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Koudia Al Baida Wind Farm, Morocco

10 June 2022

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10 June 2022

Biodiversity Action Plan

Koudia Al Baida Wind Farm, Morocco

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Acronyms and Abbreviations

Name	Description
BAP	Biodiversity Action Plan
CAV-JM	Jbel Moussa Vulture Reception Centre
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CRM	Collision Risk Modelling
DAA	Defined Area of Analysis
EBRD	European Bank for Reconstruction and Development
EHS	Environment, Health and Safety
ESAP	Environmental and Social Action Plan
ESIA	Environmental and Social Impact Assessment
HHSE	Hygiene Health Safety and Environment
IFC	International Finance Cooperation
IUCN	International Union for Conservation of Nature
ONEE	National Office of Water and Electricity
PBF	Priority Biodiversity Feature
PR	Performance Requirement
SBEI	Site of Biological and Ecological Interest

1. INTRODUCTION

The Koudia Al Baida Wind Farm Project is located in northern Morocco, east of Tangier, in the communes of Tlat Taghramt and Allylène (prefecture of M'Diq-Fnideq). It will replace the existing wind farm known as Abdelkhalek Torres, managed by the National Office of Water and Electricity (ONEE), already located in Koudia Al Baida.

This project is part of achieving the objective of supplying 12% of national electricity production by 2030, with a potential production of 100 MW provided by 20 wind turbines. Therefore, this will help save 1.5 million tons of oil equivalent of fossil fuels.

The wind farm is planned to be sited on the ridges along the RP 4703 road, between the RN16 (Douar Ain El Jir) and Tlat Taghramt, in one of the best wind farm locations in the country, where winds are regular, with an average speed of around 10 m/s at 40 metres from the ground. The connection lines from the wind farm to the national grid (two 225 kV lines) run for 10 km along the mountains to the east of these ridges.

The project involves dismantling the wind farm comprising 90 wind turbines and developing the platforms which will accommodate the 20 new wind turbines, a network of roads and associated easements, administrative and security buildings, a transformer substation and a construction trailer over 390 ha. The new wind farm has four separate wind turbine groups, whose electricity is collected via underground cables, before being transported to the substation by air. The project also involves installing two connecting power lines over approximately 10 km.

2. ALIGNMENT WITH OTHER RELEVANT PROJECT DOCUMENTS

This Biodiversity Action Plan (BAP) should be read in conjunction with the other environmental documents available for this project, which are:

- The Environmental and Social Impact Assessment (ESIA) of the Repowering project involving the Koudia al Baida I Ginger/Phenixa wind farm (November 2021) and its appendices, including the stroboscopic and acoustic studies;
- The Environmental and Social Management Plan (ESMP) from November 2021 prepared by Futuren-MASEN and Ginger/Phenixa;
- The ornithological studies conducted in 2015/2016 and 2018 as part of the preliminary studies for the selection of the wind turbines' location;
- The ornithological campaign at the wind farm of Koudia El Baida carried out in autumn 2021 (from October 18 to 22) by ERM and SELF;
- Complementary studies of fauna biodiversity at the Koudia El Baida wind farm carried out in spring 2022 (between March and May) by SELF;
- The assessment of cumulative impacts on biodiversity prepared by ERM in May 2022;
- Bird collision risk modelling performed by ERM in May 2022 following the fall 2021 and spring 2022 bird surveys, and appended to this report (Appendix A); and
- Critical Habitat Assessment prepared by ERM in November 2021 according to the EBRD PR6 standard, and appended to this report (Appendix B).

3. LIMITATIONS

This BAP is based on the information contained in the documentation provided by the project and on observations and information acquired during the site visit carried out in September 2021 as part of

the project due diligence process and the ornithological study carried out in October 2021 as well as complementary studies of the biodiversity carried out between March and May 2022.

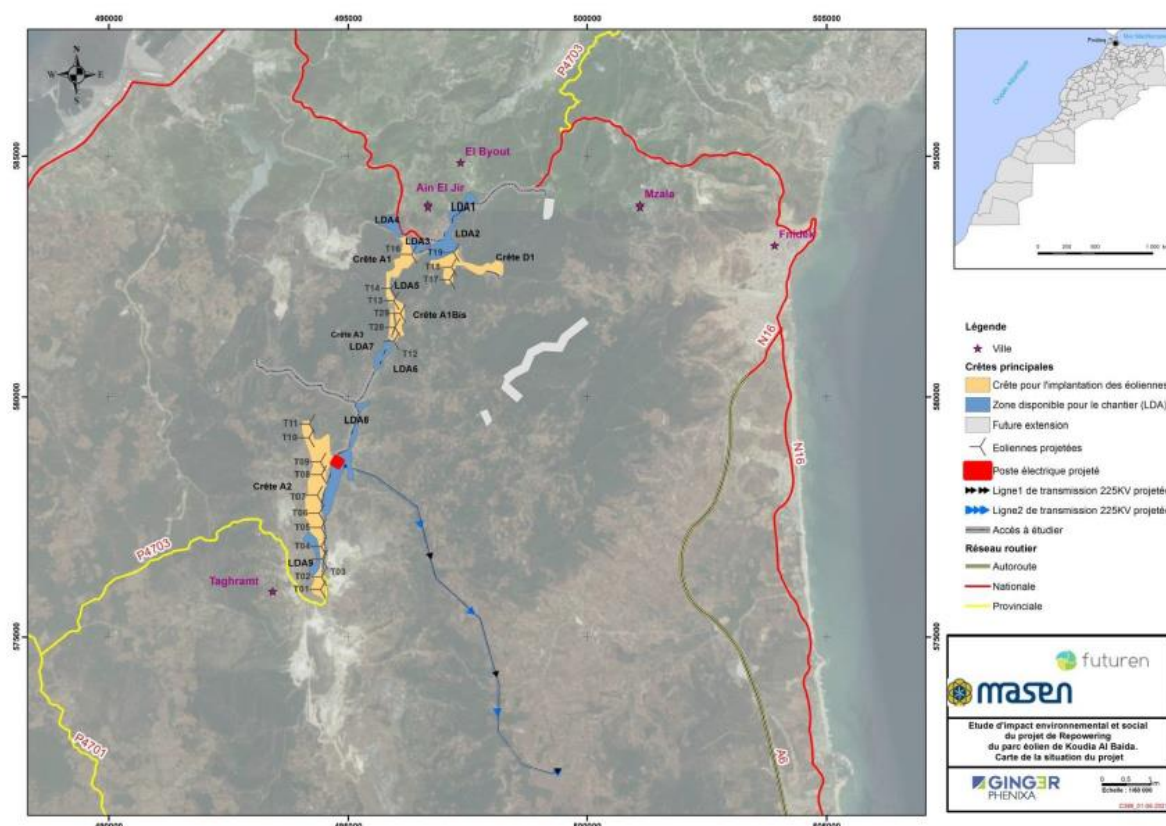
The following should also be noted:

- The assessment is based on certain facts with subjective interpretations based on professional judgments by ERM. The professional judgments made are based on the facts available within the framework of existing data, the budget and schedule.
- The site visit carried out as part of the project due diligence process was conducted over two days in September 2021 and was limited to a sample of sites, and was not intended to be exhaustive. The extent of the site visit was limited by the budget, schedule and availability of teams and stakeholders.
- An ornithological study carried out from 18 to 22 October 2021, which was limited by the calendar (end of the autumn migratory season) and the amount of data collected due largely to weather conditions.
- Additional biodiversity surveys between March and May 2022 that were influenced by weather conditions.
- The level of review carried out by ERM was dictated by the time allotted for conducting the review and compiling this report.
- The information provided in this report should be considered as a technical contribution and not as legal advice. ERM accepts no responsibility towards the lenders with regard to any matter outside the scope of the foregoing.
- Georeferenced data and flight height of migratory birds at the project site are not available for the 2015-2016 ornithological study, thereby limiting the assessment of the bird collision risk. Collision risk modelling (Appendix A) was carried out on the basis of available data with a view to assessing the risk of collision and provide recommendations and implications of continuous preventive monitoring with a wind turbine shutdown protocol intended to avoid collisions with birds.
- The assessment of the cumulative impact of neighbouring wind farms takes into account the data made available for the El Houma wind farm located near the project. These data were provided to ERM by the EBRD and are limited to the results of the spring ornithological campaign from March to April 2021 carried out as part of the environmental monitoring for the El Houma wind farm.
- The project's impact area on priority habitats assessed in accordance with the EBRD's PR6 (Appendix B) will be determined according to the final impact area of the project (in terms of construction/excavation, clearing, occupancy, etc.) which remain undefined at this stage. Based on the available data, in particular the maps of the environments in the wind turbine installation areas or of the ESIA works for the project, it is estimated that the priority cushion-formation habitats cover an area of 120 Ha.

4. SUMMARY OF THE INITIAL STATE

4.1 Area of assessment

Demarcation of the area of assessment is presented in Figure 4-1 below. In terms of biodiversity, the area of assessment covers the site of the new project, consisting of the four ridges (A1, A2, A3 and D1), which will have the wind turbines installed and corridors 100-500 m wide, running along the power lines and road tracks. This area, rising up to a height of between 370 m and 570 m, also includes the sites of the substation and construction trailer, as well as the storage areas for the dismantled equipment.



Source: Environmental and Social Impact Assessment of the Repowering project involving the Koudia al Baida I Ginger/Phenixa wind farm: November 2021

Figure 4-1 Demarcation of the area of assessment¹

4.2 Methodology

The initial state of biodiversity, restricted to environments, flora and vertebrates, was defined on the basis of bibliographic data and field surveys, with a variable sampling effort. The habitats (treated as

¹ Translation of legend: ☆ : Town. Main ridges : Ridge where turbines will be installed : Area available for construction works. : Future extension. : Proposed wind turbines. : Proposed electricity substation : Proposed 225-kV power line 1. : Proposed 225-kV power line 2. : Access to be considered. Road network : Motorway : National highway. : Provincial road.

“Environments”) were briefly described, accompanied by a detailed map of the vegetation units. Additional habitat data is also provided in the chapters dealing with wildlife, particularly bats and birds.

The field survey programme varies among the groups:

- 1 mission of 7 days (24-30 September 2020) was devoted to flora, herpetofauna and land mammals;
- 1 field survey of 6 days (April 20 to 25, 2022) dedicated to the herpetofauna, with complementary surveys on May 13, 16 and 17, 2022
- 1 field campaign of 3 days (April 21, 23 and 24, 2022) dedicated to the entomofauna;
- 1 survey conducted between April 19 and 25 and May 12 and 17 for terrestrial mammals including night and daytime observation sessions;
- 2 visits of 6 nights of recording in 2018 for Chiroptera: June 20-26 and September 18-24. A supplemental survey was conducted between April 19-25 and May 12-17 in two visits of 6 days each; and
- 5 3-day visits in 2015-2016 for birds: 2 in the fall (September and October) and 3 in the spring (March to May), with two additional missions in April and May 2018 and a 1 visit to the LHT corridor: 24-30 September 2018. Bird surveys were conducted in fall 2021 (October 18-22) and spring 2022 (three monthly visits: March 27-30 and April 6, April 20-24, and May 13-18) to provide the flight parameters necessary to estimate the risk of fall and spring migratory bird collisions with turbine blades.

For the flora and zoological groups studied, an inventory of species is provided, mainly from the bibliography; it is completed by the results of field visits for birds, chiropterans and flora. Various types of abundance indices are used, but without any precision on the distribution of the field surveys (geo-referencing of the surveys and observation points).

The presence of different habitats could be confirmed in the field between May 12 and 17. Thus, maps could be produced with the purpose of illustrating the value of habitats according to strictly terrestrial heritage species (rare or endemic) and bats.

4.3 Environments (Habitats)

The habitats studied are often located on ridges with steep flanks (10 to 30%), defined by layers of limestone, shale or flysch and marl sediments, which present, with a network of temporary wadis, a relatively rugged landscape, with slopes covered with forests and scrub, replaced locally by human habitat and agricultural land. The study of the vegetation has defined a dozen types of habitats:

- oak heathland, in the form of variants, ranging from forest to very light scrub;
- dense heathland scrub, in very dense formations on the main ridge;
- light scrub, very fragmented, resulting from anthropic degradation;
- reforestation with maritime pine;
- cushion formation, dominant on the ridge on the south-west of the site;
- arable land, active or abandoned, with the latter being invaded by Pteridium;
- rural human habitat (douars, with spaced out plantations of trees), to which the aforementioned habitat will be joined under the name “Sector cleared for development”; and
- small sources and wadis, with a fluctuating flow, usually low.

Other diagnoses indicate the presence of several caves, cracked rock habitats and dense or scorched grass.

The results of the Critical Habitat Assessment (Appendix B) demonstrated the presence of priority habitats in the area of assessment for the project, specifically the cushion-formation environments. Steppe cushion habitats were observed in the study area during the additional biodiversity surveys conducted in spring 2022. Figure 4.2 illustrates the different habitats observed during the spring 2022 missions.

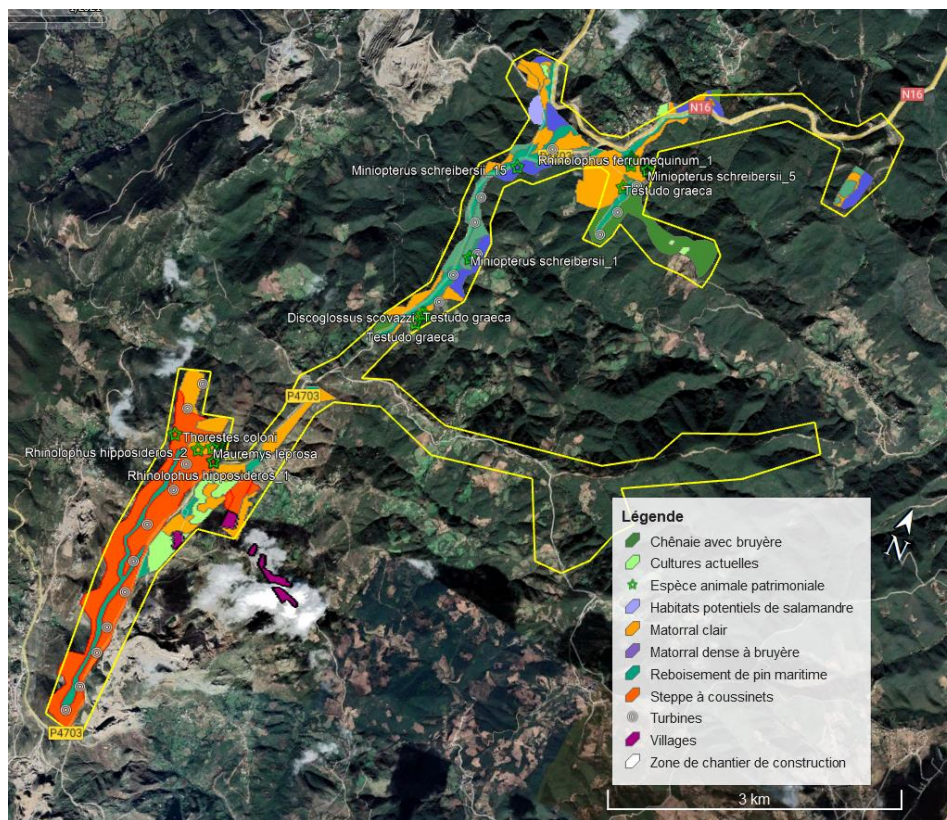


Figure 4.2 Habitats observed during the additional biodiversity studies conducted in spring 2022

Figure 4.3 presents a tentative map of critical and priority habitats, including cushion steppe habitats, potential salamander habitats and cork oak habitats. It thus defines the exclusion zones consisting of sensitive habitats that the Project must avoid during the construction phase. This figure does not exclude the possibility that additional critical or priority habitats may exist within the Project area. The areas of final sensitivity of the Project in terms of construction-excavation, clearing, occupancy, etc. will have to be identified and delineated on the basis of an identification of the habitats prior to any work by a competent person with strong knowledge in the habitats and their sensitivity.

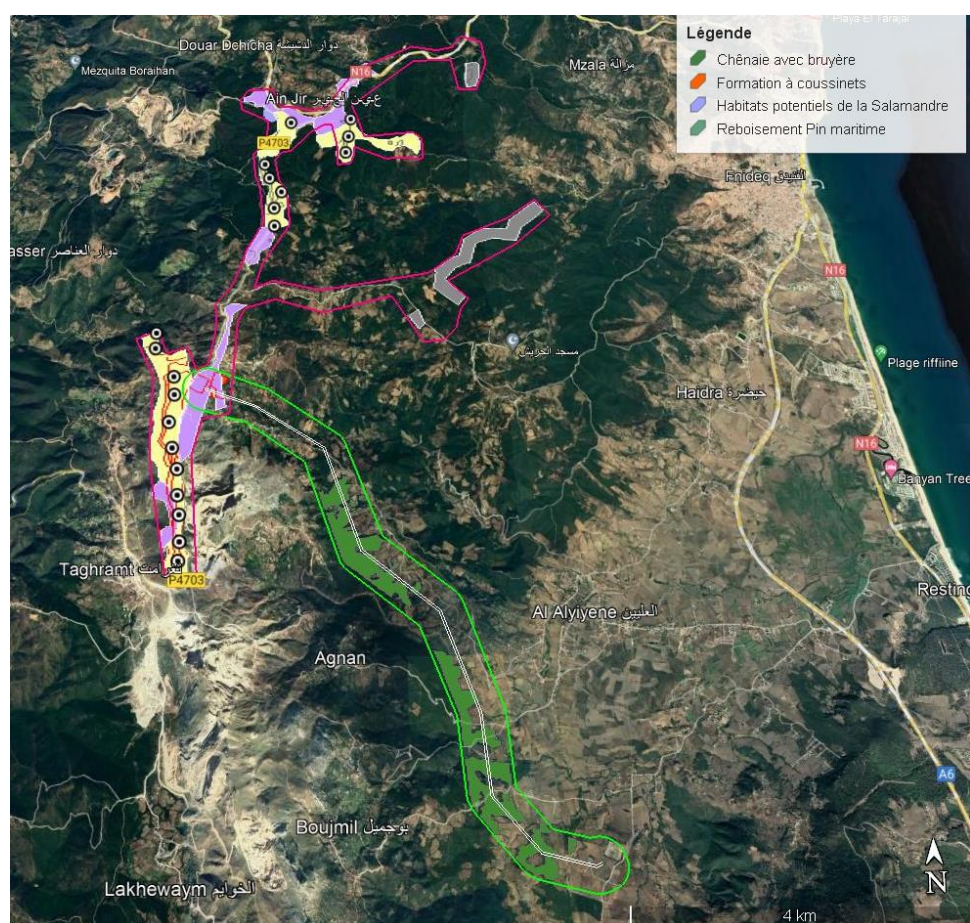


Figure 4.3 Provisional map of the exclusion zone for the Koudia El Baida wind farm and its transmission line

The project's impact area on priority habitats will be determined according to the final impact area of the project (in terms of construction/excavation, clearing, occupancy, etc) which is still unknown at this stage. A heritage assessment of habitats was made in the ESIA carried out in October 2021 for the project, classifying them into three categories:

- modified habitats: villages, crops, sectors cleared for development, reforestation with maritime pine, light scrub, very degraded environment; the possible presence of the Salamander in the wetlands of maritime pine reforestation and crops (gullies);
- natural habitats: oak heathland and dense scrub;
- sensitive habitats: cushion formations located on limestone or dolomitic ridges very exposed to the wind, which contain a very rare Moroccan endemic plant, *Stachys fontqueri*.

The ecosystem services identified are those related to erosion control, grazing and hunting. Siting areas for the wind turbines are not expected to impact ecosystem services. In addition, the risk of erosion is likely to increase during the work carried out on existing habitats.

4.4 Flora

A total of 34 species can be derived from the study of the vegetation, among the few dozen that appear to be on the site and in its vicinity. Ten taxa are endemic, two of which are restricted to

Morocco and the others extend across Algeria and/or the Iberian Peninsula. Three taxa are said to be rare in Morocco, four of which are very rare (Table 4-1).

Table 4-1 Rare and/or endemic plants identified in the area of assessment

Taxon	Endemism				Rarity			
	M	M+I	M+A	M+I+A	RR	RR?	R	R?
<i>Asplenium obovatum</i>					*			
<i>Calluna vulgaris</i>							*	
<i>Carlina brachylepis</i>			*					
<i>Cistus ladanifer subsp. Africanus</i>				*				
<i>Cistus populifolius subsp. Major</i>		*						*
<i>Erica australis</i>		*				*		
<i>Galium rotundifolium</i>					*			
<i>Genista triacanthos subsp. Triacanthos</i>		*					*	
<i>Leontodon saxatilis subsp. Perennis</i>	*							*
<i>Leontodon tingitanus</i>		*						*
<i>Lonicera periclymeum subsp. Hispanica</i>		*						
<i>Soliva stolonifera</i>						*		
<i>Stachys fontqueri</i>	*				*			
<i>Teucrium afrum subsp. Afrum</i>		*					*	
<i>Ulex parviflorus subsp. africanus</i>			*				*	

Source: ESIA of the Repowering project involving the Koudia al Baida wind farm prepared by EDF Renewables - MASENGinger Phenixa, October 2021

Key: Endemism: (M: Morocco I: Iberian Peninsula, A: Algeria); Rarity (RR: very rare, RR?: suspected of being very rare, R: rare, R? suspected of being rare).

The results of the Critical Habitat Assessment (Appendix B) demonstrated the presence of two additional species of flora which are a priority according to the EBRD's PR6 standard. They are Anssel Srhih (*Narcissus tingitanus*), a plant endemic to Morocco with a restricted distribution in the Rif mountain range and coastal regions, and Alfa grass (*Stipa tenacissima*), with a limited presence in Morocco in some regions including the Rif mountain range.

