Αρχή Ηλεκτρισμού Κύπρου

20MW Akrotiri P.V. Park

Phased Development Proposal

July 2018

Electricity Authority of Cyprus

20MW Akrotiri PV Park – Phased Development Proposal

July 2018

TABLE OF CONTENTS

1 INTRODUCTION

The proposal herein is for the staged development of the proposed EAC Akrotiri PV Park. The purpose of the proposal is to alleviate any concerns of the environmental impact of the project.

The project has been developed in close cooperation with the SBAA Environmental Department and incorporates a comprehensive set of design and layout considerations and mitigation actions, with the clear intent to minimize its environmental impact and also to support the environmental objectives of the area. In this respect EAC is confident that the project proposal is a model environmental integration concept and that the presence of the project in the area will have an overall positive environmental impact. It is understood however that the SBAA Environmental Department is still concerned about (a) the overall impact of the project, when viewed in conjunction with other developments in the wider area and (b) some knowledge gaps of the possible effects of the proposed project on the flora and fauna of the area.

The intent of this proposal is to allow for the immediate partial development of the project, in a way that addresses the concerns of the SBAA Environmental Department.

Under this proposal, the project is to be developed in two stages. Stage A will be developed in the least environmentally sensitive area of the proposed project area and stage B will be located in the area where some environmental concerns and uncertainties remain.

The proposed mitigation measures will be forward looking, in the respect that some of the measures that are specifically aimed to mitigate the impacts on the area included in Phase B will start to be implemented during the Phase A development.

It is expected that this proposal will allow for the immediate approval of the Appropriate Assessment, so that (a) Phase A can be immediately constructed and (b) clearly define the parameters and conditions that will be required for the construction of Phase B.

It is also stressed that the staged development proposal does not intent to reduce in any way the proposed mitigation measures. The approach proposed is to stage the project and mitigation measures in a way that allows part of the project to proceed immediately in a way that enhances and ensures the environmental integration of the project. It is expected this proposal will allow the Appropriate Assessment to be framed in way that addresses all environmental concerns and uncertainties, while still allowing a section of the project to proceed.

2 Phased Development Description

Under the phased development proposal the overall footprint of the project remains unchanged. The boundaries of the project have been set in cooperation with the civil and military departments of the SBAA, so that

(a) They include only agricultural land and do not disturb any areas of natural vegetation

(b) Are at least 150 m from the perimeter fence of the Akrotiri Station

(c) Do not enter the airfield radar lines

(d) Follow the tree lines on the north of the project area, which are to be maintained and extended where appropriate

(e) The reflections from the PV park do not interfere with the safe operation of the airfield

Phase A will consist of one 8MW sub-park on the east side of the project area (A1) and one 4MW sub-park on the west side of the project area (A2), as shown in Appendix 2.

Phase B, of 8MW, will consist of the central area and will include the area where the existing orchard is located.

3 Mitigation Measures

3.1 Phase A Measures

Phase A mitigation measures are understood to comprise only of measures and actions that are under the direct control of the project owner. Mitigation measures, actions and/or prerequisites that are deemed necessary for the entire project to proceed are to be included in Phase B of the project.

1. Only agricultural land is used
2. Project boundaries, as originally set are respected
3. Grid connection is routed through the airfield perimeter fence, minimizing its overall impact. Underground cables will be used for the grid connection to the new Main Gate substation.
4. A short length of the grid connection, about 150-200m, will go through low growth natural vegetation.
    a. Underground cables will be used. It remains at the discretion of the SBAA Env. Department to suggest an overhead line.
    b. To minimize impact on natural vegetation a single crossing will be used, where cables for all sub-parks and project phases will be laid. This ensures that natural vegetation will be disturbed only once.
5. The PV park will not have lights on during the night. Exceptionally perimeter lights may go on in the event of an intrusion alarm.
6. The northern perimeter of the PV park is along existing tree lines, to maximize the trees that will not be affected and to also reduce the visual impact of the project.

Additional trees will be planted along the north-eastern end to complete the visual isolation.

7. Trees within area A1 and A2 are to removed, except northern boundary trees, as described above.
8. A comprehensive tree replacement program will be undertaken by EAC, in consultation with the SBAA Environmental Department, as regards to species and location. This program will overcompensate the tree removal for the entire project (both Phases A and B). As estimated in the AA supporting study, commissioned by EAC, a total of about 3800 trees will be removed for the construction of the entire project, with the majority of those trees being located in the Phase B area. EAC will undertake to plant up to 8000 trees. The trees will be planted along the access road to the PV Park, or as otherwise advised by the SBAA Environmental Department. It is understood that the trees to be planted will be endemic species that will be agreed with the SBAA Environemental Department.
9. EAC to fund falcon site survey programs, as well as “lake effect monitoring| as will be advised, to help complete the knowledge gaps identified. The environmental NGO’s to possibly participate and/or coordinate the studies. Overall cost of the studies to be up to €60.000, over a period of 5 years.
10. All other typical measures will also be complied with (ie minimal earth removals, fencing specifications, waste management etc)

3.2 Phase B Measures

Construction of Phase B will start after Construction of Phase A is completed and relevant mitigation measures are in place. Additional mitigation measures will include:

1. About 1/3 of the existing orange orchard (about 20 ha) will be maintained and be actively managed, to protect the urtica membranecea (nettle variety) plant. Agricultural practices to be advised by the SBAA Environmental Department.
2. Any excess area that may remain after the detailed project design will be allocated to increase the area of orchard that will remain and be maintained.
3. A seed collection and storage/ replanting-to-other-sites program to be set up for the urtica plant, as will be advised.
4. Any other, external to the project prerequisites, which are not under the direct control of the project owner, that the SBAA Environmental Department deems appropriate and includes as such in the final AA Assessment (ie bird radar installation, hunting restrictions, commitments if any of the Bishopric to maintain and/or develop its remaining property in particular ways, etc).

Διάταξη Φωτοβολταϊκών
πλαισίων

A2

B

A1

Δημόσιος Δρόμος

F:\RENEWABLE ENERGY SOURCES\PHOTOVOLTAICS\AKROTIRI PHOTOVOLTAIKO PARKO\TEM 14+TEM15\Civil\KATASKEVASTIKA SXEDIA\Arch_Civil\PV2-1 revA TOPOGRAFIKO 1_5000, PV2-2 revC DIATAKSH FOTOVOLTAIKON-COLOUR-29_08_2016.dwg

Δρόμος προς επαναχάραξη
Road to be rerouted

Δημόσιος Δρόμος/
Public Road

Προτεινόμενος δρόμος προσπέλασης

Δημόσιος Δρόμος/
Public Road

Δημόσιος Δρόμος/
Public Road

1.00

1.00

1

2

Διάταξη Φωτοβολταϊκών
πλαισίων

Δημόσιος Δρόμος

1

2

V:\

A	ΕΠΕΚΤΑΣΗ ΓΗΠΕΔΟΥ ΚΑΙ ΑΝΑΔΙΑΤΑΞΗ ΦΩΤΟΒΟΛΤΑΪΚΩΝ	Δ.Π.	Χ.Κ.	Κ.Ρ.	04/15
ΑΝΑΘ.	ΠΕΡΙΓΡΑΦΗ	ΣΧΕΔΙΟ	ΕΛΕΓΧΟΣ	ΕΓΚΡΙΣΗ	ΗΜΕΡ.

ΑΡΧΗ ΗΛΕΚΤΡΙΣΜΟΥ ΚΥΠΡΟΥ
ELECTRICITY AUTHORITY OF CYPRUS

ΚΕΝΤΡΙΚΑ ΓΡΑΦΕΙΑ — HEAD OFFICE

AKROTIRI PV PARK

ΧΩΡΟΤΑΞΙΚΟ ΣΧΕΔΙΟ

SITE PLAN

Σχέδιο/Drawn	Ελεγχος/Ghecked	Εγκριση/Approved	Ημερομ./date
Δ. ΠΑΝΑΓΗ	Ε. ΚΟΤΖΙΑΠΑΣΙΗ	Χρ. ΣΤΑΥΡΟΥ	ΜΑΡΤΙΟΣ 2015
Κλίμακα/Scale 1:5000	ΑΡ. ΣΧ. /DR. No. PV2-1		REV.No. A

F:\RENEWABLE ENERGY SOURCES\PHOTOVOLTAICS\AKROTIRI PHOTOVOLTAIKO PARKO\TEM 14+TEM15\Civil\KATASKEVASTIKA SXEDIA\Arch_Civil\PV2-1 revA TOPOGRAFIKO 1_5000, PV2-2 revC DIATAKSH FOTOVOLTAIKON-CO

APPROPRIATE ASSESSMENT (AA)

Stage 1: Consideration of Plan/Project
Stage 2: Judgement of Likely Significant Effect (JLSE)
Stage 3: Appropriate Assessment (AA)
Stage 4: Consideration of Alternatives, Compensation and Imperative Reasons of Over-riding Public Interest (IROPI)

Stage 1: Consideration of Plan, Project or Activity

Title of Proposal: Development and operation by the Electricity Authority of Cyprus, of a 12 MW photovoltaic park at Akrotiri
Serial Number in SBAA Appropriate Assessment Register: 58
Version 1.4, 26 July 2018
Name of SACs, SPAs and Ramsar[1] Site(s):

- Akrotiri Wetlands SPA
- Akrotiri Cliffs SPA
- Akrotiri SAC
- Akrotiri Ramsar Site

This Decision Form is a record of the assessment, undertaken by the Sovereign Base Areas Administration [SBAA] Environment Department in respect of the above project, in accordance with Section 10 of the 'Protection and Management of Nature and Wildlife Ordinance 2007' and Section 10 of the 'Game and Wild Birds Ordinance 2008'.

Competent Authority:

The Senior Environmental Adviser for the SBAA.

Section 10 of the 'Protection and Management of Nature and Wildlife Ordinance 2007' and Section 10 of the 'Game and Wild Birds Ordinance 2008' require that a Competent Authority carries out an Appropriate Assessment (AA) before deciding to undertake, or give any consent, permission or other authorisation for a plan or project which is likely to have a significant effect on a protected site.

This Decision Form can cover the three key stages of a Habitats Regulations Assessment (HRA):

1. *Judgment of Likely Significant Effects (JLSE): taking account of proposed avoidance and mitigation measures, is the Plan or Project likely to have a significant effect on the achievement of Conservation Objectives for a SPA, SAC or Ramsar site Feature?*

2. *Appropriate Assessment (AA): can the Plan or Project be modified, or additional Avoidance and Mitigation Measures be secured to avoid any adverse impact on the integrity of a Site*

3. *In the absence of satisfactory alternatives, the Chief Officer may decide to approve a project, notwithstanding that it may have an adverse effect on the integrity or the character of the site, for imperative reasons of overriding public interest. When an SAC hosts a priority plant or fauna species or a priority natural habitat type the Chief Officer may only approve a project, which may have an adverse effect on the integrity or the character of the site, on grounds of public health or safety or for reasons relating to beneficial consequences of primary importance for the environment. In such a case compensatory measures must be secured to ensure that the overall coherence of the SAC/SPA network will be maintained.*

[1] Wetlands of International Importance identified under the 1979 Ramsar Convention: it is SBAA policy to also apply the Appropriate Assessment processes to the special features of Ramsar Sites

Summary of the Project
Full details of the project should be referenced or Annexed.

References:

As in section 8 of the Report at Annex 1 and section 8 of the Report Amendment at Annex 1A.

Annexes:
1. Report to inform the AA for the proposed EAC photovoltaic park at Akrotiri, Version 2.3, November 2017
2. Amendment to the 'Report to inform the AA for the proposed EAC photovoltaic park at Akrotiri', Version 1.3, 16th July 2018
3. Technical consideration summary table

1. What are the Plan/Project proposals?

1.1 The project includes the construction and operation of a 12 MW photovoltaic park at Akrotiri. Details are provided in section 2 of the Report Amendment at Annex 1A.

2. What Other Consents, Permissions and Authorisations are required from the Sovereign Base Areas Administration?

All other environmental consents, permissions and authorisations should be covered in the EIA, and should include:

2.1 Licence to fell trees qualifying for protection under the Forest Ordinance.
2.2 Licence from SBAA to disturb/handle protected species.
2.3 Consultation with Antiquities Departments in relation to the possible need for a watching brief during excavation work.

3. What other designated sites or protected species may be affected?

3.1 Protected fauna species of Schedule 3 of the Protection and Management of Nature and Wildlife Ordinance (Reference B of the Report at Annex 1).

Consideration of Plans or Projects under the Provisions of the Ordinances

4. Consideration of Plans and Projects under the Provisions of the Ordinances?

4.1 Is the proposal a plan or a project? **Project**

4.2 Is the project connected with or necessary to the conservation management of the site? **No**

Stage 2: Judgement of Likely Significant Effects

Judgement of Likely Significant Effects (JLSE)

This section should consider the implications of the Plan or Project (P/P) on the conservation objectives of the sites concerned. It should outline any avoidance or mitigation measures that have already been integrated into the P/P, and any remaining residual effects, both alone and in combination with any other relevant plans and projects that are likely to have residual effects on the site. A technical consideration may be presented in an accompanying report or Environmental Statement, but should be summarised in the table in Annex 1. The technical consideration should refer to favourable condition tables for each feature. Impacts may include for example, physical habitat loss, physical habitat damage, non-toxic contamination, toxic contamination, noise disturbance, visual disturbance (not exhaustive).

5. What SPAs / SACs or Ramsar Sites may be affected by this Plan or Project; what are the qualifying interest features and their conservation objectives?

5.1 The qualifying interest features are covered in the Report at Annex 1 and the Report Amendment at Annex 1A. The conservation objectives are covered in the Technical Consideration Summary at Annex 2.

6. What is the current and potential condition of the qualifying interest features?

6.1 The current and potential condition of the qualifying interest features is discussed in the Report at Annex 1 and the Report Amendment at Annex 1A.

7. What are the possible impacts of the Plan or Project?

7.1 The possible impacts are summarised in the Technical Consideration Summary at Annex 2.

8. What mitigation measures have been identified to avoid any likely significant effects of the Plan or Project on the SPA/SAC/Ramsar Sites?

8.1 The mitigation measures are described in the Technical Consideration Summary at Annex 2. These concern only the AA and do not include any EIA considerations.
8.2 All conditions and mitigation measures, in both the AA and the EIA, will be prescribed in the Construction Environmental Management Plan (CEMP) to be prepared by the proponents.
8.3 To ensure appropriate implementation of the CEMP, an Environmental Manager and a suitably qualified Ecologist will be employed by the proponents.

