REPORT

Mirny (Kazakhstan) 1GW Wind Farm Project

ESIA Report Chapter 06 - Impact Assessment, Biological Components

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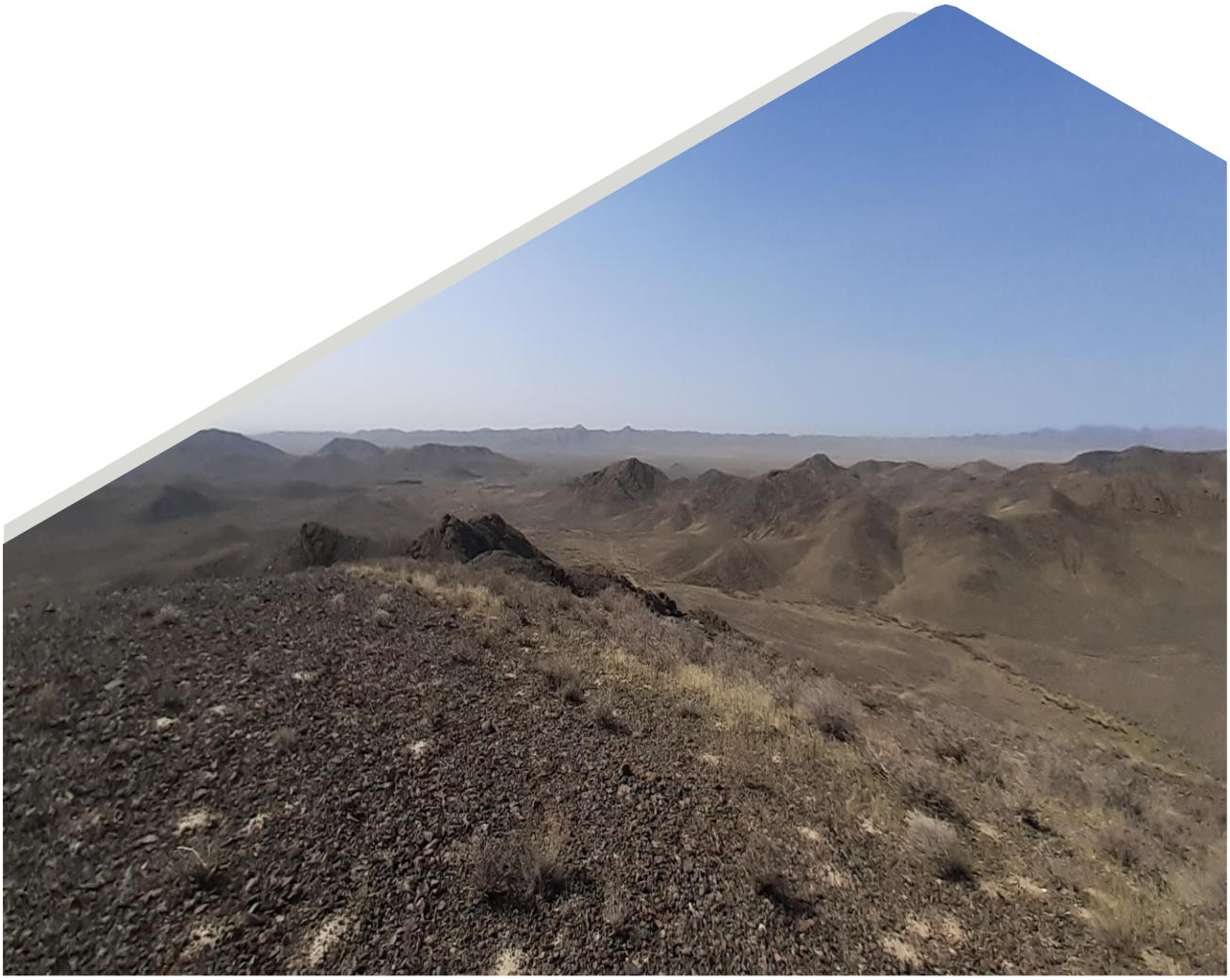

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6.0 IMPACT ASSESSMENT – BIOLOGICAL COMPONENTS

This section presents the results of impact assessment on biological components conducted according to the Impact Assessment ("IA") Methodology described in Chapter 03. For each impact factor identified an impact assessment is presented for all affected components, along with the related mitigation measures and the residual impacts. The Project is composed of two elements, the Wind Power Plant (WPP) and the Overhead Transmission Line (OHTL). When these generate different impacts on an E&S component, the impact assessment reported below presents them separately.

Following the preliminary impact assessment developed during the scoping phase, a further analysis has been made on the impact factors (given in section 6.1).

6.1 Biological components

As described in Chapter 03 of this ESIA (IA Methodology), the Project actions carried out during the Construction and Operation phase could potentially generate direct and indirect impacts on biodiversity. According to IFC Performance Standard 6, GN 15:

- "*Direct impacts might include (i) disturbance or reduction in species' populations or their habitats (for example… road kill; or results from noise, light, and land or shipping traffic); (ii) effects from emissions and effluents, (iii) alterations of surface hydrology, land forms,…; (iv) competition by invasive species, edge effects, and barriers to dispersal; and (v) reduced access to ecosystem services, including loss or degradation*."
- "*Indirect impacts might include project-induced access by third parties, in-migration and associated impacts on resource use, including land conversion, hunting and wildlife trade, and spread of invasive alien species*."
- "*Mitigation and management measures should then be defined to address adverse impacts to biodiversity or ecosystem services. As mentioned in Performance Standard 1, residual impacts are those that might remain after measures are taken to avoid and minimize impacts on biodiversity and ecosystem services and/or to restore viability*."

The biological components identified for the Impact Assessment (IA) during the Construction and Operation Phase are:

- Terrestrial habitat and ecosystems (flora and fauna to include mammals, reptiles and invertebrates).
- Freshwater habitat and ecosystems (flora and fauna to include amphibians).
- Birds and bats.
- Protected areas.

The biological components have different sensitives (presented in the IA Methodology section). The sensitivity value (S) has been reassigned for birds and bats according to the baseline results as show in Table 1.

Table 1: Biological components sensitivity values.

Components	Sensitivity elements	S value
Terrestrial habitats and ecosystems (Flora and Fauna, excluding birds and bats)	Landcover types within the Project site include shrubland, herbaceous vegetation, and bare/sparse vegetation. Five main habitats were identified at the scoping stage northern and/or southern areas: xerophytic rocky low mountains; outcrops of flat granite slabs; saxual valley forests; sagebrush	High (5)

Components	Sensitivity elements	S value
	and sagebrush deserts on gently undulating plains; and gently sloping solonchak depressions on the plains. According to the Sentinel-2 10m Land Use/Land Cover Time Series layer by Esri, the Project footprint (WTGs and OHTL) interacts with the following land use/land cover categories. Natural Habitats: water, flooded vegetation, bare ground, rangeland. Modified Habitats: crops, built areas. Flora: Regel's tulip, listed in the Red Book of the Republic of Kazakhstan and listed as Endangered on the IUCN Global Red List, is present within the Project site. Other flora species endemic and rare to the region were also recorded across the Project site. The 2025 fieldwork was extended to the OHL: Albert tulip (*Tulipa alberti*) and two-flowered tulip (*Tulipa biflora*), both species listed in the Red Book of the Republic of Kazakhstan, were observed in the southern substation area and in the northern substation area respectively. In the northern substation area both species were observed. More than twenty herpetofauna species were recorded within the northern and southern areas and in overall Project footprint (including the OHTL), of which the steppe tortoise and the central Asian brown frog are classified as Vulnerable on the IUCN Global Red List. Ten species of mammals (excluding bats) were recorded during surveys; of these, the argali (Near Threatened on the IUCN Global Red List) and goitered gazelle (Vulnerable on the IUCN Global Red List) are present within the Project site and may experience impacts during the construction and operational phases. Literature suggests there could be a range of invertebrates present within the Project site.	
Freshwater habitats and ecosystems (Flora and Fauna)	Access to water is limited during the summer, with the rivers and streams almost dry in the second half of June. Only in some places small temporary reservoirs with an open water surface. No freshwater bodies are present within the Project site. There are wetlands present to the southwest and northeast of the Project area in the wider region. Literature studies suggested that seven notable freshwater species are present within the wider region.	Low (1)
Birds and bats	The Project site supports numerous bird and bat species. Some bat species are listed in the Red Data Book of the Republic of Kazakhstan and/or IUCN Global Red List. Birds of prey that nest within or adjacent the Project site include long-legged buzzard, golden eagle, steppe eagle, saker falcon, and common kestrel. The Project site is used by a range of migratory birds of prey birds, waterbirds, and other passerines. Cracks in the numerous natural outcrops of rock can provide shelter and roosting opportunities for bats. Bat surveys across northern and southern areas recorded six species. All six species are classed as Least Concern or Data deficient on the IUCN Global Red List, and none of the bat species are included in The Red Book of the Republic of Kazakhstan.	High (5)
Protected Areas (PAs)	The following legally protected and internationally recognised areas have been identified within the Study Area: **Zhusandala State Reserved Zone**, the WPP is entirely within the reserve; Andasay State Nature Preserve is located 1.5km to the west of the WPP Footprint; Pribalkash State Nature Santuary, situated approximately 20 km east to the Project site (Yukgres SS); Zhusandala Important Bird and Biodiversity Area (IBA) and Key Biodiversity Area (KBA), situated at a distance of more than 40 km east of the Project site; Topar Lake System KBA, located at a distance of more than 50 km east of the Project site; Ili River Delta KBA and Ili River Delta and South Lake Balkash Ramsar site, located at a distance of approximately 30 km north-east of the Project site. **Zhusandala State Reserved Zone**	Medium - High (4)

Components	Sensitivity elements	S value
	The definition of the boundaries of the Zhusandala State Reserved Zone is ambiguous due to conflicting information provided by several reliable sources. It was originally established in 2001 and is included in the List of Nationally Significant Specially Protected Natural Areas approved by the Government of the Republic of Kazakhstan on 26 September 2017 by Resolution No. 593 and recognised as an important site for specific bird species like the Pallas's sandgrouse and Great Bustard. The area consists of steppe and semi-desert landscapes. The Forestry and Wildlife Committee of the Ministry of Ecology, Geology and Natural Resources is the Authority responsible for the protected area management. Recently in 2025, as part of the establishment of new protected areas in Kazakhstan, there was a reconsideration with some modifications in the boundaries of the territories of some existing protected area, including Zhusandala State Reserved Zone (as broadly discussed in the Analysis of Alternative chapter of this ESIA). , This was also confirmed from the data obtained from local consultants and previous studies demonstrate more extensive protected area boundaries, encompassing the entire WPP footprint and most of the OHL to the north. The Reserved Zone supports grassland (95.65%), shrubland (3.89%) and bare areas (0.4%) as well as 231 species of birds and 56 species of mammals. Of these bird species, one is classified as IUCN Critically Endangered, five Endangered, and six Vulnerable bird species with one Critically Endangered and two Vulnerable mammal species also known to be present. The Zhusandala Reserve total hectarage is 2,787836 Ha. The total hectarage of the Project AoI is 76,599 Ha. Of this 62,698 Ha of the AoI are within the reserve (82%) and 13,901 Ha (18%) of OHTL are outside the reserve. Therefore 2.25% of the total reserve area is Project AoI. The reserve was designated with the intention of arresting declines in several key species and providing space for their restoration to a more favourable condition. The reserve contains important avian and mammal fauna. The Committee for Forestry and Wildlife of the Ministry of Ecology and Natural Resources to take the most effective action to minimise any potential damage to the biodiversity of the reserve, has instructed the State Republic of Kazakhstan Enterprise 'Ohozoprom' to consider the signing of a Memorandum between and the Company, under which joint work on biodiversity conservation will be undertaken. This was signed on 15 of June 2025.	

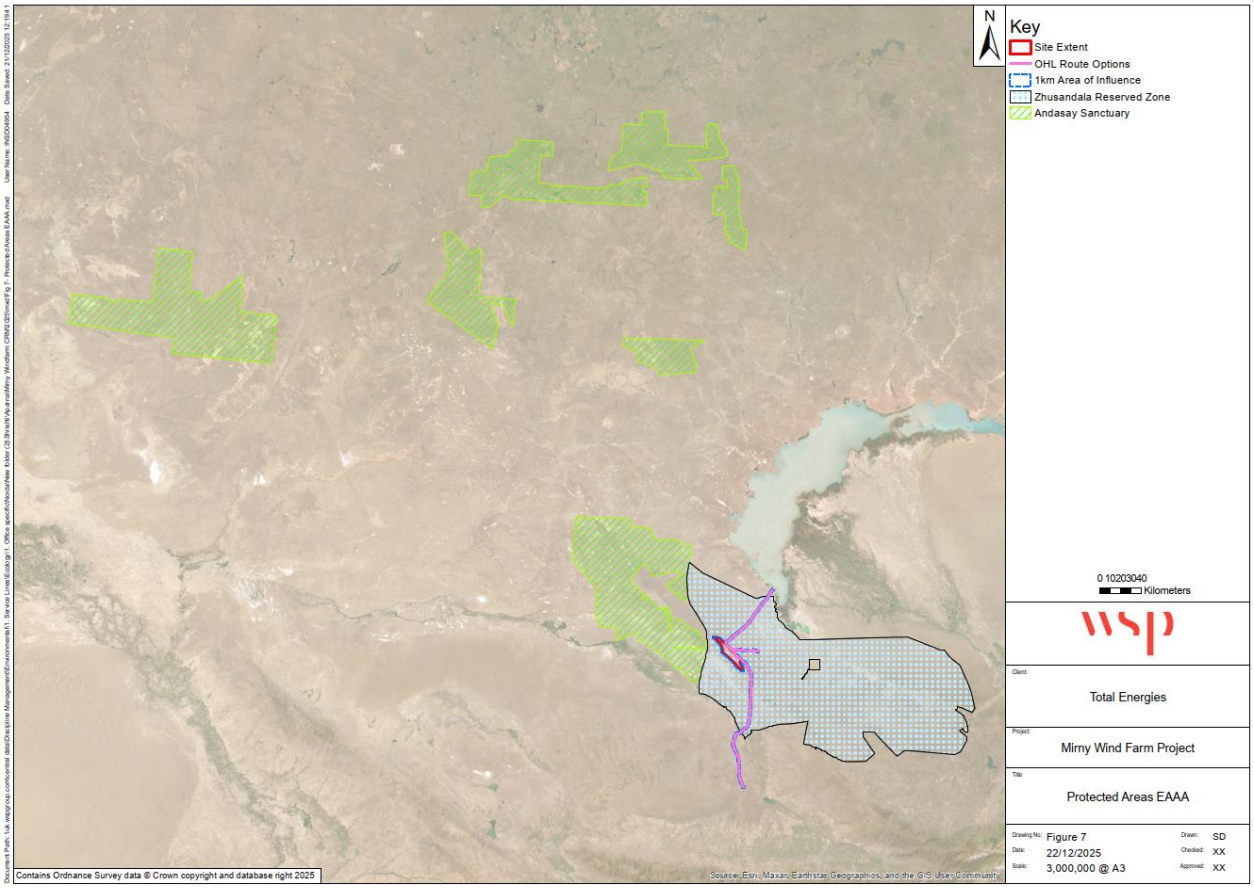


Figure 1: Relationship between the Project AoI and Zhusandala State Reserved Zone.

6.2 Impact Assessment for Construction Phase

6.2.1 Impact Assessment

The effects of impact factors generated by the Project actions during the construction phase that could potentially affect the biological components have been identified and assessed in the following Table 2.

Table 2: Impact Assessment Biological Components - Construction Phase.

Impact Factor	Impact Assessment	Components Affected
Removal/degradation of soil and vegetation - Land occupation	The Project-related roads to be built and/or renovated, the WTGs foundations and crane pads areas and the OHTL steel transmission towers areas will require vegetation clearance, topsoil stripping and levelling. The Project footprint is mainly characterized by shrubland, herbaceous vegetation, and bare/sparse vegetation, with floral species of conservation interest. Earthworks will remove plants and soil and change land use. Ground preparation and construction works will cause direct habitat loss, habitat fragmentation, and habitat degradation. In addition, the removal/degradation of vegetation and topsoil could cause habitat loss and degradation of habitats suitable for fauna, affecting the primary source of food, shelter and/or nesting sites. Species characterized by low mobility (such as small mammals, reptiles and amphibians) may not be able to move ahead of construction. Species with a hiding strategy to	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna) ▪ Protected Areas

Impact Factor	Impact Assessment	Components Affected
	escape predators might also be accidentally killed. Nesting sites could be destroyed by vegetation clearing with different effects depending on timing and the species reproduction strategy. Moreover, site preparation activities could cause the displacement of populations, alteration of predation rate and disruption of species interactions. The physical presence of new infrastructures can potentially constitute an element of interference with the fauna component and act as a deterrent to the frequentation of these areas, causing avoidance and / or temporary abandonment of the site. These impact factors will generate impacts within Project footprints. The total Project footprint is expected to generate a loss of 221.82 ha of habitat (i.e., this value includes the areas among the WTGs and beneath the spans between two OHTL towers/poles. Consequently, it can be regarded as a proxy for the consideration of aerial habitats as well). The loss is precautionarily assessed to affect 221.82 ha of Critical Habitat. The vast majority of the calculated habitat loss is expected to be Natural Habitat, and is taken as 221.82 ha on a precautionary basis. A Project AoI and AoI Critical Habitat map is provided in Figure 2 and **Error! Reference source not found.** below. The map will be further detailed and refined as part of an iteration of the Biodiversity Action Plan (BAP).	
Change in the local morphology and topography	Construction activities such as topsoil removal, surface levelling and grading, will potentially lead to irreversible changes in local morphology and topography. The activities mainly include earth movements and excavation necessary for building the infrastructure foundations and subsequent filling and backfill activities; the preparation of subgrades for the construction of new roads; and earth movements for the construction of all necessary infrastructure for the campsite, among others. In addition, the Project demand of raw materials will make use of various materials acquired from local quarries, therefore the Project will also be impacting the local geomorphology, albeit indirectly. As the local morphology changes, local surface drainage is also altered, which may have consequences on soil permeability and erosion. If not correctly mitigated and monitored, the erosion and landslides may impact terrestrial flora and habitats outside the Project footprint. This impact factor is expected to be lower for the construction of the OHTL, since these constructions require less excavation, and less materials than for the WPP. However, if not properly mitigated these impacts may extend beyond the Project footprints and affect an area conservatively considered to be included in a 1 km buffer.	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna) ▪ Protected Areas
Change in the local hydrology and surface water quality	During the rainy season, the stormwater generated has the potential to wash away the loose soil, along with sediments and debris, pollutants and products stored and carry them to the nearest surface water bodies. As seasonal streams flow in an outward direction from the Project footprint, if not properly mitigated, the stormwater could potentially impact freshwater habitat, flora and fauna and its associated ecosystems services located downstream (*e.g.* use the water as food, shelter, and/or reproduction strategy). In addition, some construction activities (such as excavations, transportation of materials and machinery, among others), if not well planned, may interfere with the small seasonal streams and water springs existing in the WPP AoI, which may cause their disruption during the rainy season. The OHTL section that will be connected to the SS Shu, in the south, will cross the Shu River. This river is generally small in width, around 50-70 m large. However, the satellite images show that the river section crossed by the OHTL divides into a series of meanders, therefore the area to be crossed by the OHTL can extend up to a few hundred meters (also considering its floodplain). The OHTL will also cross a tributary river (the Kuragaty River). As a consequence, construction activities can disrupt	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna) ▪ Protected Areas

Impact Factor	Impact Assessment	Components Affected
	watercourses, wetlands habitats and their biodiversity along this river section. Proper methods for water bodies crossings are taken to avoid changes in the hydrological regime and cause temporary destruction and/or fragmentation of freshwater ecosystems. Project impacts on surface water bodies may also occur due to interference caused by potential pollutants from accidental spills of hazardous substances. This impact factor is expected to generate effects within the Project footprints, however if not properly mitigated potential impacts could also affect the river basins and nearest tributaries.	
Emission of dust and particulate matter- Emission of gaseous pollutants	During the construction phase, excavation, earthworks and vehicles moving on unpaved and poorly maintained roads are sources of Particulate Matter (PM). Dust and PM impact vegetation through deposition on leaf surface, which blocks stomata and hampers photosynthesis, respiration and transpiration, ultimately causing leaf injury. As a result, the productivity of plants can decline due to habitat degradation resulting from the reduction of vegetation growth, abundance and species loss. Fauna species that depend on those habitats for food and shelter can be also affected by the habitat degradation and through inhalation or ingestion of dust and PM. Gaseous pollutants and greenhouses gases will be released by heavy-duty vehicles and stationary engines. Some gaseous pollutants and greenhouse gases (i.e. ozone, sulphur and nitrogen oxides) penetrate through the plant stomata, inducing them to close, which blocks CO_2 transfer and induces a reduction in photosynthesis, causing an alteration of life cycles. Such effect may cause an overall depletion of the conditions of terrestrial habitats with consequent loss of biodiversity. The fauna component is also affected by exhausts from vehicles. These gases can cause lesions to the respiratory system, damage to the reproductive system, debilitating disorders of various species, leading in some cases to death. Furthermore, impacts could also be indirect, as wildlife species could be exposed to this pollutant through frequenting compromised habitats (e.g., acidification phenomena) or the intake of contaminated food (e.g., heavy metals). Dust is expected to be a significant issue for biodiversity (degradation of vegetation including threatened flora and degradation of habitats for fauna). Dust, PM and gaseous pollutants are expected to generate impacts within and close to the construction sites, but potential impacts may extend beyond and affect terrestrial and freshwater ecosystems within an AoI that has been conservatively considered to be up to 1km from the Project footprint.	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna) ▪ Protected Areas
Emission of noise and vibrations	Heavy construction equipment and machinery will generate noise and vibrations, which could cause habitat degradation due to temporary avoidance by fauna species, with a consequent reduction in habitat biodiversity. Species particularly sensitive to noise and vibrations are found through all taxa (birds, bats, reptiles, amphibians and mammals). Disturbance from anthropogenic noise, for example, is known to be correlated with reduced densities of breeding birds. Noise can mask the sounds of nature (such as birdsong, low-intensity echolocation signals), leading to significant physiological damage (such as alterations in the heartbeat, increase in the hormone production), alteration in the species behaviour, inhibiting its reproductive success, foraging, territorial defence and communication. Several studies show that many species are sensitive from levels of 40-50 dB. The effects of noise disturbance from human activity on wildlife are species-specific and mostly perceived over short distances up to 250/300 m. Noise and vibrations from Project activities may have potential impacts extending beyond the construction areas and affect species within an AoI conservatively defined to be up to 1km from the Project footprint.	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna) ▪ Protected Areas

Impact Factor	Impact Assessment	Components Affected
Emission of light	During the construction phase, emission of light is expected in case of night work and night lighting of parking or storage areas. The Project lies in an area with no light pollution. Night lighting is known to cause disturbance to nocturnal, crepuscular, and diurnal species, affecting their circadian rhythms and their activity cycles. This impact factor directly affects nocturnal fauna through disorientation and changes of night habits, with effects on foraging behaviour, disruption of predator-prey relationships, reproduction-rate, migration, and communication activities. In addition, light pollution can disrupt plants by distorting their natural day–night cycle. Taking a conservative approach, night lighting could generate effects up to 100 m from the Project footprint.	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna)
Demand for solid waste treatment/disposal	The improper management of solid waste may lead to soil, surface water and groundwater pollution and air quality degradation both onsite and offsite. Hazardous waste, if spread on soil or in surface water bodies, can generate significant pollution. There are no appropriate solid waste landfills and treatment plants near Mirny (< 200 km) suitable for receiving the waste that will be generated during construction. The WPP construction site will be provided with a solid waste temporary storage area. The OHTL corridor and the road construction sites will be provided with smaller solid waste accumulation areas, and the waste will be periodically transferred to the main storage at the WPP site. Waste generation could negatively and directly affect wildlife populations due to accidental ingestion, as fauna is often unable to distinguish between food and plastic waste. In addition, inappropriate solid waste temporary accumulation areas may attract wild fauna, increasing the risk of vehicle collisions, opportunistic hunting, poisoning, and transmission of diseases. The effects of waste are expected to be limited to the habitats in proximity to the Project footprint but may go beyond depending on the species affected and their mobility.	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna) ▪ Protected Areas
Demand for liquid waste and wastewater treatment/disposal	During the construction phase the Project will generate large amounts of wastewater. These amounts will be greater compared to the amounts generated from the surrounding areas. These waste, if not properly managed, can introduce several contaminants and pathogens to soil, which could eventually reach surface water. The degradation of water quality may generate a habitat loss for freshwater species (such as nursery areas). The Project construction will generate both hazardous and non-hazardous liquid waste. All these substances may pose threats to aquatic life and terrestrial wildlife. Their impacts include harm to wildlife physiology, oxygen depletion due to the increased microbial activity, and contamination of drinking water by pathogens with an increased risk of diseases. It should be considered that at the Project site or in its vicinity there is no public sewage system, so the Company plans to treat domestic sewage waste through a closed-cycle wastewater treatment system. This information is still pending confirmation. The Project AoI will be equipped with stormwater drainage systems, whereas the OHTL corridor and the roads construction sites will not have any kind of wastewater treatment facility or liquid waste temporary accumulation area. Currently it is not known how wastewater generated during the OHTL construction will be managed. This impact factor will potentially affect the areas nearby the pollution sources, but due to the high mobility of freshwater fauna, impacts could potentially extend well beyond and affect the river basins and nearest tributaries.	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna) ▪ Protected Areas

