AVIFAUNAL IMPACT ASSESSMENT

Camden Green Ammonia and Hydrogen Facility & Grid Connection

Mpumalanga Province

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EXECUTIVE SUMMARY

1 BACKGROUND

The proposed Camden Renewable Energy Complex (the 'Complex') is being developed by ENERTRAG South Africa (Pty) Ltd ("ENERTRAG" or "Developer") in the context of the Department of Mineral Resources and Energy's (DMRE) Integrated Resource Plan, and the Renewable Energy Independent Power Producer Procurement Programme (REIPPP).

The Complex can be divided into eight (8) Projects, namely:

- Camden I Wind Energy Facility (up to 200MW).
- Camden I Wind Grid Connection (up to 132kV).
- Camden up to 400kV Gid Connection and Collector substation.
- Camden I Solar up to 100MW.
- Camden I Solar up to 132kV Gid Connection.
- Camden Green Hydrogen and Ammonia Facility, including grid connection infrastructure.
- Camden II Wind Energy Facility (up to 200MW).
- Camden II Wind Energy Facility up to 132kV Gid Connection.

This impact report deals with the Camden Green Hydrogen and Ammonia facility (the Facility) and 132kV grid connection.

2 AVIFAUNA

The SABAP2 data indicates that a total of 234 bird species could potentially occur within the broader area – Appendix 1 provides a comprehensive list of all the species. Of these, 15 species are classified as priority i.e. Red List species. Of the priority species, 10 are likely to occur regularly in the development area.

3 SUMMARY AND CONCLUSION

3.1 Green Ammonia and Hydrogen Facility

The proposed Facility will have two potential impacts on priority avifauna. These impacts are the following:

- Displacement due to disturbance associated with the construction of the Facility.
- Displacement due to habitat transformation associated with the construction of the Facility.

3.1.1 Displacement of priority species due to disturbance linked to construction activities in the construction phase

Apart from direct habitat destruction, the construction activities could impact on birds through disturbance; this could lead to breeding failure if the disturbance happens during a critical part of the breeding cycle. Construction activities in close proximity to breeding locations could be a source of disturbance and could lead to temporary breeding failure or even permanent abandonment of nests. A potential mitigation measure is the timeous identification of nests and the timing of the construction activities to avoid disturbance during a critical phase of the breeding cycle, although in practice that can admittedly be very challenging to implement. Terrestrial species and owls are most likely to be affected by displacement due to disturbance. The priority species which are potentially vulnerable to this impact are Secretarybird, Denham's Bustard, White-bellied Bustard, Blue Crane, Grey Crowned Crane, Blue Korhaan and African Grass Owl. The impact is rated as **Low** pre-mitigation and will be reduced but remain at a **Very Low** level post-mitigation.

3.1.2 Displacement of priority species due to habitat transformation in the construction phase

These activities will impact on birds breeding, foraging and roosting in or in close proximity of the proposed facility through **transformation of habitat**, which could result in temporary or permanent displacement. Unfortunately, very little mitigation can be applied to reduce the significance of this impact as the total permanent transformation of the natural habitat within the construction footprint of the facility is unavoidable. The loss of habitat for priority species due to direct habitat transformation associated with the construction of the 25 ha proposed facility is likely to be moderate due to the relatively small size of the footprint, but ideally high quality grassland should be avoided if possible. Terrestrial species and owls are most likely to be affected by displacement due to habitat transformation. The priority species which are potentially vulnerable to this impact are Secretarybird, Denham's Bustard, White-bellied Bustard, Blue Crane, Grey Crowned Crane, Blue Korhaan and African Grass Owl. The impact is rated as **Low** pre-mitigation and will be reduced but remain at a **Low** level post-mitigation.

3.2 The up to 132kV OHL

The following potential impacts on powerline sensitive avifauna are associated with the construction and operation of the up to 132kV grid connection related to the Facility:

- Mortality due to electrocution on the proposed 132kV OHL infrastructure
- Mortality due to collisions with the proposed 132kV OHL.

3.2.1 Mortality of powerline sensitive avifauna due to electrocutions on the OHL

Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components (Van Rooyen 2004). The electrocution risk is largely determined by the voltage size of the proposed powerline and the pole/tower design. Should the proposed OHL be constructed using a 132kV tower specification, the electrocution impact for the majority of priority species will be negligible. The only priority species capable of bridging the clearance distances of an OHL constructed using this specification is the Cape Vulture, due to their size and gregarious nature. The impact is rated as **Low** pre-mitigation and it will decrease to **Very Low** post-mitigation due to the short length of line.

3.2.2 Mortality of powerline sensitive avifauna due to collisions with the OHL

Collisions are perhaps the biggest threat posed by high voltage lines to birds in southern Africa (Van Rooyen 2004). Most heavily impacted upon are bustards, storks, cranes and various species of waterbirds, and to a lesser extent, vultures. These species are mostly heavy-bodied birds with limited manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with transmission lines (Van Rooyen 2004, Shaw et al. 2017). However, the small length of line (approximately 100m) significantly reduces the potential collision risk. The priority species which are potentially vulnerable to this impact are Secretarybird, Denham's Bustard, White-bellied Bustard, Blue Crane, Grey Crowned Crane, Wattled Crane, Southern Bald Ibis, Blue Korhaan, African Grass Owl and Cape Vulture. The impact is rated as **Low** pre-mitigation and it will decrease to **Very Low** post-mitigation.

3.3 Cumulative impacts

3.3.1 Green Ammonia and Hydrogen Facility

The total area of similar habitat (excluding opencast mining and urban areas) available to birds in the 30km radius around the project area is approximately 4 258 km². The land parcels affected by the planned renewable energy facilities, which include the 25ha that will be taken up by the Facility, within this radius takes up a total of ~124km², which is 2.9% of the available habitat. The impact on avifauna of the currently planned renewable energy projects within this area, including the proposed Facility, is therefore considered to be **Low**, and the impact could be reduced if the recommended mitigation at the two Camden wind projects and the Camden I SEF is diligently implemented.

3.3.2 Up to 132kV OHL

The existing high voltage lines in the 30km radius around the proposed Facility run into hundreds of kilometres (see Figure 4). The up to 132kV contribution (maximum 100m) to the total length of high voltage lines within a 30km radius is **Very Low**. However, the density of all planned and existing high voltage lines within a 30km radius, and by implication the cumulative impact on avifauna, is considered to be **Moderate**.

4 ENVIRONMENTAL SENSITIVITIES

The following specific environmental sensitivities were identified from an avifaunal perspective (see Figure a):

Development in the remaining high sensitivity grassland must be limited as far as possible. The grassland is vital breeding, roosting and foraging habitat for a variety of SCC. These include Blue Crane (SA status near-threatened), Blue Korhaan (Global status near -threatened), White-bellied Bustard (SA Status Vulnerable), Denham's Bustard (SA Status Vulnerable).

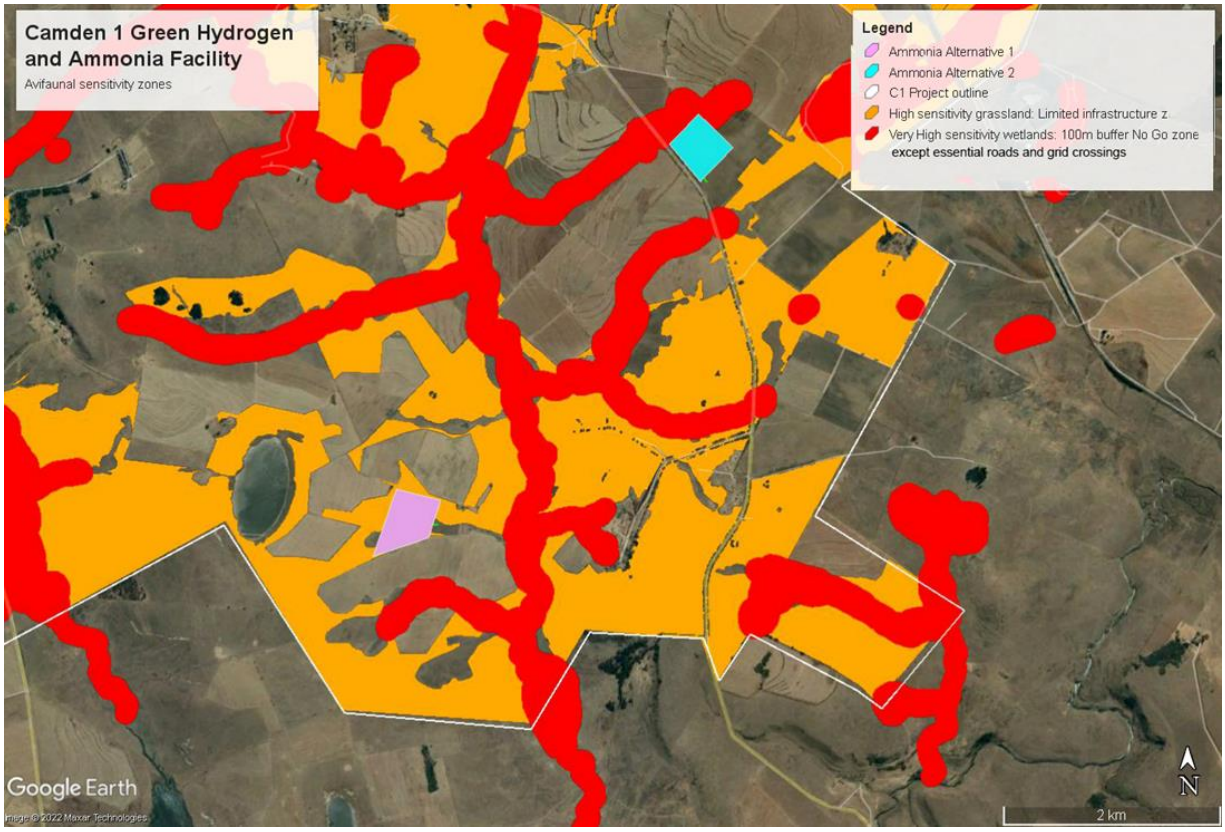

Figure a: Avifaunal sensitivity zones at the proposed Green Ammonia and Hydrogen facility.

5 CONCLUSION AND IMPACT STATEMENT

5.1 Green Ammonia and Hydrogen Facility

The proposed Facility will have a **Low** impact on priority avifauna which, in most instances, could be reduced to a **Very Low** impact through appropriate mitigation, although some instances Low residual impacts will still be present after mitigation. No fatal flaws were discovered during the onsite investigations. The proposed development is therefore supported, provided the mitigation measures listed in this report are strictly implemented.

5.2 The up to 132kV OHL

The proposed up to 132kV OHL will have a **Low** impact on priority avifauna which, in all instances, could be reduced to a **Very Low** impact through appropriate mitigation. No fatal flaws were discovered during the onsite investigations. The proposed development is therefore supported, provided the mitigation measures listed in this report are strictly implemented.

CONTENTS

DETAILS OF THE SPECIALIST

Chris van Rooyen (Bird Specialist)

Chris has 25 years' experience in the management of wildlife interactions with electricity infrastructure. He was head of the Eskom-Endangered Wildlife Trust (EWT) Strategic Partnership from 1996 to 2007, which has received international acclaim as a model of co-operative management between industry and natural resource conservation. He is an acknowledged global expert in this field and has worked in South Africa, Namibia, Botswana, Lesotho, New Zealand, Texas, New Mexico and Florida. Chris also has extensive project management experience and has received several management awards from Eskom for his work in the Eskom-EWT Strategic Partnership. He is the author of 15 academic papers (some with co-authors), co-author of two book chapters and several research reports. He has been involved as ornithological consultant in numerous power line and wind generation projects. Chris is also co-author of the Best Practice for Avian Monitoring and Impact Mitigation at Wind Development Sites in Southern Africa, which is currently (2016) accepted as the industry standard. Chris also works outside the electricity industry and had done a wide range of bird impact assessment studies associated with various residential and industrial developments.

Albert Froneman (Bird and GIS Specialist)

Albert has an M. Sc. in Conservation Biology from the University of Cape Town and started his career in the natural sciences as a Geographic Information Systems (GIS) specialist at Council for Scientific and Industrial Research (CSIR). In 1998, he joined the Endangered Wildlife Trust where he headed up the Airports Company South Africa – EWT Strategic Partnership, a position he held until he resigned in 2008 to work as a private ornithological consultant. Albert's specialist field is the management of wildlife, especially bird related hazards at airports. His expertise is recognized internationally; in 2005 he was elected as Vice Chairman of the International Bird Strike Committee. Since 2010, Albert has worked closely with Chris van Rooyen in developing a protocol for pre-construction monitoring at wind energy facilities, and he is currently jointly coordinating pre-construction monitoring programmes at several solar facility facilities. Albert also works outside the electricity industry and had done a wide range of bird impact assessment studies associated with various residential and industrial developments.

1 INTRODUCTION

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This impact report deals with the Camden Green Hydrogen and Ammonia facility (the Facility) and 132kV grid connection.

1.1 Camden Green Hydrogen and Ammonia Facility

Table 1 summarises the main features of the proposed Facility, relevant to potential avifaunal impacts.

Table 1: Camden Green Hydrogen and Ammonia Facility summary

No.	Component	Footprint (Ha)
1	Water Reservoir	2
2	Water Treatment Unit	1.5
3	Electrolyser Unit	1
4	Air Separation Unit	0.5
5	Ammonia Processing Unit	2
6	Liquid Air Storage System (LAES)	1
7	Liquid Ammonia Storage Tank	2
8	Hydrogen and Oxygen Storage Tank Farm	12
9	Ancillary infrastructure	3
	Total Footprint	25

1.2 Up to 132kV Grid Connection

There will be a very short (100m) grid line (up to 132kV) for the ammonia plant as well to allow for a connection between the adjacent MTS and green hydrogen and ammonia plants. See Figure 1 for a map of the development area.