9. After mitigation, what are the likely residual effects of the proposal on the international nature conservation interests for which the site(s) is designated?

9.1 The residual effects are described in the Technical Consideration Summary at Annex 2.

10. Is Appropriate Assessment Required?

10.1 The SBAA's decision is that an Appropriate Assessment is required for this project.

Stage 3: Appropriate Assessment

Appropriate Assessment [if required]

This section may be used to record detailed assessments into whether significant residual effects identified in the JLSE will have an adverse impact on the integrity/character of the site, and/or may consider whether any further avoidance or mitigation measures could be implemented beyond those already integrated into the plan or project proposal, and assess whether there are any remaining residual adverse impacts on the integrity or the character of the site.

11. What additional avoidance and/or mitigation measures might be imposed to avoid the Plan or Project having an adverse impact on the integrity of the SPA/SAC/Ramsar Sites?

11.1 All mitigation measures are described in the Technical Consideration Summary at Annex 2.

12. After mitigation, what are the likely residual effects of the proposal on the international nature conservation interests of the SPA/SAC/Ramsar Sites?

12.1 The residual effects are described in the Technical Consideration Summary at Annex 2.

13. Will the Plan or Project have an adverse impact on the integrity of the SPA/SAC/Ramsar Sites?

13.1 The SBAA's decision is that the project, in combination with other plans/projects, will not have an adverse impact on the integrity of the designated sites.

SBA Decision
The Formal Record of AA Decision should be completed and signed off by the Chief Officer.

If there are remaining residual adverse impacts on the integrity of the site that cannot be avoided or mitigated, the plan or project sponsor will need to consider alternatives. If there are no alternatives the Chief Officer will need to consider if the plan or project must proceed for imperative reasons of overriding public interest, and if so will need to identify whether sufficient compensation can be secured to enable the plan, project or activity to proceed. Stage C will need to be completed.

SBAA Formal Record of AA Decisions
This AA Decision Form may be prepared by suitably qualified and experienced environmental consultants working on behalf of the proponent, but must be authorised by an SBA Competent Authority.

Consultation
The consultation process started at the EIA level (RoC Environment Department, Forestry, Game Fund, Birdlife Cyprus, Terra Cypria, EAC and their consultants from Frederick University) and developed further in the AA specialist areas (Akrotiri Environmental Education Centre, Game Fund, Cyprus Environment Department, Forestry Department, EAC, Frederick University, Birdlife Cyprus, DIO and Atlantis Consulting).

SBAA Decision: Appropriate Assessment (AA)
The SBAA's decision is that the Plan, Project or Activity, following further analysis and/or the imposition of additional avoidance or mitigation measures, will not adversely affect the integrity of the SAC/SPA/Ramsar Sites.

SBAA Decision: Alternatives, Imperative Reasons of Over-riding Public Interest (IROPI) and Compensation [Only to be used in exceptional circumstances]

If adverse effects on the integrity of the site cannot be avoided or mitigated, significant consideration is required, covering the following three criteria:

i. Are there alternatives to the proposal? Select decision: **Yes/No**

ii. Must the proposal proceed for imperative reasons of overriding public interest (IROPI)? Select decision: **Yes / No**

iii. Have Compensatory Measures been secured? Select decision: **Yes / No**

Detail of any discussions about alternatives, IROPI and compensation, and final agreement is to be annexed to this document.

Prepared by: **Pantelis Charilaou** **Contact no: 25962522**	**Authorised by:** **Pantelis Charilaou** **Contact no: 25962522**
Signature: Pantelis Charilaou **Date: 26 July 2018**	**Signature: Pantelis Charilaou** **Date: 26 July 2018**

Comment Competent Authority: It is recommended to approve the project under Section 10 of the Protection and Management of Nature and Wildlife Ordinance 26/2007 and Section 10 of the Game and Wild Birds Ordinance 21/2008, provided:

EAC implements the following mitigation measures:

1. **Collection and re-instatement of top-soil in the power-cable crossing under protected habitat.**
2. **Monitoring and managing alien invasive species, such as *Acacia saligna*, under a monitoring program for five years.**
3. **Minimising the width of the power cable crossing, by using either hand tools or narrow machinery.**
4. **Physical restriction of access during the construction of the power cable crossing, to avoid impact to areas beyond the excavation footprint.**
5. **Maintaining and completing the tree-line along the northern boundary of the project footprint.**
6. **Planting of 8,000 trees to compensate for the removal of 3,800 trees.**
7. **Funding monitoring surveys for bird interest at the footprint of the whole project, during appropriate periods before the commencement of works and for three years after construction.**
8. **Funding a monitoring scheme to collect actual collision data, to assess the impact of the 'Lake Effect', during a period of five years.**
9. **Implementing mitigation measures for the 'Lake Effect', if required, under the recommendations of the monitoring scheme at 8 above.**
10. **Preparation of a Construction Environmental Management Plan (CEMP), to assess and manage all environmental risks.**
11. **Employment of an Environmental Manager and a suitably qualified Ecologist, to ensure appropriate implementation of the CEMP, including all conditions and mitigation measures.**

MOD/SBAP/SBAA implement the following mitigation measures:

1. **Installation of bird deflectors on the guy wires of Antenna 'Charlie', before the next spring bird migration season.**
2. **Implementation of further mitigation such as installation of bird deflectors on guy wires within the whole of the antenna site at Akrotiri, under the recommendations of the modelling exercise for flight paths and collision risks under preparation.**
3. **Implementation of a monitoring scheme to assess the collision risks of birds within the antenna sites, using methods such as radar, site surveys etc, to assess the success of mitigation and recommend possible improvements.**
4. **Creation of an alternative flight path north of the antenna sites, under the recommendations of the flight path survey underway.**
5. **Implementation of the policing and monitoring scheme to minimise the shooting of protected birds within hunting areas H1 and H2.**

Approved by:	
Appointment:	**Signature:**
Contact Number:	**Date:**

Comment Chief Officer:

Annex 1

Report to inform the Appropriate Assessment (AA) for the proposed Electricity Authority of Cyprus (EAC) photovoltaic park at Akrotiri

Version 2.3, November 2017

Pantelis Charilaou, SBAA Environment and Conservation Officer

1. Background

An Environmental Impact Assessment (EIA) (Reference A) was prepared in April 2015, which was considered to be inadequate, especially in the nature conservation parts. The proponents commissioned another study to address the gaps and provide AA information. This was finalised in July 2016 (Reference B). The EIA Committee of the Republic of Cyprus (RoC) discussed the EIA under delegated powers from SBAA and issued an opinion (Reference C), stating that the RoC Environment Department does not consent, at present stage, to the approval of the project, based on a number of given reasons. One of the issues raised in the opinion, which also concerns the AA process, is the requirement to consider the impacts of the proposed project in combination with other plans, programmes or projects, and in particular the Non-military Development (NMD) plan underway. Legal advice was sought from the SBA Attorney General and Legal Adviser (AGLA), which can be found in the E-mail at Reference D.

2. Details of the project

The project includes the construction and operation of a 20 MW photovoltaic park at Akrotiri, as described in the studies at References A and B. The proposed park includes 80,000 photovoltaic panels, covering a footprint of around 353,400 square metres. The energy produced is to be fed into the EAC distribution network. Access to the plant will be from the north, via the existing road/track network, which will need to be upgraded.

The park will be connected to a new EAC substation currently under construction within RAF Station Akrotiri. The underground connection between the park and the RAF boundary has been addressed in the study at Reference B. The new substation and the part of the connection within RAF Akrotiri have been addressed in another study, which concluded that there will be no significant impact on designated features. Also, the underground cable connecting Kolossi substation with RAF substation is currently being upgraded, based on an assessment concluding that there will be no significant impact on designated features.

3. Likely impact on Special Protection Areas (SPAs), Special Areas of Conservation (SACS) and other important features

The project is likely to have the following significant impact on Akrotiri Wetlands SPA, Akrotiri Cliffs SPA, Akrotiri SAC and Akrotiri Ramsar Site. Maps and Data forms for these sites are included in the following appendices and links:

SPA Map for Akrotiri Wetlands and Akrotiri Cliffs	Appendix 8
Akrotiri Wetlands SPA Data Form	Appendix 9
Akrotiri Cliffs SPA Data Form	Appendix 10
Akrotiri Ramsar Map	Appendix 11

The designation map for Akrotiri SAC can be found at:
http://www.sbaadministration.org/images/AEEIC/sac/20160112-Akrotiri_SAC_MAP.pdf

The Data Form for Akrotiri-Episkopi SACs can be found at: { HYPERLINK "http://www.sbaadministration.org/docs/eco/SAC/20150528_ECO_FPACK_SACDataFormAkrotiriEpiskop_ECO.pdf" }

The Akrotiri Ramsar Information Sheet can be found at: http://jncc.defra.gov.uk/pdf/RIS/UK32001.pdf

3.1 Impact on habitats and flora

The footprint of the project (References A and B) covers agricultural land, including cultivations for seasonal crops, citrus plantations and hedges/windbreaks at the boundaries of the different plots involved. The project has been designed to exclude natural habitats as a guiding principle. The only natural habitat affected is the area where the power cable will cross '*Juniperus phoenicea* Arborescent Matorral' habitat (code 5212). The impact has been assessed in the study at Reference B, which suggested that there will be no significant effect. Mitigation measures have been proposed, such as collection and re-instatement of top soil and monitoring/managing invasive species, particularly *Acacia saligna* for a period of time.
Generally, no direct significant impact is expected on SAC habitat, but significant impact has been identified on *Urtica membranacea.* This plant species, prior to its identification within the project site, had been included in the Cyprus Red Book (Reference E), as vulnerable, with a total population of 2,700-3,000 at four locations. The population recorded in the Cyprus Red Book has been decreasing due to various human activities and land-use changes (Reference F). The population within the proposed development site has been estimated at 50,000 – 55,000, within the citrus plantations and the hedges/tree-lines along plot boundaries. Nearby citrus plantations, outside the project footprint have been surveyed but the plant has not been found (Reference B).

3.2 Impact on birds

3.2.1 Impact on all bird species in the designation of Akrotiri Wetlands SPA and Akrotiri Cliffs SPA

Two potential issues have been raised for possible impact on the designated bird species using the area. The first one refers to the reflections from the photovoltaic panels and the possible effect on bird navigation and orientation. A literature check and discussion with experts (Game Fund, SBAA and Birdlife Cyprus) has far found no evidence substantiating such risk, other than the possibility for a very localised, temporary impact, which would not affect the longer-term navigation and orientation ability. The second issue relates to bird mortality due to collisions with the photovoltaic panels caused by the so called 'lake effect'. This risk has been considered in the United States (US), following a Federal study on bird mortality

at three solar energy facilities in California (Reference G). Other useful sources of information include a preliminary assessment of avian mortality at solar energy facilities in the US (Reference H) and a preliminary analysis of avian mortality at solar energy facilities in southern California (Reference I). In Cyprus (Reference T), incidents appearing to have a 'lake effect' element have been recorded, with Greater falmingos crashing on greenhouses.

Although there are still significant gaps in knowledge, it appears that the risk to birds relates to their attraction to the solar panels (as well as the attraction to the panels of insects, which form the food source of insectivorous birds), both birds and insects presumably perceiving the reflecting panels to be bodies of water. Also, the nature and magnitude of the impact on birds relates in general to the location of each photovoltaic project, the size of its footprint and the technology employed: Projects located in migration flyways, wetlands and other areas of bird importance are expected to have a bigger impact; projects with larger footprints will have more impact than smaller ones; and projects with collectors reflecting polarised sunlight in a way which makes them appear as a water body may attract more birds and their insect prey.

The only quantitative data found, albeit in a different context of location and scale, are from the assessment at Reference H. This suggests an annual mortality of 10.7 birds per MW in the study area, comprising 0.5 birds of known photovoltaic project-related fatality and 10.2 birds of unknown fatality.

The mortality due to the 'lake effect' should be assessed cumulatively with other sources of mortality or other impact on birds in the area, listed in Akrotiri Peninsula Environmental Management Plan (APEMP), at Reference J. These include collisions with communication antennae, collisions with aircraft, illegal hunting and poaching. Available information on these includes:

3.2.1.1 Collisions with communication antennae

Several studies addressed this issue, the last one being the Birdlife report at Reference K, consolidating all previous collision-related studies. However, so far it has not been possible to quantify the actual mortality due to collisions with the Pluto and WAF communication antennae and their infrastructure and come up with an agreed set of mitigation measures. In general, daytime data have been more reliable than night-time, but due to various uncertainty factors, such as the high scavenging rate, it has been difficult to agree on extrapolations. Thus, it has not been possible to carry out any evaluation of the mortality with respect to the population dynamics of important bird species. One area where there has been more agreement is the higher risk for mass collisions under certain circumstances. Such an event has already taken place to a certain extent in August 2012 where 2500 white storks roosted at Akrotiri Salt Lake in August 2012, with a few birds colliding with Pluto II.

Actual collision data from the above studies include several designation species: Glossy ibis, Eurasian sparrow-hawk, Steppe buzzard, Red-footed falcon, Honey buzzard, Marsh harrier, Pallid harrier Bee-eater and Shelduck, as well as a number of species contributing to the water-bird congregation designation criterion.

3.2.1.2 Collisions with aircraft

A study to address the bird collision risk with aircraft at Akrotiri RAF is underway. The preliminary results suggest medium/high risk for a number of designated species, including Greater flamingos, Great white pelicans, Honey buzzards, Bee-eaters, Eleonora's falcons, Marsh harriers, Red-footed falcons and Pallid harriers. Existing actual bird-strike data during the last five years include an average of six collisions per year. Some of the collisions have been identified to species level and do not include any of the designation

species. However, actual data are likely to be underestimating the risk, as strikes, especial involving small-size birds, can easily be missed.

3.2.1.2 Shooting of protected bird species

The area west and north-west of Akrotiri Marsh (H1 and H2 shown on the map in Appendix 12), is part of a hunting area, which is one of a few areas in Cyprus where hunting is known to have a considerable impact on protected species. Every year a number of injured protected birds are reported, but it is estimated that many more affected birds are never detected, including those which are never found (scavenged or lost), and those collected by hunters for consumption. According to the Game Fund the designation species affected include: Eleonora's falcon, Peregrine falcon, Great white pelican, Purple heron, Glossy ibis, Honey buzzard, Marsh harrier, Pallid harrier, Red-footed falcon, Saker falcon, Collared pratincole, Ferruginous duck, Squacco heron, Shelduck, Ruff, Bee-eater, Spur-winged plover, other raptors and other water-birds. Mass illegal shooting incidents are also taking place such as the shooting of 52 Red-footed falcons in October 2007 at the Fassouri plantations.

