
**PROPOSED ARCELORMITTAL COMBINED CYCLE GAS
TURBINE POWER PLANT, 400 KV OVERHEAD POWER LINE
TO THE EXISTING AURORA SUBSTATION AND
UNDERGROUND PIPELINE TO THE PORT OF SALDANHA,
SALDANHA, WESTERN CAPE:
AVIFAUNAL IMPACT STUDY**



Produced for ERM by:



June 2016

EXECUTIVE SUMMARY

Simon Todd Consulting was enlisted by Environmental Resources Management (ERM) to undertake an avifaunal impact study for the proposed ArcelorMittal combined cycle gas turbine (CCGT) power plant, on-site switching yard and ancillary infrastructure as well as a new 400 kV overhead power line to the existing Eskom Aurora substation in order to connect the proposed power plant to the national grid and an underground pipeline to transport gas, water and power between the Port of Saldanha and the proposed power plant.

Up to 267 bird species are known to occur within the study area and broader impact zone of the development, including 26 red-listed or threatened species, 40 endemic species and 26 near-endemic species. A large portion of these were however not considered relevant, with 16 species considered as priority species for this study. The birds of greatest potential relevance and importance in terms of the possible impacts of the development are likely to be local populations of endemic passerines, resident or visiting large terrestrial birds, resident or passing raptors and transient waterbirds.

The development will pose several impacts to avifauna, which after mitigation, include: a **moderate** and **minor** displacement impact caused respectively by habitat loss and disturbance associated with the construction and maintenance activities of the various features of the development; a **minor** impact of electrocutions of birds on power infrastructure; and a **minor** impact of avian collisions with overhead power lines due to the fact that the new overhead power lines are routed in an existing feeder servitude and therefore do not result in an altogether new impact threat.

The study area and more specifically the proposed site location are not considered unique habitats in the landscape and are already subject to varying degrees of transformation and degradation. Although four threatened and/or priority species were recorded in the study area – Martial Eagle, Lanner Falcon, Black Harrier and Southern Black Korhaan – the area is not considered critical for their conservation and the extent of habitat loss for these species would be considered low.

The proposed ArcelorMittal CCGT power plant, 400 kV overhead power line to the Eskom Aurora substation and underground pipeline to the Port of Saldanha has been assessed as being of **moderate** sensitivity from an avifaunal perspective due to the presence of priority species, the general avifauna occurring in the study area and broader impact zone of the development and the nearby proximity of two IBAs. **The development is however likely to have little, if any significant long-term impact on the avifauna of the wider area, especially after mitigation, and as such, is considered to have acceptable levels of impact overall.**

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DECLARATION OF INDEPENDENCE

I, **Blair Zoghby**, in my capacity as a specialist consultant, hereby declare that I:

- Act/acted as an independent specialist to Environmental Resources Management (ERM) (Pty) Ltd for this project.
- Do not have any personal, business or financial interest in the project expect for financial remuneration for specialist investigations completed in a professional capacity as specified by the Environmental Impact Assessment Regulations, 2014.
- Will not be affected by the outcome of the environmental process, of which this report forms part of.
- Do not have any influence over the decisions made by the governing authorities.
- Do not object to or endorse the proposed developments, but aim to present facts and my best scientific and professional opinion with regard to the impacts of the development.
- Undertake to disclose to the relevant authorities any information that has or may have the potential to influence its decision or the objectivity of any report, plan or document required in terms of the Environmental Impact Assessment Regulations, 2014.

PROFESSIONAL EXPERIENCE

Simon Todd Consulting has extensive experience in the assessment of renewable energy developments, having provided ecological assessments for more than 100 different renewable energy developments. This includes a variety of facilities in the immediate vicinity of the current site as well as in the broader North Cape region. Simon Todd is a recognised arid-areas ecological expert and is a past chairman of the Arid-Zone Ecology Forum and has 18 years' experience working throughout the country. Simon Todd is registered with the South African Council for Natural Scientific Professions (No. 400425/11).

Blair Zoghby has been involved in ornithological conservation and research for eight years and holds an MSc degree in Zoology/Conservation Biology obtained through the Percy FitzPatrick Institute of African Ornithology, University of Cape Town, South Africa. He has undertaken numerous avian impact assessments across the country and as such, has experience working with a wide variety of bird species and bird habitats.

INDEMNITY

- This report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken.
- This report is based on a desktop investigation using available information and data related to the site to be affected, *in situ* fieldwork, surveys and assessments and the specialists best scientific and professional knowledge.
- The Precautionary Principle has been applied throughout this investigation.
- The findings, results, observations, conclusions and recommendations given in this report are based on the specialist's best scientific and professional knowledge as well as information available at the time of study.
- Additional information may become known or available during a later stage of the process for which no allowance could have been made at the time of this report.
- The specialist reserves the right to modify this report, recommendations and conclusions at any stage should additional information become available.
- Information, recommendations and conclusions in this report cannot be applied to any other area without proper investigation.
- This report, in its entirety or any portion thereof, may not be altered in any manner or form or for any purpose without the specific and written consent of the specialist as specified above.
- Acceptance of this report, in any physical or digital form, serves to confirm acknowledgement of these terms and liabilities.



Blair Zoghby



Simon Todd Pr.Sci.Nat 400425/11.

June 2016

1. INTRODUCTION

1.1. BACKGROUND

ArcelorMittal is proposing the establishment of a combined cycle gas turbine (CCGT) power plant, with an on-site switching yard and ancillary infrastructure as well as a new 400 kV overhead power line to the existing Eskom Aurora substation in order to connect the proposed power plant to the national grid. The proposed CCGT power plant, on-site switching yard and ancillary infrastructure will be located on the Remaining Extent of Farm Yzervarkensrug 129 and Farm Jackelskloof 195, the new 400 kV overhead power line will be routed east of the plant following the existing Aurora to Blouwater 132 kV feeder servitude and the pipeline servicing the development will be routed south-west to the Port of Saldanha in the Western Cape.

The National Environmental Management Act (NEMA) (Act 107 of 1998) requires that an Environmental Impact Assessment (EIA) be conducted for any development which could have a significant effect on the environment, with the objective to identify, predict and evaluate the actual and potential impacts of these activities on ecological systems; identify alternatives; and provide recommendations for mitigation to minimize the negative impacts. The results of the EIA are then lodged with the National Department of Environmental Affairs (DEA) for further examination before an outcome of authorisation for the development is given.

In order to meet these requirements and manage the EIA process, ArcelorMittal has appointed Environmental Resources Management (ERM) as independent environmental assessment practitioners. As part of the specialist studies required for the EIA, ERM has enlisted Simon Todd Consulting to provide an avifaunal impact study of the developable area.

The purpose of the avifaunal impact study is to describe and detail the avian ecological features of the proposed site, provide an assessment of the avian ecological sensitivity of the site, identify and assess the significance of the likely impacts associated with the development and provide measures to avoid, minimize and mitigate project related impacts to avifauna.

1.2. RELEVANT ASPECTS OF THE DEVELOPMENT

- The proposed development area is located within an area identified for industrial development according to the Saldanha Bay Municipal Spatial Development Framework.
- The site for the proposed CCGT power plant and switching yard is located less than 1 km to the east of the existing ArcelorMittal Steelworks, immediately adjacent to the Eskom Blouwater substation, and will have a footprint of approximately 800 m x 600 m in size.
- The power generated at the plant will be evacuated through the construction of a new 22 km High Voltage (HV) 400 kV overhead power line from the plants own switching yard east to the existing Eskom Aurora 400 kV substation, following the existing Aurora to Blouwater 132 kV feeder servitude.
- The underground pipeline, which will consist of four pipes (two gas, one water and one power) buried to a depth of 3 – 4 m, will be routed south-west to the Port of Saldanha approximately 4.6 km away and will have a servitude of 15 – 20 m.
- Ancillary infrastructure associated with the proposed development will include access tracks/roads, control and electrical building, central control room, warehouse and administrative buildings and storage facilities.

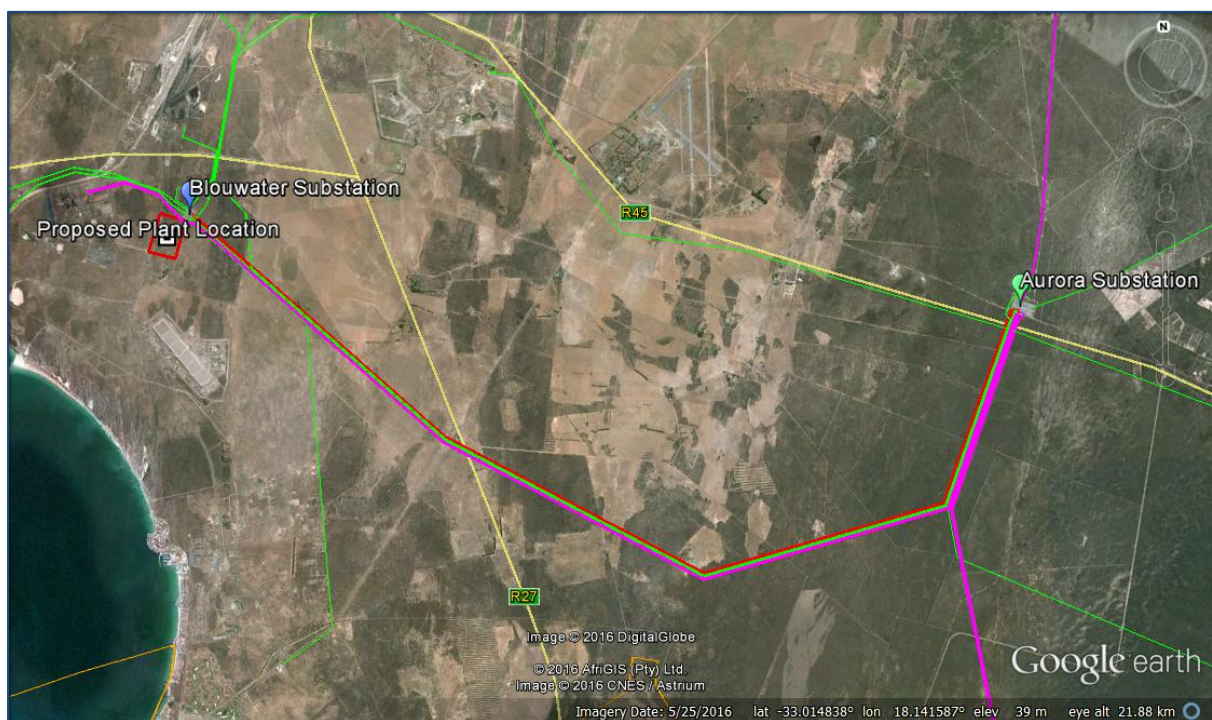


Figure 1: Satellite image showing the proposed CCGT power plant location and route of the proposed 400 kV overhead power line (red line) between the Eskom Blouwater Substation (blue marker) and the Eskom Aurora Substation (green marker). Note that

the proposed power line route follows the existing feeder servitude for high voltage lines (green line) and transmission lines (purple line).

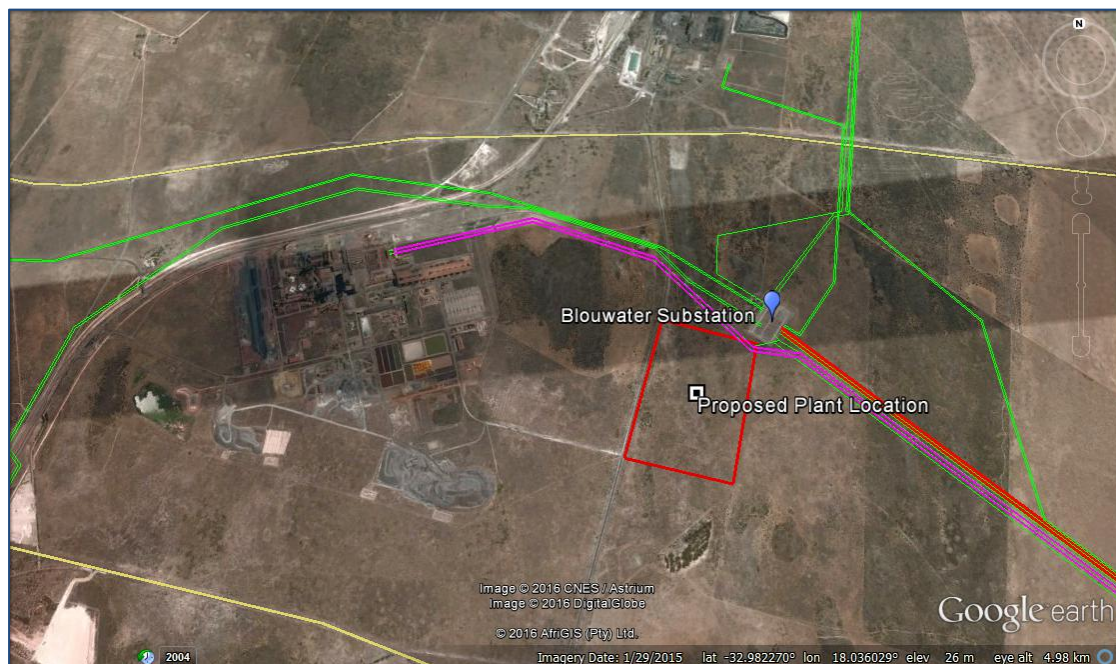


Figure 2: Satellite image showing a closer view of the proposed CCGT power plant location just to the east of the existing ArcelorMittal Steelworks.

1.3. RELEVANT LEGISLATION AND GUIDELINES

The following legislation is applicable to the proposed development:

1.3.1. The Convention on Biological Diversity

The Convention on Biological Diversity (CBD) is an international convention (to which South Africa is a signatory) and represents a commitment to sustainable development. The Convention has three main objectives: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits from the use of genetic resources (<http://cbd.int/convention/guide/>). Although the convention does not include specific recommendations or guidelines pertaining to birds and energy infrastructure interactions and impacts, it does make provisions for keeping and restoring biodiversity.

1.3.2. The Convention on the Conservation of Migratory Species of Wild Animals

The Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or the Bonn Convention) is an intergovernmental treaty and is the most appropriate instrument to deal with the conservation of terrestrial, aquatic and avian migratory species. The convention includes policy and guidelines with regards to the impact associated with man-made infrastructure. CMS requires that parties (South Africa is a signatory) take measures to avoid migratory species from becoming endangered (Art II, par. 1 and 2) and to

make every effort to prevent the adverse effects of activities and obstacles that seriously impede or prevent the migration of migratory species i.e. power lines (Art 111, par. 4b and 4c).

1.3.3. The Agreement on the Convention of African-Eurasian Migratory Water Birds

The Agreement on the Conservation of African-Eurasian Migratory Water birds (AEWA) is an intergovernmental treaty dedicated to the conservation of migratory waterbirds and their habitat across Africa, Europe, the Middle East Central Asia, Greenland and the Canadian Archipelago. The AEWA covers 255 species of birds ecologically dependent on wetlands for at least part of their annual cycle and is a legally binding agreement by all contracting parties (South Africa included) to guarantee the conservation of migratory waterbirds within their national boundaries through species and habitat protection and the management of human activities.

1.3.4. The National Environmental Management: Biodiversity Act

The National Environmental Management: Biodiversity Act (No. 10 of 2004, NEMBA) regulations on Threatened and Protected Species (TOPS) provides for the consolidation of biodiversity legislation through establishing national norms and standards for the management of biodiversity across all sectors and by different management authorities. The national Act and several sets of provincial conservation legislation provide for among other things, the management and conservation of South Africa's biodiversity; protection of species and ecosystems that necessitate national protection and the sustainable use of indigenous biological resources.