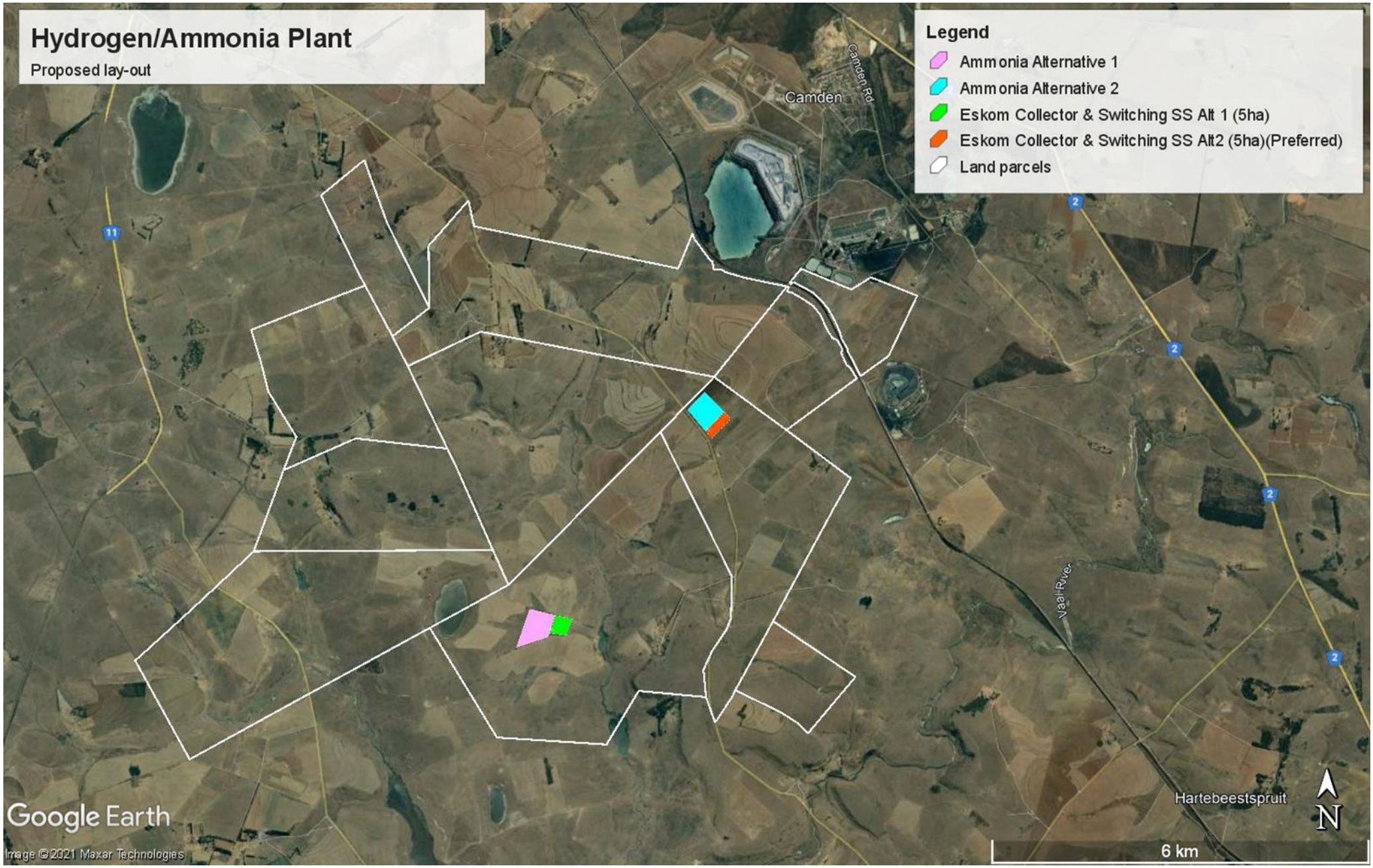


Figure 1: Conceptual lay-out of the proposed Camden Green Hydrogen and Ammonia Facility, showing the alternative locations.

2 TERMS OF REFERENCE & PROTOCOLS

2.1 Green Hydrogen and Ammonia Facility

The Protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial animal species (Government Gazette No 43855, 30 October 2020).

2.2 Up to 132kV grid connection protocol

The Protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial animal species (Government Gazette No 43855, 30 October 2020).

The purpose of the specialist report is to determine the main issues and potential impacts of the Facility and grid connection, based by the on existing information and field assessments, according to the said protocols. In summary, the protocols require the following:

- Describe the affected environment from an avifaunal perspective.
- Discuss gaps in baseline data and other limitations and describe the expected impacts associated with the Facility and the up to 132kV grid connection.
- Identify potential sensitive environments and receptors that may be impacted on by the proposed Facility and 132kV grid connection and the types of impacts (i.e. direct, indirect and cumulative) that are most likely to occur.
- Determine the nature and extent of potential impacts during the construction, operational and decommissioning phases of the Facility and up to 132kV grid connection.
- Identify avifaunal sensitivities, including 'No-Go' areas, where applicable.
- Recommend mitigation measures to reduce the impact of the expected impacts.
- Provide an impact statement on whether the projects should be approved or not.

3 OUTLINE OF METHODOLOGY AND INFORMATION REVIEWED

The following methods were employed to conduct this study:

- Priority species were defined as follows:
  - South African Red Data species: High conservation significance.
- Bird distribution data from the Southern African Bird Atlas Project 2 (SABAP 2) was obtained (http://sabap2.adu.org.za/), in order to ascertain which species, occur in the pentads where the proposed development is located. A pentad grid cell covers 5 minutes of latitude by 5 minutes of longitude (5' × 5'). Each pentad is approximately 8 × 7.6 km. To get a more representative impression of the birdlife, a consolidated data set was obtained for a total of 16 pentads some of which intersect and others that are near the development areas, henceforth referred to as "the broader area" (see Figure 2Figure 2). The decision to include multiple pentads around the development area was to get a more representative picture of the bird abundance and variety in the region. The additional pentads and their data augment the bird distribution data. A total of 165 full protocol lists (i.e. bird listing surveys lasting a minimum of two hours each) and 227 ad hoc protocol lists (surveys lasting less than two hours but still yielding valuable data) have been completed to date for the 16 pentads where the development area is located. The SABAP2 data was therefore regarded as a reliable reflection of the avifauna which occurs in the area, but the data was also supplemented by data collected during the site surveys and general knowledge of the area.
- A classification of the vegetation types in the development area was obtained from the Atlas of Southern African Birds 1 (SABAP1) and the National Vegetation Map compiled by the South African National Biodiversity Institute (Mucina & Rutherford 2006).

- The national threatened status of all priority species was determined with the use of the most recent edition of the Red List Book of Birds of South Africa, Lesotho and Swaziland (Taylor *et al.* 2015), and the latest authoritative summary of southern African bird biology (Hockey *et al.* 2005).
- The global threatened status of all priority species was determined by consulting the latest (2021.3) IUCN Red List of Threatened Species (http://www.iucnredlist.org/).
- The Important Bird and Biodiversity Areas of South Africa (Marnewick *et al.* 2015; http://www.birdlife.org.za/conservation/important-bird-areas) was consulted for information on potentially relevant Important Bird Areas (IBAs).
- Satellite imagery (Google Earth © 2022) was used in order to view the broader area on a landscape level and to help identify bird habitat on the ground.
- The South African National Biodiversity BGIS map viewer was used to determine the locality of the development areas relative to National Protected Areas.
- The DFFE National Screening Tool was used to determine the assigned avian sensitivity of the development area.
- The South African National Biodiversity Institute (SANBI) guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa (2020) were consulted to assist with the interpretation of the Terrestrial Animal Species protocol.
- The main source of information on the avifaunal diversity and abundance at the project area is an integrated pre-construction monitoring programme which was implemented at the project area, covering all eight projects of the Camden Renewable Energy Complex, including the Facility.

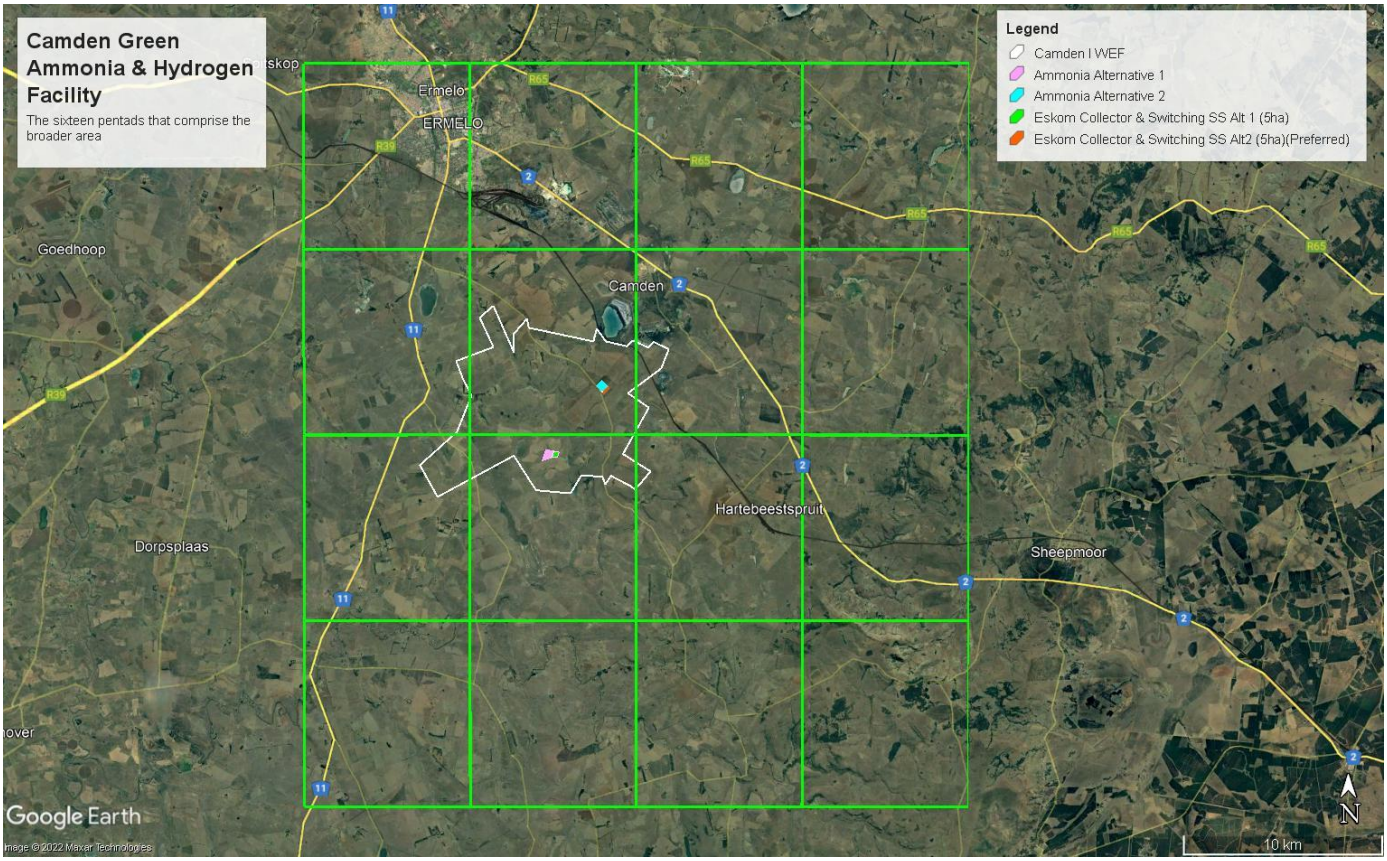


Figure 2: Area covered by the sixteen SABAP2 pentad grid cells (green squares).

4 ASSUMPTIONS AND LIMITATIONS

This study made the basic assumption that the sources of information used are reliable and accurate. The following must be noted:

- The SABAP2 dataset is a comprehensive dataset which provides a reasonably accurate snapshot of the avifauna which could occur at the proposed site. For purposes of completeness, the list of species that could be encountered was supplemented with personal observations, general knowledge of the area, and the results of the on-site surveys.
- Conclusions in this report are based on experience of these and similar species at developments in different parts of South Africa. However, bird behaviour can never be predicted with absolute certainty.
- It is assumed that the up to 132kV overhead line will be built on poles/towers designed to 132kV specifications.

5 LEGISLATIVE CONTEXT

5.1 Agreements and conventions

Table 2 below lists agreements and conventions which South Africa is party to, and which are relevant to the conservation of avifauna[1].

Table 2: Agreements and conventions which South Africa is party to and which are relevant to the conservation of avifauna.