In quantitative terms, the highest numbers amongst the bird species concerned in this report, affected by illegal shooting concern the Bee-eater. Illegal shooting takes place during the migration of these birds through the area, especially at the boundary with the RoC within the eucalyptus plantations north of the salt lake. The number of spent cartridges every year found in this area, which is a game reserve, suggests many hundreds of killed birds.

3.2.1.3 Assessment of cumulative bird mortality

Given the uncertainty involved in quantifying bird mortality, both cumulatively and for each of the sources, as outlined in 3.2.1, 3.2.1.1, 3.2.1.2 and 3.2.1.2 above, an assessment for the relevant - both between sources and species - mortality risk (and the associated fitness risk) of each designation species has been carried out. The results are shown in the table below. The objective of this exercise is to prioritise the risk, with a view to identify the species of highest concern (cumulative impact - mortality or fitness - equal to or higher than 1.5).

The table was prepared by Thomas Hadjikyriakou (SBAA) and Nicos Kassinis (Cyprus Game and Fauna Service), using their expert judgment and the following information and set of criteria:

- Actual mortality data
- General ecology of each species
- Population and rarity of each species in the area (as a combination of probability and impact)
- Movements of each species in the area
- Food type and feeding habits of each species
- Size, location and nature of mortality source

This assessment is using a 0 (lowest) - 3 (highest impact) scale. The cumulative mortality is calculated as the average of the mortality factors in the four sources. The last column represents an assessment of the reduced breeding success for the local breeders, due to cumulative mortality.

Bird species	Mortality due to the lake effect	Collision on antennae mortality	Collision on aircraft mortality	Illegal Shooting mortality	Cumulative mortality	Cumulative estimated impact on fitness*

Eleonora's falcon *Falco Eleonorae*	2	2	2	2	2.0	3
European shag *Phalacrocorax aristotelis desmarestii*	0	1	0	0	0.25	1**
Peregrine falcon *Falco peregrines*	1	2	1	2	1.5	2
Great white pelican *Pelecanus onocrotalus*	1	3	1	1	1.5	0
Purple heron *Ardea purpurea*	1	1	0	1	0.75	0
Glossy ibis *Plegadis falcinellus*	1	2	0	1	1	0
Greater flamingo *Phoenicopterus roseus*	2	3	2	0	1.75	0
Honey buzzard *Pernis apivorus*	1	3	3	3	2.5	0
Marsh harrier *Circus aeruginosus*	2	3	1	3	2.25	0
Pallid harrier *Circus macrourus*	0	2	1	2	1.25	0
Red-footed falcon *Falco vespertinus*	2	2	2	3	2.25	0
Saker falcon *Falco cherrug*	0	1	0	1	0.5	0
Crane *Grus grus*	1	3	3	0	1.75	0
Collared pratincole *Glareola pratincola*	0	1	0	1	0.5	0
Kentish plover *Charadrius alexandrinus*	1	2	0	0	0.75	1
Slender-billed gull *Larus genei*	1	1	0	0	0.5	0
Gull-billed tern *Sterna nilotica*	3	1	0	0	1	0
Black-winged stilt *Himantopus himantopus*	1	3	0	0	1	1
Ferruginous duck *Aythya nyroca*	1	3	0	3	1.75	2
Squacco heron *Ardeola ralloides*	1	3	0	1	1.25	0
Demoiselle crane *Anthropoides virgo*	1	3	3	0	1.75	0
Shelduck *Tadorna tadorna*	1	3	0	3	1.75	0

Greater sand plover *Charadrius leschenaultia*	1	1	0	0	0.5	0
Little stint *Calidris minuta*	1	2	0	0	0.75	0
Ruff *Philomachus pugnax*	1	3	1	1	1.5	0
White-winged tern *Chlidonias leucopterus*	3	2	0	0	1.25	0
Bee-eater *Merops apiaster*	0	1	1	3	1.25	0
Spur-winged plover *Vanellus spinosus*	1	3	1	1	1.5	1
Other raptors	1	3	1	3	1.75	1
Other water-birds	1	2	2	1	1.5	0

* Reduced breeding success for locally breeding species

** According to the Game and Fauna Service, the European shag is suffering by catch mortality in the area from long-line and net fishing.

The results suggest that the species with highest cumulative mortality risk are (red shaded cells in the table): Eleonora's falcon, Peregrine falcon, Great white pelican, Greater flamingo, Honey buzzard, Marsh harrier, Red-footed falcon, Crane, Ferruginous duck, Demoiselle crane, Shelduck, Ruff, Spur-winged plover, other raptors and other water-birds. The fitness impact is highest for Eleonora's falcon, Peregrine falcon and Ferruginous duck (yellow shaded cells in the table).

3.2.2 Bird species of the SPA designations affected by the proposed habitat changes in the project

Although the project does not affect any designated SPA habitat, according to the APEMP and subsequent information, the following SPA designation bird species use the habitat in the project footprint:
Red-footed falcon (*Falco vespertinus*), Eleonora's falcon (*Falco eleonorae*), Honey buzzard (*Pernis apivorus*), Saker falcon (*Falco cherrug*), Demoiselle crane *(Grus virgo*), Marsh harrier (*Circus aeruginosus*), Pallid harrier (*Circus macrourus*), Peregrine falcon (*Falco peregrinus*) and Bee-eater (*Merops apiaster*).
The list of designation bird species is considerably bigger as far as the Bishop's Pool is concerned, 200 meters west of the project footprint, which is part of Akrotiri Wetlands SPA, designated in 2008. At the time of the SPA designations, certain stakeholders argued that the whole of Bishop's Farm should have been included in the SPA designation. The SBA authorities decided not to include the whole area in the designation, due to lack of supporting data. Birdlife Cyprus, however, included the farm in their Important Bird Area (IBA) revised designation in 2013 (Reference L).

The initial status condition of the bird species in the SPA designations is described in the SPA Data Forms (Appendices 2-4). Favourable Reference Values (FRVs) for SPA designation birds have been defined in the

Republic of Cyprus, but not yet in the SBAs. The dynamic condition of some of the bird species is being monitored in various surveys, studies and research projects, but these have not been put into context with the favourable conservation status of the species involved. Also, such data have not yet been analysed to establish population trends. In terms of the ecological coherence of the SPA network in Cyprus, Akrotiri plays a vital role for many of the species concerned. Firstly, it is a raptor bottleneck site in the autumn involving the Red-footed falcons, Honey buzzards, Saker falcons, Marsh harriers and Pallid harriers. Akrotiri is one of the three most important nesting sites for Eleonora's falcons, one of the five most important nesting sites for Peregrine falcons, one of the most important roosting sites for migrating Demoiselle and Common Cranes and an important flyway of migratory Bee-eaters in Cyprus.

3.2.2.1 Percentage loss of habitat from the project for designation bird species

In order to quantify the habitat loss impact for the birds using the proposed footprint a quantitative method can be used first, comparing percentage losses. The total habitat for each species in the area of the peninsula can be calculated based on the APEMP maps and subsequent information, yielding the following results:

Bird species	Total Habitat sq. Metres	% Loss of Habitat at Akrotiri Peninsula
Red-footed falcon	35,437,915	1.2
Eleonora's falcon	74,869,651	0.6
Honey buzzard	58,988,931	0.7
Saker falcon	58,988,931	0.7
Demoiselle crane	18,624,698	2.4
Marsh harrier	34,190,928	1.3
Pallid harrier	58,988,931	0.7
Peregrine falcon	68,996,789	0.6
Bee-eater	74,223,411	0.6

3.2.2.2 Habitat loss for bird species in combination with other plans or projects

If the same principle, as in 3.2.2.1, is applied to calculate the cumulative impact with other projects or plans, habitat losses in the area for the above bird species would relate to the Lanitis Golf and the Casino development north of Akrotiri Salt Lake, military projects or plans and the non-Military Development Plan underway for the SBAs, which includes specific proposals at Akrotiri Peninsula.

The golf development covers an area of 1,418,989 square metres of agricultural land with mostly citrus plantations and parts with seasonal crops, combined with rows/hedges of high trees and bushes at plot boundaries. According to various sources, including the APEMP (Reference J), the EIA for the project (Reference M) and the Red-footed falcon survey (Reference N) this habitat is used by Red-footed falcons for resting and/or feeding. The additional habitat loss due to this project for this species is 4%.

The same habitat loss is expected to affect Eleonora's falcons as well, in respect of roosting and/or feeding. Although in the APEMP the territory for this species was confined within the SBA boundary, the data collected in recent research (Reference O) suggest that the wider farm land in the area, including in the

RoC, is being used by the species. Therefore, the total habitat of the species in the area needs to be increased by roughly 6,000,000 square metres. This reduces the % loss of habitat from the photovoltaic park to 0.5% with an additional loss from the golf course development of 1.8%.
The golf course will also cause habitat loss to the Bee-eater in the order of 1.9%.
A second large-scale casino development has been announced in the RoC, close to or overlapping the golf course project. According to the RoC Environment Department (Reference P), no formal application has been submitted yet and no assessment has been carried out. However, there appears to be a strong intention to proceed with this development and affect habitat similar to the golf project, both in nature and scale.
In terms of military development, Defence Infrastructure Organisation (DIO) have confirmed that there are currently no plans which would involve direct impact on bird habitats, but this statement was made on the caveat that a high level sustainability appraisal is about to begin for all future military development aspirations, which could change the situation. The designation bird species which could be affected are: Eleonora's' falcon, Saker falcon, Bee-eater, Peregrine, Pallid harrier, and Honey buzzard.
As far as non-military development is concerned, no projects are currently planned in the area which could add to the habitat loss for birds. However, a plan is underway for the whole of the SBA areas, excluding the military estate, which will define a new regime of non-military development and can create potential for additional habitat loss for the bird species in question. At the moment this plan is being assessed under an SEA and it is not possible to quantify the potential impact, until the final plan is approved.

The habitat loss for the designation bird species in combination with other plans and projects takes the following form:

Bird species	Total Habitat sq. Metres	Total % Loss of habitat
Red-footed falcon	35,437,915	5,2 + Casino + NMD
Eleonora's falcon	80,869,651	2,3 + Casino + NMD + Military Development
Honey buzzard	58,988,931	0,7 + NMD + Military Development
Saker falcon	58,988,931	0,7 + NMD + Military Development
Demoiselle crane	18,624,698	2,4 + NMD
Marsh harrier	34,190,928	1,3 + NMD + Military Development
Pallid harrier	58,988,931	0,7 + NMD + Military Development
Peregrine falcon	68,996,789	0,6 + NMD + Military Development
Bee-eater	74,223,411	2,5 + Casino + NMD + Military Development

Besides plans and projects, illegal activities in the peninsula are reducing the habitat of the bird species in question. A list of such activities is included the APEPM, but some of these have since been escalating, such as for example the illegal extension of the restaurants at Lady's Mile (affecting the habitat of Honey buzzard, Saker falcon, Eleonora's falcon, Bee-eater, Peregrine, Pallid harrier and Marsh harrier).

In addition to the quantitative part, it is necessary to follow a more qualitative approach, with a view to evaluate the importance of the project site with respect to the wider habitat of each species on the peninsula.

3.2.2.3 Qualitative impact assessment of habitat loss on designation bird species

The site information varies for each species and more systematic information is available only for Eleonora's falcons and Red-footed falcons.

3.2.2.3.1 Eleonora's falcons

Eleonora's falcon is a complete, long-distance, trans-equatorial, migratory raptor species nesting in the Mediterranean, Canary Islands and the Atlantic coast of Morocco, with Cyprus hosting the easternmost breeding population. In Cyprus it nests on the southern sea-cliffs between Akrotiri Peninsula and Cape Aspro. It arrives in the Mediterranean from its wintering grounds in Madagascar and Mascarene Islands in late April and leaves in late October. It is protected under the EU Wild Birds Directive, the Bern Convention, the Bonn Convention and CITES. The species was included in the 2010 SBAA designation of Akrotiri Cliffs SPA (32 nesting pairs average 2003-2008) and Episkopi Cliffs SPA (37 nesting pairs average 2003-2008) (Reference Q). During the last three years (2014-2016) Akrotiri Cliffs hosted on average 30 nesting pairs and Episkopi Cliffs another 30, out of an average of 130 in the whole of Cyprus (References R, O, S). Although systematic surveys with a new, enhanced methodology have been carried out during the last 6 years, the data have not been analysed to produce population trends.

The habitat requirement for this species in Cyprus is steep sea-cliffs for nesting and, predominantly, agricultural, forest and wetland areas in the spring/summer for feeding on insects. Its diet changes with the onset of the autumn migration from Europe to Africa, to catching migrating birds, predominantly above the nesting colonies towards the sea.

The SPA designations in 2010 were based only on the nesting sites for this species, due to lack of specific information at the time in relation to its other habitat uses.

A study is underway (Reference I), where 14 individuals from the Akrotiri colony (13 breeding and 1 non-breeding) have been fitted with transmitters which record locations of presence and activity of the birds. The preliminary results of this study show that there are two main areas of activity of this colony in the whole of Cyprus (Appendix 3), one of which is Akrotiri Peninsula (Appendix 4). The study has also shown 72 hotspots of activity of the Akrotiri colony (excluding the nesting sites), in the whole island, 26 of which (36%) involve citrus plantations with tall tree-lines along plot boundaries. These hotspots mostly involve feeding activity. Out of the 72 hotspots in the whole of Cyprus, 38 (53%) are located at Akrotiri Peninsula (Appendix 4). Out of all the activity hotspots in Cyprus, 4 (6%) are within Bishop's Farm at Akrotiri and 2 (3%) within the footprint of the proposed development (Appendix 5). Out of the 38 hotspots within the peninsula, 34 (89%) are within private land, which is subject to land-use changes. Some of these hotspots have already been earmarked for development and/or change of land use, through different processes in both the Republic of Cyprus (RoC) and the SBAs. The biggest project in scale, which was expected to have an impact on Eleonora's Falcons, was the Lanitis golf development within the plantations in the RoC, north of Akrotiri Salt Lake. Certain conditions for mitigation and monitoring were imposed under the environmental assessment of the project in relation to the bird interest. According to the Cyprus Environment Department, the assessment process has not progressed further, as the proponents have not yet submitted a plan for the management of flora and fauna under the project. In the meantime, as far as the current proposal is concerned, the mitigation option shown on the map at Appendix 1 has been proposed, with a view to maintain feeding habitat interest for Eleonora's falcons within the project footprint. This would secure the long-term availability of such habitat, whereas the current statutory and management regime provides no control of the authorities over the change of fruit-farming to other agricultural uses or farming intensification with excessive use of insecticides. In fact, the agricultural land

within Bishop's farm – and elsewhere in the peninsula – has changed considerably in the last few years from fruit-farming to seasonal crops (Appendices 6 and 7). It is expected that land-use change will intensify after the implementation of the new policy on non-military development within the SBAs, which is underway.