4.5 Fauna (excluding birdlife)

4.5.1 Herpetofauna

The few species mentioned in the environmental impact study are traditionally associated with the area: four taxa endemic to Morocco or North Africa, two of which are vulnerable (North African Fire Salamander, *Salamandra algira* subsp. *tingitana*, and the Common Tortoise, *Testudo graeca*) and two others are considered near threatened with a risk of becoming threatened (Western False Smooth Snake, *Macropododon brevis*, and Moroccan Three-toed Skink, *Chalcides pseudostratus*). There are other species not under threat, which are worthy of mention, three of which are from the Maghreb region (Painted Frog, *Discoglossus scovazzi*, Moroccan-eyed Lizard, *Timon tingitanus*, and Vaucher's

Wall Lizard, *Podarcis vaucheri*) and two others are Moroccan (Riffian Skink, *Chalcides colosii*, and Tangier Worm Lizard, *Blanus tingitanus*).

The inventory of amphibians and reptiles of confirmed or highly probable presence in the site presented in the Spring 2022 Biodiversity Supplemental Study Report includes additional protected species with International Union for Conservation of Nature (IUCN) conservation status, including the Common Toad (*Bufo spinosus*, Near Threatened), Greek turtle (*Testudo graeca*, Vulnerable), Leper emydon (*Mauremys leprosa*, Vulnerable), Hooded snake (*Macropododon brevis*, Near Threatened according to the IUCN), the Atlas Viper (*Vipera monticola*, Near Threatened according to the IUCN), and the Mauritania Viper (*Daboia mauritanica*, Near Threatened according to the IUCN).

Meanwhile, an additional species was identified through the assessment of critical and priority habitats (Appendix B). It is the Lataste's Viper (*Vipera latastei*). The list of herpetofauna species identified as priorities according to the EBRD's PR6 standard is presented in Table 4-2 below.

The presence of these species highlights the need for conservation measures for their habitats, mostly forest and rock. Figure 4.2 above illustrates the various habitats observed during the 2022 spring missions and shows the location of priority habitats, including cushion steppe type habitats and potential salamander habitats.

Table 4-2: Priority herpetofauna species present in the area of assessment for the project

Herpetofauna species	Criteria	Priority or critical
Lataste's Viper (<i>Vipera latastei</i>)	Presence of vulnerable species	Priority
North African Fire Salamander (<i>Salamandra atra</i>)	Presence of vulnerable species	Priority
	Presence of species whose distribution area is restricted	Priority
Maghreb Green Bush-cricket (<i>Tettigonia savignyi</i>)	Presence of vulnerable species	Priority
Tangier Worm Lizard (<i>Blanus tingitanus</i>)	Presence of species whose distribution area is restricted	Priority
Moroccan Three-toed Skink (<i>Chalcides pseudostratus</i>)	Presence of species whose distribution area is restricted	Priority
Riffian Skink (<i>Chalcides colosii</i>)	Presence of species whose distribution area is restricted	Priority
Common Tortoise (<i>Testudo graeca</i>)	Presence of vulnerable species	Priority

4.5.2 Land mammals (excluding bats)

Only endemic species which could be potentially present on the site are mentioned for this group in the environmental impact study: two Lagomorphs (Mediterranean Hare, *Lepus mediterraneus*, and European Rabbit, *Oryctolagus cuniculus*), the second of which is considered near threatened, and two Rodents (Maghreb Garden Dormouse, *Eliomys munbyanus*, and Barbary Striped Grass Mouse, *Lemniscomys barbarus*). These taxa, with the exception of the rabbit, are not particularly threatened.

According to the additional Spring2022 biodiversity surveys, terrestrial mammals are rare.

No sensitive mammal species has been identified through the Critical Habitat Assessment.

4.5.3 Bats

The study on bats, carried out in 2018, targeted the main habitats they prefer, whether they are hunting environments (grass, scrub) or resting and breeding sites (rock environments, caves, human

constructions, forests). These same habitats were targeted in the April and May 2022 additional survey.

Field records provided 12 species (Table 4-3) from among about 20 which are believed to be present in or around the site.

Table 4-3 Bats recorded on the site in 2018 and 2022, their conservation status and abundance

Species	IUCN status		CITES	CMS	Bern		Eurobats	Abund.	Risk
	Global	Medit.	Ap 4	Ap 3	Ap 2	Ap 3			
<i>Eptesicus isabellinus</i> ¹	LC	LC	x		x		x	++	++
<i>Myotis marginatus</i>	LC	LC	x		x		x	(+)	+
<i>Pipistrellus kuhli</i>	LC	LC	x		x		x	+++	++
<i>Pipistrellus</i>	LC	LC	x			x	x	+++	++
<i>Plecotus gaisleri</i> ²	LC	LC	x		x		x	+	+
<i>Hypsugo savii</i>	LC	LC	x		x		x	+	++
<i>Tadarida teniotis</i>	LC	LC	x		x		x	++	+++
<i>Rhinolophus hipposideros</i>	LC	NT	x		x		x	++	+
<i>Miniopterus schreibersii</i>	NT	NT	x	x	x		x	+++	+
<i>Myotis punicus</i> ³	NT	NT	x	x	x		x	+	+
<i>Nyctalus lasiopterus</i>	VU	NT	x		x		x	(+)	+++
<i>Rhinolophus ferrumequinum</i>	LC	NT	x		x		x	++	+

^{1,2,3}Endemism: ¹. Western Mediterranean, ². Maghreb, ³. Maghreb, Corsica, Sardinia, Malta

IUCN statuses listed in the table include:

LC; Least Concern

NT : Near Threatened

VU: Vulnerable

EN : Endangered

Species observed in April and May 2022 include: *Hypsugo savii*; *Miniopterus schreibersii*; *Nyctalus lasiopterus*; *Pipistrellus kuhlii*; *Pipistrellus pipistrellus*; *Rhinolophus ferrumequinum*; *Rhinolophus hipposideros*; and *Tadarida teniotis*

This fauna is dominated (in terms of frequency) by three species, with the others being rather rare (four of which are regularly noted). The frequency of flights did not exceed 150 sequences per night (101 in April and May 2022), due to strong winds and haze, which are a frequent occurrence, especially on the ridges.

Of the species that are thought to be present, at least nine are sensitive, in the sense that they have an unfavorable conservation status at the global or Mediterranean scale (vulnerable or near-threatened taxa). Five taxa are considered Near Threatened in North Africa, two of which are also

globally threatened, and one, the Great Noctule *Nyctalus lasiopterus*, is considered globally vulnerable, but it is very rare in the records. (8 night records during the 2022 spring missions). Schreibers' Miniopterus (*Miniopterus schreibersii*), is relatively abundant in the April 2022 recordings (27 night recordings).

The 2018 study defines a single zone of medium sensitivity (with fairly average chiropteran densities); it corresponds to a wooded area that is fairly sheltered from the west winds by the main ridge. The same conclusions were made based on the results of the 2022 study. The highest activity (101 passages for *Pipistrellus kuhlii*) was noted around turbines 28-29, where dense *Erica matorral* exists.

Priority species identified through the EBRPD PR6 critical habitat assessment are presented in Table 3 4 below. Two of these species (*Miniopterus schreibersii* and *Nyctalus lasiopterus*) have already been recorded at the site as mentioned above.

Table 4-4: Priority bat species present in the area of assessment for the project

Species of bat	Criteria	Priority or critical
Schreiber's Bent-winged Bat (<i>Miniopterus schreibersii</i>)	Presence of vulnerable species	Priority
Long-fingered Bat (<i>Myotis capaccinii</i>)	Presence of vulnerable species	Priority
Mehely's Horseshoe Bat (<i>Rhinolophus mehelyi</i>)	Presence of vulnerable species	Priority
Giant Noctule (<i>Nyctalus lasiopterus</i>)	Presence of vulnerable species	Priority

4.5.4 Entomofauna

The Critical Habitat Assessment identified four priority or critical insect species in the area of assessment for the project, two of which are endemic to Morocco (*Nimbus anyerae* and *Thorectes coloni*) and two to the Maghreb region (*Thorectes distinctus* and *Tettigonia savignyi*). The only species assessed as critical is *Nimbus anyerae*, while the other two are considered priorities.

Table 4-5: Priority entomofauna species present in the area of assessment for the project

Entomofauna species	Criteria	Priority or critical
<i>Nimbus anyerae</i>	Presence of species whose distribution area is restricted	Priority
	Presence on the IUCN Red List as EN or CR	Priority
	The area of assessment supports $\geq 0.5\%$ of the global population AND ≥ 5 reproduction units of a species CR or EN	Critical
<i>Tettigonia savignyi</i>	Presence of vulnerable species	Priority
<i>Thorectes distinctus</i>	Presence on the IUCN Red List as EN or CR	Priority
<i>Thorectes coloni</i>	Presence of species whose distribution area is restricted	Priority
	Presence on the IUCN Red List as EN or CR	Priority

Dedicated entomology field surveys conducted in the spring of 2022 revealed the presence of one individual of *Thorectes coloni*, a priority species in the study area. This species is dependent on the cushion habitat. The importance of this plant formation has already been highlighted in the ESIA.

Two Moroccan endemic ants, *Anochetus ghilianii* and *Aphaenogaster gemella maroccana* were also recorded during the spring 2022 entomological missions.

4.6 Birds

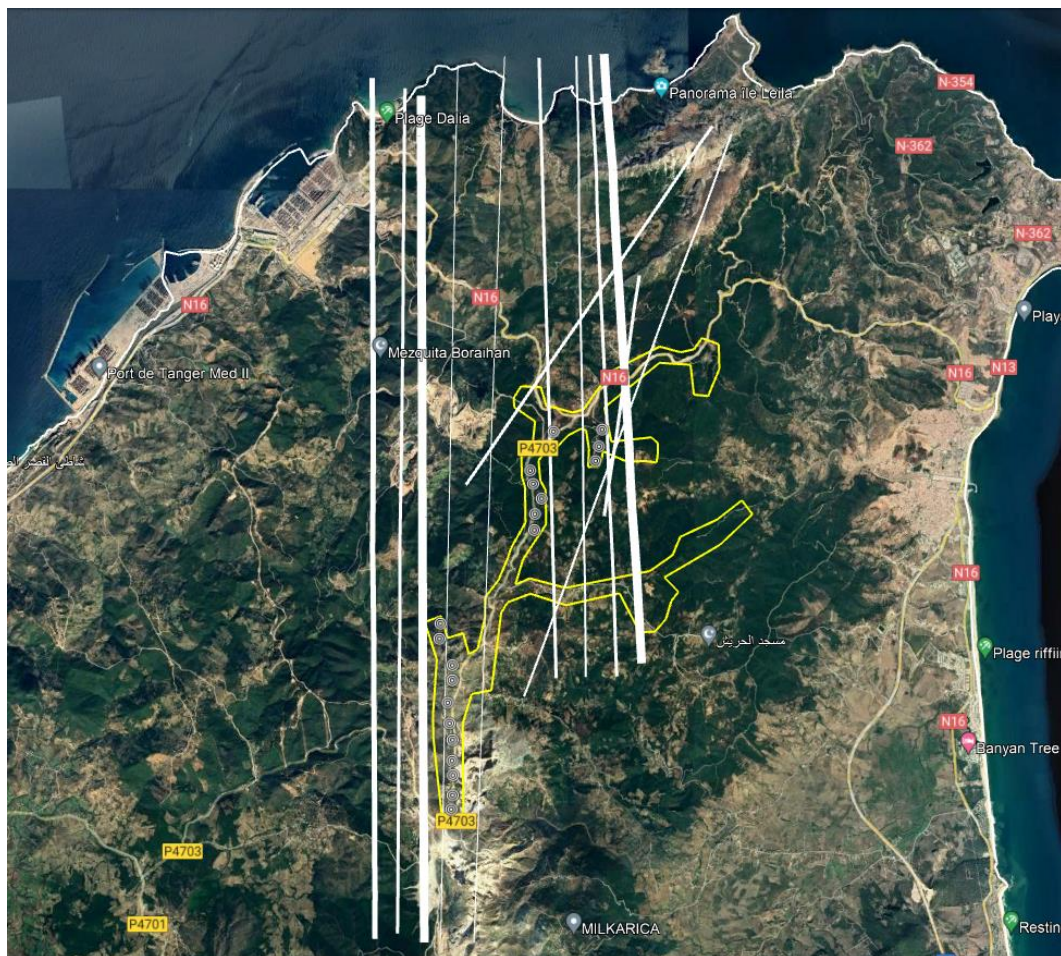
The project site is located south of the Strait of Gibraltar, one of the major bird migration corridors in the Palearctic, used by tens of thousands of soaring birds. Together with its immediate surroundings, it appears to provide shelter for more than 160 species of birds, among which are several raptors protected by Moroccan law and which face a major risk of collision with wind turbines, as well as White and Black Storks and some Corvids. However, the population is rich in resident and migratory passerines, barely affected by the wind turbines.

Two sensitive species, *Neophron percnopterus* and *Anthus pratensis*, were observed on site during the autumn 2021 and spring 2022 missions, and are classified on the international red list (IUCN) as vulnerable and near threatened respectively. Four other species have a heritage value in Morocco, in the sense that they are threatened with extinction as breeders (*Gyps fulvus* and *Pandion haliaetus*) or North African endemics (*Phoenicurus moussieri*, *Oenanthe oenanthe* and *Alectoris barbara*). It should be noted that Moroccan law protects all species of raptors.

Breeders are classified according to their habitats in three categories: cave, steppes and forest. The cave group (Corvids, Common Kestrel, Blue Rock Thrush, Western Black-eared Wheatear) and, to a lesser extent, the steppes group (Barbary Partridge, Moussier's Redstart, etc), would be the most sensitive to the project during the construction phase, since they occupy the work areas (rocky steppe, sometimes reforested ridges). The forest areas are located mainly at the bottom and on the slopes of valleys, but those of Aïn Jir - Tlat Taghramt are on the ridge and are an area of medium sensitivity for the birds in relation to the future wind farm.

Postnuptial migratory birds, studied during two visits carried out in 2015 and 2016 when the sky was hazy and the east wind was strong, showed low numbers, especially during the October visit, while at the end of the same month in 2021, at least 3,500 Griffon Vultures were seen passing through Jbel Moussa, slightly to the north of the wind farm's site, including 2,300 for one hour, with slight winds. The spring 2022 monitoring counted 5051 birds, most of which were migrating raptors.

The schematic representation of passageways (Figure 4.3) was based on the frequency and number of migratory soaring birds during ornithological missions in spring 2022. This map shows the existence of preferred corridors for the passage of raptors. However, several of these migratory birds were observed close to turbines, depending on the species.



Source: Supplementary Biodiversity Study Report by SELF in May 2022

Figure 4.4 Corridors de migration des oiseaux, simulés à partir de l'abondance des migrants navigants lors des missions du printemps 2022

As the height of these flights was not studied in the impact study for the Koudia Al Baida wind farm repowering project (October 2021), the risk of bird collisions with the turbines could not be estimated statistically from the available data. In order to be able to provide the flight parameters necessary for the said estimation of the risk of bird collision, an ornithological campaign was conducted in October 2021 by ERM and SELF, and between March and May 2022 by SELF.

The combined results of the collision risk study (Appendix A) using the 2015-2016 data, the 2021 fall survey, and the 2022 spring survey indicate a lower collision risk than predicted by the previous model presented in Appendix A. This is likely related to the more site-specific and accurate flight height data. Nevertheless, the collision risk increased for griffon vultures and booted eagles, indicating relatively high flight activity in relation to the area swept by the blades. The collision risk study confirms the risk of collision for a number of priority species. A potential risk of collision at the Koudia Al Baida site could be confirmed while the migratory corridors would have been avoided during the design phase of the Project.

The October 2021 and March to May 2022 campaigns provided useful data to supplement the data collected in 2015-2016 as follows:

- They provided survey data specific to the Project site;

- They provided survey data for the latter part of October that had not been previously surveyed;
- They confirmed that the majority of recorded species flew along the ridges at the height of the turbines, within the blade rotation sphere, located between 18 and 150 m above ground level, rather than using the valleys and flying below the Project ridges;
- They observed the passage of birds at the level of the ridges in the northern part of the site (towards turbines 16 to 19); and
- They confirmed that southward migration occurred across the Project site when winds were from the west.

It should be noted that a significant number of griffon vultures that could be observed outside the period of the ornithological campaign of October 2021 to cross the Strait of Gibraltar east of the location planned for the park Koudia Al Baida on October 29 (more than 500 passages) and November 5, 2021 (about 4000 passages), which confirms the importance of this area for migratory birdlife.

The schematic representation of the passage corridors (Figure 4.3) was established based on the frequency and number of passage birds during the ornithological missions conducted in the spring of 2022. This figure demonstrates the existence of preferred corridors for the passage of raptors. However, several birds among these migrants passed by the turbines, depending on the species.

4.7 Protected areas

The area of assessment is located in the Intercontinental Biosphere Reserve of the Mediterranean, which has a less restrictive status for wind farms and is where the site of the wind farm is located in a buffer zone. This area is quite far from the Ben Karrich Site of Biological and Ecological Interest (SBEI), located south of Tetouan, but it is about ten kilometres from the SBEI in Jbel Moussa, whose coastline has recently been classified as a Ramsar Site. This SBEI, rich in endemic plants and high-quality landscapes, has been classified mainly for its importance for migratory birdlife especially Raptors, which are currently benefiting from reintroduction campaigns.

4.8 Sensitive receptors

The breeding avifauna is considered of medium sensitivity, since it concerns a few species not protected by Moroccan law and fairly well represented in the site: three corvids quite common in northern Morocco and whose nesting habitats are, among others, on the ridges that will receive the wind turbines. For steppe birds, whose habitats are partially on the ridges, will be slightly affected during construction; forest passerines are little affected (habitats occupied by electrical pylons and possible runways).

Migratory birds are moderately to highly sensitive, as the study area is crossed by several tens of thousands of large raptors and storks, including sensitive species (*Neophron percnopterus* and *Anthus pratensis*) classified on the IUCN red list. This has been confirmed by observations by ornithologists towards the end of the fall migration period in 2021 and the spring migration period between March and May 2022.

The ESIA report identifies that during both migration phases, birds avoid flying over the ridges between Ain Jir and Taghramt, while they use a wide central pass, located between ridges A2 and A3. In addition, the valley to the north of the site is the site of east-west (and west-east) flights, due to the strong winds that frequently drive the birds in these directions. During the October 2021 and March to May 2022 campaigns, the majority of species recorded were flying along the ridges at the height of the turbines, rather than using the valleys and flying below the Project ridges. The October campaign observed bird passage at ridge level in the northern portion of the site and confirmed that southward migration was occurring across the Project site when winds were from the west. The spring campaign demonstrated a significant number of raptor passages along the corridor west of the ridges.

A risk of avian collision with the turbines would be possible according to collision risk modeling conducted in May 2022 based on available data from the 2015-2016 surveys and the October 2021 and March-May 2022 missions. The risk of collision was assessed as low based on the available data and considering the limitations mentioned.

Chiropterans show minor to moderate sensitivity; they are very low in abundance on the very windy ridges occupied by the existing wind farm, but on the forested lands to the east of them, Chiropteran activity is higher, due to lower elevations and winds.

Critical habitats are limited to a cushion formation that occupies the slopes of the A2 ridge and contains a very rare endemic species *Stachys fontqueri*.

5. SUMMARY OF EXPECTED IMPACTS

5.1 Construction phase

The construction phase typically involves the presence, over several months, of many machines and people, which cause many impacts, the most significant of which affect bats, birds and habitats.

The impacts affecting *bats* are indirect, related to the destruction of their hunting habitats, especially on the ridges, which will be the site of the wind turbines and access roads leading to their platforms. This impact is considered permanent, but underground sites could also be temporarily closed, in addition to disturbing the bats in them.

No loss is foreseeable in the dense forest north of the project area.

With regard to *birdlife*, work during the breeding period (spring-early summer) can destroy individuals and/or occupied nests and/or hamper nesting (due to the disturbance caused) of sensitive species near the work area. No direct impact is foreseeable on these birds from the work itself, but it is not ruled out in the case of small passerines, which are sometimes very abundant on the ridges.

The impacts of the work on the environment (including flora and vegetation) would be low to nil at the level of the ridges bearing the current wind farm, given the already degraded state of its habitats, but in the sectors that will be newly occupied (ridges, electricity pylons, etc.), the risk of loss of habitats must be considered. This loss is low in the case of power lines, but the installation of pylons in the forest may affect the oak forest and must be taken seriously given the dependence of the herpetofauna and sensitive entomofauna on this type of habitat. Similarly, pollution of habitats is possible in the event of poor maintenance of machinery (oil leaks) or accidents (overturning of machinery) or poor waste management.

Concerning terrestrial fauna (mammals and reptiles), several factors related to construction can cause their disappearance: the degradation of their habitats, disturbance related to the work and human presence, and poaching. The degradation of sensitive habitats in cushion habitats can also have an impact on the endangered beetle species.

As for impacts on protected areas, only the biosphere reserve is considered, since the park will be built in its core protection area; but the registration of this protected area came after the implementation of the existing wind farm, and since most of the wind turbines of the new park will take the place of the old ones, the impact of the work on the already anthropized habitats will be limited. However, the widening of tracks for construction vehicle traffic and the larger size of the new turbines could have a significant effect on habitats, particularly dense heathland mattoral habitats that have an important role in mitigating erosion risks and priority habitats such as the steppe pad habitat located in the southern area of the site, which supports rare plant species and on which sensitive herpetofauna and entomofauna depend.

