degradation of prey base due to landscape-scale changes. Existing observations confirm continued breeding and foraging near turbines, but the lack of a comprehensive national population estimate, combined with gaps in independent monitoring, hampers effective impact assessment.

To ensure the long-term viability of the species, a multi-tiered research and mitigation strategy must be implemented. This should include

- systematic annual monitoring of breeding territories adjacent to wind farm areas,
- a country-wide population survey (or at least in representative sample areas allowing to estimate the population trends in the country), which is recommended to be repeated in every 5-10 years,
- behavioral studies and flight path analyses using satellite telemetry of adults and juveniles,
- full utilization of data from automated detection systems such as Identiflight, and
- annual Post-construction Fatality Monitoring studies in line with the recommendations of the CMS Energy Task Force.

Mitigation measures, additional to the ones already in place at already constructed wind projects, must include retrofitting dangerous low and mid-voltage poles with bird-safe insulation, installation of bird flight diverters on all high-voltage transmission lines, realignment

or shutdown of turbines in high-risk areas during critical periods, and adjustments in lighting to reduce nocturnal disorientation. Furthermore, strategic placement of new turbines informed by cumulative impact assessments and transparent, independent review processes is essential to minimizing long-term threats to the Saker Falcon population in Uzbekistan.

Based on the information that Sakers started to breed on power lines (Kreuzberg-Mukhina et al., 2001), installing nest boxes on transmission grid towers could contribute to develop the population, just as it happened in Central Europe.