The nesting sites of the colony of the species at Akrotiri are within the military base, which makes them relatively undisturbed. Impact includes military activities such as flying and cliff training, as well as the increasing recreational interest along the coast via boat access. The military activities are subject to Appropriate Assessment with a view to avoid/minimise the impact on sensitive sites during sensitive periods.

3.2.2.3.2 Red-footed falcons

The Red-footed falcon is an obligate trans-equatorial migratory raptor. It is breeding in Eastern Europe and west, central and north-central Asia, whilst wintering in southern Africa. While migrating across the Mediterranean, some of the birds use islands such as Cyprus as stopover, roosting and feeding sites, especially during their autumn migration in September-October. Akrotiri Peninsula is one of the most important, if not the most important staging area for the species in Cyprus. The diet of this species at Akrotiri consists mostly of insects.

The Red-footed falcon is protected under the EU Wild Birds Directive, the Bern Convention, the Bonn Convention and CITES. It qualified as a threatened bird-species for the designation in 2010 of Akrotiri Wetlands SPA. The designation was based on existing data and a joint study carried out in 2009 (Reference N) and included Akrotiri wetlands as well as extensive farmland north of Akrotiri Marsh. The designation covered only the 'Bishop's Pool' from the Bishop's estate, although Red-footed falcons (up to 31 birds) were observed within the citrus and seasonal plantations of the farm. The same applied to other farmland areas east of Trakhoni (within the SBAs) and between Asomatos and Trakhoni (within the RoC), which were not included in the designation either. The Roc Game Fund has been carrying out systematic surveys on the species during the autumn migration in September – October, but the results have not been analysed yet to produce population trends. Similarly with Eleonora's falcons, the farmland habitat used by the Red-footed falcons in both the RoC and the SBAs is at risk from development, land-use change, or modification of farming practices such as intensification and excessive use of insecticides. Such development includes the Lanitis golf project and the environmental assessment information, held by the RoC Environment Department, is relevant to this species as well. The mitigation proposed for Eleonora's falcons is expected to benefit the Red-footed falcons as well. The change of fruit-farming to other land-uses within Bishop's farm and other areas on the peninsula outlined above in relation to Eleonora's falcons, is affecting the Red-footed falcon interest as well.

3.2.2.3.3 Honey buzzards

Migrating Honey buzzards congregate at Akrotiri Peninsula during their autumn migration between September and October. Their numbers vary from year to year, with maximum counts of several thousands.

They use the area for migration purposes only. Some only use the thermals created at Akrotiri and carry on their migration to their wintering grounds in Africa, whilst others roost in the area but tend to stage not more than a day.

Their known, main roosting sites include the eucalyptus forest north of the Salt Lake and various flat areas of the peninsula. Some sightings suggest that they could be roosting in the general area of the Bishop's Farm as well.
However, there are no systematic data available to inform further assessment of the roosting interest.

3.2.2.3.4 Marsh harriers

Marsh Harriers are winter visitors and passage migrants and use the wetland part of the peninsula, including the Bishop's Farm.
Again, there are no systematic data available to inform further the assessment of their habitat loss from the project.

3.2.2.3.5 Pallid harriers

The Pallid Harriers are common passage migrants during both the autumn and spring migrations. They use the whole of the peninsula, mainly the parts with open habitats, as a staging area.
Due to the lack of systematic data, no further assessment of their habitat loss from the project can be carried out.

3.2.2.3.6 Saker falcons

A significant number of the European population of Saker Falcons are using Akrotiri during their migration, either as a flyway, or as a staging site. They are using the whole of the peninsula and roost mainly at the eucalyptus forest and Akrotiri Merra.
Due to the lack of systematic data, no further assessment of their habitat loss from the project can be carried out.

3.2.2.3.7 Demoiselle cranes

The European population of the Demoiselle cranes uses Cyprus during their migration, especially during the autumn. Significant numbers use Akrotiri Peninsula to roost overnight, taking off the next day, using the local thermals to gain height. Counts include a few hundred every year and the Bishop's farm is one of the three main areas they use for roosting, the other two being Akrotiri Salt Lake and Akrotiri Merra.

3.2.2.3.8 Peregrine falcons

Peregrine Falcons have a breeding population at Akrotiri Cliffs but some also use the area for migration, especially during the autumn.
They use the whole of the peninsula, extending to the north-west towards Episkopi, for roosting and hunting.

Due to the lack of systematic data, no further assessment of their habitat loss from the project can be carried out.

3.2.2.3.9 Bee-eaters

Many thousands of Bee-eaters use Akrotiri Peninsula during their autumn migration during September-October. Some will only rest overnight, but others will stay for a few days to rest and feed.
They use the whole of the peninsula for feeding, except for the main body of the Salt Lake, which is used for thermalling purposes only. A few birds also breed on the vertical walls of the disused quarry in the Bishop's Farm.
Due to the fact that this species uses the whole of the area in a very general, intensive and opportunistic way, it is safe to say that, in this case, it is not necessary to carry out assessment further to the quantitative part in 3.2.2.1 and 3.2.2.2.

4 Proposed mitigation

4.1 Mitigation for flora and bird habitat loss

The original proposal for mitigation (Option 1) included an EAC obligation to maintain approximately 25% of the citrus plantations (together with the corresponding hedges/tree-lines along its eastern and western boundaries), as shown on the plan at Appendix 1, as well as the hedges/tree-lines along the northern boundary of the project. The plantation would be maintained using best agricultural practices to be agreed with the authorities in order to benefit *U. Membranacea* and some of the bird interest. It also included collection of the seeds from the areas to be affected to be used to plant the green areas to be maintained within the project fenced site, deposition in existing seed banks and planting in botanical gardens in Cyprus. The top soil from affected areas, containing *U. membranacea* seeds would be collected and used in the green areas of the project and the proponents would undertake a three year monitoring program to be sponsored by EAC to monitor the success of the mitigation measures and the *U. membranacea* population within the project site.
Bird expert stakeholders have expressed concerns that option 1 would not be effective with respect to the bird interest, as the bird habitat maintained would be too small and fragmented in terms of being surrounded by panels. This issue has been discussed with EAC who made a commitment (Option 2) to take this into account in the final design of the park, with a view to maintain and/or re-instate the full area of citrus plantation currently within the project footprint. Any area of citrus plantation to be lost will be compensated with an equal area of land, beyond the project footprint, at an appropriate location, where EAC will establish and maintain habitat suitable to host the desirable bird interest together with any other significant ecological interest. At the same time, EAC have offered to plant trees along the access road to the photovoltaic park as a further compensation measure for the impact on bird habitat.
The proponents have also offered from the outset, to support the funding of a monitoring scheme for the habitat requirements of the two bird species (Eleonora's and Red-footed falcons).

4.2 Mitigation for bird mortality

Given the uncertainty and lack of knowledge in both the mechanisms of bird attraction involved and the population-level impact of photovoltaic project avian mortality , there is currently no effective mitigation measures proposed in literature, other than appropriate decisions for optimal project siting locations to

avoid important bird habitats. There are some suggestions such as fitting visual cues on photovoltaic panels to reduce their water-body perception impact, but these have not been tested yet.
It is useful to note that any other mitigation proposed to retain or enhance the bird interest is in principle contrary to the above approach, which suggests keeping away from bird interest.
Although effective mitigation for the lake effect is not feasible at this stage, there are opportunities for reducing considerably bird mortality due to collisions with antennae and illegal shooting.

4.3 Residual impact

The analysis for the residual impact refers to Option 2, as it is considered to be better than option 1 in terms of mitigating impact.

Flora

The proposed mitigation is expected to secure the viability of the *Urtica membranacea* population in the area.

Bird mortality

Given the lack of effective mitigation outlined in 4.2 above, bird mortality remains as described in section 3.2.1.3.

Habitat loss for designation birds

The project will not affect SPA designated habitat, but it will affect habitat which supports bird species for which the SPAs have been designated. In quantity terms, the percentages of bird habitat loss are roughly the figures in 3.2.2.1, irrespective of the mitigation, since the area to be occupied by panels is roughly constant. However, in more qualitative terms, retaining and maintaining the citrus plantation and/or other suitable bird habitat is expected to mitigate adequately the habitat loss for Eleonora's falcons and to a certain degree for Red-footed falcons. It is not possible to make any estimation in qualitative terms for the remaining seven bird species, due to lack of systematic data. This said, it is noted that for the Bee-eater it is argued in 3.2.2.3.9, that no qualitative assessment is required.

In terms of the cumulative impact, the percentage losses are analysed in 3.2.2.2. The known part of the impact shows considerable increase for Eleonora's falcons, Red-footed falcons and Bee-eaters. This part is associated with the Lanitis Golf Course development, where there is uncertainty involved with respect to the assessment and mitigation in relation to the protected bird species. The same uncertainty is involved with the Casino development. These two projects (Lanitis and Casino) are expected to affect the same type of habitat as this project, namely agricultural habitat supporting SPA birds, but not designated as SPA habitat.

The impact of military development cannot be assessed at this point in time, due to the current lack of specific proposals, which is another area of uncertainty.

The impact of non-military development is the most important source of uncertainty, in both quantitative and qualitative terms. The provisions of this plan will affect the whole of the peninsula (excluding the military estate), and are likely to affect land which supports SPA interest, including both agricultural land and natural habitats. This is likely to contribute considerably to the cumulative impact assessed in this

study, not only in terms of percentages but most importantly in terms of the integrity and character of the designated interest.

5 Uncertainty and Gaps

The 'Lake effect'

Other than the rough estimate in Reference 8, the risks in both quantitative (numbers of birds) and qualitative (species vulnerable to collisions) terms in the context of Akrotiri Peninsula cannot be accurately assessed based on current knowledge. Additionally, there are yet no effective mitigation measures proposed in this field. Monitoring the actual mortality is also a difficult task due to the project scales involved, accessibility, scavenging etc.

Collisions with antennae mortality

There are no agreed/confirmed data/estimations yet on the actual bird mortality due to collisions with communication antennae and the associated infrastructure.

Shooting of protected bird species

There has been no systematic study to establish the numbers and species of protected birds killed due to illegal shooting within and outside the hunting area at Akrotiri/Episkopi.

Habitat loss for designated bird species

Systematic data on the habitat use by important bird species in Akrotiri Peninsula are limited. As far as the bird species of the SPA designations affected by the proposed habitat changes in the project are concerned, there are some systematic data for only Eleonora's falcons and Red-footed falcons.

Also, the cumulative impact on bird habitat loss in the area currently includes a high level of uncertainty, due to the fact that future development plans have not yet been finalised. This uncertainty covers both the non-military development (NMD) and the military plans. The NMD process is currently under way and the Strategic Environmental Assessment (SEA) is due to be completed in the next month or so.

Additionally, there is some uncertainty involved in relation to the effectiveness of the proposed mitigation for maintaining fruit plantations and other bird habitat.

Conflict of bird interest with the operation of RAF airport.

Concerns have been raised on military grounds, in particular the flight safety at RAF Akrotiri, in respect of the bird interest in the area of the project. Any changes to the bird use of the area in the Bishop's Farm can potentially affect the risk of bird collisions with aircraft.

6 Conclusions and recommendations

6.1 Current project

The purpose of the project for the production of renewable energy and the savings in emissions (covered in the EIA) is a very positive element, albeit, ideally such projects should be located away from areas with bird interest on a precautionary approach with respect to the 'lake effect'.

Also, the mitigation and monitoring proposed would be a model approach to reaching management agreements, especially in privately owned land, to satisfy both sustainable development and designation

objectives. This approach could be applied at a higher level in the planning process, in order to take into account cumulative impacts and the requirement to safeguard the integrity of the designated sites, based on their conservation objectives.

Given the considerable uncertainty involved, especially in terms of the cumulative impacts of NMD, it would appear that, in technical terms, the best option would be to complete the decision-making process in parallel to the SEA and AA for NMD, or at least once the NMD impact becomes clearer. This would agree in principle with the EIA recommendation outlined in section 1 above.

6.2 Wider issues

In the wider context and in order to better inform and facilitate the future management and decision-making process it is recommended to:

6.2.1 Give priority to the assessment of bird collisions with the antenna farms and the implementation and monitoring of mitigation measures.

6.2.2 Give priority to monitoring and policing the hunting area at Akrotiri in order to reduce the impact on protected birds.