1.4. TERMS OF REFERENCE

The specific terms of reference for this Avifaunal Impact Study include the following:

- A description of the environment of the study area in terms of the avian habitats present.
- A consolidated list of bird species and priority bird species (priority species will include nationally and/or globally threatened, rare, endemic or range-restricted bird species) likely to occur within the study area and broader impact zone of the development, with information on the relative value (in terms of breeding, nesting, roosting and foraging) of the site for these birds.
- A delineation of areas that are potentially highly sensitive, no-go areas that may need to be avoided by the development.
- A description and evaluation of the environmental issues and potential impacts (including direct, indirect and cumulative impacts) that the proposed development may have on the bird species present.
- A statement regarding the potential significance of the identified issues based on the evaluation of the issues/impacts.

- A description of any mitigation measures that may be required to manage impacts related to the monitoring and assessment of the site.

1.5. STUDY METHODOLOGY

1.5.1. Approach

The Avifaunal Impact Study included the following steps:

- A review of all available published and unpublished literature pertaining to bird interactions with plants, substations and power lines, summarising the issues involved and the current level of knowledge in the field. Various information sources including data on the local avifauna of the area and previous studies of bird interactions with plants, substations and power lines were examined.
- A site visit to the study area (6-8 June 2016) to determine the *in situ* local avifauna and avian habitats present on site. Walked transects, vehicle transects and vantage point surveys were conducted in various habitats across the site to:
 - Quantify aspects of the local avifauna (such as species diversity and abundance);
 - Identify important avian features present on site (such as nesting and roosting sites);
 - Confirm the presence, abundance, habitat preference and movements of priority species;
 - Identify important flyways across the site; and
 - Delineate any obvious, highly sensitive, no-go areas to be avoided by the development.
- The compilation of a consolidated and annotated list of the avifauna likely to occur within the study area and the broader impact zone of the development based on a combination of existing distributional data, species seen during the site visit, previous studies conducted in the area and experience of the local avifauna.
- The compilation of a short-list of priority bird species (including nationally and/or globally threatened, rare, endemic or range-restricted bird species) which could be affected by the proposed development. These species will subsequently be considered as adequate surrogates for the local avifauna in general, and mitigation of impacts on these species will be considered likely to accommodate any less important bird populations that may also potentially be affected.
- An avian site sensitivity map was generated by integrating avian microhabitats present on site and avifaunal information collected during the site visit. The avian sensitivity of the different units identified in the mapping procedure were rated according to the following scale:
 - *Low*: Areas of natural or transformed habitat with a low sensitivity where there is likely to be a negligible impact on ecological processes and avifauna.

Most types of development can proceed within these areas with little ecological impact.

- *Medium*: Areas of natural or previously transformed land where the impacts are likely to be largely local. These areas usually comprise the bulk of habitats within an area. Development within these areas can proceed with relatively little ecological and avian impacts provided that appropriate mitigation measures are taken.
- *High*: Areas of natural or transformed land where a high impact is anticipated due to the high biodiversity, sensitivity or important ecological role of the area. Development within these areas is undesirable and should only proceed with caution as it may not be possible to mitigate all impacts appropriately.
- *Very High*: Critical and unique habitats that serve as habitat for rare, threatened, endemic or range-restricted species and/or perform critical ecological roles. These areas are essentially no-go areas from a development perspective and should be avoided as much as possible.

In some situations, areas were also classified between the above categories, such as *Medium-High*, where it was deemed that an area did not fit well into a certain category but rather fell most appropriately between two sensitivity categories.

- The construction of a matrix of potential impacts of the development on the local avifauna will be drawn up and the significance of these impacts will be assessed in terms of the available suite of mitigation options available.
- A final statement on the overall significance of the potential impacts of the development on the avifauna of the area will be written up.

1.5.2. Data sources used

The following data sources and reports were used in varying degrees of detail for this study:

- The Southern African Bird Atlas Project 1 (SABAP 1; Harrison *et al.*, 1997) quarter degree squares (QDC) 3218CC (298 cards) and 3318AA (381 cards) as well as the Southern African Bird Atlas Project 2 (SABAP 2; <http://sabap2.adu.org.za/index.php>) pentads 3255_1800 (7 cards), 3300_1800 (92 cards), 3300_1805 (6 cards) and 3300_1810 (5 cards) were consulted to determine the bird species likely to occur within the study area and the broader impact zone of the development.
- The Important Bird Areas (IBA; Barnes, 1998) report was consulted to determine the location of the nearest IBAs and their importance in relation to this study.
- The Coordinated Avifaunal Roadcounts (CAR; Young *et al.*, 2003) data was consulted to obtain relevant data on large terrestrial bird reporting rates in the study area.
- The Coordinated Waterbird Counts (CWAC; Taylor *et al.*, 1999) data was consulted to determine if large concentrations of waterbirds, associated with South African wetlands, occur within or near the study area.

- The conservation status, endemism and biology of all species considered likely to occur within the study area was then determined from Hockey *et al.* (2005) and Taylor *et al.* (2015).
- The South African National Vegetation Map (Mucina & Rutherford, 2006) was consulted in order to determine the vegetation types and their conservation status that occur within the study area.

1.5.3. Limitations and assumptions

The specialist made the assumption that the sources of information used in the compilation of this report are reliable. However, it must be noted that there are limiting factors and these could detract from the accuracy of the predicted results:

- The SABAP 1 data for the relevant quarter degree squares covering the developable area are now >18 years old (Harrison *et al.*, 1997).
- Limited time in the field means that important components of the local avifauna (i.e. nest sites or localised areas of key habitats for rare or threatened species) could have been missed. The full length of the proposed power line was however surveyed and no nest sites were recorded to the best of this specialists capabilities, given the time and extent of such a task.

The site visit as well as personal experience of the avifauna of the area and of similar species in different parts of South Africa, through the specialist's experience working across the country, goes some way to remedying any knowledge deficiencies.

2. DESCRIPTION OF THE AFFECTED ENVIRONMENT

2.1. BROAD-SCALE VEGETATION PATTERNS

According to the national vegetation map (Mucina & Rutherford, 2006) the proposed CCGT power plant and proposed 400 kV overhead power line traverse three vegetation types within the Fynboss Biome *en route* from the plant location in the west to the Eskom Aurora Substation in the east. The vegetation types include: Saldanha Limestone Strandveld where the proposed CCGT power plant and on-site switching yard is situated, Saldanha Flats Strandveld along the central region of overhead power line route and Hopefield Sand Fynbos around the Eskom Aurora Substation. All three vegetation types are classified as *Endangered* and are, on the whole, made up of shrublands with a moderately tall shrub layer and low, open, succulent undergrowth.

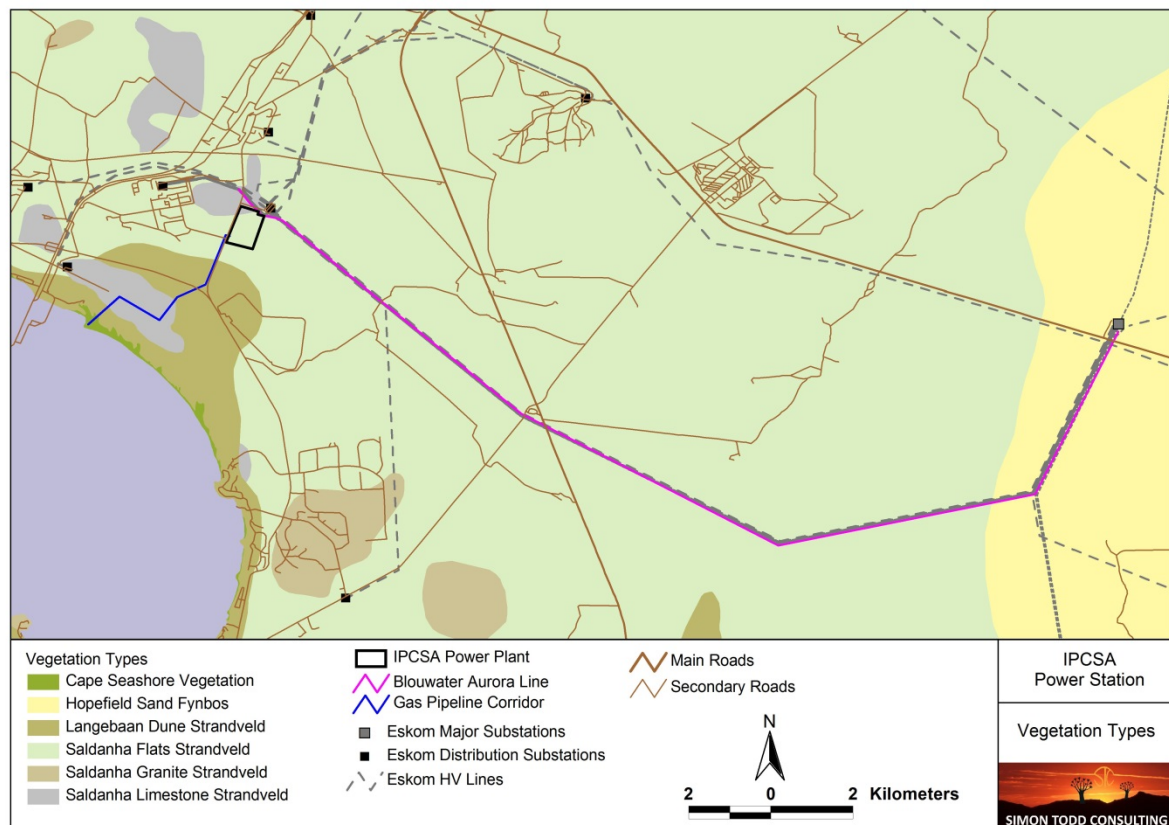


Figure 3: Broad-scale overview of the vegetation in and around the proposed CCGT power plant and 400 kV overhead power line to the Eskom Aurora Substation. The vegetation map is an extract of the national vegetation map as produced by Mucina & Rutherford (2006), and also includes rivers and wetlands delineated by the National Freshwater Ecosystem Priority Areas assessment (Nel et al. 2011).

2.2. AVIAN MICROHABITATS

While broad-scale vegetation patterns influence the distribution and abundance of bird species holistically, it is the fine-scale vegetation patterns and various avian microhabitats in an area that determine local avifauna populations.

A number of different avian microhabitats were identified at the site and these formed the basis of the avian site sensitivity map. These units include:

- *Fynbos shrubland*: This habitat unit represents a large portion of the vegetation traversed by the eastern section of overhead power line and is largely made up of dense low shrub. This habitat unit supported the highest diversity and abundance of species in the study area, specifically endemic and near-endemic passerines, as well as a few species of conservation concern (Martial Eagle *Polemaetus bellicosus* and Lanner Falcon *Falco biarmicus*).
- *Strandveld shrubland*: This habitat unit represents the majority of the vegetation traversed by the overhead power line (western and central section) and is comprised

of sparse shrub with scattered rock and succulent-dominated undergrowth. Bird species diversity and abundance was relatively low in this vegetation, however one species of conservation concern – Black Harrier *Circus maurus* – was recorded in and is known to favour this habitat unit.

- *Cultivated land*: Cultivated land represents a significant feeding area for many bird species in any landscape. The land preparation process opens up the soil and makes insects, seeds, bulbs and other food sources readily accessible to birds. The crops and pasture plants are also easy food sources and often attract insects which are in turn eaten by birds. Cultivated lands occur throughout the study area, with relevant bird species of conservation concern (Blue Crane *Anthropoides paradiseus* and Southern Black Korhaan *Afrotis afra*) likely to be attracted to these areas.
- *Stands of exotic plantations*: This habitat unit occurs sporadically throughout the study area and represents the only large trees within the landscape. Although this habitat unit is largely made up of exotic tree species (*Eucalyptus*) where bird species diversity and abundance was not particularly high, it represents a potentially important nesting area for larger raptors.
- *Ephemeral pans*: There are numerous ephemeral pans (which will only hold water after heavy rains) scattered around the study area. This habitat unit is important for numerous species of waterbirds, specifically those of conservation concern (Greater Flamingo *Phoenicopterus ruber*, Lesser Flamingo *Phoenicopterus minor*, Great White Pelican *Pelecanus onocrotalus* and Maccoa Duck *Oxyura maccoa*).

It should however be noted, that the study area has already been subject to varying degrees of disturbance and degradation caused by past and present land-use practises such as agriculture and industry due to its close proximity to the town of Saldanha.



Figure 4: Dense fynbos shrubland (left) and more open strandveld shrubland (right).



Figure 5: Cultivated lands (left) and stands of exotic plantations (right).



Figure 6: Ephemeral pan.

2.3. AVIFAUNA

Up to 267 bird species have been recorded within the relevant and respective SABAP 1 and 2 quarter degree squares and pentads covering the study area and broader impact zone of the development (Appendix 1), including 26 red-listed or threatened species, 40 endemic species and 26 near-endemic species. A large portion of these species were however not considered relevant for this study due to the fact that the grid size used for the SABAP 1 data collection was 27 km x 27 km, extending out to sea, and therefore includes pelagic species which would definitely not occur in the study area or broader impact zone of the development. Of the 26 red-listed or threatened species listed, 16 are relevant to this study. A total of 32 bird species were recorded during the field visit, most notable of which being Martial Eagle, Lanner Falcon, Black Harrier and Southern Black Korhaan.

The birds of greatest potential relevance and importance in terms of the possible impacts of the proposed CCGT power plant and 400 kV overhead power line are likely to be local

populations of endemic passerines (Cape Long-billed Lark *Certhilauda curvirostris* and Cape Clapper Lark *Mirafra apiata*), resident or visiting large terrestrial birds (Blue Crane, Southern Black Korhaan and Secretarybird *Sagittarius serpentarius*), resident or passing raptors (Martial Eagle, Lanner Falcon, Black Harrier) and transient waterbirds (Greater Flamingo, Lesser Flamingo, Great White Pelican and Maccoa Duck).

At the time of the site visit (6-8 June 2016), bird diversity and abundance was greatest in the *Fynbos shrubland* habitat unit at the eastern end of the proposed power line route, near the Eskom Aurora substation. A large majority of this eastern section of the proposed power line route traverses a game lodge/reserve where the natural vegetation remains relatively intact (especially in comparison to the surrounding areas). All four of the red-listed or threatened species (Martial Eagle, Lanner Falcon, Black Harrier and Southern Black Korhaan) recorded during the field visit were seen in this area. Other habitat units were less prolific, however the *Cultivated lands* habitat unit did also produce a high number of species and is expected to be visited regularly by Blue Cranes due to their fondness towards cereal crop fields and planted pastures. It is also expected that numerous species of transient waterbirds will fly-over the study area between resource areas, with many species (Greater Flamingo, Lesser Flamingo and Great White Pelican) doing so at night.



Figure 7: Lanner Falcon (left) and Martial Eagle (right) both recorded in the *Fynbos shrubland* habitat unit. Note both species making use of the existing power infrastructure.

On the basis of the observations recorded during the field visit, and in combination with already documented information on the avifauna of the study area, 16 priority species are considered central in this avifaunal impact study (Table 1). These are mostly threatened species which are known to occur, or could occur, in relatively high numbers in the developable area and the broader impact zone of the development and which are likely to be, or could be, negatively affected by the proposed CCGT power plant and 400 kV overhead power line.

Overall, the avifauna of the study area and the broader impact zone are not considered unique and are typical of what occurs across large areas of the Fynbos Biome, however

because of the expected occurrence of numerous priority species in the study area and the nearby proximity of two Important Bird and Biodiversity Areas, the sensitivity of the site, from an avian perspective, will be of **moderate** significance.

Table 1: Priority species list considered central to the avifaunal impact study for the proposed ArcelorMittal CCGT power plant and 400 kV overhead power line, selected on the basis of conservation status (Taylor *et al.*, 2015).

