

“Ayg-1” PV Project, Armenia Critical Habitat Assessment

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Rev01

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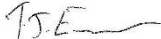
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Contents

1	Introduction	5
1.1	Purpose of Report	5
1.2	Project Background	5
2	Assessment Framework and Methodologies	7
2.1	Frameworks	7
2.1.1	International Finance Corporation (IFC) Performance Standard (PS) 6	7
2.1.2	European Bank for Reconstruction and Development (EBRD) Performance Requirement (PR) 6	7
2.2	Assessment Methods	8
2.2.1	General	8
2.2.2	Literature review and stakeholder consultation	8
2.2.3	Determination of Ecologically Appropriate Area of Analysis	8
2.2.4	Assessment against Critical Habitat criteria	9
2.2.5	Assessment against Priority Biodiversity Feature criteria	11
3	Baseline Ecological Information	13
3.1	Survey Timings and Methods	13
3.1.1	General	13
3.1.2	Habitats and Flora	13
3.1.3	Fauna (mammals, reptiles and amphibians)	14
3.1.4	Birds	14
3.1.5	Invertebrates	15
3.2	Results	15
3.2.1	General Site Description	15
3.2.2	Protected Areas	16
3.2.3	Habitats and Flora	17
3.2.4	Fauna	17
4	Critical Habitat Assessment	19
4.1	Introduction	19
4.2	Determination of Critical Habitat	28
4.2.1	General	28
4.3	Priority Biodiversity Features	28
4.3.1	Criterion 1 Threatened habitat	28

4.3.2 Criterion 2 Vulnerable species 29

4.3.3 Criterion 3 Significant feature as identified by stakeholders or governments..... 29

4.3.4 Criterion 4 Ecological structure and functions that are vital to maintaining the viability of priority biodiversity features 29

5 Mitigation and future management 30

5.1 General 30

5.2 Mitigation and Monitoring 30

5.2.1 Biodiversity Management Plan (BMP) 30

6 Summary 32

1 INTRODUCTION

1.1 Purpose of Report

This report details the Critical Habitat Assessment (CHA) for the “Ayg-1” PV Project, Republic of Armenia, which has been completed in line with IFC Performance Standard 6 (PS 6) and EBRD Performance Requirement 6 (PR 6) and their corresponding Guidance Notes (GN).

This CHA aims to:

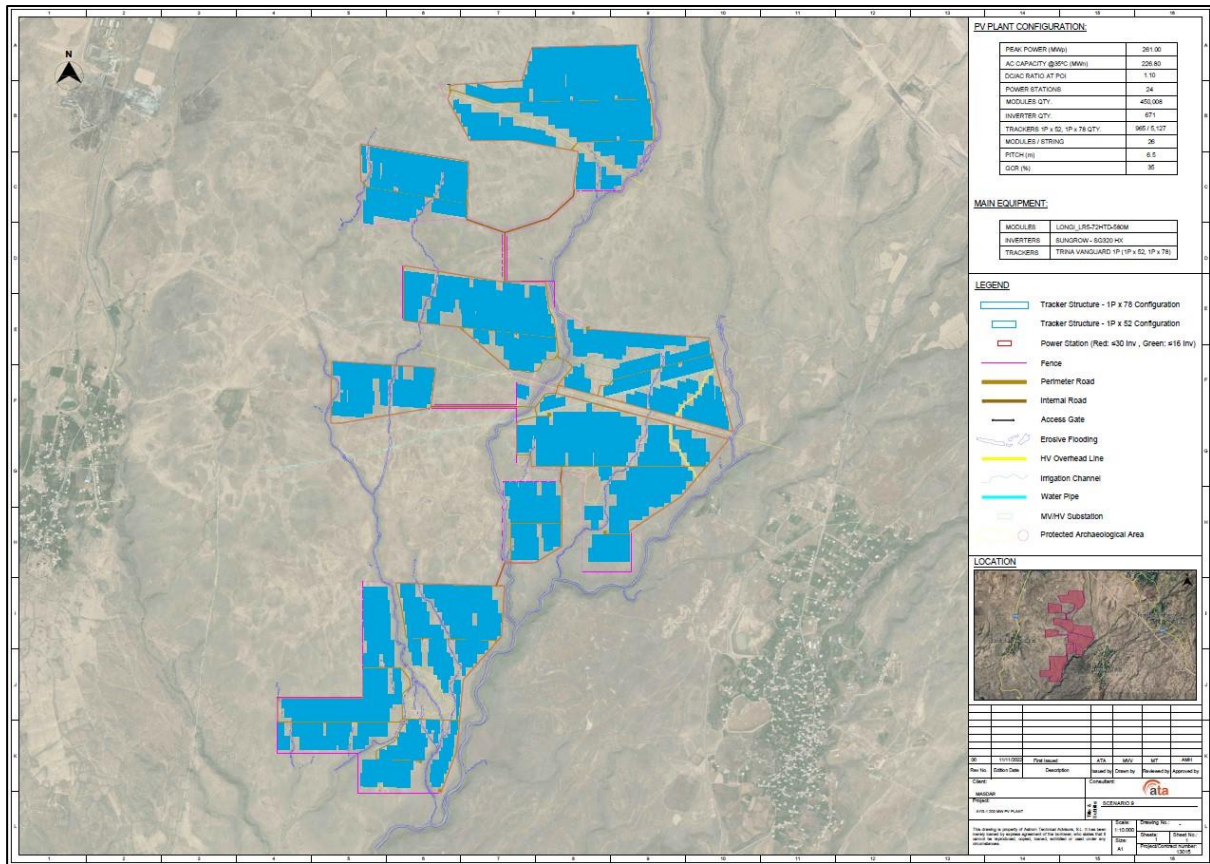
- identify Critical Habitat qualifying species or habitats, Priority Biodiversity Features and Natural Habitat associated with the Project.
- Highlight future actions for the Project where applicable, including identification and filling of data gaps and the need for additional field surveys as well as outline details to be included in a Biodiversity Action Plan (BAP).

1.2 Project Background

The Project consists of a Solar PV Site and small section of Overhead Line (along with associated infrastructure) and is located in the Talin Municipality, Aragatsotn marz (province) of Armenia.

The Project Site is approximately 1.2 km south-east of Talin and approximately 1.8 km east of Dashtadem. The Solar PV Site boundary is shown in *Figure 1*. The interconnection will be through a loop in loop out on an existing transmission line that crosses the site. The distance between the Project substation and the existing OHL is less than 300 meters.