5.2 Operational phase

Chiropterans suffer mortality by percussion or barotrauma, which mainly concerns species flying at height; in the absence of monitoring at height, the estimation of this risk refers to the results of Mediterranean studies, with reference to those of EUROBATS (2016). Two of the priority species present at the site have been identified in the project area, namely *Miniopterus schreibersii* and *Nyctalus lasiopterus*. According to the campaigns conducted in 2021 and 2022, these species are rare on the site. However, the studies carried out in the ESIA (in June and September) show that the potential risk for the two species, the Great Boreal Owl (vulnerable) and Cestoni's Molossus, is high. A complementary study on chiropterans is therefore recommended to confirm the risk of the Project on chiropterans. On the ridges, chiropteran flights (and therefore their mortality) are favored by moderate winds (3 to 6 m/s) and nil for speeds greater than 8 m/s, while they are very reduced in periods of rain or fog. The area of moderate sensitivity is located east of the ridges that will receive the wind farm.

Birdlife in general and migratory in particular are affected by fatalities caused by collisions with wind turbines and power lines and by electrocution from coming into contact with them. The collision risks vary with the mode and height of flight, wind speed and the birds' rate of activity. The most vulnerable among these are the large gliders: raptors (vultures, buzzards, kites and eagles), storks, herons etc. But the risk depends on the winds, which are often strong in the Tangier Peninsula and sometimes force the birds to fly low or drag them east or west of the peninsula, depending on their direction and strength. The visibility of the wind turbines, due to their position on the ridges, and the N-S orientation of the ridges, would significantly reduce the collision risk, while the haze would increase it, since it would make the electrical cables barely visible.

The intensity of this permanent impact is considered *low* for all birds, considering that it affects a small proportion of migratory birds transiting through the site. But this intensity is *moderate* for large raptors, based on the reckoning that the new wind farm, with only 20 wind turbines, would have less of an impact than the old one. However, the dimensions of the new wind turbines are larger than those of the old wind farm, and are taken into account in collision risk modelling for birdlife (Appendix A). A potential collision risk at the Koudia Al Baida site is confirmed by this modelling.

Scenario 4 of the bird collision risk modelling will be considered.

The risk of electrocution depends mainly on the configuration of the electric poles, which should not provide the birds with the opportunity to settle on top of them, but also on the spacing between the wires of opposite phases. Here again, the orientation of the two planned lines, subparallel to the dominant direction of the crossings, would mitigate the risks associated with these lines.

6. CUMULATIVE IMPACTS

A cumulative impact assessment was prepared by ERM in May 2022. A summary of the main cumulative impacts is included in this section.

6.1 Cumulative impacts on habitats and plant components

The land clearing caused by the construction of wind farms is, in general, proportionally small to the area of land acquired for these projects (usually less than 4%). In mountainous areas, the need for access roads on slopes and curves which are acceptable for operating large wind turbine transport machines means that this proportion is greater than on flat terrain. The fact that wind turbines are located on the ridges means that they can occupy fairly rare habitats.

In the case of Koudia El Baida wind farm, the only sensitive habitat affected is the cushion formation, which is dominant on the ridge to the southwest at the level of the high ridges, north of Tlat Taghramt.

6.2 Cumulative impacts on herpetofauna and land mammals

These creatures are exposed to indirect impacts, linked to the destruction of habitats, and to direct impacts which result from disturbing and killing these animals. These animals are subject to permanent tracking by populations; but as they are subject to various protection measures on wind farms, the animals are likely to be affected by lower levels of risk. For this reason, although quantitative data is not available in all wind farms in the region, the cumulative impact of the wind farm on these animals will be considered low.

6.3 Cumulative impacts on birds

During the operational phase, according to the knowledge acquired on the overall numbers and migration corridors in the north-eastern part of the Tangier Peninsula, and on a preliminary basis, the Koudia El Baida wind farm is exposed to collision risks (see numbers recorded by the ESIA). About a quarter of the migratory birds which pass through the gully corresponding to Jbel Moussa fly over the Al Haouma wind farm. The Khalladi wind farm would come last, with very low numbers of migratory soaring birds.

The Al Haouma wind farm also identified a risk of collision that could affect some species. However, the number of collisions and mortality was not available in the 2021 spring monitoring report to compare the impact of the Al Haouma project on migratory and sensitive birds with that estimated by the collision risk modelling of the Koudia El Baida wind farm.

6.4 Cumulative impacts on chiropterans

Rare protected species have been identified in the areas of the Al Haouma and Koudia El Baida wind farms, including *Nyctalus lasiopterus*. While the presence of sensitive species at the Koudia El Baida site remains relatively rare, the lack of data at the neighbouring wind farms does not allow for an assessment of the potential impact they could have. Given the potential impact of the two neighboring wind farms on chiropterans, preventive actions are needed to mitigate potential negative cumulative impacts.

7. PROPOSED MEASURES FOR THE MANAGEMENT AND PROTECTION OF BIODIVERSITY

7.1 Construction phase

These measures apply to both wind farm structures and power lines.

7.1.1 *Impact: habitat destruction and disturbance of wildlife (including bats)*

- All project activities and installations will be limited to within the project site and will not encroach on adjacent land; the installations will be removed as soon as possible.
- Determine the final area of sensitivity of the project in terms of construction-excavation works, clearing, occupation, etc. based on the map illustrating sensitive habitats (cushion and salamander habitats) in the project area - map prepared based on the results of the 2022 Spring Visits (Figure 4.3). Reduce LDA9 work area right-of-way at A2 ridge (avoid critical habitat loss of the cushion habitats).
- Consider a micro-implantation approach to avoid direct encroachment of turbines and assembly areas on sensitive habitats (cushion and salamander habitats) if necessary.
- Adequate compensation (creation of plantations, animal shelters, etc.) should be considered for potential loss of this and other habitat types.
- At the end of the project, decompact the soil on the surface to promote spontaneous revegetation.
- Run a campaign to raise workers' awareness of the ecological and useful value of wild flora and fauna, so that they preserve them.
- Fight against poaching and any form of vandalism against wildlife.
- Machinery, operating during daylight hours only, must be in good condition to meet regulatory noise levels.
- Spoil storage areas must be clearly identified and delineated. A technical and ecological study of the spoil disposal areas must be prepared.
- Schedule work outside of the animal breeding season (mostly spring and early summer) and provide opportunities for animals to leave the development areas prior to work.
- Remove top soil and deposit it in a special repository for reuse in revegetation. Avoidance of any backfilling of on-site habitats: excavated spoil from the excavation process is placed directly into dumpsters for disposal in spoil disposal areas. This measure is a priority on the two southern ridges of the wind farm.
- Limit the amount of excavated material brought in from outside to the site to avoid the introduction of invasive exogenous species.
- Clean construction machinery and equipment to prevent the spread of invasive plants.
- Manage the project according to the IFC's Environmental, Health, and Safety (EHS) Guidelines.
- Implement a forest wildfire prevention and control protocol.

7.1.2 *Impact: risk of pollution of natural environments, flora and fauna*

- Ensure that preventive maintenance is carried out on the machines.
- Avoid discharging and storing hydrocarbons on the site.

- Refuelling tankers must be equipped with nozzles and check valves and use an absorbent tarpaulin.
- Define procedures aimed at limiting any accidental pollution (i.e. absorbent products, such as sand or an anti-pollution kit which the machines must be equipped with).

7.1.3 *Impact: destruction of individuals/nests and disturbance of breeding birds*

- Water the grounds during the work and when the machines are moving around to limit the accumulation of dust.

7.1.4 *Impact: wildlife mortality*

- Establish procedures to deal with all species found on site (reporting, identification and potential resettlement).
- Limit the traffic speed on the construction site to 30 km/h.

7.1.5 *Impact: poaching/hunting/trade*

- Prohibit/sanction hunting, falconry and any trade in animals from the site.

7.1.6 *Impact of human activities*

- Avoid night work (avoid noise/light disturbances affecting wildlife).

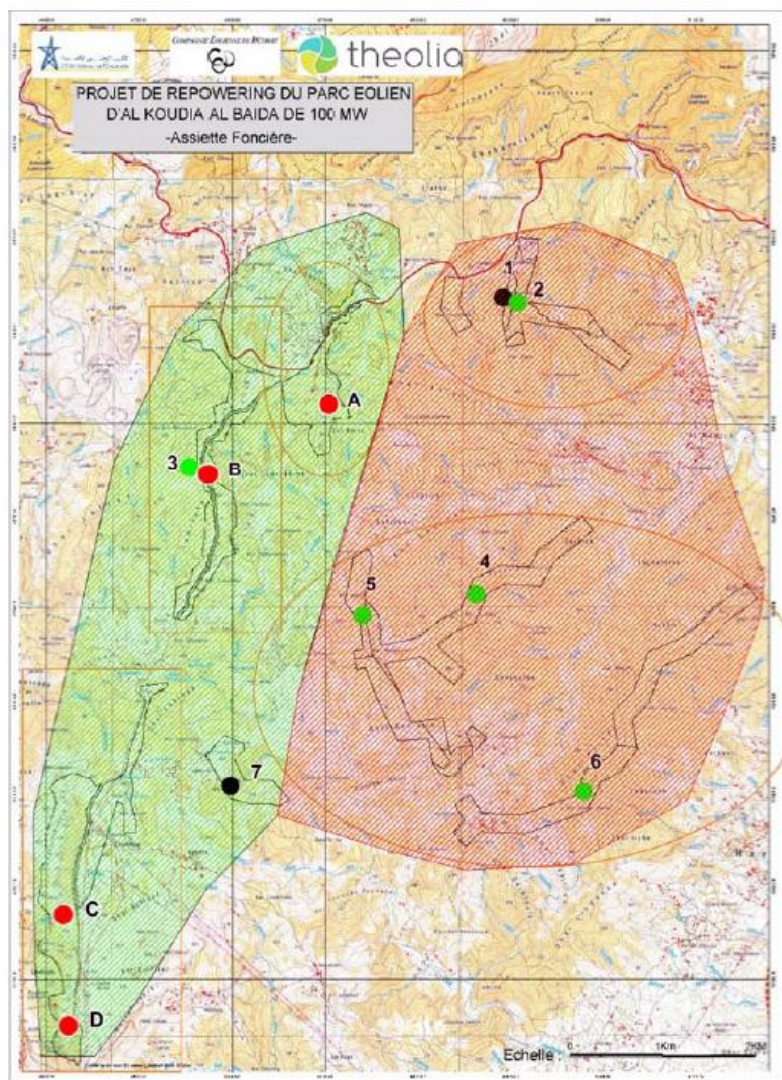
7.1.7 *Impact: fire risks*

- Provide training to staff on fire prevention and firefighting.

7.2 Operational phase

7.2.1 *Impact: bat mortality*

- In the sector identified as being of medium sensitivity (see map below in Figure 6 1), it is proposed to conduct a supplementary study on chiropterans during the period of high activity (summer) before the start of construction. Shutdowns of the wind turbines should be considered in the event that a significant potential impact on chiropterans is confirmed; these shutdowns would only relate to the period of intense chiropteran activity, i.e. April-October:
 - Nights with no rain;
 - If the wind speed is less than 8 m/s; and
 - During the first four hours of the night.
- Set up a direct monitoring of bat mortality by collision covering the first five years of operation of the park.
- Drain away rainwater and prevent it from stagnating at the foot of the wind turbines and attracting bats.



Source: CED's Chiroptera study mission 1 and 2, November 2018

Figure 7-1: Map showing areas of sensitivity for bats in the project area (green: less sensitive area, red: moderately sensitive area)

7.2.2 Impact: mortality of migratory birdlife

- Do not install wind turbines in the Aïn Jir sector, in the col identified between ridges A1 and A2 and for 1 kilometre on either side of this col.
- Enhance the vulture attraction structure (carrion container) created in cooperation between GREPOM/BirdLife Morocco and the Department of Water and Forests; by attracting vultures to available food and away from the project site, this carrion container reduces the risk of mortality affecting these birds.
- Drain away rainwater and prevent it from stagnating at the foot of the wind turbines and attracting birds.
- Clear away carcasses naturally present on the site to avoid attracting birds such as vultures, which would then be exposed to the risk of collision.

- Devise and implement a preventive shutdown on demand protocol to avoid collisions with birds. This protocol will need to be updated on the basis of the monitoring programme. This programme will include ongoing preventive monitoring using the necessary monitoring resources (e.g. radar and/or human observers) to detect soaring birds. They will be monitored by an ornithologist and there will be direct monitoring of bird fatalities due to collisions covering the first five years of the wind farm's operations.
- Design and implement a preventive stop-on-demand protocol to avoid collisions with birds. This protocol will be updated based on the monitoring program. This program will include continuous operational preventive monitoring using the necessary monitoring equipment (e.g. radar, camera system and/or human observer) for the detection of soaring birds, which will be monitored by an ornithologist, as well as direct monitoring of bird collision mortality for the first five years of the park's operation.

7.2.3 *Impact: poaching/hunting/trade in birds*

- Establish a mechanism to sanction hunting and trade in animals.

7.2.4 *Impact: use of herbicides and pesticides*

- Implement an integrated pest control programme which avoids the use of pesticides and herbicides and complies with the requirements of the AfDB.

7.2.5 *Impact: fire risk*

- Provide training to the wind farm's staff in fire prevention and management.

8. BIODIVERSITY MONITORING AND PROTECTION PROGRAMME

This programme, presented in tabular form, is essentially compiled on the basis of the measures proposed in the ESIA presented above and of the results of collision risk modelling (Appendix A) and of the Critical Habitat Evaluation within the meaning of the EBRD's performance requirement 6 (Appendix B), which have been translated into practical actions, devised in accordance with the EBRD's requirements and international good practice.

8.1 Design and construction phase

8.1.1 Actions to protect Habitats, Vegetation and Flora

Impact	Biodiversity Protection Plan – Pre-construction and Construction	Location	Timeline	Responsibility
General actions relating to all impacts on biodiversity	Devise a fire-prevention and firefighting plan. The plan aims to prevent and mitigate direct and indirect losses of biodiversity related to fires, but it will also address the health risks of fires. The plan must cover the alert system (i.e. observatories), the training of staff in good prevention practices, the protocol and response equipment, the training of staff included as part of the protocol, coordination with the Water and Forests Department (which has its own firefighting mechanism) and firefighters. The plan will apply to all phases of the project and will be integrated into the specifications for the subcontractors.	Project area	Before construction	Developer and subcontractors
	Implement a biodiversity training/awareness programme. The developer will ensure that all staff present in the wind farm area, including workers, will undergo a training/awareness programme on all topics related to biodiversity in general and to that of the site in particular (habitats and species, impacts and losses, pollution, conservation, regulations etc). The aim of this action is to prevent adverse impacts on the site's biodiversity, by improving the behaviour of the staff involved in the construction and facilitating their communication with ecologists. It should last 5–6 hours, covering classroom and field work.	Project area	One or more stages in the construction phase, depending on the turnover of staff	Developer and subcontractors
Habitat loss and fragmentation	Identify areas for carrying out the works. The work resulting in clearing must be contained in the Defined Areas of Analysis (DAA): <ul style="list-style-type: none"> traffic, parking and the temporary installation of equipment must not spill over into these areas; identify areas for depositing debris; and avoid depositing any debris temporarily in the vicinity of the DAAs, especially on the verge of the access roads. The materials dug up during the excavation work are immediately loaded onto machines which transport them to the facilities set up to deposit them. 	Defined Areas of Analysis	Entire construction phase	Developer and subcontractors
	Demarcate areas for depositing the excavated material. The developer will delineate areas of excavated material disposal sites, that will be calibrated to receive the volume of materials produced by the project; and will ensure to identify and avoid sensitive areas.	Project area	Before construction	Developer

Impact	Biodiversity Protection Plan – Pre-construction and Construction	Location	Timeline	Responsibility
	<p>During construction activities, the developer will ensure that the following tasks are carried out:</p> <ul style="list-style-type: none"> verify and guarantee the compliance of the work with the measures devised in this action plan; check to see whether new impacts are emerging and devise the necessary measures; draw up specific action plans (rehabilitation/revegetation of impacted habitats, management of materials at risk of causing pollution etc). 	Project area	Entire construction phase	Developer
	<p>Monitor the impact of construction work on habitats. The developer will monitor sensitive habitats during construction with the aim of preventing the destruction of sensitive habitats such as cushion formations. If a sensitive habitat (cushion-formation habitat and potential habitat for salamander) needs to be used, an opinion is required from an expert and will include an assessment of the impacts of this extension and a draft of the appropriate measures, firstly, to minimise the impact and then to provide compensation, if appropriate. A micro-implantation approach to avoid direct encroachment of turbines and assembly areas on sensitive habitats may be considered.</p>	Project area	Construction phase	Developer and subcontractors
	<p>Assess the impacts of any deviation from the DAA, if necessary. If a sensitive habitat (cushion-formation habitat outside the DAA) needs to be used during construction, an opinion is required from suitably qualified person and will include an assessment of the impacts of this extension and a draft of the appropriate measures.</p>	Defined Areas of Analysis	Entire construction phase	Developer and subcontractors
	<p>Prepare a compensation plan for critical habitats impacted by construction work. A compensation plan will have to be prepared in anticipation of the losses which will be caused by the construction work (widening of roads, installation of new wind turbines etc). Cushion-type habitats could be irreversibly impacted during construction. Therefore, to obtain at least a <i>No Net Loss</i> result, it is important to devise a compensation plan before the work commences. Different approaches are possible for the compensation plan, such as protecting similar ecosystems at risk in other projects or initiatives, or proposing financial assistance to protected areas with a similar type of ecosystem. It will also be necessary to define a protocol for the rehabilitation of these habitats, using only local vegetation adapted to local conditions (sowing of seeds, transplantations, preparation of nursery plans etc). See the action defined below.</p>	Ridges occupied by critical habitats.	Before construction	Developer
	<p>Prepare a rehabilitation plan. The developer will prepare and implement a rehabilitation plan (in particular through revegetation) for the critical habitats impacted, specifically the environments with cushion formations. This plan must include:</p> <ul style="list-style-type: none"> the process for collecting, drying, storing and sowing seeds; rehabilitation processes through plans, with possible nurseries; 	Planned location for power lines	Construction phase	Developer

Impact	Biodiversity Protection Plan – Pre-construction and Construction	Location	Timeline	Responsibility
	<ul style="list-style-type: none"> soil fertilisation and watering processes (focusing on the use of plant soil accumulated on site) etc. 			
	Consultation with the Regional Directorate of Water and Forests concerning clearing operations. The planned clearing operations in wooded habitats must be negotiated in advance with the Regional Directorate of Water and Forests, which will determine the mode and cost of the related compensation.	Defined wooded areas of analysis	Start of construction phase	Developer and subcontractors
	Preserve the surface layer of the excavated soil. During all excavation work, the surface layer of the soil (50-80 cm thick) will be taken first and stored in a plot chosen for this purpose. This layer will be reused to fertilise the areas to be rehabilitated. These deposits must not be stacked more than 2 metres high.	Project area	Entire construction phase	Developer and subcontractors
	Implement a fire prevention and firefighting plan. The developer must have a fire prevention and firefighting plan (especially for forest fires), established and implemented in coordination with the Regional Directorate of Water and Forests and with the Civil Protection authority.	Project area	Construction and operational phases	Developer and subcontractors
Modification of habitats (pollution)	Prepare a pollutants management plan. The developer must have a management plan for dealing with polluting products (fuel, oil, wastewater, solid waste etc) during the construction phase. The management plan must focus on the usual good practices followed in the management of these pollutants, in particular as regards the maintenance of the machinery and the methods for storing and handling hydrocarbons.	Project area	Start of construction phase	Developer and subcontractors
	Limit the traffic speed in the work area. In order to prevent modification of the habitats (especially the most sensitive, containing vulnerable species) through excess dust, the traffic speed on the access roads must be permanently limited, with clear signage displayed and sanctions imposed that are tailored to the companies involved. The work area will be subject to a limitation clause relating to the generation of dust.	Project area	Construction phase	Developer and subcontractors
	Prohibit the use of foreign soil or plants. The constructor will be prohibited from introducing into the site soils or plants which are foreign to it, in order to avoid any risk of spreading invasive species likely to modify the habitats. Revegetation should be carried out with native species only.	Project area	Construction phase	Developer and subcontractors
Loss of vulnerable flora species.	Make subcontractors aware of vulnerable flora species. The developer will formally ban project staff, including subcontractors, from using vulnerable flora species. Those involved in the construction will be informed of the areas demarcated for this purpose.	Project area	Construction phase	Developer and subcontractors

8.1.2 Actions to protect Herpetofauna and Terrestrial Mammals

Impact	Biodiversity Protection Plan – Construction	Location	Timeline	Responsibility
Loss of amphibian or reptile habitat	Prevent the destruction of wetland habitats frequented by the North African Fire Salamander and other sensitive amphibians or reptiles identified in the CHA. As these habitats are very rare on the site, the expert hired to monitor the herpetofauna will identify all the water points likely to undergo road development and will carefully search for the species. Any individuals found will be moved to an equivalent habitat outside the habitat undergoing development, if possible. Mitigation measures (e.g. passages under access roads) may be decided on in collaboration with a specialised laboratory.	Natural water points in the project area	Before any development affecting water points	Developer
Risk of direct mortality to amphibians, reptiles or insects	Implement an awareness-raising programme about amphibians, reptiles, insects and land mammals. Introduce amphibians, reptiles, insects and land mammals as part of the training and awareness programme provided as a general measure in this action plan, given that these animals have, for the most part, a bad reputation among the public even though they play a major role in ensuring the integrity of the ecosystems.	Project area	At the start and during construction	Developer and subcontractors
	Inspect the cables. Once the cable trenches are dug, they must be inspected every day to ensure that no reptiles, amphibians or mammals are trapped in them. A systematic inspection will be carried out before the trenches are covered.	Trenches	Construction	Developer
	Impose a traffic speed limit of 20 km/h on site, with a recommendation to avoid running over any land fauna.	Project area	Construction	Developer and subcontractors
	Prohibit, monitor and sanction any killing of land animals on site (poaching or trade in amphibians, reptiles and mammals) and any action leading to this.	Project area	Construction	Developer and subcontractors