Common name	Scientific name	Conservation status	Regional endemism	Estimated importance of local population	Preferred habitat	Likelihood of occurring in the study area	Susceptible to
Bustard, Ludwig's	<i>Neotis ludwigii</i>	Endangered	Endemic	Moderate	Semi-arid dwarf shrubland, also in arid savanna and fynbos	Low	Collision
Crane, Blue	<i>Anthropoides paradiseus</i>	Near-threatened	Endemic	High	Grasslands, but also in wetlands, cultivated pastures and croplands	High	Collision
Courser, Burchell's	<i>Cursorius rufus</i>	Vulnerable	Near-endemic	Low	Sparsely vegetated arid regions	Low	Disturbance
Duck, Maccoa	<i>Oxyura maccoa</i>	Near-threatened	-	Moderate	Inland water bodies with emergent vegetation; flyover	Moderate	Habitat loss/disturbance
Eagle, Martial	<i>Polemaetus bellicosus</i>	Endangered	-	Low	Open savanna and woodland on plains, also semi-arid shrublands	Recorded in the study area	Collision, electrocution
Eagle, Verreaux's	<i>Aquila verreauxii</i>	Vulnerable	-	Moderate	Mountainous regions and rocky areas with cliffs	High	Collision
Falcon, Lanner	<i>Falco biarmicus</i>	Vulnerable	-	High	Open grassland or woodland near cliff or electricity pylons	Recorded in the study area	Collision, disturbance/ habitat loss
Flamingo, Greater	<i>Phoenicopterus ruber</i>	Near-threatened	-	High	Saline or brackish water bodies; flyover	High	Collision
Flamingo, Lesser	<i>Phoenicopterus minor</i>	Near-threatened	-	High	Eutrophic shallow wetlands, salt pans; flyover	High	Collisions
Harrier, African Marsh	<i>Circus ranivorus</i>	Endangered	-	High	Inland and coastal wetlands, and adjacent moist grasslands	High	Habitat loss/disturbance; collisions
Harrier, Black	<i>Circus maurus</i>	Endangered	Near-endemic	High	Fynbos, shrubland, dry grassland and croplands	Recorded in the study area	Disturbance/ habitat loss
Korhaan, Southern Black	<i>Afrotis afra</i>	Vulnerable	Endemic	High	Renosterveld, fynbos and succulent Karoo	Recorded in the study area	Habitat loss/disturbance; collisions
Pelican, Great White	<i>Pelecanus onocrotalus</i>	Vulnerable	-	High	Shallow lakes, estuaries, large pans and dams	High	Collisions
Secretarybird	<i>Sagittarius serpentarius</i>	Vulnerable	-	Moderate	Open grassland with scattered trees and shrubs	Moderate	Collision
Stork, Black	<i>Ciconia nigra</i>	Vulnerable	-	Moderate	Mountainous regions	High	Collision, electrocution
Vulture, Cape	<i>Gyps coprotheres</i>	Endangered	Near-endemic	Low	Mountainous regions, but range widely in surrounding areas	Low	Habitat loss/disturbance; collisions; electrocutions

2.4. IMPORTANT BIRD AND BIODIVERSITY AREAS

Important Bird and Biodiversity Areas (IBA) are sites of global significance for bird conservation, identified nationally through multi-stakeholder processes using global standardised, quantitative and scientifically agreed criteria (Marnewick *et al.*, 2015). The criteria are based in the presence of threatened species, assemblages of restricted-range and biome-restricted species, and large concentrations of congregatory species, referred to collectively as IBA 'trigger' species. Birds have been shown to be effective indicators of biodiversity hotspots, and so IBAs hold a large and representative proportion of other taxa too. Therefore, the conservation of IBAs ensures both the survival of a correspondingly large variety and abundance of other biodiversity and the integrity of ecosystem services that also support human well-being (Marnewick *et al.*, 2015).

At their closest points, the proposed development is ± 2 km north of the West Coast National Park and Saldanha Bay Islands IBA and ± 8 km south of the Berg River Estuary IBA.

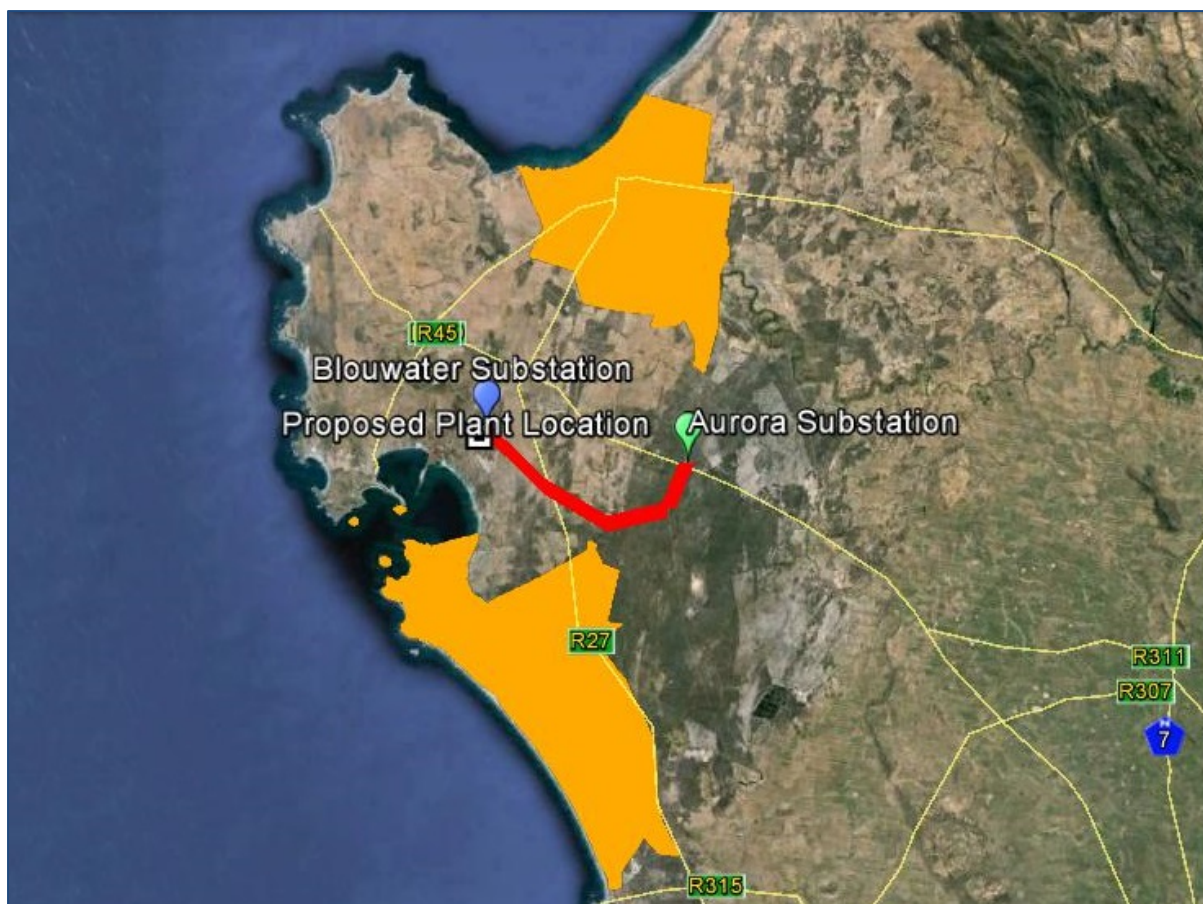


Figure 8: Satellite image showing the proposed development in relation to the West Coast National Park and Saldanha Bay Islands IBA (to the south) and the Berg River Estuary IBA (to the north).

2.4.1. West Coast National Park and Saldanha Bay Islands IBA

Site description

The West Coast National Park adjoins the town of Langebaan c. 100 km north of Cape Town and encompasses Langebaan Lagoon, a wetland of international importance and a designated Ramsar site; the coastal zone, which includes Postberg Nature Reserve and much of 16 Mile Beach; and the islands in Saldanha Bay, namely Jutten (43 ha), Malgas (18 ha), Marcus (17 ha) Vondeling (21 ha) and Schaapen (29 ha). Meeuw Island (7 ha) still belongs to the SANDF but is included in the IBA. The lagoon, an arm of Saldanha Bay, is approximately 15 km long, 3 km wide and up to 6 m deep, and is sheltered from wave action. The spring tide range extends from 1.7 m at the mouth to 1.4 m at the lagoon's southern end. Several hydrological conditions change along the length of the lagoon, creating a gradient of habitats. Although it receives no significant freshwater input above ground, the lagoon is fed by a number of underground aquifers, particularly the Elandsfontein aquifer, and consequently qualifies as an estuary.

The rich mud of the salt marshes supports dense populations of molluscs and crustaceans. Some 71 species of marine algae have been recorded in the lagoon and its verges are lush with salt-marsh succulents and dense stands of bulrushes, reeds and freshwater vegetation. The lagoon serves as a nursery ground for juvenile fish, and gobies, pipefish, skates, rays and small sharks are common. Extensive areas of mudflats, sand flats and salt-marsh succulents (concentrated in the south) are exposed at low tide. The localised freshwater input at the lagoon's southern section permits the growth of a diversity of palustrine wetland vegetation.

The islands within the IBAs borders are diverse. Jutten, a large, triangular island, lies about 800 m from Jut Point at the southern entrance to Saldanha Bay and rises to some 60 m a.s.l. Sparse vegetation grows over numerous boulders strewn across its flat perimeter and up the sides of two small hills. There are buildings on the island and stone and concrete walls intricately subdivide it. Malgas Island, which is circular and flat, lies across from Jutten at the northern entrance to Saldanha Bay. Large boulders are scattered across this barren island. Marcus Island rises to just over 7 m a.s.l. and lies deep in Saldanha Bay, about 1.2 km south of Hoedjies Point. Since 1976 it has been connected to the mainland by a 2-km causeway, which was built as part of the harbour development for the export of iron ore and the import of crude oil. Sparse vegetation is interspersed between scattered boulders. Meeuw and Schaapen islands, which lie about 800 m from one another, are near the shore of Donkergat Bay and Langebaan Town respectively. Both islands are located in the southern section of Saldanha Bay, almost in the mouth of Langebaan Lagoon, and are sparsely covered by vegetation.

Well-developed strandveld, comprising low bushes and succulents, dominates the terrestrial vegetation around the lagoon. Many flowering annuals put on a show in spring and there are also elements of coastal sclerophyllous fynbos, especially in the east. Some old

farmlands provide more open habitat. The open coast on the park's western border is exposed to heavy wave action and is predominantly sandy in the south and rocky in the north.

Birds

More than 250 bird species have been recorded in the West Coast National Park. Langebaan Lagoon is the most important wetland for waders in South Africa, regularly accounting for c. 10% of South Africa's coastal wader numbers. It consistently supports more than 20 000 non-passerine waterbirds in summer, of which 16 500 are waders and 93% are Palearctic migrants. In some years wader numbers can increase from 4 000 in winter to 20 000 in summer. Grey Plover *Pluvialis squatarola*, Curlew Sandpiper *Calidris ferruginea*, Sanderling *C. alba*, Red Knot *C. canutus* and Ruddy Turnstone *Arenaria interpres* are the major components of the summer wader assemblage. Important resident waders include Chestnut-banded Plover *Charadrius pallidus*, White-fronted Plover *C. marginatus* and Kittlitz's Plover *C. pecuarius*.

In winter, the lagoon regularly holds more than 6 500 birds, of which Greater Flamingo *Phoenicopterus ruber* and Lesser Flamingo *P. minor* make up 2 000, and 4 000 are waders. The terrestrial strandveld habitat is important for African Marsh Harrier *Circus ranivorus*, Black Harrier *C. maurus*, Southern Black Korhaan *Afrotis afra*, Red-chested Flufftail *Sarothrura rufa* and African Rail *Rallus caerulescens*, and possibly also for the secretive Hottentot Buttonquail *Turnix hottentottus*.

The islands in Saldanha Bay are home to nearly 80 000 coastal seabirds. Malgas Island is one of only six localities in the world that supports breeding Cape Gannet *Morus capensis* and is known to have been used by the species since at least 1648. The colony on the island comprises 25% of the global Cape Gannet population. Together, the islands hold important numbers of African Penguin *Spheniscus demersus*, although there is considerable cause for concern because the populations at Malgas, Marcus and Jutten islands have declined by more than 50% – a decline that is mirrored across the species' west coast breeding sites. The largest known Kelp Gull *Larus dominicanus* colony in southern Africa is found on Schaapen Island. Nearly 10% of South Africa's Hartlaub's Gull *Chroicocephalus hartlaubii* population and 5% of the global Crowned Cormorant *Phalacrocorax coronatus* population are present in this IBA. Important populations of Bank Cormorant *P. neglectus*, Cape Cormorant *P. capensis* and Swift Tern *Thalasseus bergii* also breed at the various islands.

The lagoon has supported large numbers of Caspian Tern *Sterna caspia* in the past, but they may have moved to the Lower Berg River wetlands (SA104). Twelve per cent of the world's African Black Oystercatcher *Haematopus moquini* population is found scattered throughout the IBA, mostly on the islands. The coastal strandveld supports several restricted-range and biome-restricted assemblage species, including the recently described Cape Long-billed

Lark *Certhilauda curvirostris*, Karoo Lark *Calendulauda albescens*, Cape Bulbul *Pycnonotus capensis*, Cape Spurfowl *Pternistis capensis* and Sickie-winged Chat *Cercomela sinuata*.

IBA trigger species

Globally threatened species are African Penguin (614 breeding pairs), Cape Gannet (30 000 breeding pairs), Cape Cormorant (3 343 breeding pairs), Bank Cormorant (65 breeding pairs), Crowned Cormorant (maximum 308 individuals; CWAC data), African Black Oystercatcher, Lesser Flamingo (maximum 687 individuals; CWAC data), Chestnut-banded Plover, Secretarybird *Sagittarius serpentarius*, Black Harrier and Southern Black Korhaan. Regionally threatened species are Caspian Tern, Greater Flamingo, Great White Pelican *Pelecanus onocrotalus*, Verreaux's Eagle *Aquila verreauxii*, African Marsh Harrier and Lanner Falcon *Falco biarmicus*.

Restricted-range and biome-restricted species include Cape Spurfowl and Cape Bulbul, which are common; Karoo Lark, which is locally common; and Cape Long-billed Lark and Layard's Tit-Babbler *Sylvia layardi*, which are uncommon.

Species that meet the 1% or more congregatory population threshold are Cape Gannet (30 000 breeding pairs; CWAC data), Cape Cormorant (3 343 breeding pairs; CWAC data), Crowned Cormorant (maximum 308 individuals; CWAC data), Bank Cormorant (65 breeding pairs; CWAC data), Greater Flamingo (maximum 1 312 individuals; CWAC data), Lesser Flamingo (maximum 687 individuals; CWAC data), White-fronted Plover (maximum 197 individuals; CWAC data), Grey Plover (maximum 3 300 individuals; CWAC data), Ruddy Turnstone (maximum 1 600 individuals; CWAC data), Curlew Sandpiper (maximum 7 859 individuals; CWAC data), Sanderling (maximum 4 950 individuals; CWAC data), Kelp Gull (4 221 breeding pairs) and Hartlaub's Gull (245 breeding pairs). Species that meet the 0.5% population threshold are Kittlitz's Plover (maximum 106 individuals; CWAC data), Red Knot (maximum 2 000 individuals; CWAC data) and Common Tern *Sterna hirundo* (maximum 1 000 individuals; CWAC data).

Threats

The proclamation of the national park at this site precludes most threats, although the Industrial Development Zone at Saldanha and the expansion associated with it could impact negatively on the system as a whole. After the completion of the Sishen–Saldanha railway line in the early 1970s and the construction of a deep-water harbour in Saldanha Bay, the area was committed as a major port for the export of iron ore. Major industrial development subsequently led to the town's growth. Metal pollution from the iron-ore berth and pollution and oiling incidents from urbanisation and shipping pose a threat to the future of the lagoon. The development of the port has already altered the hydrodynamics and physical structure of the bay; it is due to be expanded and the number of different products exported, including various minerals and chemicals, will be increased.