Figure 1. Layout of the Project AOI comprising the proposed Solar PV Site



This document covers the development of a 200 MW solar PV project (Project Site) and consists of a Solar PV Site, covering an area of 520 ha, and its associated infrastructure.

2 ASSESSMENT FRAMEWORK AND METHODOLOGIES

2.1 Frameworks

2.1.1 International Finance Corporation (IFC) Performance Standard (PS) 6

In accordance with IFC PS 6, habitats are divided into modified habitats, natural habitats, and critical habitats. Critical Habitats (CH) are a subset of either modified or natural habitats supporting high biodiversity value, including:

- Habitat of significant importance to critically endangered and/or endangered species (International Union for Conservation of Nature and Natural Resources (IUCN) Red List)
- Habitat of significant importance to endemic and/or restricted-range species
- Habitat supporting globally significant concentrations of migratory species and/or congregatory species
- Highly threatened and/or unique ecosystems
- Areas associated with key evolutionary processes

Since habitat destruction is recognised as a major threat to the maintenance of biodiversity and to assess likely significance of impacts, IFC PS 6 requires the following depending on habitat status:

Modified Habitat: exercise care to minimise any conversion or degradation of such habitat, depending on scale of project, identify opportunities to enhance habitat and protect and conserve biodiversity as part of operations.

Natural Habitat: developer will not significantly convert or degrade such habitat unless no financial/technical feasible alternatives exist, or overall benefits outweigh cost (including those to biodiversity), and conversion or degradation is suitably mitigated. Mitigation must achieve no net loss of biodiversity where feasible; offset losses through creation of ecologically comparable area that is managed for biodiversity, compensation of direct users of biodiversity.

Critical Habitat: in areas of CH, the Developer will not implement project activities unless there are no measurable adverse impacts on the ability of the critical habitat to support established populations of species described or on the functions of the critical habitat; no reduction in population of a recognised critically endangered or endangered species and lesser impacts mitigated as per natural habitats.

2.1.2 European Bank for Reconstruction and Development (EBRD) Performance Requirement (PR) 6

The EBRD PR 6 sets objectives to protect and conserve biodiversity using a precautionary approach, utilise the mitigation hierarchy to achieve no net loss/net gains where appropriate, maintain ecosystem services, and promote good practice in the management and use of natural resources.

In addition to the Critical Habitat noted above, the PR 6 also builds on the requirements to preserve important areas of natural habitats, defining these as “Priority Biodiversity Features” (PBF), with a criterion-based qualitative approach also used to determine their significance.

2.2 Assessment Methods

2.2.1 General

The CHA comprises several steps in order to ensure the process is robust:

- Initial Screening – which involves making stakeholder consultation and/or an initial literature review *e.g.* Important Bird Areas in Armenia; Red Data Book of Plants and Animals of Armenia (2010); IUCN Red List of Threatened Species and; World Database of Key Biodiversity Areas.
- Establishment of baseline which includes field data collection and verification of available information *e.g.* Habitat Survey; Bird Survey; Bat Survey; Invertebrate Survey; Reptile Survey.
- Critical habitat determination:
 - a) Determination of Ecologically Appropriate Area of Analysis.
 - b) Assessment against Critical Habitat criteria.

2.2.2 Literature review and stakeholder consultation

A literature review was performed in order to understand the baseline conditions of the Project as well as informing the CHA. Primary sources of Project-related information included reports / articles / books related to the site and on-line resources including but not limited to:

- Field data collection and verification of available information *e.g.* Habitat, flora and fauna surveys
- Red Data Book of Plants and Animals of Armenia (2010)
- IUCN Red List of Threatened Species
- BirdLife International Important Bird and Biodiversity Areas (IBAs)
- World Database of Key Biodiversity Areas (KBAs)

2.2.3 Determination of Ecologically Appropriate Area of Analysis

IFC PS 6 requires identification of Ecologically Appropriate Area of Analysis (EAAA) to determine the presence of critical habitat for each species with regular occurrence in the Project’s area of influence, or ecosystem, covered by Criteria 1-4. The boundaries of an EAAA are determined by taking into account the distribution of species or ecosystems (within and sometimes extending beyond the project’s Area of Influence (AOI)) and the ecological patterns, processes, features, and functions that are necessary for maintaining them. This approach ensures that all important biodiversity within the project footprint and linked surrounding habitats are taken into consideration.

Criteria used to define CH under EBRD PR 6 are closely aligned to the IFC guidance and these require that the study area be defined by comparable parameters to the above. In essence any CH assessment must encompass all direct and indirect impacts within a broad landscape unit which is large enough to include features and functions relevant to the species being considered.

2.2.4 Assessment against Critical Habitat criteria

Criteria

The CH determination refers to the evaluation of the area in question with respect to each of the five CH criteria defined in IFC PS 6 GN and the six defined in EBRD PR 6 GN. Each criterion is described in detail in paragraphs GN70–GN83 of IFC PS 6 GN and Section 3.7 of EBRD PR 6 GN as summarised in Tables 1 and 2 below. Definitions and quantitative thresholds for each criterion of the assessment in both guidance notes follow those set out in the IFC guidance as this is considered the most appropriate source by both IFC and EBRD at the time of writing:

Table 1 – Critical Habitat Criteria as defined by IFC PS 6

Critical Habitat Criteria as defined by IFC PS 6	PS 6 Criterion Number
Critically Endangered (CR) and/or Endangered (EN) species	1
Endemic or restricted-range species	2
Migratory or congregatory species	3
Highly threatened and/or unique ecosystems	4
Key evolutionary processes	5

Table 2 – Critical Habitat Criteria as defined by EBRD PR 6

Critical Habitat Criteria as defined by EBRD PR 6	PR 6 Criterion Number
Highly threatened and/or unique ecosystems	i
Habitats of significant importance to endangered or Critically Endangered species	ii
Habitats of significant importance to endemic or range restricted species	iii
Habitats supporting globally significant concentrations of migratory or congregatory species	iv
Areas associated with key evolutionary processes	v
Ecological functions that are vital in maintaining the viability of biodiversity features described (as critical habitat features)	vi

PS 6 Criterion 1 and PR 6 Criterion ii: Critically Endangered (CR) and/or Endangered (EN) Species

Species or areas supporting species threatened with global extinction and listed as Critically Endangered (CR) and Endangered (EN) on the IUCN Red List or local equivalent trigger CH under these criteria. The principal thresholds for triggering CH are:

- a) the EAAA contains “globally important concentrations” of an IUCN CR or EN species, defined as at least 0.5% of the global population AND over 5 reproductive units.