Convention name	Description	Geographic scope
African-Eurasian Waterbird Agreement (AEWA)	The Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) is an intergovernmental treaty dedicated to the conservation of migratory waterbirds and their habitats across Africa, Europe, the Middle East, Central Asia, Greenland and the Canadian Archipelago. Developed under the framework of the Convention on Migratory Species (CMS) and administered by the United Nations Environment Programme (UNEP), AEWA brings together countries and the wider international conservation community in an effort to establish coordinated conservation and management of migratory waterbirds throughout their entire migratory range.	Regional
Convention on Biological Diversity (CBD), Nairobi, 1992	The Convention on Biological Diversity (CBD) entered into force on 29 December 1993. It has 3 main objectives: The conservation of biological diversity The sustainable use of the components of biological diversity The fair and equitable sharing of the benefits arising out of the utilization of genetic resources.	Global
Convention on the Conservation of Migratory Species of Wild Animals, (CMS), Bonn, 1979	As an environmental treaty under the aegis of the United Nations Environment Programme, CMS provides a global platform for the conservation and sustainable use of migratory animals and their habitats. CMS brings together the States through which migratory animals pass, the Range States, and lays the legal foundation for internationally coordinated conservation measures throughout a migratory range.	Global
Convention on the International Trade in Endangered Species of Wild Flora and Fauna, (CITES), Washington DC, 1973	CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival.	Global
Ramsar Convention on Wetlands of International Importance, Ramsar, 1971	The Convention on Wetlands, called the Ramsar Convention, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.	Global
Memorandum of Understanding on the Conservation of Migratory Birds of Prey in Africa and Eurasia	The Signatories will aim to take co-ordinated measures to achieve and maintain the favourable conservation status of birds of prey throughout their range and to reverse their decline when and where appropriate.	Regional

[1] (BirdLife International (2021) Country profile: South Africa. Available from: http://www.birdlife.org/datazone/country/south_africa. Checked: 2021-09-20).

5.2 National legislation

5.2.1 Constitution of the Republic of South Africa, 1996

The Constitution of the Republic of South Africa provides in the Bill of Rights that: Everyone has the right –

(a) to an environment that is not harmful to their health or well-being; and

(b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that –

  (i) prevent pollution and ecological degradation;

  (ii) promote conservation; and

  (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

5.2.2 The National Environmental Management Act 107 of 1998 (NEMA)

The National Environmental Management Act 107 of 1998 (NEMA) creates the legislative framework for environmental protection in South Africa and is aimed at giving effect to the environmental right in the Constitution. It sets out a number of guiding principles that apply to the actions of all organs of state that may significantly affect the environment. Sustainable development (socially, environmentally and economically) is one of the key principles, and internationally accepted principles of environmental management, such as the precautionary principle and the polluter pays principle, are also incorporated. NEMA also provides that a wide variety of listed developmental activities, which may significantly affect the environment, may be performed only after an environmental impact assessment has been done and authorization has been obtained from the relevant authority. Many of these listed activities can potentially have negative impacts on bird populations in a variety of ways. The clearance of natural vegetation, for instance, can lead to a loss of habitat and may depress prey populations, while erecting structures needed for generating and distributing energy, communication, and so forth can cause mortalities by collision or electrocution.

NEMA makes provision for the prescription of procedures for the assessment and minimum criteria for reporting on identified environmental themes (Sections 24(5)(a) and (h) and 44) when applying for environmental authorisation. The Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species was published on 30 October 2020. This protocol applies also for the assessment of impacts caused by the Facility and the up to 132kV grid connection on avifauna.

5.2.3 The National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA) and the Threatened or Protected Species Regulations, February 2007 (TOPS Regulations)

The most prominent statute containing provisions directly aimed at the conservation of birds is the National Environmental Management: Biodiversity Act 10 of 2004 read with the Threatened or Protected Species Regulations, February 2007 (TOPS Regulations). Chapter 1 sets out the objectives of the Act, and they are aligned with the objectives of the Convention on Biological Diversity, which are the conservation of biodiversity, the sustainable use of its components, and the fair and equitable sharing of the benefits of the use of genetic resources. The Act also gives effect to CITES, the Ramsar Convention, and the Bonn Convention on Migratory Species of Wild Animals. The State is endowed with the trusteeship of biodiversity and has the responsibility to manage, conserve and sustain the biodiversity of South Africa.

5.3 Provincial Legislation

The current legislation applicable to the conservation of fauna and flora in Mpumalanga is the Mpumalanga Nature Conservation Act 10 of 1998. It consolidated and amended the laws relating to nature conservation within the province and provides for matters connected therewith. All birds are classified as Protected Game (Section 4 (1) (b)), except those listed in Schedule 3, which are classified as Ordinary Game (Section 4 (1)(c)).

6 BASELINE ASSESSMENT

6.1 Important Bird Areas

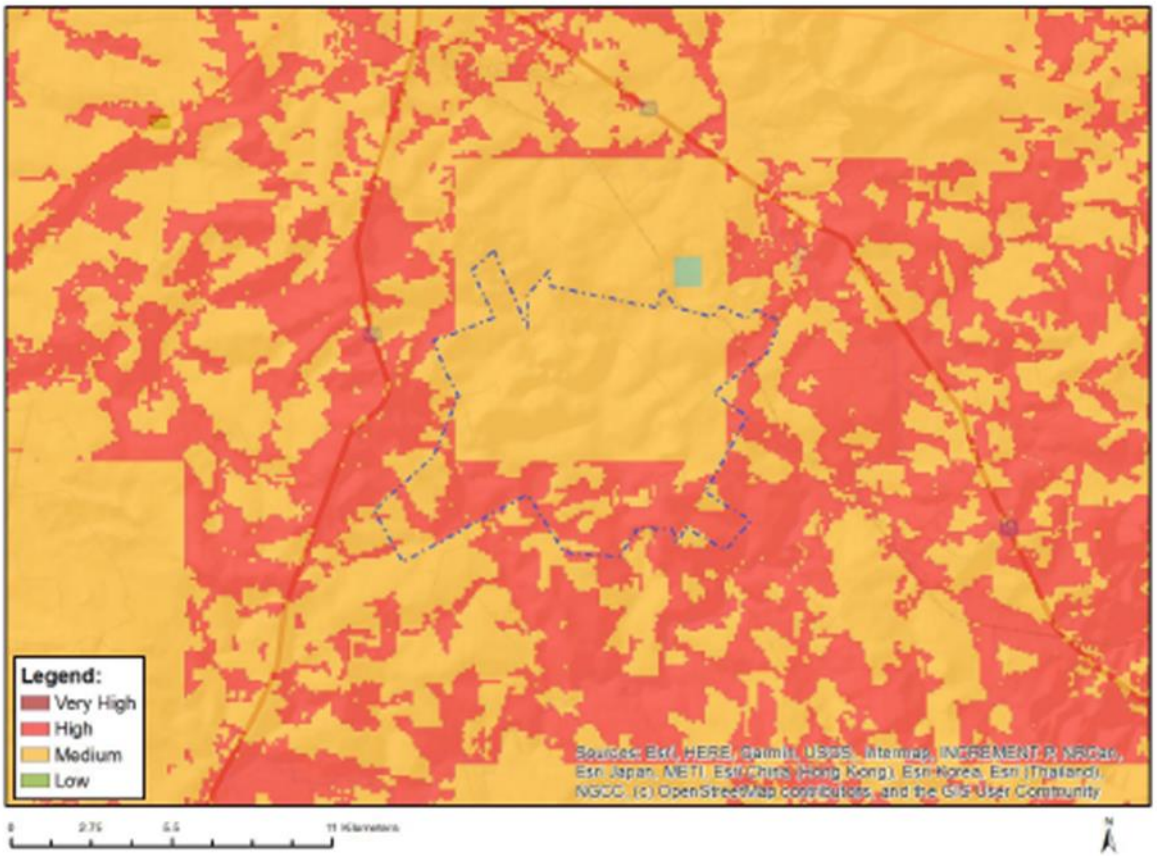
The proposed facility is located within the proposed Camden I wind farm project site. It is not located in an Important Bird Area (IBA), but it is located between three IBAs. The closest IBA to the project site is the Amersfoort-Bethal-Carolina IBA SA018, which is located within 1.5km from the site to the west. The Grasslands IBA SA020 is located 6-7km to the east of the site. The Chrissies Pans IBA SA019 is located 16-17km to the north-east of the site. Due to the close proximity of the site to the IBAs, it is possible that some highly mobile priority species which are also IBA trigger species, and which occur either permanently or sporadically in the IBAs, might be impacted by the project when they leave to forage or breed beyond the borders of the IBA. Species that were recorded in the broader areas and fall within this category are the following:

- Secretarybird
- Denham's Bustard
- Blue Crane
- Grey Crowned Crane
- Wattled Crane
- Martial Eagle
- Lanner Falcon
- Greater Flamingo
- Lesser Flamingo
- African Marsh Harrier
- Black Harrier
- Southern Bald Ibis
- African Grass Owl

6.2 DFFE National Screening Tool

The Camden I WEF project area, which includes both Facility alternatives, is classified as Medium to High sensitivity according to the Animal Species theme, based on the potential presence of several species of conservation concern (SCC) namely Grey Crowned Crane (Globally and Regionally Endangered), Martial Eagle (Globally and Regionally Endangered), Southern Bald Ibis (Globally and Regionally Vulnerable), White-bellied Korhaan (Regionally Vulnerable) and Secretarybird (Globally Endangered and Regionally Vulnerable) (Figure 3). This classification was confirmed during the site surveys at the WEF, based on the presence of recorded SCC, namely Secretarybird (Globally Endangered, Regionally Vulnerable) White-bellied Bustard (Regionally Vulnerable), Blue Crane (Globally Vulnerable, Regionally Near-threatened), Grey Crowned Crane (Globally and Regionally Endangered), Martial Eagle (Globally and Regionally Endangered), Lanner Falcon (Regionally Vulnerable), Greater Flamingo (Regionally Near-threatened), Lesser Flamingo (Globally and Regionally Near-threatened), Black Harrier (Regionally and Globally Endangered), Southern Bald Ibis (Regionally and Globally Vulnerable), Blue Korhaan (Globally Near-threatened), African Grass Owl (Regionally Vulnerable) and Cape Vulture (Globally Vulnerable and Regionally Endangered).

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Balearica regulorum
High	Aves-Polemaetus bellicosus
High	Aves-Geronticus calvus
High	Aves-Eupodotis senegalensis
Medium	Aves-Balearica regulorum
Medium	Aves-Sagittarius serpentarius

Figure 3: The National Web-Based Environmental Screening Tool map of the Camden I development area, indicating sensitivities for the Animal Species theme. The medium and high classification is based on the potential presence of several species of conservation concern (SCC) namely Grey Crowned Crane (Globally and Regionally Endangered), Martial Eagle (Globally and Regionally Endangered), Southern Bald Ibis (Globally and Regionally Vulnerable), White-bellied Korhaan (Regionally Vulnerable) and Secretarybird (Globally Endangered and Regionally Vulnerable).

6.3 Protected Areas

According to the South African Protected Areas database (SAPAD), part of the project area overlaps with the Langcarel Private Nature Reserve. From an avifaunal perspective the state of the habitat and land use at the project area is more

important than the legal status, which has been surveyed and assessed for this assessment. The results provided are therefore applicable regardless of the legal status of the land parcels considered.

6.4 Biomes and vegetation types

The Camden I WEF project area, which includes both Facility site alternatives, is situated in the Grassland Biome, in the Mesic Highveld Grassland Bioregion (Muchina & Rutherford 2006). Vegetation on site consists predominantly Amersfoort Highveld Clay Grassland and Eastern Highveld Grassland, which is comprised of undulating grassland plains, with small, scattered patches of dolerite outcrops in areas, low hills, and pan depressions. The vegetation is comprised of a short, closed grassland cover, largely dominated by a dense *Themeda triandra* sward, often severely grazed to form a short lawn (Mucina & Rutherford 2006).

Ermelo has a temperate climate. January is the warmest month with a maximum temperature of 24.4 C°. June and July are the coldest months, with a minimum temperature of 0.2 C°. The driest month is June with an average of 3 mm of precipitation. Most of the precipitation falls in December, averaging 151 mm. The average annual precipitation is around 756 mm (Climate – data.org 2021).

The topography in the project area is characterised by gentle undulating plains. The predominant land use for this area is livestock grazing with some crop farming, mostly maize, soya beans and pastures. The livestock in the project area is a combination of mostly sheep and cattle, with a few horses.

6.5 Bird habitat

Whilst much of the distribution and abundance of the bird species in the Camden 1 wind farm project site can be explained by the dominant biomes and vegetation types, it is also important to examine the modifications which have changed the natural landscape, and which may have an effect on the distribution of avifauna. These are sometimes evident at a much smaller spatial scale than the biome or vegetation types and are determined by a host of factors such as topography, land use and man-made infrastructure.

The following bird habitat classes were identified relevant to the green hydrogen and ammonia facility (see Appendix 2 for examples of the habitat classes):

6.5.1 Grassland

Site alternative 1 is located in grassland. The priority species which could potentially use the grassland in the Camden 1 wind farm project site (including Site alternative 1) on a regular basis are the following:

- Secretarybird
- White-bellied Bustard
- Blue Crane
- Grey Crowned Crane
- Lanner Falcon
- Southern Bald Ibis
- Blue Korhaan
- African Grass Owl

The priority species which could occasionally use the grassland in the Camden 1 wind farm project site (including Site alternative 1) are the following:

- Denham's Bustard
- Martial Eagle

- African Marsh Harrier
- Black Harrier
- Montagu's Harrier
- Cape Vulture

6.5.2 Agricultural lands

The Camden 1 wind farm project site, where the Facility site alternatives are located, contains a patchwork of agricultural fields, where maize, soya beans and pastures are cultivated. Some fields are lying fallow or are in the process of being re-vegetated by grass. Site alternative 2 is located in an agricultural field. The priority species which could potentially use the agricultural fields on a regular basis in the Camden 1 wind farm project site (including Site alternative 2) are the following:

- Blue Crane
- Grey Crowned Crane
- Lanner Falcon
- Southern Bald Ibis

The priority species which could occasionally use the agricultural lands in the project site are the following:

- Denham's Bustard
- Martial Eagle
- Cape Vulture

See Appendix 2 for photographic record of habitat features in the development area and immediate surroundings.