8.1.3 Actions to protect Birds and Bats

Impact	Biodiversity Protection Plan – Construction	Location	Timeline	Responsibility
Loss of bird habitats	Avoid all construction activities where nesting is present. The constructor will avoid as far as possible the destruction of habitats where evidence is provided for the nesting of sensitive birds during construction. In this case, it will plan its interventions in these habitats outside the breeding period (from the occupation of the nest until the young fly the nest) of the species concerned. These periods are from mid-March to mid-July in the project area.	Project area	Construction phase	Developer and subcontractors

Impact	Biodiversity Protection Plan – Construction	Location	Timeline	Responsibility
Direct harm caused to birds	<p>Establish a on-demand shutdown protocol.</p> <p>A shutdown protocol will be developed by the Project Company prior to the start of operation to evaluate the downtime and loss of electrical production due to this protocol, and to define the conditions for shutting down the turbines on demand.</p> <p>The variables/conditions of the shutdown on-demand protocol are mentioned in the collision risk modelling (Appendix A). It will have to be established over the whole project area during their migration, between the months of March and June, as well as between the months of August and mid-November (to be readjusted according to the high activity periods). These conditions will have to be discussed and agreed upon with the ornithologists in charge of the operational monitoring of the project.</p>	Ridges where the turbines are located	Pre-construction phase, spring 2022	Developer
			Before operations start	Project Company and O&M
	<p>Implement a training and awareness programme about birdlife. The training and awareness programme planned during the construction phase will explicitly include birds (to be mentioned in the training specifications). This training will give a clear and concise idea about the role of bird breeding and migration, and about the ecosystem services for birds</p>	Project area	Construction phase	Developer and subcontractors
	<p>Prohibit any action which involves killing or resulting in the killing of birds, whatever the means and causes (trapping, poisoning, hunting with dogs), and also the destruction or removal of nests, clutches of eggs or broods.</p>	Project area	Construction phase	Developer and subcontractors
	<p>Prohibit the disturbance of breeding birds. If breeding birds are discovered during the work, they will not be killed, and if they are occupying a nest, it will be preserved as long as it contains eggs or chicks. In the case of nesting birds, chicks will be transported to an equivalent habitat near the work site.</p>	Project area	Construction phase	Developer and subcontractors

Impact	Biodiversity Protection Plan – Construction	Location	Timeline	Responsibility
	Sanction any nuisance caused to the birds. Staff involved in the construction operation will be sanctioned for any activity disturbing the birds, whether this involves sound, light or any other nuisance, especially during the night and during the breeding periods (mid-March to mid-July).	Project area	Construction phase	Developer and subcontractors
Direct harm to bats	Carry out an additional bat study. The developer will conduct a supplementary study of chiropterans before construction. In order to determine whether shutting down on demand should be introduced throughout the whole wind farm from the start of operations as a precautionary measure, or after mortality surveys have been conducted, ground-level detection is required before operations commence in all project areas, at least in the four locations where studies have taken place using cradles (points A, B, C and D representing ultrasound recording stations in the 2018 bat study conducted by Phenixa). These measurements can be taken by continuous ultrasound detection using a detector-recorder at ground level. Three missions lasting six days will be carried out during summer period (June, July, August).	Project area	Pre-construction phase, spring 2022	Developer
	Avoid the destruction of trophic habitats and breeding sites of bats. The constructor will avoid as far as possible the destruction of trophic habitats and breeding sites of bats. If it is essential to develop certain non-sensitive habitats, the constructor will plan its interventions in these habitats outside the breeding period of the species concerned.	Project area	Construction phase	Developer and subcontractors
	Prohibit the disturbance of breeding bats. If breeding bats are discovered during the work, they will not be disturbed, and if they are occupying a site, it will be preserved until breeding is over.	Project area	Construction phase	Developer and subcontractors
	Establish a monitoring program for chiropterans In order to prevent bat mortality due to contact with wind turbines, the developer will prepare a protocol for shutting down wind turbines on demand (bridges) during the high frequency of use of the project area by chiropterans. These shutdowns will only occur during the period of intense chiropteran activity, i.e., April-October: o On non-rainy nights; o If the wind speed is less than 8 m/s; and o During the first 4 hours after nightfall			

8.2 Operational phase

8.2.1 Actions to protect Habitats

Impact	Biodiversity Protection Plan – Construction	Location	Timeline	Responsibility
Loss and modification of habitats	Implement a programme for monitoring the rehabilitation of the soil's vegetation cover. A detailed programme to monitor the progress of the rehabilitation initiated during the construction phase. It will therefore cover the first five years of operations.	Project area	Operational period	Operator
	Study the potential impact of any changes to the project or work in consultation with experts. The operator will refrain from carrying out actions to modify the project, which are likely to have an impact on the habitats on the site. If modification is necessary, it will be subject to the opinion of an ecologist.	Project area	Operational period	Operator
	Devise a fire prevention and firefighting plan for the operational phase. The fire prevention and firefighting plan drawn up for the construction phase will be adopted for the operational phase, with an update and possible adaptations.	Project area	Operational period	Operator

8.2.2 Actions to protect Herpetofauna and Terrestrial Mammals

Impact	Biodiversity Protection Plan – Construction	Location	Timeline	Responsibility
Risks of wildlife mortality	Implement a training and awareness programme about wildlife. A training/awareness-raising programme should be provided to staff involved in the operation of the project. The programme will have the same content as that of the construction phase, but it will be adapted to the needs of biodiversity protection during operational activities.	Project area	Start of operational phase	Developer and operator
	Limit the speed of machinery traffic in the project area to 20 km/h in order to avoid wildlife dying due to being run over.	Project area	All the time	Developer and operator
	Prohibit and control all activities likely to lead to wildlife mortality (poaching, poisoning, detention, animal trade, use of pesticides).	Project area	All the time	Developer and operator
	Apply restrictions on access to the area acquired for developing the wind farm , particularly access for activities harmful to wildlife (hunting, poaching, activities involving fire etc).	Entrance to access roads to the wind farm	All the time	Developer and operator

8.2.3 Actions to protect Birds and Bats

Impact	Biodiversity Protection Plan – Construction	Location	Timeline	Responsibility
All types of impact	Develop measures to compensate for net losses or net gains for the species concerned. Trigger the implementation of compensation measures when residual mortality thresholds are exceeded. The residual mortality thresholds for birds and bats will have to take into account the level of protection of the species according to national legislation and international criteria (IUCN, Bonn Convention on Migratory Species etc). For example, a threshold of one dead individual from a bird or bat species in the CR, EN or VU categories according to the IUCN or other applicable legislation, per monitoring period and in three consecutive or six alternate monitoring periods, and more than one dead individual animal in two consecutive or three alternating monitoring periods must trigger the implementation of compensation measures.	Off site	<p>Identification study and pre-feasibility of potential compensation measures for target species (more threatened, rarer, more sensitive to impacts)</p> <p>As soon as possible and no later than before the end of the first year of operations</p> <p>Implementation of compensation measures as soon as possible once residual mortality thresholds (after implementation of all possible prevention and correction measures) are exceeded.</p>	Developer and operator
Risks of bird mortality	Ensure that power lines and electric pylons follow best practice standards to reduce the risk of birdlife mortality. Power lines and pylons will have to comply with the Guidelines of AEWCA-CMS (Agreement on the Conservation of African-Eurasian Migratory Waterbirds), the Convention on Migratory Species (Bonn Convention), Recommendations of the "Bern Convention Expert Group on the Conservation of Birds" and "Birds and High Voltage Lines in	Power line	Design and construction	Developer and constructor

Impact	Biodiversity Protection Plan – Construction	Location	Timeline	Responsibility
	<p>the Rift Valley/Red Sea Flyway". Power cables should be insulated in areas near perches, at least at pylon level.</p>			
	<p>Devise and implement a monitoring programme for birds</p> <p>The operator will implement a detailed post-construction monitoring programme specifically for birds and their mortality rates. The objectives of this programme are to estimate bird mortality rates due to collision and electrocution, to monitor the dynamics of the bird population and to take circumstantial measures to avoid or reduce bird mortality (in this case, stopping or slowing down wind turbines). It will be based on the results and measurements taken from the additional study carried out during construction. This monitoring of birdlife mortality during the early years of operations will make it possible to verify the effectiveness of the wind turbine shutdown or slow down protocols already implemented, and to assess the need to extend the shutdown protocol to other wind turbines or to adapt it.</p> <p>This programme is based on two complementary methods:</p> <ul style="list-style-type: none"> - Direct monitoring of bird mortality due to collision according to international good practices, which will cover the first five years of the wind farm's operations. This monitoring will involve regular studies to record bird fatalities around the wind turbines, through an active search for carcasses around the turbines. - Continuous preventive monitoring using appropriate tools (e.g. soaring bird detection radars or other means). The birds will be monitored by an ornithologist, one of whose roles is to alert, in the event of a collision risk, the operator of the wind turbines to shut down (or possibly slow down) the devices affected by the risk. It is recommended that the feasibility of this monitoring method (type of monitoring tools, their number and position in the wind farm, training for observers in their use etc), including testing, should be analysed before operations begin. <p>Monitoring campaigns will target migratory birds, especially large soaring birds, since the ESIA and the additional biodiversity surveys have highlighted the large abundance of them compared to spring breeders. According to our knowledge of migrations through the Strait of Gibraltar, postnuptial passages take place between August and November and prenuptial passages are between March and June.</p> <p>As regards power lines, the recommended measures regarding the configuration of pylons and power cables will almost completely avoid electrocution, but if they are not properly</p>	<p>Ridges and power lines</p>	<p>For the entire duration of the operational phase, with a focus on the migration period</p>	<p>Developer and operator</p>

Impact	Biodiversity Protection Plan – Construction	Location	Timeline	Responsibility
	applied, the mortality monitoring protocol will also be applied to them. In this case the search for carcasses will be carried out at the foot of 20–30 per cent of the pylons, during each campaign of the monitoring programme and depending on the position of the lines.			
	Support the activities of the vulture rehabilitation centre. The developer will support the activities of the vulture reception centre (CAV-JM) created in Jbel Moussa. This measure is proposed as a means of avoiding raptor fatalities, since this provider of carrion attracts the birds to Jbel Moussa and prevents them from foraging elsewhere, including in the area of Koudia El Baida wind farm. Actions to support the activities of the CAV-JM will be defined by the developer.	Jbel Moussa vulture rehabilitation centre (CRV-JM)	Start of construction and for the duration of operations	Developer and operator
	Avoid creating artificial habitats to attract large birds close to the wind turbines (landfill, open bodies of water etc).	Ridges and their vicinity	Operational phase	Developer and operator
	Prevent the presence of carcasses on the site. If a carcass is detected on the site, it will be immediately transported, regardless of its size, to the carrion container for vultures, created near the park.	Project areas	Operations	Operator
	<p>Implement a shutdown on demand protocol for birds .</p> <p>This protocol could be combined with essential monitoring tools (e.g. radar) and having an observer frequently present on the site (to alert wind turbine operators to order their shutdown)</p> <p>The variables which will need to be considered to prepare the shutdown on demand protocol (flanges) to avoid collisions with birds are included in collision risk modelling in Appendix A of this BAP. Shut-down on demand is recommended on the entire project area during migration, between the months of March and June, as well as between the months of August and mid-November (to be readjusted according to the strong periods of activity). These conditions will have to be discussed and agreed upon with the ornithologists in charge of the operational monitoring of the project.</p> <p>Bird mortality thresholds by species and period, the level of protection of species according to national legislation and international criteria (IUCN, Bonn Convention etc) will have to be taken into account in these shutdown protocols. The results of the various additional studies described in the Biodiversity Protection Plan construction table will make it possible to determine the wind turbines affected by the shutdown protocol. Similarly, the results of</p>	Ridges for installing wind turbines	Preventive protocol for shutdown on demand, from the start of operations. The design of this protocol will be based on the additional pre-construction birdlife studies. This design may be reviewed during the early years of operations, on the basis of the results of the early monitoring years (results of studies	Operator

Impact	Biodiversity Protection Plan – Construction	Location	Timeline	Responsibility
	detailed operational monitoring programmes specifically for birds and their mortality rates will make it possible to adapt the protocols.		monitoring birdlife mortality).	
Risks of bat mortality	<p>Devise a monitoring programme for bats. The operator will implement a detailed operational monitoring programme specifically for bats and their mortality rates. The objectives of this programme are to estimate bat mortality rates, monitor the dynamics of the bat population and to implement any measures to avoid or reduce these fatalities (with reference to the EUROBAT standards). It will be based on the results and measurements taken from the additional study carried out before construction.</p> <p>The programme will include the regular recording of fatalities around wind turbines by carrying out an active search for carcasses around the turbines. The surveys will involve 50 per cent of the wind turbines (10) in all the operations carried out, with the possibility of focusing only on wind turbines where recorders have revealed a large amount of bat activity.</p> <p>The frequency of the operations involving the search for carcasses and recording of bat activity, which would take place between April and October in northern Morocco, can only be defined on the basis of the results of the additional study carried out in the construction phase, since the peaks of activity of these animals are very erratic over time.</p> <p>The count will be carried out by a competent, qualified person, over a diameter equal to twice the length of the blades as far as possible. The protocol should subsequently be adapted to the physical situation of each tower. Preferably, trained dogs can detect the presence of carcasses in hard-to-reach areas.</p>	Ridges	For the entire operational period	Developer and operator
	<p>Minimise lighting for the wind turbines. Lighting for the turbines should be kept to a minimum. If necessary, use low-intensity lighting (causing little disturbance to birds, not very attractive to insects and bats etc).</p>	Ridges for installing wind turbines	Design and operation of wind turbines	Builder and operator
	<p>Devise and implement a protocol for shutting down on demand. The preparation and implementation of the shutdown protocol on demand will depend on the results of the complementary study on chiropterans during the summer period (June-July-August).</p> <p>The mortality thresholds for bats by species and period, the level of protection of the species according to national legislation and international criteria (IUCN, Bonn Convention, etc.) will have to be taken into account in these shutdown protocols. The results of the various additional studies described in the table Biodiversity Protection Plan - Construction, will determine which wind turbines are affected by the shutdown protocol. Similarly, the results of</p>	Ridges for installing wind turbines	This design may be reviewed during the early years of operations, on the basis of the results of the early monitoring	Operator

Impact	Biodiversity Protection Plan – Construction	Location	Timeline	Responsibility
	the detailed operational monitoring programs specific to chiropterans and their mortality will allow the protocols to be adapted.		<p>years (results of studies monitoring bat mortality).</p> <p>In the event that the protocol for shutting down on demand is not implemented following the additional studies, it could be implemented according to the results of the follow-up studies on bat mortality, as soon as possible if the mortality thresholds are exceeded.</p>	

9. REPORTS

Most of the measures proposed in this BAP will be monitored and evaluated via a technical reporting mechanism, which differs between the two main phases of the project and in terms of the topics they address.

These reports will receive input or support from field checks, the subcontractors' green terms of reference, conventions and administrative documents required to initiate and legitimise the actions.

9.1 Construction phase

9.1.1 *Creating/populating an information system on the biodiversity of the site*

- Monitoring report on biodiversity-related actions and measures.
- Register of environmental incidents (fires, pollution, accidental and forced mortalities among animals, translocation of animals and plants etc).

9.1.2 *Habitats, Flora and Vegetation*

- Compensation plan, where appropriate, depending on the impact of the construction work on sensitive habitats (cushion habitat and potential salamander habitat)
- Identification of sensitive areas where depositing excavated material should be avoided.
- Rehabilitation plan (in particular through revegetation) for the impacted habitats.
- Fire prevention and firefighting plan.
- Pollutant management plan.

9.1.3 *Fauna*

- Additional study of bats

9.2 Operational phase

9.2.1 *Information system (database) on the biodiversity of the site*

- Register of bird and bat fatalities.
- Register of environmental incidents (excluding bird and bat fatalities).

9.2.2 *Habitats, Flora and Vegetation*

- Fire prevention and firefighting plan (adapted for operations).
- Post-construction monitoring programme for habitats and vegetation in terms of their rehabilitation.

9.2.3 *Fauna*

- Post-construction monitoring programme tailored to birds.
- Post-construction monitoring programme tailored to bats.
- Monitoring of support for the activities of the Jbel Moussa vulture reception centre (CAV-JM).

10. TRAINING, RAISING AWARENESS AND PROVIDING SKILLS

A training programme is planned to:

- raise the awareness of the project's staff so that they can contribute implicitly to the protection of biodiversity and to facilitate communication with them, and
- onboard staff responsible for the ecological aspects of biodiversity monitoring.

This training will be provided at the beginning of the two main phases of the project, with significantly different content.

10.1 CONSTRUCTION PHASE

- Biodiversity-specific training/awareness programme: (1) Content and pedagogical approach; (2) Evaluation (process, beneficiaries etc).
- Training of staff responsible for internal monitoring of biodiversity (habitat rehabilitation, management of environmental incidents etc).

10.2 OPERATIONAL PHASE

- Biodiversity-specific training/awareness programme: (1) Content and pedagogical approach; (2) Evaluation (process, beneficiaries etc).
- Training of staff responsible for internal monitoring of biodiversity (habitat rehabilitation, management of environmental incidents etc).

11. ROLES AND RESPONSIBILITIES

Implementation and monitoring of the implementation of the actions in the BAP will be the Developer's prerogative. The Developer will establish and maintain, in its capacity as Project Owner, an organisational structure where the roles, responsibilities and powers related to the implementation of the ESAP and BAP are clearly defined.

All members of staff will be continuously informed about operational policies and procedures to ensure a significant reduction in environmental harm. Compliance with the environmental policy is the responsibility of management, every employee and all contractors.

The Developer will appoint a Project Manager who will allocate the necessary resources (human and financial) throughout the project cycle to ensure that it is in strict compliance, and on an ongoing basis, with the BAP guidelines.

Implementation of the BAP actions and the monitoring of these actions will be carried out by an Environment Manager in charge of compliance with Moroccan environmental legislation and the implementation of the ESAP (PR1, PR3 and PR6). The Manager will work directly to the Project Manager. The roles and responsibilities involved are as follows:

- Ensure compliance with Moroccan environmental legislation (including the environmental recommendations made in the ESIA and the specifications);
- Ensure the implementation of the ESAP, in particular the specifications for PR1, PR3 and PR6;
- Ensure the review and implementation of the environmental aspects of the Contractors' Management Plan;
- Monitor the environmental performance of the Project Owner;
- Monitor the environmental performance of the contractor and subcontractors;
- Obtain sufficient resources from the Project Management unit to ensure the compliance and effectiveness of the action plans;
- Immediately notify the Project Management unit of any incident or instance of non-compliance in the areas under its remit;
- Draft the environmental aspects of the annual monitoring report submitted to the EBRD;
- Prepare the assignments of the independent auditors;
- Ensure that training and awareness-raising activities are carried out for the staff of the Project Owner and Contractor;
- Maintain records of training materials, non-compliance and incidents, for waste management, authority inspections, and for any other requirements related to the environmental reports and documents.

APPENDIX A COLLISION RISK MODELLING FOR BIRDS

Technical Note – Collision Risk Modelling for Birds for the Koudia Al Baida Wind Farm

This technical note presents a bird collision risk assessment through collision risk modelling (CRM) for the Koudia Al Baida wind farm in Morocco ("the Project"), based on data collected between March and May 2022. This CRM updates the modelling prepared in October 2021 based on survey data for the Project collected during field work in 2015-2016 and October 2021 (ERM, 2021) .

Model used

- The CRM presented is based on the Band et al. model published by Scottish Natural Heritage (now NatureScot) (Band et al, 2005). The model can be run in two different ways using baseline data to assess the collision impacts of : Regular flights through a wind farm; or
- Birds using the wind farm's airspace.

Due to the location of the Koudia Al Baida wind farm along the western part of the Eastern Atlantic and Mediterranean/Black Sea Flyway, the CRM has been adjusted for regular flights through the wind farm, focusing on the spring migration period (March to May 2022).

Target species

- Based on the results of the baseline data collected in Spring 2022, the CRM is being undertaken for the following migratory bird species: *Pernis apivorus* (Honey Buzzard);
- *Milvus migrans* (Black Kite) ;
- *Neophron percopterus* (Egyptian woodpecker) ;
- *Circaetus gallicus* (Short-toed Eagle) ;
- *Circus aeruginosus* (Marsh Harrier);
- *Pandion haliaetus* (Osprey);
- *Gyps fulvus* (Griffon Vulture) ;
- *Hieraaetus pennatus* (Booted Eagle); and

Accipiter nisus (European Sparrowhawk). The CRM was conducted for these species either because they were recorded in relatively high numbers, thereby increasing the potential risk of collision, or because of their conservation status. A number of species included in the 2021 model were not recorded in the spring 2022 survey (Black Stork, White Stork), or were recorded in very low numbers (Osprey) and were not included in the updated model. *Baseline data and assumptions*

Bird surveys to record spring migration movements through the Koudia Al Baida wind farm were conducted over 17 days between March and May 2022 using Vantage Points (VP) surveys methods. Surveys were conducted using a modified version of the Scottish Natural Heritage (SNH, now NatureScot) guidelines. Bird species, group size, flight height, flight direction and proximity to the vantage point were recorded. A large number of short duration VPs were surveyed to cover the entire project site. The VPs were located at the turbine sites in the existing wind farm. For the analysis in the CRM, VP locations were grouped according to coverage of the north, center, and south of the wind farm. A total of 49 hours and 24 minutes of survey time was undertaken to cover the north of the site, 57 hours and 22 minutes for the south of the site, and 22 hours and 57 minutes for the center of the site. All bird records within 500 m of each VP and flying at a height of potential collision risk (19 m

- 151 m) were included in the model. The availability of accurate, detailed, site-specific data allowed for a less conservative model run compared to the previous version of the CRM prepared in 2021.