- b) areas that support globally important concentrations of an IUCN Red-listed Vulnerable (VU) species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds in (a).
- c) is as appropriate, areas containing important concentrations of a nationally or regionally listed EN or CR species.

PS 6 Criterion 2 and PR 6 Criterion iii: Endemic and/or Restricted-Range Species and Supporting Habitats

IFC GN6 - Paragraph 74 (2019) defines “endemic” as synonymous with “restricted range” species, and for terrestrial vertebrate and plant species, this criterion refers to species with a global range size of $\leq 50,000 \text{ km}^2$. In order to trigger CH under these criteria, the EAAA must contain $\geq 10\%$ of the global population of such a species AND at least 10 reproductive units.

PS 6 Criterion 3 and PR 6 Criterion iv: Migratory or Congregatory Species and Supporting Habitats

Migratory species are defined as any species of which a significant proportion of its members cyclically and predictably move from one geographical area to another (including within the same ecosystem). Congregatory species are defined as species whose individuals gather in large groups on a cyclical or otherwise regular and/or predictable basis. Examples of Congregatory species are:

- Species that form colonies.
- Species that form colonies for breeding purposes and/or where large numbers of individuals of a species gather at the same time for non-breeding purposes (for example, foraging and roosting).
- Species that utilize a bottleneck site where significant numbers of individuals of a species occur in a concentrated period of time (for example, for migration).
- Species with large but clumped distributions where a large number of individuals may be concentrated in a single or a few sites while the rest of the species is largely dispersed (for example, wildebeest or Argali distributions).
- Source populations where certain sites hold populations of species that make an inordinate contribution to recruitment of the species elsewhere (especially important for marine species) (IFC PS 6 GN76-77).

Thresholds for these criteria as per IFC PS 6 GN78 are the following:

- a) areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population of a migratory or congregatory species at any point of the species’ lifecycle.
- b) areas that predictably support ≥ 10 percent of the global population of a species during periods of environmental stress.

PS 6 Criterion 4 and PR 6 Criterion i: Highly Threatened or Unique Ecosystems

As per IFC PS 6 GN79, it is necessary to use the Red List of Ecosystems where formal IUCN assessments have been performed. Where formal IUCN assessments have not been performed, assessments may be made using systematic methods at the national/regional level, carried out by

governmental bodies, recognized academic institutions and/or other relevant qualified organizations (including internationally recognized NGOs).

Thresholds for these criteria as per IFC PS 6 GN80 are the following:

- a) areas representing ≥ 5 percent of the global extent of an ecosystem type meeting the criteria for IUCN status of CR or EN.
- b) other areas, not yet assessed by IUCN, but determined to be of high priority for conservation by regional or national systematic conservation planning.

PS 6 Criterion 5 and PR 6 Criterion v: Key Evolutionary Processes

According to the GN81 of IFC PS 6, the structural attributes of a region, such as its topography, geology, soil, temperature, and vegetation, and combinations of these variables, can influence the evolutionary processes that give rise to regional configurations of species and ecological properties. In some cases, spatial features that are unique or idiosyncratic of the landscape have been associated with genetically unique populations or subpopulations of plant and animal species. Physical or spatial features have been described as surrogates or spatial catalysts for evolutionary and ecological processes, and such features are often associated with species diversification. By conserving species diversity within a landscape, the processes that drive speciation, as well as the genetic diversity within species, ensures the evolutionary flexibility in a system, which is especially important in a rapidly changing climate.

It should be noted that the IFC PS 6 GN provides qualitative guidance for assessing the projects against these criteria rather than quantitative thresholds, unlike PS 6 Criteria 1-4.

EBRD PR 6 Criterion vi: Ecological Functions that are Vital to Maintaining the Viability of the Biodiversity Features Described.

EBRD PR 6 describes this as “ecological functions without which critical biodiversity features could not persist.” Examples of these are given as riparian zones and rivers, dispersal or migration corridors, hydrological regimes, seasonal refuges or food sources, keystone or habitat-forming species.

As with PR 6 Criterion v this item holds a qualitative threshold rather than a quantitative one, and as such the likelihood of triggering CH should be informed by survey data and the use of relevant expert opinions.

2.2.5 Assessment against Priority Biodiversity Feature criteria

Four criteria relating to the determination of PBF are presented within EBRD PR 6. As noted above there are no quantitative thresholds stated within the guidance for the determination of PBF and as such background data, field data and expert opinion is used to complete a qualitative assessment. *Table 3* shows the criteria for defining PBFs with examples of each feature taken from the EBRD PR 6 guidance note.

Table 3 – Priority Biodiversity Feature (PBF) Criteria as Defined by EBRD PR 6

Feature	PR 6 PBF Criterion Number
Threatened Habitats	1
Vulnerable Species	2
Significant biodiversity features identified by stakeholders or governments (e.g. IBAs or KBAs)	3
Ecological structure and functions that are vital to maintaining the viability of priority biodiversity features	4

Examples of threatened habitats are given as: Habitats considered under pressure by national, regional or international assessments. They include natural and priority habitats identified under Annex I of the EU Habitats Directive.

Examples of Vulnerable species are given as: Species listed by the IUCN or any other national/regional lists (e.g., national Red Lists or Red Data Books) as Vulnerable or equivalent (N.B. in Uzbekistan the Vulnerable tier is split into Vulnerable: Rare and Vulnerable: Declining). These include animal and plant species of community interest identified under the EU Habitats Directive (Annex II).

Examples of Significant biodiversity features are given as: Key Biodiversity Areas and Important Bird and Biodiversity Areas.

Examples of Ecological structure and functions needed to maintain the viability of priority biodiversity features are given as: Locations essential for priority biodiversity features, riparian zones and rivers, dispersal or migration corridors, hydrological regimes, seasonal refuges or food sources, keystone or habitat-forming species.

3 BASELINE ECOLOGICAL INFORMATION

3.1 Survey Timings and Methods

3.1.1 General

The ecological baseline (habitat identification, floral survey, terrestrial fauna and avifauna survey) was established by local biodiversity specialists undertaking four field expeditions between the June to August. These surveys included:

- Walkover transect survey for habitat assessment categorization and rare and endemic species of plants within the Solar PV site;
- Walkover transect surveys and short vantage point surveys for birds, reptiles and amphibians, mammals within the Solar PV site;
- Dusk transect surveys for bats using a bat detector.

