

Perdekraal West Wind Energy Facility Site 1 and associated infrastructure, Western Cape Province

Motivation for amendment of Environmental
Authorisation

DEA Ref.: 12/12/20/1783/1

September 2018

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PROJECT DETAILS

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Client	:	Perdekraal West Wind Farm (Pty) Ltd
Report Status	:	Report for Public and Authority Review and Comment

When used as a reference this report should be cited as: Savannah Environmental (2018) Motivational Report for the Amendment to the Environmental Authorisation for the Perdekraal West Wind Energy Facility, Western Cape Province.

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PURPOSE OF THE REPORT

An Environmental Authorisation (EA) for the Perdekraal West Wind Energy Facility and associated infrastructure, in the Western Cape Province (DEA ref: 12/12/20/1783/1) was obtained by Perdekraal West Wind Farm (Pty) Ltd on 04 December 2012. The project is intended to be bid into future rounds of the Department of Energy's (DoE) Renewable Energy Independent Power Producers Procurement (REIPPP) Programme, the next of which is expected to be in November 2018. There have been advancements to wind turbine technology since the issuing of the EA, and the turbines authorised in the EA are therefore not considered to be the most suitable in terms of production and economic considerations.

In this regard, Perdekraal West Wind Farm (Pty) Ltd is considering an updated turbine model for the project and is proposing the following:

- » a reduction in the number of wind turbines from the authorised 60 – 65, to **up to 47**;
- » an increase to the rotor diameter for each wind turbine from the authorised to a maximum of 120m, to a range from **120m up to 155m**;
- » an increase in hub height from 70m to 120m, to a range **up to 120m**;
- » turbine capacity from 1.5 to 3.5 MW, to a range from **1.5MW up to 6MW**; and
- » increase in blade tip length from the authorised 105m to 180m, to a range from **130m up to 198m**.

The increase in the rotor diameter, blade tip length, wind turbine generation capacity and reduction in the number of turbines will result in the optimisation of the facility layout which was submitted to the Department of Environmental Affairs (DEA) in the EIA process, and subsequent amendments thereto. These amendments to the project are proposed in order to increase the efficiency of the facility and consequently the economic competitiveness thereof, as well as to avoid environmental sensitivities on the site.

The proposed amendments in themselves are not listed activities, and do not trigger any new listed activity as the proposed amendments are within the original authorised development footprint, and do not change the scope of the EA.

In terms of Condition 5 of the Environmental Authorisation and Chapter 5 of the EIA Regulations of December 2014 (as amended on 07 April 2017 and 13 July 2018), it is possible for an applicant to apply, in writing, to the competent authority for a change or deviation from the project description to be approved.

Savannah Environmental has prepared this motivation report in support of this amendment application on behalf of Perdekraal West Wind Farm (Pty) Ltd. This report aims to provide detail pertaining to the significance and impacts of the proposed change to the project description and layout in order for interested and affected parties to be informed of the proposed amendments and provide comment, and for the competent authority to be able to reach a decision in this regard. This report is supported by specialist studies in order to inform the final conclusion regarding the proposed amendments (refer to **Appendix A to F** of this report). This main report must be read together with these specialist studies in order to obtain a complete understanding of the proposed amendments and the implications thereof.

This amendment motivation report will be made available to registered interested and affected parties for a 30-day period from **3 September 2018 to 4 October 2018**. The availability of the report was advertised in the Worcester Standard on **6 September 2018** (refer to **Appendix G3**).

This document is available for download at www.savannah.com. CD copies are available on request. To obtain CD copies, further information, register on the project database, or submit written comment, please contact:

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All comments received during the review period will be included within a Comments and Responses report to be submitted to the DEA with the final amendment motivation and application.

1. OVERVIEW OF THE PROJECT

Location:

The authorised Perdekraal West Wind Farm Site 1 is located on a site ~32km north of Touws River in the Witzenberg Local Municipality, which falls within the jurisdiction of the Cape Winelands District Municipality in the Western Cape Province. The project site is located within the Komsberg Renewable Energy Development Zone (REDZ 2) as determined by the Strategic Environmental Assessment for Wind and Solar Photovoltaic Energy in South Africa (2015 – CSIR/DEA), and formally gazetted on 16 February 2018 (GN 114). The Perdekraal West Wind Farm is to be constructed within the project site which comprises the following farm portions:

- » The Farm Lower Stinkfontein 245; and
- » Portion 1 of Rietpoort Farm 243.

Potential Environmental Impacts as determined through the EIA Process:

From the specialist investigations undertaken within the EIA process for the wind energy facility, the following environmental impacts were identified:

- » Potential impacts on birds;
- » Potential impacts on bats;
- » Potential ecological impact;
- » Potential impacts on heritage;
- » Areas of visual impact; and
- » Potential noise impact.

Key conclusions and recommendations of the EIA pertinent to this application:

From the specialist investigations undertaken as part of the EIA for the wind energy facility, it was concluded that the majority of impacts are of low to medium significance with the implementation of appropriate mitigation measures. No environmental fatal flaws were identified on the site. However, areas of very high sensitivity were identified and avoided through micro siting of the wind turbines. Areas of sensitivity identified during the EIA process¹ include:

- » **Avifauna:**
 - More than 200 bird species could possibly occur on the site, including up to 12 red-listed species, 66 endemics or near-endemics, and three red-listed endemics (Ludwig's Bustard, Blue Crane and Black Harrier).
 - Thirteen (13) priority species are recognised as key in the assessment of avian impacts of the proposed Perdekraal REF. These are mostly nationally and/or globally threatened species which are known to occur, or could occur in relatively high numbers in the development area and which are likely to be, or could be, negatively affected by the REF project. Six species (Blue Crane,

¹ The original EIA assessment (which received environmental authorisation (EA) on 4 January 2012) included wind and solar facilities of between 230MW-300MW on two properties including the Remainder of Erf 245 of the Farm Perdekraal and Portion 1 of Rietpoort Farm 243, and was collectively referred to as the Perdekraal Renewable Energy Facility (REF). The EA was then amended, and split into two separate wind farm facilities including Perdekraal West and Perdekraal East as approved in the split EA issued on the 4 December 2012. The same specialist studies that were used for the original EIA assessment informed the split amendment of the Perdekraal West Wind Farm EA. This information is included above.

Secretarybird, Peregrine Falcon, Black Stork, Cinnamon-breasted Warbler and Black-eared Sparrowlark were included.

- The most important aspects of the avifauna on the Perdekraal site, and those most relevant to the impact assessment, are:
 - Seasonal influxes of Ludwig's Bustard. This is a nomadic, nationally 'Vulnerable' and globally 'Endangered', near-endemic species, highly susceptible to collision mortality on power lines (Jenkins *et al.* 2010, Jenkins *et al.* 2010 in prep.), probably susceptible to turbine collision mortality, and possibly susceptible to disturbance and displacement by the wind farm.
 - Resident and breeding raptors, in particular Martial Eagle (three pairs just outside the development area), Black Harrier (likely to occur regularly on site, and could breed within it in wet years – Curtis *et al.* 2004). Both are threatened species, the latter is endemic, and both are potentially susceptible to collision with and displacement from the area by the turbine arrays.
 - Populations of Karoo endemics (e.g. Cinnamon-breasted Warbler, Blackeared Sparrowlark) which lose some habitat, and may be disturbed or displaced.
 - Aggregations of wetland species at and around the large dam on the eastern boundary of the study area, which may be at risk of colliding with the turbines.

» **Bats:**

- There are no known bat caves, disused mines, road culverts or bridges on the site to provide suitable roosting sites for bats on the site. This decreases the diversity of the bat fauna likely to occur in the area.
- The bats detected are not tree-roosting and migratory species, species known to be most affected by wind turbines.
- During the EIA survey some bat activity was detected at Perdekraal. The species found was Cape Serotine Bat.
- The limited bat activity noted during the EIA survey is an observation that is supported by the paucity of vegetation providing habitat for bats.

» **Ecology:**

- **Fauna** – The biophysical environment of the Perdekraal site is dominated by open plains and low hills. The Grootrivier and associated floodplain is an important feature of the site. Due to the relatively homogenous nature of the surrounding plains, the Grootrivier and other drainage lines at Perdekraal represent an important feature of the landscape as they greatly increase the structural diversity and habitat heterogeneity of the site.
- At least 44 mammal species are likely to occur at the Perdekraal site. The most significant of these in terms of conservation status is the Riverine Rabbit, which has been recorded in the immediate vicinity of the Perdekraal site (EWT Riverine Rabbit Project 2010). Based on food plants reported in the literature and the habitat requirements of the species, the flood plain of the Grootrivier is identified as suitable habitat for this species. Given the critical status of this species, a negative impact on the local population of Riverine Rabbit would be of global significance. The flood plain of the Grootrivier supports *Salsola* and *Acacia*, and other dense shrubs which represent likely habitat for Riverine Rabbit, suitable habitat areas have been classified as very high sensitivity in the ecological sensitivity map. The ecology sensitivity map along with input from the other specialists informed the relocation of turbines from this area, and reconfigure the site layout to produce the final layout presented in the EIA.
- Due to the semi-arid nature of the region, there are relatively few amphibians which potentially occur at the site. Two regional endemic species, the Karoo Dainty Frog and Tradouw Toadlet are

likely to occur. Both are likely to be associated with moist areas along drainage lines. Small semi-permanent pools associated with rocky reaches of the Grootrivier were observed and represent suitable habitat for these and other amphibians.