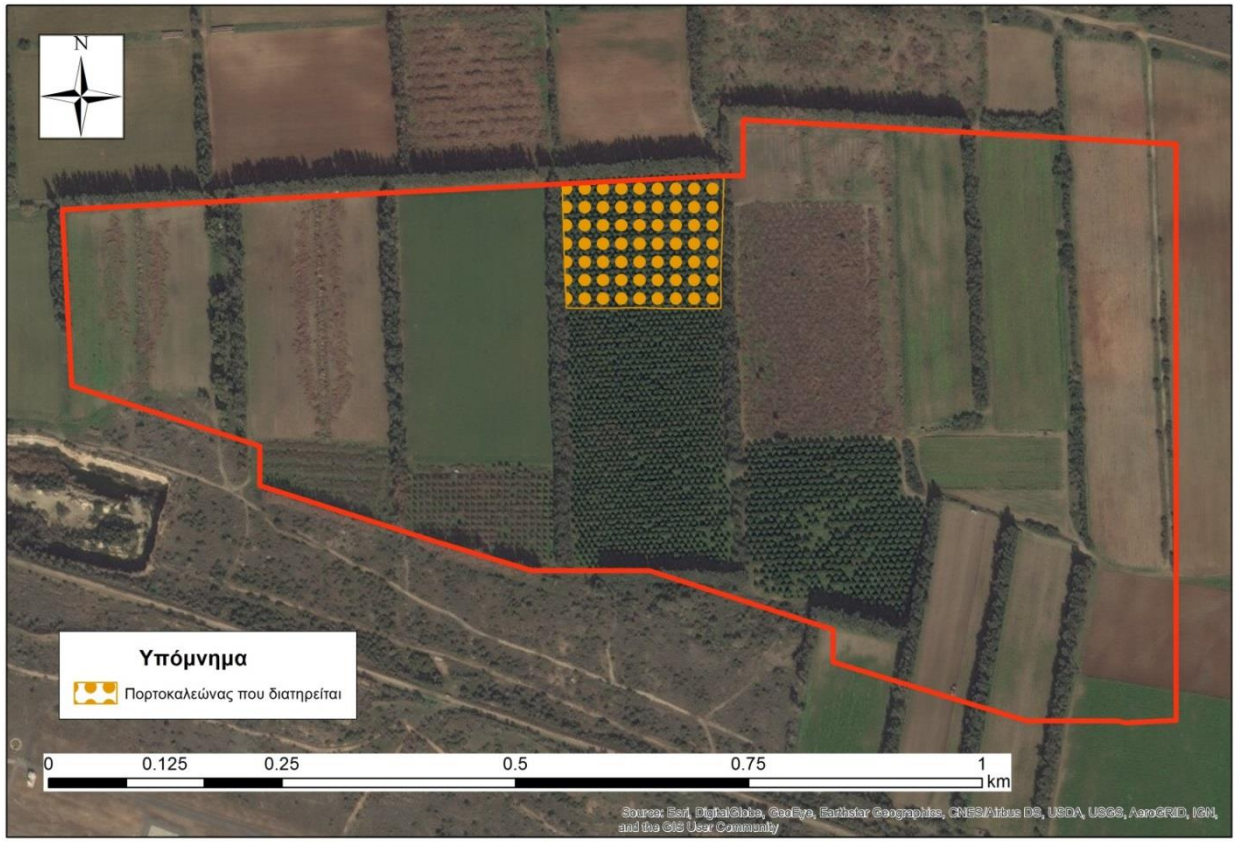
6.2.3 Assess the hunting intensity at Akrotiri, in both temporal and spatial terms, with a view to reduce the impact on protected birds, especially the migratory species.

6.2.4 Give priority to research with respect to the habitat requirements of the designated bird species at Akrotiri Peninsula, such as Eleonora's falcons and Red-footed falcons, in order to inform the management of the area and decisions on sustainable development. The commitment of this project's proponents to maintain habitats in a suitable condition and contribute to monitoring and research is a very positive step forward and can be taken a level higher as suggested in section 6.1.

7 Appendices

Appendix 1

Project footprint (red line) and citrus plantation proposed to be maintained (orange circles) – Option 1



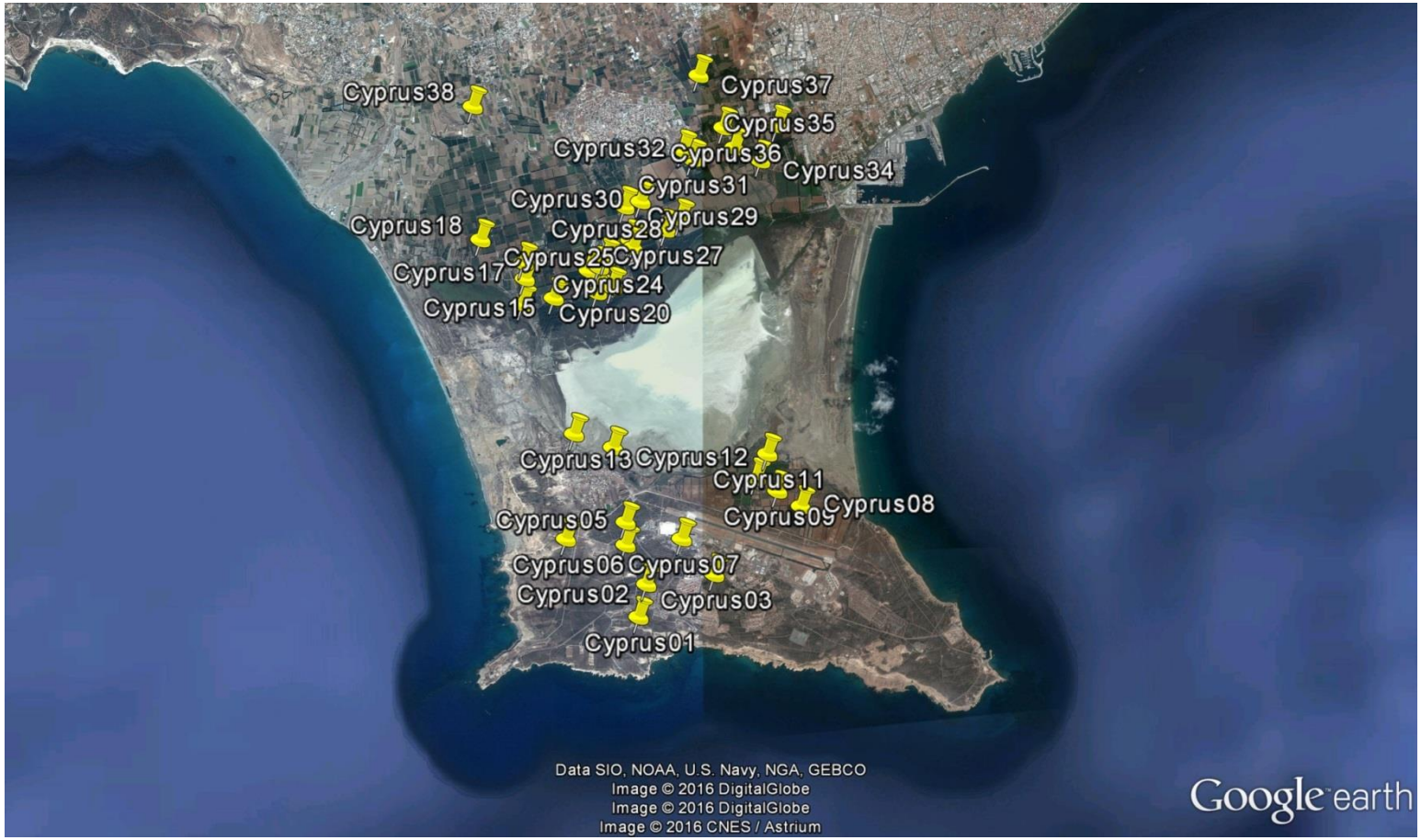
Appendix 2
Arrangement of the solar panels within the project footprint – Option 1

{ EMBED AcroExch.Document.11 }

Appendix 3
Eleonora's falcon hotspots in Cyprus

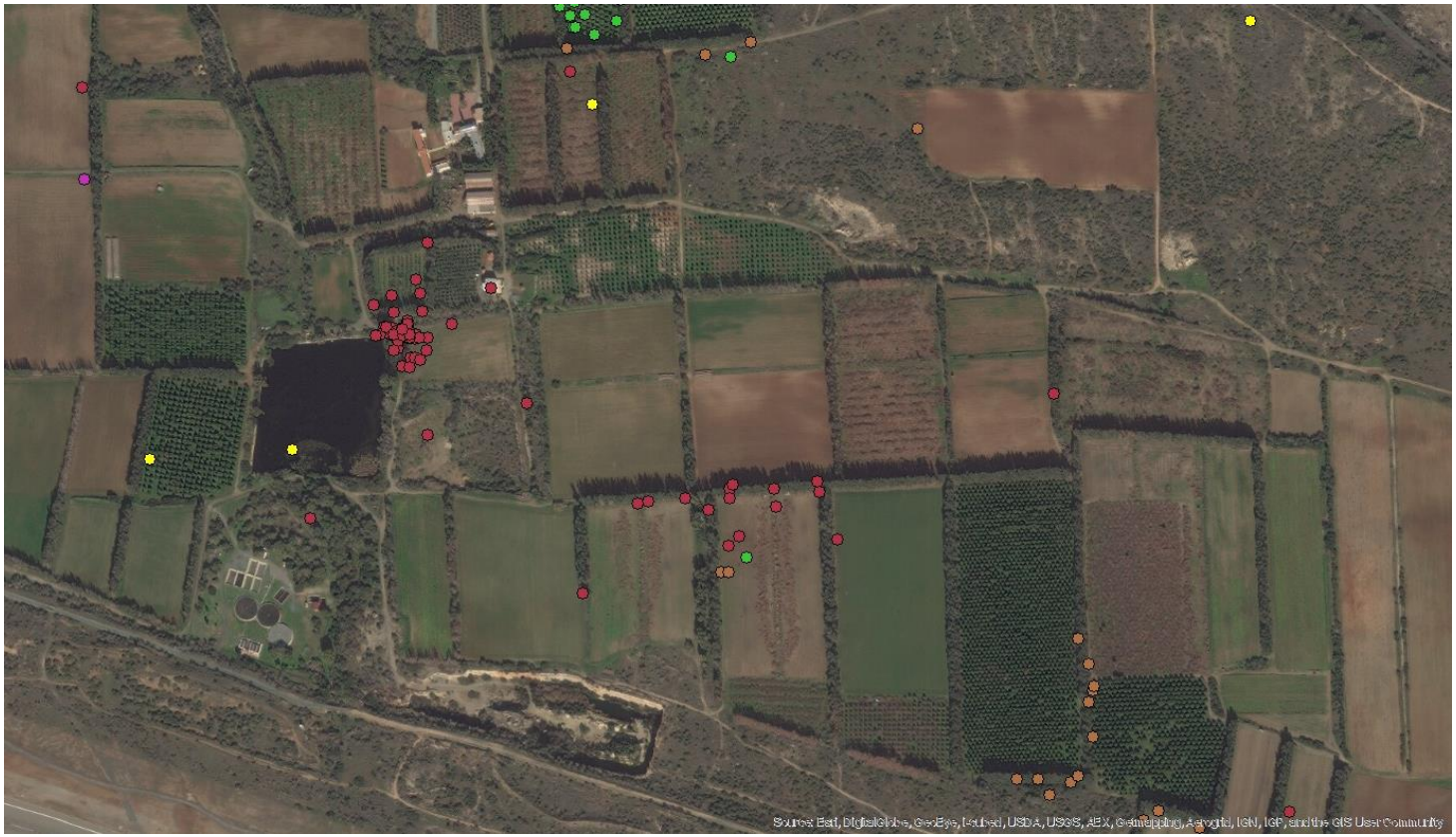
Appendix 4

Eleonora's falcon hotspots in Akrotiri Peninsula



Appendix 5

Eleonora's falcon hotspots within Bishop's Farm



Appendix 6

Citrus plantations within Bishop's Farm in 2003

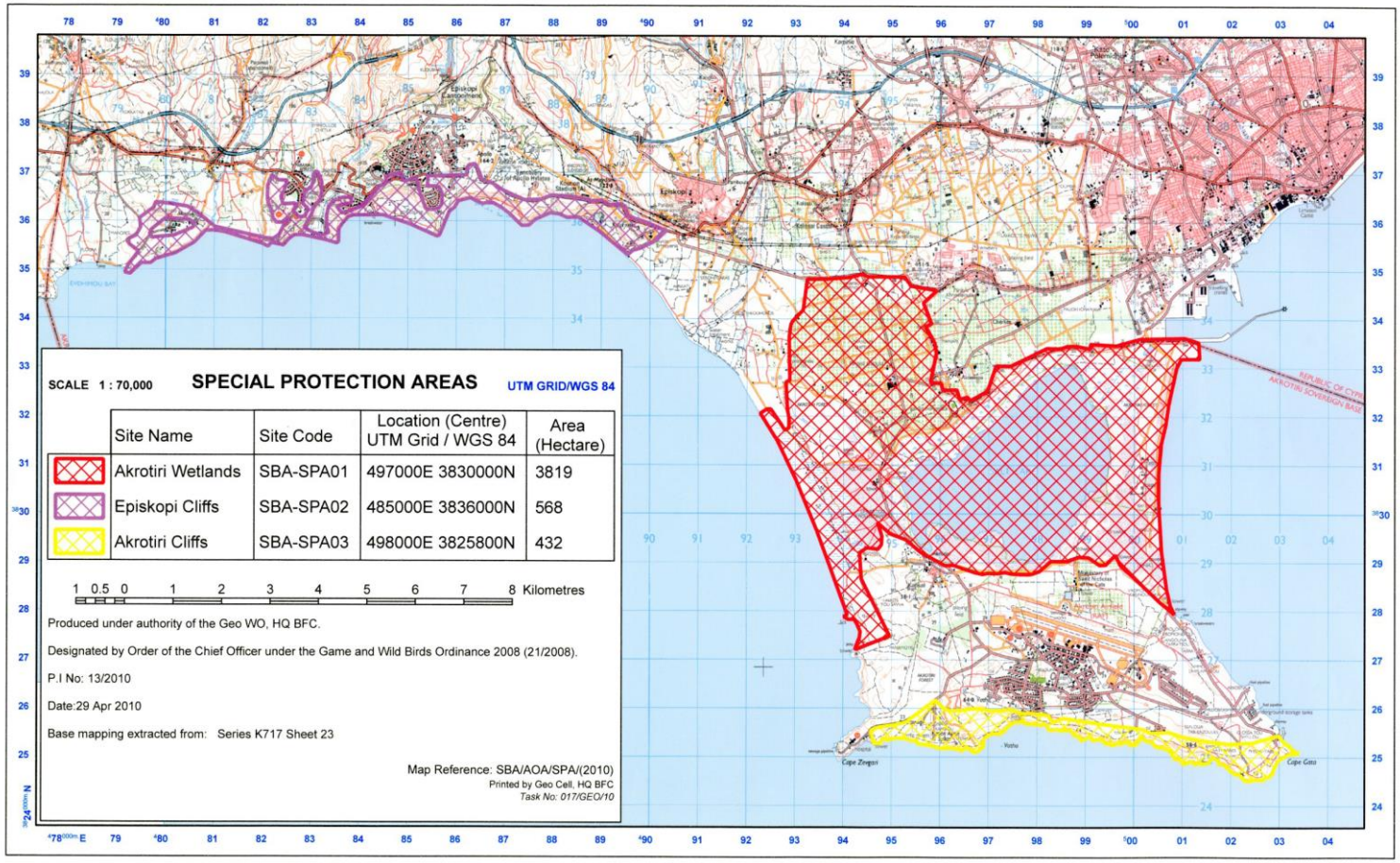
Appendix 7

Citrus plantations within Bishop's Farm in 2016


Image © 2016 DigitalGlobe
Image © 2016 DigitalGlobe
Image © 2016 CNES / Astrium
Google earth