These changes, which include the development of potential phosphate mines next to the IBA, pose a major threat to the sensitive ecosystems of Langebaan Lagoon in that increased shipping traffic and industrial activities may result in oil or chemical spills. The intertidal salt flats, marshes and rocky islands are at particular risk. Chronic pollution from crude oil or other contaminants that spill into the ocean when tankers break open, wash their tanks, dump cargo or pump bilge can occur. African Penguins are particularly susceptible to events such as this and a single oil disaster can severely affect populations. One large spill could threaten all the important seabird populations at the Saldanha Bay islands, as well as impact the Ramsar-designated Langebaan Lagoon.

Dredging required to deepen the harbour is an additional threat as it can lead to increased sedimentation in the lagoon itself. A fine layer of sediments on the mudflats reduces habitat quality for invertebrates and could also reduce the foraging quality for birds. Sewage effluent overflows and leaks from soak-away tanks in the towns of Langebaan and Saldanha occasionally affect water quality in the bay, impacting negatively on the sensitive ecology of the system and potentially reducing the habitat quality.

Between 1956 and 1980 the global Cape Gannet population declined some 50%. The collapse was attributed to a decrease in sardine *Sardinops sagax* stocks, the gannets' primary food source. Despite the global decline, which affected mainly Namibian colonies, the Malgas Island colony has been increasing since the late 1960s to early 1970s, which correlates with the local recovery of sardine stocks in the Western Cape. African Penguin and Cape Cormorant are thought to have been affected by competition with commercial fisheries, especially purse-seining for surface-shoaling fish such as anchovy *Engraulis capensis* and sardine. A recommendation has been made that marine reserves with a radius of 25 km are established around important breeding islands. Commercial fishing should be banned or restricted within these zones.

Uncontrolled recreational activities such as jet-skiing and kite-boarding can disturb foraging birds. This is a particular threat for migratory waders, which need to gain weight for the return flight to the northern hemisphere. It is being tackled by the West Coast National Park Forum and the development of a watercraft association in Langebaan. A new camp may be built in the park, at a site known as Kleinmooimaak on the lagoon shore. If it goes ahead, the disturbance effect along the shore will increase and the activities and numbers of people utilising this area will have to be regulated.

Seals have been known to prey on juvenile seabirds and this can impact on populations on the rocky islands of the IBA. This threat is being actively managed by park and DEA: Oceans and Coasts Division officials and the culling of rogue seals is carried out when necessary. Since the construction of the causeway to Marcus Island, several mammalian predators have periodically occurred on the island, including Cape grey mongoose *Herpestes pulverulentus*, yellow mongoose *Cynictis penicillata*, small-spotted genet *Genetta genetta* and Cape fox *Vulpes chama*. During a four-year period, a minimum of 195

individuals of nine seabird and shorebird species, including large numbers of African Penguin and African Black Oystercatcher (8% of the island's breeding population was killed in a single season), were killed by mammalian predators on Marcus Island. This led to the construction of a predator-proof wall, which has reduced, but not eliminated, predation on the island. Since the construction of the causeway, populations of all breeding seabirds on Marcus Island have declined. European rabbits *Oryctolagus cuniculus* have substantially altered the vegetation on Schaapen and Jutten islands, but there is no evidence to suggest they have adversely affected breeding seabirds.

2.4.2. Berg River Estuary IBA

Site description

Covering an area of c. 6 621 ha, the Berg River Estuary IBA is located 140 km north of Cape Town. The town of Laaiplek lies directly north of the river mouth, and 6 km upstream is the town of Velddrif. The Berg River forms one of only four perennial estuaries on the arid west coast of southern Africa. The IBA includes only the lower Berg River, but this system is reliant on the management of its catchment, which extends c. 160 km upstream from the river mouth to its source in the Franschhoek and Drakenstein mountains. From its source, the river flows through the towns of Paarl and Wellington before arching west and meeting the Atlantic Ocean at Laaiplek. The lower reaches of the river meander over very flat country so that, on average, the riverbed falls only 1 m in the last 50 km.

The ecological functioning of the estuary is determined by seasonal changes in river discharge and consequent changes in salinity and turbidity. In winter, when the estuary is flooded by muddy, fresh river water, most of the marine species disappear. As the floods recede in spring, the salinity increases and the system shifts back to a predominantly marine environment. When the shallow pools on the floodplain start to dry out, also in spring, there is a marked increase in the number of birds the wetlands support.

The floodplain encompasses eight major wetland types in addition to the river channel: ephemeral pans, commercial salt pans, reed marsh, sedge marsh, salt marsh, halophytic floodplain, xeric floodplain and intertidal mudflats. The ephemeral pans comprise monospecific stands of *Juncus maritimus* in summer. After winter rains, abundant *Aponogeton distachyos* appears, along with other species. The commercial salt pans comprise a salt desert generally lacking macrophytes.

The reed marsh is based on saturated, silt-rich soils, mainly on inner riverine beds. Although the sedge marsh is dominated by *Juncus kraussii*, smaller sedge species are also present in a varied mosaic that includes non-sedge species. The salt marsh experiences tidal flooding by saline water twice a day and is dominated by fleshy-leaved salt-tolerant species. Halophytic floodplain vegetation consists primarily of *Sarcocornia pillansii*, which may be interspersed with open patches that are colonised by ephemeral growth in spring. The xeric floodplain vegetation comprises a great diversity of xerophytes. The floodplain can be inundated for up to two weeks at a time when the Berg River floods. The terrestrial vegetation within the

catchment has been altered dramatically and consists primarily of an agricultural matrix, with patches of Strandveld near the coast and a mosaic of invasive alien *Acacia* species and indigenous fynbos in the mountainous interior.

Birds

Since 1975, approximately 250 bird species have been recorded on and adjacent to the lower Berg River, 127 of which are waterbirds. The most important habitats for foraging birds are the estuarine mudflats and ephemeral floodplain pans, while for breeding the riparian marshes and the commercial salt pans are key. On average, more than 12 000 non-passerine waterbirds occur at the estuary during summer and 6 000 non-passerine waterbirds during winter. In combination, the estuary and floodplain regularly support more than 20 000 birds; in December 1992 a count of both habitats yielded 46 234 waterbirds.

Total waterbird numbers are strongly influenced by the influx of Palearctic migrants and more than 8 000 migrant waders, especially Curlew Sandpiper *Calidris ferruginea* and Little Stint *C. minuta*, are regularly present in summer. Among resident waders, Kittlitz's Plover *Charadrius pecuarius* is most abundant, but large numbers of the Afro-tropical resident population of Pied Avocet *Recurvirostra avosetta* are also present when conditions are favourable. The open mudflats support a small population of African Black Oystercatcher *Haematopus moquini*.

The commercial salt pans hold many breeding species, including very large numbers of Caspian Tern *Sterna caspia*, incorporating up to 13% of the South African breeding population. Greater Flamingo *Phoenicopterus roseus* and Lesser Flamingo *Phoeniconaias minor* have attempted to breed at the salt pans in recent years and Chestnut-banded Plover *Charadrius pallidus* breeds here regularly. Kelp Gull *Larus dominicanus* and Hartlaub's Gull *Chroicocephalus hartlaubii* are resident at the Berg River and occur in large numbers, breeding in mid-summer and early winter respectively. Swift Tern *Thalasseus bergii* breeds here sporadically. Large mixed-tern roosts are occasionally seen on the floodplain and the small islands in the middle estuary. Substantial numbers of Great White Pelican *Pelecanus onocrotalus* occur regularly on the lower Berg River, which is a key foraging and roosting area for the Dassen Island (IBA SA109) breeding population during the non-breeding season.

Great Crested Grebe *Podiceps cristatus* and Black-necked Grebe *P. nigricollis* breed occasionally. South African Shelduck *Tadorna cana* uses the estuary in large numbers as a moulting site and also breeds regularly. Yellow-billed Duck *Anas undulata*, Cape Teal *A. capensis*, Cape Shoveler *A. smithii* and Red-knobbed Coot *Fulica cristata* breed in the inundated salt marshes in the upper estuary. This area is also one of the few remaining breeding sites for Greater Painted-snipe *Rostratula benghalensis* in the Western Cape.

A large heronry c. 1 km west of the Kersefontein farmhouse is known to have existed for the past 300 years. It holds 13 breeding species, including substantial numbers of Grey Heron *Ardea cinerea*, Black-headed Heron *A. melanocephala*, Western Cattle Egret *Bubulcus*

ibis, Yellow-billed Egret *Egretta intermedia* and African Spoonbill *Platalea alba*, as well as Glossy Ibis *Plegadis falcinellus*, which appears to be increasing. The reed marsh immediately adjacent to the floodplain is important for breeding African Marsh Harrier *Circus ranivorus*, especially below Die Plaat. African Fish Eagle *Haliaeetus vocifer* and an isolated European Bee-eater *Merops apiaster* population occasionally breed along the river. There is a significant roosting site for four of South Africa's cormorant species – Crowned *Phalacrocorax coronatus*, Cape *P. capensis*, Bank *P. neglectus* and White-breasted *P. lucidus* – in the area, which also provides a night roost for certain species, with estimates of up to 60 000 Cape Cormorants coming in to roost in the evenings, as well as significant numbers of different tern species.

The numbers of Cape, Bank and Crowned cormorants have reduced significantly and it is suggested that the density of wader species using the area is also decreasing year on year due to alterations in habitat quality and other disturbances. Of particular concern is the number of species that no longer meet the population limits for the congregatory category of the IBA criteria.

IBA trigger species

Globally threatened species are Cape Cormorant (maximum 1 787 individuals), Crowned Cormorant (maximum 70 individuals), Lesser Flamingo, African Black Oystercatcher, Black Harrier *Circus maurus* and Chestnut-banded Plover. Regionally threatened species are Greater Flamingo, Great White Pelican, Caspian Tern, African Marsh Harrier, Lanner Falcon *Falco biarmicus* and Greater Painted-snipe. Biome-restricted species common in the IBA include Cape Spurfowl *Pternistis capensis* and Cape Bulbul *Pycnonotus capensis*, while Karoo Lark *Calendulauda albescens* is locally common.

Red-knobbed Coot (maximum 1 400 individuals) meets the 1% or more congregatory threshold, and African Spoonbill and Chestnut-banded Plover meet the 0.5% or more congregatory threshold. Species that have not met the 1% or more threshold but should be on probation and reviewed in future assessments are Cape Shoveler, Kittlitz's Plover, Curlew Sandpiper, Pied Avocet, Kelp Gull, Hartlaub's Gull, Swift Tern, Sandwich Tern *Thalasseus sandvicensis* and White-winged Tern *Chlidonias leucopterus*. Species that should be reviewed for the 0.5% or more threshold are Great Crested Grebe, Black-necked Grebe, Little Stint and South African Shelduck.

Threats

The principal threat to this estuary stems from inadequate water flow volumes and an unnatural flow regime of fresh water coming down the Berg River from its catchment, due to high levels of water abstraction along the river's course and to the Berg River Dam. In 1998, water supplied to the Greater Cape Town metropolitan area from the Berg River and additional abstraction for agricultural use had reduced the mean annual run-off of water by 23%. Further reductions are likely to have occurred as a result of the construction of the Berg River Dam, which stores water and supplies it to the growing population of Cape Town.

Abstraction at the dam and increased, unregulated abstraction of water along the river's length have a major impact on the water levels and flow regime of the estuary.

The dam was built so that specific volumes of water could be released at certain intervals in order to maintain the natural flow regime of the river. However, these flow regimes will not entirely mimic a natural system. Winter inundation of the floodplain, either naturally or through controlled releases, is essential for the continued ecological functioning of the floodplain and estuary. Lack of winter flooding may result in the development of hyper-saline conditions and consequent biological sterility on the floodplain. The most important threat to this wetland is therefore further reduction in the mean annual run-off, which would significantly affect seasonal water flow patterns and volumes.

The mean annual run-off may also be reduced by a proposed impoundment upstream of the estuary. In addition, water volumes will almost certainly be diminished by the construction of the Corex steel smelter (Saldanha Steel) and the associated spin-off industries near Saldanha Bay, which will require considerable quantities of water for their operation. It has been proposed that water be abstracted from the Berg River for these purposes. The Saldanha Bay Industrial Development Zone and the associated industries planned for the area may further exacerbate water abstraction issues in this system.

A second threat is hyper-salinity in the estuary, which occurs when the sediments at the river mouth are dredged to allow boats access to what has become a fully constructed harbour in place of the natural estuary and river mouth. Dredging increases the velocity of the tidal flow, the turbidity of the water and the penetration of salt water upstream, and intensifies erosion within the system. The increased penetration of salt water – a result of reduced freshwater flow as well as dredging – changes the ecological character of the estuary, impacting primarily on the vegetation types and invertebrate fauna of the area. Alterations in the plant and invertebrate community in turn impact on the foraging wader and other waterbird species.

Eutrophication of the estuary and wetlands due to the run-off of excess fertilisers and other chemicals from agricultural activities along the Berg River's course to the sea can have a major negative impact on the ecology of the wetland system. Greater nutrient loading may be another cause of the increase in algal and plant material that seems to be affecting wader foraging habitat. Light, noise and other pollutants from upstream activities, the harbour, salt-mining operations and the urban area can lead to further degradation of the sensitive estuarine environment.

Human activities, such as boating on the river, and disturbance factors from the nearby towns, harbour and factories also pose a threat to the birds of this site. Birds breeding and foraging in the wetlands are likely to be affected and may be forced out of highly disturbed areas. Proposed developments in certain parts of the estuary will also lead to an irreversible loss of habitat and increased disturbance in adjacent areas.

In the terrestrial environment, the occurrence of alien vegetation such as *Sesbania punicea* and Australian *Eucalyptus* and *Acacia* species constitute further threats as they transpire more than indigenous vegetation does and thus use substantially more water. The aquatic water hyacinth *Eichhornia crassipes* has invaded and poses a significant threat to the open-water system and floodplain, changing the character of the tidal mudflats that provide essential foraging habitat for migratory and resident shorebirds and waders.

2.5. AVIAN SITE SENSITIVITY MAP

The avian site sensitivity map (Figure 9) was generated by integrating avian microhabitats present on site, avifaunal information collected during the site visit as well as the topography of the study area, as this is important in determining risk associated with a power line development (i.e. collision risk). It is important to delineate sensitive avian microhabitats within the study area in order to ensure the development does not have a long term negative impact on these habitats. Important avian microhabitats play an integral role within the landscape, providing nesting, foraging and reproductive benefits to the local avifauna.

The location for the proposed CCGT power plant has been identified as being of *Low* avian sensitivity due to the fact that it is located adjacent to the ArcelorMittal Steelworks and in an area that has been heavily disturbed. The *Strandveld shrubland* habitat unit which surrounds the proposed plant location was homogenous, lacking structural and compositional variation, and did not support a high diversity and abundance of bird species.

The entire length of the proposed 400 kV overhead power line has been assessed as being of *High* avian sensitivity due to the fact that numerous red-listed, threatened or priority species are expected to traverse the area, between the aforementioned IBAs or various ephemeral pans (Greater and Lesser Flamingo and Great White Pelican) and between resource areas in the study area (Blue Crane and Southern Black Korhaan). Two priority species – Lanner Falcon and Martial Eagle – have already been recorded interacting with existing power infrastructure in the study area and as such, it is of paramount importance that new infrastructure includes mitigation measures so as not to exponentially increase the risk to these and other priority species.