- Forty five (45) reptile species, consisting of 7 tortoises, 16 snakes, 13 lizards, 2 chameleons and 7 geckos potentially occur at the Perdekraal REF site. More than 25 of these are regional endemics. There were few noteworthy or localized habitats at the Perdekraal site that are likely to be of greater importance in terms of reptile abundance and diversity than other such habitats.
- The important ecological and biodiversity features (i.e. the Grootrivier floodplain along the northern portion of the site) of the site were mapped using satellite imagery and the extensive site survey undertaken by the ecology specialist. The Grootrivier is a dominant landscape feature and represents an ecologically sensitive area of the site. The areas outside of the drainage features are homogenous and are considered to be of medium sensitivity.
- **Flora** – The natural vegetation found on the Perdekraal site consists of Tanqua Karoo (SKv 5) southwest of the Grootrivier and Tanqua Wash Riviere (AZi 7).
- The site is dominated by *Pteronia pallens* and *Ruschia spinosa* with few palatable species, such as *Zygophyllum retrofractum* present.
- The vegetation in the seasonal watercourses is more vigorous than that on the open hills and slopes, and the Grootrivier offers some food value to livestock due to both the perennial availability of shrubs and the occasional flooding which stimulates the growth of the riparian vegetation. The flooding of the river is itself a form of disturbance but is important for recharging the ground table.
- Four relatively distinct units of vegetation were determined, although between the units there is a high degree of similarity and overlap. These include:
 - **Community 1:** *Ruschia spinescens* dominated Shrubland – Community 1 is represented by low shrubland vegetation dominated by *Ruschia spinosa* (doringvygie), an unpalatable succulent species that has thorns which discourage grazing. It is not a sensitive vegetation type and is widespread beyond the boundaries of the study area.
 - **Community 2:** *Pteronia pallens* dominated Shrubland – *Pteronia pallens* (Scholtzbos) is a shrub species of up to 1 m in height. It is abundant and dominant in the central, elevated part of the study area on substrate that has gravel and cobbles on the surface. The Scholtzbosveld was classified to have a low sensitivity.
 - **Community 3:** Ceres Karoo Vygieveld – the area north of the Grootrivier is short vygieveld, no more than 0.3 m tall with *Ruschia spinosa* being dominant. In some places there are clumped vygies (possibly *Antimima* sp.) and areas dominated by low plants of *Malephora crassa*. Apart from *R. spinosa* the only other prominent shrub is *Pteronia pallens*. the area north of the Grootrivier is mapped entirely as having Community 3 and is rated as sensitive.
 - **Community 4:** Riparian vegetation of the Grootrivier and its tributaries - The Grootrivier drains to the Tanquarivier and has riparian vegetation typical of the Tanqua Wash Riviere *Acacia karoo* is a common tree along the washes and drainage lines with a lower shrub stratum of *Salsola* spp., mainly *Salsola aphylla* and *Lycium* sp. *Melianthus comosus* is also found on the periphery of the main wash.
- The Tanqua Wash Riviere vegetation is not threatened but since it is riparian vegetation it has Very High Sensitivity and important conservation status. The Tanqua Wash Riviere is mapped as a Critical Biodiversity Area (CBA). The remainder of the Perdekraal study area is mapped as Ecological Support Area (ESA) which also has a high conservation status. Consequently, all areas of natural vegetation at the Perdekraal study site (CBAs and Ecological Support Areas) were treated as being important from a conservation viewpoint.

» **Heritage:**

- **Archaeology** – Most of the material observed within the site can most likely be ascribed to the Middle Stone Age (MSA). A few isolated large implements were recovered which resembled incomplete bifaces (ESA). There were also some scatters of indurated stone tools which appeared to have recent flake scars and which could be interpreted as Late Stone Age (LSA).
- **Graves** – A single, unfenced, formal graveyard was recovered near the ruins of the Rietpoort farmhouse (approximately 4km). This collection of 7 graves, arranged in a row facing east, comprised 5 of packed stone and 2 with cement casings. Two had engraved headstones. One contained a name, the other a more extensive inscription in Dutch. However, the inscription was weathered and no date could be found on it. Further collections of stone cairns, which are interpreted as graves, were found near ruins of settlements and predominantly situated on the margins of dry river beds.
- **Built Environment** – The extant building on the site includes the Perdekraal farmhouse, which has some early 20th century attributes but has been substantially transformed by later additions.
- **Palaeontology** – The proposed wind farm at Perdekraal in the Ceres or Tanqua Karoo, c. 30km north of Touwsrivier, Western Cape Province, overlies six formations of Palaeozoic sedimentary rocks assigned to the Witteberg Group (Cape Supergroup) as well as to the Dwyka Group and Ecca Group (Karoo Supergroup). The palaeontological sensitivity of these rocks ranges from low to high. The potential impact from disturbance and/or destruction of fossil heritage in these rocks is of high significance, at both local and regional levels.

» **Visual:**

- The Perdekraal site, being in a valley basin in the Ceres-karoo, has relatively few visual constraints. However, the large size and high number of wind turbines proposed to form part of this wind farm would create a distinct feature in the open and sparsely vegetated Karoo landscape, and would be visible for a considerable distance.
- Taking into account the topography and nature of the landscape at the Perdekraal site, and the remoteness of the site, it is anticipated that the wind turbines would have a high visual impact before mitigation. The visual impact can, however, be reduced to medium-high by applying the recommended visual mitigation measures. The design phase mitigation measures include the following:
 - A visual buffer zone of 500 m for the wind turbines along the main drainage courses (Groot River and Adamskraal River), these being the main landscape features;
 - A visual buffer of 500m for the wind turbines from the local district roads;
 - A 250m setback for the wind turbines from farm boundaries should be observed;
 - The substation and Operation and Maintenance buildings to ideally be set back 250m from local district roads;
 - Cables to be located underground as far as possible;
 - The substation and Operation and Maintenance buildings are to be grouped together as far as possible to minimise the scatter of buildings across the site;
 - The design of the buildings to be compatible in scale and form with buildings of the surrounding rural area, and with regional architecture;
 - All yards and storage areas to be enclosed by masonry walls;
 - The internal access roads should not be located in drainage courses. The roads should generally follow the grain of the land, and their alignments fine-tuned to fit the topography; and
 - Signage related to the enterprise to be discrete and confined to the entrance gates. No other corporate or advertising signage, particularly billboards, to be permitted.

- The operation phase mitigation measures include the following:
 - The footprint of the operations and maintenance facilities, as well as parking and vehicular circulation, should be clearly defined, and not be allowed to spill over into other areas of the site; and
 - The operations and maintenance areas should be screened by buildings, walls, hedges, and / or tree planting, and should be kept in a tidy state to minimise further visual impact.
- » **Noise:**
 - The results of the NIA indicated that where wind turbines were to be located closer than 600m from the wind farm site boundaries the LAeq beyond the boundary would exceed the ambient (residual) sound level by 7 dB or more. In such instances this would be adjudicated to be a “disturbing noise” in terms of the Noise Control Regulations (NCR), and noise mitigation procedures would be required to be implemented. In terms of SANS 10328 the associated intensity of noise impact would be Medium.
 - Based on the findings of the NIA, it was recommended that wind turbines are located no closer than 600 m from the wind energy farm site boundaries.

As part of the planning mitigation strategy, the applicant considered all the above-mentioned findings and sensitivities, and duly made the necessary amendments to the layout considered in the EIA in order to reduce impacts to an acceptable level (refer to **Figure 1.1**). No environmental fatal flaws were identified to be associated with the proposed Perdekraal West Wind Energy Facility Site 1. A number of issues requiring mitigation were however highlighted. Environmental specifications for the management of potential impacts are detailed within the approved Environmental Management Programme (EMPr).

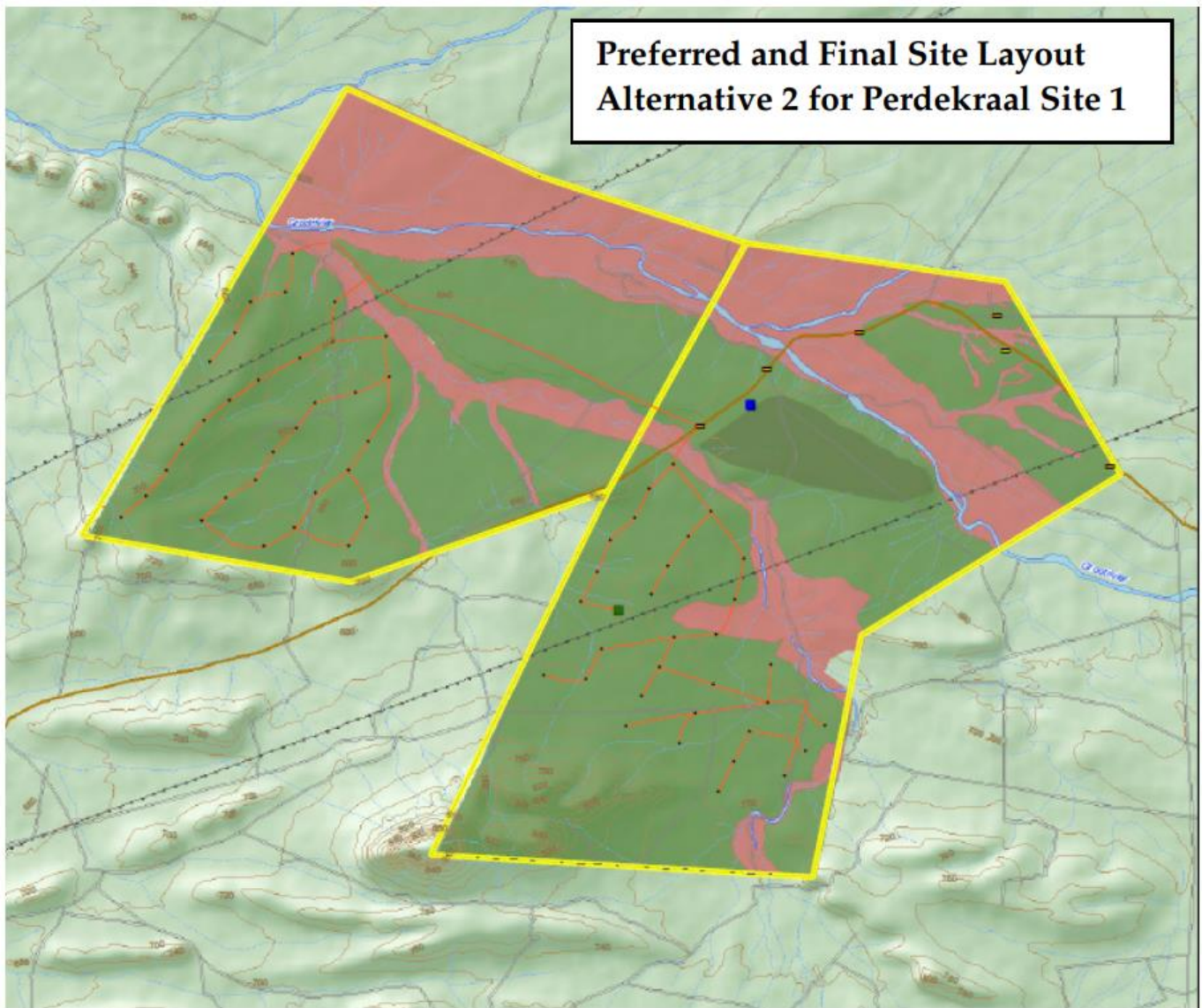


Figure 1.1: The preferred Site Layout Alternative 2 for Perdekraal Site 1², approved as per Condition 1 of the EA dated 4 December 2012s. The maroon areas are not acceptable for establishment of the wind turbines from an ecological perspective. The light blue area represents the Groot River. The orange squares represent preferred access points, yellow squares represent alternative access points. The green square represents the substation Option 1. The blue square represents the Operation and Maintenance Building location. Orange lines represent internal roads. Black dots present the wind turbine locations. The yellow line represents the site boundary.