Impact Factor	Impact Assessment	Components Affected
Water demand	Water scarcity of the Project region is an issue to take in consideration. Project water demand by the workforce, for dust suppression and other construction activities could affect the hydrological and groundwater regime of the Project site. Most of the water will be drawn from water wells drilled onsite. Water trucks can be also used as an extra support, if needed. Changes in the hydrological regime and groundwater may deteriorate, pollute and/or modify freshwater ecosystems. The potential impacts deriving from these activities are expected within the Project footprint and potential impacts could affect river basins and the nearest tributaries.	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna) ▪ Protected Areas
Workers' influx	Project workers may exert pressure on biodiversity values through illegal and unsustainable hunting and fishing, which could affect terrestrial and freshwater habitats, fauna species and the nearest Zhusandala State Reserved Zone. Workers and human influx are expected to generate effects within the Project footprint and its surroundings.	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna) ▪ Protected Areas
Increase of traffic-Improvement of road network	The Project will upgrade roads and will require the construction of new access or service roads. New or larger roads can be detrimental to both habitat suitability and habitat connectivity and lead to habitat fragmentation, which may in turn prevent or restrict wildlife movements. Better and more roads may also increase traffic noise affecting wildlife. Temporary and permanent infrastructures can act as a deterrent to fauna visiting habitats in their vicinity, causing their avoidance and / or temporary abandonment. The transport of workers, goods and materials within the construction site and the different project facilities will generate more traffic. Therefore, accidental collisions with wildlife might occur especially where the road crosses wildlife corridors. Fauna species are attracted to roads for a variety of reasons, and more vehicular traffic may result in higher rates of animal mortality: amphibians may be attracted by standing water on the roadside or within the construction areas; asphalt is a heat source for reptiles and other ectotherms; some birds use roadside gravel to aid in the digestion of seeds and use the dust or sand bathing to helps in maintaining their plumage in good condition; vultures, crows, and other scavengers seek out roadkill animals and often become roadkill themselves; mammals may be attracted by organic waste, grazing herbivores are attracted to the roadside vegetation and many large mammals use roads as corridors for dispersal, routine movements or scavenging opportunities. The impact factor acts mainly on the Project footprint and nearby areas, even if the potential impacts derived may reach beyond, depending on the mobility of the species affected.	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna) ▪ Protected Areas
Introduction and spreading of invasive alien species	Removal of natural vegetation cover and soil disturbance could facilitate the spreading of invasive non-native species (invasive alien species, IAS) accidentally introduced by cars, trucks and other heavy machinery within and around the Project footprint. The spreading of IAS has a negative impact on biodiversity, local ecosystems, and fauna species. Many IAS have also impact on ecosystem services. IAS pose a threat to biodiversity and related ecosystem services by heavily impacting native species as well as the structure and function of ecosystems through alteration of habitats, predation, competition, transmission of diseases, and replacement of native species.	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna)

Impact Factor	Impact Assessment	Components Affected
	Invasive alien species tend to have high adaptability in disturbed and anthropized habitats, like those that typically develop along roads, and may contribute to further habitat degradation. This impact factor is also considered likely to affect freshwater ecosystems, and in that case potential impacts may go well beyond the Project footprint, affecting the Shu River basins and nearest tributaries. For terrestrial ecosystems, the impact factor is expected to affect a limited area in the vicinity of the Project footprint. Conservatively, a 250 m buffer from the Project footprint has been considered as seeds may be transported accidentally by workers, or fauna.	▪ Protected Areas

6.2.2 Mitigation Measures

The mitigation measures that will be implemented during the *construction phase* for all biological components are provided below in Table 2, listed according to the mitigation hierarchy. Several mitigation measures presented in Chapter 4 of the ESIA to mitigate impacts on physical environmental components will also have indirect mitigating effects on biodiversity. These are not repeated here. These measures will be implemented in addition to the Project embedded mitigation measures which are standard procedures applied by the Contractor to achieve compliance with legal requirements and regulations and alignment with Good International Industry Practices ("GIIP").

ESMPs to be implemented during the Project's construction phase will be prepared in a timely manner before the start of construction activities and will incorporate the mitigation measures presented below. The ESMPs will be part of the ESMS, whose structure and functioning are described under Chapter 12 of this ESIA (Environmental & Social Management System Framework Document).

The Contractor will ensure a team of expert ecologists is hired and included (flora and fauna specialists) in the HSE department to manage the field activities according to the proposed mitigation measures.

Based on the impact assessment, the Management Plans proposed are included in the following table.

Table 3: Mitigation measures for biological components - Construction phase.

Mitigation hierarchy	Mitigation Measure
Impact factor: Removal/degradation of soil and vegetation and land occupation	
Avoidance	The relevant authorities of the Zhusandala State Reserved Zone were consulted and recommendations being taken into consideration by the Project (face to face meeting between Okhotzooprom and WSP In August 2024). In the absence of a formal Management Plan for the protected area[1], the Contractor will liaise with the Forestry and Wildlife Committee of the Ministry of Ecology, Geology and Natural Resources. The aim of this liaison is to ensure that the Project aligns with any government-recognised management plans for the area. In addition, the Contractor will collaborate with the Reserve authority to investigate the feasibility of establishing supplementary programmes aimed at promoting and enhancing the conservation and effective management of the area. Further details will be provided in the *Biodiversity Management Plan* and in the *Biodiversity Action Plan*.

[1] Explore the World's Protected Areas

Avoidance	Avoid the unnecessary removal or degradation of soil and vegetation. The Contractor will forbid unnecessary soil excavations and vegetation clearance which can lead to soil weakening and an excess of waste generation. The Contractor will plan the soil and vegetation removal activities. The Contractor will ensure that: • the Project's footprint will be minimized, only the strictly necessary soil portion will be degraded and – consequently - only the strictly necessary facilities will be built. • The amounts of excavated soils and rocks and the vegetation clearance will reflect the Project's specifications. • An accurate planning and supervision of the activities will prevent potential unnecessary intentional or accidental deterioration of soil and vegetation. • The excavation fronts, considering the lithology on site, will have a natural slope angle of 30° (in case no barrier, mash or other types of soil containing measures will be installed) for preventing further soil deterioration through sliding and falls.
Avoidance	Avoid using polluting practices for removing the vegetation. The use of fire, herbicides or similar substances will be strictly prohibited in any seasons and anywhere. For preventing the spread of pollutants, the Contractor will avoid the use of pesticides, herbicides and additives which are harmful for the human health and the environment. The Contractor will also ensure that no portion of land will be set on fire for removing vegetation. Mechanical removal will be opted instead.
Avoidance	Avoid work during nesting/breeding periods. The Contractor will forbid any vegetation clearance during the nesting/maternity period of birds and bats (March - late July/early August). During the same period ground disturbance activities will also be limited to avoid disturbing ground-nesting species. Pre-clearance surveys must be undertaken by a suitably experienced ecologist. These surveys would identify any potential nests in the vegetation to be removed and then establish suitable "no go" buffers around these nests, to prevent the nest being destroyed or disturbed. Buffers would be species specific and determined in consultation with ACBK, based on the species identified. As an example, appropriate disturbance distance buffers in the breeding period for Golden Eagle (*Aquila chrysaetos*) is 750-1000m, for marsh harrier (*Circus aeruginosus*) 300-500m (Disturbance Distances in selected Scottish Bird Species – NatureScot Guidance | NatureScot). For blasting works, the same approach will be applied, considering that for every doubling of distance, the sound level (single point source.) reduces by 6 decibels (dB). Specific instructions will be integrated in a section of the *Biodiversity Management Plan*.
Avoidance Minimization	Avoidance/minimization of impacts within Critical and Natural Habitats Natural Habitats and Critical Habitats will be protected by the Contractor from unintentional disturbance during construction. Temporary demarcation could be provided by highly visible wooden sticks (50 cm high) planted into the ground and/or flagging tape, while a more permanent fencing could be provided in areas of sensitivity or subject to higher risk of disturbance. In this case appropriate signage will be installed to make the area recognizable by operators and to comply with H&S regulations and plans. Awareness among employees and contractors working on site about the protected species/habitats potentially present in the area will be developed, to ensure constant monitoring and promote actions to be taken if wildlife is encountered. In particular: • Facilities, especially temporary facilities, will be placed in Modified Habitats to the extent possible. • All non-essential access roads will be closed after construction. • Public access to the remaining access/service roads will be limited. • Pre-clearance checks to identify sensitive receptors will be carried out (see next two measures).

	Specific instructions will be integrated in a section of the *Biodiversity Management Plan*.
Minimization	<u>Birds – Pre-clearances surveys (threatened species)</u> Surveys for migratory birds will be completed in Spring and Autumn during the construction period. A pre-construction walk-over survey will be undertaken of all working areas to check for the presence of threatened species ground nesting birds which would be at risk from construction related impacts. Surveys will be completed by an appropriately qualified ecologist and surveys will be undertaken in the hours after sunrise (up to 10:00). The surveyors will aim to identify behavior indicative of breeding activity (e.g. carrying food / nesting material / fecal sacs, presence of nests, eggs or chicks (both nidifugous and nidicolous). Where nests are found they will be recorded in full and their locations mapped, with the data transferred to Excel master sheets and Google Earth. Mapping will then be circulated to the project team along with details of a works exclusion zone. Exclusion zones will be dependent on the species of bird nesting along with its conservation status and be agreed with the qualified project ecologist team. Construction will be limited within an agreed buffer around active raptor nests.
Minimization	<u>Herpetofauna, small mammals (threatened species) - Pre-clearance surveys and minimization of impacts</u> In order to minimize mortality, an expert ecologist will perform a site recognition in the footprint area, to identify and relocate fauna species (not earlier than 7 days before site clearance). The survey will focus on fauna species with limited mobility (e.g., reptiles such as Steppe Tortoise and amphibians) that cannot move ahead of construction as well as the presence of nests. If any of these species are observed, they will be collected by the ecologist and translocated to undisturbed and suitable local habitats identified. Further measures will be implemented for *Testudo horsfieldii*, with the aim of minimising the impact on hibernating individuals and avoiding/minimising the loss of species nests (nesting typically occurs from late May until early September.) These measures will take into account the environmental challenges posed by the project site. A *Biodiversity Management Plan* will be developed to address the protection of fauna species over the construction. Instruction regarding collection and translocation techniques and suitable translocation sites will also be identified within the Plan.
Minimization	<u>Minimize disturbance during hibernation periods (threatened species)</u> The Contractor will plan the start of any vegetation clearance and ground disturbance activities at the end of hibernation and before the breeding season to avoid disturbing ground-nesting species and species with limited mobility, such as reptiles and amphibians. The Contractor will conduct a specific recognition survey in the construction area, to recognize the presence of any hibernated species to be sure that no individuals are present underground. Specific instructions will be integrated in a section of the *Biodiversity Management Plan*.
Avoidance/Minimization	<u>Flora site recognition (threatened species) - Pre-clearance surveys and minimization of impacts</u> An expert ecologist will perform a site recognition in the footprint area to check the presence of flora individuals belonging to flora threatened species, directly impacted by the Project. Upon this reconnaissance, the following two measures will be applied: • *In-situ* conservation where possible (e.g. micro-site facilities). Sites will be fenced to avoid disturbing threatened species. • The flora species identified are going to be salvaged prior to construction and directly translocated to the appropriate sites. The identification and flagging of individuals to be translocated will take place preferably during the flowering season of the species, while the translocation of individuals be performed during the dormant stage to minimize stresses to the plant. The data regarding date, location, source population, and number of individuals collected and translocated will be recorded. A *Biodiversity Management Plan* will be developed to address the protection of flora species over construction. A Salvaging and Translocation section will be prepared based on the construction

	schedule. Collection and translocation techniques and suitable translocation sites will also be identified within the Plan.
Minimization	<u>All fauna and flora species - Workers' biodiversity awareness raising</u> • Establishing a proper code of conduct and awareness raising / training of personnel. • Biodiversity training will cover all relevant mitigation requirements in relation to biodiversity applicable to workers. • Sensitive species will be included in the site induction for all operational staff. During this induction, additional control measures will be discussed, including allowing animals to move around the site, not chasing after them in vehicles or approaching them on foot, and what to do if they observe breeding birds within their works areas. • Prohibit hunting of any wildlife at any time and under any condition by workers onsite. • Prohibit flora collections of any flora species at any time and under any condition by workers onsite. • Restrict activities to allocated areas only, including movement of workers and vehicles to allocated roads within the site and prohibit off-roading to minimize disturbances.
Minimization	<u>Minimize disturbance during nesting/breeding periods.</u> In case vegetation removal cannot be avoided during bird and bats breeding season, the Contractor will have nesting birds and bat roost presence verified by a qualified ecologist within 48 hours from vegetation clearance. If breeding birds are discovered, then works will be postponed in that area until the breeding cycle is complete (this may take up to three weeks). If permanent or temporary roost are observed in the areas to be cleared, the Project will take action to allow the bats to leave on their own at sundown but keep them from returning at sun set (e.g., remove or obstruct the roost, close the roost entrance). This will only be done if no dependent young are present. Specific instruction will be integrated in a section of the *Biodiversity Management Plan*.
Minimization	<u>Flora seed collection (threatened species)</u> Seed collection will be performed for endemic/rare/protected flora species, identified within the Project AoI (*Tulipa regelii, Tulipa alberti, Tulipa borszczowii, Tulipa greigii*). The seed collection and conservation will follow the best practice indicated by the Millenium Seed Bank. Seeds collected will be separately stored for each species and sub population using clearly identifiable codes and will be donated to the most appropriate Seed Bank in the area for storage and scientific research. Specific instructions will be integrated in a section of the *Biodiversity Management Plan*.
Minimization	<u>Minimize the effects of the moving vehicles.</u> The over consolidation of soils and the vegetation disruption will be prevented or at least limited by keeping the moving vehicles (e.g., dumper trucks, concrete mixers, bulldozers) on predefined paths and roads to be well identified prior starting the construction activities. Such roads will be properly paved (i.e. with chip rock), highlighted, and delimited. The same rules will be applied to the area on which the construction operations have already started. Off road driving will be prohibited in order to avoid any unnecessary disturbance of natural vegetation.
Minimization	<u>Minimize mortality in deep excavations.</u> The Contractor will cover or fence all the deep excavations to prevent the access of wildlife and people while not working (including at night). Open trenches and other excavations will be checked daily (even more frequently during hot summer days) to identify any entrapped mammals. Rescue of any entrapped animals will be undertaken with extra care to minimize animal stress and the risk of injury. For trenches that will need to be left open for a considerable time, install slopes or other escape measures for small animals at places that are not fenced of (where possible).

Minimization	Proper storage of topsoil. Removed topsoil will be stored by the Contractor in a proper area at the Project Site to be used for landscaping after construction. This topsoil will also be used for restoration activities. Topsoil will not be mixed with subsoil or rock-like topsoil materials. Topsoil will be stored at a location that is shielded from the construction activities on geotextile sheeting, will be covered to be protected from the weathering and will be marked clearly. The topsoil should not be positioned adjacent to ditches, water courses, future excavations, and other construction activities.
Minimization	Minimize birds' collision, mortality and electrocution. At all temporary infrastructure, the Contractor will install window decals or non-reflective window covering to reduce the potential for bird window strikes. In addition, bird-friendly glasses or bird bollards will be installed on glass to avoid reflective glass that birds confuse with habitat.
Minimization	Large Mammals (threatened species) – On going monitoring. Goitered gazelle (*Gazella subgutturosa* – VU) and argali (*Ovis ammon karelini* NT and included in the RDB of Kazakhstan) were identified as having ranges which overlap with the Project Area. It will therefore be necessary to carry out ongoing monitoring to assess any impacts generated by the project and thus identify specific measures additional to put in place. Specific instruction will be integrated in a section of the *Biodiversity Management Plan.*
Restoration	Restoration of temporarily degraded/disturbed habitats. The Contractor will recover degraded and disturbed areas during the construction phase by planting native flora species. In addition, planting threatened flora species to increase the value of habitats and promote the conservation of threatened flora species will be also considered as part of the restoration programme. This action will contribute towards the No Net Loss/Net Gain achievement by the Project. All recovered areas must be maintained, and specific instruction integrated in a specific *Biodiversity Management Plan*. The Contractor will implement a monitoring plan, keep track of the restoration activities, evaluate their effectiveness, and implement a maintenance plan.
Offsetting	Based on the preliminary NH/CH quantification (ref. to Chapter 6.2.1), the Project is expected to affect 222 ha of Critical Habitat and 0,58 ha of Natural Habitat. Offsetting for the loss of Natural and Critical Habitats will be required to deliver No Net Loss (NNL) and Net Gain (NG) respectively. Full details of the measures to achieve no net loss will be provided in the final BAP.
Impact Factor: Change in the local morphology and topography	
Avoidance	Avoid unnecessary morphology and topography changes. The Contractor will ensure that unnecessary leveling and excavations will be avoided. The excavation rates will follow the Project design specifications, which will be defined to avoid as much as possible effects on the local morphology and topography. No unauthorized and uncontrolled piles and mounts of soil and rocks, debris, or waste (although temporary) will be created, and no digging of materials will be allowed.
Minimization	Minimize the disturbance to the existing contour. The Contractor will ensure that no excessive changes in the local morphology and topography will be generated and that – where possible - the general slope of the site will be preserved. The operations will strictly follow the Project design drafted accordingly to specific technical studies. The works will consider the morphology and topography of the site and the pattern of the water flow and the infiltration rates. During the vegetation clearance, the excavation and the foundations laying, no voids will be left (i.e., sinking prevention) and no unnecessary soil over consolidation will be carried out.
Restoration	Restore the excavated areas as soon as feasible.

	The Contractor will ensure that the excavated areas will be restored shortly after completion of construction activities using the most effective bio-engineering techniques (*e.g.,* slope plantings, plant-root reinforced and anchored slopes). Specific instruction will be integrated in a section of the *Biodiversity Management Plan*.
Impact Factor: Change in the local hydrology and surface water quality	
Avoidance	Avoid leaks and spills on the surface of water bodies. The Project area is characterized by small seasonal streams (e.g. Karakasay Creek, Kiyakty Creek, Sarybulaksay Creek) and water springs and the OHTL section will cross the Shu River. Pollutant leaks and spills potentially generated during transportation on roads will be avoided. The moving vehicles (e.g., trucks meant for goods and materials transportation, dumper trucks, concrete mixers, bulldozers) will follow predefined paths and roads, will avoid crossing water bodies and will be regularly cleaned and repaired/maintained. The Contractor will ensure that: • No dirty or damaged vehicles will leave the construction site. • Goods and materials to be transported by road will be properly secured to avoid goods tripping, flipping and overflows. • The vehicles transporting sludge, semi-solid and liquids will have perfect tightness and will be equipped with spills prevention kits. The drivers will be authorized and trained to properly behave in case of accidental spills and leaks.
Avoidance	Avoid discharging liquid, semi-solid or muddy materials into surface waters. The Contractor will ensure that no intentional or accidental discharge of liquid, semi-solid or muddy materials into surface waters will be carried out. The supervision of materials quantities, paths and destinations will help prevent such potential issues.
Avoidance	Avoid generating water pits and ponds. The Contractor will prevent any type of action that can lead to the generation of pits and ponds such as soil over consolidation and uncontrolled wastewater discharges. Proper runoffs and stream channeling design will prevent such risks. In case heavy rain leads to the generation of pits and ponds, the Contractor will promptly complete their removal by pumping the water by means of vacuum truck and disposing it of as per the Project specifications and requirements. Check such locations for breeding amphibians before draining (do not drain until young leave the pond or relocate) and daily checks/provision of ramps where banks are steep to minimise fauna falling and drowning.
Minimization	Freshwater fauna natural movement. Where the Project crosses small seasonal streams and rivers, appropriate mitigation measures will be implemented and installed to ensure the continuity of the water feature. The Project will not constitute a barrier to fish and freshwater species movement. They must be designed to avoid the interruption of waterways, modification of natural flow velocity, and formation of stagnant water.
Minimization	Freshwater habitats and species - Minimize the potential pollution and sedimentation of the surface water The potential pollution of minor surface water bodies (*e.g.*, seasonal water channels and rivers) will be avoided by avoiding pollutant runoffs with potential adverse effects: • the solid and liquid storage of products and waste on the construction site will be properly managed. • The fine-grained material should be stockpiled, covered, and placed 30 m from the drains or from the areas where seasonal water channels generated. • Any type of uncontrolled wastewater, oils, fuels, or chemicals spreading and runoff will be avoided. • The Contractor will design and install a station for properly collecting and managing the wastewater deriving from the construction site activities. During construction works, any degradation of freshwater habitats will be also avoided, in terms of sedimentation due to the crossing works on the banks or in stream.