Appendix 8

Akrotiri Wetlands, Akrotiri Cliffs and Episkopi Cliffs SPA Map



Appendix 9
Akrotiri Wetlands SPA Data Form

DESIGNATION OF SPECIAL PROTECTION AREAS IN THE SOVEREIGN BASE AREAS

1. **Site Name**:
Akrotiri Wetlands

2. Site Administration:
Sovereign Base Areas Administration

3. Site Description and Importance
Akrotiri Wetlands site comprises the Salt Lake and other coastal lagoons and pools, halophytic wetlands, the Phassouri Marsh (reedbeds and sedgebeds) and surrounding marshes and halophilus scrubs, eucalyptus plantations and adjacent farmland.
The Salt Lake, the Phassouri Marsh and the surrounding wetlands support the largest number of water birds in Cyprus. Eighty-nine species of migratory water birds use the area for wintering, roosting and foraging. Thousands of Flamingos use the Salt Lake every year for wintering (peak number over the last five years: 10,000). Hundreds of Demoiselle Cranes use the Salt Lake and the surrounding marshes in August and September for roosting (365 birds recorded in 2007). Large numbers of White storks and Common Cranes also concentrate at the wetlands (between late September and late October more than 10,000 cranes have been recorded over-flying the Akrotiri Peninsula). The wetlands are used by sandpipers of 20 species (especially Ruff and Little Stint) numbering in their thousands as a staging ground during spring migration. Akrotiri Salt Lake is also one of the two most important nesting sites for the Blackwinged Stilt (up to 54 pairs nested there during spring 2005).
The area, and especially the eucalyptus forest and the fruit plantations, is an important site for migratory raptors. Large numbers of Red-footed Falcons (up to 830), Honey Buzzards (up to 5,000), Marsh Harriers (up to 600), Lesser Kestrels (up to 137) , and many other species of raptors pass through the area (autumn migration raptor count from 2004 - 2007 identified 25 species of raptors with a total annual population of up to 7000 birds).
The Spur-winged Plover uses the Phassouri marsh area regularly for breeding. This marsh is also the only nesting site for the globally endangered Ferruginous Duck that colonized the site since 2005, and also one of the two nesting sites for the Blackheaded Yellow Wagtail on the island. Significant numbers of Shelducks overwinter at the Salt Lake, while large numbers of Slender-billed Gulls and Bee-eaters are passage migrants. It is one of the two nesting sites for the Kentish Plover on the island.

4. **Site holds the following birds qualifying under Directive 79/409/EEC on the Protection of Wild Birds as mirrored by the Protection and Management of Game and Wild Birds Ordinance.**

4. 1. Site holds at least 1% of a flyway or EU population of a threatened species at the EU level

Scientific name Common name
Pelecanus onocrotalus Great White Pelican
Ardea purpurea Purple Heron
Plegadis falcinellus Glossy Ibis
Phoenicopterus roseus Greater Flamingo

Pernis apivorus European Honey Buzzard
Circus aeruginosus Western Marsh Harrier
Circus macrourus Pallid Harrier
Falco vespertinus Red-footed Falcon
Falco cherrug Saker Falcon
Grus grus Crane
Glareola pratincola Collared Pratincole
Charandrius alexandrinus Kentish Plover
Larus genei Slender-billed Gull
Sterna(Gelochelidon) nilotica Gull-billed Tern
Himantopus himantopus Black-winged Stilt
Aythya nyroca Ferruginous Duck
Ardeola ralloides Squacco Heron
4.2 Site holds at least 1% of flyway of migratory species not considered threatened at the EU level.
Scientific name Common name
Anthropoides virgo Demoiselle Crane
Tadorna tadorna Shelduck
Charadrius leschenaultii Greater sand Plover
Calidris minuta Little Stint
Philomachus pugnax Ruff
Chlidonias leucopterus White-winged Tern
Merops apiaster European Bee-eater
4.3 Site is one of the five most important in Cyprus for a species or subspecies considered threatened in the EU.
Scientific Name Common name
Himantopus himantopus
Black-winged Stilt (migrant breeder)
Charadrius alexandrines Kentish Plover (resident breeder)
Vanellus spinosus Spur-winged Plover (migrant breeder)
Aythya nyroca Ferruginous Duck (migrant breeder)
4.4 Site holds 3,900- 7,300 raptors and 1,000- 6,000 cranes.
4.5 Site holds between 30,000- 40,000 waterbirds annually.

Appendix 10
Akrotiri Cliffs SPA Data Form

DESIGNATION OF SPECIAL PROTECTION AREAS IN THE SOVEREIGN BASE AREAS

1. **Site Name**:
Akrotiri Cliffs

2. **Site Administration:**
Sovereign Base Areas Administration

3. Site Description and Importance

The Akrotiri Cliffs are situated at the southern end of the Akrotiri Peninsula. Formed in the pleistocene geological period, the cliffs provide a combination of habitats including submerged and partially submerged sea caves and vegetated sea cliffs, adjacent to garigue and maquis habitats. The combination of these habitats and the relatively undisturbed location within a military Base provides important breeding sites for the migrant breeder Eleonora's Falcon (average nesting pairs over the last five years: 32), and the resident breeder European (Mediterranean) Shag.

4. Site holds the following birds qualifying under Directive 79/409/EEC on the Protection of Wild Birds as mirrored by the Protection and Management of Game and Wild Birds Ordinance.

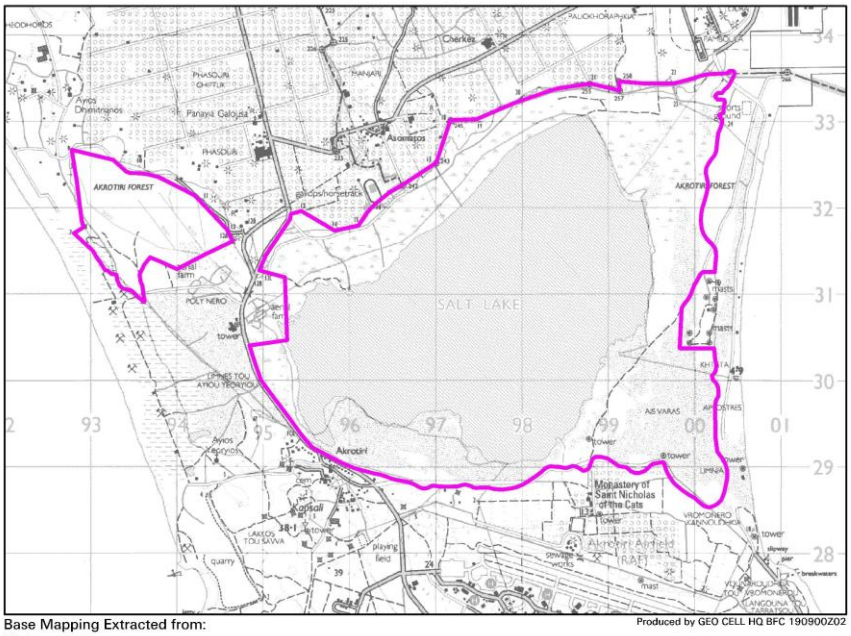
4. 1. Site holds at least 1% of a flyway or EU population of a threatened species at the EU level

Scientific name Common name
Falco eleonorae Eleonora's Falcon
Migrant breeder

4.2 Site is one of the five most important in Cyprus for a species or subspecies considered threatened in the EU.

Scientific Name Common name
Phalacrocorax aristotelis desmarestii
European (Mediterranean) Shag resident breeder
Falco eleonorae Eleonora's Falcon (migrant breeder)
Falco peregrinus Peregrine Falcon (resident breeder)

Appendix 11
Akrotiri Ramsar Site Map



Base Mapping Extracted from:
Series K717
Sheet 23
Edition 6 GSGS

Produced by GEO CELL HQ BFC 190900Z02

LEGEND

AKROTIRI

SOVEREIGN BASE AREAS, CYPRUS

RAMSAR SITE CODE :

Wetland of International Importance, Ramsar Convention boundary shown thus

Longitude: 32° 58' 00"

Latitude: 34° 37' 00"

Area of Ramsar site: 2171 ha

SCALE 1:50,000 Kms

Map 1 of 1

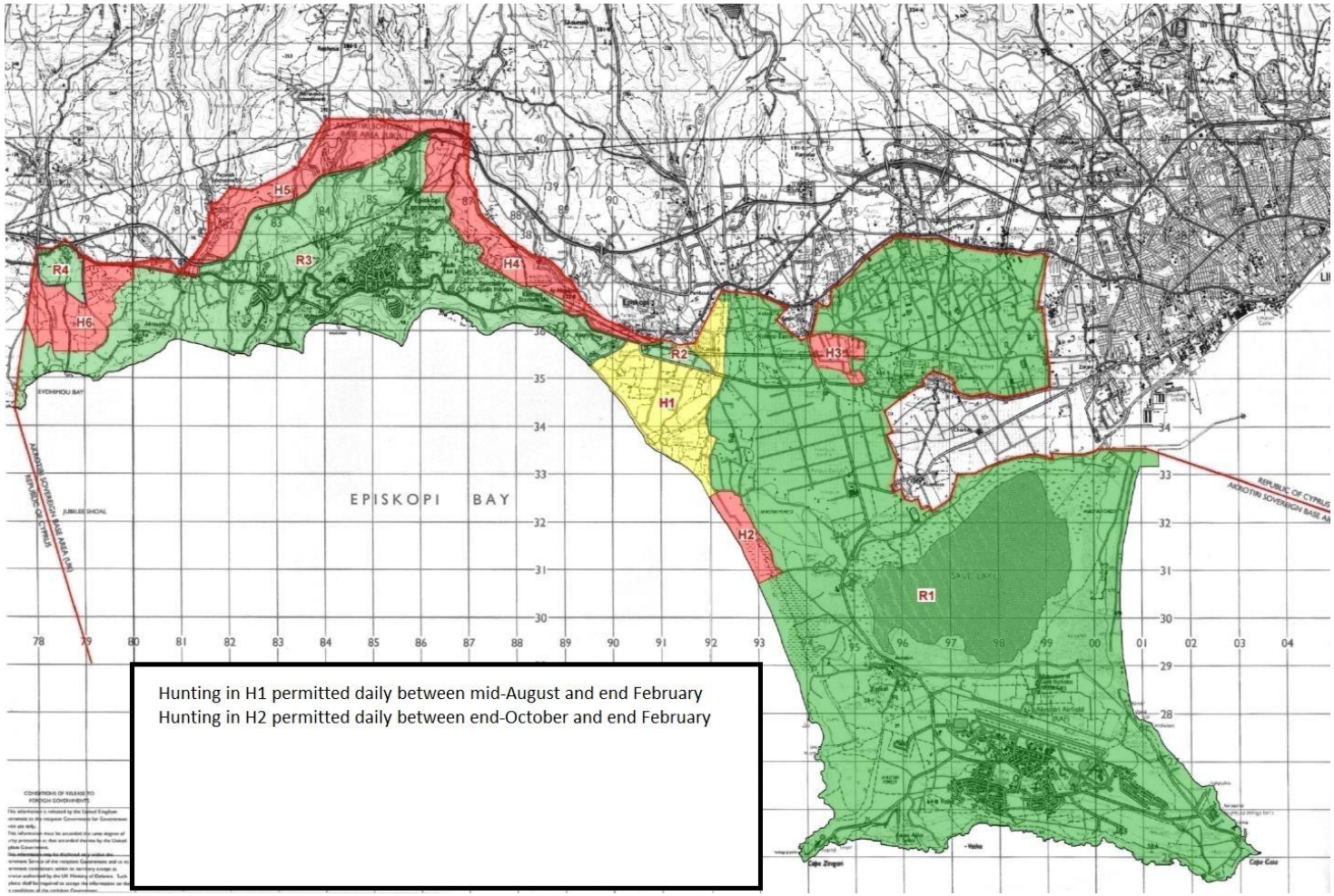
Version number: 1.0/19 December 2002

SCALE 1:50,000

1 0 1 2 3 Kilometres

Appendix 12

Hunting Areas H1 and H2 at Akrotiri



8 References

A. EIA for the construction and operation of a 20 MW photovoltaic park at Akrotiri, April 2015, AEOLIKI

B. Appropriate assessment of environmental impacts of the intended creation of a 20 MW photovoltaic park at Akrotiri, July 2016, Frederick University

C. EIA Committee opinion, 13 July 2017, Cyprus Environment Department

D. 20170906-AGLA_EAC_photovoltaic_park-LC4_EN17, 6 September 2017, Legislative Counsel Anthony Green

E. The Red Data Book of the Flora of Cyprus, 2007, Cyprus Forestry Association

F. Communication P. Charilaou (SBAA) with Takis Papachristoforou (Cyprus Forestry Department) in November 2016

G. Position Paper, Solar Energy, American Bird Conservancy, found at{ HYPERLINK "https://abcbirds.org/wp-content/uploads/2015/05/PP-Solar-Energy.pdf" }

H. A preliminary assessment of avian mortality at utility-scale solar energy facilities in the United Sates, Leroy J. Walston Jr. et al, 2016, found at

{ HYPERLINK "http://www.sciencedirect.com/science/article/pii/S0960148116301422/pdfft?md5=1ba6c7cca745b611daf0f7f47cac2516&pid=1-s2.0-S0960148116301422-main.pdf" }

I. Avian mortality at solar energy facilities in southern California: A preliminary analysis, Rebecca A. Kagan et al, 2014, found at https://alternativeenergy.procon.org/sourcefiles/avian-mortality-solar-energy-ivanpah-apr-2014.pdf

J. Akrotiri Peninsula Environmental Management Plan, SBAA Environment Department 2012, found at { HYPERLINK "http://www.sbaadministration.org/home/docs/eco/20121002_AKI_PEN_MGT_PLAN.pdf" }

K. Consolidation of previous bird studies at Akrotiri: A review of bird and other studies relevant to the impact of the Akrotiri antenna fields on birds and its mitigation, Alan Tye, 2013.