Earlier site visits were undertaken and incidental records from such visits were noted and presented where relevant.

The Solar PV site footprint (being relatively small) was surveyed on foot with a series of transects running from east to west and north to south directions. The area was traversed in a regular pattern in order to reduce the chances of missing any important biotic features.

3.1.2 Habitats and Flora

Vegetation types in the project impact area were identified and classified through field surveys. The field surveys were carried out in the classical way of geospatial research: itinerary and semi-stationary, the researched region was conditionally divided according to the main biotopes to take into account the relief and landscape of the site.

During the research, the encountered plant species were recorded and digitally photographed. If it was not possible to determine the plant species in field conditions, the whole plant species or samples of individual plant organs were taken for the purpose of studying it in laboratory conditions. The determination of the species and the adjustment of the names was made with 11 volumes of the flora of Armenia (Флора Армени, 1954-2010), the scientific names of the plants were specified according to S. Cherepanov's methodical manual (Черепанов, 1995), a number of additional works, professional literature were studied, the samples taken from the field were compared with RA NAS A.L. with the botanical specimens in the herbarium of the Institute of Botany named after Takhtajyan (ERE). The status of rare and endangered species was determined according to the Red Data Book of Plants and Animals of Armenia (2010).

3.1.3 Fauna (mammals, reptiles and amphibians)

A total of four field expeditions were carried out in June-August, to target the late spring and late summer aspects of the fauna. This was supplemented with background data records from historical studies in the study area and its immediate proximity.

Before the beginning of research work on the territory all available scientific information having any relation to this region was processed (literature, various reports, the collection of the Institute of Zoology). Based on that process many species were identified to have been present in the area during recent decades. In addition to that data, preliminary data from The "EMERALD" network in the republic of Armenia in 2016, observado data (<https://observation.org>) and Integrated Biodiversity Assessment Tool (IBAT) (www.ibat.alliace.org) was also used. Based on the aforementioned, preliminary lists were compiled of potential vertebrate species that could occur in the AOI.

Transect surveys were used to record terrestrial vertebrates and determine the species composition of vertebrates using standard methods (Formozov A. 1951,1976; Novikov G. 1953; Oshmarin P. 1990, Romanov V. 2005, Promotorova E. 2022). Encounters with vertebrates are mostly incidental so field signs were used to record most species. Direct visual observations of birds, mammals, reptiles, and amphibians along the route were recorded. All sightings, field signs and activities were recorded as:

- footprints;
- feeding signs (gnawing, eating, leftovers, etc.);
- droppings, excrement, faeces; and
- refuges (dens, lairs, colonies, nests).

In addition, stops were made along the survey route, to observe reptiles, if possible. The herpetofauna was determined mainly by visual observations and inspection of refuges (under rocks, bushes, etc.).

The Kuznetsov B. Identifier of Vertebrate Animals of the Fauna of the USSR 1975 was used to identify small and medium-sized mammals. To identify reptiles and amphibians, the identifier Դանիելյան Ֆ., Առաքելյան Մ. 2016թ.

In order to collect data on bat presence and their species identification, a Bat Detector – Fledermusdetektor was used from dusk into the night.

3.1.4 Birds

Observations of birds were mainly recorded during each survey visit. Collins Bird Guide 2009, Dick Forsman 2016 were used to determine the species composition of birds of the study area.

The criteria contained in the Bird Atlas published by the British Trust for Ornithology 2007-2011, which were slightly modified and adapted to the local needs of the project, were used to determine species status and criteria.

Based on the literature and survey data, a list of species was compiled of the presumed presence on this territory and in its immediate vicinity of some species of birds. When selecting the species that may occur in the area, the habitat preferences specific to each of the species was considered (mountain steppe, bushes, small rocks, stones, wet areas, cultivated or abandoned agricultural land, etc.). Species of birds both supposed and actually recorded during the field studies were recorded according to their residence status both in Armenia and in the AOI.

3.1.5 Invertebrates

Invertebrate surveys were carried out over the Project area with the order of beetles (Coleoptera) and the suborder of butterflies (Lepidoptera: Rhopalocera) selected as representative groups which were recorded in detail during the surveys. A special attention was also paid to detecting protected species or species of conservation concern from other taxonomic groups (molluscs, other insect orders) listed in the Red Data Book of Plants and Animals of Armenia (2010), Appendix 2 of the Bern Convention and the IUCN Red List of Threatened Species.

Surveys were carried out using transect counts in target areas and their immediate vicinities. During the research work, traditional methods of entomological research were employed which involved mostly hand collection, including from under stones, from manure and collection using insect nets. Transect count and visual observation of butterfly species was also held along the routes.

3.2 Results

3.2.1 General Site Description

The Project Site is located in the Talin municipality of Aragatsotn marz (province). According to the division of floristic regions of Armenia (Takhtajian, 1954), the area is entirely within the south-eastern part of the Shirak floristic region, adjacent to the Yerevanian and Aragats floristic regions.

The area is located at 1240 - 1610 mm above sea level. The area is stony with large areas occupied by boulders. There are gullies (wadis) in the area, which dry up in the summer. The area is characterized by mountain steppe vegetation.

Wormwood semi-deserts, mountain steppe and steppe bushes are the main types of vegetation in the Project Site. Petrophilic vegetation is found in a small area, which dries up in the summer, and there is some wetland vegetation with a very poor species diversity. In the area, there are former arable plots, which are sometimes separated by stone walls.

Large areas of formerly agricultural arable land, which have not been cultivated for decades, are used as grazing pastures by local herders. There are overgrazed areas in the area, where the vegetation is very poor. There are some small insignificant areas of arable land.

It has been confirmed by field visits, as well as by comparison and identification of existing literary data, that no plant species in need of special protection, endangered, vulnerable, on the verge of extinction and registered in the Red Book of Armenia or the Red List of the National Academy of Sciences were found in the Project site and nearby areas. Additionally, no invasive species were recorded.

All the above-described type of landscape predetermined the species composition of fauna inhabiting the territory of the planned construction and operation of the solar power plant "Ayg-1".