² As taken from the approved Final EIA report for the Perdekraal Renewable Energy Facility at Perdekraal Site 1, dated May 2012.

2. DETAILS OF THE AMENDMENTS APPLIED FOR

The amendments being applied relate to the authorised wind turbine specifications as detailed in the EA dated 04 December 2012. This requested amendment will result in an optimisation of the layout assessed within the EIA. This proposed amended layout is presented in **Figure 2.1**. It must be noted that this layout will be finalised and submitted to the DEA for review and approval (in accordance with Condition 28 of the EA) once a turbine supplier has been selected for the project.

This section of the report details the amendments considered within this report and by the specialist investigations (refer to **Appendix A – F**). Each amendment request is detailed below.

2.1. Decrease in number of Wind Turbines

The number of wind turbines are proposed to be decreased from the authorised 60 – 65 turbines, to 47 turbines. It is therefore requested that the project description in the EA be amended to include the correct number of turbines to be installed at the site. The wording on page 5 of the EA is requested to be changed as follows (amendments shown in **Bold** text):

From:

60 - 65 turbines

To:

Up to 47 turbines.

2.2. Amendment to Wind Turbine specifications

The wind turbine rotor diameter, hub height and blade tip height specifications are not included in the Environmental Authorisation (EA). These specifications are therefore requested to be added. In addition, the rotor diameter specification is to be amended from that specified in the approved FEIR on page 34 stating a range from between 70m and 120m, to a range from **120m up to 155m**. The blade tip height will need to be increased accordingly to a range from **130m up to 198m**. Additionally, it is requested that the wind turbine generation capacity maximum is increase from 1.5MW to 3MW, to a range from **1.5MW up to 6MW**.

It is requested that the wind turbine specifications are included on Page 5 of the EA under the section stating "The infrastructure associated with this facility includes:" as follows (amendments shown in **Bold** text):

- » **Wind turbine generation capacity range from 1.5MW up to 6MW;**
- » **Rotor diameter with a range from 120m up to 155m;**
- » **Hub height with a range up to 120m; and**
- » **Blade tip height with a range from 130m up to 198m.**

The table below provides a detailed comparison of the project description included in the EA as authorised on 04 December 2012 with the proposed project components which are requested to be amended.

Component	Authorised turbine specification	Amended turbine specifications
Number of turbines	60 - 65	47
Rotor diameter	Not specified	Range from 120m up to 155m
Hub height	Not specified (70m to 120m) ³	Range up to 120m
Blade tip height	Not specified	Range from 130m up to 198m
Wind Turbine Generation Capacity	Not specified (from 1.5MW to 3.5 MW) ⁴	Range from 1.5MW up to 6MW
Electrical connections	Internal and external electrical connections	Internal and external electrical connections
Access roads	Access roads	Access roads
Infrastructure	Additional infrastructure (includes a lay down area, a temporary site compound area for contractors and a borrow pit)	Additional infrastructure (includes a lay down area, a temporary site compound area for contractors and a borrow pit)
Power line connection	Power line connection of approximately 7km from the site to the Eskom Kappa Substation will be required. The overhead line will run adjacent to the existing 400kV line	Power line connection of approximately 7km from the site to the Eskom Kappa Substation will be required. The overhead line will run adjacent to the existing 400kV line
Substation	A new substation (150m x 150m) and a transformer at Substation Option 1	A new substation (150m x 150m) and a transformer at Substation Option 1

³ Wind turbine specification values as contained in the approved Final EIA report for the Perdekraal Renewable Energy Facility at Perdekraal Site 1, dated May 2012.

⁴ Wind turbine specification values as contained in the approved Final EIA report for the Perdekraal Renewable Energy Facility at Perdekraal Site 1, dated May 2012.

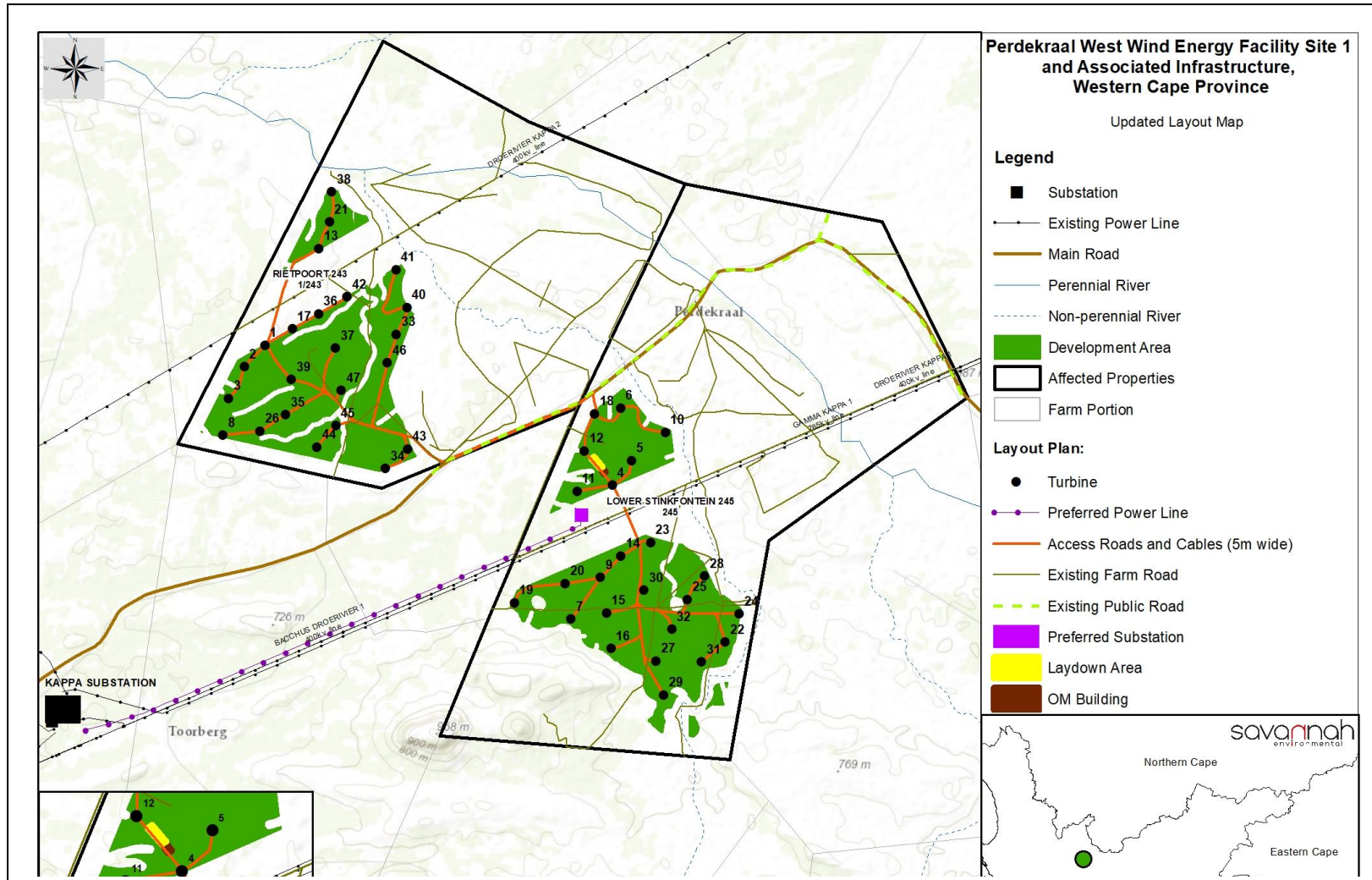


Figure 2.1: Updated wind farm layout⁵ (A3 Map included in **Appendix H**).

⁵ The power line and substation information provided here formed part of a separate environmental assessment process which was approved on 10 August 2016 (DEA Ref: 14/12/16/3/3/1/1550). This is provided for information purposes only as it has already been approved.

3. MOTIVATION FOR THE PROPOSED AMENDMENTS

3.1. Decrease in number of Wind Turbines and Amendment to Wind Turbine Specifications

Wind turbine generators are constantly under development to increase the potential energy output capacity per wind turbine. The more energy one turbine can produce, the fewer turbines are required to generate the authorised contracted capacity of the project.

Following the issuing of the EA for the project, there have been advancements to wind turbine technology, and the turbines authorised in the EA are therefore not considered to be the most suitable in terms of production and economic considerations. In this regard, Perdekraal West Wind Farm (Pty) Ltd is considering an updated turbine model for the project. The increase in the rotor diameter, blade tip length, wind turbine generation capacity and reduction in the number of turbines will result in the optimisation of the facility layout which was assessed within the EIA for the project. These amendments to the project are proposed in order to increase the efficiency of the facility and consequently the economic competitiveness thereof, as well as to avoid environmental sensitivities on the site.

The amendment to the wind turbine specifications is not in itself a listed activity and will not trigger any new listed activities as the proposed amendment will fall within the originally authorised footprint of the facility or change the scope of the EA.

4. CONSIDERATIONS IN TERMS OF THE REQUIREMENTS OF THE EIA REGULATIONS

In terms of Regulation 31 of the EIA Regulations 2014, as amended, an environmental authorisation may be amended by following the process in this Part (i.e. a Part 2 amendment) if it is expected that the amendment may result in an increased level or change in the nature of impact where such level or change in nature of impact was not:

- a) Assessed and included in the initial application for environmental authorisation; or
- b) Taken into consideration in the initial authorisation.

In this instance, the amended turbine specifications were not considered in the initial authorisation. The change does not however, on its own, constitute a listed or specified activity. Therefore, the application is made in terms of Regulation 31(a).

5. POTENTIAL FOR CHANGE IN THE SIGNIFICANCE OF IMPACTS AS ASSESSED IN THE EIA AS A RESULT OF THE PROPOSED AMENDMENTS

An amendment application for the requested amendments has been submitted to the DEA. The DEA has advised (as per the acknowledgement of receipt of the application notification letter, dated 17 July 2018) that this application is considered to be a Part 2 amendment as contemplated in terms of Regulation 31 of the EIA Regulations (2014), as amended. In terms of Regulation 32(1)(a)(i), the following section provides an assessment of the impacts related to the proposed change. Understanding the nature of the proposed amendments and the impacts associated with the project (as assessed within the EIA), the following has been considered:

- » Impacts on birds;
- » Impacts on bats;
- » Ecological Impacts;
- » Heritage Impacts;
- » Visual impacts; and
- » Noise impacts.