L. Important Bird Areas of Cyprus, Birdlife Cyprus, 2014

M. EIA for Lanitis Golf Development at Tserkez Chiftlik, and Asomatos at Fassouri, found at { HYPERLINK "http://www.moa.gov.cy/moa/environment/environmentnew.nsf/2014page49_gr/2014page49_gr?OpenForm" }

N. Distribution and population of the Red-footed falcon *Falco vespertinus* on the Akrotiri Peninsula, Davidson and Charilaou, 2009, found at { HYPERLINK "http://www.sbaadministration.org/images/AEEIC/publications/20090304_RFFreport.pdf" }

O. Unpublished PhD research data, Thomas Hadjikyriakou

P. E-mail from Demetris Koutroukides of the Cyprus Environment Department to Pantelis Charilaou of SBAA dated 14 September 2017.

Q. SPA Designation Order, SBAA, found at { HYPERLINK "http://www.sbaadministration.org/home/legislation/01_02_09_06_PIs/01_02_09_06_51_PI_2010/20100429_PI-13_u.pdf" }

R. Birdlife Cyprus, Cyprus Bird Reports 2012, 2013, 2014.

S. Hadjikyriakou, T. G. and Kirschel, A. N. G. 2016. Video evidence confirms cannibalism in Eleonora's falcon. *Journal of Raptor Research* 50 (2):220-223.

T. Communication P. Charilaou (SBAA) with Nicos Kassinis (Cyprus Game and Fauna Service) in November 2017.

Annex 1A

Amendment to the 'Report to inform the Appropriate Assessment (AA) for the proposed Electricity Authority of Cyprus (EAC) photovoltaic park at Akrotiri, Version 2.3, November 2017' Version 1.3 (final), 16th July 2018

Pantelis Charilaou, SBAA Environment and Conservation Officer

This document amends the above report - hereinafter referred to as the original report - in view of a revised proposal for the project itself. At the same time, it includes some new assessment information. For practicality purposes, it follows the same structure as the original report, amending each section separately. Any information in the original report not amended by this document is still valid.

1. Background

On 5th July 2018 the proponents submitted the revised proposal at Reference A1.

2. Details of the project

The revised proposal includes the construction and operation of a 12MW plant as a 'Phase A' and a possible extension in the future (Phase B), to cover 8 extra MW. The footprints of the two phases are shown in the map and plan at Appendix A1. The connection to the new EAC substation remains the same as in the original proposal.

3. Likely impact on Special Protection Areas (SPAs), Special Areas of Conservation (SACS) and other important features

No amendment to this section.

3.1 Impact on habitats and flora

Phase A covers 160,500 m² of agricultural land, involving mostly seasonal crops and a small part (7,000 m²) of fruit-trees. It also covers 2,700 running metres of tall trees along boundaries of the different plots, out of which 900 metres will remain and 1,800 will be removed.
The impact of the power-cable cross remains insignificant and the same mitigation applies. Phase A has no impact on *Urtica membranacea.*

3.2 Impact on birds

3.2.1 Impact on all bird species in the designation of Akrotiri Wetlands SPA and Akrotiri Cliffs SPA

In addition to the literature referenced in the original report, in 2017, Natural England commissioned the Manchester Metropolitan University to carry out an evidence review of the ecological impact of solar farms (Reference A2), which aimed to gather and synthesise evidence from the scientific and grey literature on the ecological implications of solar farms, with special emphasis to birds and bats. The report generally confirms the analysis in the original report, for lack of ecological evidence with incidental and informal evidence suggesting low (with no absolute or relative definition of this term) but not impossible collision risk. It also highlights a general agreement to avoid protected areas based on the precautionary principle, and highly recommends research into the ecological impacts of solar PV arrays.

3.2.1.1 Collisions with communication antennae

No amendment to this section.

3.2.1.2 Collisions with aircraft

No amendment to this section.

3.2.1.2 Shooting of protected bird species

A recent analysis by the RoC Game Fund suggests that Akrotiri Peninsula is one of the hotspots of protected-bird illegal shooting, with 10-15% of all dead/injured, protected birds, recovered island-wide, originating from Akrotiri.

3.2.1.3 Cumulative bird mortality risk

There has been substantial progress with respect to mitigation on bird mortality due to collisions with communication antennae and shooting of protected bird species, as prescribed in Appendix A2. It is also estimated that the lake effect risk of the revised application is lower than the original application. It is considered that this combination of mitigation with the smaller project

size of Phase A will reduce the cumulative bird mortality risk. It is also considered that monitoring the effectiveness of the mitigation (for collisions, shooting and lake effect) will help reduce uncertainty, better assess bird mortality and propose possible improved mitigation.

3.2.2 Bird species of the SPA designations affected by the proposed habitat changes in the project

3.2.2.1 Percentage loss of habitat from the project for designation bird species

Phase A represents 37% of the total footprint area used for the calculations in the original report. Therefore, the bird habitat loss for Phase A reduces to:

Bird species	Total Habitat sq. Metres	% Loss of Habitat at Akrotiri Peninsula
Red-footed falcon	35,437,915	0.44
Eleonora's falcon	74,869,651	0.22
Honey buzzard	58,988,931	0.26
Saker falcon	58,988,931	0.26
Demoiselle crane	18,624,698	0.89
Marsh harrier	34,190,928	0.48
Pallid harrier	58,988,931	0.26
Peregrine falcon	68,996,789	0.22
Bee-eater	74,223,411	0.22

3.2.2.2 Habitat loss for bird species in combination with other plans or projects

Based on the reduced loss of habitat, the cumulative impact with other projects or plans reduces to:

Bird species	Total Habitat sq. Metres	Total % Loss of habitat
Red-footed falcon	35,437,915	4.44 + Casino + NMD

Eleonora's falcon	80,869,651	1,92 + Casino + NMD + Military Development
Honey buzzard	58,988,931	0,26 + NMD + Military Development
Saker falcon	58,988,931	0,26 + NMD + Military Development
Demoiselle crane	18,624,698	0,89 + NMD
Marsh harrier	34,190,928	0,48 + NMD + Military Development
Pallid harrier	58,988,931	0,26 + NMD + Military Development
Peregrine falcon	68,996,789	0,22 + NMD + Military Development
Bee-eater	74,223,411	2,12 + Casino + NMD + Military Development

3.2.2.3 Qualitative impact assessment of habitat loss on designation bird species

No amendment to this section.

3.2.2.3.1 Eleonora's falcons

According to the paper at Reference A3, the Cyprus population size was stable between 2000 and 2017 with a mean of 232 adults per season between 2012 and 2017.

Additional analysis of the data collected in the study at reference I (of the original report) shows that 68% of the hotspots for Eleonora's falcon activity within Akrotiri Peninsula were associated with fruit-tree plantations in combination with tall-tree lines along plot boundaries. The footprint of Phase A of the project affects one hotspot, the second one being associated with Phase B.

3.2.2.3.2 Red-footed falcons

No modification to this section.

3.2.2.3.3 Honey buzzards

No modification to this section.

3.2.2.3.4 Marsh harriers

No modification to this section.

3.2.2.3.5 Pallid harriers

No modification to this section.

3.2.2.3.6 Saker falcons

No modification to this section.

3.2.2.3.7 Demoiselle cranes

No modification to this section.

3.2.2.3.8 Peregrine falcons

No modification to this section.

3.2.2.3.9 Bee-eaters

No modification to this section.

4 Proposed mitigation

4.1 Mitigation for flora and bird habitat loss

No mitigation for flora is required for Phase A.
The tree-line along the northern boundary of the Phase A footprint will be retained and extended.
EAC proposes to plant up to 8,000 trees to compensate for the removal of around 3,800 trees for both Phases A and B. This proposal may be meeting the EIA requirements, but in terms of the AA and the associated bird habitat, especially for the Eleonora's and Red-footed falcons, it is considered that the tree-lines will have to be combined with fruit-tree or other irrigated, properly maintained plantations.
EAC are proposing to fund monitoring surveys for bird interest at the footprint of the whole project, during appropriate periods before and after construction, with a view to inform further assessment, including for possible Phase B extension. A rough estimate of the cost has been made, but more accurate costing is required in due course.

4.2 Mitigation for bird mortality

Mitigation measures for reducing bird mortality due to collisions with antennae and illegal shooting have been secured as prescribed in Appendix A2.
It is considered, based on existing surveys and literature, that, appropriate installation of bird deflectors on guy wires in all the antenna sites will reduce considerably the collision risks. A

difficulty remains with the actual antenna wires, which, according to the operators of the sites, cannot be fitted with deflectors. Some of these wires could be 'screened' by guy wires and their deflectors, but mitigation needs to be considered for the rest. A model of bird flight-paths and antenna arrangements is currently being prepared by the SBA Environment Department, with a view to inform mitigation in further detail. At the same time, DIO is investigating the use of radar technology which will assist with monitoring bird movements for a variety of purposes, including assessment and mitigation. Such technology should be used in combination with site surveys for assessment of bird collisions before and after the installation of bird deflectors. Also, there has been progress with the survey commissioned for the creation of extra flight-path space north of the antenna sites, which will work in combination with the installation of bird deflectors. The survey is now being finalised by the consultants and the SBA Authorities have engaged in discussions with the Cyprus Forestry Department with a view to agree the way forward.

Proper implementation of the policing and monitoring plan for the hunting area is expected to minimise the shooting of protected birds.

EAC are proposing to fund a monitoring scheme to collect actual collision data, to assess the impact of the 'Lake Effect', with a view to apply mitigation, if necessary, and inform the assessment for Phase B. A rough estimation for the cost has been made, but this needs to be confirmed more accurately.

4.3 Residual impact

Flora

No residual impact on important flora species is expected from Phase A.

Bird mortality

Proper implementation of the mitigation outlined in 4.2 is expected to reduce significantly the cumulative bird mortality.

The uncertainty in the numbers and species involved should also be minimised through appropriate implementation of monitoring.

Habitat loss for designation birds

In quantitative terms, the percentages of bird habitat loss for Phase A have reduced to the figures in 3.2.2.1. In qualitative terms, avoiding the citrus plantation (in Phase A) will minimise the habitat loss for Eleonora's falcons and to a certain degree for Red-footed falcons. However, it is expected that there will be a temporary impact on bird interest in general, in the form of disturbance, during the construction of Phase A. At the same time, it is not possible to predict

the indirect and/or fragmentation impact during the operation of Phase A on the habitat use by Eleonora's and Red-footed falcons of the citrus plantation in the footprint for Phase B.
As far as the cumulative impact is concerned, although percentage losses analysed in 3.2.2.2 are reduced for Phase A, the analysis in the original report still applies. The same applies to the military development element.
The SEIA report for NMD has not been finalised yet, but the draft has identified the proposals which could contribute to the cumulative habitat loss for designation birds and made appropriate rectifying recommendations.

5 Uncertainty and Gaps

The 'Lake effect'
It is estimated that the risk and uncertainty for Phase A is reduced due to the reduced size and modified outline. Also, the proposed monitoring surveys are expected to provide more information to reduce uncertainty.

Collisions with antennae mortality

The installation of bird deflectors on guy wires is expected to reduce the uncertainty in this area, especially when combined with a monitoring scheme.

Shooting of protected bird species

The proposed policing of hunting is expected to minimise uncertainty in this area.

Habitat loss for designated bird species

No amendment to this section.

Conflict of bird interest with the operation of RAF airport.

No amendment to this section.

6 Conclusions and recommendations

6.1 Current project

The revised proposal is improved compared to the original one, especially in the reduced Phase A avoiding the citrus plantation and committing for further surveys to fill in the gaps in knowledge. The NMD process has not progressed as expected and it is difficult to predict when it will be completed. Therefore, it is considered inappropriate to delay the decision on the

project further, but at the same time it is deemed necessary to ensure that NMD will take appropriate account of the assessment and outcome of this application.

Wider issues

6.1.1 The recommendation in the original report in terms of bird collisions with antennae is being addressed as prescribed in Appendix A2.

6.1.2 The recommendation in the original report in terms of the monitoring and policing of the hunting area at Akrotiri is being addressed as prescribed in Appendix A2.

6.1.3 The recommendation in the original report to assess the hunting intensity at Akrotiri is being addressed as prescribed in Appendix A2.

6.1.4 The recommendation in the original report with respect to research on the habitat requirements of the designated bird species is being addressed as prescribed in the mitigating measures of the Technical consideration summary at Annex 2.