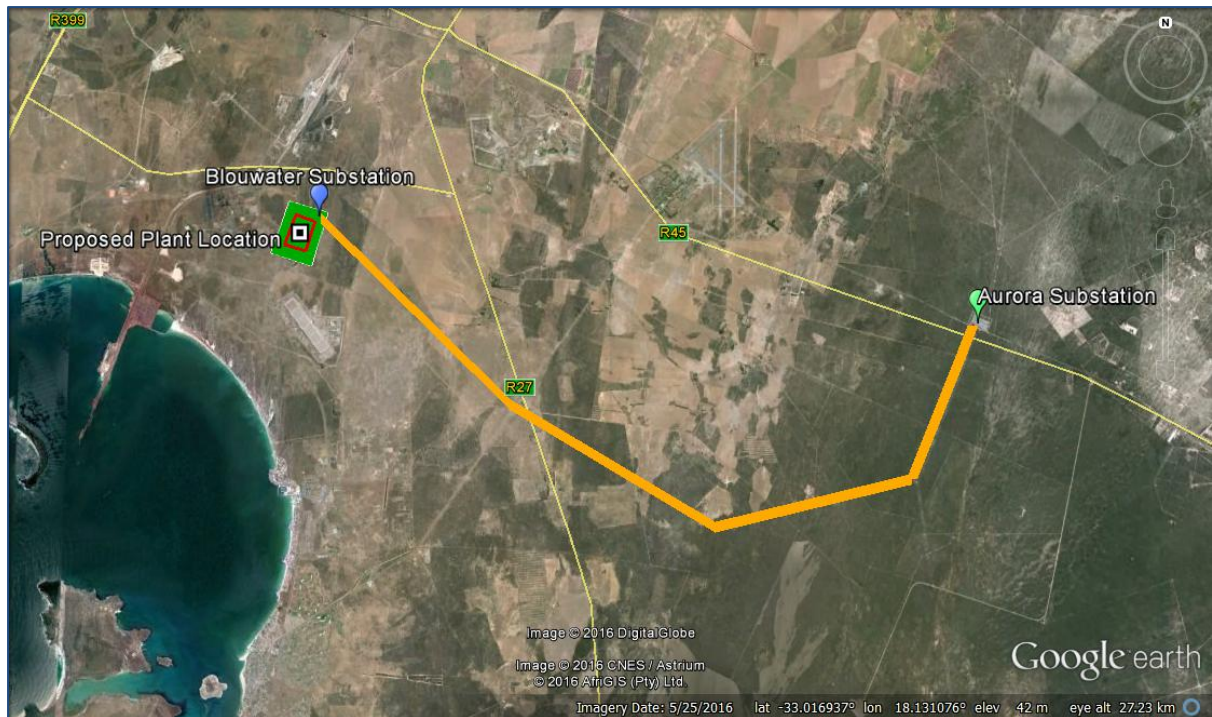


Figure 9: Avian site sensitivity map of the proposed ArcelorMittal CCGT power plant and 400 kV overhead power line. Avifaunal sensitivity: Green = *Low* and Orange = *High*.

3. ASSESSMENT OF IMPACTS

3.1. GENERAL DESCRIPTION OF BIRD INTERACTIONS WITH POWER PLANTS AND ASSOCIATED POWER INFRASTRUCTURE

While alternative energy sources are important to the future development of power generation and hold great potential, they are not without their environmental risks and negative impacts. Poorly sited or designed plants can have negative impacts on not only vulnerable species and habitats, but also on entire ecosystem functioning. These impacts are extremely variable, differing from site to site, and are dependent on numerous contributing factors which include the design and specifications of the plant, the importance and sensitivity of avian microhabitats present on site and the diversity and abundance of the local avifauna.

3.1.1. Impacts of CCGT power plants

Habitat loss

Although the degree of this impact is dependent on the location and scale of the development, this is potentially the most significant impact associated with the construction and operation (maintenance) of any plant. Extensive areas of vegetation (habitat) are cleared to accommodate the considerable amount of infrastructure required at these facilities, reducing the amount of habitat available to birds for foraging, roosting and

breeding (Smallie, 2013). This impact is likely to affect smaller bird species (i.e. larks and pipits) with small home ranges, as entire territories could be removed during construction activities.

Disturbance and displacement

Construction of CCGT power plants requires a significant amount of machinery and labour to be present on site for a period of time. For shy, sensitive species or ground-nesting birds resident in the area, construction activities are likely to cause a temporary disturbance or even result in displacement from the site entirely. In addition, but to a lesser extent, ongoing maintenance activities at the operational facility are likely to cause some degree of disturbance to birds in the general vicinity.

Human conflict

Certain bird species may seek to benefit from the plant, using the erected structures as prominent perches, sheltered roost sites or even nesting sites, and possibly foraging around the infrastructure. This may result in the fouling of critical components of the plant, bringing local bird populations into conflict with facility operators.

3.1.2. Impacts of associated power infrastructure

Due to their large size and prominence, electrical infrastructure constitutes an important interface between wildlife and man. Negative interactions between wildlife and electricity structures take many forms, but two common problems in southern Africa are electrocutions of birds and birds colliding with power lines (Ledger & Annegran, 1981; Ledger, 1983; Ledger, 1984; Hobbs & Ledger, 1986a; Hobbs & Ledger, 1986b; Ledger, Hobbs & Smith, 1992; Verdoorn, 1996; Kruger & Van Rooyen, 1998; Van Rooyen, 1998; Kruger, 1999; Van Rooyen, 1999; Van Rooyen, 2000). Other problems include displacement caused by disturbance and habitat destruction during construction and maintenance activities and electrical faults caused by bird nests and excrement when roosting or breeding on electricity infrastructure (Van Rooyen & Taylor, 1999).

Electrocution of birds

Avian electrocutions occur when a bird perches or attempts to perch on an electrical structure and causes an electrical short circuit by physically bridging the gap between live phases and earth components (phase-earth electrocution) or two live phases (phase-phase electrocution) (Van Rooyen, 2004b; Lehman *et al.*, 2007). Electrocution risk is strongly influenced by the power line voltage, the design of the pole structure and the size of the bird, with mainly larger, perching species such as vultures, eagles and storks being affected as they are capable of spanning the spaces between energised components.

Birds colliding with power lines

Power lines pose a significant collision risk to birds, affecting a particular suite of collision prone species. These are mostly heavy-bodied birds such as bustards, cranes, storks, large eagles and various species of waterbirds that have limited manoeuvrability in flight, which

makes it difficult for them to take the necessary evasive action to avoid colliding with power lines (Anderson, 2001; Van Rooyen 2004a; Jenkins *et al.*, 2010).

Body size and morphology are key predictive factors of collision risk, with large-bodied birds with high wing loadings (the ration of body weight to wing area) most at risk (Bevanger, 1998; Janss, 2000). These birds must fly fast to remain airborne, and do not have sufficient manoeuvrability to avoid unexpected obstacles.

Vision and the visual capacity of birds is another key factor, with many collision-prone birds principally using lateral vision to navigate in flight, when it is the lower resolution and often restricted, forward vision that is useful to detect obstacles (Martin & Shaw, 2010; Martin, 2011; Martin *et al.*, 2012). More so than that, recent research has shown that birds can render themselves blind in the direction of travel during flight through voluntary head movements (Martin & Shaw, 2010).

Behaviour and experience are also important, with birds flying in flocks, at low levels and in crepuscular or nocturnal conditions at higher risk of collision as well as migratory and nomadic species that spend much of their time in unfamiliar locations (Bevanger, 2002; Anderson 2002). Juvenile birds have also been reported as being more collision-prone than adults (Henderson *et al.*, 1996).

Topography and weather conditions affect how birds use the landscape and power lines in sensitive bird areas e.g. those that separate feeding and roosting areas or cross flyways, can be very dangerous (Bevanger, 1994). Lines crossing the prevailing wind conditions can pose a problem for large birds that use the wind to aid take-off and landing (APLIC, 1994; Bevanger, 1994). Inclement weather can disorient birds and reduce their flight altitude, and strong winds can result in birds colliding with power lines that they see but do not have enough flight control to avoid (APLIC, 1994).

Displacement caused by disturbance and habitat destruction

During the construction phase and maintenance of power lines, some habitat destruction and transformation inevitably takes place. This happens with the construction of access roads and the clearing of servitudes and the levelling of substation or switching yards. Servitudes have to be cleared of excess vegetation at regular intervals in order to allow access to the line for maintenance, to prevent vegetation from intruding into the legally prescribed clearance gap between the ground and the conductors and to minimise the risk of fire under the line, which can result in electrical flashovers. These activities have an impact on birds breeding, foraging and roosting in or in close proximity of the servitude through transformation of habitat which could result in temporary or permanent displacement.

Electrical faults caused by bird nests and excrement

Bird nests may cause faults through nest material protruding and constituting an air gap intrusion (Van Rooyen, 2000; Van Rooyen, 2001). Crows in particular often incorporate wire and other conductive material into their nests. Similarly so, a fault can occur when long streams of excrement released by large birds, either perched or in flight near a power line, can cause a flashover (Van Rooyen, 2000; Van Rooyen, 2001). A streamer that bridges the gap between the earth components, namely the steel tower and a bird perched on it above the insulator, and the nearest live component, acts as a fuse and results in an electrical fault. Physiologically, only larger birds are capable of causing this.

3.2. PROJECT SPECIFIC ASSESSMENT OF IMPACTS

Specific impacts of the proposed ArcelorMittal CCGT power plant and 400 kV overhead power line are most likely to be manifested in the following ways:

- Disturbance and displacement of local endemic passerines - from nesting and/or foraging areas by construction, operation and maintenance of the proposed CCGT power plant, new overhead power line and underground pipeline.
- Disturbance and displacement of resident or visiting large terrestrial species – Blue Crane, Southern Black Korhaan and Secretarybird – from nesting and/or foraging areas by construction, operation and maintenance of the proposed CCGT power plant and underground pipeline, and/or mortality of these species in collisions with new overhead power lines whilst flying *en route* to distant resource areas.
- Disturbance and displacement of resident or visiting raptors – Martial Eagle, Lanner Falcon and Black Harrier – from foraging areas by construction, operation and maintenance of the proposed CCGT power plant and underground pipeline, and/or mortality of these species in collisions with new overhead power lines or by electrocutions when perched on power infrastructure.
- Injury or mortality of transient waterbirds – Greater Flamingo, Lesser Flamingo and Great White Pelican – using possible flight paths in and out of resource areas in the broader impact zone in collisions with new overhead power lines.

Generally, however, the anticipated impacts on avifauna of the proposed development are not considered to be of any great significance if mitigation measures are applied. There will be some habitat loss for endemic passerines, some species – endemic passerines, large terrestrial species and raptors – may be displaced from a broader area either temporarily by construction, operation and maintenance activities, or more permanently by the disruptive activities at the operational development, and some species - large terrestrials, raptors and transient waterbirds - may be killed in interactions (collisions and electrocutions) with the new overhead power lines and power infrastructure, but numbers affected are likely to be low. This assessment is largely based on the fact that the vegetation surrounding the proposed location for the CCGT power plant is already heavily degraded and disturbed by

the nearby ArcelorMittal Steelworks and that the new overhead power line feeds into and runs parallel to the existing Eskom servitude and in doing so, does not pose an altogether new threat to avifauna in the area.

3.3. SIGNIFICANCE OF IDENTIFIED IMPACTS OF THE PROPOSED ARCELORMITTAL CCGT POWER PLANT AND 400 KV OVERHEAD POWER LINE

3.3.1. Assessment methodology

The assessment criteria used in the assessment are described below and are drawn from the EIA Regulations, published by the Department of Environmental Affairs and Tourism in terms of the Environmental Conservation Act No. 73 of 1989.

For each impact the following are described:

Nature of the impact. A description of positive or negative effects of the project on the affected environment, including who or what would be affected and how.

Extent of the impact. This includes assessing the spatial scale of the impact using the following scale:

- **On-site** – impacts that are limited to the site boundaries.
- **Local** – impacts that affect an area in a radius of 5 km around the site.
- **Regional** – impacts that affect regionally important environmental resources or are experienced at a regional scale as determined by administrative boundaries or habitat type/ecosystem.
- **National** – impacts that affect nationally important environmental resources or affect an area that is nationally important or has macro-economic consequences.
- **Transboundary/International** – impacts that affect internationally important resources such as areas protected by international conventions.

Duration of the impact. The lifespan of the impact is assessed as follows:

- **Temporary** – impacts are predicted to be of short duration, intermittent or occasional.
- **Short-term** – impacts that are predicted to last only for the duration of the construction period.
- **Long-term** – impacts that will continue for the life of the project, but cease when the project stops operating.
- **Permanent** – impacts that cause a permanent change in the affected receptor or resource (e.g. removal or destruction of ecological habitat) that endures substantially beyond the project lifetime.

Intensity or magnitude of the impact. The intensity or severity of the impact would be indicated as either:

- **Negligible** – the impact on the environment is not detectable.
- **Low** – the impact affects the environment in such a way that natural functions and processes are not affected.
- **Medium** – where the affected environment is altered but natural functions and processes continue, albeit in a modified way.
- **High** – where natural functions or processes are altered to the extent that it will temporarily or permanently cease.

Potential for impact on irreplaceable resources. This refers to the potential for an environmental resource to be replaced, should it be impacted. A resource could possibly be replaced by natural processes (e.g. by natural colonisation from surrounding areas), through artificial means (e.g. by reseeded disturbed areas or replanting rescued species) or by providing a substitute resource, in certain cases. In natural systems, providing substitute resources is usually not possible, but in social systems substitutes are often possible (e.g. by constructing new social facilities for those that are lost). Should it not be possible to replace a resource, the resource is essentially irreplaceable e.g. red-listed or threatened species that are restricted to a particular site or habitat of very limited extent.

Probability of occurrence. The likelihood of the impact actually occurring would be indicated as either:

- **Improbable** – the possibility of the impact materialising is very low as a result of design or historic experience.
- **Probable** – there is a distinct possibility that the impact will occur.
- **Highly Probable** – it is most likely that the impact will occur.
- **Definite** – the impact will occur regardless of the implementation of any prevention or mitigation measures.

Significance of the impact. Based on a synthesis of the information contained in the criteria above, the potential impact would then be described according to the following significance criteria:

- **Negligible** – An impact of negligible significance is where the magnitude is negligible, low or medium and the likelihood of the impact occurring is unlikely or likely. An impact of negligible significance is where a resource or receptor will not be affected in any way by a particular activity, or the predicted effect is deemed to be imperceptible or is indistinguishable from natural background levels.
- **Minor** – An impact of minor significance is where the magnitude of the impact is low but the likelihood of the impact occurring is likely or definite. An impact of minor significance is one where an effect will be experienced, but the impact magnitude is sufficiently small and well within accepted standards, and/or the receptor is of low sensitivity/value.

- **Moderate** – An impact of moderate significance is where the magnitude is medium to high and the likelihood of the impact occurring is likely or definite. An impact of moderate significance is one within accepted limits and standards. The emphasis for moderate impacts is on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that “moderate” impacts have to be reduced to “minor” impacts, but that moderate impacts are being managed effectively and efficiently.
- **Major** – An impact of major significance is where the magnitude of the impact is medium to high and the likelihood of the impact occurring is also likely or definite. An impact of major significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource receptors. A goal of the EIA process is to get to a position where the project does not have any major residual impacts, certainly not ones that would endure into the long term or extend over a large area. However, for some aspects there may be major residual impacts even after all practicable mitigation options have been exhausted (i.e. ALARP has been applied).

SIGNIFICANCE RATING

	LIKELIHOOD	Unlikely	Likely	Definite
MAGNITUDE	Negligible	Negligible	Negligible	Minor
	Low	Negligible	Minor	Minor
	Medium	Minor	Moderate	Moderate
	High	Moderate	Major	Major

Confidence. The level of confidence in predicting the impact can be described as:

- **Low** – where there is little confidence in the prediction, due to inherent uncertainty about the likely response of the receiving ecosystem or inadequate information.
- **Medium** – where there is a moderate level of confidence in the prediction.
- **High** – where the impact can be predicted with a high level of confidence.

Cumulative Impact. Consideration is given to the extent of any accumulative impact that may occur due to the proposed development. Such impacts are evaluated with an assessment of similar developments already in the environment. Such impacts will be either positive or negative, and will be graded as being of negligible, low, medium or high impact.