The change in rotor diameter and blade tip length, the reduction in the number of turbines (and subsequent change to the layout assessed in the EIA) are expected to have no effect on the findings of the Socio-economic Assessment undertaken as part of the EIA process. Therefore, no Socio-economic Specialist Report has been included. The potential for change in the significance and/or nature of impacts based on the proposed amendments as described within this motivation report is discussed below, and detailed in the specialists' assessment addendum reports contained in **Appendix A-F**. Additional mitigation measures have been underlined for ease of reference, where applicable. This section of the main report must be read together with the specialist reports contained in Appendix A-F in order for the reader to obtain a complete understanding of the proposed amendments and the implications thereof.

5.1. Impacts on avifauna

More than 200 bird species could possibly occur on the site, including up to 12 red-listed species, 66 endemics or near-endemics, and three red-listed endemics (Ludwig's Bustard, Blue Crane and Black Harrier). The original avian impact study was informed by only a single, brief visit to the proposed development area. This relatively superficial understanding of the birds of the affected area was significantly improved by the 12-months of baseline monitoring work done post-authorisation (Jenkins *et al.* 2013). The present, revised assessment refers to this new information.

Eighty-eight (88) species were recorded in the vicinity of the proposed development area during the 12-month pre-construction study, made up of a low-moderate diversity of Karroid species. The initial short-list of priority species (Jenkins 2010) was only partly confirmed, with large terrestrial birds (notably Ludwig's Bustard and Blue Crane) and wetland birds (including Greater Flamingo and Black Stork) relatively scarce in, or entirely absent from the area, perhaps because the study period coincided with very dry conditions. Large eagles, particularly Verreaux's Eagle, were seen less frequently than expected. Also, none of the study area proved adequate to support rocky-country endemics such as Cinnamon-breasted Warbler, and the dry conditions probably also precluded influxes to the area of nomadic Karoo endemics such as Black-eared Sparrowlark. Conversely, Booted Eagle and Lanner Falcon were more abundant in the area than expected.

Lanner Falcon (regionally Vulnerable – Taylor *et al.* 2015) activity was focused on a likely nest site in an old crow nest structure on a transmission pylon in the north-west of the proposed Perdekraal West development area. Should this pair of falcons remain in the area, they will certainly be exposed to disturbance, displacement and collision mortality risk impacts during the construction and operation of the proposed Perdekraal West wind farm, and a dedicated mitigation scheme may be required.

Three Martial Eagle nest sites are known in the area (Jenkins *et al.* 2013b; **Figure 4.1**), all on the Eskom transmission lines: one at 32°59.240 S, 20°10.210 E (about 9 km north-east of the Perdekraal West development area), one at 33°05.390 S, 19°58.250 E (about 5 km to the south-west), and one at 33°02.070 S, 20°13.291 E (about 8 km to the east). Although this globally Vulnerable (www.iucnredlist.org) and regionally Endangered (Taylor *et al.* 2015) species was occasionally recorded in the area during pre-construction monitoring, none of the known nest sites in the vicinity were active over this period (Jenkins *et al.* 2013a).

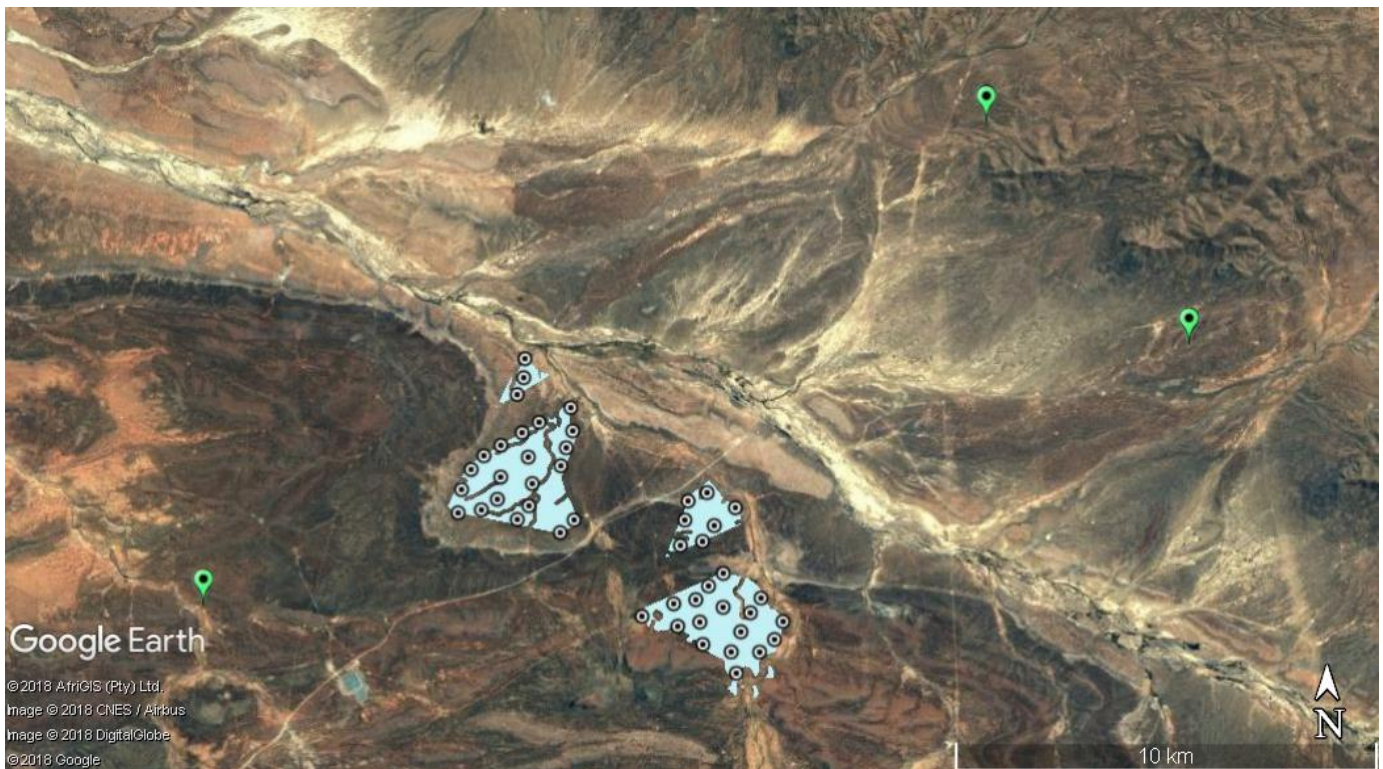


Figure 4.1: Three known Martial Eagle nest sites (blue waypoints) in relation to the proposed location of the Perdekraal Renewable Energy Facility (from Jenkins 2010, Jenkins *et al.* 2013b). The developable areas are shown in blue polygons with proposed wind turbines (as per the original layout) shown in white dots.

The avifaunal amendment report (**Appendix A**) undertaken to assess the proposed amendments includes a revised list of the most significant impacts on birds of the proposed wind energy facility (WEF) development (adapted from Jenkins 2010 and Jenkins *et al.* 2013a). This is as follows:

- (i) Disturbance and displacement of resident/breeding raptors (especially Lanner Falcon and Martial Eagle, possibly Black Harrier) from nesting and/or foraging areas by construction and/or operation of the facility, and/or mortality of these species in collisions with the turbine blades or associated new power lines while slope-soaring or hunting, or by electrocution when perched on electrical infrastructure.

- (ii) Disturbance and displacement of seasonal influxes of large terrestrial birds (especially Ludwig's Bustard, possibly Blue Crane) from nesting and/or foraging areas by construction and/or operation of the facility, and/or mortality of these species in collisions with the turbine blades or associated new power lines while commuting between resource areas.
- (iii) Disturbance and displacement of resident/breeding nomadic Karoo endemics, and possible disturbance, displacement and collision mortality of wetland birds frequenting the larger farm dams in the area, during years of relatively good rainfall.

This revised list of impacts is based on the outcomes of the original bird study and pre-construction monitoring and is not necessarily as a result of the proposed amendments.

5.1.1. Comparative Assessment

The newly proposed amendment configuration does not impinge further into any of the pre-defined high-sensitivity areas for birds (Jenkins 2010) when compared to the previous project layout, and therefore does not present a greater potential for negative impacts in terms of disturbance or displacement (or habitat loss). In fact, with a 28% reduction in the number of turbine placements there will be an associated reduction in the destructive footprint of the facility, and presumably some level of reduction in the duration and/or extent of disruptive construction activities.

However, even allowing for a reduced number of turbines, the proposed increase in rotor diameter and blade tip height means that the aggregate rotor swept area of the amended layout will be 20% larger (0.886km² vs 0.734 km²) than the authorised project, at least theoretically presenting a greater risk for collision mortality. The effect on the potential impact of the WEF of increasing the maximum vertical reach of the blade tip by 10.0% is probably negligible (Barclay *et al.* 2007), although this could result in a marginal increase in collision risk for soaring birds.

Overall, these differences are probably not sufficient to require any material change to the overall findings of the existing impact assessment (Tables below), although this review presents the opportunity to introduce (i) some more recently acquired information which affects some of the impact magnitudes and significance ratings, and (ii) new mitigation measures (underlined in the Tables below), mainly to accommodate the pair of Lanner Falcons found nesting on a transmission tower close to the proposed development during pre-construction monitoring (Jenkins *et al.* 2013). It is again important to note that these changes in impact ratings and additional mitigation measures are a result of additional information being available from the pre-construction monitoring and not as a result of the proposed amendments.