6.6 AVIFAUNA

6.6.1 South African Bird Atlas Project 2

The SABAP2 data indicates that a total of 234 bird species could potentially occur within the broader area – Appendix 1 provides a comprehensive list of all the species. Of these, 15 species are classified as priority species (see definition of priority species in section 4). Of the priority species, 10 are likely to occur regularly in the development area (see Table 2 below).

Table 3 below lists all the priority species that are likely to occur regularly and the possible impact on the respective species by the proposed facility and associated grid line. The following abbreviations and acronyms are used:

NT = Near threatened
VU = Vulnerable
EN = Endangered

Table 3: Priority species potentially occurring at the development area

Species name	Scientific name	SABAp2 full protocol reporting rate	SABAp2 Ad hoc protocol reporting rate	Global status	Regional status	Recorded during surveys	Likelihood of regular occurrence	Grassland	Agriculture	Powerline - Collision	Displacement: Disturbance	Displacement: Habitat transformation	Electrocutions: 132kV grid
African Grass Owl	*Tyto capensis*	2.4	0	-	VU	x	M	x		x	x	x	
Denham's Bustard	*Neotis denhami*	1.8	0	NT	VU		L	x		x	x	x	
Lanner Falcon	*Falco biarmicus*	7.3	0	-	VU	x	M	x	x				
Secretarybird	*Sagittarius serpentarius*	13	0	EN	VU	x	H	x		x	x	x	
Southern Bald Ibis	*Geronticus calvus*	23	3.1	VU	VU	x	H	x	x	x			
White-bellied Bustard	*Eupodotis senegalensis*	7.9	0	-	VU	x	M	x		x	x	x	
Blue Crane	*Grus paradisea*	12	0.4	VU	NT	x	H	x	x	x	x	x	
Greater Flamingo	*Phoenicopterus roseus*	3.6	4.4	-	NT	x	M			x			
Lesser Flamingo	*Phoeniconaias minor*	3.6	1.3	NT	NT	x	M			x			
African Marsh Harrier	*Circus ranivorus*	0.6	0	-	EN		L						
Black Harrier	*Circus maurus*	0	0.9	EN	EN		L	x					
Cape Vulture	*Gyps coprotheres*	0	0	EN	EN	x	L	x		x			x
Grey Crowned Crane	*Balearica regulorum*	5.5	0	EN	EN	x	M	x	x	x	x	x	
Martial Eagle	*Polemaetus bellicosus*	2.4	0	EN	EN	x	L	x					
Wattled Crane	*Grus carunculata*	0.6	0	VU	CR		L			x			

6.6.2 Field surveys

Error! Reference source not found.4 lists the priority species recorded during field surveys at the Camden I WEF project area, which includes both the Facility location alternatives.

Table 4: Priority species recorded during field surveys at the Camden I WEF

Priority Species	Taxonomic name	SA Status	Global status
Cape Vulture	*Gyps coprotheres*	Endangered	Endangered
Grey Crowned Crane	*Balearica regulorum*	Endangered	Endangered
Martial Eagle	*Polemaetus bellicosus*	Endangered	Endangered
Blue Crane	*Grus paradisea*	Near threatened	Vulnerable
Greater Flamingo	*Phoenicopterus roseus*	Near threatened	
Lesser Flamingo	*Phoeniconaias minor*	Near threatened	Near threatened
African Grass Owl	*Tyto capensis*	Vulnerable	
Lanner Falcon	*Falco biarmicus*	Vulnerable	
Secretarybird	*Sagittarius serpentarius*	Vulnerable	Endangered
Southern Bald Ibis	*Geronticus calvus*	Vulnerable	Vulnerable
White-bellied Bustard	*Eupodotis senegalensis*	Vulnerable	

See Appendix 1 for a list of all species recorded during the pre-construction monitoring.

7 IMPACT ASSESSMENT

7.1 Displacement due to habitat destruction and disturbance

During the construction of the green hydrogen and ammonia facility and associated grid 132kV line, habitat destruction/transformation will inevitably take place. The construction activities will constitute the following:

- Site clearance and preparation;
- Construction of the infrastructure related to the hydrogen and ammonia plant (Water Reservoir, Water Treatment Unit, Electrolyser Unit, Air Separation Unit, Ammonia Processing Unit, Liquid Air Storage System (LAES), Liquid Air Storage System (LAES), Liquid Ammonia Storage Tank, Hydrogen Storage Tank and overhead power line);
- Transportation of personnel, construction material and equipment to the site, and personnel away from the site;
- Removal of vegetation for the proposed infrastructure and overhead power line, stockpiling of topsoil and cleared vegetation;
- Excavations for infrastructure;

These activities will impact on birds breeding, foraging and roosting in or in close proximity of the proposed facility through **transformation of habitat**, which could result in temporary or permanent displacement. Unfortunately, very little mitigation can be applied to reduce the significance of this impact as the total permanent transformation of the natural habitat within the construction footprint of the facility is unavoidable. The loss of habitat for priority species due to direct habitat transformation associated with the construction of the 25 ha proposed Facility is likely to be moderate due to the relatively small size of the footprint, but ideally high quality grassland should be avoided if possible.

Apart from direct habitat destruction, the above-mentioned activities also impact on birds through **disturbance**; this could lead to breeding failure if the disturbance happens during a critical part of the breeding cycle. Construction activities in close proximity to breeding locations could be a source of disturbance and could lead to temporary breeding failure or even permanent abandonment of nests. A potential mitigation measure is the timeous identification of nests and the timing of the construction activities to avoid disturbance during a critical phase of the breeding cycle, although in practice that can admittedly be very challenging to implement. Terrestrial species and owls are most likely to be affected by displacement due to disturbance.

The priority species which are potentially vulnerable to this impact are listed in Table 3, and below:

- Secretarybird
- Denham's Bustard
- White-bellied Bustard
- Blue Crane
- Grey Crowned Crane
- Blue Korhaan
- African Grass Owl

7.2 Electrocutions

Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components (Van Rooyen 2004). The electrocution risk is largely determined by the pole/tower design. In the case of the proposed up to 132kV grid connection between the facility and the MTS, the electrocution risk is envisaged to be negligible because the small length of line (approximately 100m). The only priority species which may be potentially at risk of electrocution due to the up to 132kV grid connection power line is Cape Vulture (depending on which design will ultimately be used). However, the species is likely to occur sporadically, and the presence of large 400kV transmission lines in close proximity to the proposed facility also helps to reduce the risk, in that the vultures would most likely prefer to perch on these 400kV towers.

7.3 Collisions

Collisions are perhaps the biggest threat posed by high voltage lines to birds in southern Africa (Van Rooyen 2004). Most heavily impacted upon are bustards, storks, cranes and various species of waterbirds, and to a lesser extent, vultures. These species are mostly heavy-bodied birds with limited manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with transmission lines (Van Rooyen 2004, Shaw *et al*. 2017). However, the small length of line (approximately 100m) significantly reduces the potential collision risk.

Using a controlled experiment spanning a period of nearly eight years (2008 to 2016), the Endangered Wildlife Trust (EWT) and Eskom tested the effectiveness of two types of line markers in reducing power line collision mortalities of large birds on three up to 400kV transmission lines near Hydra substation in the Karoo. Marking was highly effective for Blue Cranes, with a 92% reduction in mortality, and large birds in general with a 56% reduction in mortality. The two different marking devices were approximately equally effective, namely spirals and bird flappers, they found no evidence supporting the preferential use of one type of marker over the other (Shaw *et al*. 2017).

The priority species which are potentially vulnerable to this impact are listed in Table 3, and below:

- Secretarybird
- Denham's Bustard
- White-bellied Bustard
- Blue Crane
- Grey Crowned Crane
- Wattled Crane
- Southern Bald Ibis
- Blue Korhaan
- African Grass Owl
- Cape Vulture

8 IMPACT RATINGS

The impacts on avifauna of the proposed Facility and up to 132V grid connection are rated according to the criteria set out below.

8.1 Determination of Significance of Impacts

The EIA Methodology assists in evaluating the overall effect of a proposed activity on the environment. The determination of the effect of an environmental impact on an environmental parameter is determined through a systematic analysis of the various components of the impact. This is undertaken using information that is available to the environmental practitioner through the process of the environmental impact assessment. The impact evaluation of predicted impacts was undertaken through an assessment of the significance of the impacts.

The assessment of impacts and mitigation evaluates the likely extent and significance of the potential impacts on identified receptors and resources against defined assessment criteria, to develop and describe measures that will be taken to avoid, minimise or compensate for any adverse environmental impacts, to enhance positive impacts, and to report the significance of residual impacts that occur following mitigation. The key objectives of the risk assessment methodology are to identify any additional potential environmental issues and associated impacts likely to arise from the proposed project, and to propose a significance ranking. Issues / aspects are reviewed and ranked against a series of significance criteria to identify and record interactions between activities and aspects, and resources and receptors to provide a detailed discussion of impacts. The assessment considers direct[2], indirect[3], secondary[4] as well as cumulative[5] impacts.

A standard risk assessment methodology is used for the ranking of the identified environmental impacts pre-and post-mitigation (i.e. residual impact). The significance of environmental aspects is determined and ranked by considering the criteria[6] presented in Table 8.

Table 5: Impact Assessment Criteria and Scoring System

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	Very low: No impact on processes	Low: Slight impact on processes	Medium: Processes continue but in a modified way	High: Processes temporarily cease	Very High: Permanent cessation of processes
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	Site: Site only	Local: Inside activity area	Regional: Outside activity area	National: National scope or level	International: Across borders or boundaries
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	Reversible: Recovery without rehabilitation		Recoverable: Recovery with rehabilitation		Irreversible: Not possible despite action
Impact Duration (D) The length of permanence of the impact on the environmental receptor	Immediate: On impact	Short term: 0-5 years	Medium term: 5-15 years	Long term: Project life	Permanent: Indefinite

[2] Impacts that arise directly from activities that form an integral part of the Project.

[3] Impacts that arise indirectly from activities not explicitly forming part of the Project.

[4] Secondary or induced impacts caused by a change in the Project environment.

[5] Impacts are those impacts arising from the combination of multiple impacts from existing projects, the Project and/or future projects.

[6] The definitions given are for guidance only, and not all the definitions will apply to all the environmental receptors and resources being assessed. Impact significance was assessed with and without mitigation measures in place.

Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	Improbable	Low Probability	Probable	Highly Probability	Definite
Significance (S) is determined by combining the above criteria in the following formula:	$[S = (E + D + R + M) \times P]$ $Significance = (Extent + Duration + Reversibility + Magnitude) \times Probability$				
IMPACT SIGNIFICANCE RATING					
Total Score	**4 to 15**	**16 to 30**	**31 to 60**	**61 to 80**	**81 to 100**
Environmental Significance Rating (Negative (-))	**Very low**	**Low**	**Moderate**	**High**	**Very High**
Environmental Significance Rating (Positive (+))	**Very low**	**Low**	**Moderate**	**High**	**Very High**

8.2 Impact Assessments

8.2.1 Impact assessment tables

The impacts are summarised in table form are in Appendix 3.

8.3 Cumulative impacts

"Cumulative Impact", in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

The role of the cumulative assessment is to test if such impacts are relevant to the proposed project in the proposed location (i.e. whether the addition of the proposed project in the area will increase the impact). This section addresses whether the construction of the proposed development will result in:

- Unacceptable risk
- Unacceptable loss
- Complete or whole-scale changes to the environment
- Unacceptable increase in impact

4.3.1 Ammonia and Hydrogen Green Facility

According to the official database of DFFE and other documents in the public domain, there are currently three planned renewable energy facilities within a 30km radius around the proposed development, namely the Camden I and II Wind Energy Facilities, and the Camden Solar Energy Facility (see Figure 4).

The total area of similar habitat (excluding opencast mining and urban areas) available to birds in the 30km radius around the project area is approximately 4 258 km². The land parcels affected by the planned renewable energy facilities, **which include the 25ha that will be taken up by the Facility**, within this radius takes up a total of ~124km², which is 2.9% of the available habitat. The impact on avifauna of the currently planned renewable energy projects within this area, including the proposed

Facility, is therefore considered to be **Low**, and the impact could be reduced to **Very Low** if the recommended mitigation at the two Camden wind projects and the Camden I SEF is diligently implemented.