Mitigation. The objective of mitigation is to firstly avoid and minimise impacts where possible and where these cannot be completely avoided, to compensate for the negative

impacts of the development on vegetation and animal habitats and to maximise re-vegetation and rehabilitation of disturbed areas. For each impact identified, appropriate mitigation measures to reduce or otherwise avoid the potential impacts are suggested. All impacts are assessed without mitigation and with the mitigation measures as suggested appropriately implemented.

3.3.2. ArcelorMittal CCGT power plant and underground pipeline - construction phase impacts

Habitat loss due to construction

Impact Nature

All construction activities would result in a loss of vegetation and habitat affecting endemic passerines, large terrestrial species and raptors through site clearance, the construction of internal roads and the establishment of auxiliary buildings.

The habitat is however already degraded to varying degrees across the developable area and the habitat is not unique within the landscape.

Impact	Nature	Extent	Duration	Intensity	Reversibility	Impact on irreplaceable resources	Probability	Significance	Confidence
Without mitigation	Negative	On-site	Long-term	High	Low	High	Definite	Major	High
With mitigation	Negative	On-site	Long-term	Medium	Low	Medium	Definite	Moderate	High

Mitigation

- All construction activities must be carried out according to the generally accepted environmental best practise and the temporal and spatial footprint of the development should be kept to a minimum.
- Existing roads must be used as much as possible for access during construction.
- The boundaries of the development area are to be clearly demarcated and it must be ensured that all activities remain within the demarcated footprint.
- Provide adequate briefing for site personnel.
- Any bird nests that are found during the construction phase must be reported to the Environmental Control Officer (ECO).
- The above measures must be covered in a site specific EMPr and controlled by an ECO.

Residual Impact

The vegetation within the development area can be rehabilitated after the life time of the facility if proposed mitigation measures are put in place.

Cumulative Impact

The development is situated in an area identified for industrial development according to the Saldanha Bay Municipal Spatial Development Framework. As such, there has already been a lot of degradation to the natural habitat within the area through industry and agriculture. The cumulative impact of the proposed development would therefore be small and the overall significance minor.

Disturbance during construction

Impact Nature

All construction activities would result in a disturbance impact affecting endemic passerines, large terrestrial species and raptors through the noise and movement of construction equipment and personnel.

It must however be noted, that species are particularly sensitive to disturbance during the breeding season and this must be borne in mind during the construction phase.

Impact	Nature	Extent	Duration	Intensity	Reversibility	Impact on irreplaceable resources	Probability	Significance	Confidence
Without mitigation	Negative	Local	Short-term	High	Medium	High	Definite	Moderate	Medium
With mitigation	Negative	Local	Short-term	Medium	Medium	Medium	Highly Probable	Minor	Medium

Mitigation

- Strict control must be maintained over all activities during construction, in line with an approved construction EMPr.
- During construction, if any priority species identified in this report are observed to be roosting and/or nesting and breeding in the vicinity, the ECO must be notified.
- The construction camps and laydown areas and site offices etc. must be as close to the site as possible.
- Contractors and working staff should stay within the development area and movement outside these areas especially into sensitive avian microhabitats must be restricted.
- Driving must take place on existing roads and a speed limit of 50 km/h must be implemented on all internal roads.

Residual Impact

Some disturbance during the construction phase is inevitable. It is likely that some species will be disturbed and potentially displaced by the development.

Cumulative Impact

The development is situated in an area identified for industrial development according to the Saldanha Bay Municipal Spatial Development Framework. As such, there has already been a lot of disturbance within the area through industry and agriculture. The cumulative impact of the proposed development would therefore be small and the overall significance minor.

3.3.3. ArcelorMittal CCGT power plant and underground pipeline - operational phase impacts

Disturbance during operation

Impact Nature

All maintenance and operational activities would result in a disturbance impact affecting endemic passerines, large terrestrial species and raptors through the noise and movement of maintenance equipment and personnel.

Impact	Nature	Extent	Duration	Intensity	Reversibility	Impact on irreplaceable resources	Probability	Significance	Confidence
Without mitigation	Negative	Local	Long-term	Medium	Medium	Medium	Highly Probable	Moderate	High
With mitigation	Negative	Local	Long-term	Low	Medium	Low	Probable	Minor	High
Mitigation <ul style="list-style-type: none"> If birds are nesting on power infrastructure and cannot be tolerated due to operational risks of fire, electrical short or other problems, birds should be prevented from accessing nesting sites by using mesh or other means of excluding them. Birds should not be shot, poisoned or harmed as this is not an effective control method and has negative ecological consequences. Birds already with eggs and chicks should be allowed to fledge their chicks before nests are removed. If there are any persistent problems with avifauna, then an avifaunal specialist should be consulted for advice on further mitigation. Contractors and working staff should stay within the development area and movement outside these areas especially into sensitive avian microhabitats must be restricted. Driving must take place on existing roads and a speed limit of 50 km/h must be implemented on all access roads. 									
Residual Impact Some disturbance during the operational phase is inevitable. It is likely that some species will be disturbed and potentially displaced by the development.									
Cumulative Impact The development is situated in an area identified for industrial development according to the Saldanha Bay Municipal Spatial Development Framework. As such, there has already been a lot of disturbance within the area through industry and agriculture. The cumulative impact of the proposed development would therefore be small and the overall significance minor.									

3.3.4. ArcelorMittal CCGT power plant grid connection - construction phase impacts

Habitat loss due to power line construction

Impact Nature All construction activities would result in a loss of vegetation and habitat affecting endemic passerines, large terrestrial species and raptors through site clearance for substations and power line infrastructure and servitudes which have to be cleared of excess vegetation at regular intervals in order to allow access to power lines for maintenance and to prevent vegetation from intruding into the legally prescribed clearance gap, minimising the risk of fire.									
Impact	Nature	Extent	Duration	Intensity	Reversibility	Impact on irreplaceable resources	Probability	Significance	Confidence
Without mitigation	Negative	On-site	Long-term	Low	Medium	Low	Improbable	Minor	High

With mitigation	Negative	On-site	Long-term	Low	Medium	Low	Improbable	Minor	High
Mitigation Mitigation <ul style="list-style-type: none"> All construction activities must be carried out according to the generally accepted environmental best practise and the temporal and spatial footprint of the development should be kept to a minimum. Existing roads must be used as much as possible for access during construction. The boundaries of the development area are to be clearly demarcated and it must be ensured that all activities remain within the demarcated footprint. Provide adequate briefing for site personnel. Any bird nests that are found during the construction phase must be reported to the Environmental Control Officer (ECO). The above measures must be covered in a site specific EMPr and controlled by an ECO. 									
Residual Impact The vegetation within the development area can be rehabilitated after the life time of the facility if proposed mitigation measures are put in place.									
Cumulative Impact The proposed 400 kV overhead power line is to be routed within the Aurora to Blouwater 132 kV feeder servitude (existing power lines) and as such, will not result in significant losses of natural vegetation as the area has already been degraded for the development of the existing power infrastructure.									

Avifaunal disturbance due to grid connection construction activities

Impact Nature All construction activities would result in a disturbance impact affecting endemic passerines, large terrestrial species and raptors through the noise and movement of construction equipment and personnel. It must however be noted, that species are particularly sensitive to disturbance during the breeding season and this must be borne in mind during both the construction and operational phases.									
Impact	Nature	Extent	Duration	Intensity	Reversibility	Impact on irreplaceable resources	Probability	Significance	Confidence
Without mitigation	Negative	Local	Long-term	Medium	High	Medium	Definite	Moderate	High
With mitigation	Negative	Local	Long-term	Low	High	Low	Highly Probable	Minor	High
Mitigation <ul style="list-style-type: none"> Strict control must be maintained over all activities during construction, in line with an approved construction EMPr. During construction, if any priority species identified in this report are observed to be roosting and/or nesting and breeding in the vicinity, the ECO must be notified. The construction camps and laydown areas and site offices etc. must be as close to the site as possible. Contractors and working staff should stay within the development area and 									

<p>movement outside these areas especially into sensitive avian microhabitats must be restricted.</p> <ul style="list-style-type: none"> • Driving must take place on existing roads and a speed limit of 50 km/h must be implemented on all internal roads.
<p>Residual Impact</p> <p>Some disturbance during the construction phase is inevitable. It is likely that some species will be disturbed and potentially displaced by the development.</p>
<p>Cumulative Impact</p> <p>The proposed 400 kV overhead power line is to be routed within the Aurora to Blouwater 132 kV feeder servitude (existing power lines) and as such, will not result in significant disturbances to avifauna as the area has already been degraded for the development of the existing power infrastructure.</p>

3.3.5. ArcelorMittal CCGT power plant grid connection - operational phase impacts

Disturbance along power line

<p>Impact Nature</p> <p>All maintenance and operational activities would result in a disturbance impact affecting endemic passerines, large terrestrial species and raptors through the noise and movement of maintenance equipment and personnel.</p>									
Impact	Nature	Extent	Duration	Intensity	Reversibility	Impact on irreplaceable resources	Probability	Significance	Confidence
Without mitigation	Negative	On-site	Intermittent	Low	High	Low	Probable	Minor	Medium
With mitigation	Negative	On-site	Intermittent	Negligible	High	Negligible	Improbable	Negligible	Medium
<p>Mitigation</p> <ul style="list-style-type: none"> • If birds are nesting on power infrastructure and cannot be tolerated due to operational risks of fire, electrical short or other problems, birds should be prevented from accessing nesting sites by using mesh or other means of excluding them. Birds should not be shot, poisoned or harmed as this is not an effective control method and has negative ecological consequences. Birds already with eggs and chicks should be allowed to fledge their chicks before nests are removed. • If there are any persistent problems with avifauna, then an avifaunal specialist should be consulted for advice on further mitigation. • Contractors and working staff should stay within the development area and movement outside these areas especially into sensitive avian microhabitats must be restricted. • Driving must take place on existing roads and a speed limit of 50 km/h must be implemented on all access roads. 									
<p>Residual Impact</p> <p>Some disturbance during the operational phase is inevitable. It is likely that some species will be disturbed and potentially displaced by the development.</p>									
<p>Cumulative Impact</p> <p>The proposed 400 kV overhead power line is to be routed within the Aurora to Blouwater 132 kV feeder servitude (existing power lines) and as such, will not result in additional</p>									

disturbances to avifauna as the area has already been degraded for the development of the existing power infrastructure and will be subject to regular disturbance anyway to service existing lines.

Avian electrocutions on power infrastructure

Impact Nature

Electrocutions of birds on associated power infrastructure results in injuries or death and could potentially affect large, perching species in the area such as raptors and storks.

Avian electrocutions occur when a bird perches or attempts to perch on an electrical structure and causes an electrical short circuit by physically bridging the gap between live components and/or live and earthed components (van Rooyen, 2004b; Lehman *et al.*, 2007).

Impact	Nature	Extent	Duration	Intensity	Reversibility	Impact on irreplaceable resources	Probability	Significance	Confidence
Without mitigation	Negative	Local	Long-term	Medium	Medium	Medium	Probable	Moderate	High
With mitigation	Negative	Local	Long-term	Low	Medium	Low	Improbable	Minor	High

Mitigation

- A “Bird Friendly” structure, with a bird perch (as per standard Eskom guidelines) should be used for the tower infrastructure.
- All relevant perching surfaces should be fitted with bird guards and perch guards as deterrents (Hunting, 2002).
- Installation of artificial bird space perches and nesting platforms, at a safe distance from energised components (Goudie, 2006; Prinsen *et al.*, 2012).

Residual Impact

The power line infrastructure will be within the area over a long period of time, if not permanently. However, if the power line infrastructure is removed the impacts associated (avian injuries and mortalities) will cease.

Cumulative Impact

The proposed 400 kV overhead power line is to be routed within the Aurora to Blouwater 132 kV feeder servitude where existing power lines occur. As such, the additional lines will not exponentially increase the risk of avian electrocutions as this risk already occurs (no new threat).

Avian collisions with power lines

Impact Nature

Collisions are the single biggest threat posed by power lines in South Africa (van Rooyen, 2004). Avian species most susceptible and impacted upon are large, heavy-bodied birds such as bustards, storks, korhaans and certain raptors.

Impact	Nature	Extent	Duration	Intensity	Reversibility	Impact on irreplaceable resources	Probability	Significance	Confidence
Without mitigation	Negative	Regional	Long-term	Medium-High	Medium	Medium	Highly Probable	Moderate	High
With mitigation	Negative	Regional	Long-term	Medium-Low	Medium	Low	Probable	Minor	High

Mitigation

- High sensitivity sections of the power line should be marked with Bird Flight Diverters (BFDs), on the earth wire of the line, 5 metres apart, alternating black and white to increase the visibility of the power line and reduce the likelihood of collisions (Jenkins *et al.*, 2010).
- In order to mitigate the risk of collisions for transient birds at night, it is recommended that markers be painted with glo-in-the-dark paint. Although this measure has only had limited success, it is the best option at the moment. *It is understood, from personal communication, that the Endangered Wildlife Trust – Wildlife and Energy Programme is working on developing solar-powered LED markers, but these are not available as of yet. If however these become available before construction begins or if mortalities are recorded once the development is operational, it would be recommended to use these to combat collisions of transient birds at night.*
- Power lines in a servitude should be kept to a similar height and structure to avoid increasing the spatial extent of threat.
- The power line route should be scanned at least twice a month for the first year after construction to identify and locations of high impact. All mortalities along the power line route should be recorded and if there are any sites where repeated mortalities have occurred, an avifaunal specialist should be consulted for advice on additional mitigation measures to be implemented.

Residual Impact

The power line infrastructure will be within the area over a long period of time, if not permanently. However, if the power line infrastructure is removed the impacts associated (avian injuries and mortalities) will cease.

Cumulative Impact

The proposed 400 kV overhead power line is to be routed within the Aurora to Blouwater 132 kV feeder servitude where existing power lines occur. As such, the additional lines will not exponentially increase the risk of avian collisions with power as this risk already occurs (no new threat).

3.4. SUMMARY ASSESSMENT

A summary assessment of the above impacts is provided below with reference to the different phases of the project (construction and operation) as well as without and with mitigation. The majority of impacts can be reduced to a low level through avoiding the sensitive receptors and implementing relatively simple mitigation measures.

Impact	Pre-construction		Post-construction	
	Without mitigation	With mitigation	Without mitigation	With mitigation
Habitat loss	Major	Moderate	Minor	Minor
Disturbance	Moderate	Minor	Minor	Negligible
Electrocutions	Negligible	Negligible	Moderate	Minor
Collisions	Negligible	Negligible	Moderate	Minor

3.5. CUMULATIVE IMPACTS

Cumulative impacts arise from the combined presence of several similar developments within an area which affect ecological processes operating at broader scales or which each have a small impact which becomes significant when combined. The proposed development area is located within an area identified for industrial development according to the Saldanha Bay Municipal Spatial Development Framework and as such, has already experienced high levels of disturbance and degradation due to industry as well as past and present agricultural practises in the surrounding areas. Future proposed developments are highlighted below (Figure 10) and will contribute to the cumulative impacts on avifauna in the study area and broader impact zone of the development. These developments include:

- The IDZ development;
- Afrisam Cement Plant;
- LPG storage facilities – Sunrise and Avidja;
- Vredenburg Industrial Development
 - Frontier Separation Plant
 - Chlor-Alkali Facility
- Desalination plant; and
- One additional 1 000 MW gas-fired power plant.



Figure 10: Future proposed developments considered in the assessment of cumulative impacts on avifauna.

Impact Nature

The cumulative impact of all development in the study area and surrounds is likely to impact on avifauna through increased habitat loss and disturbance as well a greater likelihood of injury or mortality by electrocutions or collisions on power infrastructure due to increased exposure.