The spring migration season for migratory birds crossing the Strait of Gibraltar between Africa and Europe is approximately between March and the end of June, but some species have much longer or much shorter migration seasons.

For this CRM, the numbers of passages per hour were calculated for the entire wind farm, based on the total number of survey hours. The numbers per hour were converted to a total number of birds passing through the wind farm, assuming average days of 12.5 hours during the spring migration period (based on sunrise and sunset times), and the length of the migration season for each of the species involved, using published data on the migration schedule of birds crossing the Strait of Gibraltar. In reality, bird movements occur in peaks throughout the migration season, and applying a constant rate throughout the season is likely to overestimate the number of birds passing through the project site, allowing for a precautionary approach to extrapolating the field survey data. *Assumptions of the Project and turbine model*

The Koudia Al Baida wind farm will have 20 wind turbines and will be located in four groups on parallel ridges. The Project's "risk window" (i.e. the area of airspace which birds pass through where they are likely to collide) was defined as the shortest distance between the turbines furthest east and west (3,025 m), multiplied by the height of the blade tips (151 m). The presence of a "safe" airspace between the turbines of the four units is offset by the increased theoretical risk for birds which must perform a longer transit through several rotors or blades. The input parameters of the turbine specifications for the CRM are presented in Table 6. Where parameters were not provided by the Project, assumptions about turbine diameter or efficiency were assumed based on industry standard values or known values for turbines of a similar size.

Table 6: Turbine specifications for CRM

Specification	Measurement
Manufacture and model of the turbine	SG 5.0-132 (AM0, 5.0MW) MKII
Number of blades	3
Maximum blade length	4.4 m*
Blade angle	25° **
Rotor diameter	132 m
Rotation period	5 seconds*
Hub height	84 m

*assumption based on the specifications for the similar SG blade – 5.0 – 145

**assumption based on Band et al 2012.

Avoidance rate

The latest NatureScot guidance recommends using a default avoidance rate of 98% unless a species-specific avoidance rate has been calculated. No species-specific avoidance rate was proposed for the species considered in this CRM. However, a species-specific avoidance rate was considered for the Red Kite, whose ecology and morphology are very similar to that of the Black Kite. Therefore, the avoidance rate specific to Red Kites (99%) was used for Black Kites. *Results of the collision risk model*

The CRM results for the 2022 Spring Mission are presented in Table 2 below. The full model is included in Appendix A. The combined results for the Fall CRM based on the 2015 and 2021 data and the current Spring 2022 CRM are presented in Table 3.

Table 2 Results of the CRM of the 2nd half of October 2021

Species	Number of annual collisions by 2016 Spring CRM	Number of annual collisions expected by the CRM in Spring 2022
Black Stork	0.14	0

Species	Number of annual collisions by 2016 Spring CRM	Number of annual collisions expected by the CRM in Spring 2022
White Stork	22.04	0
Honey Buzzard	17.07	1.39
Black Kite	16.06	9.63
Booted Eagle	1.23	5.94
Griffon Vulture	16.54	24.26
Egyptian Vulture	2.78	0.24
Short-toed Snake Eagle	4.70	3.11
European Hawk	4.70	0.60
Marsh Harrier	-	0.16
Osprey	5.15	0.02

Table 3 Combined results for Fall 2021 and Spring 2022 CRMs

Species	Number of annual collisions by Spring 2022 CRM	Number of annual collisions by Fall 2015 and Fall 2021 CRM	Number of total annual collisions
Black Stork	0	2.41	2.41
White Stork	0	8.41	8.41
Honey Buzzard	1.39	5.22	6.61
Black Kite	9.63	0.84	10.47
Booted Eagle	5.94	1.69	7.63
Griffon Vulture	24.26	0.25	24.51
Egyptian Vulture	0.24	-	0.24
Short-toed Snake Eagle	3.11	2.31	5.42
European Hawk	0.60	0.21	0.81
Marsh Harrier	0.16	-	0.16
Osprey	0.02	0.03	0.05

Discussion

The results of the CRM based on the spring 2022 data indicate, in the majority of cases, a lower collision risk than predicted by the previous model. This is likely related to the more site-specific survey data, and the more accurate data available regarding bird flight height and distance from the wind farm used in the 2022 CRM. The predicted collision risk increased for griffon vulture and booted eagle, indicating relatively high flight activity of these species relative to the area swept by the rotor.

Recommendations

It should be recognized that although more accurate spring migration data has been collected, the CRM maintains precautionary principles and is based on the number of birds passing through the site within 500 m of the observers. Operational monitoring of actual mortalities will provide site-specific data on the actual number of collisions, and will further inform the impacts of the Project.

- However, the high flight activity and predicted annual mortality indicate that the site presents a collision risk to a number of species of conservation concern. Based on the anticipated level of collision, the following measures are recommended: Implement a seasonal or on-demand shutdown protocol to avoid collisions; and

Undertake operational monitoring of the effectiveness of the mitigation program, validate the CRM and inform additional adaptive management of the wind farm. *Operating Reduction Program Recommendations*

Programmes for reducing the operations of wind farms have been implemented for farms located at bottleneck sites along major international migration routes for bird species in full flight, such as in Spain and Portugal, on the northern shore of the Strait of Gibraltar, or along the west coast of the Red Sea in Egypt.

Generally speaking, a programme to reduce the operations of a wind farm will include either a seasonal element (e.g., operations are reduced on certain dates) or a shutdown on demand, triggered by specific monitoring of the site. The programmes for shutting down operations on demand are most often operated by means of radar, visual observation, or a combination of both.

In order to reduce the number of reductions required to ensure the safe operation of a wind farm, a protocol should be drafted setting out when the wind turbines' rotation will be reduced. When identification of individual species or the reduction of individual wind turbines rather than an entire project is required, visual observers should be part of the reduction programme, either to alert the wind farm control room or, in more advanced wind farms, to reduce the individual turbines' rotation directly themselves.

Guidelines on programmes for stopping the operations of wind farms on demand for the Rift Valley/Red Sea Flyway have been published (Birdlife, 2015). Much of the guidance is also relevant to Morocco. This provides useful guidance for projects in Morocco, with many of the same migratory birds in full flight using both the Rift Valley/Red Sea Flyway and the Eastern Atlantic and Mediterranean/Black Sea Flyway. The indicative conditions for shutting down on demand, developed for use in the area of the Gabel El Zayt wind farm in Egypt, are set out below and can provide a useful basis for a programme aimed at reducing operations on the Koudia Al Baida site.

Box 1. Indicative protocol for shutting down on demand for Gabel El Zayt

The following conditions for shutting down operations on demand have been established for use by visual observers specifically to be used in the Gabel El Zayt area in response to the birds identified during baseline studies. The relevant conditions for the Koudia Al Baida site have been summarised on the basis of those presented in the Migratory Soaring Birds Project² guidelines on the use of systems for shutdown on demand for migratory birds on the Rift Valley/Red Sea Flyway.

The duration of the shutdown periods is not defined and depends on the conditions which triggered the shutdown.

Condition 1. Whenever individuals from threatened species of soaring birds are detected in the area of the wind farm or heading towards it, at flight altitudes entailing a high risk of collision, the turbines must be stopped. The list of threatened species considered should be agreed on a site-by-site basis, depending on the species recorded during the baseline surveys or likely to occur at the project site based on known distributions.

Condition 2. Whenever flocks of 10 or more birds in flight are detected close to the area of the wind farm or heading towards it, at flight altitudes entailing a high risk of collision, the turbines must be stopped. The risk will be assessed taking into account the species, altitude, speed and behaviour, as well as the time required to stop the turbines once the order is given.

Condition 3. Even when the above conditions are not met, one or more turbines must be stopped whenever there is an imminent high risk of a migratory bird colliding with one of the turbines. As a general rule, it will be used for a single or limited number of turbines and for a very short period and it should only be applied when it is considered that there is still sufficient time to prevent the collision.

Source: Birdlife International 2015 ⁽³⁾

Proposed Shutdown on Demand Protocol

Considering the species recorded during the field missions and bibliographic research, that cross the extended project area during their migration, the following shutdown-on-demand conditions are recommended on the project area during their migration, between the months of March and June, as well as between the months of August and mid-November (to be readapted according to the high activity periods). These conditions will need to be discussed and agreed upon with the ornithologists responsible for operational monitoring of the project.

Condition 1: Whenever Egyptian vulture (IUCN threatened species) or any other vulnerable, threatened or critically endangered species is detected in the wind farm area, or heading towards it, at flight altitudes involving a high risk of collision, the turbines shall be shut down.

Condition 2. When flocks of 10 or more birds (including all raptors, storks, and any other migratory soaring birds) are detected in the vicinity of, or heading toward, the wind farm area at flight altitudes involving a high risk of collision, the affected turbines that pose a risk of collision shall be shut down.

² <https://migratorysoaringbirds.birdlife.org/en/content/msb-guidance-power-line-developers#gsc.tab=0>

⁽³⁾ Birdlife International (2015) Review and guidance on use of "shutdown-on-demand" for wind turbines to conserve migrating soaring birds in the Rift Valley/Red Sea Flyway. Regional Flyway Facility, Amman, Jordan.

The risk will be assessed taking into account the species, altitude, speed and behavior, as well as the time required to shut down the turbines once the instruction is given.

Condition 3. Even if the above conditions are not met, one or more turbines must be shut down when there is a high and imminent risk of collision of a migratory bird in flight with one of the turbines. In general, this measure will only be used for one or a limited number of turbines and for a very short period of time, and should only be applied if it is believed that there is sufficient time remaining to prevent the collision.

Triggering of the shutdown-on-demand protocol should be reviewed by ornitologists trained to judge which birds/flocks are more or less likely to collide with turbines.

Potential consequences of the shutdown on demand on electricity generation

Implementation of a shutdown protocol will result in a reduction in turbine power due to the shutdown of individual turbines or groups of turbines during periods of high collision risk. There are different approaches to implementing shutdown protocols. The most conservative approaches result in a higher level of shutdown and a greater reduction in energy production. Three scenarios were presented in the previous CRM. An additional scenario based on the spring survey data is presented below. These scenarios are all based on a number of assumptions regarding wind resources in the Project area and Project operations. These assumptions are as follows:

- all turbines operate 100% of the time, for 8,760 hours per year; and
- the wind is constant throughout the year and day.

Although these assumptions are not true in real life, they are useful in terms of allowing different scenarios to be compared.

Seasonal shutdown

This is the most cautious approach in terms of reducing operations. The main migration period runs from March to June (122 days) in spring and from mid-August to the end of October (76 days). The key time of day when migration activity takes place is during the first five hours after sunrise. Assuming that the reduction is only required for five hours per day during these periods, the total reduction time over a year would be 990 hours (610 hours + 380 hours) per turbine. This would amount to approximately 11% of available production hours (8,760 hours per turbine). In actual fact, a complete seasonal reduction would not be necessary, according to the results of the surveys carried out, which indicate substantial differences in activity between days, with some days having very few flights recorded for endangered species.

Shutdown on demand – Scenario 1

The surveys carried out for the project do not provide sufficient information for the main migration seasons of spring and autumn to estimate the number of times that a shutdown on demand protocol should be implemented. Data from shutdown on demand protocols for wind farms in similar situations can be used to estimate the probability of time lost due to shutdown on demand.

De Lucas et al (2012)⁴ published the results of research on the impacts of visual shutdown protocols on demand (i.e. using only human observers without radar) in 10 wind farms in southern Spain, north of the Strait of Gibraltar. The diversity and abundance of migratory gliding bird species recorded there are similar to those recorded in the project area, with the area of assessment also being part of the western part of the Eastern Atlantic and Mediterranean/Black Sea Flyway. De Lucas et al reported a total of 4,408 turbine shutdowns per year, which equates to 18.1 shutdowns per turbine, with an

⁴ de Lucas, M., Ferrer, M., Bechard, M.J. & Munoz, A.R. (2012) Griffon vulture mortality at wind farms in southern Spain: Distribution of fatalities and active mitigation measures. *Biological Conservation* 147: 184–189.

average shutdown time of 22 minutes. Extrapolating these results to the project would equate to a total of 7,964 minutes of downtime, or 132.73 hours per year for the project. In terms of total production time for the entire project ($8,760 \times 20 = 175,200$ hours), this level of reduction would be equivalent to 0.076% of the total available production time (Birdlife International, 2015, De Lucas et al 2012).

Shutdown on demand – Scenario 2

Radar-assisted Shutdown on Demand has been implemented at a number of wind power sites, including in Portugal and Egypt (Birdlife International 2015, Tome et al 2019). In both cases, the wind power plants are located on key migratory bottlenecks. The Portuguese site is on the same western section of the Eastern Atlantic and Mediterranean/Black Sea flyway, and the Egyptian site is on the eastern section of the Mediterranean/Black Sea/Rift Valley flyway. At both sites, Shutdown-on-Demand systems supported by radar and visual observations were implemented at both sites. In Portugal, shutdown on demand has been operational since 2010. Total production loss due to shutdowns has been reduced from about 1% in 2010 to less than 0.01% in 2018. As the experience of the team controlling the shutdown system has improved over time, the number of individual shutdowns per year has been reduced from about 80 per year to about 10 per year, with response time dropping from about 5 minutes to shut down turbines to less than 30 seconds.

In Egypt, Shutdown on Demand has been operational since 2016. The loss of production due to outages for 2016 and 2017 was about 0.03%. As with the example in Portugal, the experience of the team involved in implementing Shutdown on Demand appears to have resulted in effective implementation of the protocol, resulting in relatively little operational time loss.

In both cases, radar- and visual-assisted Shutdown-on-Demand was shown to reduce collisions with very limited loss of production at project sites with comparable or greater numbers of seasonal migratory birds in flight during the spring and fall migration seasons.

With a similar shutdown-on-demand system, it is reasonable to assume that similar levels of production loss would be experienced at the project site.

On-Demand Shutdown - Scenario Based on Spring 2022 Data

The CRM based on the spring 2022 survey data can be used to inform shutdown-on-demand scenarios in two more or less conservative ways. The more conservative approach is to assume that all birds passing through the "at risk" area within 500 m of the turbines are at risk of collision, and that a shutdown-on-demand event would be triggered for all birds at risk of collision with the turbines, assuming they do not avoid them. The less precautionary approach is to assume that a shutdown-on-demand event should only be triggered for flights likely to collide, once the avoidance rate has been applied. Using the Spring 2022 survey data (Appendix A), a total of 2,748 migratory bird flights for the species identified in Table 2 were predicted to collide, assuming no avoidance. Using data from De Lucas et al. (2012) (), turbine shutdowns for on-demand shutdown protocols at wind farms in southern Spain lasted an average of 22 minutes.

Extrapolating these results to the Project would equate to a total of 1,020.8 hours of downtime in spring. In terms of total production time for the entire Project ($8760 \times 20 = 175,200$ hours), this level of reduction would equate to 0.58% of total available production time (Birdlife International, 2015, De Lucas et al 2012).

If the on-demand shutdown were to be triggered only for flights that are predicted to collide with avoidance, a total of 45 flights would trigger the shutdown. Using the same assumptions as above, this would equate to 16.6 hours of downtime, or 0.009% of total available production time.

In reality, the level of on-demand shutdown is likely to fall somewhere in between these estimates, because shutdown will be triggered for flights that are likely to collide, not just those that will definitely collide.

Appendix A – Collision risk model

CRM revised for the spring migration season based on spring 2016 data

Species	8-10th March (3 days)	14-16th April (3 days)	26th May (1 day)	Total Birds Recorded Spring	Total per day	Length of Migration Season (days)	Total Estimated Birds Passing Through The Survey Area/Risk Window	Total Estimated Birds At Collision Risk Height	Risk Window	Swept Area (m)	Rotor Area	Birds through rotors	Collision Rate (From Band 2012 spreadsheet)	No. birds colliding assuming no avoidance	Avoidance Rate	Annual No. Collisions
Black stork	-	-	3.00	3.00	0.43	67.00	28.71	14.36	456775.00	273695.55	0.60	17.21	0.41	7.02	0.02	0.14
White stork	-	-	204.00	204.00	29.14	151.00	4400.57	2200.29	456775.00	273695.55	0.60	2636.78	0.42	1102.18	0.02	22.04
Honey buzzard	-	-	3377.00	3377.00	482.43	24.00	11578.29	5789.14	456775.00	273695.55	0.60	6937.61	0.12	853.33	0.02	17.07
Black kite	1863.00	-	658.00	2521.00	360.14	62.00	22328.86	11164.43	456775.00	273695.55	0.60	13379.25	0.12	1605.51	0.01	16.06
Booted eagle	6.00	-	94.00	100.00	14.29	62.00	885.71	442.86	456775.00	273695.55	0.60	530.71	0.12	61.56	0.02	1.23
Griffon vulture	3.00	-	601.00	604.00	86.29	62.00	5349.71	2674.86	456775.00	273695.55	0.60	3205.50	0.26	827.02	0.02	16.54
Egyptian vulture	36.00	9.00	3.00	48.00	6.86	86.00	589.71	294.86	456775.00	273695.55	0.60	353.35	0.39	138.87	0.02	2.78
Short-toed snake eagle	206.00	3.00	167.00	376.00	53.71	60.00	3222.86	1611.43	456775.00	273695.55	0.60	1931.11	0.12	224.01	0.02	4.48
Sparrowhawk	-	-	6.00	6.00	0.86	55.00	47.14	23.57	456775.00	273695.55	0.60	28.25	0.09	2.43	0.02	0.05

CRM revised for the autumn migration season based on autumn 2015 data

Species	8 - 10th September (3 days)	16-18th October (3 days)	Total Birds Recorded Autumn	Total per day	Length of Migration Season (days)	Total Estimated Birds Passing Through The Survey Area/Risk Window	Total Estimated Birds At Collision Risk Height	Risk Window	Swept Area (m)	Rotor Area	Birds through rotors	Collision Rate (From Band 2012 spreadsheet)	No. birds colliding assuming no avoidance	Avoidance Rate	Annual No. Collisions
Black stork	138.00	-	138.00	19.71	25.00	492.86	246.43	456775.00	273695.55	0.60	295.32	0.41	120.49	0.02	2.41
White stork	250.00	-	250.00	35.71	47.00	1678.57	839.29	456775.00	273695.55	0.60	1005.79	0.42	420.42	0.02	8.41
Honey buzzard	1232.00	8.00	1240.00	177.14	20.00	3542.86	1771.43	456775.00	273695.55	0.60	2122.85	0.12	261.11	0.02	5.22
Black kite	178.00	-	178.00	25.43	46.00	1169.71	584.86	456775.00	273695.55	0.60	700.88	0.12	84.11	0.01	0.84
Booted eagle	209.00	7.00	216.00	30.86	30.00	925.71	462.86	456775.00	273695.55	0.60	554.68	0.12	64.34	0.02	1.29
Short-toed snake eagle	5	2	7	1	41	41	20.5	456775.00	273695.55	0.60	24.57	0.12	2.85	0.02	0.06
Sparrowhawk	6	1	7	1	34	34	17	456775.00	273695.55	0.60	20.37	0.09	1.75	0.02	0.04

CRM for the second half of October based on October 2021 data

Species	Total Birds Recorded 18th- 22nd Oct 2021	Total per hour	Length of Migration Season Data Applicable to Second Half of October (15 days)	Total Estimated Birds Passing Through The Survey Area/Risk Window	Total Estimated Birds At Collision Risk Height	Risk Window	Swept Area (m)	Rotor Area	Birds through rotors	Collision Rate (From Band 2012 spreadsheet)	No. birds colliding assuming no avoidance	Avoidance Rate	Annual No. Collisions
Sparrowhawk	4.00	1.03	15.00	166.24	166.24	456775.00	273695.55	0.60	99.61	0.09	8.57	0.02	0.17
Short-toed snake eagle	10.00	2.58	15.00	415.59	415.59	456775.00	273695.55	0.60	249.02	0.40	99.61	0.02	1.99
Griffon vulture	4.00	1.03	15.00	166.24	166.24	456775.00	273695.55	0.60	99.61	0.12	12.25	0.02	0.25
Booted eagle	7.00	1.80	15.00	290.91	290.91	456775.00	273695.55	0.60	174.31	0.12	20.22	0.02	0.40

CRM for Spring 2022

Species	27th - 31st March & 6th April (6 days)		20-24th April (5 days)		12th-17th May (6 days)		Total Birds Recorded Spring	Total per hour	Length of Migration Season (days)	Total Estimated Birds Passing Through The Survey Area/Risk Window	Risk Window	Swept Area (m)	Rotor Area (%)	Birds through rotors	Collision Rate (From Band 2012 spreadsheet) (%)	No. birds colliding assuming no avoidance	Avoidance Rate (%)	Annual No. Collisions
	No. Birds	Survey Duration (hh:mm:ss)	No. Birds	Survey Duration (hh:mm:ss)	No. Birds	Survey Duration (hh:mm:ss)												
Honey buzzard	0	28:33:00	0	41:52:00	65	59:18:00	65	3.15	24	945	456775	273695.55	0.60	566	0.12	70	0.02	1.39
Black kite	130	28:33:00	115	41:52:00	76	59:18:00	321	17.29	62	13396	456775	273695.55	0.60	8027	0.12	963	0.01	9.63
Booted eagle	104	28:33:00	2	41:52:00	8	59:18:00	114	5.51	62	4271	456775	273695.55	0.60	2559	0.12	297	0.02	5.94
Griffon vulture	16	28:33:00	101	41:52:00	54	59:18:00	171	10.12	62	7846	456775	273695.55	0.60	4701	0.26	1213	0.02	24.26
Egyptian vulture	1	28:33:00	0	41:52:00	0	59:18:00	1	0.05	86	50	456775	273695.55	0.60	30	0.39	12	0.02	0.24
Short-toed snake eagle	13	28:33:00	12	41:52:00	6	59:18:00	31	2.98	60	2237	456775	273695.55	0.60	1341	0.12	156	0.02	3.11
Sparrowhawk	14	28:33:00	1	41:52:00	0	59:18:00	15	0.84	55	577	456775	273695.55	0.60	346	0.09	30	0.02	0.60
Western Marsh	3	28:33:00	0	41:52:00	0	59:18:00	3	0.14	77	134	456775	273695.55	0.60	80	0.10	8	0.02	0.16
Osprey	1	28:33:00	0	41:52:00	0	59:18:00	1	0.05	31	18	456775	273695.55	0.60	11	0.09	1	0.02	0.02

Appendix B – Collision Risk Modelling for Birds for Koudia Al Baida wind farm based on data from 2015 and 2016 studies

Target species

Based on the results of baseline data collected during the project in 2015 and 2016, CRM was carried out for the following migratory bird species either because they were recorded in relatively high numbers, making collision impacts more likely, or because of their conservation status:

- *Ciconia nigra* (Black Stork);
- *Ciconia ciconia* (White Stork);
- *Pernis apivorus* (Honey Buzzard);
- *Milvus migrans* (Black Kite);
- *Pandion haliaetus* (Osprey);
- *Hieraaetus pennatus* (Booted Eagle);
- *Gyps fulvus* (Griffon Vulture); and
- *Neophron percnopterus* (Egyptian Vulture).