	A *Water and Groundwater Management Plan* will be prepared and approved before the start of construction activities, to include the management of construction stormwater and wastewater, to ensure the protection of surface water resources and that the work is done correctly, safely, and in compliance with all regulations at every stage.
Restoration	Restoration of degraded freshwater. If any freshwater habitats are degraded by the construction activities, the Contractor will implement recovery actions for those habitats to maintain the form and function of these ecosystems. Specific instruction will be integrated in a section of the *Biodiversity Management Plan*. The various restoration techniques include physical methods such as sewage interception, dredging, algae removal, and biological processes which include restoration of aquatic plants and/or bio-membrane techniques. All recovered areas must be maintained. The Contractor should implement a monitoring plan, keep track of the restoration activities, evaluate their effectiveness, and should implement a maintenance plan. The plan must include control of water quality, freshwater biodiversity, and the maintenance of the ecological balance.
Impact Factors: Emission of dust and particulate matter and Emission of gaseous pollutants	
Avoidance	Avoid vehicle idling. The Contractor will ensure that engines, vehicles, equipment and machinery are switched off/turned off while not in use.
Avoidance	Avoid using machinery, equipment and vehicles that don't undergo periodical control and maintenance. For reducing emissions and Project environmental impacts, the Contractor will exclusively use equipment and machinery that have undergone: • Periodical maintenance and control on the emission control systems (e.g., aspiration and filtration systems) serving the machinery, equipment and vehicles. • Periodical verifications on the fuel and oil types used and on their consumption. • Periodical control on the speed of moving trucks. • Periodical verification of the weight of the truckloads. The Contractor will ensure that a specialized subcontractor will carry out the periodical maintenance and control activities and that such activities will be tracked by registering them on a dedicated log to be kept on site.
Avoidance	Avoid using non-compliant hazardous materials and chemicals. The Contractor will ensure that the hazardous materials and chemicals used onsite (i.e., paints, glues, oils, thinners, and plastics) be all sourced and purchased according to the Project standards. The usage of non-compliant or unlabeled chemicals will not be allowed. The chemicals bins and trays will be properly labelled. The materials and chemicals' labels will show the product name and the hazard pictograms (e.g., Hazardous to the environment or Acute toxicity symbols). Each product will be equipped with its updated MSDS showing the productor name, the chemical formula/the components, the hazard pictograms, the warnings and the danger indications and the safety advice on the personal or collective protection equipment to be used for the handling.
Avoidance	Avoid unproper management of chemicals. The Contractor will ensure that the materials and chemicals used onsite are properly stored in dedicated locations which will be locked up and well-ventilated. The bulks, cans, bins, and trays will be closed/sealed to avoid pollutants run-off.
Avoidance	Avoid open burning of solid wastes. The Contractor will forbid the open burning of any solid wastes.
Avoidance	Avoid dust emissions from construction material storage and from soil and rocks piles and mounts. Specific mitigation measures will be adopted on site to avoid dust and particulate matter dispersion:

	• the loose material, when temporarily stored on the Project construction area for later use, disposal, or reuse, will be properly segregated, sprayed down with water, and protected from weathering (i.e., covered up with a geotextile or other type of layers). • The granular material will be stored in stalls, or in controlled and treated heaps protected with tarpaulins. • Covered and uncovered warehouses for storing small/medium construction materials and equipment will be installed. • The height of the mounds/piles of loose material should not be more than 2 m and the slope angle should not be more than 30° for preventing flows and sliding. • Wind barriers (protective fences) will be used when necessary. • The Contractor will avoid long-term stockpiling of material; however, when a longer stockpiling is necessary, the piles should be capped or grassed over. The Contractor will supervise the construction site for ensuring the proper adoption of the mitigation measures and the compliance to the *Dust Management Plan* by carrying out periodical visual inspections.
Avoidance	<u>Avoid dust emissions from moving vehicles.</u> To avoid dust generation from moving vehicles and dispersion, the following measures will be implemented: • Roads will be sprayed down with water during the dry season. • All moving vehicles will follow pre-defined routes. • The speed limit for heavy vehicles within the construction site will be restricted to 20 km/h. Loose material on trucks and other transport vehicles will be covered up to avoid dust dispersion. • Trucks and the other vehicles will be periodically washed and cleaned prior to leaving the construction site. • Periodic visual inspections will be carried out to ensure the adoption of mitigation measures. An *Air Quality Management Plan* will be prepared and approved before the start of construction activities, to avoid dust and particulate matter spreading and to ensure the work is done correctly, safely, and in compliance with all regulations at every stage.
Minimization	<u>Minimize dust emissions deriving from the construction activities (roads, roads graveling, WTG and OHTL areas).</u> Earthworks, excavation, soil stripping and earthmoving will generate dust and particulate matter, especially during the dry seasons. The Contractor will ensure that: • Water available on site for dust suppression is sufficient. • Construction activities will not result in exceedances of the air quality objectives/limit values for gaseous pollutants and for dust deposition. • Excavation surfaces will be stabilized, covered up and/or re-vegetated as soon as possible. The Contractor will carry out periodical on-site visual inspection for assessing the proper implementation of these control measures. Monitoring campaigns for dust, particles, and gaseous emissions ($PM_{2.5}$, PM_{10}, O_3, SO_2, NO, NO_2, NO_X, metals and VOCs) will be carried out and in case applicable limits are passed, corrective measures will be adopted. An *Air Quality Management Plan* will be prepared and approved before the start of construction activities, to avoid dust and particulate matter spreading and to ensure the work is done correctly, safely, and in compliance with all regulations at every stage.
Minimization	<u>Minimize greenhouse gas emissions and other gas pollutants.</u> The Contractor will minimize greenhouse gases emissions throughout the construction phase by adopting specific measures such as: • minimizing, to the extent possible, emissions from fuel combustion by reducing to the minimum the materials and goods transportation needs through accurate transport planning, sourcing near material suppliers and preferring, where possible, transportation methods having less environment impacts (e.g. avoiding planes).

	• Purchasing low Sulphur fuel for feeding vehicles and engines. • Sourcing, where possible, plants, machinery, vehicles, and equipment operating on carbon-neutral biofuels or renewable energies. • Ensuring that the cooling systems to be installed in the administration/offices area contain exclusively refrigerant gases with low global warning potential (GWP) and periodically inspecting them for detecting gas leakages. • Defining strategies for decreasing waste generation, reuse, and recycling and, consequently, decrease the waste disposing off to landfill. • Preferring eco-friendly building materials and preferring renewable energy sources for the construction phase. • Using low-carbon concrete over traditional materials (i.e., low embodied carbon construction materials).
Minimization	Minimize dust emissions from truck loading and unloading operations. The Contractor will ensure that the trucks loading and unloading operations be carried out so to minimize dust and particulate matter emissions. Truck loads will be sprayed before unloading.
Restoration	Restore the highly degraded soil and excavated areas. Where and to the extent possible, the Contractor will restore the roads, and the construction area surfaces to their earlier conditions for preventing dust and particulate matter emissions over time. Specific instruction will be integrated into a section of the *Biodiversity Management Plan*.
Impact Factor: Emission of noise and vibrations	
Avoidance	Avoid rearing and breading periods. The Contractor will plan activities generating high noise levels to start outside the breeding and rearing periods (depending on the species). Specific instruction will be integrated in a section of the *Biodiversity Management Plan*.
Avoidance	Avoid night work. Night work in proximity to natural habitats and sensitive areas will be avoided from 8pm to 6 am, to reduce impacts to nocturnal fauna species, especially bats.
Minimization	Use of sound barriers. *In case of noise sensitive receptors in the Project's footprint area, this mitigation measure will be performed.* The installation of acoustic barriers could help minimize the impact of noise emission and vibrations. The contractor should consider the installation of the following sound barriers or a combination of them: artificial acoustic barriers; earth berms structures; low-height barriers and/or vegetative barriers, selecting plants tolerant for conditions (e.g., native species, and air/road contaminants). Specific instruction will be integrated in a section of the *Biodiversity Management Plan*.
Minimization	Minimize noise emissions from facilities and vehicles. During construction phase the Contractor will: • select equipment with lower sound power levels. The noise emission of equipment used at the site, expressed in terms of sound power level (LwA), must comply with the noise limits according to the power (kW) of the equipment. Install silencers for fans, suitable mufflers on engine exhausts and compressor components, acoustic enclosures for equipment casing radiation noise, vibration isolation for mechanical equipment. • Maintain regularly the equipment to ensure noise levels are maintained within requirements. • Reduce noise impact from vehicle transport by switching off machinery or equipment engines during idle hours.
Impact Factor: Emission of light	

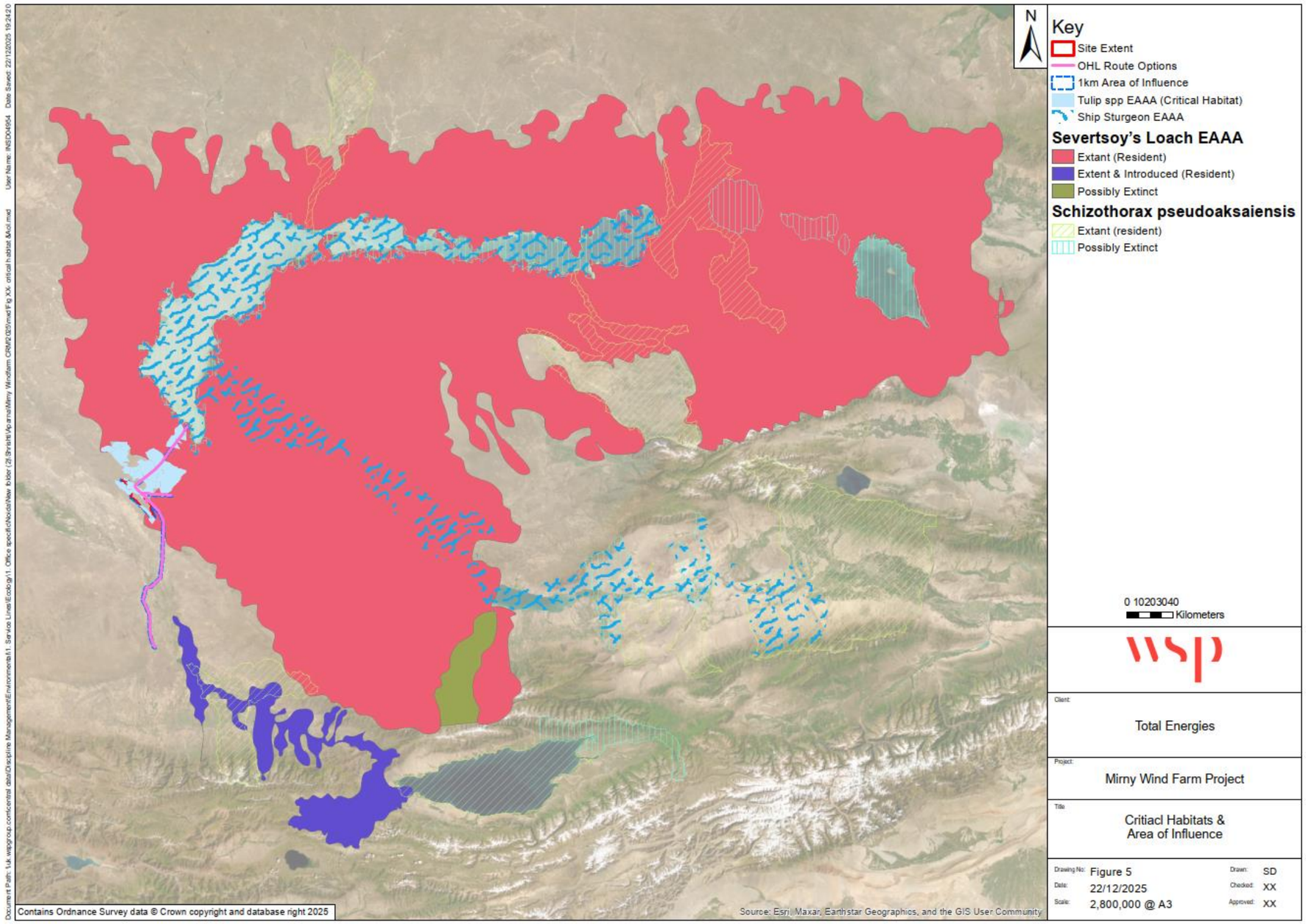
Avoidance	<u>Avoid emission of light on sensitive areas</u> The Contractor during the construction phase will: • avoid direct light to the adjacent natural areas. Direct lights solely onto work areas (i.e. use of spotlights instead of flood lights). For road and amenity lighting installations, light near and above the horizontal should normally be minimized to reduce glare and sky glow. • Avoid long wavelength light sources, higher than 700 nm, thus red lights. Red lights showed the strongest attraction of migrant birds. Avoid light with blue/violet (400 – 500nm) and ultra-violet wavelengths (< 400nm). Also, avoid using white LEDs that contain high short wave blue light components. Most wildlife species are sensitive to shortwave blue/violet light. This light also scatters more readily and contributes to skyglow.
Minimization	<u>Implement lighting solutions on the project site to reduce potential fauna attraction.</u> The Contractor, during the construction phase, will: • plan the lighting to ensure the level of light required for the safety of the workers and the safety of the equipment while minimizing the luminous level. • Minimize activities at night, particularly where the project is in proximity to sensitive ecosystems. • When selecting luminaires ensure that suitable products are chosen and that their placement minimizes stray light and glare. Prefer dark-sky compliant full-shielded (i.e., full cut-off) light fixtures that direct light downwards below the horizontal plane and result in no up-light. • Keep glare to a minimum by ensuring that the main beam angle of all lights directed towards any potential observer is not more than 70°. Higher mounting heights allow lower main beam angles, which can assist in reducing glare. • When lighting vertical structures, direct light downwards wherever possible. If there is no alternative to up-lighting, then the use of shields, baffles and louvres will help reduce spill light around and over the structure to a minimum. • Use of full horizontal cut off luminaires installed at 0° uplift will, in addition to reducing sky glow, also help to minimize visual intrusion within the open landscape. • Use more warm-white light sources, as proposed by many organizations (The Dark and Quiet Skies consortium, the International Union for Conservation of Nature and United Nations Office for Outer Space Affairs). Use green “bird friendly” high-pressure sodium bulbs for lighting to reduce attraction to nocturnally migrating birds, particularly in locations were turning lights off is not possible. • Use amber spectrum bulbs (wavelength of 500 – 700nm), with minimal blue. Best is with light sources higher than 560nm. • Consider lumens (amount of light produced) rather than watts (amount of energy used) when selecting lighting and prefer low glare lighting fixtures to reduce excessive brightness and diffuse light. Low glare options can also require less energy. • Using non reflective surface treatments for project facilities. Reduce building contrast levels by using finishes with low reflectance levels and colors that match natural landscapes. Where possible, structures on the site will be dark in color to absorb light reflection. • Consider flashing lights instead of steady lights. Flashing lights are believed to be less attractive to birds than steady lights.
Impact Factors: Demand for solid waste treatment/disposal and Demand for liquid waste and wastewater treatment/disposal	
Avoidance	<u>Avoid improper site waste management.</u> The Contractor will ensure that: • The Project area will be equipped with proper temporary waste storage/accumulation areas. • The temporary waste storage/accumulation areas will be roofed, concrete-paved or waterproofed or equipped with containment trays to prevent spills and leakages. • The waste will be stored segregated per category, and it will be labelled for its identification and classification. • The drains of the waste storage/accumulation areas will collect the water runoffs and convey them into the wastewater treatment plant. • No waste mixing, no storing on the bare land and no burning will be allowed.

	• The materials that can be recycled such as packaging paper, plastic and glass bottles will be sent to licensed recycling facilities, as far as practicable. • The waste deriving from the equipment maintenance (e.g., filters, oily rugs and metal parts containing hydrocarbons, oils and lubricants) will be properly stored on a leak-proof floor covered with shelter and then sent to recovery/disposal. • The waste oils will be collected in specific containers; the different kinds of oils will not be mixed for storage. • A specialist will carry out regular site inspections and verify the spills and leaks containment systems, conditions and integrity. • The site workers will be trained in good practices and arrangements for collection, safe handling and effective and correct disposal of both hazardous and non-hazardous waste. The training will include instructions and best practices for enhancing the waste reduction, reuse and recycling; the medical waste generated from the site infirmary will not be mixed to the general waste, but it will be properly segregated, and it will be managed by a company licensed for managing medical waste.
Avoidance	Avoid fauna from accessing waste storage. The Contractor will install fences to prevent animals accidentally entering waste storage areas. Fences will be designed and use materials that are not harmful to wildlife. Visual, physical and/or audio deterrents will be installed to keep fauna and avifauna away from waste storage.
Avoidance	Avoid burning waste. The toxic chemicals released during burning include nitrogen oxides, sulfur dioxide, VOCs and polycyclic organic matter. Burning plastic and treated wood also releases heavy metals and toxic chemicals, such as dioxin. The Contractor will ensure that no intentional or accidental waste burning will occur on site. The Contractor will take immediate actions – according to the legal framework - in case a waste arson starts.
Avoidance	Avoid the waste spreading all over the construction site. The Contractor will install trash bins all over construction site to avoid waste spreading, burning and burial. The domestic solid waste from the accommodation camp and the rest areas will be properly collected, segregated, and managed as per the Project standards. The site HSE team will raise the workers' awareness on proper general waste disposal.
Restoration	Restore the areas where temporary deposits have been dismantled. As the temporary waste storage/accumulation areas will be dismantled/decommissioned, these will be restored, cleaned and destinated to other purposes or revegetated. If revegetated, the Contractor should implement a monitoring plan, keeping track of the restoration activities, evaluating their effectiveness and should implement a maintenance plan. The plan must include the control of the quality of the plant soil, the quality of mixtures for hydro-seeding, the engraftment of planted tree and shrub individuals, the management of reforested areas over time, the use of rescue irrigation if necessary. Specific instruction will be integrated into a section of the *Biodiversity Management Plan*.
Impact factor: Water demand	
Avoidance	Avoid improper river pumping. The Contractor will: • avoid abstracting water from low flow rivers; and/or • maintain river's flow magnitude, frequency, duration and time.
Impact Factor: Workers' influx	
Avoidance	Avoidance of any contact with wildlife. The Contractor will prohibit the workers from engaging themselves in any type of fishing, hunting and arrangement of traps for animals and birds.

	Any fauna species encountered will not be interfered with or disturbed until it moves on by itself. This includes temporary stopping operations as needed.
Minimization	Employees and subcontractors' awareness raising. All employees and subcontractors will be trained and informed by the Contractor on the presence of conservation areas on site, on the biodiversity values, and how to behave in case of wildlife encounter. By partnering with agencies responsible for law control, the Contractor will strengthen law enforcement against illicit wildlife trade.
Impact Factors: Increase of road traffic and Improvement of road network	
Avoidance	Avoid exceeding the speed limits when transporting goods and materials onsite or offsite. • Speed limits will be introduced and applied to the entire construction site. • All drivers accessing the site will be briefed about the speed restrictions. • Signs and labels showing the maximum speed allowed will be affixed at the site entrances and on the Project area roads. Any unsafe or irresponsible actions will be identified, corrected, and reported to the HSE department.
Avoidance	Avoid unsafe or irresponsible actions by drivers. All vehicles will comply with the site safety signs and will enter and exit the Project site in a predefined direction. Vehicles' maneuvering and U-turns will not be allowed on public roads.
Avoidance	Avoid the traffic vehicles offroad, outside the Project area boundaries and the defined paths. Trucks and vehicles will travel on predefined paths. The Contractor will ensure that no vehicles and trucks will leave the predefined road without proper authorization. Entrance of unauthorized vehicles will be forbidden.
Minimization	Minimize effects of road kills. A *Fauna Handling and Rescue Procedure* will be prepared and actioned by the Contractor in case any fauna species are injured during the construction activities. Species must be taken to the allocated to the vet for treatment. To reduce the likelihood that scavenging species be struck by vehicles, roadkill will be removed or relocated and reported as an environmental event. Moreover, all fauna deaths and real animal sightings in the project site and dumping areas will be reported. Project traffic routing will be reduced through areas of particular interest for endemic fauna species (birds, amphibians, mammals) wherever possible and during sensitive periods (nesting, reproduction).
Restoration	Restore damaged roads, damaged plots of land and damaged fences. Ensure that damages caused to roads by trucks and vehicles be repaired.
Impact Factor: Introduction and spreading of invasive alien species	
Avoidance	Clean equipment. The Contractor will apply rigorous and appropriate control procedures at the site access points, to prevent accidental introduction of invasive alien species. Furthermore, the wheels of the trucks must be cleaned before the trucks leave the dumping area sites.
Minimization	Management of established invasives. In case alien (invasive) species are detected, they reduce or eliminate the impacts of established species by eradication, containment, exclusion, or population reduction through physical or biological control, according to the *Invasive Alien Species Management Plan* (IASMP). This plan will design and implement effective management programs appropriate for each species and habitats, incorporating best practices.

Minimization	Monitoring of spreading of alien (invasive) species. The contractor will adopt a monitoring plan, to verify on an annual basis the presence of invasive species through field surveys and will evaluate the effectiveness of the actions undertaken by following the IASMP.
Restoration	Post-management restoration. Sometimes, control of an invasive species is followed by rapid and adequate recovery of the native ecosystem or of the economic or societal value affected by the target species. But in other cases, native species may fail to recover, or unforeseen adverse consequences may occur, such as invasion by other introduced species. In such cases, further intervention may be required to assist in the recovery of native biodiversity or other values. This may include specific restoration projects for individual native species, or management of other invasive species. The Contractor will design and implement a post-management restoration project to ensure the success of the recovery of native biodiversity, ecosystem, ecosystem services and other values, following the IASMP.

Figure 2: Project AoI showing Site, OHTL and 1km Buffer Zones



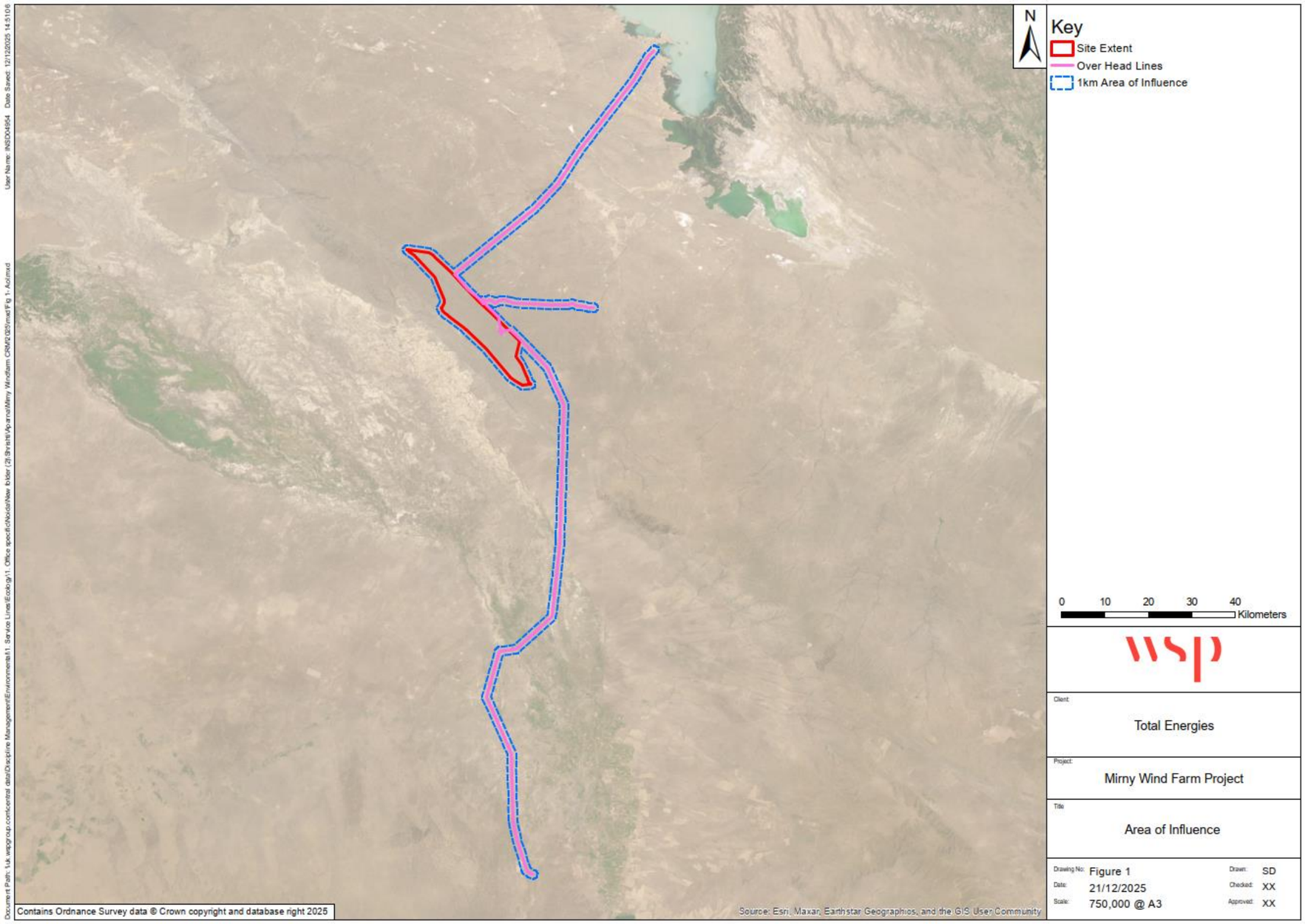


Figure 3: Project AoI with overlapped with CHs (38,444 Ha (50.2%) of the AoI is assessed as Critical Habitat.)

6.2.3 Impact Value and Residual Impact Value Calculations

This section describes the Impact Values and the Residual Impact Values (after the implementation of the mitigation measures) assessed for each impact factor on each biological component relevant for the construction phase.

The impact assessment methodology is presented in Chapter 03 of this ESIA ("IA Methodology").

6.2.3.1 Terrestrial habitat and ecosystems (all flora and fauna)

By implementing the mitigation measures listed above, the negative residual impacts for each impact factor on the component "*Terrestrial habitat and ecosystems (Flora and fauna)"* of a high sensitivity value are assessed as shown in the impact matrix reported below Table 4. Most of the impact factors have been assessed with a residual impact with **Medium** values. The impact factors "Demand for solid waste treatment/disposal" and "Demand for liquid waste and wastewater treatment/disposal" have been assessed with a residual impact with **High** values. Only the impact factor "Change in the local hydrology and surface water quality" and "Emission of light" have been assessed with a residual impact with **Low** values.

The results of the impact assessment are applicable to both the WPP and OHTL AoI.

Table 4: Residual impact assessment matrix for the biological component "*Terrestrial habitat and ecosystems (Flora and fauna)"* - Construction phase.