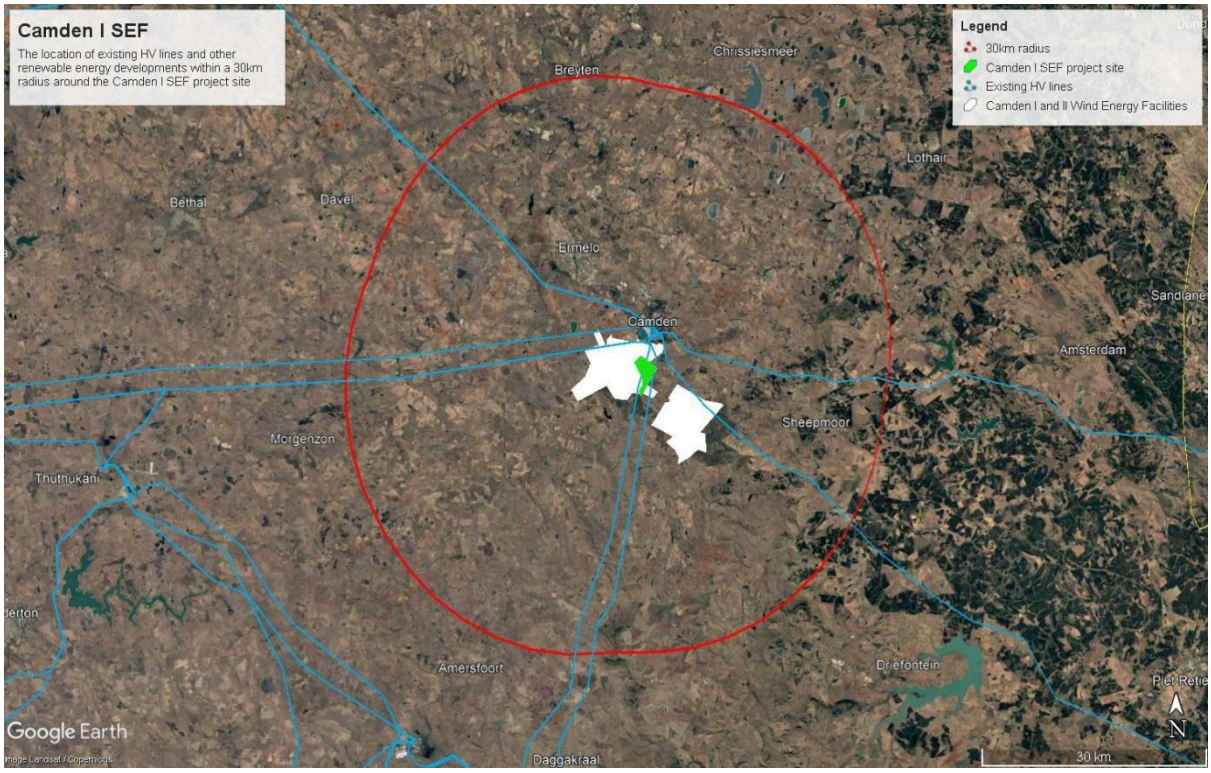


Figure 4: Proposed renewable energy projects and existing HV lines within 30km of the proposed Facility (Source: DFFE database 2022 & WSP Environmental).

4.3.2 Up to 132kV OHL

The existing high voltage lines in the 30km radius around the proposed Facility run into hundreds of kilometres (see Figure 4). The up to 132kV contribution (maximum 100m) to the total length of high voltage lines within a 30km radius is **Very Low.** However, the density of all planned and existing high voltage lines within a 30km radius, and by implication the cumulative impact on avifauna, is considered to be **Moderate**.

9 MITIGATION MEASURES

The impact significance without mitigation measures is assessed with the design controls in place. Impacts without mitigation measures in place are not representative of the proposed development's actual extent of impact and are included to facilitate understanding of how and why mitigation measures were identified. The residual impact is what remains following the application of mitigation and management measures and is thus the final level of impact associated with the proposed Project. Residual impacts also serve as the focus of management and monitoring activities during Project implementation to verify that actual impacts are the same as those predicted in this report.

The mitigation measures chosen are based on the mitigation sequence/hierarchy which allows for consideration of five (5) different levels, which include avoid/prevent, minimise, rehabilitate/restore, offset and no-go in that order. The idea is that when project impacts are considered, the first option should be to avoid or prevent the impacts from occurring in the first place if possible, however, this is not always feasible. If this is not attainable, the impacts can be allowed, however they must be minimised as far as possible by considering reducing the footprint of the development for example so that little damage is encountered. If impacts are unavoidable, the next goal is to rehabilitate or restore the areas impacted back to their original form after project completion. Offsets are then considered if all the other measures described above fail to remedy high/significant residual negative impacts. If no offsets can be achieved on a potential impact, which results in full destruction of any ecosystem for example, the no-go option is considered so that another activity or location is considered in place of the original plan.

The mitigation sequence/hierarchy is shown in Figure 13.

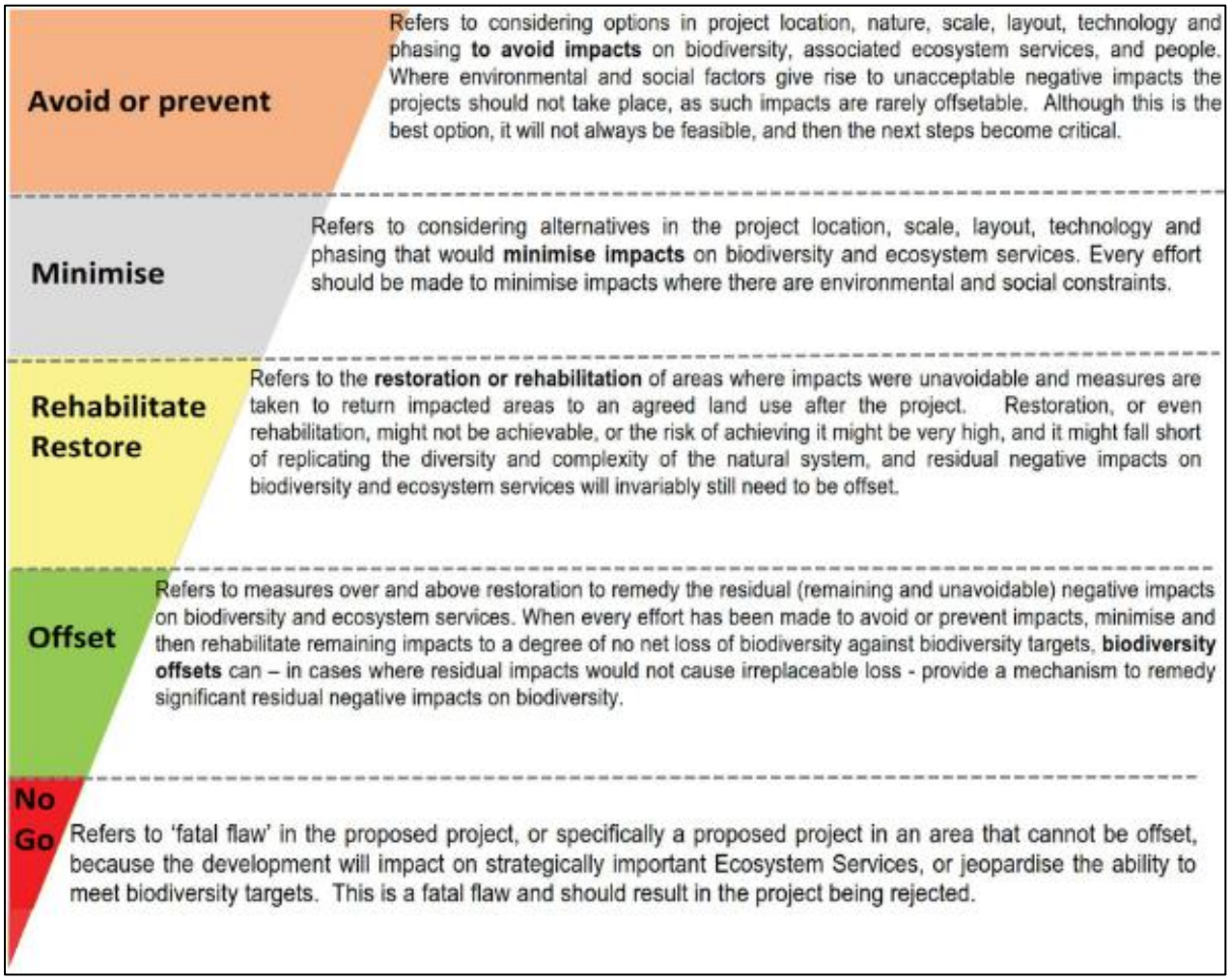


Figure 5: Mitigation Sequence/Hierarchy

9.1 Green Ammonia and Hydrogen Facility

The mitigation measures that are proposed for the Facility are listed below.

9.1.1 Design Phase

Development in the remaining high sensitivity grassland must be limited as far as possible. The grassland is vital breeding, roosting and foraging habitat for a variety of SCC. These include Blue Crane (SA status near-threatened), Blue Korhaan (Global status near -threatened), White-bellied Bustard (SA Status Vulnerable), Denham's Bustard (SA Status Vulnerable).

9.1.2 Construction phase

- Conduct an inspection to identify SCC that may be breeding within the project footprint to ensure that the impacts on breeding species (if any) are adequately managed.
- Construction activity should be restricted to the immediate footprint of the infrastructure as far as possible.
- Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of priority species. Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum
- Measures to control noise and dust should be applied according to current best practice in the industry.
- The mitigation measures proposed by the vegetation specialist must be strictly enforced, including rehabilitation of disturbed areas.

9.1.3 Operational phase

- No management actions are required for the operational phase

9.1.4 De-commissioning phase

- Decommissioning activity should be restricted to the immediate footprint of the infrastructure as far as possible.
- Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of priority species.
- Measures to control noise and dust should be applied according to current best practice in the industry.
- Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum.
- The mitigation measures proposed by the vegetation specialist must be strictly enforced, including rehabilitation of disturbed areas.

Figure 6 indicates the avifauna sensitivity zones identified in the course of the study, relevant to the Facility

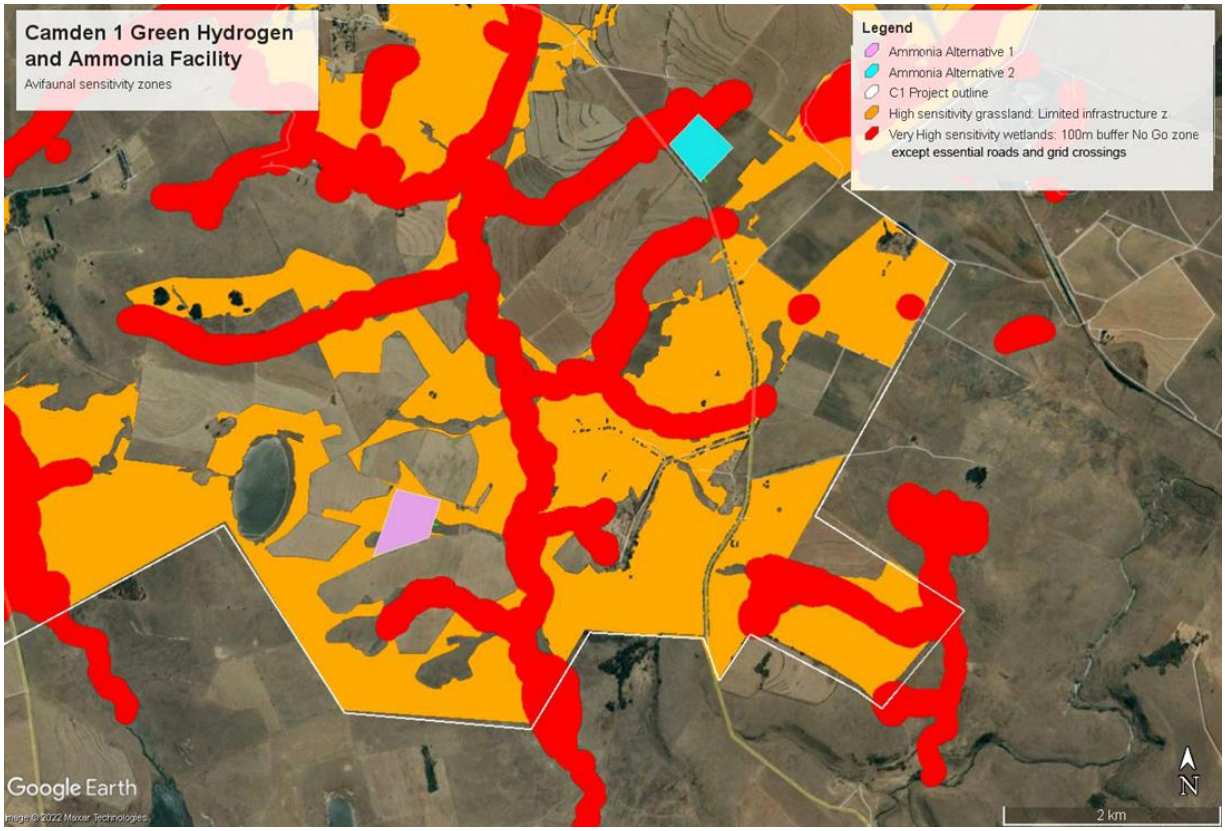


Figure 6: Avifaunal sensitivity zones

9.2 Up to 132kV OHL

The mitigation measures that are proposed for the up to 132kV OHL are listed below.

9.2.1 Planning & Design phase

- If a steel monopole pole design is used, the approved vulture friendly pole/tower design D-DT-7649 in accordance with the Eskom Distribution Technical Bulletin titled *Refurbishment of 66/88kV line kite type frames with D-DT-7649 type top configuration - Reference Number 240-170000467* relating to bird friendly structures, must be used.
- If lattice type structures are used, it is imperative that a minimum vertical clearance of 1.8m is maintained between the jumper cables and/or insulator live ends, and the horizontal earthed components. Additional mitigation in the form of insulating sleeves on jumper cables present on strain poles and terminal poles is also recommended (if suitable insulation material is readily available.

9.2.2 Construction phase

- Bird Flight Diverters must be fitted to the entire OHL according to the applicable Eskom Engineering Instruction (*Eskom Unique Identifier 240 – 93563150: The utilisation of Bird Flight Diverters on Eskom Overhead Lines*). These devices must be installed as soon as the conductors and earthwires are strung.

9.2.3 Operational phase

- No management actions are required for the operational phase

9.2.4 De-commissioning phase

- No management actions are required for the operational phase

10 PREFERRED ALTERNATIVE

10.1 Green Ammonia and Hydrogen Facility

Option 2 of the Facility is preferred, as it is located in an agricultural habitat and will not have an impact on high quality grassland.

10.2 Up to 132kV OHL

Both the alternatives can be mitigated to acceptable levels and therefore are considered suitable from an avifaunal perspective.

11 CONDITIONS FOR INCLUSION IN THE EMPr

Please see Appendix 4 for the monitoring requirements to be included in the EMPr for the Facility and associated grid connection project.