Baseline data and assumptions

Baseline data on bird migration through the Koudia Al Baida wind farm was collected for seven days between March and May 2016, and for six days between September and October 2015 through viewpoint surveys. The data provided by the project sponsor do not contain all the data generally necessary to produce a CRM. Therefore, the following assumptions have been made.

The spring migration season for migratory birds crossing the Strait of Gibraltar between Africa and Europe occurs roughly between March and the end of June, but some species have much longer or much shorter migration seasons. The autumn migration period falls roughly between mid-August and mid-October, but again, different species have different migration schedules.

For the purposes of this CRM, it was assumed that the seven days of data collected during the spring migration period in 2016 and the six days of data collected during the autumn migration period were representative of these migration periods. Data from those surveys was extrapolated over the entire migration season for each of the species concerned, using published data on the migration schedule of birds crossing the Strait of Gibraltar.

The location and coverage of the surveys in relation to the project location were not provided; only that the baseline data for the bird surveys came from "the site or its immediate vicinity". As a precautionary measure, it was therefore assumed that all birds recorded during the reference surveys would pass through or over the wind farm site.

Details of the flight heights for individual birds or flocks of birds were not provided; only that the flight height is "variable, from a few dozen metres to more than 300 m". The maximum height of the tip of the proposed turbines is 151 m. It was assumed, based on the CRM, that 50 per cent of all birds fly at a height entailing a potential collision risk.

Results of the collision risk model

The results of the CRM for spring and autumn are presented in the tables below.

CRM for spring migration season based on spring 2016 data

Species	8-10th March (3 days)	14-16th April (3 days)	26th May (1 day)	Total Birds Recorded Spring	Length of Migration Season (days)	Total Estimated Birds Passing Through The Survey Area/Risk Window	Total Estimated Birds At Collision Risk Height	Risk Window	Swept Area (m)	Rotor Area	Birds through rotors	Collision Rate (From Band 2012 spreadsheet)	No. birds colliding assuming no avoidance	Avoidance Rate	Annual No. Collisions
Black stork	-	-	3.00	3.00	67.00	28.71	14.36	456775.00	273695.55	0.60	17.21	0.41	7.02	0.02	0.14
White stork	-	-	204.00	204.00	151.00	4400.57	2200.29	456775.00	273695.55	0.60	2636.78	0.42	1102.18	0.02	22.04
Honey buzzard	-	-	3377.00	3377.00	24.00	11578.29	5789.14	456775.00	273695.55	0.60	6937.61	0.12	853.33	0.02	17.07
Black kite	1863.00	-	658.00	2521.00	62.00	22328.86	11164.43	456775.00	273695.55	0.60	13379.25	0.12	1605.51	0.01	16.06
Osprey	206.00	3.00	167.00	376.00	93.00	4995.43	2497.71	456775.00	273695.55	0.60	2993.22	0.09	257.42	0.02	5.15
Booted eagle	6.00	-	94.00	100.00	62.00	885.71	442.86	456775.00	273695.55	0.60	530.71	0.12	61.56	0.02	1.23
Griffon vulture	3.00	-	601.00	604.00	62.00	5349.71	2674.86	456775.00	273695.55	0.60	3205.50	0.26	827.02	0.02	16.54
Egyptian vulture	36.00	9.00	3.00	48.00	86.00	589.71	294.86	456775.00	273695.55	0.60	353.35	0.39	138.87	0.02	2.78

CRM for autumn migration season based on autumn 2015 data

Species	8 - 10th September (3 days)	16-18th October (3 days)	Total Birds Recorded Autumn	Total per day	Length of Migration Season (days)	Total Estimated Birds Passing Through The Survey Area/Risk Window	Total Estimated Birds At Collision Risk Height	Risk Window	Swept Area (m)	Rotor Area	Birds through rotors	Collision Rate (From Band 2012 spreadsheet)	No. birds colliding assuming no avoidance	Avoidance Rate	Annual No. Collisions
Black stork	138.00	-	138.00	19.71	25.00	492.86	246.43	456775.00	273695.55	0.60	295.32	0.41	120.49	0.02	2.41
White stork	250.00	-	250.00	35.71	47.00	1678.57	839.29	456775.00	273695.55	0.60	1005.79	0.42	420.42	0.02	8.41
Honey buzzard	1232.00	8.00	1240.00	177.14	20.00	3542.86	1771.43	456775.00	273695.55	0.60	2122.85	0.12	261.11	0.02	5.22
Black kite	178.00	-	178.00	25.43	46.00	1169.71	584.86	456775.00	273695.55	0.60	700.88	0.12	84.11	0.01	0.84
Osprey	5.00	2.00	7.00	1.00	31.00	31.00	15.50	456775.00	273695.55	0.60	18.57	0.09	1.60	0.02	0.03
Booted eagle	209.00	7.00	216.00	30.86	43.00	1326.86	663.43	456775.00	273695.55	0.60	795.04	0.12	92.22	0.02	1.84

APPENDIX B CRITICAL HABITAT ASSESSMENT

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9 November 2021

Critical Habitat Assessment

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Acronyms and Abbreviations

Name	Description
AoA	Area of Assessment
BAP	Biodiversity Action Plan
CBI	Confederation of British Industry
CH	Critical Habitat
CHA	Critical habitat Assessment
CR	Critically Endangered
EAAA	Ecologically Appropriate Area of Analysis
EBRD	European Bank for Reconstruction and Development
EN	Endangered
ERM	Environmental Resources Management
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
EU	European Union
IBAT	Integrated Biodiversity Assessment Tool
IUCN	International Union for Conservation of Nature
LC	Least Concern
MaB	Man and Biosphere
N/A	Not Applicable
NA	Northern African
ONEE	National Office of Water and Electricity
PBF	Priority Biodiversity Features
PR6	Performance Requirement 6
RBIM	Intercontinental Biosphere Reserve of the Mediterranean
TOE	Ton of oil equivalent
VU	Vulnerable

12. INTRODUCTION

The Koudia Al Baida Wind Project is located in northern Morocco, east of Tangier, in the communes of Tlat Taghramt and Allylène (prefecture of M'Diq-Fnideq). It will replace the existing wind farm known as Abdelkhalek Torres, managed by the National Office of Water and Electricity (ONEE), in Koudia Al Baida.

This project is part of the objective of supplying 12% of the national electricity production by 2030, with a potential production of 100 MW provided by 20 wind turbines. It will thus save 1.5 million TOE of fossil fuels.

The wind farm is planned on the ridges along the RP 4703 road, between the RN16 (Douar Ain El Jir) and Tlat Taghremt, in one of the best wind farms in the country, where winds are regular, with an average speed of around 10 m/s at 40 meters from the ground. The connection lines of the wind farm to the national grid (two lines of 225 kV) run for 10 km along the mountains to the east of these ridges.

The project consists of dismantling the park composed of 90 wind turbines and developing the platforms that will accommodate the 20 new wind turbines, a network of roads and associated easements, administrative and security buildings, a transformation station and a base-life on 390 ha. The new wind farm has four separate wind turbine groups, whose electricity is collected by underground cables, before being transported to the substation by air. The Project also consists of the installation of two connecting power lines over approximately 10 km.

This report presents a Critical habitat Assessment (CHA) focused on the Koudia Al Baida Windfarm Project as defined by EBRD Performance Requirement 6 (PR6)⁵.

12.1 Purpose of the Report

This report presents the findings of an assessment of the Koudia Al Baida Windfarm Project (referred to hereafter as the "Project") on critical and natural habitat and priority biodiversity features (PBF).

The report builds on the Environmental and Social Impact Assessment (ESIA) undertaken for the Project and provides additional information, with particular reference to the requirements and standards included in the European Bank for Reconstruction and Development (EBRD) Performance Requirement 6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources (PR6).

12.2 Alignment with other relevant project documents

This Critical Habitat Assessment report (CHA) should be read in conjunction with the other environmental documents available for this project, namely:

- The ESIA of Koudia al Baida I Ginger/Phenixa (October 2021) and its appendices including the stroboscopic and acoustic studies ;
- The Project's Biodiversity Action Plan (BAP) ;
- The Environmental and Social Management Plan (ESMP) of October 2021 prepared by Futuren-MASEN and Ginger/Phenixa ;
- The ornithological studies conducted in 2015/2016 and 2018 as part of the preliminary studies for the selection of the wind turbine locations ; and
- New bird monitoring study of October 2021.

⁵ EBRD 2014. Environmental and Social Policy, published May 2014.

12.3 Limitations to the CHA

This CHA is based on desktop information sources derived from both documentation provided by the Project and publicly available datasets. Where relevant information from site surveys have been included in the assessment.

The following should also be noted:

- The assessment is based on certain facts with subjective interpretations based on professional judgments by ERM. The professional judgments made are based on the facts available within the framework of existing data.
- The information provided in this report should be considered as a technical contribution and not as legal advice. ERM accepts no responsibility towards the EBRD with regard to any matter outside the scope of the foregoing.
- The description of critical/priority biodiversity features may lack field and/or quantitative data, and may prove insufficient to provide a definite identification of trigger features.

12.4 Report Structure

The remainder of this report is set out as follows:

- Section 2: Methodological Approach.
- Section 3: Definition of Critical and Priority Biodiversity Features.
- Section 4: Summary.

13. METHODOLOGICAL APPROACH TO THE CHA

13.1 Overview

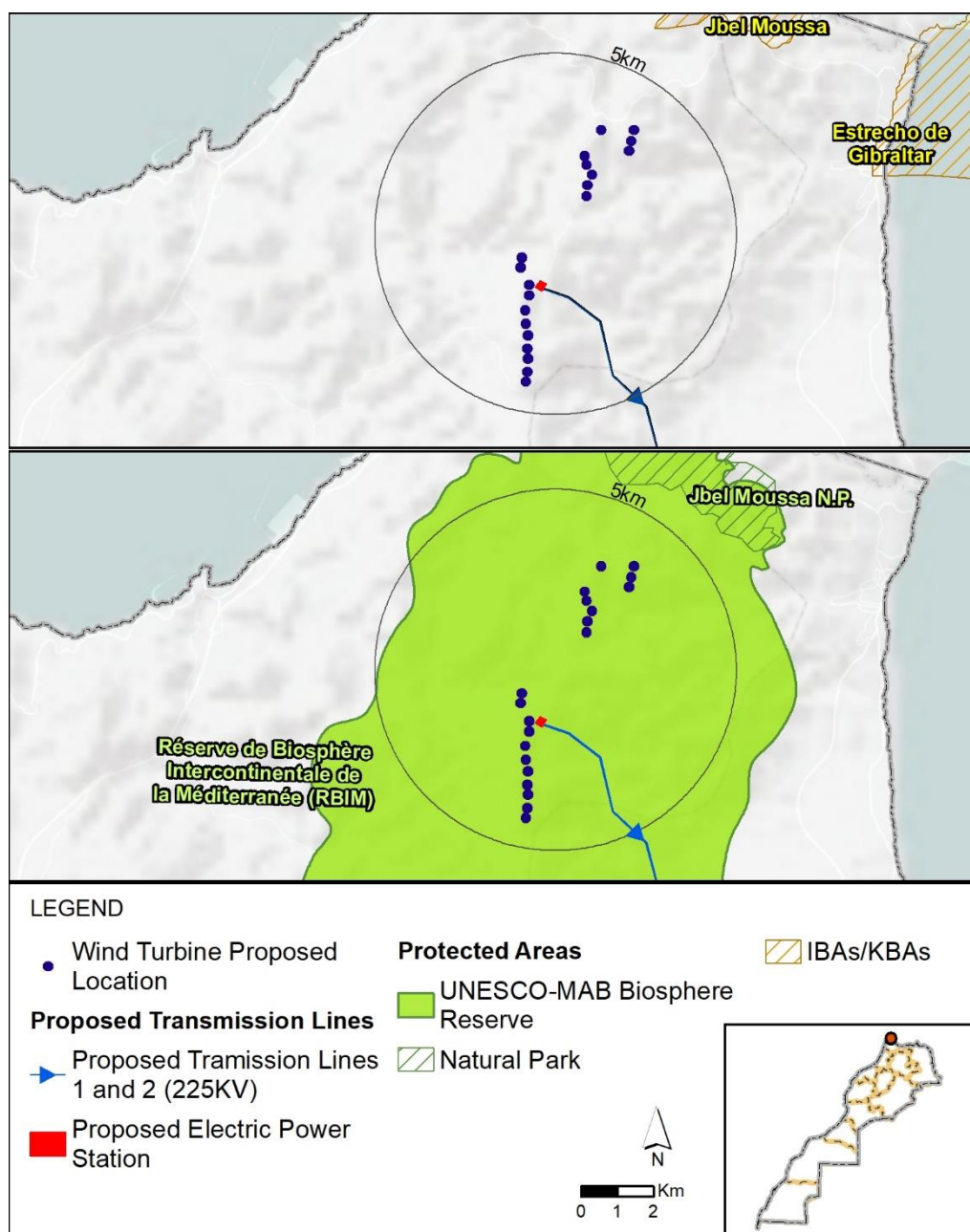
The general approach taken comprised the steps listed below.

- The Project site was defined and an Area of Assessment (AoA) for the CHA identified.
- Information on biodiversity features from the findings of a desk study and baseline surveys were used to identify areas of natural and modified habitat in the Project Area.
- Candidate biodiversity features within the AoA that could trigger critical habitat were identified, along with the habitat types supporting them. The numbers of priority species / proportions of populations in those habitats were then estimated (based on percentage of total species range, baseline survey results and expert judgement), to confirm if critical habitat was triggered under EBRD Criteria 2-4. Ecosystems, areas and underlying ecological processes that met EBRD PR6 Criteria 1, 5 and 6 within the AoA were also identified.
- Based on the above, ecologically appropriate areas of analysis were identified (encompassing the AoA) with a definable habitat / management boundary, that contained critical habitat.
- In the AoA, priority biodiversity features, were also identified based on the criteria in PR6.
- A summary of the approach taken to demonstrate that in relation to legally protected and internationally recognised areas the Project is aligned with the requirements of EBRD PR6.
- The approach to the assessment has been informed by the guidance included in the EBRD Guidance Note 6 (2014).

13.2 Area of Analysis for the CHA

The scale at which a critical habitat determination takes place depends on underlying ecological processes for the habitat in question and is not limited to the footprint of the Project. Based on the latter a proximity analysis taking as a center point the location of the Project, and two buffer areas of 5 and 10 km diameter (Figure 4-1). It is acknowledged that direct impacts will occur within the Project footprint and AoA; however indirect impacts may extend beyond this, due to aspects such as air quality, light, noise and vibration effects etc.

The extent of the AoA is deemed properly dimensioned to be able to carry out the initial screening of biodiversity features, that can later be identified as either critical or priority features.



Source. ERM, modified from IBAT, 2021

Figure 13.1 Defined Area of Analysis; Key Biodiversity Areas (top) and Protected Areas (bottom).

The AoA overlaps with a notable feature, being the Intercontinental Biosphere Reserve of the Mediterranean (MaB).

13.3 Base data used for the CHA

The desk based assessment included a review of published information from national Moroccan and international data sources as well as published scientific/gray literature. The approach to data collection was undertaken with reference to best practice guidance including EBRD PR6 and the CBI Good Practices for Collection of Biodiversity Baseline Data.

- ESIA report for the Parc Éolien de Koudia Al Baida Project;
- Bird Monitoring Field Reports of 2015/16, 2018 and 2021;
- Integrated Biodiversity Assessment Tool (IBAT) data. 2021. Generated under ERM's license on October 2021 from <https://www.ibat-alliance.org> (Proximity and PS6 reports) ;
- Edge of Existence website (species for Morocco);
- IUCN Redlist website;
- Birdlife International Website.

13.4 Definition of Priority and Critical Habitat

This report takes the definitions of priority biodiversity features and critical habitat presented in EBRD PR 6 paragraphs 12 and 14.

13.4.1 Priority Biodiversity Features

PR6 states that some areas affected by the project may be considered as priority biodiversity features. Priority biodiversity features are defined in Paragraph 12 of PR 6 as including:

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

In line with the definition of critical habitat associated with endangered and critically endangered species set out in the next sub-section, 'vulnerable species' in relation to priority biodiversity features has been taken to mean habitats of significant importance to vulnerable species.

13.4.2 Critical Habitat

PR6 states that the most sensitive biodiversity features are defined as critical habitat. Critical Habitat is defined in Paragraph 14 of PR 6 as comprising of one of the following:

- i) *Highly threatened or unique ecosystems;*
- ii) *Habitats of significant importance to endangered or critically endangered species*
- iii) *Habitats of significant importance to endemic or geographically restricted species;*

- iv) Habitats supporting globally significant migratory or congregatory species⁶;
- v) Areas associated with key evolutionary processes; or
- vi) Ecological functions that are vital to maintaining the viability of biodiversity features described above.

14. IDENTIFICATION OF PRIORITY AND CRITICAL HABITAT FEATURES

In order to identify Priority and Critical habitat features, a screening of candidate biodiversity/habitats was undertaken in accordance to the criteria set in the previous section. For the purposes of further defining their priority/critical status, an Ecologically Appropriate Area of Analysis (EAAA) was defined dependent on species:

- EAAA for *Stachys fontqueri*, *Nimbus anyerae* (and eventually *Thorectes coloni*): corresponding to Isolated habitat of hedgehog heath over calcareous soils in the southern crests (approx. area 1,5 km²); and

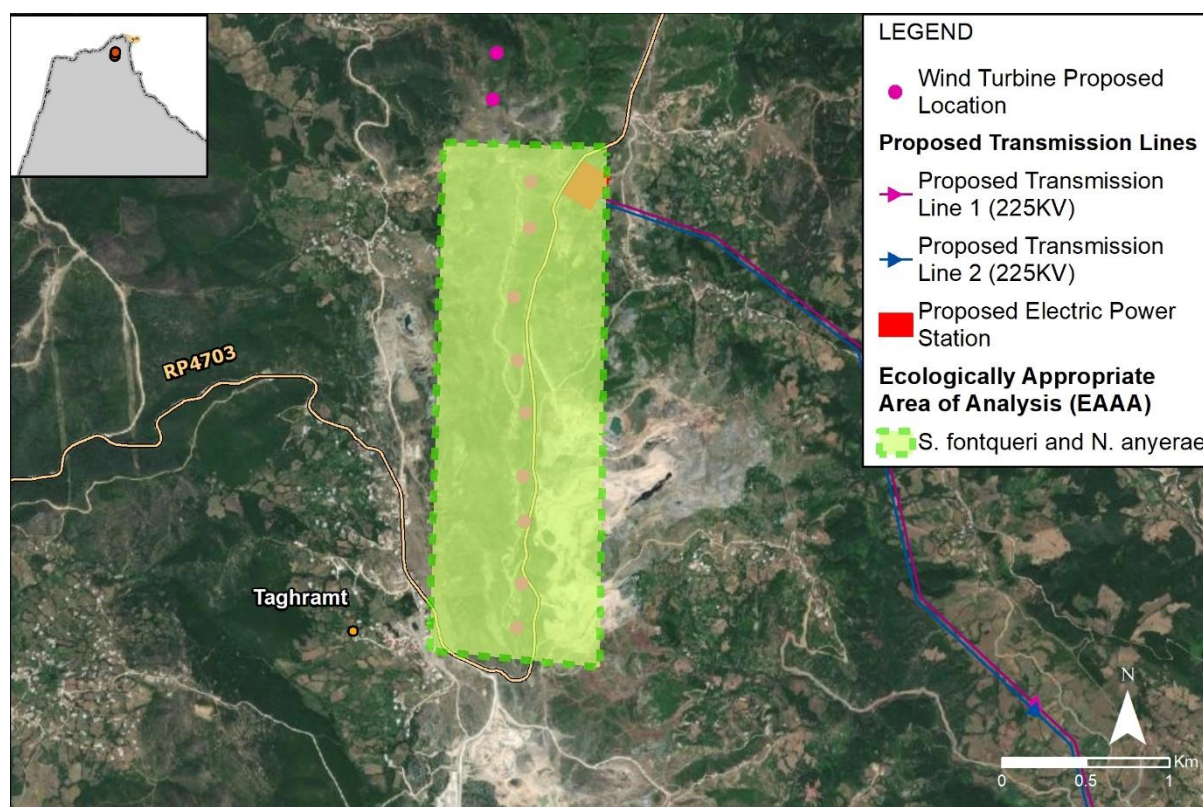


Figure 14.1 EAAA for *S. fontqueri* and *N. anyerae*

- EAAA for *Salamandra algira*; *Chalcides pseudostratus*; *Blanus tingitanus* and *Chalcides colosii*: corresponding to humid montane and open forests dominated by *Quercus suber* woodland the area surrounding the north crests east and west, where more or less continuous forest cover is found (approx. area 35 km²). Migratory bird flyway is not considered for the purpose of the EAAA (Criterion IV of Critical Habitat).