3.2.2 Protected Areas

There are eleven IBAs and KBAs within a 50 km radius from the project site. Ten of which are more than 20 km from the Project Site and any impact on the sites or species they are designated for has been scoped out:

- Kars Plain IBA and KBA (Turkey) to the north-west
- Ani KBA to the north-west
- Sardarapat IBA and KBA to the south-west
- Ararat (1) Karakose KBA (Turkey) to the south-west
- İğdir Plain IBA and KBA (Turkey) to the south
- Metsamor IBA and KBA to the south-east
- Artashavan KBA to the east
- Mount Ara IBA and KBA to the east
- Dsegh-Harghartsin-Pombak Chain and Dilijan National Park KBA to the north-east
- Pombak mountain chain IBA and KBA to the north-east

Based on information presented in the 2022 Revision of Important Bird and Biodiversity Areas of Armenia¹ (Aghababyan *et al.* 2022) the Arax River KBA is approximately 5 km to the south-west at its closest point. This mapping information within this paper was provided by WWF Armenia. It is noted that other mapping sources provide different boundaries for the KBA including a boundary that shows a small overlap with the south-western extreme of the proposed development site. For the purpose of this report the mapping provided by WWF Armenia has been used however comment is provided on how the project could be impacted by a shift in the KBA boundary.

The Arax River KBA site is designated for supporting populations of Marbled Teal (IUCN VU), Great Bustard (IUCN VU), Eurasian Otter (IUCN VU), Mehely's Horseshoe Bat (IUCN VU), Tigran's Elder (IUCN VU) and Common Tortoise (IUCN VU).

Flyways

Of 349 species of recorded birds in Armenia, 136 relate to wetlands and 118 are listed in the African-Eurasian Migratory Waterbird Agreement (AEWA) table. All globally threatened waterbirds of the

¹ Revision of Important Bird and Biodiversity Areas of Armenia. 2022. Aghababyan *et al.* International Journal of Zoology and Animal Biology Vol 5 Iss 1.

Central Asian Flyway (CAF) are represented in Armenia: Dalmatian Pelican (*Pelecanus crispus*), Lesser White-fronted Goose (*Anser erythropus*), Red-breasted Goose (*Branta ruficollis*), Marbled Teal (*Marmaronetta angustirostris*), Ferruginous Duck (*Aythya nyroca*), White-headed Duck (*Oxyura leucocephala*), Corncrake (*Crex crex*), and Sociable Plover (*Vanellus gregarius*) (IUCN Red List Database, 2000). Of them Dalmatian Pelican, Marbled Teal, Ferruginous Duck, White-headed Duck and Corncrake are breeders, and the Lesser White-fronted Goose appears during migrations and in winter.

Notable migratory species potentially using the flyway in the vicinity of the project area include Sociable Lapwing (*Vanellus gregarius*). However, the CAF is a broad front as there are no specific features within 20 km of the site which could specifically attract migrating birds.

In summary, the proposed Project Site is not located on a major bottle neck or geographical feature that would concentrate migrating species.

3.2.3 Habitats and Flora

The habitats of the entirety of the site have been historically modified, for the cultivation of arable crops, which has since been left fallow to regenerate with more natural flora. Additionally, it is now grazed by local livestock herders (in some areas heavily overgrazed). There are some areas that are less grazed with better flora, but this is limited to the seasonally wet wadis that cross the project area and still no protected flora are present. Those areas also will not be impacted by the proposed project.

The entirety of the Project site is considered to be modified habitat. The habitats of the proposed Project site and adjacent areas do not fall into Critical Habitat category (as defined in the PS6).

3.2.4 Fauna

The following faunal species of conservation concern were recorded on surveys undertaken to inform the ESIA. Some of the species listed below are considered to be potentially present in the Project AOI and this assessment has considered known ranges of each species as well as their specific habitat requirements.

During the period of field surveys no bat species have been recorded in the study area.

Very low numbers of reptiles should be noted from the outset, despite the availability of suitable habitats for many of them. In the whole area of the survey none of the reptile and amphibian species observed are included in the IUCN Red List or the Red Book of Armenia.

No red listed invertebrates were recorded.

Table 5. Species of conservation concern present or possibly present on the Solar PV Site

English Name	Scientific Names	Global Threat Status (IUCN)	National Threat Status (ARDB)	Solar PV Site
Birds				
Egyptian Vulture	<i>Neophron percnopterus</i>	EN	EN A2bcde+3bcde+4bcde	Recorded twice in the air flying around the area in search of food
Pallid Harrier	<i>Circus macrourus</i>	NT	EN B1ab(iii)+2ab(iii); D	Recorded once sitting on the ground and eating food and several times in the air looking for food
European Roller	<i>Coracias garrulus</i>	NT	VU B1ab(iii)	Was observed in the early stages of studies, in May and early June. Afterwards it was not recorded.
Saker Falcon	<i>Falco cherrug</i>	EN	EN A2bcd+3cd+4bcd	Not observed during the surveys but likely to occur over the Project Site
Demoiselle Crane	<i>Anthropoides virgo</i>	LC	EN D	Not observed during the surveys
Sociable Lapwing	<i>Vanellus gregarius</i>	CR	Unknown	Not recorded but possible movements over site
White-headed Duck	<i>Oxyura leucocephala</i>	EN	Unknown	Possible use of airspace to fly over the site
Little Bustard	<i>Tetrax tetrax</i>	NT	Unknown	Not recorded on surveys however possible use of airspace to fly over the site
Great Bustard	<i>Otis tarda</i>	VU	Unknown	Not recorded on Project Site however possible use of airspace to fly over the site (Arax River KBA)
Mammals				
Asia Minor Ground Squirrel	<i>Spermophilus xanthopyrmnus</i>	VU	VU A2c+B1 b(iii)	They are noted in two areas closely adjacent to the study area.
Schidlovsky Vole	<i>Microtus schidlovskii</i>	LC	EN B1ab (ii, iii, v)	There is virtually no data on the presence of this species in the study area. The supposed presence of this species is based on rather outdated data of the 50s.
Reptiles				
Common Tortoise	<i>Testudo graeca (T. g. armeniaca)</i>	VU	Unknown	Not recorded on the Project Site however use of the site or adjacent habitats possible (Arax River KBA)

4 CRITICAL HABITAT ASSESSMENT

4.1 Introduction

The first stage of the CHA is to undertake a screening exercise where the species of conservation concern that have been recorded within the Project AOI or those considered to be potentially present are rapidly assessed against the thresholds for determination of CH.

CHA screening has been undertaken for all species considered present or potentially present within the Project AOI that are of global conservation concern; Critically Endangered, Endangered and Vulnerable. Species with a global conservation status of Near Threatened or below have been excluded from the CHA screening unless they have a significant national or regional conservation status.