Construction Impacts: Disturbance

Nature of impact: Disturbance stemming from construction-related noise and movement will have a direct negative impact on the avifauna of the receiving environment. All birds on the site are likely to be affected, key taxa being Martial Eagle, Lanner Falcon, Ludwig's Bustard, Black Harrier, wetland species and Karoo endemics.				
	Authorised		Proposed amendment	
	Without mitigation	With mitigation	Without mitigation	With mitigation
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Short-term (1)	Short-term (1)	Short-term (1)	Short-term (1)
Magnitude	Moderate (6)	Low (4)	Moderate-Low (5)	Minor (2)
Probability	Highly probable (4)	Probable (3)	Highly probable (4)	Probable (3)

Significance	32 (Medium)	18 (Low)	28 (Low)	12 (Low)
Status (positive or negative)	Negative	Negative	Negative	Negative
Reversibility	High	High	High	High
Irreplaceable loss of resources?	Unlikely	Unlikely	Unlikely	Unlikely
Can impacts be mitigated?	Yes		Yes	
Mitigation:				
<ol style="list-style-type: none"> On-site demarcation of 'no-go' areas to minimise close disturbance and schedule the most disruptive activities to avoid disturbance at sensitive times. The key species here are Lanner Falcon (a spring breeder) and possibly Martial Eagle (an autumn breeder), which are known to breed on or close to the site. <u>Ideally, the welfare of these and other sensitive species should be further catered for by a pre-construction walk-through to inform the final layout.</u> Carefully monitoring the local avifauna during construction and implementing appropriate additional mitigation as and when significant changes are recorded in the number, distribution or breeding behaviour of any of the priority species listed in this report <u>Measures (1) and (2) should determine whether the Lanner Falcon pair recorded as resident and breeding on the site remain in residence in the same area. Should this be so, clearance of the corvid nest structures in the transmission pylons used by this falcon pair is to be undertaken, and erection of a suitable nest box for these birds to breed in must be located in an area sufficiently far away from the development area to meaningfully reduce impact risks, but not so far as to fall outside of the home range of the falcon pair (perhaps 1500 m or 4-5 pylon spans). This will have to be done with the expert guidance and with the assistance and cooperation of Eskom staff.</u> 				
Cumulative impacts:				
Perdekraal West is located directly adjacent to the proposed Perdekraal East Wind Energy Facility (a Preferred Bidder project), and close to the possibly proposed Tooverberg Wind Energy Facility (greenfields, not submitted a EIA application as yet), both of which will add significantly and cumulatively to the overall impact on birds of future development in the immediate area. Cumulative disturbance impacts are likely to be greater if all three developments are either operational or under construction ⁶ at the same time.				
Residual Risks:				
Even allowing for all the stipulated mitigation measures, there remains a residual risk that construction of the proposed facility will result in harmful disturbance of the local avifauna.				

Construction Impacts: Habitat Loss

	Authorised		Proposed amendment	
	Without mitigation	With mitigation	Without mitigation	With mitigation
Nature of impact: Loss of vegetation and avian habitat through site clearance, road upgrades and establishment of the construction camp, and lay-down and assembly areas will have a direct negative impact on the avifauna of the receiving environment. All birds on the site are likely to be affected, key taxa being Ludwig's Bustard, Black Harrier and Karoo endemics.				
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Medium-term (3)	Medium-term (3)	Medium-term (3)	Medium-term (3)
Magnitude	Low-Moderate (5)	Low (4)	Low (4)	Minor-Low (3)
Probability	Highly probable (4)	Highly probable (4)	Highly probable (4)	Highly probable (4)
Significance	36 (Medium)	32 (Medium)	32 (Medium)	28 (Low)
Status (positive or negative)	Negative	Negative	Negative	Negative
Reversibility	Very low	Very low	Very low	Very low

⁶ It is unlikely that all three potential wind farms will be under construction at the same time since the Perdekraal East Wind Farm will be entering into the construction phase, whilst the two other wind farms still need to reach financial close.

Irreplaceable loss of resources?	Possible	Possible	Possible	Possible
Can impacts be mitigated?	Yes		Yes	
Mitigation:				
1. On-site demarcation of 'no-go' areas informed by the <u>pre-construction walk-through</u> to minimise peripheral habitat destruction or degradation associated with the construction of the facility.				
Cumulative impacts:				
None.				
Residual Risks:				
Even allowing for all the stipulated mitigation measures, there remains a residual risk that construction of the proposed facility will result in some peripheral destruction or degradation of natural habitat.				

Operational Impacts: Mortality

Nature of impact: Disturbance and/or displacement from foraging or nesting areas by movement and/or noise of rotating turbine blades will have a direct negative impact on the avifauna of the receiving environment. All birds on the site are likely to be affected, key taxa being Martial Eagle, Lanner Falcon, Ludwig's Bustard, Black Harrier, wetland species and Karoo endemics.				
	Authorised		Proposed amendment	
	Without mitigation	With mitigation	Without mitigation	With mitigation
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Long (4)	Long (4)	Long (4)	Long (4)
Magnitude	Moderate (6)	Low (4)	Minor-Low (3)	Minor (2)
Probability	Highly probable (4)	Highly probable (4)	Highly probable (4)	Highly probable (4)
Significance	44 (Medium)	36 (Medium)	32 (Medium)	28 (Low)
Status (positive or negative)	Negative	Negative	Negative	Negative
Reversibility	Low	Low	Low	Low
Irreplaceable loss of resources?	Possible	Possible	Possible	Possible
Can impacts be mitigated?	Yes	Yes	Yes	Yes
Mitigation:				
1. On-site demarcation of 'no-go' areas informed by the <u>pre-construction walk-through</u> to minimise disturbance impacts associated with the operation of the facility by scheduling maintenance activities to avoid disturbances in sensitive areas (to be further identified through operational monitoring). The key species here are Lanner Falcon (a spring breeder) and possibly Martial Eagle (an autumn breeder), which are known to breed on or close to the site. Ideally, the welfare of these and other sensitive species should be further catered for by ongoing monitoring of the area throughout the first 2-3 years of operation.				
2. Carefully monitor the local avifauna post-construction and implement appropriate additional mitigation as and when significant changes are recorded in the number, distribution or breeding behaviour of any of the priority species listed in this report.				
Cumulative impacts:				
Perdekraal West is directly adjacent to the proposed Perdekraal East Wind Energy Facility (a Preferred Bidder project), and close to the possibly proposed Tooverberg Wind Energy Facility, both of which will add significantly and cumulatively to the overall impact on birds of future development in the immediate area. Cumulative disturbance impacts are likely to be a result if all three developments are operational at the same time.				
Residual Risks:				
Even allowing for all the stipulated mitigation measures, there remains a residual risk that operation of the proposed facility will result in harmful disturbance of the local avifauna.				

Operational Impacts: Displacement and Disturbance

Nature of impact: Mortality due to collisions with turbine blades and/or power lines, or by electrocution on new power infrastructure will have a direct negative impact on the avifauna of the receiving environment. All birds on the site are likely to be affected, key taxa being Ludwig's Bustard, Martial Eagle, Lanner Falcon, Black Harrier, and wetland species.				
	Authorised		Proposed amendment	
	Without mitigation	With mitigation	Without mitigation	With mitigation
Extent	Regional (2)	Local (1)	Regional (2)	Local (1)
Duration	Long (5)	Long (5)	Long (5)	Long (5)
Magnitude	Moderate (6)	Low-Moderate (5)	High (8)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)	Highly probable (4)	Highly probable (4)
Significance	52 (Medium)	44 (Medium)	60 (Medium)	48 (Medium)
Status (positive or negative)	Negative	Negative	Negative	Negative
Reversibility	Very low	Very low	Very low	Very low
Irreplaceable loss of resources?	Possible	Possible	Possible	Possible
Can impacts be mitigated?	Yes	Yes	Yes	Yes
Mitigation:				
<ol style="list-style-type: none"> 1. Minimizing the length of any new power lines installed and ensuring that all new lines are marked with bird flight diverters (Jenkins <i>et al.</i> 2010), and that all new power infrastructure is adequately insulated and bird friendly in configuration (Lehman <i>et al.</i> 2007). <i>Note that current understanding of power line collision risk in birds precludes any guarantee of successfully distinguishing high risk from medium or low risk sections of a new line (Bevanger 1994, Jenkins et al. 2010, Barrientos et al. 2011). The relatively low cost of marking the entire length of a new line during construction, especially quite a short length of line in an area frequented by collision prone birds, more than offsets the risk of not marking the line, causing unnecessary mortality of birds, and then incurring the much greater cost of retro-fitting the line post-construction. In situations where new lines run in parallel with existing, unmarked power lines, this approach has the added benefit of reducing the collision risk posed by the older line.</i> 2. Carefully monitor the local avifauna post-construction and implement appropriate additional mitigation as and when collision or electrocution mortalities are recorded for any of the priority species listed in this report. 3. Ensure that the results of subsequent monitoring work are applied to project-specific impact mitigation in a way that allows for the potentially considerable cumulative effects on the local/regional avifauna of any other wind energy projects that may be proposed for this area. 				
Cumulative impacts:				
Perdekraal West which is located within the government-gazetted REDZ (Komsberg – REDZ 2), is directly adjacent to the Preferred Bidder Perdekraal East Wind Energy Facility and is close to the possibly proposed Tooverberg Wind Energy Facility, all of which will add significantly and cumulatively to the overall impact on birds of future development in the immediate area if all are operational. Cumulative mortality impacts are likely to be greater if all three developments are in place and operational at the same time and could escalate to levels that are at least locally unsustainable.				
Residual Risks:				
Even allowing for all the stipulated mitigation measures, there remains a residual risk that operation of the proposed facility will result in harmful levels of mortality in local bird populations.				

5.1.2. Conclusion

Considering the findings of the assessment, it is concluded that the proposed changes in turbine specifications and layout will potentially slightly increase the overall anticipated impact of the proposed Perdekraal West Wind Farm on the local avifauna in terms of collision risk, with the increase in aggregate rotor swept area theoretically escalating collision risk by about 20%. Impacts associated with disturbance and habitat loss will however decrease as a result of the reduced number of turbines. Provided that a

commitment is made to implementing the new mitigation measures listed in the tables in the section above, the findings of the original bird impact study remain broadly applicable, the proposed amendment is acceptable and should be authorised, and the project should proceed.

5.2. Impacts on bats

The original bat specialist report dated 2010 undertaken by Dr. Jacobs confirmed the presence of Cape Serotine Bat on the study site. The more recent Natural Scientific Services (NSS – now called Inkululeko Wildlife Services (IWS)) (2013) bat pre-construction monitoring assessment confirmed three bat species from three Species Ecological Groups / Guilds on site: Egyptian Free-tailed Bat (*Tadarida aegyptiaca*) in Species Group A, the Cape Serotine Bat (*Neoromicia capensis*) in Species Group B, and the Natal Long-fingered Bat (*Miniopterus natalensis*) in Species Group C. The latest IWS fieldwork in 2016 has confirmed all three of the aforementioned species, as well as one additional one – the Long-tailed Serotine Bat (*Eptesicus hottentotus*) in Species Group B. *E. hottentotus* is a clutter edge forager at Medium risk of turbine related fatality.

None of the above are threatened species according to Child *et al* (2016), but all are protected by the Cape Nature: Nature Conservation Ordinance 19 of 1974 (the Ordinance). The confirmed four species have a medium to high risk of turbine-related fatality (Sowler *et al.*, 2017).