12 'NO-GO' ALTERNATIVE

The 'no-go' alternative is the option of not constructing the Facility and up to 132kV OHL, where the *status quo* of the current status and/or activities on the project areas would prevail. This alternative would result in no additional impact on the receiving environment.

Should the 'no-go' alternative be considered, there would be no impact on the existing environmental baseline and no benefits to the local economy and affected communities. The alternative also bears the opportunity cost of missed socio-economic benefits to the local community that would otherwise realise from establishing the farms which form part of the project areas. The option of not developing also entails that the bid to provide renewable/clean energy to the national grid and contribute to meeting the country's energy demands will be forfeited.

However, from a strictly avifaunal perspective, the 'no-go' alternative will result in the current *status quo* being maintained. The 'no-go' option would eliminate any additional impact on the ecological integrity of the proposed Facility development site, as far as avifauna is concerned, bearing in mind that there have already been extensive impacts in the project area in the form of agriculture.

13 SUMMARY AND CONCLUSION

13.1 Green Ammonia and Hydrogen Facility

The proposed Facility will have two potential impacts on priority avifauna. These impacts are the following:

- Displacement due to disturbance associated with the construction of the Facility.
- Displacement due to habitat transformation associated with the construction of the Facility.

13.1.1 Displacement of priority species due to disturbance linked to construction activities in the construction phase

Apart from direct habitat destruction, the construction activities could impact on birds through disturbance; this could lead to breeding failure if the disturbance happens during a critical part of the breeding cycle. Construction activities in close proximity to breeding locations could be a source of disturbance and could lead to temporary breeding failure or even permanent abandonment of nests. A potential mitigation measure is the timeous identification of nests and the timing of the construction activities to avoid disturbance during a critical phase of the breeding cycle, although in practice that can admittedly be very challenging to implement. Terrestrial species and owls are most likely to be affected by displacement due to disturbance. The priority species which are potentially vulnerable to this impact are Secretarybird, Denham's Bustard, White-bellied Bustard, Blue Crane, Grey Crowned Crane, Blue Korhaan and African Grass Owl. The impact is rated as **Low** pre-mitigation and will be reduced but remain at a **Very Low** level post-mitigation.

13.1.2 Displacement of priority species due to habitat transformation in the construction phase

These activities will impact on birds breeding, foraging and roosting in or in close proximity of the proposed facility through **transformation of habitat**, which could result in temporary or permanent displacement. Unfortunately, very little mitigation can be applied to reduce the significance of this impact as the total permanent transformation of the natural habitat within the construction footprint of the facility is unavoidable. The loss of habitat for priority species due to direct habitat transformation associated with the construction of the 25 ha proposed facility is likely to be moderate due to the relatively small size of the footprint, but ideally high quality grassland should be avoided if possible. Terrestrial species and owls are most likely to be affected by displacement due to habitat transformation. The priority species which are potentially vulnerable to this impact are Secretarybird, Denham's Bustard, White-bellied Bustard, Blue Crane, Grey Crowned Crane, Blue Korhaan and African Grass Owl. The impact is rated as **Low** pre-mitigation and will be reduced but remain at a **Low** level post-mitigation.

13.2 The up to 132kV OHL

The following potential impacts on powerline sensitive avifauna are associated with the construction and operation of the up to 132kV grid connection related to the Facility:

- Mortality due to electrocution on the proposed OHL infrastructure
- Mortality due to collisions with the proposed OHL.

13.2.1 Mortality of powerline sensitive avifauna due to electrocutions on the OHL

Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components (Van Rooyen 2004). The electrocution risk is largely determined by the voltage size of the proposed powerline and the pole/tower design. Should the proposed OHL be constructed using a 132kV tower specification, the electrocution impact for the majority of priority species will be negligible. The only priority species capable of bridging the clearance distances of an OHL constructed using this specification is the Cape Vulture, due to their size and gregarious nature. The impact is rated as **Low** pre-mitigation and it will decrease to **Very Low** post-mitigation due to the short length of line.

13.2.2 Mortality of powerline sensitive avifauna due to collisions with the OHL

Collisions are perhaps the biggest threat posed by high voltage lines to birds in southern Africa (Van Rooyen 2004). Most heavily impacted upon are bustards, storks, cranes and various species of waterbirds, and to a lesser extent, vultures. These species are mostly heavy-bodied birds with limited manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with transmission lines (Van Rooyen 2004, Shaw et al. 2017). However, the small length of line (approximately 100m) significantly reduces the potential collision risk. The priority species which are potentially vulnerable to this impact are Secretarybird, Denham's Bustard, White-bellied Bustard, Blue Crane, Grey Crowned Crane, Wattled Crane, Southern Bald Ibis, Blue Korhaan, African Grass Owl and Cape Vulture. The impact is rated as **Low** pre-mitigation and it will decrease to **Very Low** post-mitigation.

13.3 Cumulative impacts

13.3.1 Green Ammonia and Hydrogen Facility

The total area of similar habitat (excluding opencast mining and urban areas) available to birds in the 30km radius around the project area is approximately 4 258 km². The land parcels affected by the planned renewable energy facilities, which include the 25ha that will be taken up by the Facility, within this radius takes up a total of ~124km², which is 2.9% of the available habitat. The impact on avifauna of the currently planned renewable energy projects within this area, including the proposed Facility, is therefore considered to be **Low**, and the impact could be reduced if the recommended mitigation at the two Camden wind projects and the Camden I SEF is diligently implemented.

13.3.2 Up to 132kV OHL

The existing high voltage lines in the 30km radius around the proposed Facility run into hundreds of kilometres (see Figure 4). The up to 132kV contribution (maximum 100m) to the total length of high voltage lines within a 30km radius is **Very Low**. However, the density of all planned and existing high voltage lines within a 30km radius, and by implication the cumulative impact on avifauna, is considered to be **Moderate**.

14 CONCLUSION AND IMPACT STATEMENT

14.1 Green Ammonia and Hydrogen Facility

The proposed Facility will have a **Low** impact on priority avifauna which, in most instances, could be reduced to a **Very Low** impact through appropriate mitigation, although some instances Low residual

impacts will still be present after mitigation. No fatal flaws were discovered during the onsite investigations. The proposed development is therefore supported, provided the mitigation measures listed in this report are strictly implemented.

14.2 The up to 132kV OHL

The proposed up to 132kV OHL will have a **Low** impact on priority avifauna which, in all instances, could be reduced to a **Very Low** impact through appropriate mitigation. No fatal flaws were discovered during the onsite investigations. The proposed development is therefore supported, provided the mitigation measures listed in this report are strictly implemented.

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APPENDIX 1: SPECIES LISTS

Species list for the broader area Species name	Taxonomic name	SABAP2 full protocol reporting rate	SABAP2 Ad hoc protocol reporting rate	Global status	Regional status
African Black Duck	*Anas sparsa*	10.9	0.0	-	-
African Black Swift	*Apus barbatus*	3.0	0.4	-	-
African Darter	*Anhinga rufa*	16.4	2.2	-	-
African Fish Eagle	*Haliaeetus vocifer*	12.1	0.9	-	-
African Grass Owl	*Tyto capensis*	2.4	0.0	-	VU
African Harrier-Hawk	*Polyboroides typus*	11.5	1.8	-	-
African Hoopoe	*Upupa africana*	12.7	0.9	-	-
African Jacana	*Actophilornis africanus*	1.8	1.3	-	-
African Marsh Harrier	*Circus ranivorus*	0.6	0.0	-	EN
African Palm Swift	*Cypsiurus parvus*	1.2	1.3	-	-
African Paradise Flycatcher	*Terpsiphone viridis*	4.8	0.0	-	-
African Pipit	*Anthus cinnamomeus*	74.5	8.4	-	-
African Rail	*Rallus caerulescens*	5.5	0.0	-	-
African Reed Warbler	*Acrocephalus baeticatus*	3.0	0.4	-	-
African Sacred Ibis	*Threskiornis aethiopicus*	47.9	6.2	-	-
African Snipe	*Gallinago nigripennis*	20.0	0.9	-	-
African Spoonbill	*Platalea alba*	16.4	2.2	-	-
African Stonechat	*Saxicola torquatus*	87.9	10.6	-	-
African Swamphen	*Porphyrio madagascariensis*	6.1	2.2	-	-
African Wattled Lapwing	*Vanellus senegallus*	23.0	0.4	-	-
African Yellow Warbler	*Iduna natalensis*	3.0	0.0	-	-
Amethyst Sunbird	*Chalcomitra amethystina*	11.5	0.4	-	-
Amur Falcon	*Falco amurensis*	29.1	6.6	-	-
Ant-eating Chat	*Myrmecocichla formicivora*	89.7	12.3	-	-
Banded Martin	*Riparia cincta*	42.4	3.1	-	-
Barn Swallow	*Hirundo rustica*	41.8	7.9	-	-
Bar-throated Apalis	*Apalis thoracica*	5.5	0.0	-	-
Black Crake	*Zapornia flavirostra*	9.1	0.0	-	-
Black Harrier	*Circus maurus*	0.0	0.9	EN	EN
Black Heron	*Egretta ardesiaca*	0.6	0.0	-	-
Black Sparrowhawk	*Accipiter melanoleucus*	12.1	0.9	-	-
Black-bellied Bustard	*Lissotis melanogaster*	0.6	0.0	-	-
Black-chested Prinia	*Prinia flavicans*	16.4	0.0	-	-
Black-chested Snake Eagle	*Circaetus pectoralis*	3.0	0.4	-	-
Black-collared Barbet	*Lybius torquatus*	28.5	0.9	-	-
Black-crowned Night Heron	*Nycticorax nycticorax*	0.6	0.0	-	-
Black-headed Heron	*Ardea melanocephala*	52.1	4.0	-	-
Black-headed Oriole	*Oriolus larvatus*	13.9	1.8	-	-
Black-necked Grebe	*Podiceps nigricollis*	0.6	0.4	-	-
Blacksmith Lapwing	*Vanellus armatus*	67.9	7.0	-	-
Black-throated Canary	*Crithagra atrogularis*	67.9	2.2	-	-
Black-winged Kite	*Elanus caeruleus*	60.6	12.8	-	-
Black-winged Lapwing	*Vanellus melanopterus*	14.5	0.0	-	-
Black-winged Stilt	*Himantopus himantopus*	9.1	0.0	-	-
Blue Crane	*Grus paradisea*	11.5	0.4	VU	NT
Blue Korhaan	*Eupodotis caerulescens*	6.1	0.0	NT	

Species list for the broader area Species name	Taxonomic name	SABAP2 full protocol reporting rate	SABAP2 Ad hoc protocol reporting rate	Global status	Regional status
Blue-billed Teal	*Spatula hottentota*	1.2	0.0	-	-
Bokmakierie	*Telophorus zeylonus*	64.8	4.4	-	-
Brown Snake Eagle	*Circaetus cinereus*	1.8	0.0	-	-
Brown-throated Martin	*Riparia paludicola*	46.7	4.0	-	-
Buff-streaked Chat	*Campicoloides bifasciatus*	5.5	0.4	-	-
Cape Batis	*Batis capensis*	0.6	0.0	-	-
Cape Bunting	*Emberiza capensis*	13.9	0.4	-	-
Cape Canary	*Serinus canicollis*	75.2	7.0	-	-
Cape Crow	*Corvus capensis*	17.6	0.4	-	-
Cape Grassbird	*Sphenoeacus afer*	24.8	0.9	-	-
Cape Longclaw	*Macronyx capensis*	86.7	10.1	-	-
Cape Robin-Chat	*Cossypha caffra*	60.0	3.5	-	-
Cape Shoveler	*Spatula smithii*	18.8	0.0	-	-
Cape Sparrow	*Passer melanurus*	81.8	6.6	-	-
Cape Starling	*Lamprotornis nitens*	6.1	0.0	-	-
Cape Teal	*Anas capensis*	3.0	0.0	-	-
Cape Turtle Dove	*Streptopelia capicola*	92.1	23.8	-	-
Cape Vulture	*Gyps coprotheres*	0.0	0.0	EN	EN
Cape Wagtail	*Motacilla capensis*	78.2	3.5	-	-
Cape Weaver	*Ploceus capensis*	33.9	2.2	-	-
Cape White-eye	*Zosterops virens*	35.2	1.3	-	-
Capped Wheatear	*Oenanthe pileata*	10.3	0.0	-	-
Cardinal Woodpecker	*Dendropicos fuscescens*	9.1	1.3	-	-
Chorister Robin-Chat Robin-Chat	*Cossypha dichroa*	1.2	0.0	-	-
Cinnamon-breasted Bunting	*Emberiza tahapisi*	1.8	0.0	-	-
Cloud Cisticola	*Cisticola textrix*	7.9	0.9	-	-
Common Buttonquail	*Turnix sylvaticus*	0.6	0.0	-	-
Common Buzzard	*Buteo buteo*	27.9	9.3	-	-
Common Greenshank	*Tringa nebularia*	5.5	0.0	-	-
Common House Martin	*Delichon urbicum*	6.1	0.0	-	-
Common Moorhen	*Gallinula chloropus*	32.7	1.8	-	-
Common Myna	*Acridotheres tristis*	21.2	10.1	-	-
Common Ostrich	*Struthio camelus*	21.8	1.3	-	-
Common Quail	*Coturnix coturnix*	29.1	0.4	-	-
Common Sandpiper	*Actitis hypoleucos*	1.2	0.0	-	-
Common Waxbill	*Estrilda astrild*	52.7	3.5	-	-
Crested Barbet	*Trachyphonus vaillantii*	3.0	0.0	-	-
Crowned Lapwing	*Vanellus coronatus*	61.2	3.1	-	-
Cuckoo Finch	*Anomalospiza imberbis*	1.2	0.0	-	-
Dark-capped Bulbul	*Pycnonotus tricolor*	50.3	4.0	-	-
Denham's Bustard	*Neotis denhami*	1.8	0.0	NT	VU
Diederik Cuckoo	*Chrysococcyx caprius*	24.2	0.9	-	-
Domestic Duck	*Anas platyrhynchos domestica*	0.6	0.0	-	-
Drakensberg Prinia	*Prinia hypoxantha*	18.8	0.0	-	-
Eastern Clapper Lark	*Mirafra fasciolata*	6.7	0.0	-	-
Eastern Long-billed Lark	*Certhilauda semitorquata*	4.8	0.0	-	-
Egyptian Goose	*Alopochen aegyptiaca*	78.2	6.2	-	-