⁶ It is acknowledged that the Project location is found within a wide migratory corridor associated to the East Atlantic Fly way; nonetheless it is deemed that species use it mainly as passage, as such the flyway is not included as habitat for migratory bird species.

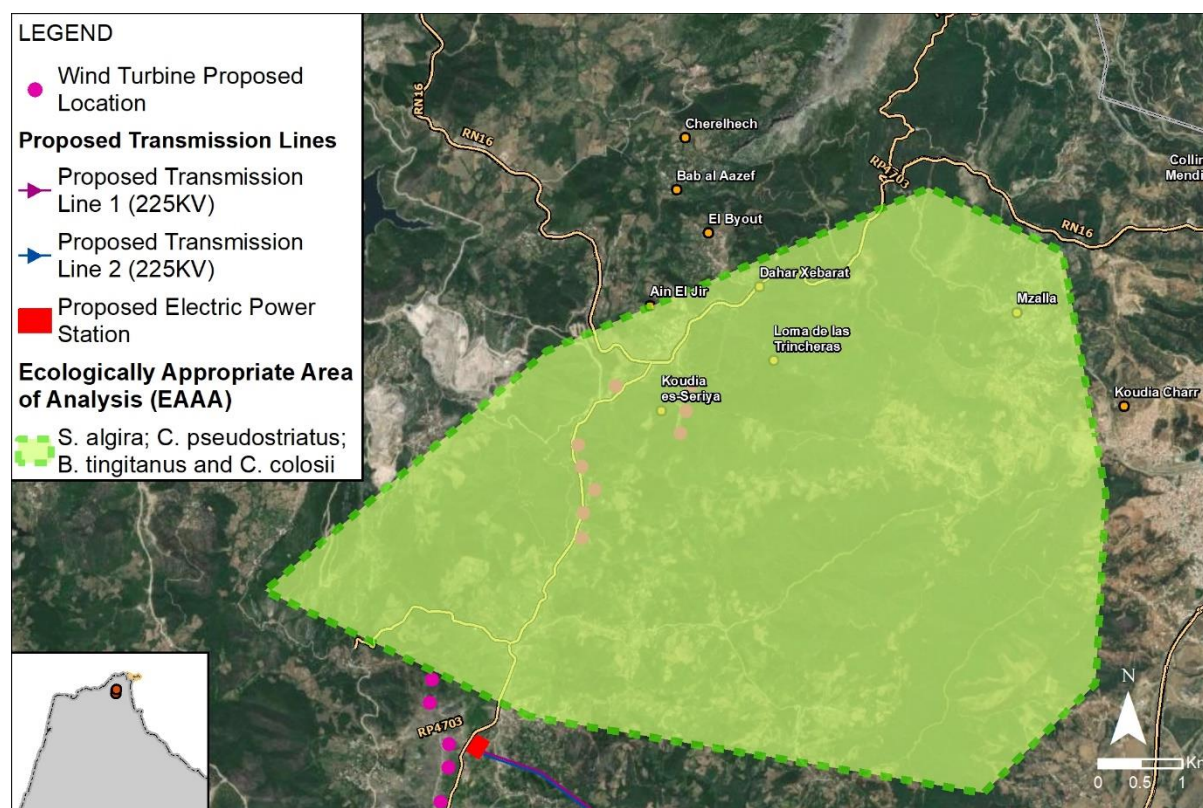


Figure 14.2 EAAA for *S. algira*; *C. pseudostriatus*; *B. tingitanus* and *C. colosii*

For the Criteria which relate to the EU Habitats Directive or Resolution 4 and 6 of Bern Convention, the assessment takes in account footnote 4 of the Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources (v. January 1, 2020), which states:

“In non-member countries, clients should conduct expert assessment of Critical Habitat using the other criteria and thresholds listed in this guidance to determine the appropriate restrictions and requirements. Expert assessment should be conducted by biologists with specialized experience with the species in that particular geographic context, wherever feasible. The intent is to avoid inappropriate application of the Annex IV species list to non-member countries with significantly different ecological contexts and/or more favorable species conservation status”


In this case, being Morocco not an EU member country, the assessment has been done using the other Criteria with the result of the EAAA being Priority Biodiversity Feature for a number of criteria, habitats and species, and Critical Habitat for a species of endangered insect. In order to be comprehensive following an assessment of the habitats and species included in the relevant Annexes of the EU Habitat directives and the Resolution of the Bern Convention with an analysis of applicability to the case. It has to be noted that the biogeography of the concerned region is very similar in many aspects to the corresponding southern Mediterranean part of the EU, particularly Spain, but the level of threat and rarity of similar ecosystems and specific species at both sides of the Mediterranean can be very different, and some habitats and species can be very rare or threatened at the European side and not so at the Northern African (NA) side, as their area of presence can be on the NA side in its main proportion, being the European range marginal or at the limit of its geographical range.



It needs to be noted also that, differently to the other Criteria, and specially for Critical Habitats, there are no numerical thresholds for presence of the mentioned habitats or species of the EU Habitat Directive and Bern Convention, therefore it could be interpreted that their mere presence within the EAAA could determine the definition of PBF or CH of the concerned EAAA. Given the number of habitats and species identified in the mentioned Annexes and Resolutions linked to their sometimes


expanded geographical distributions and low levels of threat, even at EU level, the mere presence of such habitats and species at the EAAA level could determine vast areas of PBF or even CH at Northern African geographical level.

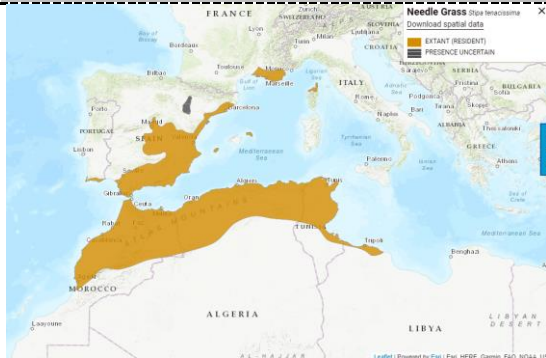
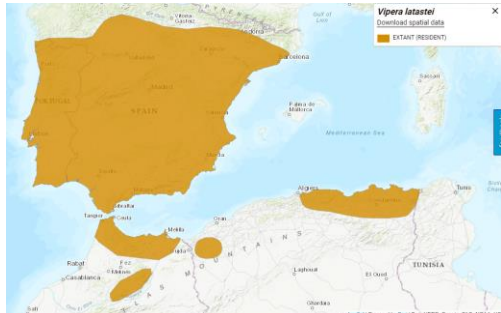
Table 14.1 and Table 14.2 set out the identification of priority biodiversity features and critical habitat within the Project AoA.

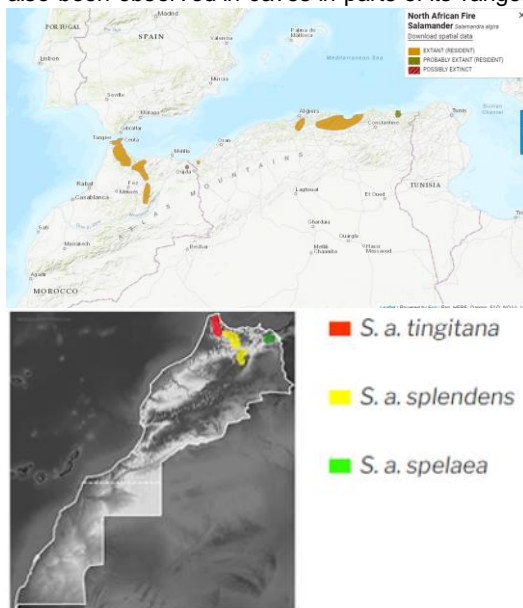
Table 14.1 Performance Requirement 6 Priority Biodiversity and Critical Habitat Features

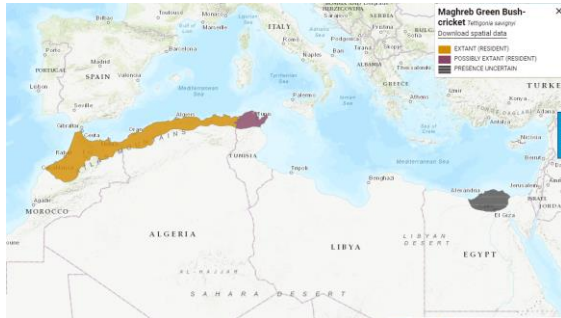
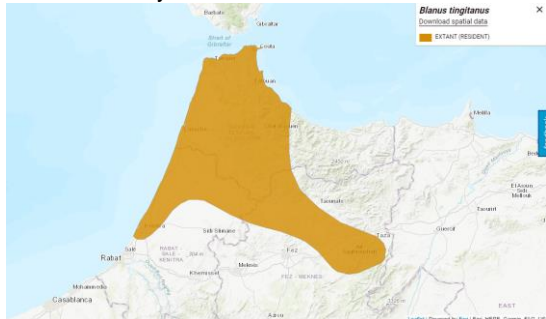
Feature		Description/Distribution	Priority Biodiversity Feature Y/N	Critical Habitat Feature Y/N
Presence of Threatened Ecosystems				
None present				
Presence of Threatened Species				
<ul style="list-style-type: none"> ■ Presence of Vulnerable Species (IUCN VU or National Red List Vulnerable or equivalent) ■ Presence of Habitat of Significant Importance to Endangered or Critically Endangered Species (IUCN EN or CR or National Red List Endangered or Critically Endangered or equivalent) ■ Presence of Habitats of Significant Importance for Endemic or Geographically Restricted Species ■ Presence of Habitats Supporting Globally Significant Migratory or Congregatory Species (NOTE : No species have been found to trigger this criterion) 				
Species	Moroccan Status	IUCN Status		
Schreiber's Bent-winged Bat (<i>Miniopterus schreibersii</i>)	-	VU	<p>Occurs from south-western Europe and north and west Africa through the Middle East to the Caucasus. It is known from records in North Africa (Morocco, Algeria, Tunisia, Libya). Forages mainly in deciduous woodlands and mature orchards (including olive groves), gardens, along hedgerows separating pastures and riverine forests and in urban areas. In the Mediterranean area they can use grasslands, but avoid arable land and maquis.</p>  <p>Yes (PBF) Criterion Threatened species: (c) EAAA supports VU species</p> <p>No, CH criteria do not apply to this species.</p>	

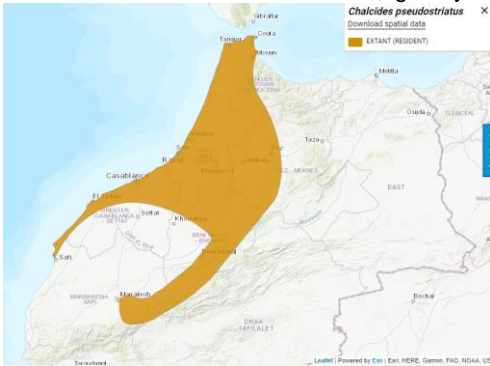
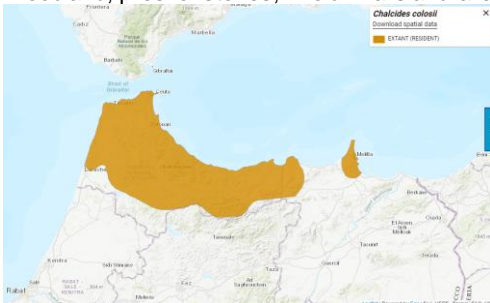
Feature	Description/Distribution	Priority Biodiversity Feature Y/N	Critical Habitat Feature Y/N
Long-fingered Bat (<i>Myotis capaccinii</i>)	<p>Sparsely distributed from eastern Iberia, Spain through the northern Mediterranean to coastal Asia Minor and Israel, Lebanon and Jordan, and also in Mesopotamia from Turkey to Iran and in north-west Africa (limited to the Mediterranean fringe of western Maghreb: north Morocco and north west Algeria). Depends strictly on aquatic habitats. It forages over wetlands and waterways (including artificial waterbodies, such as canals and reservoirs), also scrub.</p> 	<p>Y (PBF) Criterion Threatened species: (c) EAAA supports VU species</p>	<p>No, CH criteria do not apply to this species.</p>
Mehely's Horseshoe Bat (<i>Rhinolophus mehelyi</i>)	<p>Largely restricted to the Mediterranean. It has a discontinuous distribution from north Africa (Morocco, Algeria, Tunisia and Egypt) and southern Europe through Asia Minor, Anatolia, to Transcaucasia, Iran and Afghanistan. It is patchily distributed in some large and vulnerable colonies. It occurs up to 2,000 m Asl in High and Saharan Atlas mountains, although it is typically found at lower altitudes in other parts of its range. Forages in Mediterranean shrubland and woodland, in dry steppes and particularly link to water bodies.</p> 	<p>Yes (PBF) Criterion Threatened species: (c) EAAA supports VU species</p>	<p>No, CH criteria do not apply to this species.</p>

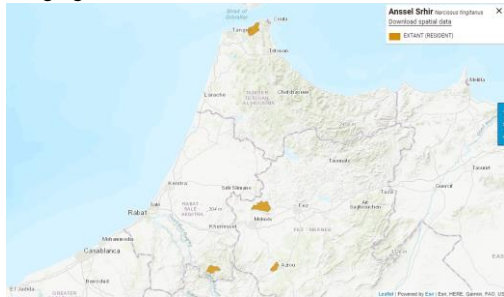
Feature			Description/Distribution	Priority Biodiversity Feature Y/N	Critical Habitat Feature Y/N
Giant Noctule (<i>Nyctalus lasiopterus</i>)	-	VU	<p>Has a very scattered distribution through central and southern Europe (Iberia to the Balkans, Urals) and north Africa (Morocco, only two records in northwest Morocco), Libya, and possibly Algeria. Outside the Mediterranean region the range extends eastwards through Asia Minor to the Caucasus, northern Iran, Kazakhstan and the Urals in Russia. Forages over mixed and deciduous forest and wooded river valleys (the latter especially on migration). It is highly dependent on mature forest.</p> 	<p>Yes (PBF) Criterion Threatened species: (c) EAAA supports VU species</p>	<p>No, CH criteria do not apply to this species.</p>
Needle Grass (<i>Stipa tenacissima</i>)	-	VU	<p>In north Africa this species forms vast steppes that are mostly distributed in a thin latitudinal fringe, from western Libya to western Morocco (Cortina et al. 2009). In Morocco this plant is found from eastern Morocco, the Rif and Middle Atlas mountains and along the High Atlas range to the southwest of the country. This plant is a perennial grass, that can form large tussocks. This species is found in dry, rocky and base rich soils, being very frequent in calcareous regions near the coast or in semi-arid inland areas. It also can be found in rocky slopes, and open Mediterranean scrubland or Pine forests of <i>Pinus halepensis</i>.</p>	<p>Yes (PBF) Criterion Threatened species: (c) EAAA supports VU species</p>	<p>No, CH criteria do not apply to this species.</p>

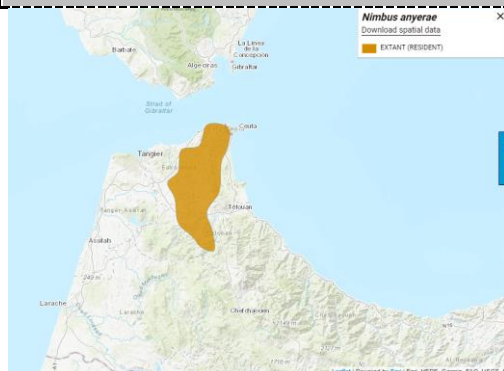
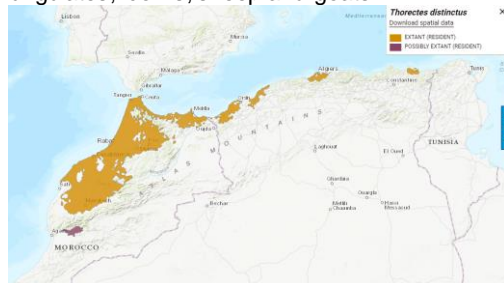
Feature	Description/Distribution			Priority Biodiversity Feature Y/N	Critical Habitat Feature Y/N
					
Lataste's viper (<i>Vipera latastei</i>)	Cat. 4	VU	<p>Ranges from northern Morocco to northern Algeria, and extreme northwestern Tunisia in North Africa, and it is also present on the Iberian Peninsula where it has a fragmented population in both Portugal and Spain. Populations of vipers from the Middle Atlas Mountains of Morocco formerly allocated to <i>V. monticola</i> are now recognised as belonging to <i>V. latastei</i>. It occurs from sea level up to almost 3,000 m asl. This species is found in generally moist, rocky areas, in dry scrubland and woodland, hedgerows, stone walls and sometimes in coastal dunes.</p> 	<p>Yes (PBF) Criterion Threatened species: (c) EAAA supports VU species</p>	<p>No, CH criteria do not apply to this species.</p>
North African Fire Salamander (<i>Salamandra algira</i>)	Cat. 4	VU	<p>Recent morphological, ecological and genetic studies on <i>Salamandra algira</i> indicate that there are at least three differentiated phenotypes and genotypes with parapatric distribution. <i>Salamandra algira</i> must be considered a complex of more than one species.</p>	<p>Yes (PBF) Criterion Threatened species:</p>	<p>No, established EAAA is not deemed to trigger Range Restricted criterion</p>

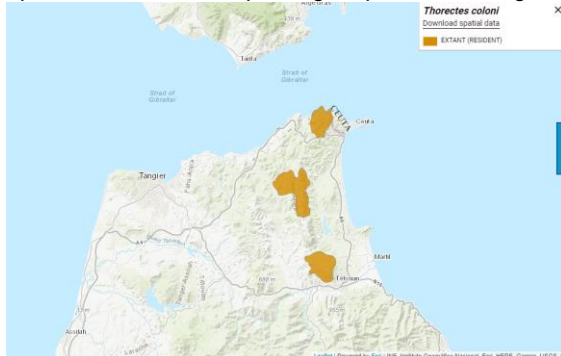
Feature	Description/Distribution	Priority Biodiversity Feature Y/N	Critical Habitat Feature Y/N
	<p>This species is restricted to north-west Africa, with a fragmented range in parts of northern Morocco (Rif and Moyen Atlas), Ceuta (Spain), and northern Algeria (coastal mountain ranges).</p> <p><i>Salamandra algira</i> shows a fragmented distribution pattern which is mostly confined to mountain ranges at an altitude of 0 - 2455 m above sea level (asl), with five subspecies recognised: <i>S. a. tingitana</i> occupies the northwestern Rif, ranging from Ceuta to Chefchouen.</p> <p>The species has an altitudinal range of approximately 80-2,450m asl. It is generally restricted to humid montane forests where it is found under stones and beneath roots in Cedar (<i>Cedrus</i>) and Oak (<i>Quercus</i>) woodland. It has also been observed in caves in parts of its range.</p>  <p>The figure consists of two parts. The top part is a map of North Africa showing the distribution of the North African Fire Salamander (<i>Salamandra atra</i>) across the Rif mountains in Morocco, Ceuta in Spain, and northern Algeria. The map uses a color-coded legend: orange for 'EXTANT (RESIDENT)', yellow for 'PROBABLY EXTANT (RESIDENT)', and red for 'PROBABLY EXTINCT'. The bottom part is a detailed grayscale map of the Rif mountains in Morocco, with three specific areas highlighted in color: red for <i>S. a. tingitana</i>, yellow for <i>S. a. splendens</i>, and green for <i>S. a. spelaea</i>.</p>	<p>(c) EAAA supports VU species</p> <p>and</p> <p>Criterion Range Restricted species: (a) EAAA for regularly occurring range-restricted species</p>	<p>applicable threshold of:</p> <p>(a) EAAA regularly holds $\geq 10\%$ of global population AND ≥ 10 reproductive units of the species</p>
Source: Beukema et al., 2010.			