A bat sensitivity map for the proposed Perdekraal East (Site 2) and West (Site 1) WEFs was compiled by NSS (2013). This was based on the bat activity levels observed and the bat roosting and foraging habitat potential. The NSS (2013) sensitivity map shows an old turbine layout for both Perdekraal East (Site 2) and West (Site 1) WEF. In the current amendment assessment (**Appendix B**) undertaken to assess the proposed amendments, IWS has used the sensitivity layers from NSS (2013) and overlaid the latest 2018 – 47 turbine layout and development area, as provided by BioTherm on 6 June 2018 (**Figure 4.2**). Based on what has been learnt at operating WEFs in SA, IWS has changed the Low sensitivity areas to Low-Medium sensitivity, as it is still very possible and likely that bat fatalities will occur at turbines within these zones but at a lower frequency than Medium to High sensitivity zones.

The revised turbine layout ensures that turbine bases, as well as the full rotor swept area avoids all High bat sensitive areas. However, there are still turbines that encroach on Medium-High and Medium bat sensitive areas, as per **Table 1** and **Figure 4.2**. This is considered acceptable with implementation of additional mitigation measures detailed in Section 5.2.1 below.

Table 1: Turbines in or near bat sensitive areas

Turbine No.	Tower Base Sensitivity	Within Rotor Distance of Higher Sensitivity Area (< 78 m)
1	Low-Medium	
2	Low-Medium	
3	Low-Medium	
4	Low-Medium	
5	Low-Medium	
6	Low-Medium	
7	Medium-High	
8	Low-Medium	
9	Medium-High	
10	Low-Medium	
11	Medium	
12	Low-Medium	
13	Low-Medium	
14	Medium	
15	Medium-High	
16	Medium-High	
17	Low-Medium	
18	Low-Medium	
19	Medium-High	
20	Medium-High	
21	Low-Medium	
22	Medium-High	
23	Medium	
24	Medium	
25	Medium	
26	Low-Medium	
27	Medium-High	
28	Medium	
29	Medium-High	
30	Medium	70 m from Medium-High Sensitivity
31	Medium-High	
32	Medium-High	
33	Low-Medium	
34	Low-Medium	
35	Low-Medium	
36	Low-Medium	
37	Low-Medium	
38	Low-Medium	
39	Low-Medium	
40	Low-Medium	
41	Low-Medium	
42	Low-Medium	
43	Low-Medium	
44	Low-Medium	
45	Low-Medium	
46	Low-Medium	
47	Low-Medium	

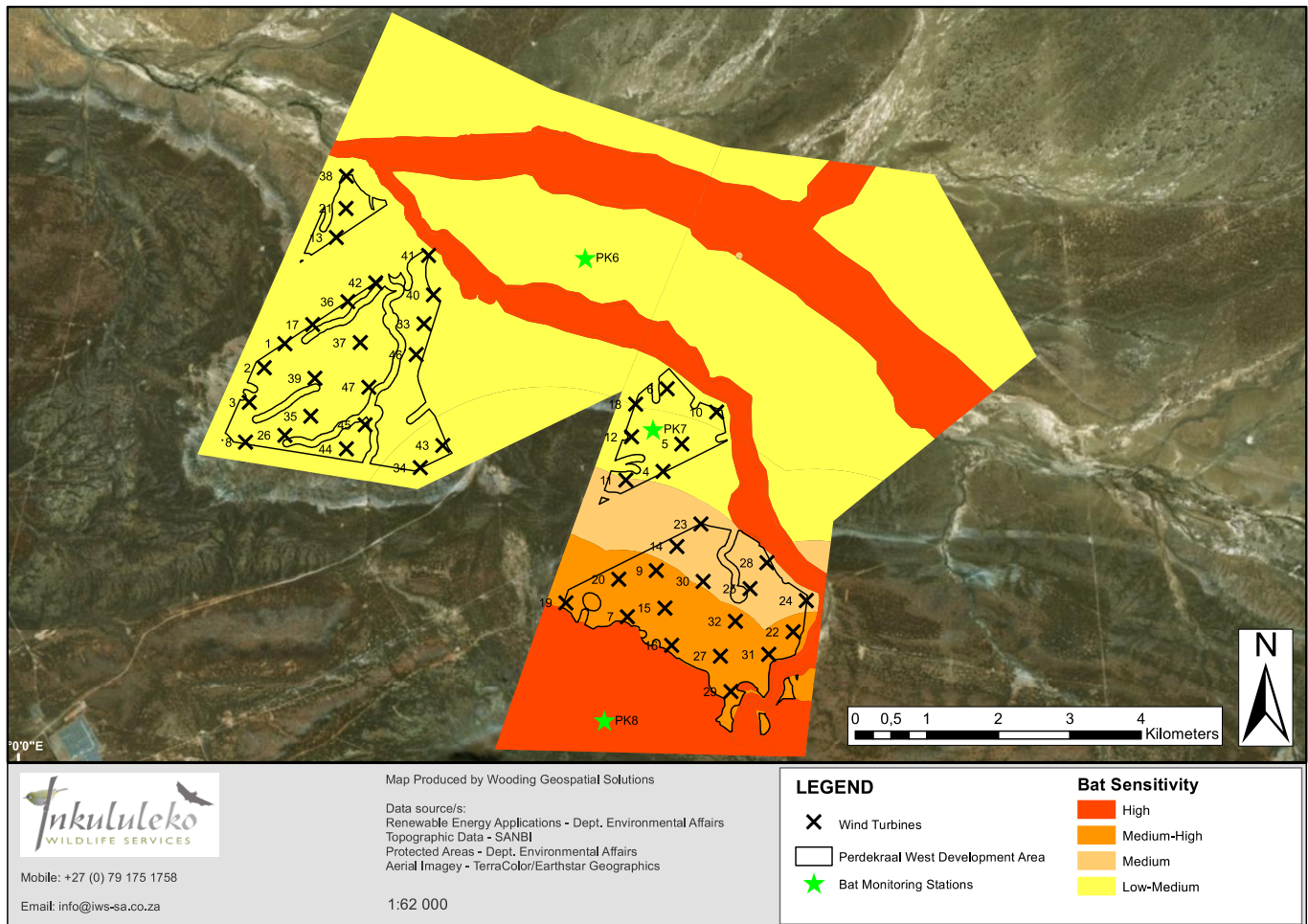


Figure 4.2: Bat Sensitivity Map for Perdekraal East (Site 2) and Perdekraal West (Site 1) (IWS 2016) (new turbine layout)

5.2.1. Comparative Assessment

Impact 1: Roost disturbance or destruction due to construction activities

The impact and significance ratings remain unchanged for this potential impact with the implementation of the amendment. However, the following additional mitigation measures (underlined bullet points) are to be included in the EMPr:

- » All turbines (including their full rotor swept zone) to be kept out of all High bat sensitivity areas. The amended layout associated with the proposed amendment of turbine specifications ensures that this recommendation is met.
- » Minimise disturbance and avoid destruction of farm buildings on site (where bats were observed roosting in a roof).

Impact 2: Fragmentation to and displacement from foraging habitat due to wind turbine construction and operation

The impact and significance ratings remain unchanged for this potential impact. However, the following additional mitigation measures (underlined bullet points) are to be included in the EMPr:

- » All turbines (including their full rotor swept zone) to be kept out of all High bat sensitivity areas. The amended layout associated with the proposed amendment of turbine specifications ensures that this recommendation is met.
- » Construction of roads should ideally not interfere with identified sensitive habitats and vegetation clearing should be kept to a minimum and avoided entirely along the two main river channels and their respective riparian buffers.
- » With the exception of compulsory civil aviation lighting, minimise artificial lighting at night, especially high-intensity lighting, steady-burning, or bright lights such as sodium vapour, quartz, halogen, or other bright spotlights. Lights should be hooded downward and directed to minimise horizontal and skyward illumination. All internal turbine nacelle and tower lighting should be extinguished when unoccupied.

Impact 3: Bat fatalities due to collision or barotrauma during foraging activity

Whilst it is important to note that changes in impacts or mitigation measures may not only be due to project changes, but due to valuable information learnt from monitoring at operational facilities over the last 5 years, the impact ratings for the table below will change from the impacts identified in the EIA bat specialist report (2010) and pre-construction bat monitoring report (2013). However, the significance ratings remain unchanged with implementation of additional mitigation measures for this potential impact. The following additional mitigation measures (underlined bullet points) are to be included in the EMPr:

	Authorised		Proposed amendment	
	Without mitigation	With mitigation	Without mitigation	With mitigation
Extent	Study Area (2)	Study Area (2)	Regional/National (4)	Study Area (2)
Duration	Permanent (5)	Permanent (5)	Permanent (5)	Long-term (4)
Magnitude	Low (4)	Minor (2)	High (8)	Minor (2)
Probability	Definite (5)	Probable (3)	Definite (5)	Probable (3)
Significance	55 (Medium)	27 (Low)	85 (High)	24 (Low)
Status (positive or negative)	Negative	Negative	Negative	Negative
Reversibility	Low	Medium	Low	High
Irreplaceable loss of resources?	Yes	No	Yes	No
Can impacts be mitigated?	Yes	Yes	Yes	Yes

Mitigation:
Turbine Sighting and Dimensions

- » No part of any turbine (including the full rotor swept area) should fall within or at the very edge of areas of High bat sensitivity. It is recommended that any turbines where any part of the turbine encroaches on these high sensitivity buffers or are surrounded on all sides by high sensitivity areas are moved. This has been achieved

with the amended layout associated with the proposed amendment of turbine specifications. No turbines or their rotor swept areas are within areas of High bat sensitivity.

- » Gaps of at least 2 - 3 Turbine Diameters are left open between turbines, from blade tip to blade tip.

Lighting:

- » With the exception of compulsory civil aviation lighting, minimise artificial lighting at night, especially high-intensity lighting, steady-burning, or bright lights such as sodium vapour, quartz, halogen, or other bright spotlights at sub-station, offices and turbines. All non-aviation lights should be hooded downward and directed to minimise horizontal and skyward illumination.
- » On the condition that the above criteria regarding the lighting is adhered to, then there should be at least a 200m no turbine development zone around any sub-stations or office/ operations and maintenance buildings. However, should lighting not be down-hooded and be of bright intensity, then there should be at least a 500m no turbine development zone around any sub-stations or office/ operations and maintenance buildings.
- » All non-aviation internal turbine nacelle and tower lighting should be extinguished when unoccupied.