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Features		Impact Value	Mitigation effectiveness	Residual impact value
Removal/degradation of soil and vegetation- Land occupation	Duration:	Long	High	Reversibility:	Irreversible	**Very High**	Medium-high	**Medium**
	Frequency:	Frequent						
	Geo. Extent:	Project footprint						
	Intensity:	Medium						
Changes in local morphology and topography	Duration:	Medium-long	High	Reversibility:	Long term	**Very High**	Medium-high	**Medium**
	Frequency:	Frequent						
	Geo. Extent:	Local						
	Intensity:	Medium						
Change in the local hydrology and surface water quality	Duration:	Medium-long	High	Reversibility:	Mid term	**High**	Medium-high	**Low**
	Frequency:	Highly frequent						
	Geo. Extent:	Local						
	Intensity:	Low						
Emission of dust and particulate matter, gaseous pollutants	Duration:	Medium-long	High	Reversibility:	Mid term	**High**	Medium	**Medium**
	Frequency:	Highly frequent						
	Geo. Extent:	Local						
	Intensity:	Medium						
Emission of noise and vibrations	Duration:	Medium-long	High	Reversibility:	Mid term	**High**	Medium-high	**Medium**
	Frequency:	Highly frequent						
	Geo. Extent:	Local						
	Intensity:	Medium						
Emission of light	Duration:	Medium-long	High	Reversibility:	Short-mid-term	**Medium**	Medium-high	**Low**
	Frequency:	Frequent						
	Geo. Extent:	Local						
	Intensity:	Medium						
Demand for solid waste	Duration:	Medium-long	High	Reversibility:	Long term	**Very High**	Medium	**High**
	Frequency:	Highly frequent						

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Features		Impact Value	Mitigation effectiveness	Residual impact value
treatment/disposal	Geo. Extent:	Regional						
	Intensity:	High						
Demand for liquid waste and wastewater treatment/disposal	Duration:	Medium-long	High	Reversibility:	Long term	**Very High**	High	**Low**
	Frequency:	Highly frequent						
	Geo. Extent:	Regional						
	Intensity:	High						
Water demand	Duration:	Medium-long	High	Reversibility:	Long term	**Very High**	Medium-high	**Medium**
	Frequency:	Highly frequent						
	Geo. Extent:	Regional						
	Intensity:	High						
Workers' influx	Duration:	Medium-long	High	Reversibility:	Mid term	**High**	Medium	**Medium**
	Frequency:	Highly frequent						
	Geo. Extent:	Local						
	Intensity:	High						
Increase of traffic- Improvement of road network	Duration:	Medium-long	High	Reversibility:	Long term	**Very High**	Medium-high	**Medium**
	Frequency:	Highly frequent						
	Geo. Extent:	Project footprint						
	Intensity:	High						
Introduction and spreading of invasive alien species	Duration:	Medium-long	High	Reversibility:	Long term	**Very High**	Medium-high	**Medium**
	Frequency:	Highly frequent						
	Geo. Extent:	Regional						
	Intensity:	High						

6.2.3.2 Freshwater habitat and ecosystems (Flora and fauna)

By implementing the mitigation measures listed above, the negative residual impacts for the component "*Freshwater habitat and ecosystems (Flora and fauna)"* with a medium sensitivity value are assessed as shown in the impact matrix reported below Table 5. Most of the impact factor have been assessed with a residual impact with **Negligible** values.

The OHTL section that will be connected to the south step-up substation will cross the Shu River. At this stage of the impact assessment and since the baseline's studies are still ongoing, the mitigation measures and residual impact analysis has not been completed.

Table 5: Residual impact assessment matrix for the biological component "*Freshwater habitat and ecosystems (Flora and fauna)*" during construction phase.

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Features		Impact Value	Mitigation effectiveness	Residual impact value
Removal/degradation of soil and vegetation- Land occupation	Duration:	Long	Medium-low	Reversibility:	Irreversible	**Medium**	Medium-high	**Low**
	Frequency:	Frequent						
	Geo. Extent:	Project footprint						
	Intensity:	Medium						
Change in the local hydrology and surface water quality	Duration:	Medium-long	Medium-low	Reversibility:	Mid term	**Medium**	Medium	**Low**
	Frequency:	Highly frequent						
	Geo. Extent:	Local						

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Features		Impact Value	Mitigation effectiveness	Residual impact value
	Intensity:	Medium						
Emission of dust and particulate matter, gaseous pollutants	Duration:	Medium-long	Medium-low	Reversibility:	Mid term	**Medium**	Medium	**Low**
	Frequency:	Highly frequent						
	Geo. Extent:	Local						
	Intensity:	Medium						
Emission of noise and vibrations	Duration:	Medium-long	Medium-low	Reversibility:	Mid term	**Medium**	Medium-high	**Negligible**
	Frequency:	Highly frequent						
	Geo. Extent:	Local						
	Intensity:	Medium						
Emission of light	Duration:	Medium-long	Medium-low	Reversibility:	Mid term	**Low**	Medium-high	**Negligible**
	Frequency:	Frequent						
	Geo. Extent:	Local						
	Intensity:	Medium						
Demand for solid waste treatment/disposal	Duration:	Medium-long	Medium-low	Reversibility:	Long term	**Medium**	Medium-high	**Low**
	Frequency:	Highly frequent						
	Geo. Extent:	Regional						
	Intensity:	High						
Demand for liquid waste and wastewater treatment/disposal	Duration:	Medium-long	Medium-low	Reversibility:	Long term	**Medium**	Medium-high	**Low**
	Frequency:	Highly frequent						
	Geo. Extent:	Regional						
	Intensity:	High						
Water demand	Duration:	Medium-long	Medium-low	Reversibility:	Long term	**Medium**	Medium-high	**Low**
	Frequency:	Highly frequent						
	Geo. Extent:	Regional						
	Intensity:	High						
Workers' influx	Duration:	Medium-long	Medium-low	Reversibility:	Mid term	**Medium**	Medium	**Low**
	Frequency:	Highly frequent						
	Geo. Extent:	Local						
	Intensity:	High						
Increase of traffic-Improvement of road network	Duration:	Medium-long	Medium-low	Reversibility:	Long term	**Medium**	Medium-high	**Low**
	Frequency:	Highly frequent						
	Geo. Extent:	Project footprint						
	Intensity:	High						
Introduction and spreading of invasive alien species	Duration:	Medium-long	Medium-low	Reversibility:	Long term	**Medium**	Medium-high	**Low**
	Frequency:	Highly frequent						
	Geo. Extent:	Regional						

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Features		Impact Value	Mitigation effectiveness	Residual impact value
	Intensity:	High						

6.2.3.3 *Protected Areas*

By implementing the preliminary mitigation measures listed above, the negative residual impacts for the component "*Protected Areas"* with a medium-high sensitivity value are assessed as shown in the impact matrix reported below Table 6. The impact factors "Land occupation" and "Workers' influx" have been assessed with a residual impact with **Medium** values.

The results of the impact assessment are applicable to both the WPP and OHTL AoI.

Table 6: Residual impact assessment matrix for the biological component *"Protected Areas"* - Construction phase.

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Features		Impact Value	Mitigation effectiveness	Residual impact value
Land occupation	Duration:	Long	Medium-high	Reversibility:	Irreversible	**Very High**	Medium-high	**Medium**
	Frequency:	Frequent						
	Geo. Extent:	Project footprint						
	Intensity:	Medium						
Workers' influx	Duration:	Medium-long	Medium-high	Reversibility:	Long term	**High**	Medium-high	**Medium**
	Frequency:	Highly frequent						
	Geo. Extent:	Local						
	Intensity:	High						

6.3 Impact Assessment for Operation Phase

6.3.1 Impact Assessment

The effects of impact factors generated by the Project actions during the operation phase that could potentially affect the biological components have been identified and assessed in the following Table 7.

Table 7: Impact Assessment Biological Components - Operation Phase.

Impact Factor	Impact Assessment	Components Affected
Land occupation	The Project-related roads built and/or renovated; the WTGs foundations and the OHTL steel transmission towers areas will generate land occupation. Ground preparation and construction works will result in direct habitat loss, habitat fragmentation, and degradation. These effects are likely to persist throughout the operation phase. In addition, land occupation by the Project could cause habitat loss and degradation of habitats suitable for fauna, affecting the primary source of food, shelter and/or nesting sites. Species characterized by low mobility (such as small mammals, reptiles and amphibians) may not be able to move ahead of construction. Species with a hiding strategy to escape predators might also be accidentally killed. The disturbance of nesting sites may have various effects, depending on the timing of the disturbance and the species' reproductive strategy.	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Birds and bats ▪ Protected Areas

Impact Factor	Impact Assessment	Components Affected
	The physical presence of new infrastructures could generate disturbances, which might in turn lead to population displacements, alterations in predation rates, and disruptions in species interactions (in particular with reference to the mammals argali and goitered gazelle).	
Change in the local hydrology and surface water quality	During operations, potential impacts to surface water resources could occur due to the discharge or introduction of pollutants into freshwaters, such as from: - any Project structures' permanent drainage systems that are not properly functioning and kept in poor conditions; - personnel domestic wastewater, in case it is unproperly managed and disposed; - chemical hazardous materials and products, in case they are unsafely stored and/or handled; - any solid waste generated that is not properly managed and disposed; - spills and leakages during operation and management ("O&M") activities (servicing of mechanical and electrical equipment). Still, due to the minimal activities performed during the operation phase, potential impacts on surface waters are expected to be limited in the WPP construction site.	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna) ▪ Birds and bats ▪ Protected Areas
Emission of dust and particulate matter	Wind turbines and the other infrastructure part of the Project (BESS, OHTL, offices, SS, etc.) do not emit dust or particulate matter into the atmosphere when in operation. During the Project operational phase, it is expected that sources of particulate matter are identified as the maintenance vehicles that will be required sporadically. These are not considered to be relevant emitters of dust and particulate matter. As dust will not be significantly emitted by the Project itself during operations, but is part of the natural characteristics of the area, this impact factor will not be quantitatively assessed for the operational phase; however, a few standard mitigation measures are recommended in Chapter 4, aiming to further reduce any possible emissions.	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna) ▪ Protected Areas
Emission of noise and vibrations	Wind turbines produce noise through a number of different mechanisms, which can be roughly grouped into mechanical and aerodynamic sources. The major mechanical components include the gearbox, generator, and yaw motors, each of which produce their own characteristic sounds. Other mechanical systems, such as fans and hydraulic motors, can also contribute to the overall acoustic emissions. Mechanical noise is radiated by the surface of the turbine and by openings in the nacelle housing. The interaction of air and the turbine blades produces aerodynamic noise through a variety of processes as air passes over and past the blades.[2] Within this regard, in order to predict worst-case scenarios for noise levels at the nearest sensitive receptors that would potentially occur during the operation of WTGs, noise modelling studies have been conducted and details of the study have been presented under ANNEX A – Noise and Shadow Flicker Modelling Studies of this ESIA Report. The findings of experimental and observational studies from bibliography have documented that noise has the capacity to modify habitat use in certain species, which evade areas in proximity to generators due to the incessant noise, thereby diminishing the availability of suitable habitats. Furthermore, the persistent presence of artificial noise has been demonstrated to elicit a physiological stress response in mammals and birds. This response has been shown to be associated with a decline in reproductive success, which can be characterised by impaired	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna) ▪ Birds and bats ▪ Protected Areas

[2] World Bank Group. (2015). Environmental, Health, and Safety Guidelines for Wind Energy.

Impact Factor	Impact Assessment	Components Affected
	communication between individuals, heightened vigilance, or diminished courtship behaviour. Apart from the WTGs, no significant noise impact is expected from the other infrastructure part of the Project (BESS, OHTL, offices, SS, etc.) since these components primarily involve stationary equipment or infrastructure that typically operate with low noise emissions compared to the WTGs. In terms of vibrations, apart from the WTGs, impacts are considered negligible from the other infrastructure parts of the Project (BESS, OHTL, offices, SS, etc.) since these components involve static or non-moving elements that do not generate significant ground vibrations. For the WTGs, vibration impacts are also expected to be negligible. Overall, no significant impact is expected in terms of operational noise and vibration emissions.	
Emission of light	Lighting could potentially result in negative impacts of a range of ecological receptors, including those of high sensitivity such as argali, and goitered gazelle. In addition, lighting could impact foraging and commuting routes for bats.	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Birds and bats ▪ Protected Areas
Emission of shadow flicker	Shadow flickers occur when the sun passes behind the wind turbine and casts a shadow. As the rotor blades rotate, shadows pass over the same point causing an effect termed shadow flicker. The scientific literature on the impact of shadow flicker on flora and habitat is extremely limited. However, some studies on pulsed or intermittent light provide some guidance. Research conducted within controlled environments, such as greenhouses equipped with intermittent light-emitting diodes (LEDs), has demonstrated that frequencies exceeding 5 Hz tend not to elicit substantial alterations in photosynthesis across a wide range of plant species. It has been demonstrated that shade-tolerant species or undergrowth plants, habituated to variable light conditions (e.g. due to the movement of tree foliage), exhibit diminished sensitivity to light variability. The available data has not demonstrated significant differences in the growth or biomass of herbaceous vegetation and agricultural crops in the vicinity of turbines attributable solely to shadow flicker, even in areas exposed for more than 30 minutes per day. At present, there is an absence of substantial scientific evidence to suggest that shadow flickers have a significant negative impact on local flora in the vicinity of wind farms. It is evident that flora species, particularly those that are native, possess a remarkable ability to adapt to variable light conditions. Overall, no significant impact is expected in terms of shadow flicker effect.	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna) ▪ Protected Areas
Presence of new buildings/infrastructures (collision risk wind farm)	**Birds** Wind turbines impact birds through direct mortality from collisions with blades and displacement from habitats, though the latter's effects vary widely. A Collision Risk Assessment (CRA) has been undertaken for all species observed flying at Potential Collision Height (PCH) with at least five flights recorded across the entire survey effort conducted from summer 2023 to	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and

Impact Factor	Impact Assessment	Components Affected
	summer 2025. Based on this criterion, 13 species were taken forward for the assessment, which are as follows: • Black bellied Sandgrouse *Pterocles orientalis*; • Black Kite *Milvus migrans*; • Common Kestrel *Falco tinnunculus*; • Eurasian Hobby *Falco subbuteo*; • Eurasian Sparrowhawk *Accipiter nisus*; • Golden Eagle *Aquila chrysaetos*; • Lesser Kestrel *Falco naumanni*; • Little Bustard *Tetrax tetrax*; • Long legged Buzzard *Buteo rufinus*; • Rough Legged Buzzard *Buteo lagopus*; • Short Toed Snake Eagle *Circaetus gallicus*; • Steppe Eagle *Aquila nipalensis*; and • White tailed Eagle *Haliaeetus albicilla*. Based on the CRA results, the best estimate range of annual collision risk, with considering avoidance rates outlined and uncertainties, would vary from 0 to 1.9 for all species for which collision risk was modelled. The migratory Common Kestrel (*Falco tinnunculus*) demonstrated a higher frequency of annual collisions (Annual collision estimate 1.6 ± 32%). It is likely that any predicted collision events would be adverse impacts, reversible at population scale. The Project's operations may potentially disrupt the local bird community, which is of significant ecological importance within the Project site area by generating disturbance and displacement. It is important to note that birds may be disturbed by the activities of personnel and vehicles during the operation of the Project. Additionally, visual and noise disturbance from the turbines themselves may also have an impact. However, such disturbance sources will be limited, and the resident birds will become habituated to them. It is not anticipated that any ecologically significant effects will be observed. The only species of raptor that were regularly recorded by nests presence within the Project site (WTGs) and its immediate vicinity were the western Marsh-harrier (*Circus aeruginosus*) and short-toed snake eagle (*Circaetus gallicus*). It is possible that both species could be displaced from the immediate zone during the Project operation. The presence of construction workers and vehicles, in addition to the visual and acoustic disturbance caused by the turbines, has the potential to result in both species foraging away from the site. The consequence of this would be an adverse, low-magnitude, long-term impact on both species. The Project has also the potential to exert a barrier effect on the movement of bird species. The vertical configuration of turbines has the capacity to create an actual or perceived barrier which bird species may not cross or which they would need to habituate to crossing. The adverse impacts would be of low magnitude for the species inhabiting the immediate zone. However, they could be of moderate magnitude for any species that might use the area around the Project site for migration. Surveys conducted *in situ* have revealed no evidence of elevated levels of migratory bird activity within the WTGs area. This is particularly noteworthy in light of the potential for collision risk at elevated heights. However, it is important to note that the migratory corridors are aligned in a largely north-east/south-west direction, which is perpendicular to the WTGs alignment. Therefore, the infrastructure could result in the creation of an obstruction in the perpendicular direction of the predominant flight path, which would last for the duration of the proposed development. **Bats**	ecosystems (Flora and fauna) ■ Birds and bats ■ Protected areas

Impact Factor	Impact Assessment	Components Affected
	The operation of a wind farm can have direct impacts on bats, the severity of which can be determined by the ecology of each species. Bat species that occupy higher altitudes and species that tend to fly at greater heights whilst foraging or migrating, such as *Pipistrellus* species, are at greater risk of turbine collision during operation than low flying species that tend to remain at lower altitudes, such as *Rhinolophus* and *Myotis* species. It is evident that significant impacts are anticipated on the identified species of bats in the AoI, particularly on the *Pipistrellus* species. The projected consequences are contingent on the vulnerability of each species to the risk of collision, as well as their documented utilisation of the locale. It is possible that ecologically significant effects will be observed for the other species recorded during the bat surveys. Nonetheless, it is widely accepted that the impact of collision risk can be mitigated to a considerable degree. This can be achieved by implementing measures to either avoid or reduce the impact entirely. Consequently, even in the event of any residual effects occurring, these will not be significant.	
Presence of new buildings/infrastructures (OHTL-collision/electrocution)	Birds face significant electrocution and collision risks from power lines, which are a major cause of bird deaths worldwide. Electrocution occurs when a bird creates a circuit between a live and an earthed component, or between two live conductors, which is especially dangerous on medium-voltage lines. Collision happens when birds fly into the cables, particularly the overhead ground wire, with the risk influenced by factors like the bird's flight path, visibility, and the power line's height and placement. The risk of electrocution may be foreseeable for the 35kV OHTL (medium-voltage power line) connecting Sholpan to the existing Kiyakhty SS, where the species reported as most vulnerable to electrocution belong to Ciconiiformes, Falconiformes, Strigiformes and Passeriformes. Regarding collision risk, it is often observed and described for soaring, less agile birds, like herons, cranes, swans and pelicans with high or extra-high voltage power lines. The detectability of power lines for birds depends on the visibility of the wires as well as on the species' vision: for example, certain species such as vultures tend to look downwards during foraging flight. Bird casualties due to collision with overhead power lines can happen to any flying bird species. Some bird species which are active in the vicinity of power lines are more susceptible to collision risk than others. Usually it depends on the bird size, weight, character of flying, field of vision, time of the day and the special features of habitats near the power lines. Birds with low maneuverability, i.e. those with high wing load and low aspect ratio, such as bustards, pelicans, waterfowl, cranes, storks and grouse, are among the species most likely to collide with power lines. Species with narrow visual fields (e.g. swans, ducks, egrets) are at higher collision risk as they cannot see the wires from a certain angle. Another important factor is flight altitude. Migration often occurs at higher altitudes, above the height of power lines, so collision risk for migrating birds is expected to be lower. However, the collision risk of migrating birds increases with bad weather conditions which force them to fly at lower altitudes (especially at night), or if birds stop-over near a power line. On the other hand, resident birds often have more interaction with power lines due to regular movement between foraging areas and roosting or nesting sites. Several studies have shown that inexperienced juveniles more often collide with power lines than adult birds; however, there is also a number of studies that showed no difference in collision of juvenile and adult birds (Prinsen et al. 2011).	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna) ▪ Birds and bats ▪ Protected areas

Impact Factor	Impact Assessment	Components Affected
	It is accepted that bird species that regularly fly at night or in twilight are at higher risk of collision with a power line than species that mostly fly during the day. Referring to the 400-500 kv OHTL (extra-high voltage power line), from the biological point of view, the group most susceptible to collisions and therefore at greatest risk are the large, heavy bird species and certain specific orders of birds, e.g. Anseriformes, Ciconiiformes, Gaviiformes, Pelecaniformes, Otidiformes, Gruiformes, defined according to their morphological parameters (e.g. weight, wing size/area, manner/type of flight). Species which tend to group together in large flocks are also associated with higher probability of collision. The implementation of the specific mitigation measures delineated in Chapter 6.3.2 has been identified as a key strategy for achieving a significant reduction in the long-term impact. Marking the lines has become the preferred mitigation option worldwide and was demonstrated that wire marking reduced bird mortality by 55–94% (Barrientos et al., 2011[3]).	
Demand for solid waste treatment/disposal	When compared to the construction phase, the operational phase of the Project will involve a considerably lower rate of waste generation due to limited O&M activities and a smaller workforce. In addition, operational waste will largely comprise non-hazardous waste (such as recyclable waste as paper, tin cans, plastic, cartons, rubber, and glass; and non-recyclable such as food residues and other organic wastes). The generation of hazardous solid waste during operations (such as electrical waste, general clean-up materials and solvents, used chemical containers, contaminated soil from potential spills and leaks of hazardous materials, and other miscellaneous wastes) is expected to be in small quantities. However, this type of waste can cause significant adverse impacts on human health and the environment if inadequately managed. The use of inadequate facilities and procedures for the storage, collection, transfer, treatment/recycling and/or disposal of all streams of O&M waste pose a significant risk of contamination of the environment, such as soils, groundwater and surface water, and resultant impacts on sensitive biological receptors within the receiving environments. In addition, environmental contamination may also happen due to poor solid waste management by waste operators/transporters or the lack of capacity of these services at local level. As identified also for the construction phase, currently there is a lack of appropriated solid waste landfills and treatment plants in Mirny vicinities (< 200 km). It is known that the government is working to upgrade municipal landfills to meet required standards. In relation to the OHTL, no significant waste amounts are anticipated to be generated during its operation.	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna) ▪ Protected Areas
Demand for liquid waste and wastewater treatment/disposal	Wastewater generated from operational activities at the WPP site will include: - Sanitary/domestic wastewater from O&M personnel (from toilets and kitchen); - Oily wastes and oily water (from the collection of spills/leaks from transformer maintenance) – expected in very small quantities;	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and

[3] R. Barrientos et al. 'Meta-analysis of the Effectiveness of Marked Wire in Reducing Avian Collisions With Power Lines'. In: Conservation Biology 25.5 (2011), pp. 893–903 (cited on page 1).

Impact Factor	Impact Assessment	Components Affected
	- Potential hazardous liquid waste such as fuels, chemicals, paints, lubricants, solvents, waste oil, hydraulic fluid, resins, waste solvents and thinners, etc – expected in very small quantities, if any. The same closed-cycle wastewater treatment system used for constructions is planned to be used for operations. Inadequate segregation, storage, transfer and final disposal of wastewater pose a risk of accidental release of toxic substances into the environment and resulting contamination of soil, groundwater and surface water, which can generate significant impacts on local biodiversity. In addition, environmental contamination may also happen due to poor wastewater management by waste operators/transporters or the lack of capacity of these services at local level. In relation to the OHTL, no significant wastewater amounts are anticipated to be generated during its operation.	ecosystems (Flora and fauna) ▪ Protected Areas
Water Demand	Water consumption in the Project operational phase power will be negligible; in accordance with the standards of the Republic of Kazakhstan and other similar enterprises, the estimated water demand during operation will be 11,258 m^3/year, of which 8,896 m^3/year will be drinking water quality and 2,363 m^3/year will be technical water quality. However, water will still be needed for activities such as: - the daily functioning of the office's bathrooms and kitchen; - domestic cleaning purposes; - eventual landscaping; - for the onsite ion-lithium batteries; - eventual dust control; - for the firefighting stations. Groundwater is available onsite from three existing wells equipped with electric pumps powered by diesel generators. Groundwater sampling and analysis have shown that pollutant concentrations do not prevent its use for construction or operational purposes; however, the water is non-potable and must not be used for drinking due to health risks. Consequently, drinking water for operational personnel will be supplied through bottled water delivered to	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna) ▪ Protected Areas
Workers' influx / Improvement of road network	The presence of workers has the potential to generate vehicle-related collisions for all vertebrate species present within the Project's AoI, particularly those of smaller mammals and reptiles, which are characterised by their limited mobility. The consequence of this will be the direct and serious injury or mortality of receptors of low to high sensitivity. Any such impact would be negative, long-term and irreversible, and would be of medium to high magnitude and therefore of minor to major significance (depending on the receptor killed). It is conceivable that the presence of carcasses on the road may result in the attraction of scavenging animals, including birds of prey. This, in turn, could lead to an elevated risk of collision with vehicles and machinery. The enhancement of the road network is projected to result in an increase in the number of individuals accessing the area, consequently exerting an indirect impact on wildlife through the escalation of poaching activities in the vicinity. Illegal hunting, especially of gazelles, and over-exploitation of the Houbara population during the short period (about 2 weeks) of falconry hunting, which is conducted annually by permission of the Government of Kazakhstan, is already well-documented in the area.	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna) ▪ Birds and bats ▪ Protected Areas

Impact Factor	Impact Assessment	Components Affected
Introduction and spreading of invasive alien species	During The Project's operation, invasive alien species (IAS) can be introduced through the movement of equipment and personnel and spread due to habitat disturbance that favours non-native species. WTGs can also act as new habitats or "stepping stones" for invasive species to spread into new areas. Habitat disturbance and the creation of new surfaces facilitate invasion and colonization.	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna) ▪ Birds and bats ▪ Protected Areas

6.3.2 Mitigation Measures

The mitigation measures that will be implemented during the *operational phase* for all biological components are provided below in Table 8, listed according to the mitigation hierarchy. Several mitigation measures presented in Chapter 4 of the ESIA to mitigate impacts on physical environmental components will also have indirect mitigating effects on biodiversity. These are not repeated here. These measures will be implemented in addition to the Project embedded mitigation measures which are standard procedures applied by the Contractor to achieve compliance with legal requirements and regulations and alignment with Good International Industry Practices ("GIIP").