The species for which the screening exercise has been completed as well as the results of the screening are shown in *Table 5* below. Those species which are considered, at the screening stage, to potentially meet the CH thresholds or are of high international conservation concern are discussed later in this section.

4.1.1 Protected Sites

The report has been written in the understanding that the nearest protected site, Arax River KBA site is 5km from site and will not be directly impacted. Given other boundaries for this site are known to exist in wider literature a consideration on impacts upon the site has been undertaken and noted below.

The south-western corner of site, where up to approximately up to 0.1km² of overlap may occur, is a part of the site considered by assessment as being excessively overgrazed agricultural land. Accordingly this land is not well suited for the species the KBA is designated to support. The Arax River KBA covers land north of the river itself with the main tributary 40km west of site leading down to the Arax around 60km southwest of site. The areas within the KBA cover a variety of habitats with the main sites within the clear green swathe of habitats through the centre of the KBA and away from the proposed site (*Figure 2*).

The onsite habitats are far from suitable for the waterbird Marbled Teal or wetland associated Eurasian Otter. Tigran's Elder is not supported on site and no records of Common Tortoise or Mehely's Horseshoe Bat were recorded. Great Bustard could pass through the area however the site is not optimal for the species and no significant concentrations are expected.

Even if the assessment considers a closer boundary of the KBA there would be no impacts on the designated features of the protected site. Well away from the core of the protected sites best habitats, the modified habitat on site is badly overgrazed and ensured that the designated species will no be present.

Figure 2. KBA boundary (green boundary) showing the closer version to site and site location (blue circle). Showing the key swathes of habitat through the centre of the KBA away from the site



Table 5. CHA Screening: Species requiring detailed consideration as part of CHA process

Common Name	IUCN Status	National Status	Status	Status PS / PR 6 Criterion				
				1 / ii	2 / iii	3 / iv	4 / i	5 / v
Egyptian Vulture	EN	EN A2bcde+3 bcde+4bc de	Recorded twice in the air flying around the area in search of food	<p>Global population of 18,600-54,000, meaning 93-270 individuals required to meet criteria.</p> <p>Currently 52-56 pairs in country and maximum of 2 pairs in the Arax River KBA.</p> <p>Recorded twice flying over the AOI during the surveys and not recorded breeding in Project AOI.</p> <p>Criteria 1 is not triggered – no further assessment required.</p>	<p>Global population resulting in a large Extent of Occurrence (EOO) so not range restricted.</p> <p>Criteria 2 is not triggered - no further assessment required.</p>	<p>Global population of 12,400-36,000 mature individuals meaning between minimum of 62 pairs required to meet congregatory criteria (with respect to colonial breeding), and between 186 and 540 individuals to meet congregatory criteria (with respect to migration).</p> <p>Recorded twice flying over the AOI during the surveys and not recorded breeding in Project AOI.</p> <p>The species is also not recorded in significant migratory numbers.</p> <p>Criterion 3 is not triggered – no further assessment required.</p>	-	-
Pallid Harrier	NT	EN B1ab(iii)+ 2ab(iii); D	Recorded once sitting on the ground and eating food and several times in the air	<p>Global population of 18,000-30,000 mature individuals, meaning minimum of 90-150 individuals required to meet criteria.</p> <p>Does not nest in Armenia but is widespread on passage.</p>	<p>Global population resulting in a large EOO so not range restricted.</p> <p>Criteria 2 is not triggered – no further assessment required.</p>	<p>Global population of 18,000-30,000 mature individuals meaning minimum of 180 individuals to meet congregatory criteria (with respect to migration).</p> <p>Recorded several times foraging over the AOI during the surveys.</p>	-	-

Common Name	IUCN Status	National Status	Status	Status PS / PR 6 Criterion				
				1 / ii	2 / iii	3 / iv	4 / i	5 / v
			looking for food	Recorded several times foraging over the AOI during the surveys. Criteria 1 is not triggered – no further assessment required.		The species is also not recorded in significant migratory numbers. Criterion 3 is not triggered – no further assessment required.		
European Roller	NT	VU B1ab(iii)	Was observed in the early stages of studies, in May and early June. Afterwards it was not recorded.	Global population of 100,000-499,999 mature individuals, meaning minimum of 500-2,499 individuals required to meet criteria. Currently 300 - 650 pairs in country and is widespread on passage. Recorded in the AOI during the early surveys but not later, indicating species does not nest in the AOI. Criteria 1 is not triggered – no further assessment required.	Global population resulting in a large EOO so not range restricted. Criteria 2 is not triggered – no further assessment required.	Global population of 100,000-499,999 mature individuals meaning between 1,000 and 4,999 individuals to meet congregatory criteria (with respect to migration). Recorded on passage through the AOI during the surveys. The species is also not recorded in significant migratory numbers. Criterion 3 is not triggered – no further assessment required.	-	-
Saker Falcon	EN	EN A2bcd+3cd+4bcd	Not observed during the surveys but possible to occur over the Project Site	Global population of 12,200-29,800 mature individuals, meaning minimum of 61-149 individuals required to meet criteria. Resident and passage migrant in Armenia but very rare nesting species.	Global population resulting in a large EOO so not range restricted. Criteria 2 is not triggered – no further assessment required.	Global population of 12,200-29,800 mature individuals meaning between 122 and 298 individuals to meet congregatory criteria (with respect to migration). Not recorded during the surveys but potential for low numbers		

Common Name	IUCN Status	National Status	Status	Status PS / PR 6 Criterion				
				1 / ii	2 / iii	3 / iv	4 / i	5 / v
				Not recorded during the surveys and very unlikely to nest in the AOI. Criteria 1 is not triggered – no further assessment required.		(individuals) to pass over on migration. Criteria 3 is not triggered – no further assessment required.		
Demoiselle Crane	LC	EN D	Not observed during the surveys but possible movements over site	Global population of 230,000-261,000 individuals, meaning 1,150-1,305 individuals required to meet criteria. Passage migrant in Armenia. Not recorded during the surveys and unlikely to use the AOI. Criteria 1 is not triggered – no further assessment required.	Global population resulting in a large EOO so not range restricted. Criteria 2 is not triggered – no further assessment required.	Global population of 230,000-261,000 individuals meaning between 2,300 and 2,610 individuals to meet congregatory criteria (with respect to migration). Not recorded during the surveys but potential for low numbers to pass over on migration. Criteria 3 is not triggered – no further assessment required.		
Sociable Lapwing	CR	Unknown	Not recorded but possible movements over site	Global population of 16,000-17,000 individuals, meaning 80-85 individuals required to meet criteria. Passage migrant in Armenia. Singular individuals are recorded in the Arax River area and the mountain grasslands of the Geghama Ridge.	Global population resulting in a large EOO so not range restricted. Criteria 2 is not triggered – no further assessment required.	Global population of 16,000-17,000 individuals meaning between 160 and 170 individuals to meet congregatory criteria (with respect to migration). Not recorded during the surveys but potential for low numbers to pass over on migration. Criteria 3 is not triggered – no further assessment required.		