Operational Mitigation:

- » Based on bat activity monitoring at Perdekraal West (Site 1) and Perdekraal East (Site 2) WEFs, and IWS's experience and 10 operational WEFs (including the assessment of curtailment success and failure), the following bat fatality minimization measures are recommended – set curtailment for the turbines in areas of Medium-High Sensitivity and a trial consisting of two treatment groups and one control group in the Medium and Low-Medium sensitive areas:

▪ **Set Curtailment in Medium-High Sensitive Areas:**

<u>Applicable Turbines:</u>	<u>Time of Year to be applied:</u>	<u>Time of Night to be applied:</u>	<u>When Temperatures exceed:</u>	<u>Apply a Cut-in Wind Speed of:</u>
<u>Turbines 7, 9, 15, 16, 19, 20, 22, 27, 29, 30, 31 and 32</u>	<u>November, December, January and February</u>	<u>19h00 to 04h00</u>	<u>10°C</u>	<u>6 m/s</u> <u>(Based on the fact that approximately 75% of bats belonging to the Molissidae family (Group A) flying in wind speeds of less than 6m/s)</u>
<u>Turbines 7, 9, 15, 16, 19, 20, 22, 27, 29, 30, 31 and 32</u>	<u>March, April and May</u>	<u>18h00 to 22h00</u>	<u>10°C</u>	<u>6 m/s</u> <u>(Based on the fact that approximately 75% of bats belonging to the Molissidae family (Group A) flying in wind speeds of less than 6m/s)</u>

▪ **Curtailment Trials in Medium and Low-Medium Sensitive Areas:**

End Spring and Summer							
<u>Randomly Selected Turbines:</u>	<u>Group</u>	<u>Start date</u>	<u>End date</u>	<u>Start time</u>	<u>End time</u>	<u>Apply a Cut-in Wind Speed of:</u>	<u>When Temperatures exceed:</u>
<u>14</u>	<u>1</u>	<u>1 November</u>	<u>28 February</u>	<u>19h00</u>	<u>04h00</u>	<u>4m/s</u>	<u>10°C</u>
<u>18</u>	<u>1</u>	<u>1 November</u>	<u>28 February</u>	<u>19h00</u>	<u>04h00</u>	<u>4m/s</u>	<u>10°C</u>
<u>25</u>	<u>1</u>	<u>1 November</u>	<u>28 February</u>	<u>19h00</u>	<u>04h00</u>	<u>4m/s</u>	<u>10°C</u>
<u>39</u>	<u>1</u>	<u>1 November</u>	<u>28 February</u>	<u>19h00</u>	<u>04h00</u>	<u>4m/s</u>	<u>10°C</u>
<u>4</u>	<u>2</u>	<u>1 November</u>	<u>28 February</u>	<u>19h00</u>	<u>04h00</u>	<u>5m/s</u>	<u>10°C</u>
<u>23</u>	<u>2</u>	<u>1 November</u>	<u>28 February</u>	<u>19h00</u>	<u>04h00</u>	<u>5m/s</u>	<u>10°C</u>
<u>28</u>	<u>2</u>	<u>1 November</u>	<u>28 February</u>	<u>19h00</u>	<u>04h00</u>	<u>5m/s</u>	<u>10°C</u>
<u>38</u>	<u>2</u>	<u>1 November</u>	<u>28 February</u>	<u>19h00</u>	<u>04h00</u>	<u>5m/s</u>	<u>10°C</u>
<u>8</u>	<u>3</u>	<u>1 November</u>	<u>28 February</u>	<u>19h00</u>	<u>04h00</u>	<u>Control</u>	<u>Control</u>
<u>11</u>	<u>3</u>	<u>1 November</u>	<u>28 February</u>	<u>19h00</u>	<u>04h00</u>	<u>Control</u>	<u>Control</u>
<u>24</u>	<u>3</u>	<u>1 November</u>	<u>28 February</u>	<u>19h00</u>	<u>04h00</u>	<u>Control</u>	<u>Control</u>
<u>37</u>	<u>3</u>	<u>1 November</u>	<u>28 February</u>	<u>19h00</u>	<u>04h00</u>	<u>Control</u>	<u>Control</u>

Autumn							
Randomly Selected Turbines:	Group	Start date	End date	Start time	End time	Apply a Cut-in Wind Speed of:	When Temperatures exceed:
14	1	1 March	31 May	18h00	22h00	4m/s	10°C
18	1	1 March	31 May	18h00	22h00	4m/s	10°C
25	1	1 March	31 May	18h00	22h00	4m/s	10°C
39	1	1 March	31 May	18h00	22h00	4m/s	10°C
4	2	1 March	31 May	18h00	22h00	5m/s	10°C
23	2	1 March	31 May	18h00	22h00	5m/s	10°C
28	2	1 March	31 May	18h00	22h00	5m/s	10°C
38	2	1 March	31 May	18h00	22h00	5m/s	10°C
8	3	1 March	31 May	18h00	22h00	Control	Control
11	3	1 March	31 May	18h00	22h00	Control	Control
24	3	1 March	31 May	18h00	22h00	Control	Control
37	3	1 March	31 May	18h00	22h00	Control	Control

- » Post-construction/ operational bat monitoring must be performed according to the South African Good Practise Guidelines for Operational Monitoring for Bats at Wind Energy Facilities (Aronson et al, 2014) or later version valid at the time of monitoring. IWS recommends the initial 2 years and then the frequency thereafter to be informed by the specialist conducting the operational monitoring.
- » Allowance should be made for a bat ecologist to engage early in the planning and design phase with the turbine engineers in order for bat monitoring equipment to be erected onto some turbines.
- » The South African Bat Fatality Threshold Guidelines Edition 2 (MacEwan et al, 2018) has introduced a way to calculate a bat fatality threshold for development projects that could help reduce the possibility of population level declines. The Perdekraal West (Site 1) WEF must not exceed the bat fatality thresholds as per these guidelines or subsequent versions valid at the time of operation.
- » Should adjusted bat fatalities (adjusted for biases such as searcher efficiency and carcass persistence) equal or exceed bat fatality threshold levels per annum after Year 1 of monitoring, then operational mitigation must be adapted according to MacEwan et al (2018) and Aronson et al (2018).
- » After the implementation of mitigation measures recommended above, a second year of monitoring should take place to assess whether the mitigation measures were effective. If the annual fatalities were reduced to below threshold value, then operational monitoring should only be performed every 3rd year thereafter, with adaptive mitigation based on these results if needed. If the 2nd year results were not reduced to below threshold level bat fatalities, then monitoring should continue every year until adaptive mitigation becomes effective.
- » Adaptive mitigation, as per the operational bat monitoring specialist recommendations should be implemented.

On-going involvement and support of the South African Bat Assessment Association Panel (SABAAP) and other important environmental and conservation organisations:

- » During operational monitoring, annual monitoring reports to be submitted to SABAAP, EWT, the DEA, Cape Nature and to the SANBI Bird and Bat Database.
- » All of the above recommendations should be written into the authorisation of this amendment application.

Cumulative impacts:

Whilst it is very important to consider the site-specific or local impacts that may be caused by individual developments; it is equally important to consider the cumulative impacts of the facility in light of other similar developments nearby. Based on the information on EIA applications for renewable energy projects as per the DEA as at the end of Quarter 1 of 2018, it is already evident that an intensive amount of wind energy production has been approved or is being planned within 100 km of the Perdekraal West (Site 1) WEF in the Western Cape. Immediately adjacent to the Perdekraal West (Site 1) WEF is the Preferred Bidder Perdekraal East (Site 2) WEF and closer to Sutherland are several proposed facilities.

Based on IWS's experience at 10 operational WEFs in the Western and Eastern Cape already, several bat species (of the same kind as found at the Perdekraal West (Site 1) WEF) are being killed by wind turbines. The three most active species that occur at the Perdekraal East (Site 2) WEF and surrounds that have been reported as wind turbine fatalities in SA include *Tadarida*

aegyptiaca, *Neoromicia capensis* and *Miniopterus natalensis*, (Doty & Martin, 2012; MacEwan, 2016; Perold & MacEwan, 2017).

IWS recommends that the SABAA threshold document (MacEwan *et al* 2018) be used to inform further development and cap bat fatalities. IWS and SABAAP do not condone the killing of any bats. In reality, it is not possible to have zero bat fatalities at any WEFs, but multiple fatalities of any species need to be taken seriously and should warrant mitigation, due to the impact that adult losses can have on a population.

The South African Bat Fatality Threshold Guidelines Edition 2 (MacEwan *et al* 2018) has introduced a way to calculate a bat fatality threshold for development projects based on the development area and the Ecoregion in which the development is. This method could help reduce the possibility of population level declines. Should adjusted bat fatalities (adjusted for biases such as searcher efficiency and carcass persistence) equal or exceed the annual fatalities per species (excluding the criteria for conservation important species), then operational mitigation must be adapted according to MacEwan *et al* (2018) and Aronson *et al* (2018). Financial allowance should be made in the operational budget for adaptive mitigation.

The same guidelines allow for assessment of bigger areas to determine cumulative thresholds as well. IWS recommends that the DEA and the Western Cape Conservation authority commission an individual or a company to collate data gathered from the various projects in the area to assess the actual cumulative impact and to make recommendations from a regional perspective.

Based on these principles the Perdekraal West (Site 1) WEF adjusted bat fatalities, (adjusted for biases such as searcher efficiency and carcass persistence) should not equal or exceed 6 bat fatalities per annum per species (excluding the criteria for conservation important species). However, the same principles should apply to all WFs in the 100km vicinity of the Perdekraal West WEF.

Bats are particularly susceptible to anthropogenic changes because of their low reproductive rate, longevity, and high metabolic rates. The consequences of bat population declines are decreased pest-insect control by insectivorous bats, decreased pollination and seed dispersal by frugivorous bats and other ecosystem services provided by bats. Project related consequences of high bat fatalities are reputational damage and increased costs for unplanned mitigation measures required.

In the USA, Bat Conservation International (Hein & Schirmacher, 2016) has stated that, although population data are sparse or lacking for many bat species, current and presumed future level of fatality is considered to be unsustainable, and actions to reduce impact of wind turbines on bats should be implemented immediately.

South Africa doesn't want to find themselves in the situation where the USA and Canada are with hundreds of thousands of bats dying annually and declining species numbers because cumulative action was not taken sooner.

Residual Risks:

A Low residual risk applies if the above mitigation measures are adhered to fully.

Impact 7: Reduction in the size, genetic diversity, resilience and persistence of bat populations

It is important to note that changes in impacts or mitigation measures may not only be due to project changes, but due to valuable information learnt from monitoring at operational facilities over the last 5 years. As such, the impact ratings for the table below will change from the impacts identified in the EIA bat specialist report (2010) and pre-construction bat monitoring report (2013). However, the significance ratings remain unchanged with implementation of additional mitigation measures for this potential impact. The same mitigation measures stipulated in the table above are to be included in the EMPr to mitigate this potential impact.