ESMPs to be implemented during the Project's operational phase will be prepared in a timely manner before the start of operations activities and will incorporate the mitigation measures presented below. The ESMPs will be part of the ESMS, whose structure and functioning are described under Chapter 12 of this ESIA (Environmental & Social Management System Framework Document).

The Contactor will ensure an expert ecologist (flora and fauna specialist) is hired and included in the HSE department to manage the field activities according to the proposed mitigation measures.

Based on the impact assessment, the MPs to be prepared are included in the following table. However, the MPs mentioned may be not exhaustive and depending on future needs, they can be modified to better adapt to the Project needs, as well as others can also be included.

Table 8: Mitigation measures for biological and ecological components – Operation Phase.

Mitigation hierarchy	Mitigation Measure
Impact factor: Land occupation	
Minimization	All fauna and flora species - Workers' biodiversity awareness raising • Establishing a proper code of conduct and awareness raising / training of personnel. • Biodiversity training will cover all relevant mitigation requirements in relation to biodiversity applicable to workers. • Sensitive species will be included in the site induction for all operational staff. During this induction, additional control measures will be discussed, including allowing animals to move around the site, not chasing after them in vehicles or approaching them on foot, and what to do if they observe breeding birds within their works areas. • Prohibit hunting of any wildlife at any time and under any condition by workers onsite. • Prohibit flora collections of any flora species at any time and under any condition by workers onsite.

	• Restrict activities to allocated areas only, including movement of workers and vehicles to allocated roads within the site and prohibit off-roading to minimize disturbances.
Minimization	<u>Minimization of vehicle collision and mortality</u> • Speed limits are to be enforced. • Regular signage will be installed along the site access roads and internal roads informing all drivers of the speed limit. • Ban against off-road driving at all times of the day, and if necessary, the works area will be subject to a walkover by the project ecologist team. • An incidental / chance find procedure will be included in the BMP so that all workers report any road collisions so that any such incident can be investigated in full.
Minimization	<u>Fauna (threatened species) – On going monitoring.</u> Goitered gazelle (*Gazella subgutturosa* – VU) and argali (*Ovis ammon karelini* – NT and included in the RDB of Kazakhstan) were identified as having ranges which overlap with the Project site. It will therefore be necessary to carry out ongoing monitoring to assess any impacts generated by the project and thus identify specific measures to put in place. If found to be present during pre-construction surveys, monitoring of populations as appropriate, including monitoring of any offsets or enhancements for those species. Specific instruction will be integrated into a section of the *Biodiversity Management Plan.*
Offsetting	Offsetting for the loss of Natural and Critical Habitats will be required to deliver no net loss/net gain of biodiversity in these areas. Full details of the measures to achieve no net loss will be provided in the final BAP.
Impact factor: Emission of light	
Avoidance	Not implement site-wide lighting so any lighting impacts during operation will be very limited. Avoid night-time working, where possible.
Avoidance	For external security lights PIR trigger units should be used and these should be timed to automatically switch off after five minutes.
Minimization	Where lighting is required within worker compounds, site offices etc. ensure that any lighting is shielded and protected to reduce light-spill and glare. Low intensity lighting should also be used, where possible, to further reduce light spill.
Minimization	Turbines will not be lit and any aviation lights will be shielded to minimize visibility from ground level to reduce the attractiveness of lights to night flying insects which in turn could attract bats.
Minimization	The lighting above the turbine doors will be PIR-controlled and timed to switch off automatically after five minutes. This measure is intended to reduce the number of night-flying invertebrates in proximity to turbines.
	Use more warm-white light sources, as proposed by many organizations (The Dark and Quiet Skies consortium, the International Union for Conservation of Nature and United Nations Office for Outer Space Affairs). Use green “bird friendly” high-pressure sodium bulbs for lighting to reduce attraction to nocturnally migrating birds, particularly in locations were turning lights off is not possible. Use amber spectrum bulbs (wavelength of 500 – 700nm), with minimal blue. Best is with light sources higher than 560nm. Consider lumens (amount of light produced) rather than watts (amount of energy used) when selecting lighting and prefer low glare lighting fixtures to reduce excessive brightness and diffuse light. Low glare options can also require less energy.
Minimization	Consider flashing lights instead of steady lights. Flashing lights are believed to be less attractive to birds than steady lights.

Impact factor: Presence of new buildings/infrastructures (collision risk wind farm)	
Minimization	Birds and bats - Minimize birds/bats collision risk and mortality during migration periods A technology-led Shut Down on Demand during both Spring and Autumn bird migration periods (will be implemented. An Active Turbine Management Plan (ATMP) for a shut down on demand system will be prepared as a stand-alone document. The ATMP will detail the shutdown of all or some WTG and/or Predictive Fixed Shutdown of all or some WTGs located at sensitive areas to birds in response to the potential bird collision risk identified in the CRM assessment. Shutdowns are generally short term in nature. WTG shutdown will be subject to certain criteria being met and ensure a high level of energy generation while protecting biodiversity. The ATMP will include at least: • Definition/delimitation of key flight activity periods at the Project site; • Identification of the best high-tech monitoring technology (e.g., Bird Detection Radar Systems, IdentiFlight system); • Drawing on bird monitoring data both historic and real time, bird behavioural variables, site-specific characteristics and weather data and other relevant data; • Identification of high-risk areas and times; defining the groups of WTGs by zones and achieve effective coverage; • Adopting a reactive/responsive approach to mitigation but which will be informed and refined through a predictive approach; • Determining strategically located vantage points for monitoring flight activity and to facilitate effective turbine shutdown; and Improving effective communication networks between bird observers as well as between bird observers and wind turbine operators. Details will be provided in the *Biodiversity Management Plan*.
Minimization	Birds and bats - Minimize birds collision risk and mortality In order to further minimize the probability of bird collisions with the WGTs, it is recommended that a single blade of each turbine be painted black. This measure is based on the hypothesis that birds of prey, vultures and other birds active during the day are able to detect the painted blades, whereas bats, which rely more on auditory cues and have different visual capabilities, may not perceive the painted blades as effectively.
Minimization	Birds - Minimization of disturbance and collision risk All carrion that is found within the proposed WTG site will be removed in order to prevent carrion eating birds from entering the turbine area.
Mnimization	Birds - Raptor nesting monitoring The presence of raptor territories with active nests will be continuously monitored throughout the life of the wind farm. Should there be any collisions of these species with turbines, these will also be recorded. Information regarding monitoring will be passed to the relevant authorities responsible for environmental monitoring and tracking of biodiversity losses. All available guidelines for monitoring the impacts of wind farms on birds will be used and the relevant statutory bodies will be consulted.
Minimization	Bats - Minimize the risk of bat collision against turbines The growth of vegetation in close proximity to wind turbines will be prohibited, as this would provide a food source for bats, thereby encouraging them to forage in the vicinity of the turbines.
Minimization	Birds and Bats – Ongoing monitoring It is recommended that the program of VP surveys is continued, including continuing the migration season VP surveys, undertaking carcass searches beneath the constructed turbines and the implementation of shutdown of the turbines programme mentioned above.

Impact factor: Presence of new buildings/infrastructures (OHTL- collision/electrocution)	
Minimization	Minimisation of bird mortality Install bird deterrents and/or bird diverters (e.g. PVC spirals, flapper diverters, spheres, pendants) on the OHTL cables or pales to increase the visibility of transmission lines and reduce bird collisions (high voltage OHTL) and electrocution (medium voltage OHTL).
Impact factor: Workers' influx / Improvement of road network	
Minimization	To limit unauthorised access to new road infrastructure and strengthen surveillance and control of illegal activities, it will be necessary to initiate coordinated activities with Okhotzooprom. These might include the assessment of video surveillance systems and camera traps positioned at strategic points on access roads, connected to the management company's operations centre. In addition, it will be deemed necessary to enter into cooperation agreements between the facility operator and Okhotzooprom for the timely reporting of suspicious activities.
Impact factor: Introduction and spreading of invasive alien species	
Minimization	A programme of regular monitoring of all habitat reinstatement, translocation, recreation, offsetting or enhancement as identified and implemented as required following pre-construction surveys. More details will be provided in the *Biodiversity Management Plan*.
Minimization	Remove invasive plant species during routine vegetation maintenance.
Minimization	Should pest species be identified, the project ecologist will be notified and an appropriate course of action will be taken. In order to reduce the risk of by-catching, live traps will be used for the capture of small mammals. It is recommended that poison baits are not used unless there is certainty that non-target species will be affected. Any such use should be in accordance with national and international best practice and will also be subject to risk assessment. Should poison baits be deployed, it is imperative to ensure that any poisoned animal is unable to move out onto the wider area of influence. This measure is crucial to mitigate the risk of natural predators consuming poisoned animal.

6.3.3 Impact Value and Residual Impact Value Calculation

This section describes the Impact Values, and the Residual Impact Values (after the implementation of mitigation measures) found for each impact factor on each biological component relevant for the operation phase.

The impact calculations methodology is presented in Chapter 03 of this ESIA ("IA Methodology").

6.3.3.1 Terrestrial habitat and ecosystems (Flora and Fauna)

By implementing the preliminary mitigation measures listed above, the negative residual impacts for each impact factor on the component "*Terrestrial habitat and ecosystems (Flora and fauna)"* of a high sensitivity value are assessed as shown in the impact matrix reported below Table 9. Most of the impact factors have been assessed with a residual impact with **Low** values.

The results of the impact assessment are applicable to both the WPP and OHTL AoI.

Table 9: Residual impact assessment matrix for the biological component "*Terrestrial habitat and ecosystems (Flora and fauna)"* during operational phase.

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Features		Impact Value	Mitigation effectiveness	Residual impact value
Land occupation	Duration:	Long	High	Reversibility:	Long term	**Very High**	High	**Low**
	Frequency:	Continuous						
	Geo. Extent:	Project footprint						

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Features		Impact Value	Mitigation effectiveness	Residual impact value
	Intensity:	Medium						
Change in the local hydrology and surface water quality	Duration:	Long	High	Reversibility:	Long term	**Very High**	High	**Low**
	Frequency:	Continuous						
	Geo. Extent:	Local						
	Intensity:	Low						
Emission of dust and particulate matter, gaseous pollutants	Duration:	Long	High	Reversibility:	Short-mid-term	**Medium**	Medium-high	**Low**
	Frequency:	Sporadic						
	Geo. Extent:	Local						
	Intensity:	Low						
Emission of noise and vibrations	Duration:	Long	High	Reversibility:	Short-term	**Low**	Medium-high	**Negligible**
	Frequency:	Continuous						
	Geo. Extent:	Local						
	Intensity:	Low						
Emission of light	Duration:	Long	High	Reversibility:	Short-term	**Low**	Medium-high	**Negligible**
	Frequency:	Highly frequent						
	Geo. Extent:	Local						
	Intensity:	Low						
Demand for solid waste treatment/disposal	Duration:	Long	High	Reversibility:	Short-mid-term	**Medium**	Medium	**Low**
	Frequency:	Sporadic						
	Geo. Extent:	Regional						
	Intensity:	Low						
Demand for liquid waste and wastewater treatment/disposal	Duration:	Long	High	Reversibility:	Short-mid-term	**Medium**	Medium	**Low**
	Frequency:	Sporadic						
	Geo. Extent:	Regional						
	Intensity:	Low						
Water demand	Duration:	Long	High	Reversibility:	Short-mid-term	**Medium**	Medium	**Low**
	Frequency:	Sporadic						
	Geo. Extent:	Regional						
	Intensity:	Low						
Workers' influx	Duration:	Long	High	Reversibility:	Short-mid-term	**Medium**	Medium-high	**Low**
	Frequency:	Frequent						
	Geo. Extent:	Regional						
	Intensity:	Low						
Emission of shadow flicker	Duration:	Long	High	Reversibility:	Short-term	**Low**	Low	**Low**
	Frequency:	Continuous						
	Geo. Extent:	Local						
	Intensity:	Medium						
Presence of new buildings/infrast	Duration:	Long	High	Reversibility:	Long term	**Very High**	High	**Low**
	Frequency:	Continuous						

ructures (collision risk wind farm)	Geo. Extent:	Local						
	Intensity:	Low						
Presence of new buildings/infrastructures (OHTL-electrocution)	Duration:	Long	High	Reversibility:	Long term	**Very High**	High	**Low**
	Frequency:	Continuous						
	Geo. Extent:	Local						
	Intensity:	Low						
Introduction and spreading of invasive alien species	Duration:	Long	High	Reversibility:	Mid term	**High**	Medium-high	**Low**
	Frequency:	Sporadic						
	Geo. Extent:	Regional						
	Intensity:	Medium						

6.3.3.2 *Freshwater habitat and ecosystems (Flora and fauna)*

By implementing the preliminary mitigation measures listed above, the negative residual impacts for each impact factor on the component "*Terrestrial habitat and ecosystems (Flora and fauna)"* of a high sensitivity value are assessed as shown in the impact matrix reported below Table 4. Most of the impact factors have been assessed with a residual impact with **Low** values.

The results of the impact assessment are applicable to both the WPP and OHTL AoI.

Table 10: Residual impact assessment matrix for the biological component "*Freshwater habitat and ecosystems (Flora and fauna)"* during operational phase.

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Features		Impact Value	Mitigation effectiveness	Residual impact value
Change in the local hydrology and surface water quality	Duration:	Long	Medium	Reversibility:	Long term	**High**	Medium-high	**Low**
	Frequency:	Continuous						
	Geo. Extent:	Local						
	Intensity:	Low						
Emission of dust and particulate matter, gaseous pollutants	Duration:	Long	Medium	Reversibility:	Short-mid-term	**Low**	Medium-high	**Negligible**
	Frequency:	Sporadic						
	Geo. Extent:	Local						
	Intensity:	Low						
Emission of noise and vibrations	Duration:	Long	Medium	Reversibility:	Short-term	**Low**	Medium-high	**Negligible**
	Frequency:	Continuous						
	Geo. Extent:	Local						
	Intensity:	Low						
	Frequency:							
	Geo. Extent:							
	Intensity:							
	Duration:	Long	Medium			**Low**	Medium	**Low**

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Features		Impact Value	Mitigation effectiveness	Residual impact value
Demand for solid waste treatment/disposal	Frequency:	Sporadic		Reversibility:	Short-mid-term			
	Geo. Extent:	Regional						
	Intensity:	Low						
Demand for liquid waste and wastewater treatment/disposal	Duration:	Long	Medium	Reversibility:	Short-mid-term	**Low**	Medium	**Low**
	Frequency:	Sporadic						
	Geo. Extent:	Regional						
	Intensity:	Low						
Water demand	Duration:	Long	Medium	Reversibility:	Short-mid-term	**Low**	Medium	**Low**
	Frequency:	Sporadic						
	Geo. Extent:	Regional						
	Intensity:	Low						
Workers' influx/ Improvement of road network	Duration:	Long	Medium	Reversibility:	Short-mid-term	**Low**	Medium	**Low**
	Frequency:	Frequent						
	Geo. Extent:	Regional						
	Intensity:	Negligible						
Emission of shadow flicker	Duration:	Long	Medium	Reversibility:	Short-term	**Low**	Low	**Low**
	Frequency:	Continuous						
	Geo. Extent:	Local						
	Intensity:	Medium						
Presence of new buildings/infrastructures (collision risk wind farm)	Duration:	Long	Medium	Reversibility:	Long term	**High**	High	**Low**
	Frequency:	Continuous						
	Geo. Extent:	Local						
	Intensity:	Low						
Presence of new buildings/infrastructures (OHTL-electrocution)	Duration:	Long	Medium	Reversibility:	Long term	**High**	High	**Low**
	Frequency:	Continuous						
	Geo. Extent:	Local						
	Intensity:	Low						
Introduction and spreading of invasive alien species	Duration:	Long	Medium	Reversibility:	Mid term	**Medium**	Medium-high	**Low**
	Frequency:	Sporadic						
	Geo. Extent:	Regional						
	Intensity:	Medium						

6.3.3.3 *Birds and Bats*

By implementing the mitigation measures listed above, the negative residual impacts for the component "*Birds and Bats"* with a high sensitivity value are assessed as shown in the impact matrix reported below Table 11 and Table 12. Most of the impact factors have been assessed with a residual impact with **Low** values. The results

of the impact assessment are applicable to both the WPP and OHTL AoI, whereas specific impact factors are individually assessed for WPP and OHTL.

Table 11: Residual impact assessment matrix for the biological component "Birds" – Operation phase.

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Features		Impact Value	Mitigation effectiveness	Residual impact value
Land occupation	Duration:	Long	High	Reversibility:	Long term	**Very High**	High	**Low**
	Frequency:	Continuous						
	Geo. Extent:	Project footprint						
	Intensity:	Low						
Change in the local hydrology and surface water quality	Duration:	Long	High	Reversibility:	Long term	**Very High**	High	**Low**
	Frequency:	Continuous						
	Geo. Extent:	Project footprint						
	Intensity:	Low						
Introduction and spreading of invasive alien species	Duration:	Long	High	Reversibility:	Short-mid-term	**Medium**	Medium-high	**Low**
	Frequency:	Sporadic						
	Geo. Extent:	Regional						
	Intensity:	Medium						
Emission of noise and vibrations	Duration:	Long	High	Reversibility:	Short-term	**Low**	Medium-high	**Negligible**
	Frequency:	Continuous						
	Geo. Extent:	Local						
	Intensity:	Low						
Emission of light	Duration:	Long	High	Reversibility:	Short-term	**Low**	Medium-high	**Negligible**
	Frequency:	Highly frequent						
	Geo. Extent:	Local						
	Intensity:	Low						
Emission of shadow flicker	Duration:	Long	High	Reversibility:	Short-term	**Low**	Low	**Low**
	Frequency:	Continuous						
	Geo. Extent:	Local						
	Intensity:	Low						
Presence of new buildings/infrastructures (collision risk wind farm)	Duration:	Long	High	Reversibility:	Short-mid-term	**High**	Medium-high	**Low**
	Frequency:	Continuous						
	Geo. Extent:	Local						
	Intensity:	High						
Presence of new buildings/infrastructures (OHTL-electrocution)	Duration:	Long	High	Reversibility:	Short-mid-term	**High**	Medium-high	**Low**
	Frequency:	Continuous						
	Geo. Extent:	Local						
	Intensity:	High						
Workers' influx	Duration:	Long	High	Reversibility:	Short-mid-term	**Medium**	Medium-high	**Low**
	Frequency:	Frequent						
	Geo. Extent:	Regional						

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Features		Impact Value	Mitigation effectiveness	Residual impact value
	Intensity:	Low						

Table 12: Residual impact assessment matrix for the biological component "Bats" – Operation phase.

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Features		Impact Value	Mitigation effectiveness	Residual impact value
Land occupation	Duration:	Long	Medium-low	Reversibility:	Long term	**Medium**	Medium-high	**Low**
	Frequency:	Continuous						
	Geo. Extent:	Project footprint						
	Intensity:	Medium						
Change in the local hydrology and surface water quality	Duration:	Long	Medium-low	Reversibility:	Long term	**Medium**	Medium-high	**Low**
	Frequency:	Continuous						
	Geo. Extent:	Local						
	Intensity:	Low						
Introduction and spreading of invasive alien species	Duration:	Long	Medium-low	Reversibility:	Short-mid-term	**Low**	Medium-high	**Negligible**
	Frequency:	Sporadic						
	Geo. Extent:	Regional						
	Intensity:	Medium						
Emission of noise and vibrations	Duration:	Long	Medium-low	Reversibility:	Short-term	**Negligible**	Medium-high	**Negligible**
	Frequency:	Continuous						
	Geo. Extent:	Local						
	Intensity:	Low						
Emission of light	Duration:	Long	Medium-low	Reversibility:	Short-term	**Negligible**	Medium-high	**Negligible**
	Frequency:	Highly frequent						
	Geo. Extent:	Local						
	Intensity:	Low						
Emission of shadow flicker	Duration:	Long	Medium-low	Reversibility:	Short-term	**Negligible**	Low	**Negligible**
	Frequency:	Continuous						
	Geo. Extent:	Local						
	Intensity:	Low						
Presence of new buildings/infrastructures (collision risk wind farm)	Duration:	Long	Medium-low	Reversibility:	Short-mid-term	**Low**	Medium	**Low**
	Frequency:	Continuous						
	Geo. Extent:	Local						
	Intensity:	High						
Presence of new buildings/infrastruct	Duration:	Long	Medium-low	Reversibility:	Short-mid-term	**Low**	Medium	**Low**
	Frequency:	Continuous						

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Features		Impact Value	Mitigation effectiveness	Residual impact value
ures (OHTL-electrocution)	Geo. Extent:	Local						
	Intensity:	High						
Workers' influx	Duration: Frequency:	Long Frequent	Medium-low	Reversibility:	Short-mid-term	**Low**	Medium	**Negligible**
	Geo. Extent:	Regional						
	Intensity:	Low						

6.3.3.4 *Protected areas*

By implementing the mitigation measures listed above, the negative residual impacts for the component "*Birds and Bats"* with a high sensitivity value are assessed as shown in the impact matrix reported below Table 5. Most of the impact factors have been assessed with a residual impact with **Low** values. The results of the impact assessment are applicable to both the WPP and OHTL AoI, whereas specific impact factors are individually assessed for WPP and OHTL.

Table 13: Residual impact assessment matrix for the biological component "Protected areas" – Operation phase.

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Features		Impact Value	Mitigation effectiveness	Residual impact value
Land occupation	Duration:	Long	Medium-high	Reversibility:	Long term	**High**	High	**Low**
	Frequency:	Continuous						
	Geo. Extent:	Project footprint						
	Intensity:	Medium						
Change in the local hydrology and surface water quality	Duration:	Long	Medium-high	Reversibility:	Long term	**High**	High	**Low**
	Frequency:	Continuous						
	Geo. Extent:	Local						
	Intensity:	Low						
Emission of dust and particulate matter, gaseous pollutants	Duration:	Long	Medium-high	Reversibility:	Short-mid-term	**Medium**	Medium-high	**Negligible**
	Frequency:	Sporadic						
	Geo. Extent:	Local						
	Intensity:	Low						
Emission of noise and vibrations	Duration:	Long	Medium-high	Reversibility:	Short-term	**Low**	Medium-high	**Negligible**
	Frequency:	Continuous						
	Geo. Extent:	Local						
	Intensity:	Low						
Emission of light	Duration:	Long	Medium-high	Reversibility:	Short-term	**Low**	Medium-high	**Negligible**
	Frequency:	Highly frequent						

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Features		Impact Value	Mitigation effectiveness	Residual impact value
	Geo. Extent:	Local						
	Intensity:	Low						
Demand for solid waste treatment/disposal	Duration:	Long	Medium-high	Reversibility:	Short-mid-term	**Medium**	Medium	**Low**
	Frequency:	Sporadic						
	Geo. Extent:	Regional						
	Intensity:	Low						
Demand for liquid waste and wastewater treatment/disposal	Duration:	Long	Medium-high	Reversibility:	Short-mid-term	**Medium**	Medium	**Low**
	Frequency:	Sporadic						
	Geo. Extent:	Regional						
	Intensity:	Low						
Water demand	Duration:	Long	Medium-high	Reversibility:	Short-mid-term	**Medium**	Medium	**Low**
	Frequency:	Sporadic						
	Geo. Extent:	Regional						
	Intensity:	Low						
Workers' influx	Duration:	Long	Medium-high	Reversibility:	Short-mid-term	**Medium**	Medium-high	**Low**
	Frequency:	Frequent						
	Geo. Extent:	Regional						
	Intensity:	Low						
Emission of shadow flicker	Duration:	Long	Medium-high	Reversibility:	Short-term	**Low**	Low	**Low**
	Frequency:	Continuous						
	Geo. Extent:	Local						
	Intensity:	Medium						
Presence of new buildings/infrastructures (collision risk wind farm)	Duration:	Long	Medium-high	Reversibility:	Long term	**High**	High	**Low**
	Frequency:	Continuous						
	Geo. Extent:	Local						
	Intensity:	Low						
Presence of new buildings/infrastructures (OHTL-electrocution)	Duration:	Long	Medium-high	Reversibility:	Long term	**High**	High	**Low**
	Frequency:	Continuous						
	Geo. Extent:	Local						
	Intensity:	Low						
Introduction and spreading of invasive alien species	Duration:	Long	Medium-high	Reversibility:	Mid term	**High**	Medium-high	**Low**
	Frequency:	Sporadic						
	Geo. Extent:	Regional						
	Intensity:	Medium						

6.4 Impact Assessment for Decommissioning Phase

6.4.1 Impact Assessment

During decommissioning of the WPP site, the dismantling and removal of turbines and related infrastructure from the site will take place. Impacts on the biological environment may occur such as noise emissions, air emissions, and waste generation. These potential impacts require mitigations to avoid negative effects on the local environment, including also biological and social sensitive receptors, as per the IFC EHS Guidelines for Wind Energy[4].