Species list for the broader area Species name	Taxonomic name	SABAP2 full protocol reporting rate	SABAP2 Ad hoc protocol reporting rate	Global status	Regional status
European Bee-eater	*Merops apiaster*	0.6	0.0	-	-
Familiar Chat	*Oenanthe familiaris*	0.6	0.0	-	-
Fan-tailed Widowbird	*Euplectes axillaris*	39.4	3.1	-	-
Fiscal Flycatcher	*Melaenornis silens*	17.0	0.9	-	-
Fork-tailed Drongo	*Dicrurus adsimilis*	10.3	0.4	-	-
Fulvous Whistling Duck	*Dendrocygna bicolor*	0.0	0.4	-	-
Giant Kingfisher	*Megaceryle maxima*	4.8	0.0	-	-
Glossy Ibis	*Plegadis falcinellus*	4.2	1.8	-	-
Golden-breasted Bunting	*Emberiza flaviventris*	5.5	0.4	-	-
Goliath Heron	*Ardea goliath*	2.4	0.0	-	-
Great Egret	*Ardea alba*	7.9	1.3	-	-
Greater Flamingo	*Phoenicopterus roseus*	3.6	4.4	-	NT
Greater Striped Swallow	*Cecropis cucullata*	55.8	7.9	-	-
Green Wood Hoopoe	*Phoeniculus purpureus*	7.9	0.4	-	-
Grey Crowned Crane	*Balearica regulorum*	5.5	0.0	EN	EN
Grey Heron	*Ardea cinerea*	24.8	3.5	-	-
Grey-headed Gull	*Chroicocephalus cirrocephalus*	3.6	0.4	-	-
Grey-winged Francolin	*Scleroptila afra*	27.3	2.2	-	-
Groundscraper Thrush	*Turdus litsitsirupa*	0.6	0.0	-	-
Hadada Ibis	*Bostrychia hagedash*	89.7	13.7	-	-
Hamerkop	*Scopus umbretta*	11.5	0.0	-	-
Helmeted Guineafowl	*Numida meleagris*	49.1	3.1	-	-
Horus Swift	*Apus horus*	1.2	0.0	-	-
House Sparrow	*Passer domesticus*	20.0	9.3	-	-
Intermediate Egret	*Ardea intermedia*	13.9	1.8	-	-
Jackal Buzzard	*Buteo rufofuscus*	19.4	2.2	-	-
Karoo Thrush	*Turdus smithi*	5.5	0.0	-	-
Kittlitz's Plover	*Charadrius pecuarius*	7.3	0.4	-	-
Kurrichane Thrush	*Turdus libonyana*	8.5	0.4	-	-
Lanner Falcon	*Falco biarmicus*	7.3	0.0	-	VU
Laughing Dove	*Spilopelia senegalensis*	45.5	7.5	-	-
Lazy Cisticola	*Cisticola aberrans*	4.8	0.0	-	-
Lesser Flamingo	*Phoeniconaias minor*	3.6	1.3	NT	NT
Lesser Grey Shrike	*Lanius minor*	0.6	0.0	-	-
Lesser Honeyguide	*Indicator minor*	0.6	0.0	-	-
Lesser Moorhen	*Paragallinula angulata*	0.6	0.4	-	-
Lesser Striped Swallow	*Cecropis abyssinica*	0.6	1.3	-	-
Lesser Swamp Warbler	*Acrocephalus gracilirostris*	12.7	0.4	-	-
Levaillant's Cisticola	*Cisticola tinniens*	73.9	5.7	-	-
Little Egret	*Egretta garzetta*	4.2	1.3	-	-
Little Grebe	*Tachybaptus ruficollis*	38.8	3.1	-	-
Little Rush Warbler	*Bradypterus baboecala*	6.7	0.9	-	-
Little Stint	*Calidris minuta*	1.8	0.0	-	-
Little Swift	*Apus affinis*	16.4	4.8	-	-
Long-crested Eagle	*Lophaetus occipitalis*	6.7	9.3	-	-
Long-tailed Widowbird	*Euplectes progne*	84.8	15.4	-	-
Malachite Kingfisher	*Corythornis cristatus*	7.3	0.0	-	-
Malachite Sunbird	*Nectarinia famosa*	11.5	0.4	-	-

Species list for the broader area Species name	Taxonomic name	SABAP2 full protocol reporting rate	SABAP2 Ad hoc protocol reporting rate	Global status	Regional status
Mallard	*Anas platyrhynchos*	0.6	0.4	-	-
Marsh Owl	*Asio capensis*	5.5	0.4	-	-
Martial Eagle	*Polemaetus bellicosus*	2.4	0.0	EN	EN
Montagu's Harrier	*Circus pygargus*	1.2	0.0	-	-
Mountain Wheatear	*Myrmecocichla monticola*	4.8	0.9	-	-
Namaqua Dove	*Oena capensis*	1.8	0.0	-	-
Neddicky	*Cisticola fulvicapilla*	7.9	0.0	-	-
Nicholson's Pipit	*Anthus nicholsoni*	1.8	0.4	-	-
Northern Black Korhaan	*Afrotis afraoides*	0.6	0.0	-	-
Olive Thrush	*Turdus olivaceus*	6.1	0.4	-	-
Olive Woodpecker	*Dendropicos griseocephalus*	3.0	0.0	-	-
Orange-breasted Waxbill	*Amandava subflava*	9.7	0.0	-	-
Pale-crowned Cisticola	*Cisticola cinnamomeus*	21.2	0.0	-	-
Peregrine Falcon	*Falco peregrinus*	1.2	0.0	-	-
Pied Avocet	*Recurvirostra avosetta*	4.8	0.0	-	-
Pied Crow	*Corvus albus*	11.5	3.5	-	-
Pied Kingfisher	*Ceryle rudis*	12.7	0.4	-	-
Pied Starling	*Lamprotornis bicolor*	55.2	11.5	-	-
Pin-tailed Whydah	*Vidua macroura*	44.8	2.6	-	-
Plain-backed Pipit	*Anthus leucophrys*	1.2	0.0	-	-
Purple Heron	*Ardea purpurea*	4.2	0.0	-	-
Quailfinch	*Ortygospiza atricollis*	47.9	1.8	-	-
Red-backed Shrike	*Lanius collurio*	0.6	0.0	-	-
Red-billed Quelea	*Quelea quelea*	38.8	1.8	-	-
Red-billed Teal	*Anas erythrorhyncha*	17.0	1.3	-	-
Red-capped Lark	*Calandrella cinerea*	56.4	2.2	-	-
Red-chested Cuckoo	*Cuculus solitarius*	4.8	0.4	-	-
Red-chested Flufftail	*Sarothrura rufa*	0.6	0.0	-	-
Red-collared Widowbird	*Euplectes ardens*	12.1	1.3	-	-
Red-eyed Dove	*Streptopelia semitorquata*	64.2	12.3	-	-
Red-faced Mousebird	*Urocolius indicus*	4.2	0.4	-	-
Red-headed Finch	*Amadina erythrocephala*	1.8	0.0	-	-
Red-knobbed Coot	*Fulica cristata*	58.2	4.8	-	-
Red-throated Wryneck	*Jynx ruficollis*	29.7	2.2	-	-
Red-winged Francolin	*Scleroptila levaillantii*	24.8	1.3	-	-
Red-winged Starling	*Onychognathus morio*	8.5	3.1	-	-
Reed Cormorant	*Microcarbo africanus*	63.6	4.8	-	-
Rock Dove	*Columba livia*	6.1	4.4	-	-
Rock Kestrel	*Falco rupicolus*	5.5	0.9	-	-
Rock Martin	*Ptyonoprogne fuligula*	13.9	1.8	-	-
Ruff	*Calidris pugnax*	1.8	0.4	-	-
Rufous-naped Lark	*Mirafra africana*	1.2	0.9	-	-
Sand Martin	*Riparia riparia*	1.2	0.4	-	-
Secretarybird	*Sagittarius serpentarius*	13.3	0.0	EN	VU
Sedge Warbler	*Acrocephalus schoenobaenus*	0.6	0.0	-	-
Sentinel Rock Thrush	*Monticola explorator*	2.4	0.0	NT	
South African Cliff Swallow	*Petrochelidon spilodera*	38.2	3.5	-	-
South African Shelduck	*Tadorna cana*	30.3	3.5	-	-

Species list for the broader area Species name	Taxonomic name	SABAP2 full protocol reporting rate	SABAP2 Ad hoc protocol reporting rate	Global status	Regional status
Southern Bald Ibis	*Geronticus calvus*	23.0	3.1	VU	VU
Southern Boubou	*Laniarius ferrugineus*	15.2	0.9	-	-
Southern Fiscal	*Lanius collaris*	92.1	15.4	-	-
Southern Grey-headed Sparrow	*Passer diffusus*	57.6	4.4	-	-
Southern Masked Weaver	*Ploceus velatus*	90.9	9.7	-	-
Southern Pochard	*Netta erythrophthalma*	9.1	0.0	-	-
Southern Red Bishop	*Euplectes orix*	84.2	12.3	-	-
Speckled Mousebird	*Colius striatus*	25.5	0.9	-	-
Speckled Pigeon	*Columba guinea*	67.3	13.2	-	-
Spike-heeled Lark	*Chersomanes albofasciata*	48.5	1.3	-	-
Spotted Eagle-Owl	*Bubo africanus*	9.1	0.9	-	-
Spotted Flycatcher	*Muscicapa striata*	4.2	0.4	-	-
Spotted Thick-knee	*Burhinus capensis*	9.1	0.0	-	-
Spur-winged Goose	*Plectropterus gambensis*	44.2	1.8	-	-
Squacco Heron	*Ardeola ralloides*	1.2	0.0	-	-
Streaky-headed Seedeater	*Crithagra gularis*	9.1	0.4	-	-
Swainson's Spurfowl	*Pternistis swainsonii*	61.2	2.6	-	-
Tawny-flanked Prinia	*Prinia subflava*	0.6	0.4	-	-
Temminck's Courser	*Cursorius temminckii*	1.8	0.0	-	-
Three-banded Plover	*Charadrius tricollaris*	35.2	0.9	-	-
Village Weaver	*Ploceus cucullatus*	4.2	0.0	-	-
Wailing Cisticola	*Cisticola lais*	9.1	0.0	-	-
Wattled Crane	*Grus carunculata*	0.6	0.0	VU	CR
Wattled Starling	*Creatophora cinerea*	0.6	0.0	-	-
Western Barn Owl	*Tyto alba*	3.0	0.4	-	-
Western Cattle Egret	*Bubulcus ibis*	44.8	12.3	-	-
Western Osprey	*Pandion haliaetus*	0.6	0.0	-	-
Whiskered Tern	*Chlidonias hybrida*	12.1	5.3	-	-
White Stork	*Ciconia ciconia*	7.3	1.3	-	-
White-backed Duck	*Thalassornis leuconotus*	6.7	0.0	-	-
White-bellied Bustard	*Eupodotis senegalensis*	7.9	0.0	-	VU
White-breasted Cormorant	*Phalacrocorax lucidus*	11.5	0.9	-	-
White-faced Whistling Duck	*Dendrocygna viduata*	0.6	0.0	-	-
White-rumped Swift	*Apus caffer*	30.3	4.0	-	-
White-throated Swallow	*Hirundo albigularis*	37.6	1.8	-	-
White-winged Tern	*Chlidonias leucopterus*	3.6	0.9	-	-
Willow Warbler	*Phylloscopus trochilus*	4.2	0.0	-	-
Wing-snapping Cisticola	*Cisticola ayresii*	45.5	6.2	-	-
Wood Sandpiper	*Tringa glareola*	6.1	0.0	-	-
Yellow Canary	*Crithagra flaviventris*	15.8	0.4	-	-
Yellow-billed Duck	*Anas undulata*	61.8	4.4	-	-
Yellow-billed Kite	*Milvus aegyptius*	2.4	0.0	-	-
Yellow-crowned Bishop	*Euplectes afer*	34.5	4.0	-	-
Yellow-fronted Canary	*Crithagra mozambica*	9.1	0.9	-	-
Zitting Cisticola	*Cisticola juncidis*	41.2	2.6	-	-