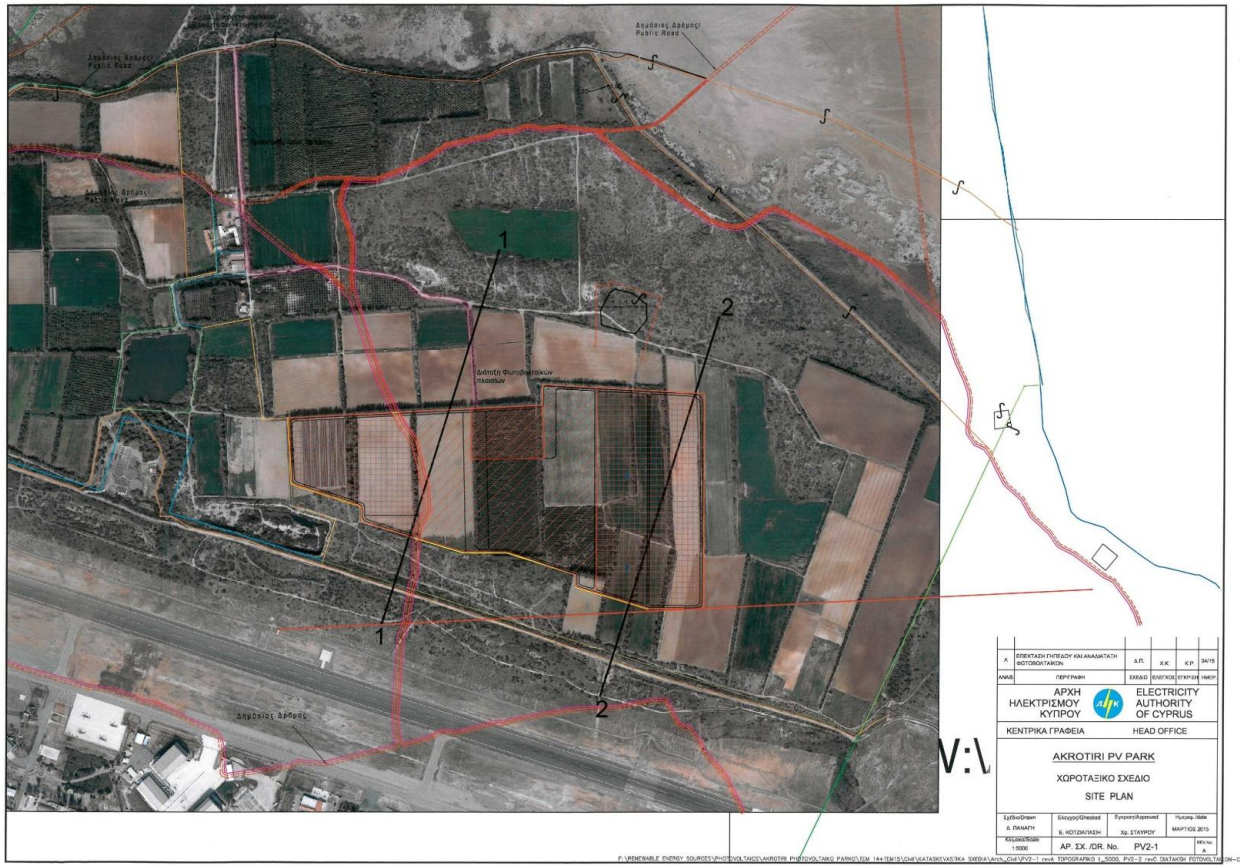
7 Appendices

Appendix A1

EAC map with proposed Phases A and B

Phase A footprint shown double hatched

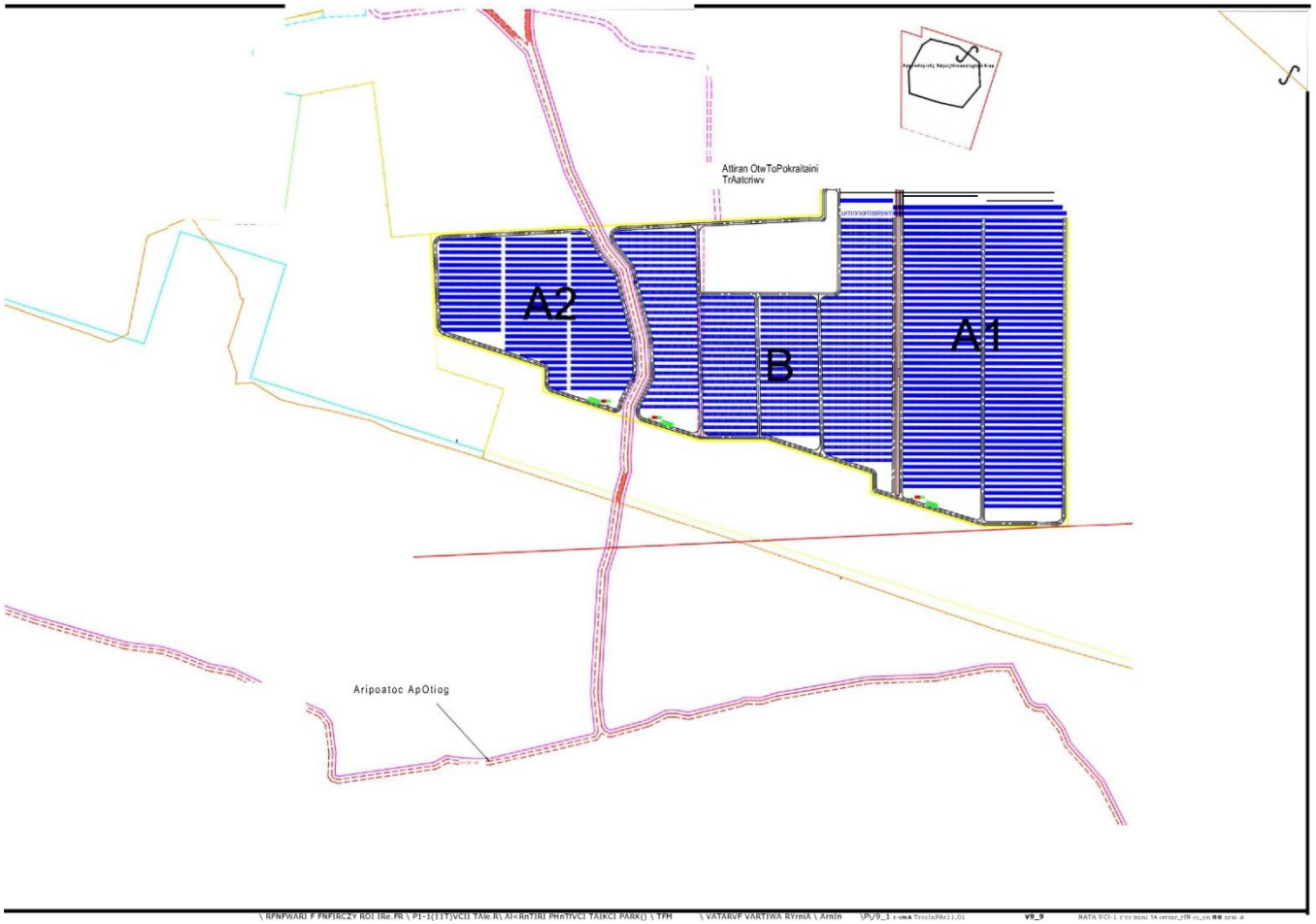
Phase B footprint shown hatched



EAC plan with proposed Phases A and B

Phase A: A1 + A2

Phase B: B



Appendix A2

SBAA/BFC Mitigation measures for bird mortality under the Appropriate Assessment for the 'Development and operation by the Electricity Authority of Cyprus, of a 12 MW photovoltaic park at Akrotiri, version 1.4, dated 25th July 2018'

The following measures will be implemented by SBAA/BFC to reduce the mortality of protected birds at Akrotiri Peninsula:

1. Bird deflectors of appropriate design and density will be installed before end-October 2018 on the guy wires of five masts of the 'SLS Charlie' antenna.
2. A modelling exercise for bird flight paths and collision risks will be completed before end-September 2018, to establish which of the remaining guy wires within the whole of the antenna site at Akrotiri Salt Lake need to be fitted with bird deflectors.
3. Bird deflectors will be installed according to the recommendations of the modelling exercise at 2 above, during the period 2019-2024, in parallel to the maintenance scheme of the antenna sites.
4. A joint monitoring scheme will be developed and implemented before end-2019, to assess the success of the bird deflector mitigation and recommend possible improvements.
5. An alternative flight path north of the antenna sites will be created before end-2019, under the recommendations of the flight path survey underway.
6. A policing and monitoring scheme will be implemented at Akrotiri, within hunting areas H1 and H2, to reduce the mortality of protected birds by 75%, under the following parameters:
    A. The scheme will cover from mid-August to end-February.
    B. The operations will start in August 2018 and will cover two days a week, one of which on a weekend, with two patrols in each operation. The effectiveness will be continuously assessed with a view to gradually reduce the frequency of operations to the minimum required to maintain the mortality rate at the target level.
    C. The patrols will be covered by the SBA Police together with the SBAA Environment Department and/or Cyprus Game Fund.
    D. A joint report will be prepared every year by end-March, to review the methodology, assess the results of the operations and propose the way forward for the next period.

8 References

A1. Phased Development Proposal for 20 MW Akrotiri P.V. Park, Electricity Authority of Cyprus, July 2018

A2. Evidence review of the impact of solar farms on birds, bats and general ecology (NEER012), 1st Edition, Chris Harrison et al, 9th March 2017

A3. Breeding success of Eleonora's falcon in Cyprus revisited, Thomas Hadjikyriakou et al, 2018

Annex 2
Technical consideration summary

SPA / SAC / Ramsar Site Feature	Conservation Objective / Favourable Condition Attribute	Potential Hazards of the plan or project	Avoidance and Mitigating Factors or Measures (if appropriate)	Probability, Magnitude, Likely Duration and Reversibility of residual impacts	In Combination Effects (if appropriate)	Conclusion
Akrotiri SAC 'Juniperus phoenicea Arborescent Matorral' habitat (code 5212)	Avoid the deterioration of the qualifying natural habitat ensuring the integrity of the site is maintained and the site makes a full contribution to achieving Favourable Conservation Status of each of the qualifying features**.** Subject to natural change, to maintain or restore: • The extent and distribution of the habitat; • The structure and function (including typical species) of the habitat; • The supporting processes on which the habitat rely	**Direct loss of habitat** Temporary loss of habitat during the crossing of a power cable. Introduction or spread of alien invasive plant species.	Collection and re-instatement of top soil. Monitoring and managing alien invasive species such as *Acacia saligna* for a period of time to be defined under a monitoring program. Minimising the width of the crossing by using either hand tools or narrow machinery. Physical restriction of access during the construction to avoid impact to areas beyond the footprint of the excavation.	Residual impacts after implementation of mitigating measures are minimal.	None known/anticipated.	No likely significant effect.

Akrotiri Wetlands SPA **Akrotiri Cliffs SPA** **Akrotiri Ramsar Site** Eleonora's falcon *Falco Eleonorae* European shag *Phalacrocorax aristotelis Desmarestii* Peregrine falcon *Falco peregrinus* Great white pelican *Pelecanus onocrotalus* Purple heron *Ardea purpurea* Glossy ibis *Plegadis falcinellus* Greater flamingo *Phoenicopterus roseus* Honey buzzard *Pernis apivorus* Marsh harrier *Circus aeruginosus* Pallid harrier *Circus macrourus* Red-footed falcon *Falco vespertinus* Saker falcon *Falco cherrug* Crane *Grus grus* Collared pratincole *Glareola pratincola*	With regard to the individual species and/or assemblage of species for which the site has been classified avoid the deterioration of the habitats of the qualifying features, and the significant disturbance of the qualifying features, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving the aims of the Ordinance. Subject to natural change, to maintain or restore: • The extent and distribution of the habitats of the qualifying features; • The structure and function of the habitats of the qualifying features; • The supporting processes on which the habitats of the qualifying features rely; • The populations of the qualifying features; • The distribution of the qualifying features within the site.	**Potential bird mortality** during the operation of the photovoltaic plant due to the 'Lake Effect'.	Due to the uncertainty and current lack of knowledge, there are no known effective mitigation measures, other than suggestions for optimal project siting locations to avoid important bird areas. There are also some suggestions for fitting visual cues on the panels to reduce their water-like appearance/perception by birds, but these have not been tested yet. The bird collision monitoring scheme is expected to provide actual data which can be used to inform mitigation and the assessment for a possible Phase B. The secured mitigation measures for bird collisions with antennae, which include fitting bird deflectors on guy wires, creation of extra flight-path space north of the antenna sites and associated monitoring for both, is expected to reduce considerably bird collisions. Mitigation with respect to antenna wires which could still pose collision risks will also need to be implemented following the conclusion of the relevant study. The secured policing and monitoring plan for hunting will minimise the shooting of protected birds.	Predicting the impact of the Lake Effect in both quantitative and qualitative terms under the current knowledge is difficult. The only quantitative data available exist in a different context and location and suggest a rough figure of 10.7 birds per MW per year, comprising 0.5 birds of known photovoltaic project-related fatality and 10.2 of unknown fatality. Based on this rough estimate, fatality for a12 MW plant calculates to 128 birds per year, but whether any figure is significant or not will depend largely on which bird species are likely to be involved.	Cumulative mortality due to collisions with communication antennae and aircraft, and shooting of protected bird species is covered in sections 3.2.1, 3.2.1.1, 3.2.1.2 and 3.2.1.3 of the report at Annex 1 and the report amendment at Annex 1A.	Despite the uncertainty involved, it is considered that, provided there will be appropriate implementation of all mitigation, the cumulative mortality of designated bird species will not be significant.

Kentish plover *Charadrius alexandrinus* Slender-billed gull *Larus genei* Gull-billed tern *Sterna nilotica* Black-winged stilt *Himantopus himantopus* Ferruginous duck *Aythya nyroca* Squacco heron *Ardeola ralloides* Demoiselle crane *Anthropoides virgo* Shelduck *Tadorna tadorna* Greater sand plover *Charadrius leschenaultia* Little stint *Calidris minuta* Ruff *Philomachus pugnax* White-winged tern *Chlidonias leucopterus* Bee-eater Merops apiaster Spur-winged plover *Vanellus spinosus* Other raptors Other water-birds **Akrotiri Wetlands SPA** **Akrotiri Cliffs SPA** **Akrotiri Ramsar Site** Red-footed falcon *Falco vespertinus*	With regard to the individual species and/or assemblage of species for which the site has been classified avoid the	**Direct loss, degradation and fragmentation of bird habitat.**	Maintain and extend the tree line along the northern boundary of the project footprint in order to maintain the bird interest and wider biodiversity. Plant trees and other vegetation along the access road to the project, in an agreed manner, in order	The habitat loss for the nine bird species is quantified in 3.2.2.1 of the report at Annex 1 and 3.2.2.1 of the amendment report at Annex 1A.	The habitat loss in combination with other projects, plans and activities is assessed in 3.2.2.2 and 3.2.2.3 of the report at Annex 1	It is considered that the habitat loss of **the project alone** (Phase A) is not significant.

Eleonora's falcon *Falco eleonorae* Honey buzzard *Pernis apivorus* Saker falcon *Falco cherrug* Demoiselle crane *Grus virgo* Marsh harrier *Circus aeruginosus* Pallid harrier *Circus macrourus* Peregrine falcon *Falco peregrinus* Bee-eater *Merops apiaster*	deterioration of the habitats of the qualifying features, and the significant disturbance of the qualifying features, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving the aims of the Ordinance. Subject to natural change, to maintain or restore: • The extent and distribution of the habitats of the qualifying features; • The structure and function of the habitats of the qualifying features; • The supporting processes on which the habitats of the qualifying features rely; • The populations of the qualifying features; The distribution of the qualifying features within the site.		to enhance the bird interest and wider biodiversity. It is noted, however, that the planting of tall trees, in case the bird interest within the citrus plantation is affected, due to either Phase A or Phase A and B, will need to be combined with mitigation/compensation in the form of maintaining citrus or other irrigated plantation of appropriate size, location and maintenance regime. EAC to fund a monitoring scheme for the bird interest at the footprint of both Phases A and B, during appropriate periods, before and after construction.		and 3.2.2.2 and 3.2.3 of the amendment report at Annex 1A.	There is extensive uncertainty in relation to the **cumulative** impact of development on the habitats of all nine bird species, as analysed in section 4.3 of the Report at Annex 1.