Chapter 03 of this ESIA ("IA Methodology") describes the Project actions carried out during the decommissioning phase that can generate environmental pressures, which are identified as impact factors. The potential impacts that may be generated by these impact factors are described in the following table.

Table 14: Impact Assessment Biological Components - Decommissioning Phase.

Impact Factor	Impact Assessment	Components Affected
Emission of dust and particulate matter- Emission of gaseous pollutants	During the decommissioning phase, potential sources of dust and particulate matter emissions are likely to be similar to those associated with construction, but at a much lower rate, as there will be quite less soil movement required. It is not expected that significant amounts of dust will be generated during this Project phase, therefore potential impacts are assessed as insignificant, also due to the temporary and short-term nature of this phase. As the Project is located in a desert area where particulates in the air are most likely already quite significant, a few standard mitigation measures are recommended below to minimize any dust and particulate matter emissions during decommissioning, aiming basically to protect workers. During the decommissioning phase, gaseous pollutants such as CO, NO, NO_2, hydrocarbons, PAHs, and VOCs etc., will be emitted from vehicles and machinery involved in plant removal, land restoration, and the intense transportation of materials and waste off-site. However, elevated levels of ambient exhaust pollutants are not expected, also due to the temporary and short-term character of this phase. Therefore, impacts related to gaseous pollutants emissions are assessed as insignificant. Still, gaseous pollutants could cause occupational hazards and a few standard mitigation measures are recommended below to minimize any potential impacts on workers.	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna) ▪ Protected Areas
Emission of noise and vibrations	During the decommissioning phase, similar to the construction, noise will mainly be originated from the operations of heavy equipment/machines that will be used for dismantling the WTGs. Considering that these activities are expected to take place within the Project license area (i.e. away from sensitive receptors) and will be performed over a short-term and temporary basis, impacts related to noise are expected to be low. As for the construction, noise emissions shall be seen as a relevant aspect to the point of view of the health of the workers and relevant mitigation measures will be applied. In terms of vibrations, similar to the construction, the Project has the potential to generate vibration during the dismantling of WTGs (vibratory compaction, heavy vehicles passing through the roads, etc.). However, vibrations to be generated from these activities is unlikely to be significant, since the dismantling activities will take place within the Project license area (i.e. away from sensitive receptors). Based on that, impacts related to vibrations are expected to be low.	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna) ▪ Protected Areas

[4] final-aug-2015-wind-energy-ehs-guideline.pdf

Impact Factor	Impact Assessment	Components Affected
Presence of new buildings/ infrastructures	In the decommissioning phase, the WPP will be removed from service. The dismantling of wind turbines, BESS, SS, and all plant related infrastructure will entail activities that have the potential to: • contaminate soils and surface waters due to leaks/spills of fuel, oil, and hazardous materials and waste; • cause soil erosion and compaction from the increased exposure of bare ground to wind and water, which can cause changes in the soil structure and further degradation of soil quality and permeability, altering also the soil natural drainage pattern; • cause water streams sedimentation, as a consequence of the soil erosive processes. After decommissioning, the access roads will be kept, while the area – once the structures are removed – will undergo land restoration. It can thus be deduced that, in contrast to the operation phase, the dismantling of WTGs will be advantageous for birds and bats.	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna) ▪ Birds and Bats ▪ Protected Areas
Demand for solid waste treatment/disposal	Large amounts of infrastructure waste are expected to be generated in the End-of-Life (“EoL”) of the WPP (WTGs, the BESS, underground lines, etc.). Although a large part of this infrastructure could be recycled due to the materials they are made of, currently limited options seem to be available for their recycling. This is in fact a global issue, which ends up raising considerably the recycling costs, therefore, companies usually still prefer to send them to landfills or incineration, which comes with negative environmental consequences. In the recent years, Kazakhstan has developed a number of regulations and legislation related to renewable energy sources, however a specific law in relation to the waste management from decommissioning seem to be lacking. It is expected that over the next few decades, Central Asia will develop its capacity to deal with outdated wind power-related infrastructure, given the region's recent massive investment in this type of technology and the need for disposal and recycling that will become necessary in the not-too-distant future. In addition, the Project decommissioning activities will generate inert demolition waste and materials such as reinforced steel bars, broken concrete, cabling, transformer oils, etc., which have the potential to contaminate the soil and water resources. However, this also promotes a significant opportunity for material re-use and recycling.	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna) ▪ Protected Areas
Increase of traffic	The transport of workers and materials within the dismissing site and the different project facilities will generate more traffic. Therefore, accidental collisions with wildlife might occur especially where the road crosses wildlife corridors. Fauna species are attracted to roads for a variety of reasons, and more vehicular traffic may result in higher rates of animal mortality: amphibians may be attracted by standing water on the roadside or within the construction areas; asphalt is a heat source for reptiles and other ectotherms; some birds use roadside gravel to aid in the digestion of seeds and use the dust or sand bathing to helps in maintaining their plumage in good condition; vultures, crows, and other scavengers seek out roadkill animals and often become roadkill themselves; mammals may be attracted by organic waste, grazing herbivores are attracted to the roadside vegetation and many large mammals use roads as corridors for dispersal, routine movements or scavenging opportunities. The impact factor acts mainly on the Project footprint and nearby areas, even if the potential impacts derived may reach beyond, depending on the mobility of the species affected.	▪ Terrestrial habitat and ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna) ▪ Protected Areas
Introduction and spreading of invasive alien species	Decommissioning sites are highly susceptible to invasive alien species (IAS) because demolition and remediation create the perfect conditions for their introduction and spread. Human activity and extensive soil disturbance create new pathways and remove native vegetation that	▪ Terrestrial habitat and

Impact Factor	Impact Assessment	Components Affected
	would normally compete with IAS. These non-native plants and animals can then colonize the site and rapidly multiply, posing serious environmental and economic threats. The movement of waste materials, soil, and other debris both on and off-site can accidentally transport invasive seeds and root systems. Heavy machinery and vehicles brought onto the site for demolition, excavation, and earthmoving can carry seeds, plant fragments, and soil from other locations, as well as workers can unknowingly bring in seeds on their boots, clothing, and gear, especially if they have worked on other sites. Regular monitoring during and after decommissioning is critical. If new IAS are found, they must be addressed immediately to prevent establishment.	ecosystems (Flora and fauna) ▪ Freshwater habitat and ecosystems (Flora and fauna) ▪ Protected Areas

6.4.2 Mitigation Measures

The mitigation measures listed below reflect the mitigation hierarchy and are proposed for the decommissioning phase. These measures will be implemented in addition to the Project mitigation measures which are a standard procedure applied by the Project Operator (in addition to other required parties such as local authorities and/or dismantling company) to achieve compliance with legal requirements and regulations and alignment with GIIP.

The appropriate *Decommissioning Management Plan* to be applied during the Project's decommissioning phase must be prepared at least 2 months before the start of decommissioning activities. The overarching document ESMS Framework will also be prepared.

Based on the impact assessment, the mitigation measures to be included in the *Decommissioning Management Plan* will be the same set out for construction. However, they may be not exhaustive and depending on future needs, and they can be modified to better adapt to the Project needs, as well as others can also be included.

7.0 SPECIES SPECIFIC ASSESSMENT

The following sections consider the impacts of the Project and associated infrastructure on the species groups recorded during the survey period and references the detail already provided in the Biodiversity Baseline Chapter and the Critical Habitat Assessment where figures showing the locations of these biodiversity receptors are given. Impact mitigation and monitoring is discussed for all phases of the project and commitment made to the provision of further details on this in species specific mitigation and monitoring plans.

The project has committed to produce detailed mitigation strategies in the form of a BAP and BMP to ensure no net loss of biodiversity and net gain where possible. Further detailed plans will include: a Rare Plants Management Plan to manage impacts on Regel's Tulip, a Construction Mitigation and Monitoring Plan for Large Mammals to manage impacts on Argali and Goitered Gazelle and an OHTL Collision Mitigation Plan. Agreement will be sought with the lenders to ensure that the content of the documents is agreed along with a timeline for their provision.

7.1 Ornithology Surveys

7.1.1 Flight Activity Surveys

Thirty-six species were observed flying at Potential Collision Height (PCH) within the Collision Risk Zone. For Collision Risk Modelling, only species with at least five flights recorded across the entire survey effort were considered. Based on this criterion, 13 species were taken forward for the assessment, which are as follows:

- Black bellied Sandgrouse *Pterocles orientalis*;
- Black Kite *Milvus migrans*;
- Common Kestrel *Falco tinnunculus*;
- Eurasian Hobby *Falco subbuteo;*
- Eurasian Sparrowhawk *Accipiter nisus*;
- Golden Eagle *Aquila chrysaetos*;
- Lesser Kestrel *Falco naumanni*;
- Little Bustard *Tetrax tetrax*;
- Long legged Buzzard *Buteo rufinus*;
- Rough Legged Buzzard *Buteo lagopus*;
- Short Toed Snake Eagle *Circaetus gallicus*;
- Steppe Eagle *Aquila nipalensis*; and
- White tailed Eagle *Haliaeetus albicilla*.

Of these all are Least Concern on the IUCN Red List except Steppe Eagle (Endangered) and Black bellied Sandgrouse (Endangered for the European region).

The most frequently recorded birds of conservation concern over the survey period were Black bellied Sandgrouse (626 flights) and Steppe Eagle (128 flights), Long legged Buzzard a resident species also recorded a high number of flights at 118 during the survey period.

No species were recorded migrating over the Project site in internationally or nationally significant numbers although a number of species of global and national conservation concern, were recorded flying over the site. Based on numbers of birds observed during surveys the site is not considered to be on a major migratory flyway.

7.1.2 Breeding Raptors

During Spring 2023 surveys only two active raptor nests were recorded within the Project site boundary; both belonging to Long-legged Buzzard. Previously and due to the presence of numerous raptor nests the turbine array was moved away from these nest sites to lower the potential for disturbance from construction and operational activities and the potential for collision with the turbine blades and other infrastructure. During the Spring 2023 breeding raptor surveys a further 17 nests were recorded within the wider area outside of the site boundary. The distance of the nests from the nearest turbine of the most sensitive species, Steppe Eagle, Golden Eagle and Saker Falcon are given in Table 1.

Table 1: Active nests recorded in 2023 and distance to nearest turbine (Km)

Species	Approximate distance from nearest turbine (Km)
Steppe Eagle	7.2
Steppe Eagle	5.2
Golden Eagle	3.8
Golden Eagle	5.0
Golden Eagle	5.8
Golden Eagle	5.8
Golden Eagle	6.5
Golden Eagle	6.7
Saker Falcon	6.9
Saker Falcon	4.0

Nest searches during April 2025 within the Project site and in a 2-kilometer buffer zone recorded two active raptor nest sites from within the survey boundaries. The species concerned were marsh harrier (IUCN LC) and short-toed snake eagle (IUCN LC).

7.2 Impacts on Ornithology

7.2.1 Construction Phase

The proposed Project site and WTG locations have been designed to avoid the areas of highest ecological sensitivity due to numerous turbine iterations moving them away from areas of Regel Tulip, high densities of Argali and active raptor nests, notably Golden Eagle (6) and Saker Falcon (2). Potential impacts on birds during the construction phase consist of:

- Direct loss of habitat (including food sources).
- Indirect damage to habitats and disturbance of birds from presence of people, machinery, traffic, and noise, both within and outside of the Project area.

7.2.1.1 *Direct Habitat Loss*

During the habitat surveys in April/May 2023 and April 2025, five main types of habitats were identified across Project area:

- Xerophytic rocky low mountains;
- Outcrops of flat granite slabs;
- Saxual valley forests;
- Sagebrush and sagebrush deserts on gently undulating plains; and
- Gently sloping solonchak depressions on the plains.

The Project area is therefore predominantly covered in natural habitats (as per PS6) of herbaceous vegetation with some light cattle grazing and limited evidence of modification. The main contours of the plant communities are given in Figure 20 of Baseline Report.

Where possible construction areas have been chosen so that they avoid areas of higher ecological value and those that support receptors of greatest sensitivity, such as plant and animal species listed on the IUCN Red List or the Kazakhstan Red Data Book. Where the loss of habitat is unavoidable, only the minimal amount required will be removed.

Direct impacts resulting in the loss of bird habitat will occur during construction activities i.e. the construction compound, WTG foundations and electrical transmission connections, on-site construction roads and construction of off-site access road and grid connection works.

Habitats directly affected by the Project have not been shown to be of significant importance for birds during the surveys, with levels of feeding on site seen to be low during the survey period_and mostly limited to resident species such as Golden Eagle and Long-legged Buzzard.

No areas used by sensitive nesting raptors are being lost as a result of the Project based on current information. Where possible, no construction activities will take place within 500 m of active nesting locations of any raptor species. If pre-construction surveys indicate active nests of species of conservation concern, then a mitigation protocol will be followed. Where works commence between January and June in a given year, checks prior to construction will take place and works will not commence if raptors are found to be nesting in the 500 m buffer.

7.2.1.2 *Indirect Impacts*

There may be disturbance related impacts to resident breeding species during the construction phase from a range of sources. This may lead to short-term displacement of birds from feeding, roosting or nesting sites. These impacts are considered to be short-term and reversible albeit impacts are significant.

Other potential indirect impacts include pollution and increased human pressure, increased dust levels from construction activity which in turn could affect the ecological value and function of these habitats and the species they support. Mitigation will be included in the CEMP and Biodiversity Management Plan (BMP) prepared prior to construction. Mitigation measures for indirect impacts will include timing works to focus away from the periods of highest sensitivity – e.g. periods when young birds are in the nest, dust suppression activities (e.g. watering of tracks in dry periods, adherence to site speed limits, etc.) and banning of site workers from using vehicles away from the established transport routes. Where works take place during nesting periods, a pre-construction survey by a qualified ecologist will ensure works only take place where nesting birds will not be impacted.

Mitigation during construction will include timing construction activities to avoid sensitive ground nesting species during the breeding season (March to July). A pre-construction walk-over survey will be undertaken of all working areas to check for the presence of ground nesting birds which would be at risk from construction related impacts. Surveys will be completed by an appropriately qualified ornithologist, and surveys will be undertaken in the hours after sunrise (up to 10:00). The surveyors will aim to identify behaviour indicative of breeding activity (e.g. carrying food / nesting material / faecal sacs, presence of nests, eggs or chicks.

Where nests are found they will be recorded in full and their locations mapped, with the data transferred to Excel master sheets and Google Earth. Mapping will then be circulated to the project team along with details of a works exclusion zone. Exclusion zones will be dependent on the species of bird nesting along with its conservation status and be agreed with the qualified ornithologist and project ecologist.

With regard to disturbance to sensitive raptor species, should any nests be identified no construction activities (i.e. excavation using machinery rather than explosives, foundation pouring and turbine assembly) will take

place within 500 m of active nesting locations of species of conservation concern (unless following the below protocol).

Where works commence between January and June in a given year, checks prior to construction will take place and works will not commence if raptors are found to be nesting in the 500 m buffer. The same requirements will be followed during O&M activities during the operational phase of the Project.

7.2.2 Operational Phase

7.2.2.1 *Collision Risk*

Of the 13 species taken forward to the CRM, there were two species of conservation importance that had an IUCN status of > Least Concern.

- Steppe Eagle – IUCN (Endangered)
- Black Bellied Sandgrouse IUCN Global (Least Concern) but Europe (Endangered)

Steppe Eagle

Steppe Eagle is predicted to have a best estimate maximum range figure annual mortality of 0.2 individuals based on 98% avoidance rate. Using these data this would equate to between approximately 5 collisions during the operational lifetime of the Project, assuming a 25 year of operation span or 6 individuals over a 30-year operational period.

The global population of Steppe Eagle is declining and is currently estimated to be between 50,000 and 75,000 individuals and the population in central Asia has been estimated to be between at least 22,000 and 35,500 pairs. Two pairs have been recorded nesting within 8km of the nearest turbine at 7.2km and 5.2km respectively, and collectively with the birds recorded overflying the Project site this species' population is considered to be of Local importance.

In the absence of mitigation, collisions at the rates stated above would result in moderate adverse effect at a local level for this species over the lifespan of the Project.

Black Bellied Sandgrouse

Black Bellied Sandgrouse are predicted to have a best estimate maximum range figure annual mortality of 0.5 individuals based on 98% avoidance rate. Using these data this would equate to between approximately 12.5 collisions during the operational lifetime of the Project, assuming a 25 year of operation span or 15 individuals over a 30-year operational period.

On the Global level the population is declining and is currently estimated to be between 50,000 and 75,000 individuals. The population in Europe has been estimated to be between 14,900 and 37,700 individuals albeit there is unlikely to be a link between this population and that in Kazakhstan. Black bellied sandgrouse were recorded breeding on site and have been assigned a value of Local importance.

In the absence of mitigation, the effect of collision mortality on this species' population is considered to be low and at the local level over the lifespan of the Project.

Golden Eagle

In 2023 six pairs of golden eagle were recorded to the south of the turbine array at distances ranging from 3.8km to 8.0km. Most of the flight activity recorded during the flight activity surveys is anticipated to be from these pairs breeding outside the site boundary.

Golden Eagle are predicted to have a best estimate maximum range figure annual mortality of 0.8 individuals based on 98% avoidance rate. Using these data this would equate to between approximately 20 collisions during the operational lifetime of the Project, assuming a 25 year of operation span or 24 individuals over a 30-year operational period. This would impact a maximum of up to 12 to 24 breeding pairs over a 30 year period from an estimated population of 434 to 645 pairs in Kazakhstan. The global population is 85000 – 160000 individuals and the population is currently stable with an IUCN status of Least Concern. Given the relative abundance of territories recorded within the Project's AoI, this species' population here is considered to be of Regional importance.

In the absence of mitigation, the effect of collision mortality on this species' population is considered to be medium at the regional level over the lifespan of the Project.

7.2.2.2 *Displacement*

Displacement occurs at wind farm sites where birds use areas of land for activity such as feeding, roosting and loafing.

No birds were recorded regularly enough and/or in large enough numbers during the surveys completed to date to suggest the proposed Project will have a significant risk to any species because of displacement as almost all activity observed on site has been individual birds only. Feeding resources and foraging by Golden Eagles was identified during the surveys; however, given the abundance of similar habitat across the wider area, the effect of displacement upon this species (and any other) is considered to be negligible.

7.2.2.3 *Barrier Effect*

Operational WTGs can cause additional impacts as a result of barrier effect where migratory birds and bats may change their migration routes or pathways to avoid the operational wind turbine array. Such avoidance behaviour may possibly lead to increased flight time through the project site and potential increases in energy expenditure if birds are not able to benefit from the thermals generated by topographic features forcing them to use powered flight. These increases in energy expenditure may lead to reduced survival for long distance migrants. As a worst-case scenario, barrier effects may result in significant population impacts if large numbers of birds are forced to change annual or daily migration patterns.

The migration surveys completed in Spring 2023 to Summer 2025 suggest that three wide corridors with relatively high numbers of birds migrating birds have been identified and that flight densities between seasons and years has remained relatively stable at between 0 to 0.4 birds per hr/Km^2 to the highest level of >4 birds per hr/Km^2. Although a wide range of raptor and waterbird species were observed migrating through the site the migration densities indicate a broad front migration occurs across the wider area and is not focussed within the project site, as such it does not form a migration bottleneck where migrations rates per hour can range into hundreds of birds per hr/Km^2. Although the surveys indicate regular migration movements across the site in both the Spring and Autumn periods the size of the site and the relatively flat topography over large areas, it is assessed that relatively low densities of birds would not have to significantly deviate from their migration route to avoid the operational WTGs within the project site. In isolation, it is therefore considered that the Project will not cause a significant barrier effect for to migrating birds.

7.2.3 Decommissioning

The main impacts likely to occur during decommissioning of the WPP are very similar to the construction related impacts and consists mostly of habitat loss and disturbance to birds. These potential impacts will be assessed in detail at a later stage, prior to the decommissioning period. Following decommissioning, reinstatement of the habitats in areas previously occupied by WTGs, access tracks and other infrastructure with habitats rehabilitated as much as possible to a natural, non-degraded state.

7.3 Overhead Transmission Line

The planned 500kV OHL runs mainly parallel to the existing 500kV YUKGRES-Shu OHL, except for output from the designed South Mirny substation; the total length of OHL is 143 km.

The key risks to birds from the OHTL are collision with the wires and possible electrocution (albeit electrocution is ruled out as an impact due to the scale the the OHTL and the distance between the conductors). Observations from 10 VPs involved counting migratory birds for the purpose of recording the flight time within three height bands (0-20 m, 20-50 m and >50 m) within the established counting corridor (500 m to the left and 500 m to the right of the observation point, 2 and 2.5 km along the OHTL from the observation point).

Carcass search transects were walked under the existing OHTL from each VP and throughout the survey period, no fatalities were noted.

Birds were observed using the existing OHTL as hunting perches e.g. Saker Falcon, Golden Eagle and Long-legged Buzzard and at least one Golden Eagle nest was discovered albeit this nest failed prior to hatching.

During autumn 2024, winter 2024/2025, spring and summer 2025 surveys, a similar range of species were observed along the OHTL as were on the Project site VPs. Raptors included: Long-legged Buzzard (*Buteo rufinus*), Golden Eagle (*Aquila chrysaetos*), Common Kestrel (*Falco tinnunculus*),Steppe Eagle (*Aquila nipalensis*), Short-toed Snake Eagle (C*ircaetus gallicus*), Pallid Harriea r (*Circus macrourus*), hen harrier (Circus cyaneus), Montagu's harrier (*Circus pygargus)*, Marsh Harrier (*Circus aeruginosus*) and White-tailed Eagle *(Haliaeetus albicilla*). In December, a fairly stable composition of wintering birds with low diversity and abundance was recorded, which persists throughout the winter with the constant presence of two species (Red Book of Kazakhstan), the Golden Eagle and the White-tailed Eagle, and in December, the Saker Falcon.

Although it is not possible to accurately quantify collision risk, the carcass searches along the existing OHTL, which is the same design as the proposed OHTL indicate low collision risk for this area. This is however, concluded in the absence of a standardised carcass search protocol which will be required for the new proposed OHTL.

To alleviate collision risk line marking (specifically the earth wire) is the best solution for making the cables more visible to birds in flight. The presence of bird flight diverters is associated with a decrease in collision. The placement of various designs of diverter devices on wires has shown to effectively reduce bird collisions by between 55-94% and has become the preferred mitigation option worldwide. A wide range of potential line marking devices are available including: spheres, swinging plates, spiral vibration dampers, strips, SWAN-FLIGHT Diverters, FireFly Bird diverters, bird flappers, aerial marker spheres, ribbons, tapes, flags, and aviation balls.

A detailed **OHTL Collision Mitigation Plan** will be produced to identify the sections of the OHTL that would most benefit from line marking to prevent potential collisions.