Impact	Nature	Extent	Duration	Intensity	Reversibility	Impact on irreplaceable resources	Probability	Significance	Confidence
Without mitigation	Negative	Regional	Long-term	Medium-High	Medium	Medium	Highly Probable	Moderate	High
With mitigation	Negative	Regional	Long-term	Medium-Low	Medium	Low	Probable	Minor	High

Mitigation

- Refer to mitigation measures listed per impact in section 3.3 above.
- Each development will impact on avifauna in a different way and as such, would require its own unique suite of mitigation measures. In order to ensure the cumulative impacts of the various developments do not exponentially impact on avifauna, it is imperative that each development in isolation abide by the prescribed mitigation measures set by the specialist working on the impact assessment.

The development would contribute to the habitat loss through transformation and disturbance of avifauna and their habitats however this contribution would be minor when the extent of the development is considered. Similarly so, the cumulative impact of additional overhead power lines in the area would not greatly enhance the risk to avifauna due to the fact that the proposed 400 kV overhead power line is to be routed in the existing feeder servitude and as such, will not pose a new impact threat. As such, the cumulative impact of this development is considered to have a **moderate** significance without mitigation and a **minor** significance if all proposed developments abide by the various mitigation measures prescribed by the respective specialists.

4. CONCLUSIONS

The proposed ArcelorMittal CCGT power plant, 400 kV overhead power line to the Eskom Aurora substation ± 22 km to the east of the development and 4.6 km underground pipeline to the Port of Saldanha has been assessed as being of **moderate** sensitivity from an avifaunal perspective due to the presence of priority species, the general avifauna occurring in the study area and broader impact zone of the development and the nearby proximity of two IBAs.

The development will pose several impacts to avifauna, which after mitigation, include: a **moderate** and **minor** displacement impact caused respectively by habitat loss and disturbance associated with the construction and maintenance activities of the various features of the development; a **minor** impact of electrocutions of birds on power

infrastructure; and a **minor** impact of avian collisions with overhead power lines due to the fact that the new overhead power lines are routed in an existing feeder servitude and therefore do not result in an altogether new impact threat.

The development is however likely to have little, if any significant long-term impact on the avifauna of the wider area, especially after mitigation, and as such, is considered to have acceptable levels of impact overall.

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6. APPENDIX

Appendix 1: Consolidated species list of the proposed ArcelorMittal CCGT power plant and 400 kV overhead power line, including SABAP 1, SABAP 2 and field visit data. Species highlighted in bold are those that were recorded during the field visit.

Common name	Scientific name	Conservation status	Regional endemism	Susceptibility to		
				Collision	Electrocution	Disturbance / habitat loss
Avocet, Pied	<i>Recurvirostra avosetta</i>	-	-	-	-	-
Apalis, Bar-throated	<i>Apalis thoracica</i>	-	-	-	-	Moderate
Barbet, Acacia Pied	<i>Tricholaema leucomela</i>	-	Near-endemic	-	-	Moderate
Batis, Cape	<i>Batis capensis</i>	-	Near-endemic	-	-	Moderate
Bee-eater, European	<i>Merops apiaster</i>	-	-	-	-	Moderate
Bishop, Southern Red	<i>Euplectes orix</i>	-	-	-	-	Moderate
Bishop, Yellow	<i>Euplectes capensis</i>	-	-	-	-	Moderate
Bittern, Little	<i>Ixobrychus minutus</i>	-	-	-	-	Moderate
Bokmakierie	<i>Telophorus zeylonus</i>	-	Near-endemic	-	-	Moderate
Boubou, Southern	<i>Laniarus ferrugineus</i>	-	Endemic	-	-	Moderate
Bulbul, Cape	<i>Pycnonotus capensis</i>	-	Endemic	-	-	Moderate
Bunting, Cape	<i>Emberiza capensis</i>	-	Near-endemic	-	-	Moderate
Bunting, Lark-like	<i>Emberiza impetuani</i>	-	Near-endemic	-	-	Moderate
Bustard, Ludwig's	<i>Neotis ludwigii</i>	Endangered	Endemic	High	-	High
Buzzard, Common	<i>Buteo buteo</i>	-	-	Moderate	Moderate	-
Buzzard, Jackal	<i>Buteo rufofuscus</i>	-	Endemic	-	Moderate	Moderate
Canary, Black-headed	<i>Crithagra alario</i>	-	Endemic	-	-	Moderate
Canary, Brimstone	<i>Crithagra sulphurata</i>	-	-	-	-	Moderate
Canary, Cape	<i>Serinus canicollis</i>	-	Endemic	-	-	Moderate
Canary, White-throated	<i>Crithagra albogularis</i>	-	Near-endemic	-	-	Moderate

Canary, Yellow	<i>Crithagra flaviventris</i>	-	Near-endemic	-	-	Moderate
Chat, Ant-eating	<i>Myrmecocichla formicivora</i>	-	Endemic	-	-	Moderate
Chat, Familiar	<i>Cercomela familiaris</i>	-	-	-	-	-
Chat, Karoo	<i>Cercomela schlegelii</i>	-	Near-endemic	-	-	Moderate
Chat, Sickle-winged	<i>Cercomela sinuata</i>	-	Endemic	-	-	Moderate
Cisticola, Cloud	<i>Cisticola textrix</i>	-	Near-endemic	-	-	Moderate
Cisticola, Grey-backed	<i>Cisticola subruficapilla</i>	-	Near-endemic	-	-	Moderate
Cisticola, Levaillant's	<i>Cisticola tinniens</i>	-	-	-	-	-
Cisticola, Zitting	<i>Cisticola juncidis</i>	-	-	-	-	Moderate
Coot, Red-knobbed	<i>Fulica cristata</i>	-	-	-	-	-
Cormorant, Bank	<i>Phalacrocorax neglectus</i>	Endangered	Near-endemic	-	-	-
Cormorant, Cape	<i>Phalacrocorax capensis</i>	Endangered	Near-endemic	-	-	-
Cormorant, Crowned	<i>Phalacrocorax coronatus</i>	Near-threatened	Near-endemic	-	-	-
Cormorant, Reed	<i>Microcarbo africanus</i>	-	-	Moderate	-	-
Cormorant, White-breasted	<i>Phalacrocorax lucidus</i>	-	-	Moderate	-	-
Courser, Burchell's	<i>Cursorius rufus</i>	Vulnerable	Near-endemic	-	-	Moderate
Crake, Black	<i>Amaurornis flavirostris</i>	-	-	-	-	-
Crane, Blue	<i>Anthropoides paradiseus</i>	Near-threatened	Endemic	High	-	-
Crombec, Long-billed	<i>Sylvietta rufescens</i>	-	-	-	-	Moderate
Crow, Cape	<i>Corvus capensis</i>	-	-	-	-	-
Crow, Pied	<i>Corvus abuls</i>	-	-	Moderate	Moderate	-
Cuckoo, Diederick	<i>Chrysococcyx caprius</i>	-	-	-	-	Moderate
Cuckoo, Klaas's	<i>Chrysococcyx klaas</i>	-	-	-	-	Moderate
Curllew, Eurasian	<i>Numenius arquata</i>	Near-threatened	-	-	-	-
Darter, African	<i>Anhinga rufa</i>	-	-	Moderate	-	-
Dove, Cape Turtle	<i>Streptopelia capicola</i>	-	-	-	-	-
Dove, Laughing	<i>Spilopelia senegalensis</i>	-	-	-	-	-
Dove, Namaqua	<i>Oena capensis</i>	-	-	-	-	Moderate
Dove, Red-eyed	<i>Streptopelia semitorquata</i>	-	-	-	-	Moderate

Dove, Rock	<i>Columba livia</i>	-	-	-	-	-	-
Drongo, Fork-tailed	<i>Dicrurus adsimilis</i>	-	-	-	-	-	Low
Duck, African Black	<i>Anas sparsa</i>	-	-	-	Moderate	-	-
Duck, Maccoa	<i>Oxyura maccoa</i>	Near-threatened	-	-	Moderate	-	-
Duck, White-backed	<i>Thalassornis leuconotus</i>	-	-	-	Low	-	-
Duck, White-faced	<i>Dendrocygna viduata</i>	-	-	-	Moderate	-	-
Duck, Yellow-billed	<i>Anas undulata</i>	-	-	-	Moderate	-	-
Eagle, African Fish	<i>Haliaeetus vocifer</i>	-	-	-	Moderate	Moderate	-
Eagle, Booted	<i>Hieraetus pennatus</i>	-	-	-	Moderate	-	Moderate
Eagle, Martial	<i>Polemaetus bellicosus</i>	Endangered	-	-	High	High	Moderate
Eagle, Verreaux's	<i>Aquila verreauxii</i>	Vulnerable	-	-	High	-	High
Eagle-Owl, Cape	<i>Bubo capensis</i>	-	-	-	Moderate	-	-
Eagle-Owl, Spotted	<i>Bubo africanus</i>	-	-	-	-	High	Moderate
Egret, Great	<i>Ardea alba</i>	-	-	-	Moderate	-	-
Egret, Little	<i>Egretta garzetta</i>	-	-	-	Low	-	-
Egret, Western Cattle	<i>Bubulcus ibis</i>	-	-	-	Low	-	-
Egret, Yellow-billed	<i>Egretta intermedia</i>	-	-	-	Low	-	-
Falcon, Lanner	<i>Falco biarmicus</i>	Vulnerable	-	-	High	Moderate	-
Falcon, Peregrine	<i>Falco peregrinus</i>	-	-	-	Moderate	-	-
Fiscal, Common	<i>Lanius collaris</i>	-	-	-	-	-	-
Flamingo, Greater	<i>Phoenicopterus ruber</i>	Near-threatened	-	-	High	-	-
Flamingo, Lesser	<i>Phoenicopterus minor</i>	Near-threatened	-	-	High	-	-
Flufftail, Red-chested	<i>Sarothrura rufa</i>	-	-	-	-	-	Moderate
Flycatcher, African Dusky	<i>Muscicapa adusta</i>	-	-	-	-	-	Moderate
Flycatcher, African Paradise-	<i>Terpsiphone viridis</i>	-	-	-	-	-	Moderate
Flycatcher, Fairy	<i>Stenostira scita</i>	-	-	Endemic	-	-	Moderate
Flycatcher, Fiscal	<i>Sigelus silens</i>	-	-	Endemic	-	-	Moderate
Flycatcher, Spotted	<i>Muscicapa striata</i>	-	-	-	-	-	-
Francolin, Grey-winged	<i>Scleroptila africana</i>	-	-	Endemic	Moderate	-	Moderate

Gannet, Cape	<i>Morus capensis</i>		Vulnerable	Near-endemic	Low	-	-
Godwit, Bar-tailed	<i>Limosa lapponica</i>		-	-	-	-	-
Godwit, Hudsonian	<i>Limosa haemastica</i>		-	-	-	-	-
Goose, Egyptian	<i>Alopochen aegyptiaca</i>		-	-	High	High	-
Goose, Spur-winged	<i>Plectropterus gambensis</i>		-	-	High	Moderate	-
Goshawk, African	<i>Accipiter tachiro</i>		-	-	Low	-	-
Goshawk, Southern Pale Chanting	<i>Melierax canorus</i>		-	Near-endemic	-	Moderate	Moderate
Grassbird, Cape	<i>Sphenoeacus afer</i>		-	Endemic	-	-	Moderate
Grebe, Black-necked	<i>Podiceps nigricollis</i>		-	-	-	-	-
Grebe, Great Crested	<i>Podiceps cristatus</i>		-	-	-	-	-
Grebe, Little	<i>Tachybaptus ruficollis</i>		-	-	-	-	-
Greenshank, Common	<i>Tringa nebularia</i>		-	-	-	-	-
Guineafowl, Helmeted	<i>Numida meleagris</i>		-	-	Moderate	-	-
Gull, Black-headed	<i>Chroicocephalus ridibundus</i>		-	-	Low	-	-
Gull, Grey-headed	<i>Chroicocephalus cirrocephalus</i>		-	-	Low	-	-
Gull, Hartlaub's	<i>Chroicocephalus hartlaubii</i>		-	Endemic	Low	-	-
Gull, Kelp	<i>Larus dominicanus</i>		-	-	Low	-	-
Gull, Sabine's	<i>Xema sabini</i>		-	-	Low	-	-
Hamerkop	<i>Scopus umbretta</i>		-	-	Moderate	Moderate	-
Harrier, African Marsh	<i>Circus ranivorus</i>		Endangered	-	Low	-	High
Harrier, Black	<i>Circus maurus</i>		Endangered	Near-endemic	-	-	High
Harrier-Hawk, African	<i>Polyboroides typus</i>		-	-	Moderate	Moderate	-
Heron, Black-headed	<i>Ardea melanocephala</i>		-	-	Moderate	Moderate	-
Heron, Goliath	<i>Ardea goliath</i>		-	-	Moderate	-	-
Heron, Grey	<i>Ardea cinerea</i>		-	-	High	High	-
Heron, Purple	<i>Ardea purpurea</i>		-	-	Moderate	Moderate	-
Honeyguide, Greater	<i>Indicator indicator</i>		-	-	-	-	Moderate
Honeyguide, Lesser	<i>Indicator minor</i>		-	-	-	-	Moderate
Hoopoe, African	<i>Upupa africana</i>		-	-	-	-	Moderate

Ibis, African Sacred	<i>Threskiornis aethiopicus</i>	-	-	-	Moderate	-	-
Ibis, Glossy	<i>Plegadis falcinellus</i>	-	-	-	Moderate	-	-
Ibis, Hadedra	<i>Bostrychia hagedash</i>	-	-	-	Moderate	Moderate	-
Jaeger, Parasitic	<i>Stercorarius parasiticus</i>	-	-	-	-	-	-
Kestrel, Greater	<i>Falco rupicoloides</i>	-	-	-	-	Moderate	Moderate
Kestrel, Lesser	<i>Falco naumanni</i>	-	-	-	High	-	Moderate
Kestrel, Rock	<i>Falco rupicolus</i>	-	-	-	-	-	Moderate
Kingfisher, Giant	<i>Megaceryle maxima</i>	-	-	-	-	-	-
Kingfisher, Malachite	<i>Alcedo cristata</i>	-	-	-	-	-	-
Kingfisher, Pied	<i>Ceryle rudis</i>	-	-	-	-	-	-
Kite, Black-shouldered	<i>Elanus caeruleus</i>	-	-	-	Moderate	-	Moderate
Kite, Yellow-billed	<i>Milvus parasitus</i>	-	-	-	Moderate	-	-
Knot, Red	<i>Calidris canutus</i>	-	-	-	Low	-	-
Korhaan, Southern Black	<i>Afrotis afra</i>	Vulnerable	Endemic	Endemic	High	-	Moderate
Lapwing, Blacksmith	<i>Vanellus armatus</i>	-	-	-	-	-	-
Lapwing, Crowned	<i>Vanellus coronatus</i>	-	-	-	-	-	-
Lark, Cape Clapper	<i>Mirafra apiata</i>	-	Endemic	Endemic	-	-	High
Lark, Cape Long-billed	<i>Certhilauda curvirostris</i>	-	Endemic	Endemic	-	-	Moderate
Lark, Karoo	<i>Calendulauda albescens</i>	-	Endemic	Endemic	-	-	High
Lark, Karoo Long-billed	<i>Certhilauda subcoronata</i>	-	Endemic	Endemic	-	-	High
Lark, Large-billed	<i>Galerida magnirostris</i>	-	Endemic	Endemic	-	-	High
Lark, Red-capped	<i>Calandrella cinerea</i>	-	-	-	-	-	Moderate
Longclaw, Cape	<i>Macronyx capensis</i>	-	Endemic	Endemic	-	-	Moderate
Martin, Banded	<i>Riparia cincta</i>	-	-	-	-	-	-
Martin, Brown-throated	<i>Riparia paludicola</i>	-	-	-	-	-	Moderate
Martin, Common House	<i>Delichon urbicum</i>	-	-	-	-	-	-
Martin, Rock	<i>Ptyonoprogne fuligula</i>	-	-	-	-	-	Moderate
Martin, Sand	<i>Riparia riparia</i>	-	-	-	-	-	Moderate
Masked-Weaver, Southern	<i>Ploceus velatus</i>	-	-	-	-	-	Moderate