Feature			Description/Distribution	Priority Biodiversity Feature Y/N	Critical Habitat Feature Y/N
Maghreb Green Bush-cricket (<i>Tettigonia savignyi</i>)	-	VU	<p>This species has been reported from North Africa, where it occurs in Algeria and Morocco (and possibly also Tunisia). This species is found in high forbs in moist habitats, particularly close to streams and lakes. It was also found in other habitats with high cover of forbs and shrubs, such as fallow land and shrubland.</p> 	<p>Yes (PBF) Criterion Threatened species: (c) EAAA supports VU species</p>	<p>No, CH criteria do not apply to this species.</p>
Tangier Worm Lizard (<i>Blanus tingitanus</i>)	-	LC	<p>Listed as Least Concern since, although its currently known Extent of Occurrence is not much greater than 20,000 km², it occurs in an area of extensive, suitable habitat which appears not to be under very serious threat, it has a presumed large population. This is a fossorial species that is found in relatively humid soils containing humus. It can be found in woodland, scrub and traditionally cultivated areas.</p> 	<p>Yes (PBF) Criterion Range Restricted species: (a) EAAA for regularly occurring range-restricted species</p>	<p>No, established EAAA is not deemed to trigger Range Restricted criterion applicable threshold of: (a) EAAA regularly holds $\geq 10\%$ of global population AND ≥ 10 reproductive units of the species</p>

Feature	Description/Distribution		Priority Biodiversity Feature Y/N	Critical Habitat Feature Y/N
Moroccan Three-toed Skink (<i>Chalcides pseudostratus</i>)	Cat. 4	NT	<p>This species occurs in the Middle Atlas Mountains, and also present along the northern Atlantic coast of Morocco, the Zebú river basin and western part of the Rif mountain range, including the Tingitana Peninsula. It is also present in the Spanish enclave of Ceuta. It was previously found in the High Atlas Mountains. It is found in moist, grassy areas.</p> 	<p>No, established EAAA is not deemed to trigger Range Restricted criterion applicable threshold of:</p> <p>(a) EAAA regularly holds $\geq 10\%$ of global population AND ≥ 10 reproductive units of the species</p>
Riffian skink (<i>Chalcides colosii</i>)	Cat. 4	LC	<p>This species is endemic in the Maghreb area of North Africa. It is found northern Morocco in the Rif Mountains from Tangier to Melilla. It is also present in Spanish territories of Ceuta, Melilla and on the island Peñón de Tierra (close to the Peñón de Alhucemas). It is found from around 5 up to 1,600m asl. It is found in semi-arid, sub-humid and humid scrubland and woodland, piles of stones, in old walls and areas with some grassland.</p> 	<p>No, established EAAA is not deemed to trigger Range Restricted criterion applicable threshold of:</p> <p>(a) EAAA regularly holds $\geq 10\%$ of global population AND ≥ 10 reproductive units of the species</p>

Feature			Description/Distribution	Priority Biodiversity Feature Y/N	Critical Habitat Feature Y/N
Anssel Sshr (<i>Narcissus tingitanus</i>)	-	EN	<p>This species is endemic to Morocco where it has a restricted distribution in the Rif Mountains and the Middle and North Atlantic coastal regions. The species is found in four major floristic divisions: Tangier, Doukkala, Middle Sebou and Zaïane. Typical habitats for this species include grasses, scrub, oak forest clearings, wet meadows, sandy and stony pastures, woodlands, limestone mountains, peat bogs (pozzines) and temperate mixed forests, ranging between 500 and 1,200 m asl.</p> 	<p>Yes (PBF)</p> <p>Criterion Range</p> <p>Restricted species:</p> <p>(a) EAAA for regularly occurring range-restricted species</p> <p>and</p> <p>Criterion Threatened species:</p> <p>(b) EAAA supports < 0.5% of global population OR < 5 reproductive units of a CR or EN species.</p>	<p>No, EAAA does not overlap with known distribution; thus unlikely to trigger Threatened species criterion</p> <p>applicable threshold of:</p> <p>(b)EAAA supports ≥ 0.5% of the global population AND ≥ 5 reproductive units of a CR or EN species</p>
Dung beetle (<i>Nimbus anyerae</i>)	-	EN	<p>This species is endemic to northwestern Morocco (Haut mountains, at Tetouan province) and it is known from four nearby localities, at elevations ranging from 300 to 750 m asl. This species prefers calcareous mountain habitats. This species is present in a zone with singular environment conditions with continuous winds. The habitat is dominated by limestone soils with open Mediterranean scrublands of <i>Pistacia lentiscus</i>, <i>Ulex eriocladus</i>, <i>Chamaerops humilis</i>, <i>Rhamnus oleoides</i>, <i>Crataegus monogyna</i>, <i>Teucrium</i> sp. and <i>Stachys fontqueri</i>. It has been observed in sheep dung.</p>	<p>Yes (PBF)</p> <p>Criterion Range</p> <p>Restricted species:</p> <p>(a) EAAA for regularly occurring range-restricted species</p> <p>and</p> <p>Criterion Threatened species:</p> <p>(b) EAAA supports < 0.5% of global</p>	<p>Yes, established EAAA is deemed to trigger Threatened species criterion</p> <p>applicable threshold of:</p> <p>(b) EAAA supports ≥ 0.5% of the global population AND ≥ 5 reproductive units of a CR or EN species</p>

Feature	Description/Distribution		Priority Biodiversity Feature Y/N	Critical Habitat Feature Y/N	
			population OR < 5 reproductive units of a CR or EN species.		
Beetle (<i>Thorectes distinctus</i>)	-	EN	<p>This species is endemic to the Maghreb region. It occurs in two disjunct areas: the coast of Algeria (Annaba = Bone, Oran, Alger and Ghazaouet = Nemours), and western Morocco at the Smir and Atlantic coasts from the Tanger to Rabat region. The area of occupancy (AOO) is very restricted and estimated to be around 100 km². This species has a preference for sandy soils in open forests dominated by <i>Quercus suber</i> and <i>Juniperus thurifera</i>. It is a coprophagous species that feeds preferentially on excrement of wild ungulates, cows, sheep and goats.</p> 	<p>Yes (PBF) Criterion Threatened species (b) EAAA supports < 0.5% of global population OR < 5 reproductive units of a CR or EN species</p>	<p>No, established EAAA is not deemed to trigger Threatened species criterion applicable threshold of: (b)EAAA supports ≥ 0.5% of the global population AND ≥ 5 reproductive units of a CR or EN species</p>
Beetle (<i>Thorectes coloni</i>)	-	CR	<p>This species is endemic to Morocco, from Jebel Moussa and Haus sierra. It is known from four close localities in the Anyera region: Tleta-Taghramt, Yebel Musa, El Alawia and El Ouansar. The species is threatened by</p>	<p>Yes (PBF) Criterion Range Restricted species:</p>	<p>No, established EAAA is not deemed</p>

Feature	Description/Distribution	Priority Biodiversity Feature Y/N	Critical Habitat Feature Y/N
	<p>limestone quarries and so can be considered to be in four locations. The habitat is dominated by limestone soils with open Mediterranean scrublands (<i>Pistacia lentiscus</i>, <i>Ulex eriocladus</i>, <i>Chamaerops humilis</i>, <i>Rhamnus oleoides</i>, <i>Crataegus monogyna</i>, <i>Teucrium sp.</i> and <i>Stachys fontqueri</i>). This species feeds on sheep and goat pellets, and digs nests under small stones.</p> 	<p>(a) EAAA for regularly occurring range-restricted species</p> <p>and</p> <p>(b) EAAA supports < 0.5% of global population OR < 5 reproductive units of a CR or EN species.</p>	<p>to trigger Threatened species criterion applicable threshold of:</p> <p>(b)EAAA supports ≥ 0.5% of the global population AND ≥ 5 reproductive units of a CR or EN species</p>

Presence of Significant Biodiversity Features Recognised by Stakeholders or Governments (IBA, KPA, etc.)

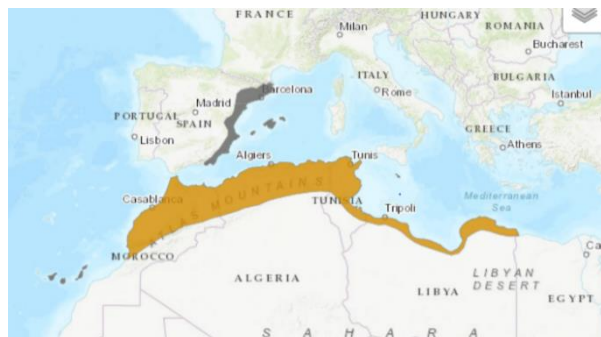
Intercontinental Biosphere Reserve of the Mediterranean (MaB)	<p>The Intercontinental Biosphere Reserve of the Mediterranean (RBIM) is the first of its type to be designated by the Man and the Biosphere Programme. It combines the Tingitane Peninsula in Morocco and the southern Iberian Peninsula of Andalusia.</p> <p>The Moroccan section of the intercontinental biosphere reserve is located in the region of Djبالا on the Tingitane Peninsula, adjacent to the Strait of Gibraltar. It is bordered by the Gharb plain and the hills of Hafs to the west, the Rif Central to the east, the Mediterranean coastline to the north, and the western Prerif to the south. The region is very mountainous and marked by two major crests: the Numidian chain and the mid-ocean limestone ridge. Extensive depressions are found in the crests, including the Chefchaouen furrow, which covers the central portion of the region.</p> <p>Morocco's interior region is mountainous and humid, and has the highest precipitation rate at the national level. The area comprises a variety of</p>	<p>Yes, the reserve promotes a sustainable development model in a framework of institutional collaboration. Materialised in the RBIM Action Plan promoting sustainable development, and the improvement of environmental</p>	<p>No, the vast RBIM is not deemed to be considered as Critical Habitat</p>
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Feature	Description/Distribution	Priority Biodiversity Feature Y/N	Critical Habitat Feature Y/N
	habitats with land cover characterised by diverse land uses including pasture, agricultural, livestock, and human settlement. Cork oak forests and deciduous forests dominate the landscape. Endemic fauna species include <i>Chalcides colosii</i> (Riffian skink), <i>Blanus tingitanus</i> (a reptile of the family Blanidae), and <i>Lacerta pater tangitana</i> . The region is also home to a number of very rare habitats such as bogs with Sphagnum (Peat moss). The Moroccan part of the reserve is home to rare flora species found exclusively in the area of Djebala, including <i>Acer granatense</i> , <i>Alnus glutinosa</i> (Common alder), and <i>Betula celtiberica</i> .	conditions and governance.	
Presence of Areas Associated with Key Evolutionary Processes			
None present			
Presence of Ecological Structure or Functions needed to Maintain Viability of Priority/Critical Habitat Features			
None present			

Table 14.2 Habitats/Species listed under Annex 4 of EU Habitats Directive and/or Resolution 4/6 of Bern Convention

Feature	Description/Distribution	Priority Biodiversity Features Y/N	Critical Habitat Feature Y/N
Presence of Threatened Habitats			
Hedgehog heath (coussinets)	The habitat is equivalent to EU Habitat 4090, Endemic oro-Mediterranean heaths with gorse, primary cushion heaths of the high, dry mountains of the Mediterranean and Irano-Turanian regions, with low, cushion-forming, often spiny shrubs, located in the EAAA on the southern crest of the windfarm.	Yes, habitat type listed in Annex 1 of EU Habitats Directive. The EAAA of the project in general has already been considered a PBF for a number of general applicable criteria.	No, it is not marked as "priority habitat type" in Annex 1 of EU Habitats Directive
Cork oak (<i>Quercus suber</i>) forests (Resolution 4 G3.712 Aquitanian [<i>Pinus pinaster</i> ssp. <i>atlantica</i>] - [<i>Quercus suber</i>] forests).	<p>Cork oak forests are located mainly in sub-humid and humid areas of the northwestern quadrant of Morocco, especially in the surroundings of the Rif mountain range.</p> <p>In isolation they also appear in the eastern Middle Atlas and in High Atlas enclaves. On Atlantic sub-littoral zones with horizontal rainfall can live in environments formally semi-arid.</p> <p>Cork oak forests are not threatened (LC) considering the whole Moroccan territory. The surface reductions suffered in the last 50 years (Sub-criterion A1) make the cork oak forests of the Semi-arid domain of the Atlantic coast (24.3%), of the Oceanic Ecoregion, of the semi-arid or dry sub-humid of high areas (14.9%) and of the Mediterranean Ecoregion, be in Vulnerable situation (VU).</p>	<p>Yes, habitat type listed in Resolution 4 of Bern Convention. The EAAA of the project in general has already been considered a PBF for a number of general applicable criteria.</p>	No, though marked as "Endangered" Natural Habitat as per Annex 1 of Resolution 4. Local designation identified it as VU (not CR/EN).
Presence of Threatened Species			
Species	EU Status	IUCN Status	

Feature	Description/Distribution		Priority Biodiversity Features Y/N	Critical Habitat Feature Y/N
Several of Birds (<i>Falco peregrinus</i> , <i>Galerida theklae</i> , <i>Lullula arborea</i> , <i>Phoenicurus moussieri</i> , <i>Pyrrhocorax pyrrhocorax</i>) Reptiles (<i>Testudo graeca</i>) Mammals (<i>Microchiroptera</i> , <i>Caracal caracal</i>)	Listed in Annex II of Habitats Directive, Annex I of Birds Directive, or Resolution 6 of Bern Convention	Varied	See explanatory note at beginning of Section 3, if the mere presence of any of these species would trigger definition of PBF, a significant portion of Northern Morocco territory would be defined as such.	Yes, listed in Annex II of Habitats Directive, Annex I of Birds Directive, or Resolution 6 of Bern Convention. The EAAA of the project has already been considered a PBF for of general applicable criteria.
North African Hedgehog (<i>Atelerix algirus</i>)	Annex IV of Habitats Directive, LC at EU level, Favourable evolution at Mediterranean level	LC	Endemic to the Mediterranean region, occurring across North Africa from Morocco to Libya, in Spain, and on a number of islands including the Canary Islands, Djerba, Malta, Majorca, Ibiza and Formentera. It typically occurs at altitudes of 0 to 400 m, although it can reach altitudes of 900 m in Morocco. Found in a range of habitats including semi-desert, dry Mediterranean scrub, grasslands, pastures, cultivated fields, and gardens, sometimes in close proximity to human habitation. It is most often found in arid areas. Its geographical range is mostly in North Africa.	N/A as the geographical range and level of presence/rarity/ in Morocco is different than in Europe.

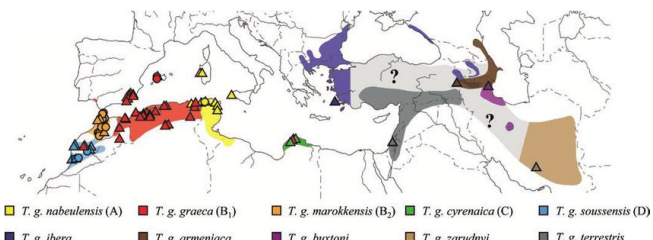



N/A

N/A as the geographical range and level of presence/rarity/ in Morocco is different than in Europe.

Feature			Description/Distribution	Priority Biodiversity Features Y/N	Critical Habitat Feature Y/N
Wildcat (<i>Felis silvestris</i>)	Annex IV of the Habitats Directive, NT at EU level, Favorable status at Mediterranean level	LC	Has a very broad distribution, found throughout most of Africa, Europe, and south west and central Asia into India, China, and Mongolia. Four major intraspecific phylogenetic groups, or subspecies exist. The African Wild Cat <i>F. s. lybica</i> occurs across northern Africa and extends around the periphery of the Arabian Peninsula to the Caspian Sea. In North Africa it occurs discontinuously from Morocco through Algeria, Tunisia, Libya and into Egypt. Wildcats in Africa are found everywhere outside tropical rainforest, although thinly distributed in true desert.	N/A	N/A Given its large global distribution, and the different levels of threats in Europe, application of criterion not considered relevant



Feature				Description/Distribution	Priority Biodiversity Features Y/N	Critical Habitat Feature Y/N
Common Tortoise (<i>Testudo graeca</i>)	Annex IV of the Habitats Directive. VU at EU level, unfavourable at EU Mediterranean region	VU		<p>Its geographic range includes North Africa, Southern Europe, and South west Asia, in 23 countries. Currently, at least 20 subspecies are published, relevant to Morocco are: <i>T. g. graeca</i> (North Africa and South Spain); <i>T. g. soussensis</i> (South Morocco) and <i>T. g. marokkensis</i> (North Morocco). The regions north of the Rif Mountains, from about Tetouan in the west and the estuary of the Moulouya river in the east, are home to <i>Testudo graeca marokkensis</i>.</p>  <p> ■ <i>T. g. nabeulensis</i> (A) ■ <i>T. g. graeca</i> (B₁) ■ <i>T. g. marokkensis</i> (B₂) ■ <i>T. g. cyrenaica</i> (C) ■ <i>T. g. soussensis</i> (D) ■ <i>T. g. iberica</i> ■ <i>T. g. armeniacae</i> ■ <i>T. g. buxtoni</i> ■ <i>T. g. zarudnyi</i> ■ <i>T. g. terrestris</i> </p> <p>Source: Gracia et al., 2017.</p>	See first row for species and PBF, same species in several lists, Annexes II and IV of EU Habitats and Resolution 6 of Bern Convention	N/A, already assessed with Criterion 2 as VU species at global level, its degree of threat (lower) and distribution (larger) at Moroccan level is different from Europe and does not require a different assessment
Mediterranean Chameleon (<i>Chamaeleo chamaeleon</i>)	Unfavourable-Inadequate at EU Mediterranean level	LC		<p>This species is found in southern Europe, (relictic and only in Southern Spain) but mostly in Northern Africa and southwestern Asia. In North Africa it occurs along the Atlantic coast of Western Sahara, is widely distributed in Morocco, and is present in northern Algeria, northern and central Tunisia, northern Libya and northern Egypt. It is a diurnal species found climbing in bushes in dry to humid habitats. It inhabits shrubland, plantations, open pine woodland, orchards (such as almonds and olive groves) and gardens.</p> 	N/A	N/A, Its geographic distribution (relictic in Europe, widely distributed in Morocco) and level of threat (much lower in Morocco) determine the non-applicability of the criterion

Feature			Description/Distribution	Priority Biodiversity Features Y/N	Critical Habitat Feature Y/N
Microchiroptera (various species)	Annex IV of the Habitats Directive, all species. Different status (3 species EN, 7 VU, 8 NT, 20 LC, 2 DD).	Similar status to EU level in most cases	Annex IV of the EU Directive considers all chiroptera present in Europe (some of them also present in Northern Africa) as with the same status, regardless of their threat category, which is rather different. See explanatory note, if the mere presence of any of these species would trigger definition of CH, most of Northern Morocco territory would be defined as such. Nine of these species have been found in the EAAA, three with a VU status and the other six mostly LC.	See first row for species and PBF, same species in several lists, Annexes II and IV of EU Habitats and Resolution 6 of Bern Convention	N/A three species already assessed under Criterion 2 for VU species at global level. The remainder 6 species of chiroptera are not considered with sufficient levels of threat or rarity at Moroccan level to be considered as triggers of CH

15. SUMMARY OF PRIORITY AND CRITICAL HABITAT FEATURES

Several species and habitats meet more than one criteria for priority or critical habitat. In order to simplify the assessment of impacts on receptors, a summary of receptors is provided in Table 15.1, identifying the highest sensitivity for which they have been identified.

Table 15.1 Summary of Priority and Critical Habitat Features

Feature	Criteria	Priority or Critical Habitat
Schreiber's Bent-winged Bat (<i>Miniopterus schreibersii</i>)	Presence of Vulnerable Species	Priority
Long-fingered Bat (<i>Myotis capaccinii</i>)	Presence of Vulnerable Species	Priority
Mehely's Horseshoe Bat (<i>Rhinolophus mehelyi</i>)	Presence of Vulnerable Species	Priority
Giant Noctule (<i>Nyctalus lasiopterus</i>)	Presence of Vulnerable Species	Priority
Needle Grass (<i>Stipa tenacissima</i>)	Presence of Vulnerable Species	Priority
Lataste's viper (<i>Vipera latastei</i>)	Presence of Vulnerable Species	Priority
North African Fire Salamander (<i>Salamandra atra</i>)	Presence of Vulnerable Species	Priority
	Presence of regularly occurring range-restricted species	Priority
Maghreb Green Bush-cricket (<i>Tettigonia savignyi</i>)	Presence of Vulnerable Species	Priority
Tangier Worm Lizard (<i>Blanus tingitanus</i>)	Presence of regularly occurring range-restricted species	Priority
Moroccan Three-toed Skink (<i>Chalcides pseudostriatus</i>)	Presence of regularly occurring range-restricted species	Priority
Riffian skink (<i>Chalcides colosii</i>)	Presence of regularly occurring range-restricted species	Priority
Ansel Srhir (<i>Narcissus tingitanus</i>)	Presence of regularly occurring range-restricted species	Priority
	Presence of IUCN Red List EN or CR species	Priority
Dung beetle (<i>Nimbus anyerae</i>)	Presence of regularly occurring range-restricted species	Priority
	Presence of IUCN Red List EN or CR species	Priority
	EAAA supports $\geq 0.5\%$ of the global population AND ≥ 5 reproductive units of a CR or EN species	Critical
Beetle (<i>Thorectes distinctus</i>)	Presence of IUCN Red List EN or CR species	Priority
Beetle (<i>Thorectes coloni</i>)	Presence of regularly occurring range-restricted species	Priority
	Presence of IUCN Red List EN or CR species	Priority
Intercontinental Biosphere Reserve of the Mediterranean (MaB)	Significant biodiversity features identified by a broad set of stakeholders or governments.	Priority
Hedgehog heath (coussinets)	Presence of threatened habitats (Annex IV)	Priority

Feature	Criteria	Priority or Critical Habitat
Cork oak (<i>Quercus suber</i>) forests (Resolution 4 G3.712 Aquitanian [<i>Pinus pinaster</i> ssp. <i>atlantica</i>] - [<i>Quercus suber</i>] forests).	Presence of threatened habitats (Annex IV)	Priority
Annex 4 species (birds, reptiles and mammals)	Presence of threatened species	Priority

As shown in Table 15.1 above, most of the identified features which have been assessed as priority habitat features; whilst only the dung beetle *Nimbus anyerae* being assessed as a critical habitat feature.

16. REFERENCES

Beukema, W., De Pous, P., Donaire, D., Escoriza, D., Bogaerts, S., Toxopeus, A.G., De Bie, C.A.J.M., Roca, J. & Carranza, S. 2010. Biogeography and contemporary climatic differentiation among Moroccan *Salamandra atra*. *Biological Journal of the Linnean Society*, 101: 626–641.

Graciá, Eva & Vargas-Ramírez, Mario & Delfino, Massimo & Anadón, José & Giménez, Andrés & FAHD, Soumia & Corti, Claudia & Jdeidi, Tarek & Fritz, Uwe. (2017). Expansion after expansion: Dissecting the phylogeography of the widely distributed spur-thighed tortoise, *Testudo graeca* (Testudines: Testudinidae). *Biological Journal of the Linnean Society*. 121. 641-654. 10.1093/biolinnean/blx007.

UNESCO. 2018. Intercontinental Biosphere Reserve of the Mediterranean, Morocco/Andalucía, Spain <https://en.unesco.org/biosphere/wnbr/mediterranean>

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