7.4 Mitigation and monitoring

7.4.1 Pre-construction

Mitigation has been included within the design process for the Project and, based on the survey information obtained to date and the final layout has been moved to account for the proximity of breeding raptors i.e. Golden Eagle, Steppe Eagle and Saker Falcon. All these nests (if they remain active during the construction period are

now 3.8km to 6.7km away for Golden Eagle, 5.3km to 7.2km away for Steppe Eagle and 4.0km to 6.9km away for Saker Falcon.

A dedicated raptor monitoring survey will be conducted prior to construction or ground clearance works during the period February to July 2026. Surveys for Black-bellied Sandgrouse and other ground nesting birds will be undertaken from March to June 2026.

7.4.2 Construction

Mitigation during construction will include timing work to avoid the most sensitive times of year for ground nesting species. If any active nests are identified no additional construction activities (i.e. excavation using machinery rather than explosives, foundation pouring and turbine assembly) will take place within 500 m of active nesting locations of species of conservation concern until after the young birds have fledged and left the area.

7.4.3 Operation

Mitigation to avoid impacts to sensitive species of birds will be implemented by the Project and will be reviewed, updated and adapted regularly using the pre-construction and operational survey data. Proposed mitigation for collision risk to soaring birds is led by shutdown on demand and given the status of the species in the vicinity of site, it is important that mitigation can be reasonably proven to be able to work effectively at ensuring no negative impacts, as such a robust, long term post construction monitoring plan will be implemented, this includes fatality monitoring, ongoing nest monitoring throughout the lifespan of the Project, general activity monitoring (via the outputs from Identiflight or a similar system), and studies into the feeding habits of sensitive species in the area.

Details of SDoD and curtailment strategies are set out in the Operational Turbine Management Framework and will be finalised in the Operational Turbine Management Plan but the general protocol is summarised here:

- SDoD involves targeted shut down of WTGs in the event that any individual priority species or significant flock of non-priority species flies within 600 m of WTGs and is on a flight path that would bring the bird into close proximity of the WTG blades where collision could potentially occur. The advantages of a technology led system such as Identiflight or similar system have been found to outweigh the disadvantages of carrying out shutdown solely led by field observers.
- Currently there are no sensitive raptor nests within the site boundary which would require any mitigation but should new active nests be found in the pre-construction monitoring then the following protocol is suggested:
- Curtailment from 01 March through 15 April during daylight hours only. This date range reflects the potentially sensitive period of early spring, during which species that could potentially nest within close proximity to any of the WTGs, specifically Steppe Eagle, Saker Falcon and Golden Eagle.
- Where nest site specific curtailment was not required the priority turbines identified in the operational turbine management framework would operate using the automated Shutdown on Demand (SDoD) curtailment regime regulated by the IdentiFlight system or similar. This condition does not preclude the implementation of other mitigation measures, including other curtailment, that might be required in the future on the basis of the results of fatality monitoring at the project site and per the adaptive management framework, which will be developed as part of the Biodiversity Management Plan (BMP).
- The Identiflight system relies on a database of images of each species requiring shutdown, many of the species found at the Project site are already on this database however some “training” will be required to ensure all species are covered. This will entail a mobile Identiflight unit being installed in the field and connected to a generator unit for power.

- Further impact mitigation could include carcass clearing from the Project site and wider area for the duration of the Project life to deter carrion feeders, notably raptor species from feeding within the Project boundary and potentially putting themselves at a higher risk of collision. This would include any collision mortality by the carcass search team as well as dead livestock if local herders can be encouraged to report any losses to the project staff.

7.5 Residual Impacts

The Identiflight system has been shown to reduce collisions significantly. Ongoing studies at the Cattle Hill Windfarm in Tasmania suggest that actual collisions following Identiflight intervention are reduced by closer to 100%. Up to 365,000 at risk WTG seconds have been observed across the entire site per year (on average 400 curtailment instigations per day, each lasting 120 seconds). In the 27 months of operation, three fatalities have been recorded at Cattle Hill which is equivalent to an overall rate of flights not resulting in collisions of 99.999% during operation for all species. This system has recently been installed at the Zarafshan Wind Power Plant in Uzbekistan but the monitoring reports are not yet available.

7.6 Enhancement and Offsetting Options

Where possible, areas of land procured for the Project should be enhanced for birds (and other wildlife). This will include restricting human access to certain parts of the Project site and allowing areas of natural vegetation to grow that would otherwise have been grazed or destroyed by vehicle movements. A programme to discourage locals from removing vegetation such as Black Saxual or poaching in the Project area would help reduce disturbance to sensitive nesting species such as Steppe Eagle and Saker Falcon.

Erecting nest boxes suitable for falcon species (such as Saker Falcon and Lesser Kestrel) on pylons outside of the Project area will enhance nesting opportunities for these species.

7.7 Operational Monitoring

In addition to the ongoing operational monitoring detailed in the ‘operational turbine management framework’ further operational monitoring will also include post construction fatality monitoring following the protocols set out in the good practice guide IFC (2023)[1].

The protocols used are summarised below and aim to provide an understanding of the impact of the operational WTGs on the birds that are using the Project site, specifically those migrating through it although this also includes resident birds.

- Searcher Efficiency Trials:

Searcher efficiency trials are designed to assess the ability of searchers to actually find carcasses and will be undertaken on a seasonal basis (Spring, Summer, Autumn and Winter) during construction and operation in order to evaluate the efficiency of the carcass search survey. These trials will inform the need for any changes to the search protocols.

- Carcass Removal Trials (carcass persistence):

Carcass removal trials are designed to estimate scavenger bias and help to calculate the potential number of carcasses in the absence of this bias. Each carcass is revisited at specific intervals to assess the carcass removal by scavenging animals.

During these initial trails each test carcass will be visited on days 1, 2, 3, 4, 7, 10 14, and 20 until the carcass has been removed or not as the case may be. On completion of the carcass removal trials the results will inform removal rates and if needed, provide an update to the carcass search methods/procedures.

- Carcass Searches:

Carcass search coverage and frequency will be confirmed after the first of the searcher efficiency and carcass removal trials and updated based on ongoing trials.

All of the WTGs will be searched during each round of searching

A plot under each WTG will be searched for carcasses with each plot centred on a WTG and the sides orientated north/south, east/west.

If a carcass is found details such as species, GPS position, distance from WTG obtained as well as photographs of carcass, location and the state of each carcass will be recorded.

Carcasses will be retrieved from the field and stored in a freezer at the site offices so that identification can be audited and confirmed periodically

- Breeding bird nest surveys (specifically raptors):

Breeding bird surveys, including detailed raptor nest searches within the Project site and wider area, will be undertaken annually during construction and in years 1, 2, 3, 5, 10, 15 and 20 of operational period to monitor any changes the breeding bird assemblage on the Project site both negative and positive. This will allow assessment of predicted impacts from habitat loss during construction and displacement from the operational wind farm to be verified and any impacts on the Zhusandala State Reserved Area to be assessed. Raptor nest surveys should also be continued from February 2026 to provide additional pre-construction data.

If an occupied nest is identified within close proximity (<500 m) of a WTG during the operation of the Project, this nest will be closely monitored by Project staff and WTGs within that buffer distance will be curtailed during daylight hours until the chicks have fledged and are no longer dependent on the nest.

If there is a significant increase in the flight activity recorded over the Project site that may lead to higher collision risk than predicted, or high rates of carcasses found (over that which has been predicted) additional mitigation may be required including further shutdown measures.

7.8 Impacts on Habitats and Terrestrial Ecology

Where possible WTG locations have been designed to avoid the areas of highest ecological sensitivity especially with regard to Regel's Tulip and *Tulipa biflora* and Argali/goitered gazelle where the turbine array was moved away from areas of known high densities of these species.

7.8.1 Construction Phase

Potential impacts on flora and fauna arising during construction comprise:

- Direct loss of vegetation and habitat (including food sources).
- Direct loss of fauna during construction activities.
- Damage to habitats and disturbance of fauna from presence of people, machinery, traffic, and noise, both within and outside of the Project area. This indirect impact could affect species of global and national conservation concern.

- Indirect impacts associated with pollution.
- Temporary impacts from occasional lighting at night.

7.8.2 Habitat and Flora Surveys

The proposed Project site is situated within areas of mixed habitats and floristic diversity. The project area as a whole includes rubble piedmont plains and loamy plains with sparse saxaul forests, turning into xerophytic low mountains. The site lies entirely in the landscape zone of deserts. Most of the northern section of the project area is occupied by plains with wormwood saltwort vegetation and areas of saxaul forests. The southern section captures part of the Shu-Ilei low-mountain massif, which is a system of gentle ridges with levelled surfaces, sharply limited by steep slopes, and canyon-like valleys along watercourses. In the mountains, shrub thickets of meadowsweet (Spiraea sp.) and others are well developed; an abundance of cereals, legumes, and onions is characteristic, providing excellent food conditions for both ungulates and birds. Along the riverbeds, the most typical are *Haloxylon aphyllum, Tamarix sp., Atriplex caragana, Eurotia ceratoides, Nitraria schoberi, Artemizia sp., Limonium sp,*

5 main types of habitats were identified:

- xerophytic rocky low mountains
- outputs of flat granite slabs
- valley saxaul forests
- sagebrush and sagebrush deserts on gently undulating plains
- gently sloping solonchak depressions on the plains.

The habitats within the site can all be classified as natural habitat (as per PS6) albeit there is light cattle, horse and sheep grazing in some areas which are used as summer pastures and have degraded communities. The majority of these areas support various Red Book tulip species, together with other Red Book species. Of increased importance, both *Tulipa regelii* and *T. biflora* trigger Critical habitat (as per PS6 and ESR6) for an EAAA that extends across open pasture and shrub habitats (mainly aligning with the sagebush and solonchak habitats listed above). These habitats are therefore of the highest value in assessment terms.

The project lies entirely within the Zhusandala State Reserved Zone which consists largely of xerophytic rocky low mountains; outcrops of flat granite slabs; saxaul valley forests; surface water features; sagebrush and sagebrush deserts on gently undulating plains and gently sloping solonchak depressions.

7.8.2.1 Habitat Loss

Direct impacts resulting in the loss of habitat and flora will occur during construction activities and in particular due to the establishment of the construction compound, earthworks for the substation, WTG foundations and electrical transmission connections, on-site construction roads and construction of off-site access roads and grid connection works. The direct habitat loss calculations for each infrastructure type are given in Table 2:

Table 2: Habitat loss calculations (ha) for all project infrastructure

Infrastructure Type	Area calculated	Length (m)	Area (ha)	Count
Turbine installation platforms	Total area. Single platform	N/A	113.42	150

Infrastructure Type	Area calculated	Length (m)	Area (ha)	Count
	area = 7561.55 m2			
Access roads	Road length x width (6.5m)	37717	35.83	N/A
Construction camp	Total area	N/A	31.5	N/A
500 kV OHTL (753 pylons)	Total line length and tower number	230000	N/A	753
Land area for 400 to 500kV OHTL (Pylons only)	Tower footprints only	N/A	431.40	N/A
Land area for 35 kV OHTL (232 poles)	Corridor + tower/pole footprints	N/A	9.67	N/A
Total habitat loss			221.82	

Based on the extent of habitat loss and the type and status of habitats and flora species that are likely to be affected by construction works, direct impacts on the degraded or previously modified terrestrial habitats are considered to be of low significance, whereas the impacts to natural habitats are considered to be of moderate significance, with loss of tulip species-supporting habitat considered to be of high significance.

Potential indirect impacts include pollution and increased human pressure across the site during construction and maintenance activities which could increase dust levels which in turn could affect the ecological value and function of surrounding habitats and the species they support.

The loss and damage of areas of Critical Habitat and natural habitats will result in a major adverse effect and the project will be required to restore and offset so that the Project achieves no net loss of biodiversity (with a net gain required for the two Critical Habitat-triggering tulip species). Details of this will be provided within a Biodiversity Action Plan (BAP).

It is assessed that ~110 Ha of tulip habitat will be directly lost as a consequence of the permanent land requirements of the Project.

7.8.2.2 Mitigation

Where possible, any areas of higher plant species diversity, areas containing red listed plants will be avoided and demarked using barrier fencing due to their slightly higher ecological value or if this is not possible harvesting of the bulbs and/or seeds of species of conservation concern will take place to allow the replanting and restoration of surrounding areas and protect populations of these species long term.

Pre-construction surveys for tulip species in areas where construction related actvities are planned, will be undertaken during the flowering season when the flowers are visible i.e. mid-March to late May. If either Regels Tulip or Two flowered Tulip are recorded in areas that cannot be avoided, then construction works must cease in this area until the plants identified have finished flowering.

Habitat loss in the areas of WTGs and road construction will be compensated by restoring and replanting land elsewhere within the Zhusandala State Preserved Area. Restoration will take placed in a phased manner to allow regeneration of habitats in some parts of the site (possibly up to 10 ha at a time) whilst not limiting ongoing

activities such as livestock grazing in others. When areas have established to a satisfactory level, restrictions will be removed, and the restoration efforts moved to the next location. This will create a mosaic of habitats in varying stages of recovery.

A full restoration plan will be developed in order to ensure that the offsets more than equal the loss of habitat. As part of the restoration, plants in these areas not native to the habitat type will be removed to help recreate and rehabilitate suitable native habitat. Details on methods for restoration and monitoring of restoration results will be taken from the range of studies on Steppe restoration that has taken place over the last decade in Central Asia and at similar large scale wind power projects.

The predicted significant adverse effects to two tulip species – *Tulipa regelii* and *T. biflora* will require a bespoke **Rare Plants Management Plan (RPMP)** to be produced (likely appended to the BAP) that will ensure robust application of the mitigation hierarchy regarding these species, and will also include details of restoration and offsetting that will be required to deliver a net gain for both off these species (as per the requirements of PS6 and ESR6 for Critical Habitat). Additionally, and in recognition of the Kazakh Red Book status of a number of of plant species, the other KRB that will be affected will also be covered by specific actions, to ensure compliance with Kazakh law.

The RPMP will be developed in collaboration with relevant stakeholders, such as (but not limited to) Forestry and Wildlife Committee, PO Okhotzooprom, Almaty Botanical Gardens and Flora & Fauna International (FFI), both of which have been involved in tulip conservation projects in Central Asia. The RPMP will comprise the following:

- Detailed pre-construction surveys of the Project footprint and full concession area to provide an accurate inventory of the locations and extents of *T. regelii, T. biflora* and all other KRB species. Surveys to be undertaken by a suitably experienced botanist with experience of KRB species (i.e. such as those engaged during baseline surveys for the Project).
- Detailed pre-construction survey of habitat conditions across the concession area where *T. regelii, T. biflora* and all other KRB species are found to be absent.
- Constraints mapping of the pre-construction surveys to inform micro-siting of works to avoid and minimise impacts to all rare plants, and *T. regelii, T. biflora* in particular.
- Identification of species-specific residual effects, following micrositing work, together with a calculation of bespoke net gain targets for *T. regelii, T. biflora,* based upon standard net gain assumptions, but critically with application of expert opinion (i.e. as provided by the identified botanist and/or relevant stakeholder inputs). Rather than seek a percentage net gain, the RPMP should seek to ensure an increase in numbers of all KRB plants, and *T. regelii, T. biflora* in particular, together with establishing an upwards trend in population numbers under the RPMP.
- Mapping of areas considered suitable for restoration management to mitigate for losses to rare plants and *T. regelii, T. biflora* within the concession area, based upon findings from the pre-construction surveys. This should consider current pressures/threats within these areas that may compromise future conservation efforts in these areas.
- Construction methods to inform restoration of areas where temporary works will take place, such as (but not limited to) storage of turves/topsoil and replacement of this once construction activities are complete, restriction on access outside of essential work areas, awareness raising with staff to prevent picking of flowers, littering, etc.

- Seed and bulb collection in areas that will be subject to soil disturbance, and propagation of these plants by specialists from the Institute of Botany and Phyointroduction from Almaty Botanical Gardens. This element should align with net gain and trend targets established as part of the RPMP.
- Engagement with the Forestry and Wildlife Committee over options for restoration and replanting of KRB plants and *T. regelii, T. biflora* in particular, within the nearby Zhusandala State Reserved Area (and other relevant sites).
- A replanting plan for plants in pre-identified areas, whether on site or in off-site options, including ongoing management requirements and agreement with relevant stakeholders (including those land users potentially at risk of conflict with the overarching RPMP objectives, such as livestock farmers). This will include specific replanting and ongoing methods, such as planting density, timing of works, ongoing protection/fencing needs.
- An ongoing monitoring strategy for the RPMP outputs, with details of adaptive management options to ensure long-term viability of the RPMP.
- Role and responsibilities of those engaged in delivery of the RPMP.

Production of the RPMP will be commenced immediately and a draft (with the relevant client and stakeholder commitments) delivered prior to contract signing.

7.8.3 Herpetofauna Surveys

Seven herpetofauna were recorded during 2023 surveys. The key finding is the relatively high abundance of the Steppe Tortoise (*Testudo horsfieldi*) with on average 10 sightings per day during the survey period (See Table 3).

Table 3: Herpetofauna species of conservation concern recorded across the Project area.

Common name	Scientific name	IUCN status
Pewzow's toad	*Bufotes pewzowii or B. zugmayeri*	Near Threatened
Steppe tortoise	*Testudo (Agryonemys) horsfieldii*	Vulnerable
Sunwatcher toadhead agama	*Phrynocephalus helioscopus*	Least Concern
Steppe agama	*Trapelus sanguinolentus*	Least Concern
Rapid racerunner	*Eremias velox*	Least Concern
Dice snake	*Natrix tesselata*	-
Tartar sand boa	*Eryx tataricus*	Least Concern

During 2024-2025 survey, the only amphibian species identified in the area was Perrin's green toad (*Bufotes perrinii*). This species was recently isolated from the collective species *Bufotes gr. viridis* and is known to be a typical inhabitant of the desert areas of Central Asia. During the spring season, the green toad (*Bufonidae*) was observed in the Project site. The species was particularly abundant in proximity to temporary watercourses in the low-hill region. At this time, adult individuals were recorded both visually (i.e. encounters on foot and by car) and by singing (i.e. noted in almost all visited valleys).

7.8.4 Impacts on Herpetofauna

Direct impacts to these species are likely as a result of construction activities including killing or injuring, disturbance, direct habitat loss from construction of WTG bases, substation, compound area, workers' accommodation and access roads and habitat loss through fragmentation/barrier effect. Habitat suitable for use by reptiles will be removed under the road and WTG bases prior to construction and as such low to moderate significant temporary negative impacts at a local level are predicted for these species on the basis that comparable contiguous habitat is located throughout the Project area.

Damage to sites used by hibernating and breeding individuals would result in impacts of substantially higher significance at a local level, therefore timing of works and suitable working methods are (including the translocation of individual animals) to focus away from the most sensitive periods is essential. In order to ensure the effectiveness of the exercise, tortoise mitigation and relocation procedures will be included within the site mobilisation plan, CEMP and BMP as appropriate prior to Contractor mobilisation and commencement of site preparation works. This will include survey information, proposed methods of capture, ensuring individual tortoises do not return to work areas and details of best practice for animal care during handling.

7.8.5 Mitigation

It is unlikely that significant population level impacts will result from the habitat loss and additional habitat will not be required to be provided prior to movement of individuals. Recent experience from other projects in Central Asia has shown that although translocation mitigation works in principle, the timing of works is very important. To ensure that the majority of potential disturbance occurs during the season of highest activity, suitable areas will be cleared during these periods (approximately March to June and August to September) and fenced off or burrows fenced off so that, when construction begin, no impacts on individuals occur.

Loss of suitable reptile habitat can be mitigated with the restoration of a larger area land within the wider area to allow populations of reptile species to increase and to achieve no net loss over the lifespan of the Project. Post-construction monitoring surveys for reptiles and amphibians will be completed in years 1, 3 and 5 following works to compare reptile activity and populations across the site with the pre-construction baseline.

Where micrositing of infrastructure will not be able to mitigate loss of Steppe Tortoise burrows and potential loss of individuals, preconstruction surveys may indicate the requirement for a relocation protocol to be enacted. The decision as to whether a translocation procedure takes place or whether local protection measures with dispersal into adjacent areas is sufficient will be taken through an adaptive management approach. In the case of translocation being determined necessary, this relocation plan would consider the following points:

- Prior to the relocation efforts for the Steppe Tortoise, suitable sites for the release of relocated individuals will be identified and mapped.
- Preconstruction surveys will be completed between April and June and prior to the commencement of construction. Juveniles emerge from winter hibernation at the end of March whereas adults emerge in April. In a typical year, the active season ends at the end of May when this species enters summer aestivation which continues into winter hibernation.
- All captured individuals are marked and moved to the release sites that should be approximately 3km from the nearest construction area.
- Prior to working in an area containing tortoise burrows, any remaining burrows will be re-checked by the EPC Contractors Ecologist using an endoscope and if empty dug out and destroyed. If any animal

is found back in the working areas, the burrow will be marked with a flag, recorded on the active kmz. map and left until the active period to allow the animal to be captured and moved whilst active.

- After the relocation expedition, a report will be prepared which will include the following information:
  - Survey dates and timing of capture and release
  - Weather conditions during survey and relocation effort
  - Location of captured individuals
  - Number of captured individuals during each relocation effort
  - Number of juveniles, mature males and mature females
  - Release sites used for relocation of each effort
  - Number of males and females released at each site
  - Number of mortalities during relocation effort

7.8.6 Mammal Surveys (excluding bats)

Of the approximately 30 species of mammals (including bats) inhabiting the territory, two species of ungulates are listed in the Red Book of Kazakhstan: the Argali (*Ovis ammon)* and the Goitered Gazelle (*Gazella subgutturoza*). One species, the great gerbil (*Rhombomys opimus)* plays a key role in the ecosystems of the project area, including being of particular importance as the main food source for a number of large birds of prey. It is also a carrier of plague, and its populations are under epizootological control.

7.8.7 Impacts on Mammals

The impacts of large-scale wind power plants on terrestrial mammals in Central Asia (except bats) has not been fully studied worldwide (Helldin et al. 2012; Schöll & Nopp-Mayr 2021; Kumara et al. 2022). Some studies show that certain species of mammals avoid areas where wind turbines are located, even if these areas were preferred before the construction of the wind farm (Łopucki et al. 2017; Schöll & Nopp-Mayr 2021; Kumara et al. 2022; Smith et al. 2020; Milligan et al. 2023). Among the species of ungulates studied were deer, in particular the semi-domesticated reindeer (*Rangifer tarandus*) and the European roe deer (*Capreolus capreolus*). In all cases, the deer avoided the wind farms. There are no known studies available for wild sheep, which include the Argali sheep inhabiting the Project area.

The impact on ungulates occurs both during the construction of wind farms and during their operation. The main factors are the direct destruction and disruption of habitats during construction, and during the operation of the wind farm – disturbance of animals by noise and the movement of blades when the turbines are in operation, increased human visits to the area (both for turbine maintenance and simply due to the appearance of roads to the wind farm in previously inaccessible areas), and deterioration of the ability of an area to provide shelter due to the fact that turbine noise can prevent animals from hearing predators in advance (Helldin *et al.* 2012; Łopucki et al. 2017; Keehn & Feldman 2018). Rows of turbines and associated infrastructure can also become barriers to the migration of ungulates (Milligan *et al.* 2023).

It is recognised within this Impact Assessment that there is a potential for constructional and operational impact on both Argali and Goitered Gazelle, within the Project area.

7.8.7.1 *Argali*

The Project Site includes approximately 16% of the Argali habitat zone that was identified prior to the final layout being selected. The majority of Argali sightings are to the south of the Project Site.

A pre-cautionary disturbance buffer of 2km encompasses approximately 49% of the identified Argali habitat zone. Thus, there is potential that Argali would either become displaced from some areas of this habitat, or the habitat becomes less suitable as a result of disturbance/increased predation. A worst-case scenario would be that Argali could be displaced from nearly half of the Argali habitat zone. This could lead to pressures on the remaining habitat such as over grazing if the population are pushed into a smaller area.

The enhancement of the road network could lead to an increase in the number of poachers to the area, which would result in an increased number of Argali being killed.

Argali are not known to make long-distance directed movements (migrations), but actively move up to 5 km (for females with lambs) and more (for males) for grazing, to watering holes and for rest, and back to places to graze (Fedosenko and Kapitonov, 19831; Berber, 20072). Whilst the Project is likely to impact on localised movement in the area, given the Project Site is located in the north of the Argali habitat zone, with sightings largely to the south of the Project Site, it is unlikely the Project will result in a barrier to major movement/migration routes.