Priority Species	Taxonomic name	Solar site
Amur Falcon	*Falco amurensis*	*
Black Sparrowhawk	*Accipiter melanoleucus*	*
Black-headed Heron	*Ardea melanocephala*	*
Blacksmith Lapwing	*Vanellus armatus*	*
Black-winged Kite	*Elanus caeruleus*	*
Cape Vulture	*Gyps coprotheres*	*
Cape Weaver	*Ploceus capensis*	*
Cape White-eye	*Zosterops virens*	*
Common Buzzard	*Buteo buteo*	*
Drakensberg Prinia	*Prinia hypoxantha*	*
Egyptian Goose	*Alopochen aegyptiaca*	*
Fiscal Flycatcher	*Melaenornis silens*	*
Grey Heron	*Ardea cinerea*	*
Grey-winged Francolin	*Scleroptila afra*	*
Little Grebe	*Tachybaptus ruficollis*	*
Long-crested Eagle	*Lophaetus occipitalis*	*
Pied Starling	*Lamprotornis bicolor*	*
Reed Cormorant	*Microcarbo africanus*	*
South African Cliff Swallow	*Petrochelidon spilodera*	*
South African Shelduck	*Tadorna cana*	*
Western Cattle Egret	*Bubulcus ibis*	*
Yellow-billed Duck	*Anas undulata*	*
22		**22**
Non-Priority Species	**Taxonomic name**	**Solar site**
African Pipit	*Anthus cinnamomeus*	*
African Quail-Finch	*Ortygospiza atricollis*	*
African Reed Warbler	*Acrocephalus baeticatus*	*
African Stonechat	*Saxicola torquatus*	*
Ant-eating Chat	*Myrmecocichla formicivora*	*
Banded Martin	*Riparia cincta*	*
Barn Swallow	*Hirundo rustica*	*
Black-chested Prinia	*Prinia flavicans*	*
Black-throated Canary	*Crithagra atrogularis*	*
Bokmakierie	*Telophorus zeylonus*	*
Brown-throated Martin	*Riparia paludicola*	*
Cape Canary	*Serinus canicollis*	*
Cape Longclaw	*Macronyx capensis*	*
Cape Robin-Chat	*Cossypha caffra*	*
Cape Sparrow	*Passer melanurus*	*
Cape Turtle Dove	*Streptopelia capicola*	*
Cape Wagtail	*Motacilla capensis*	*
Common Ostrich	*Struthio camelus*	*
Common Quail	*Coturnix coturnix*	*
Common Waxbill	*Estrilda astrild*	*

Non-Priority Species cont.	Taxonomic name	Solar site
Crowned Lapwing	*Vanellus coronatus*	*
Dark-capped Bulbul	*Pycnonotus tricolor*	*
Fan-tailed Widowbird	*Euplectes axillaris*	*
Greater Striped Swallow	*Cecropis cucullata*	*
Hadeda	*Bostrychia hagedash*	*
Helmeted Guineafowl	*Numida meleagris*	*
House Sparrow	*Passer domesticus*	*
Laughing Dove	*Spilopelia senegalensis*	*
Levaillant's Cisticola	*Cisticola tinniens*	*
Long-tailed Widowbird	*Euplectes progne*	*
Olive Woodpecker	*Dendropicos griseocephalus*	*
Orange-breasted Waxbill	*Amandava subflava*	*
Pale-crowned Cisticola	*Cisticola cinnamomeus*	*
Pin-tailed Whydah	*Lamprotornis nitens*	*
Red-billed Quelea	*Quelea quelea*	*
Red-capped Lark	*Calandrella cinerea*	*
Red-collared Widowbird	*Euplectes ardens*	*
Red-eyed Dove	*Streptopelia semitorquata*	*
Red-winged Francolin	*Scleroptila levaillantii*	*
Southern Fiscal	*Lanius collaris*	*
Southern Grey-headed Sparrow	*Passer diffusus*	*
Southern Masked Weaver	*Ploceus velatus*	*
Southern Red Bishop	*Euplectes orix*	*
Speckled Pigeon	*Columba guinea*	*
Spike-heeled Lark	*Chersomanes albofasciata*	*
Spotted Flycatcher	*Muscicapa striata*	*
Swainson's Spurfowl	*Pternistis swainsonii*	*
White-throated Swallow	*Hirundo albigularis*	*
Wing-snapping Cisticola	*Cisticola ayresii*	*
Yellow Canary	*Crithagra flaviventris*	*
Yellow-crowned Bishop	*Euplectes afer*	*
Zitting Cisticola	*Cisticola juncidis*	*
52	Subtotal	52
	Grand total	**74**

APPENDIX 2: HABITAT FEATURES AT THE PROJECT AREA

Figure 1: Agricultural lands at the locality of Site Alternative 2

Figure 2: High quality grassland near the locality of Site Alternative 1

APPENDIX 3: IMPACT TABLES

Project Name: Camden Green Ammonia and Hydrogen Facility
Impact Assessment

CONSTRUCTION

Impact number	Aspect	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+	E+	R+	D)x	P=	S	Rating	(M+	E+	R+	D)x	P=	S	Rating
Impact 1:	Displacement	Displacement of priority species due to disturbance associated with the construction of the Facility	Construction	Negative	Moderate	2	1	1	2	3	**18**	**N2**	2	1	1	2	2	**12**	**N1**
					Significance	**N2 - Low**							**N1 - Very Low**						
Impact 2:	Displacement	Displacement of priority species due to habitat transformation associated with the construction of the Facility	Construction	Negative	Moderate	2	1	5	4	2	**24**	**N2**	2	1	5	4	2	**24**	**N2**
					Significance	**N2 - Low**							**N2 - Low**						

DECOMISSIONING

Impact number	Aspect	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+	E+	R+	D)x	P=	S		(M+	E+	R+	D)x	P=	S	
Impact 1:	Displacement	Displacement of priority species due to disturbance associated with the dismantling of the Facility	Construction	Negative	Moderate	2	1	1	2	3	**18**	**N2**	2	1	1	2	2	**12**	**N1**
					Significance	**N2 - Low**							**N1 - Very Low**						

CUMULATIVE

Impact number	Aspect	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+	E+	R+	D)x	P=	S		(M+	E+	R+	D)x	P=	S	
Impact 1:	Displacement	Displacement of priority species due to disturbance associated with the construction of the Facility	Construction	Negative	Moderate	2	1	1	2	4	**24**	**N2**	2	1	1	2	2	**12**	**N1**
					Significance	**N2 - Low**							**N1 - Very Low**						
Impact 2:	Displacement	Displacement of priority species due to habitat transformation associated with the construction of the Facility	Construction	Negative	Moderate	3	1	5	4	2	**26**	**N2**	2	1	5	4	2	**24**	**N2**
					Significance	**N2 - Low**							**N2 - Low**						

OPERATION

Impact number	Aspect	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+	E+	R+	D)x	P=	S		(M+	E+	R+	D)x	P=	S	
Impact 1:	Mortality: Collision	Mortality of priority species due to collisions with the up to 132kVkV overhead power line	Operational	Negative	Moderate	5	3	3	4	2	**30**	**N2**	5	3	3	4	1	**15**	**N1**
					Significance	**N2 - Low**							**N1 - Very Low**						
Impact 2:	Mortality: Electrocution	Electrocution of priority species on the up to 132kV overhead powerline	Operational	Negative	High	5	3	3	4	2	**30**	**N2**	5	3	3	4	1	**15**	**N1**
					Significance	**N2 - Low**							**N1 - Very Low**						

CUMULATIVE

Impact number	Aspect	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+	E+	R+	D)x	P=	S		(M+	E+	R+	D)x	P=	S	
Impact 1:	Mortality: Collision	Powerline collision mortality of priority avifauna due to the construction of the overhead power line.	Cumulative	Negative	Moderate	5	3	3	4	2	**30**	**N2**	5	3	3	4	1	**15**	**N1**
					Significance	**N2 - Low**							**N1 - Very Low**						
Impact 2:	Mortality: Electrocution	Mortality (electrocution) of priority avifauna due to the construction of the on-site substation	Cumulative	Negative	High	5	3	3	4	1	**15**	**N1**	5	3	3	4	1	**15**	**N1**
					Significance	**N1 - Very Low**							**N1 - Very Low**						

APPENDIX 4: ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

Environmental Management Programme (EMPr): Green Ammonia and Hydrogen Facility

Management Plan for the Planning and Design Phase

Impact	Mitigation/Management Objectives and Outcomes	Mitigation/Management Actions	Monitoring		
			Methodology	***Frequency***	***Responsibility***
Avifauna: Displacement due to habitat transformation					
Total or partial displacement of avifauna due to habitat transformation associated with the vegetation clearance and the presence of the Facility.	Prevent unnecessary displacement of avifauna by ensuring that sensitive habitat is protected.	1. Limit construction of infrastructure in high sensitivity grassland as much as possible.	1. Development in the remaining high sensitivity grassland must be limited as far as possible.	Once-off during the planning phase.	Project Developer

EMPr for the Construction Phase

Impact	Mitigation/Management Objectives and Outcomes	Mitigation/Management Actions	Monitoring		
			Methodology	***Frequency***	***Responsibility***
Avifauna: Disturbance					
The noise and movement associated with the construction activities at the development footprint will be a source of disturbance which would lead to the displacement of avifauna from the area.	Prevent unnecessary displacement of avifauna by ensuring that contractors are aware of the requirements of the Construction Environmental Management Programme (CEMPr.)	A site-specific CEMPr must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere to the CEMPr and should apply good environmental practice during construction. The CEMPr must specifically include the following: 1. No off-road driving; 2. Maximum use of existing roads, where possible; 3. Measures to control noise and dust according to latest best practice; 4. Restricted access to the rest of the property;	1. Implementation of the CEMPr. Oversee activities to ensure that the CEMPr is implemented and enforced via site audits and inspections. Repor and record any non-compliance. Ensure that construction personnel are made aware of the impacts relating to off-road driving. 2. Construction access roads must be demarcated clearly. Undertake site inspections to verify. 3. Monitor the implementation of noise control mechanisms via site inspections and record and report non-compliance. 4. Ensure that the construction area is demarcated clearly and that construction personnel are made aware of these demarcations. Monitor via site inspections and report non-compliance.	1. Monthly 2. Monthly 3. Monthly 4. Monthly	1. Contractor and ECO 2. Contractor and ECO 3. Contractor and ECO 4. Contractor and ECO
Avifauna: Displacement due to habitat transformation					
Total or partial displacement of avifauna due to habitat transformation associated with the vegetation clearance and the presence of the Facility.	Prevent unnecessary displacement of avifauna by ensuring that the rehabilitation of transformed areas is implemented by an appropriately qualified rehabilitation specialist, according to the recommendations of the biodiversity specialist study.	1. Monitor rehabilitation via site audits and site inspections to ensure compliance. Record and report any non-compliance.	All biodiversity recommendations regarding rehabilitation must be followed	1. Frequency as stated by the biodiversity specialist	1. Project Developer 2. Facility Environmental Manager 3. Project Developer and Facility Operational Manager

EMPr for the Operational Phase

No actions are required

EMPr for the Decommissioning Phase

Impact	Mitigation/Management Objectives and Outcomes	Mitigation/Management Actions	Monitoring		
			Methodology	***Frequency***	***Responsibility***
Avifauna: Displacement due to disturbance associated with the dismantling activities					
The noise and movement associated with the de-commissioning activities at the Facility footprint will be a source of disturbance which would lead to the displacement of avifauna from the area	Prevent unnecessary displacement of avifauna by ensuring that contractors are aware of the requirements of the EMPr.	A site-specific EMPr must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere to the EMPr and must apply good environmental practice during construction. The EMPr must specifically include the following: 1. No off-road driving. 2. Maximum use of existing roads. 3. Measures to control noise and dust according to latest best practice. 4. Restricted access to the rest of the property. 5. Strict application of all recommendations in the botanical specialist report pertaining to the limitation of the footprint.	**1.** Implementation of the EMPr. Oversee activities to ensure that the EMPr is implemented and enforced via site audits and inspections. Report and record any non-compliance. 2. Ensure that construction personnel are made aware of the impacts relating to off-road driving. 3. Access roads must be demarcated clearly. Undertake site inspections to verify. 4. Monitor the implementation of noise control mechanisms via site inspections and record and report non-compliance. 5. Ensure that the footprint area is demarcated and that construction personnel are made aware of these demarcations. Monitor via site inspections and report non-compliance.	1. Monthly 2. Monthly 3. Monthly 4. Monthly 5. monthly	1. O&M Contractor and ECO 2. Contractor and ECO 3. Contractor and ECO 4. Contractor and ECO 5. Contractor and ECO

Management Plan for the Planning and Design Phase

Impact	Mitigation/Management Objectives and Outcomes	Mitigation/Management Actions	Monitoring		
			Methodology	***Frequency***	***Responsibility***
Mortality of avifauna, specifically Cape Vulture, due to electrocutions on the overhead powerline poles/towers	Reduction of avian electrocution mortality	If a steel monopole pole design is used, the approved vulture friendly pole/tower design D-DT-7649 in accordance with the Eskom Distribution Technical Bulletin titled Refurbishment of 66/88kV line kite type frames with D-DT-7649 type top configuration - Reference Number 240-170000467 relating to bird friendly structures, must be used. If lattice type structures are used, it is imperative that a minimum vertical clearance of 1.8m is maintained between the jumper cables and/or insulator live ends, and the horizontal earthed components. Additional mitigation in the form of insulating sleeves on jumper cables present on strain poles and terminal poles is also recommended (if suitable insulation material is readily available.	1. Construct the powerline using a minimum vertical clearance of 1.8m between the jumper cables and/or insulators and the horizontal earthed component on the lattice structure.	Once-off	Contractor and ECO

Management Plan for the Construction Phase

Avifauna: Mortality due to collision with the overhead powerline					
Mortality of avifauna due to collisions with the overhead powerline.	Reduction of avian collision mortality	Bird Flight Diverters must be fitted to the entire OHL according to the applicable Eskom Engineering Instruction (Eskom Unique Identifier 240 – 93563150: The utilisation of Bird Flight Diverters on Eskom Overhead Lines). These devices must be installed as soon as the conductors and earthwires are strung.	1. Fit Eskom approved Bird Flight Diverters on the entire length of line	1. Once-off	1. Contractor and ECO

Management Plan for the Operational Phase

No actions are required

Management Plan for the Decommissioning Phase

No actions are required