Common Name	IUCN Status	National Status	Status	Status PS / PR 6 Criterion					
				1 / ii	2 / iii	3 / iv	4 / i	5 / v	
				Not recorded during the surveys and unlikely to use the AOI. Criteria 1 is not triggered – no further assessment required.					
White-headed Duck	EN	Unknown	Possible use of airspace to fly over the site	Global population of 7,900-13,100 individuals, meaning 39-65 individuals required to meet criteria. Resident breeding species and passage migrant in Armenia. Project AOI does not support habitat suitable for this species however transit over AOI is possible. Not recorded on any surveys and considered that any transitory movements highly unlikely to be of significant numbers. Criteria 1 is not triggered – no further assessment required.	Global population resulting in a large EOO so not range restricted. Criteria 2 is not triggered – no further assessment required.	Global population of 7,900-13,100 individuals meaning between 79 and 131 individuals to meet congregatory criteria (with respect to migration). Project AOI does not support habitat suitable for this species however transit through AOI is possible. Not recorded on any surveys and considered that any transitory movements highly unlikely to be of significant numbers. Criterion 3 is not triggered – no further assessment required.			
Little Bustard	NT	Unknown	Not recorded on surveys however possible use of airspace to	Global population of 100,000-499,999 individuals, meaning 500-2,499 individuals required to meet criteria. Passage migrant in Armenia.	Global population resulting in a large EOO so not range restricted. Criteria 2 is not triggered – no further assessment required.	Global population of 100,000-499,999 individuals meaning between 1,000 and 4,999 individuals to meet congregatory criteria (with respect to migration).			

Common Name	IUCN Status	National Status	Status	Status PS / PR 6 Criterion				
				1 / ii	2 / iii	3 / iv	4 / i	5 / v
			fly over the site	<p>Not recorded during the surveys and unlikely to use the AOI.</p> <p>Considered that any transitory movements highly unlikely to be of significant numbers.</p> <p>Criteria 1 is not triggered – no further assessment required.</p>		<p>Project AOI does not support habitat suitable for this species however transit through AOI is possible. Not recorded on any surveys and considered that any transitory movements highly unlikely to be of significant numbers.</p> <p>Criterion 3 is not triggered – no further assessment required.</p>		
Great Bustard	VU	Unknown	<p>Not recorded on Project Site however possible use of airspace to fly over the site (Arax River KBA)</p>	<p>Global population of 44,000-57,000 individuals, meaning 220-285 individuals required to meet criteria.</p> <p>Passage migrant in Armenia, limited to just few individuals.</p> <p>Not recorded during the surveys and unlikely to use the AOI.</p> <p>Considered that any transitory movements highly unlikely to be of significant numbers.</p> <p>Criteria 1 is not triggered – no further assessment required.</p>	<p>Global population resulting in a large EOO so not range restricted.</p> <p>Criteria 2 is not triggered – no further assessment required.</p>	<p>Global population of 44,000-57,000 individuals meaning between 440 and 570 individuals to meet congregatory criteria (with respect to migration).</p> <p>Project AOI does not support habitat suitable for this species however transit through AOI is possible. Not recorded on any surveys and considered that any transitory movements highly unlikely to be of significant numbers.</p> <p>Criterion 3 is not triggered – no further assessment required.</p>		

Common Name	IUCN Status	National Status	Status	Status PS / PR 6 Criterion				
				1 / ii	2 / iii	3 / iv	4 / i	5 / v
Asia Minor Ground Squirrel	VU	VU A2c+B1 b(iii)	They are noted in two areas closely adjacent to the study area.	Global population size has not been quantified. Whilst no individuals were recorded on site their rarity in the area and that the site may be suitable for species mean that there is potential for low numbers on the site. In absence of any recorded presence, and possible presence only in low numbers, criteria not met however species is VU (globally and in country) and is included as PBF and monitoring required.	Global population resulting in a large EOO so not range restricted. Criteria 2 is not triggered – no further assessment required.	-	-	-
Schidlovsky Vole	LC	EN B1ab (ii, iii, v)	There is virtually no data on the presence of this species in the study area. The supposed presence of this species is based on rather outdated data of the 50s.	Global population size has not been quantified. Site has historic records but in its current form is not suitable for the species and is very unlikely to occur. In absence of any data, criteria not met however species is EN (in country) and is included as PBF and monitoring required.	The estimated EOO is 10,518 km ² . However, this species occurs in northeast to central Armenia, extending north into extreme south central Georgia and west into Turkey. It is separated in altitude from <i>Microtus socialis</i> and is found at higher elevations (above 1,400 m). The potential for the presence of the species is explored based on the historic records only, with local experts noting it is not likely to be present. Due to no presence	-	-	-

Common Name	IUCN Status	National Status	Status	Status PS / PR 6 Criterion				
				1 / ii	2 / iii	3 / iv	4 / i	5 / v
					confirmed during field surveys, the habitat being degraded and considered unsuitable for the species and the current known range, this species is considered not to occur on or in the vicinity of the Project AOI.			
Common Tortoise	VU	Unknown	Not recorded on the Project Site however use of the site or adjacent habitats possible (Arax River KBA)	Global population size has not been quantified. Site may be suitable for species. Potential to be present on the site. In absence of any data, criteria not met however species is VU (globally) and is included as PBF and monitoring required.	Global population resulting in a large EOO so not range restricted. Criteria 2 is not triggered – no further assessment required.	-	-	-

4.2 Determination of Critical Habitat

4.2.1 General

Based on the results of the CH Screening Exercise it has been determined that none of the species meets the thresholds for triggering Critical Habitat under the five CH criteria defined in IFC PS 6 GN and the six defined in EBRD PR 6 GN.

However, a number of PBFs have been identified and these are discussed further in this section.