While the size of the local population is unknown, baseline surveys generally recorded Argali in groups of 2 to 6 individuals. Thus, it is considered the Argali local population is relatively small. Given the global population of Argali is estimated to be 80,000 to 90,000, and the national population of Kazakhstan is approximately 14,000, the local population represents a very small percentage of the national Argali population.

It is considered that the impacts of the Project on Argali would be long and continuous for the duration of the Project being in operation, across the Local geographic extent. The magnitude of the impact would be high.

7.8.7.1.1 Mitigation

The boundary of the Project Site was amended based on the survey information collected in 2023 and the final turbine layout was designed to avoid as much of the known Argali habitat as possible, with the final location of the facilities taking into account and avoiding where possible, the migration routes, gathering places, calving grounds and watering places.

Following the request of the Committee for Forestry and Wildlife of the Ministry of Ecology and Natural Resources, the strategy to support the mitigation will be done with the support of *Ohozoprom,* with whom the Company signed a Memorandum of Understanding on 15 of June 2025, specifically to monitor and asses the status of biodiversity and wildlife during construction and operation of the Project.

To prevent disturbance, displacement and the potential for increased mortality a range of measures will be included in the BMP:

- Prohibit the movement of vehicles and other equipment outside designated roads, and adhere to speed limits. Utilise a hard-stop disciplinary procedure for enforcement. Minimise night driving by restrictions to reduce nighttime vehicle movements to an absolute minimum. Enforce road speed limits and use physical speed calming measures especially near key areas (watering points, crossings, lambing/kidding areas and watchpoints). Use road/gate permit systems to reduce access to non-project related traffic to restrict poaching activity.

- Minimize the number of service roads used for construction and then for maintenance of the wind farm complex. Close access to the road network within the wind farm, allowing their use only for wind farm maintenance. Potential use of video surveillance systems.
- Control impulsive noise control measures. Impulsive noise generation to be restricted to day-time working hours only; Impulsive events should be pre-notified and kept to short durations. Avoid repeat impulsive noise events near key areas (see above).
- A Fauna Handling and Rescue Procedure will be prepared in case any fauna species are injured during the construction activities. All animal impacts/near-misses to be reported and logged.
- Install fences to prevent animals accidentally entering waste storage areas and road-salt storage areas. Fences will be designed and use materials that are not harmful to wildlife. Organic wastes generated to be fully contained and litter wastes to be adequately secured.
- Monitoring of the Argali (e.g. radiotracking) would be undertaken throughout the operation of the Project to inform any remedial measures that need to be put into place. Monitoring will include compliance monitoring on traffic management, waste management and excavations management. Furthermore, wildlife response monitoring shall be carried out replicating baseline surveys to assess for reduced or changed activity patterns that may need to trigger further mitigation responses. Incident monitoring will take place with mandatory reporting of vehicle strikes, entrapped animals and poaching reports. Post-construction monitoring shall take place for a period of 3 years using transects and camera traps to assess if there have been any significant changes to activity both post-construction and in early operational phase.
- Use light sources with minimal ultraviolet radiation at the facility, and limit the duration of illumination (turn off for a period of about 2-3 hours in the evening after sunset). Utilise light down directed light shading to reduce unecessary light spill.
- Biodiversity training will cover all relevant mitigation requirements in relation to biodiversity applicable to workers.
- Cover or fence deep excavations or provide escape ramps where not possible to cover. Open trenches and other excavations will be checked daily. Any entrapped animals to be reported and logged.
- Activities generating high noise levels to start outside the breeding and rearing periods where possible.

Where appropriate, the installation of acoustic barriers could help minimize the impact of noise emission and vibrations.

- Measures to minimize noise emissions from facilities and vehicles.
- Strict anti-hunting and poaching controls.

With avoidance and minimisation measures implemented, it is expected the mitigation effectiveness would be high. Thus, the residual effect will be reduced to a low adverse effect.

If any freshwater habitats are degraded by the construction activities, the Contractor will implement recovery actions for those habitats to maintain the form and function of these ecosystems. Specific instruction will be integrated in a section of the BMP. All recovered areas must be maintained. The Contractor should implement a monitoring plan, keep track of the restoration activities, evaluate their effectiveness, and should implement a maintenance plan.

7.8.7.2 *Goitered Gazelle*

The Project Site includes approximately 30% of the Goitered Gazelle habitat which equates to approximately 950 km^2. Goitered Gazelle were recorded throughout the Project Site, although most sightings were to the north of the Project Site and outwith the area where the final turbine layout will be constructed. Approximately 5% of the Goitered Gazelle habitat within the Project site would be permanently lost due to the footprint of infrastructure such as turbines and roads. A pre-cautionary disturbance buffer of 2km encompasses approximately 40% of the identified Goitered Gazelle habitat, thus, there is potential that Goitered Gazelle would either become displaced from some areas of this habitat, or the habitat becomes less suitable as a result of disturbance/increased predation.

A worst-case scenario would be that Goitered Gazelle could be displaced from just over a third of their habitat within the project area. The enhancement of the road network could lead to an increase in the number of poachers to the area, which could result in an increased number of Goitered Gazelle being killed, however anti-poaching measures are already in operation in the Project area.

Goitered Gazelle make regular seasonal migrations up to 500km and live in the east of Betpak-Dala over summer, wintering in the Moyynkum sands. The vast majority of sightings of Goitered Gazelle occurred during the warm season, from April to October, while winter sightings are very few. Thus, Goitered Gazelle s may migrate from the Project Site to the Moyynkum sands or further to the southwest for winter. The migration route will remain open to the south of the Project Site, however, the migration route for Goitered Gazelle to the north of the Project Site is likely to be impeded.

While the size of the local population is unknown, baseline surveys generally recorded Goitered Gazelle in groups of less than 10 individuals, thus, it is considered the local population is relatively small. Given the global population of Goitered Gazelle is estimated to be 42,000 to 49,000 (the national population of Kazakhstan is unknown), the local population represents a very small percentage of the global Goitered Gazelle population. It is considered that the impacts of the Project on Goitered Gazelle would be long and continuous for the duration of the Project being in operation, across the Local geographic extent. The reversibility of the impact is considered to be mid-term but with a high adverse effect.

7.8.7.2.1 Mitigation

Timing construction works to avoid the most sensitive areas for breeding Goitered Gazelle will take place. The most sensitive period of the year for Goitered Gazelle is between mid-April and mid-May therefore works taking place outside these dates are unlikely to impact on breeding individuals of this species. If any works take place between these dates the Project Ecologist will check suitable habitat (rocky slopes) to look for female Gazelle with young calves and will report the location to the EPC contractor. Surveys should be undertaken in the early morning from vehicles. Suitable habitats should be scanned from approximately 2km away looking for the presence of this species.

If females are recorded with calves that are less than one week old or if pregnant females are observed there will be no works within 1km of the area until cessation of breeding activity is confirmed by the Company's Biodiversity Manager/Project Ecologist.

Surveys in areas of suitable habitat within 1km of working areas will be completed in April and May in each year throughout the construction period and if females are recorded, the areas will be avoided until birthing has been completed in order to prevent disturbance. Construction activities will be allowed to proceed once all pregnant females present have given birth and all calves are at least one week old The Project Ecologist should check with the ecologists completing other surveys (e.g. botanical, raptor and bustard surveys) for information relating

to the presence of Goitered Gazelle within the project area. Pre-construction surveys should target any areas where this species has been previously recorded in 2023 -2025, especially in areas suitable for birthing.

Following the request of the Committee for Forestry and Wildlife of the Ministry of Ecology and Natural Resources, the strategy to support the mitigation will be done with the support of *Ohozoprom,* with whom the Company signed a Memorandum of Understanding on 15 of June 2025, specifically to monitor and asses the status of biodiversity and wildlife during construction and operation of the Project. Further measures would be adopted in accordance with those suggested for the Argali and would include:

- The prohibition of the movement of vehicles and other equipment outside designated roads.
- If it is necessary to fence off individual areas, it is recommended to use a metal game fence with different hole sizes: 400×300 mm for the two lower and two upper rows + 50×300 mm for all middle rows, a total of 19 horizontal wires, fixed knots, height 2000 mm. This allows medium-sized mammals, up to the size of a gazelle, to pass through without injury, but is an effective barrier for larger animals and humans.
- Use light sources with minimal ultraviolet radiation at the facility and limit the duration of illumination (turn off for a period of about 2-3 hours in the evening after sunset).
- Develop internal rules for personnel, regulating behaviour at the facility with regard to biodiversity conservation, including Goitered Gazelle. Provide mandatory information and training to personnel using information booklets/posters on the presence of rare species, sensitive seasons.

Support for either the Reserved Zone or the nearest Andasai Nature Sanctuary, for the effective conservation of the habitats and populations of Goitered Gazelle on an area no less than that which will be lost (or degraded) for this species as a result of the creation of the wind farm.

Collectively the mitigation measures for Argali and Goitered Gazelle should allow a No Net Less. However,for both Argali and Goitered Gazelle a flexible approach to mitigation will be employed so that measures can be reactive. Mitigations will be further developed with local experts involved in their management in the region.

7.8.7.3 *Other Mammals*

Impacts on small mammal populations, including common rodent species such as the Great Gerbil (*Rhombomys opimus*), are expected primarily during the construction period. During this phase, localised disturbance of the topsoil and destruction of burrows are possible, which could lead to a decline in the numbers of individual populations. However, implementation of the project's comprehensive mitigation measures will significantly limit the negative impact on habitats and ensure the restoration of ecosystem connections in the post-construction period.

A precise quantitative determination of the impact on rodent numbers is difficult at this stage prior to preconstruction surveys of the areas of the proposed infrastructure where habitat loss and disturbance will occur, but it is expected to be temporary and localised, with subsequent recovery through natural repopulation.

After completion of construction, a partial recovery of the great gerbil population is expected during the wind farm's operation period.

Soil piles and trenches created during construction may be actively used by rodents, resulting in a localised increase in the abundance of these animal species; these rodents may penetrate anthropogenically altered landscapes into areas where they previously did not inhabit the natural landscape. However, an overall increase in the population of Great Gerbils and other small mammal species throughout the project area is unlikely. Consequently, the area's attractiveness as a hunting ground for large raptors may not increase.

7.8.8 Monitoring

During construction, monitoring of negative impacts on animal habitats and individuals is necessary. If specific negative impacts are identified, it will be necessary to ensure the preservation of similar habitats outside the area disturbed by the wind farm. It seems most appropriate to provide permanent (for the duration of the wind farm's operation) support for either the Reserved Zone or the nearest Andasai Nature Sanctuary, for the effective conservation of the habitats and populations of Argali and Goitered Gazelle on an area no less than that which will be lost (or degraded) for these species as a result of the creation of the wind farm.

Monitoring of the Goitered Gazelle (e.g. radiotracking) would be undertaken throughout the operation of the Project to determine any displacement or mortality impacts and to inform any remedial measures that need to be put into place.

For the practical implementation, a **Construction Mitigation Plan for Large Mammals**, will be developed, in consultation with PO Okhotzooprom, and will include a detailed plan to support the conservation of argali and other rare species (within the framework of the BMP), with appropriate funding from wind farm operators and the signing of relevant agreements.

7.8.9 Bat Surveys

Habitats mean the site is considered of low suitability for bats. Access to water is limited during the summer, with the rivers and streams almost dry in the second half of June. Only in some places small temporary reservoirs with an open water surface remained. The temporary reservoirs (streams, depressions filled with water) are likely to be suitable for bats. The combination of arid conditions, desert biotopes, topography, remoteness from human settlements determines the poor potential species composition of bats in the study areas.

Five species of bat have been identified by static and mobile bat detector surveys. These are

- Common pipistrelle and its sub-species Turkestan pipistrelle
- Noctule
- Parti-coloured bat
- Bobrinski's serotine
- European free-tailed bat
-

7.8.10 Impacts on Bats

Potential impacts during the construction phase include: Habitat loss/degradation, roost disturbance/destruction, disturbance from artificial lighting, noise and vibration and reduced foraging areas. During the operational phase potential impacts are collision or injury from wind farm infrastructure and OHTL collision and disruption of migration routes and alteration of commuting lines or foraging areas.

Surveys recorded common pipistrelle in low numbers. The most common species in the wind farm area are parti-coloured bat, serotine bat, and noctule bat. The cracks in the numerous natural outcrops of rock can provide shelter and roosting opportunities for bats.

Ground preparation and construction works may result in habitat loss and degradation which would reduce foraging and commuting habitats. Heavy construction equipment and machinery, construction activities, and the operation of wind turbines will generate noise and vibrations, which could cause habitat degradation due to temporary avoidance. This may extend beyond the construction areas. The Project lies in an area with no light

pollution, meaning bats are not habituated to light, so any light emissions could result in temporary avoidance and disturbance. It is considered that the impacts of the Project on bats would be continuous for the duration of the Project being in operation, across the local footprint.

7.8.11 Mitigation

Construction of the wind farm and associated infrastructure is likely to require the installation of road culverts, which in time may be colonised by bat species. Any new culvert will be fitted with mesh with a hole diameter of less than 20mm at either end of the tunnel to prevent bats colonising new structures and increasing collision risk from the operational WTG. Monitoring will also take place to ensure that these pipes remain excluded following periods of heavy rain.

A BMP will be produced that will include measures such as:

- Avoid vegetation clearance during bat maternity period (March - late July/early August).
- Pre-clearance checks by a suitably experienced ecologist.
- Activities generating high noise levels to start outside the breeding and rearing periods where possible.
- Night work in proximity to natural habitats and sensitive areas will be avoided from 8pm to 6 am, to reduce impacts to nocturnal fauna species.
- Where appropriate, the installation of acoustic barriers could help minimize the impact of noise emissions and vibration.
- Measures to minimize noise emissions from facilities and vehicles.
- A lighting design to avoid emission of light on sensitive areas.
- A technology-led Shut Down on Demand (will be implemented. An Active Turbine Management Plan (ATMP) for a shut down on demand system will be prepared as a stand-alone document. This may involve turbine curtailement options to prevent bat collisions.
- Minimise growth of vegetation in close proximity to wind turbines will be prohibited, as this would provide a food source for bats, thereby encouraging them to forage in the vicinity of the turbines.
- A monitoring programme including carcass searches beneath constructed turbines to inform remedial measures.

To minimise any impacts on migratory and resident bat species, there may be a requirement to enact operational curtailment during the bat activity season. From the 15th April–31st May and 1st June–31st July. During the main autumn migration (1 August–30 September), turbines could be feathered between civil sunset and civil sunrise whenever hub-height wind speeds are below 6.5 m/s and ambient temperature is ≥8–10°C.

7.8.12 Freshwater Species

Severtsoy's Loach (Triplophysa sewerzowi), Ship Sturgeon (*Acipernser nudiventris*) and the fish species *Schizothorax pseudoaksaiensis* are all present in Lake Balkhash and the EAAA for Severtsoy's Loach and Ship Sturgeon respectively qualifies as Critical Habitat.

The global population of Ship Sturgeon is estimated at 100 individuals, and declining, although this doesn't officially include the introduced Lake Balkhash population. The main threat to the species is thought to be illegal

hunting and habitat loss. Although the EAAA population of Ship Sturgeon is an introduced one, given its naturalised nature (it has been self-sustaining within Lake Balkhash and Lli River for nearly 100 years. The overall low global populations means that any sustained population in the EAA will be globally significant.

The global population of Severtoy's Loach is declining, with a local population extinction reported in 2000 and the Lli River also considered close to extinction. The main threat to the species is thought to be changes to water regimes and invasive species introductions.

Given the very limited Area of Occupancy (AOO) for this species and known trend of population decline, it is reasonable to assume that further losses of this species from the Lake Balkhash EAAA would result in its status being changed to Endangered to Critical Endangered.

The global population of *Schizothorax pseudoaksaiensis* is unknown but considered stable. There has been a recent decline follow likely extinction from Lake Balkhash as a result of overfishing and introduction of invasive species. Given that Lake Balkhash potentially no longer supports a population of this species, it is not considered reasonable to assume that any further losses here would result in the IUCN Red List status changing from Vulnerable.

Severtsoy's Loach, Ship Sturgeon, and *Schizothorax pseudoaksaiensis* were not recorded during field surveys in the lakes and lower reaches of the Shu River. Furthermore, the Project is not expected to constitute a barrier to fish and freshwater species movement. These species have been included in the assessment on a pre-cautionary basis as their EAAAs qualify for Critical Habitat.

The impact pathway for all these resident species in Lake Balkhash is limited to the construction works related to the upgrade of the Ulken substation and the OHTL from the project site where it joins the substation.

7.8.13 Mitigation

During construction works, any degradation of freshwater habitats will be avoided, in terms of sedimentation due to works on the banks or in stream.

A Water and Groundwater Management Plan will be prepared and approved before the start of construction activities, to include the management of construction stormwater and wastewater, to ensure the protection of surface water resources and that the work is done correctly, safely, and in compliance with all regulations at every stage.

A BMP will be produced that will include measures such as:

- The moving vehicles (e.g., trucks meant for goods and materials transportation, dumper trucks, concrete mixers, bulldozers) will follow predefined paths and roads, will avoid crossing water bodies and will be regularly cleaned and repaired/maintained.
- No discharge of liquid, semi-solid or muddy materials into surface waters will be carried out.
- Where the Project crosses small seasonal streams and rivers, appropriate mitigation measures will be implemented and installed to ensure the continuity of the water feature, and to avoid the interruption of waterways, modification of natural flow velocity, and formation of stagnant water.
- Minimize the potential pollution and sedimentation of the surface water.
- Activities generating high noise levels to start outside the breeding and rearing periods where possible.

- Where appropriate, the installation of acoustic barriers could help minimize the impact of noise emission and vibrations.
- Measures to minimize noise emissions from facilities and vehicles.
- A lighting design to avoid emission of light on sensitive areas.
- Avoid river pumping.

With avoidance and minimisation measures implemented, it is expected the mitigation effectiveness would be high. However, If any freshwater habitats are degraded by the construction activities, the Contractor will implement recovery actions for those habitats to maintain the form and function of these ecosystems. Specific instruction will be integrated in a section of the BMP.

7.8.14 Invertebrates

Invertebrates including: Beautiful Demoiselle; Blue Emperor; Bolivar's Short Winged Mantis; Common Predatory Bush-Cricket; *Ceraeocercus fuscipennis; Chilocorus bipustulatus; Coenonympha mongolica; Dorcadion balchashense; Porphyrophora sophorae; Porphyrophora victoriae; Stethorus punctillum; Sphex flavipennis* were recorded in the desk study.

7.8.15 Impacts on Invertebrates

Potential impacts during the construction phase include: habitat loss/degradation, removal of fertile soil layer, Soil compaction and disturbance from artificial lighting. During the operational phase this is likely to be limited to collision with the turbines blades or disruption to migratory routes due to increased light levels on the site.

It is considered that the impacts of the Project on invertebrates would be frequent for the duration of the Project being in operation, across the Project footprint although the intensity of the impact would be low especially given the availability of similar suitable habitat across the wider landscape.

7.8.16 Mitigation

A BMP will be produced that will include measures to prevent impacts on invertebrates such as:

- Prohibit the movement of vehicles and other equipment outside designated roads that may results in collisions with flying invertebrates.
- Provide for the removal of the top (fertile) soil layer during earthworks and its return to the site for recultivation and minimization of landscape changes.
- Plan (if possible) phased construction in different areas so as not to cause major disturbance across the entire territory at once.
- Use light sources with minimal ultraviolet radiation at the facility, and limit the duration of illumination e.g. turn off for a period of about 2-3 hours in the evening after sunset.
- Biodiversity training will cover all relevant mitigation requirements in relation to biodiversity applicable to workers
- Twice a year monitoring visits of invertebrates during construction to inform any remedial measures that need to be put into place.

- A lighting design to avoid emission of light on sensitive areas.

Given the presence of suitable directly comparable adjacent habitat, the predicted impacts of construction on invertebrate species of conservation concern are likely to include minor habitat loss and the direct killing of low numbers of individual invertebrates. As a result of the proposals, impacts are considered to be low and of minor significance at a local level. Loss of suitable invertebrate habitat will be mitigated with the restoration and creation of habitat within the wider area which should improve the habitat quality for invertebrates.

7.9 General mitigation measures for all biodiversity receptors

In addition to the receptor specific mitigation already discussed, the following measures will be incorporated into the Project. Pre-construction surveys will identify sensitive areas and species so that areas are cleared by the time work commences so that they can be captured and moved to safe areas of the site. Mitigation principles have been identified to align with both PS6 and ESR6.

7.9.1 Pre-construction

Pre-construction site preparation should always follow best practice. Ideally excavation works will be avoided between late Autumn and Winter and in the peak of Summer to avoid causing harm to species hibernating below ground unless in line with an agreed mitigation protocol.

Site preparation works during the target period will clear vegetation from the proposed working areas and make those areas unsuitable for use by species which may dig or burrow into the ground. Any active burrows present will be cleared, and any individuals present are moved safely away from work areas. In addition, one-way exclusion fencing can be implemented to prevent passage of animals back into these areas prior to construction.

Vegetation clearance outside the targeted months will be in line with the recommendations detailed within the CEMP and BMP as appropriate prior to Contractor mobilisation and commencement of site preparation works.

The protocol of the pre-construction works is broadly that, exceptional circumstances aside, works can only begin in each construction area where a pre-construction survey by a qualified ecologist confirms either:

- The area has no suitable locations/habitat for use by Steppe Tortoise
- There are no occupied Steppe Tortoise burrows present.

Where exclusion fencing is in place regular checks will be completed by qualified personnel and any tortoises present above ground will be captured and moved / translocated away from the working area to an appropriate safe location.

Where works are to commence from March onwards ground nesting birds must be considered, and no active nests must be knowingly destroyed. Active raptor nests for sensitive species of high conservation concern will be buffered by 500m and no construction will be allowed within this buffer until the young birds have fledged and left the area.

7.9.2 Construction

Again, best practice guidance will be followed for the construction phase and some standard mitigation measures are listed here:

- To reduce the risk of loss of habitat it is proposed that roads, the control compound and other site facilities are clearly demarcated before construction begins.
- Equipment should also be confined to the demarcated areas.
- Excavations for WTG bases and cable routes should be protected, either with sloping trench walls, sloping planks or fencing and regular morning inspections should be completed before works commence each day and any trapped animals released.
- The loss of habitat directly in the Project area can be mitigated post-construction through translocation of those species that trigger critical habitat As a minimum, this will result in a no net loss but is likely to result in a positive gain in habitat in the area.
- Limits on night-time driving should also be enforced as it is likely that light-shine from vehicles would illuminate a very large area due to the relative 'open' nature of the construction area.
- Machinery should also be regularly maintained to reduce potential noise disturbance as well as reduce air pollution.
- The construction programme will focus on daytime working hours to avoid impacting on potentially sensitive nocturnal species of mammal and reptile including the removal of associated light shine which would impact bat foraging across the site.
- Pollution control measures will be put into place to avoid these impacts in accordance with requirements of IFC PS3. Fuel and other potential pollutants will be stored in double bunded containers, and all re-fuelling activities will only take place is designated areas.
- Pollution spill kits will be available at all fuel stores and re-fuelling areas and any spills will be reported to the site manager immediately clean up and completed.
- Dust suppression may be required during the hot summer months, and this will be monitored by site staff. Wetting of access tracks across the site may be required and enforcement of speed limits and ensuring no off-road driving will further reduce the likelihood of dust pollution.
- During road construction, gravel will be placed on access roads around 4.5 m wide so that they will accommodate vehicles and reduce soil erosion in adjacent areas.

7.9.3 Operation

Best practice mitigation measures to reduce damage to habitats through use of on-site and off-site roads include:

- All vehicles confined to roadways.
- Speed limits enforced around the Project site and notices warning of the potential presence of animals crossing roads placed in strategic locations.
- Road condition to be monitored regularly and damaged and rutted roads repaired rather than bypassing damaged sections.

- Monitoring of erosion controls and repair as needed.

Further mitigation to reduce damage associated with off-road vehicles include prohibiting the use of vehicles and equipment off prepared roads and re-stabilising existing eroded tracks with restoration of vegetation cover as required.

For bird and bat collision mitigation, measures are set out in an **Active Turbine Management Framework** and will be detailed further in a final agreed turbine management plan. A post construction fatality monitoring plan will also be produced and agreed.