Moorhen, Common	<i>Gallinula chloropus</i>	-	-	-	-	-	-	-	-
Mousebird, Red-faced	<i>Urocolius indicus</i>	-	-	-	-	-	-	-	Moderate
Mousebird, Speckled	<i>Colius striatus</i>	-	-	-	-	-	-	-	Moderate
Mousebird, White-backed	<i>Colius colius</i>	-	-	Endemic	-	-	-	-	Moderate
Neddicky	<i>Cisticola fulvicapilla</i>	-	-	-	-	-	-	-	Moderate
Night-Heron, Black-crowned	<i>Nycticorax nycticorax</i>	-	-	-	-	-	-	-	-
Nightjar, Fiery-necked	<i>Caprimulgus pectoralis</i>	-	-	-	-	-	-	-	Moderate
Openbill, African	<i>Anastomus lamelligerus</i>	-	-	-	-	Low	-	-	-
Osprey, Western	<i>Pandion haliaetus</i>	-	-	-	-	Low	-	-	-
Ostrich, Common	<i>Struthio camelus</i>	-	-	-	-	-	-	-	-
Owl, Marsh	<i>Asio capensis</i>	-	-	-	-	High	-	-	Moderate
Owl, Western Barn	<i>Tyto alba</i>	-	-	-	-	Moderate	High	-	-
Oystercatcher, African Black	<i>Haematopus moquini</i>	-	-	-	-	-	-	-	-
Oystercatcher, Eurasian	<i>Haematopus ostralegus</i>	-	-	-	-	-	-	-	-
Pelican, Great White	<i>Pelecanus onocrotalus</i>	Vulnerable	-	-	-	Low	-	-	-
Penguin, African	<i>Spheniscus demersus</i>	Endangered	Endemic	-	-	-	-	-	-
Petrel, White-chinned	<i>Procellaria aequinoctialis</i>	Vulnerable	-	-	-	-	-	-	-
Phalarope, Red-necked	<i>Phalaropus lobatus</i>	-	-	-	-	-	-	-	-
Pigeon, African Olive	<i>Columba arquatrix</i>	-	-	-	-	-	-	-	Moderate
Pigeon, Speckled	<i>Columba guinea</i>	-	-	-	-	-	-	-	Moderate
Pipit, African	<i>Anthus cinnamomeus</i>	-	-	-	-	-	-	-	Moderate
Pipit, Long-billed	<i>Anthus similis</i>	-	-	-	-	-	-	-	Moderate
Pipit, Plain-backed	<i>Anthus leucophrys</i>	-	-	-	-	-	-	-	Moderate
Plover, Caspian	<i>Charadrius asiaticus</i>	-	-	-	-	-	-	-	-
Plover, Chestnut-banded	<i>Charadrius pallidus</i>	Near-threatened	-	-	-	-	-	-	-
Plover, Common Ringed	<i>Charadrius hiaticula</i>	-	-	-	-	-	-	-	-
Plover, Grey	<i>Pluvialis squatarola</i>	-	-	-	-	-	-	-	-
Plover, Kittlitz's	<i>Charadrius pecuarius</i>	-	-	-	-	-	-	-	-
Plover, Lesser Sand	<i>Charadrius mongolus</i>	-	-	-	-	-	-	-	-

Plover, Pacific Golden	<i>Pluvialis fulva</i>	-	-	-	-	-	-	-	-
Plover, Three-banded	<i>Charadrius tricolor</i>	-	-	-	-	-	-	-	-
Plover, White-fronted	<i>Charadrius marginatus</i>	-	-	-	-	-	-	-	-
Pochar, Southern	<i>Netta erythrophthalma</i>	-	-	-	-	Moderate	-	-	-
Prinia, Karoo	<i>Prinia maculosa</i>	-	-	-	-	Endemic	-	-	Moderate
Quail, Common	<i>Coturnix coturnix</i>	-	-	-	-	-	-	-	Moderate
Quelea, Red-billed	<i>Quelea quelea</i>	-	-	-	-	-	-	-	-
Rail, African	<i>Rallus caerulescens</i>	-	-	-	-	-	-	-	-
Raven, White-necked	<i>Corvus albicollis</i>	-	-	-	-	-	Moderate	Moderate	-
Redshank, Common	<i>Tringa totanus</i>	-	-	-	-	-	-	-	-
Robin-chat, Cape	<i>Cossypha caffra</i>	-	-	-	-	-	-	-	-
Ruff	<i>Philomachus pugnax</i>	-	-	-	-	-	-	-	-
Sanderling	<i>Calidris alba</i>	-	-	-	-	-	-	-	-
Sandgrouse, Namaqua	<i>Pterocles namaqua</i>	-	-	-	-	Near-endemic	-	-	Moderate
Sandpiper, Baird's	<i>Calidris bairdii</i>	-	-	-	-	-	-	-	-
Sandpiper, Broad-billed	<i>Limicola falcinellus</i>	-	-	-	-	-	-	-	-
Sandpiper, Common	<i>Actitis hypoleucos</i>	-	-	-	-	-	-	-	-
Sandpiper, Curlew	<i>Calidris ferruginea</i>	-	-	-	-	-	-	-	-
Sandpiper, Marsh	<i>Tringa stragmatilis</i>	-	-	-	-	-	-	-	-
Sandpiper, Terek	<i>Xenus cinereus</i>	-	-	-	-	-	-	-	-
Sandpiper, Wood	<i>Tringa glareola</i>	-	-	-	-	-	-	-	-
Saw-wing, Black	<i>Psilidoprocne holomelaena</i>	-	-	-	-	-	-	-	Moderate
Scrub-Robin, Karoo	<i>Erythropgia coryphaeus</i>	-	-	-	-	-	-	-	Moderate
Secretarybird	<i>Sagittarius serpentarius</i>	Vulnerable	-	-	-	-	High	-	Moderate
Seedeater, Streaky-headed	<i>Crithagra gularis</i>	-	-	-	-	-	-	-	Moderate
Shearwater, Sooty	<i>Puffinus griseus</i>	-	-	-	-	-	-	-	-
Shelduck, South African	<i>Tadorna cana</i>	-	-	-	-	Endemic	Moderate	-	-
Shoveler, Cape	<i>Anas smithii</i>	-	-	-	-	Near-endemic	Moderate	-	-
Shrike, Red-backed	<i>Lanius collurio</i>	-	-	-	-	-	-	-	Moderate

Siskin, Cape	<i>Crithagra totta</i>	-		Endemic	-	-	Moderate
Snipe, African	<i>Gallinago nigripennis</i>	-		-	Low	-	-
Sparrow, Cape	<i>Passer melanurus</i>	-		Near-endemic	-	-	-
Sparrow, House	<i>Passer domesticus</i>	-		-	-	-	-
Sparrow, Southern Grey-headed	<i>Passer diffusus</i>	-		-	-	-	-
Sparrowhawk, Black	<i>Accipiter melanoleucus</i>	-		-	Moderate	-	-
Sparrowlark, Grey-backed	<i>Eremopterix verticalis</i>	-		Near-endemic	-	-	Moderate
Spoonbill, African	<i>Platalea alba</i>	-		-	Moderate	-	-
Spurfowl, Cape	<i>Pternistis capensis</i>	-		Endemic	Moderate	-	-
Starling, Common	<i>Sturnus vulgaris</i>	-		-	-	-	-
Starling, Pied	<i>Lamprotornis bicolor</i>	-		Endemic	-	-	Moderate
Starling, Red-winged	<i>Onychognathus morio</i>	-		-	-	-	Moderate
Starling, Wattled	<i>Creatophora cinerea</i>	-		-	-	-	Moderate
Stilt, Black-winged	<i>Himantopus himantopus</i>	-		-	-	-	-
Stint, Little	<i>Calidris minuta</i>	-		-	Low	-	-
Stint, Red-necked	<i>Calidris ruficollis</i>	-		-	-	-	-
Stonechat, African	<i>Saxicola torquatus</i>	-		-	-	-	-
Stork, Black	<i>Ciconia nigra</i>	Vulnerable		-	High	Moderate	-
Stork, White	<i>Ciconia ciconia</i>	-		-	High	High	-
Sugarbird, Cape	<i>Promerops cafer</i>	-		Endemic	-	-	Moderate
Sunbird, Dusky	<i>Cinnyris fuscus</i>	-		Near-endemic	-	-	Moderate
Sunbird, Malachite	<i>Nectarinia famosa</i>	-		-	-	-	Moderate
Sunbird, Orange-breasted	<i>Anthobaphes violacea</i>	-		Endemic	-	-	Moderate
Sunbird, Southern Double-collared	<i>Cinnyris chalybeus</i>	-		Endemic	-	-	Moderate
Swallow, Barn	<i>Hirundo rustica</i>	-		-	-	-	Moderate
Swallow, Greater-striped	<i>Cecropis cucullata</i>	-		-	-	-	Moderate
Swallow, Pearl-breasted	<i>Hirundo dimidiata</i>	-		-	-	-	-
Swallow, White-throated	<i>Hirundo albigularis</i>	-		-	-	-	Moderate
Swamphen, African Purple	<i>Porphyrio madagascariensis</i>	-		-	-	-	-

Swamp-Warbler, Lesser	<i>Acrocephalus gracilirostris</i>	-	-	-	-	-	-	-
Swift, African Black	<i>Apus barbatus</i>	-	-	-	-	-	-	-
Swift, Alpine	<i>Tachymarptis melba</i>	-	-	-	-	-	-	-
Swift, Common	<i>Apus apus</i>	-	-	-	-	-	-	-
Swift, Horus	<i>Apus horus</i>	-	-	-	-	-	-	-
Swift, Little	<i>Apus affinis</i>	-	-	-	-	-	-	-
Swift, White-rumped	<i>Apus caffer</i>	-	-	-	-	-	-	-
Teal, Cape	<i>Anas capensis</i>	-	-	-	-	Moderate	-	-
Teal, Red-billed	<i>Anas erythrorhyncha</i>	-	-	-	-	Moderate	-	-
Tern, Antarctic	<i>Sterna vittata</i>	Endangered	-	-	-	-	-	-
Tern, Arctic	<i>Sterna paradisaea</i>	-	-	-	-	-	-	-
Tern, Black	<i>Chlidonias niger</i>	-	-	-	-	Low	-	-
Tern, Caspian	<i>Hydroprogne caspia</i>	Vulnerable	-	-	-	-	-	-
Tern, Common	<i>Sterna hirundo</i>	-	-	-	-	-	-	-
Tern, Little	<i>Sterna albifrons</i>	-	-	-	-	-	-	-
Tern, Sandwich	<i>Thalasseus sandvicensis</i>	-	-	-	-	-	-	-
Tern, Swift	<i>Thalasseus bergii</i>	-	-	-	-	-	-	-
Tern, Whiskered	<i>Chlidonias hybrida</i>	-	-	-	-	Low	-	-
Tern, White-winged	<i>Chlidonias leucopterus</i>	-	-	-	-	Low	-	-
Thick-knee, Spotted	<i>Burhinus capensis</i>	-	-	-	-	Moderate	-	Moderate
Thick-knee, Water	<i>Burhinus vermiculatus</i>	-	-	-	-	Low	-	Moderate
Thrush, Cape Rock	<i>Monticola rupestris</i>	-	-	Endemic	-	-	-	Moderate
Thrush, Karoo	<i>Turdus smithii</i>	-	-	Endemic	-	-	-	Moderate
Thrush, Olive	<i>Turdus olivaceus</i>	-	-	-	-	-	-	Moderate
Tit, Cape Penduline-	<i>Anthoscopus minutus</i>	-	-	Near-endemic	-	-	-	Moderate
Tit, Grey	<i>Parus afer</i>	-	-	Endemic	-	-	-	Moderate
Tit, Southern Black	<i>Parus niger</i>	-	-	-	-	-	-	Moderate
Tit-Babbler, Chestnut-vented	<i>Sylvia subcaerulea</i>	-	-	Near-endemic	-	-	-	Moderate
Tit-Babbler, Layard's	<i>Sylvia layardi</i>	-	-	Endemic	-	-	-	Moderate

Turnstone, Ruddy	<i>Arenaria interpres</i>	-	-	-	-	-	-	-
Vulture, Cape	<i>Gyps coprotheres</i>	Endangered						
Wagtail, Cape	<i>Motacilla capensis</i>	-						Moderate
Warbler, African Reed	<i>Acrocephalus baeticatus</i>	-						-
Warbler, Little Rush	<i>Bradypterus baboecala</i>	-						-
Warbler, Namaqua	<i>Phragmacia substriata</i>	-						Moderate
Warbler, Rufous-eared	<i>Malcorus pectoralis</i>	-						Moderate
Waxbill, Common	<i>Estrilda astrild</i>	-						Moderate
Weaver, Cape	<i>Ploceus capensis</i>	-						Moderate
Wheatear, Capped	<i>Oenanthe pileata</i>	-						Moderate
Wheatear, Mountain	<i>Oenanthe monticola</i>	-						Moderate
Whimbrel	<i>Numenius phaeopus</i>	-						-
White-eye, Cape	<i>Zosterops capensis</i>	-						Moderate
Whydah, Pin-tailed	<i>Vidua macroura</i>	-						Moderate
Woodpecker, Cardinal	<i>Dendropicus fuscescens</i>	-						Moderate

Appendix 2: Response to comments with regards to avifauna.

Comment 1

The ArcelorMittal site is an important flight path for birds. More specifically, there is a need to understand flight paths at night using radar.

Response 1

It is understood that the proposed development area is within an important flight path for birds between the West Coast National Park and Saldanha Bay Islands IBA and the Berg River Estuary IBA, however the risk of birds colliding with overhead power lines is not expected to exponentially increase as a result of this development as the proposed power line route feeds into the existing servitude between the Eskom Blouwater and Eskom Aurora substations and therefore will not pose an altogether new risk to avifauna in the area.

Comment 2

The preferred site B lies across one of the main flyways for waterbirds and migrant waders, travelling between St. Helena Bay/Lower Berg River and Langebaan Lagoon. For periods of the year thousands of Kelp Gulls commute daily through the site. The route is western end of the SFF Oil Tanks, East of Orex, Vredenburg landfill site and the switching yard (gravel road) at the corner where the St. Helena Bay road joins the R399 approximately longitude 18.03 east. In order to accurately determine this narrow route, a radar survey would be necessary because migrant waders and waterbirds fly at night. A simple mitigation would be to move the western boundary towards the eastern boundary to miss the flyway, possibly about 100 metres.

Response 2

The proposed site location is situated between numerous industrial developments such as the ArcelorMittal steel works, the Eskom Blouwater substation and the Vredenburg landfill site. As such, the area has already been affected by high levels of transformation and therefore the added impacts of habitat loss and disturbance of the proposed development will not significantly alter avian behaviour in the area.

In terms of mitigating the risks of collisions with overhead power lines, refer to previous comment and to the "Mitigation" section of the "Avian collisions with power lines" impact table.

Comment 3

An avian impact analysis should be carried out into the effect of an increased number of power lines in the area, especially the proposed 400 kV line to the Aurora Switching Station. There are currently 5 large power lines using the servitude, also the effect at Aurora with additional lines going in and out.

Response 3

This study looks at the effect of an increased number of power lines in the area, specifically within the Blouwater to Aurora servitude, and does not expect any additional power lines to result in an exponential increase in risk of electrocution or collision for avifauna in the area. The reasoning behind this is that the threat already exists and the addition of new power lines running parallel to and at the same height as will not result in an altogether new risk. There will however be a degree of habitat loss and disturbance, although the proposed route is already subject to this from the existing power lines and therefore the cumulative impact of additional power lines will be minimal.