4.3 Priority Biodiversity Features

General

All species/habitats within the background data search and recorded on site, or those considered to be potentially present, have been assessed against the PBF guidelines, which provide a qualitative approach to the assessment. All criteria were considered for each species/habitat.

Species meeting the criteria for inclusion as Priority Biodiversity Features are presented in *Table 8* and discussed in subsequent sections.

Table 8. Species considered to be Priority Biodiversity Features

Species	Status (IUCN / ARBD)	Criterion Reached
Egyptian Vulture	EN / EN	Criterion 2
Pallid Harrier	NT / EN	Criterion 2
Saker Falcon	EN / EN	Criterion 2
Demoiselle Crane	LC / EN	Criterion 2
Sociable Lapwing	CR / Unknown	Criterion 2
White-headed Duck	EN / Unknown	Criterion 2
Great Bustard	VU / Unknown	Criterion 2
Asia Minor Ground Squirrel	VU / VU	Criterion 2
Schidlovsky Vole	LC / EN	Criterion 2
Common Tortoise	VU / Unknown	Criterion 2

4.3.1 Criterion 1 Threatened habitat

No habitat types or ecosystems were present or identified as being potentially present, that would be considered as priority habitats as such Criterion 1: Threatened Habitat has not been triggered.

4.3.2 Criterion 2 Vulnerable species

Plant Species

No plant species were recorded which would be considered as Priority Biodiversity Features under PBF Criterion 2.

Bird Species

Sociable Lapwing is listed as IUCN Critically Endangered and Egyptian Vulture, Saker Falcon and White-headed Duck are listed as Endangered and Great Bustard is listed as IUCN Vulnerable. Whilst none of these species meet the thresholds for triggering Critical Habitat, they are all considered to be PBFs.

Additional bird species that are IUCN Near Threatened and Least Concern but are listed as ARDB Endangered that are considered to qualify as PBF under Criterion 2 are Pallid Harrier and Demoiselle Crane.

Mammal Species

Asia Minor Ground Squirrel is listed as IUCN Vulnerable and is present on habitats adjacent to the AOI and may be present on site. Schidlovsky Vole is listed as IUCN Least Concern but is listed as ARDB Endangered, although the supposed presence of this species is based on rather outdated data of the 50s and it is very unlikely to occur in the AOI. However, both are considered as Priority Biodiversity Features under PBF Criterion 2.

Reptile Species

Common Tortoise was the only IUCN Vulnerable species that is considered to be possibly present in the area, based on it being in a nearby KBA, and is identified as being PBFs.

4.3.3 Criterion 3 Significant feature as identified by stakeholders or governments

The Project AOI does not fall within any significant biodiversity features, nor is it within close proximity to nationally protected or internationally designated sites.

4.3.4 Criterion 4 Ecological structure and functions that are vital to maintaining the viability of priority biodiversity features

The Project Site does not contain areas of structure or function (e.g., major dispersal or migration corridors) vital for the maintenance of viable populations of Priority Biodiversity Features and as such Criterion 4 has not been triggered.

5 MITIGATION AND FUTURE MANAGEMENT

5.1 General

Direct impacts from the operation of the Project are likely to be limited to habitat loss within the PV site, although this is loss of modified and degraded habitat, as well as possible direct impacts on mammal and reptile species during the construction phase of the project.

Operational impacts of the project are limited to potential direct impacts on resident and migratory species of birds through the collision with the OHL. However, the project's OHL required is limited (to less than 300 m) and will connect with an existing transmission line that crosses the site. Although this addition poses an extremely limited increase of risk of collision it should be mitigated for. The new, short, section of OHL route will have bird deflectors to be installed along its 300m length.

Whilst proactive mitigation is present on a very short section of line a programme of adaptive monitoring will be put in place to ensure any unexpected impacts can be mitigated for. The chosen approach ensure that checks on site can be frequent, regular and consistent through the project lifecycle ensuring the greatest opportunity for on site events to feedback adaptively in to mitigation package updates. A member of site staff will be trained to carry out site checks which will include:

- Daily observation of the site to look for flocks of non-passerine birds. Should these be encountered photos will be taken and passed to an experienced ornithologist.
- Weekly search for carcasses below the OHL. Should these be encountered photos will be taken and passed to an experienced ecologist.

Should significant activity be recorded an adaptive approach will allow changes to site practices to occur including options such as further detailed survey and additional mitigation measures to the OHL. Whilst it is considered unlikely to be required further mitigation measures that have shown to be effective in other scenarios includes use of lit bird deflectors, use of UV light deflection along cables and in the worst case rerouting the line underground.

For the bird, mammal and reptile species that qualify as PBFs, the Project will need to achieve at least no net loss for PBFs over the lifespan of the scheme and measures, to achieve this will be set out in the Biodiversity Management Plan

5.2 Mitigation and Monitoring

5.2.1 Biodiversity Management Plan (BMP)

All PBF species will also need to be included in the Biodiversity Management Plan (BMP). The BMP will fully detail all relevant construction mitigation measures (Construction BMP) and habitat restoration and operation mitigation and enhancement measures (Operation BMP) which will be completed during and after the construction period to achieve the objectives of No Net Loss for PBFs.

Preclearance surveys are likely to be required for Asia Minor Ground Squirrel, Schidlovsky Vole and Common Tortoise to confidently determine the presence or absence of these species in the Project POI and the current levels of usage by this species. Measure will likely include, but not be limited to, pre-commencement survey for these species prior to construction works, movement of individual reptiles away from work location and translocation of small mammals away from works areas during construction allowing them to remain in the area as the condition of habitats increase with fenced off areas being ungrazed and providing higher quality habitat.

6 SUMMARY

Critical Habitat has not been triggered for this project but there are a number of PBFs that will need to be safeguarded during the construction phase to ensure no net loss of these features.

There are species of bird, mammal and reptile that are considered to be PBFs and mitigation and monitoring for these species will be included in a Biodiversity Management Plan.

Monitoring will need to be completed to ensure no net loss of PBFs during the operational phase.

Pre-construction surveys, at appropriate times of the year, will need to be completed to establish presence/absence in proposed works areas and if mammals and reptiles are found to be present in these areas or considered likely to occur in these areas during construction, additional mitigation (e.g. limited translocation to a suitable receptor site) will be required.

It is considered that the Project has met the requirements as set out in IFC PS6 Paragraph 17 and the measures detailed above will be included in the management plan and BMP documents. These documents will also set out measures designed to achieve No Net Loss for those species defined as PBFs.