Nature of impact:				
Bat population sizes are likely to be reduced by the fatality of bats at WEFs. This is because bats have low reproductive rates, slow generation turn-over and low population resilience against mass die-offs. The additional loss of flying adults to a population, other than natural death rates is likely to have a significance impact. Smaller populations also contain less genetic diversity and are more susceptible to genetic drift and inbreeding. WEFs may, therefore, reduce the long-term persistence of local and even regional bat populations. Given the medium to high activity levels of bats at Perdekraal West (Site 1) WEF relative to other sites in the Succulent Karoo ecoregion in South Africa where IWS/NSS has performed long-term monitoring for proposed WEFs, this potential impact has a Medium significance rating (The increase in pre-mitigation impact is not because the amendment has a higher impact (in fact it is an improvement from the original layout and mitigation measures), but rather due to what IWS has learnt through operational monitoring over the last 5 years), which can be reduced to Low based on the mitigation measures described in the impact rating table above.				
	Authorised		Proposed amendment	
	Without mitigation	With mitigation	Without mitigation	With mitigation
Extent	Study Area (2)	Study Area (2)	Regional/National (4)	Localised (3)
Duration	Long-term (4)	Long-term (4)	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Minor (2)	Moderate (6)	Minor (2)
Probability	Probable (3)	Improbable (2)	Probable (3)	Improbable (2)
Significance	24 (Low)	16 (Low)	42 (Medium)	18 (Low)
Status (positive or negative)	Negative	Negative	Negative	Negative
Reversibility	Low	Medium	Low	High
Irreplaceable loss of resources?	Yes	No	Yes	No
Can impacts be mitigated?	Yes	Yes	Yes	Yes
Mitigation:				
The same mitigation measures as specified in the impact rating table above applies.				
Cumulative impacts:				
The same cumulative impact discussion applies as per the cumulative impacts within the impact rating table above.				
Residual Risks:				
A Low residual risk applies if the above mitigation measures are adhered to fully.				

5.2.2. Conclusion

The bat richness (number of species) and the abundance based on activity levels at the Perdekraal West Wind Farm (Site 1) Facility is considered low to medium, but medium to high for the Succulent Karoo. These levels still present a risk of fatality and ultimately a risk of bat population declines. Therefore, site-specific bat fatality minimization recommendations have been provided that are achievable.

Some changes in impact ratings as detailed in the EIA bat specialist report (2010) and pre-construction monitoring report (2013) have been indicated. The increase in pre-mitigation impact is not because the amendment has a higher impact (in fact it is an improvement from the original layout and mitigation measures), but rather due to what IWS has learnt through operational monitoring over the last 5 years. The significance rating after mitigation is low for all impacts associated with a change. The significance rating has therefore remained unchanged after mitigation for all impacts in terms of the proposed amendments.

The proposed amendments are supported if all of the mitigation measures specified in this amendment report and those stipulated in the original pre-construction bat monitoring assessment (dated 2013) are adhered to, and that these mitigation measures are written into the environmental management programme and enforced by the environmental authorisation.

5.3. Ecological Impact

The ecological assessment (**Appendix C**) reviewed the proposed amendments (including the amended layout) in reference to both the original assessed layout as well as the sensitivity of the site. The site sensitivity is based on the original specialist studies undertaken as part of the EIA, as well as information collected thereafter during a recent walk-through of the adjacent Perdekraal East WEF.

The ecological impact of the current proposed 47 turbine layout (**Figure 4.3**) is likely to be similar to the 60-65 turbine layout. This is driven largely by the fact that the roads are the primary generator of terrestrial impact and not the turbines, with the result that the lower number of turbines does not result in a proportional decline in impact. The total footprint of the access roads is however the same under each layout as the larger turbines are spaced further apart. The larger turbine size is not considered to be of significance with regards to the terrestrial impacts as, while the turbine hard stand area would be larger for each turbine, this is countered by the lower number of turbines. The reduced number of turbines would mean that the average distance between turbines is larger with the result that faunal disturbance from turbine noise may be lower, but this is not likely to result in a significant overall reduction in impact.

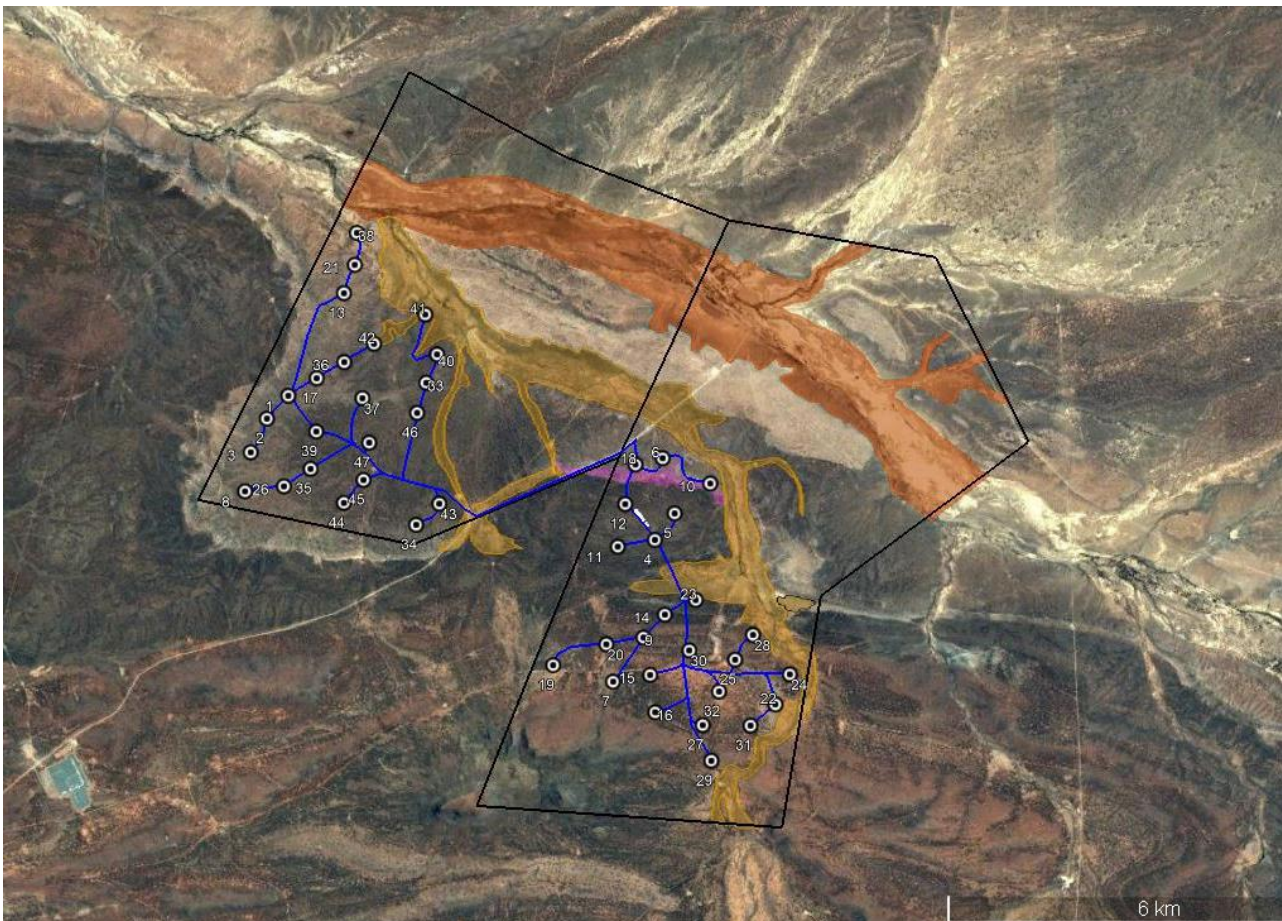


Figure 4.3: Map showing the amended layout overlaid on the sensitive features of the Perdekraal West site. This includes the primary riparian corridor in red, the secondary riparian corridor in orange and gravel outcrops with confirmed plant species of concern in purple.

The site falls within the known distribution range of the Riverine Rabbit which is classified as Critically Endangered. The Perdekraal East WEF (a Preferred Bidder project) was required to conduct extensive preconstruction Riverine Rabbit Monitoring as a result. The results of this have some implications for the current study given the proximity of these two developments to one another. No rabbits were observed at the Perdekraal East site during the extensive monitoring campaign, suggesting that it is either absent or not common on the Perdekraal East site which has similar habitat to the Perdekraal West site. However, due to the very high threat level to this species, caution is warranted in the face of uncertainty over its presence at the site, and impacts to favourable habitat for this species should be avoided. In terms of the amended layout, there are no turbines located within the demarcated riparian areas and it is thus confirmed that the layout has met the avoidance requirements in this regard.

5.3.1. Comparative Assessment

The Perdekraal West Amended layout is well supported in terms of terrestrial ecology impacts. Overall the impact of the amended layout on fauna and flora would be low, and there are no fatal flaws or critical issues associated with the proposed changes. As a result, the amendment is supported from an ecological perspective as it will not result in an increase in the significance in any of the assessed ecological impacts. No additional mitigation measures are recommended as a result of the proposed amendments.

5.3.2. Conclusion

Should the development proceed to construction, the final development footprint should be subject to a preconstruction walk-through to locate and identify species of conservation concern that are within the development footprint. Some search and rescue of plant species of conservation concern may be required.

The amendment to reduce the number of turbines but increase their size, is seen as having an overall neutral or slightly positive outcome from an ecological perspective, and is thus supported.

5.4. Impacts on heritage

In the original heritage assessment undertaken by Webley and Halkett (2011), a wide range of heritage resources were recorded within the study area. These included:

- » Palaeontological materials (these were only assessed from a desktop level, but the potential impacts were considered to be of high significance);
- » A number of Middle Stone Age (MSA) archaeological sites (artefact scatters);
- » A variety of historical archaeological resources related to previous farming activities in the area (19th and early 20th centuries) including stone walls, stone house runs, livestock enclosures, other walled features and historical refuse dumps;
- » Historical structures;
- » A number of graves associated with the historical sites; and
- » The cultural landscape.

All of these heritage resources are to be expected in the area and none, aside from the human remains, are especially significant. The EIA survey covered a variety of landscape types including both the higher ground targeted for wind turbines as well as a selection of valleys. Heritage resources were found to be strongly clustered in the river valleys and, in fact, none fall within the development area (**Figure 4.4**). Access roads and power lines and possibly also laydown areas, substations and other ancillary infrastructure may

be positioned in valleys. This means that, despite their locations away from turbine placements, heritage resources may still be threatened by the proposed WEF development.

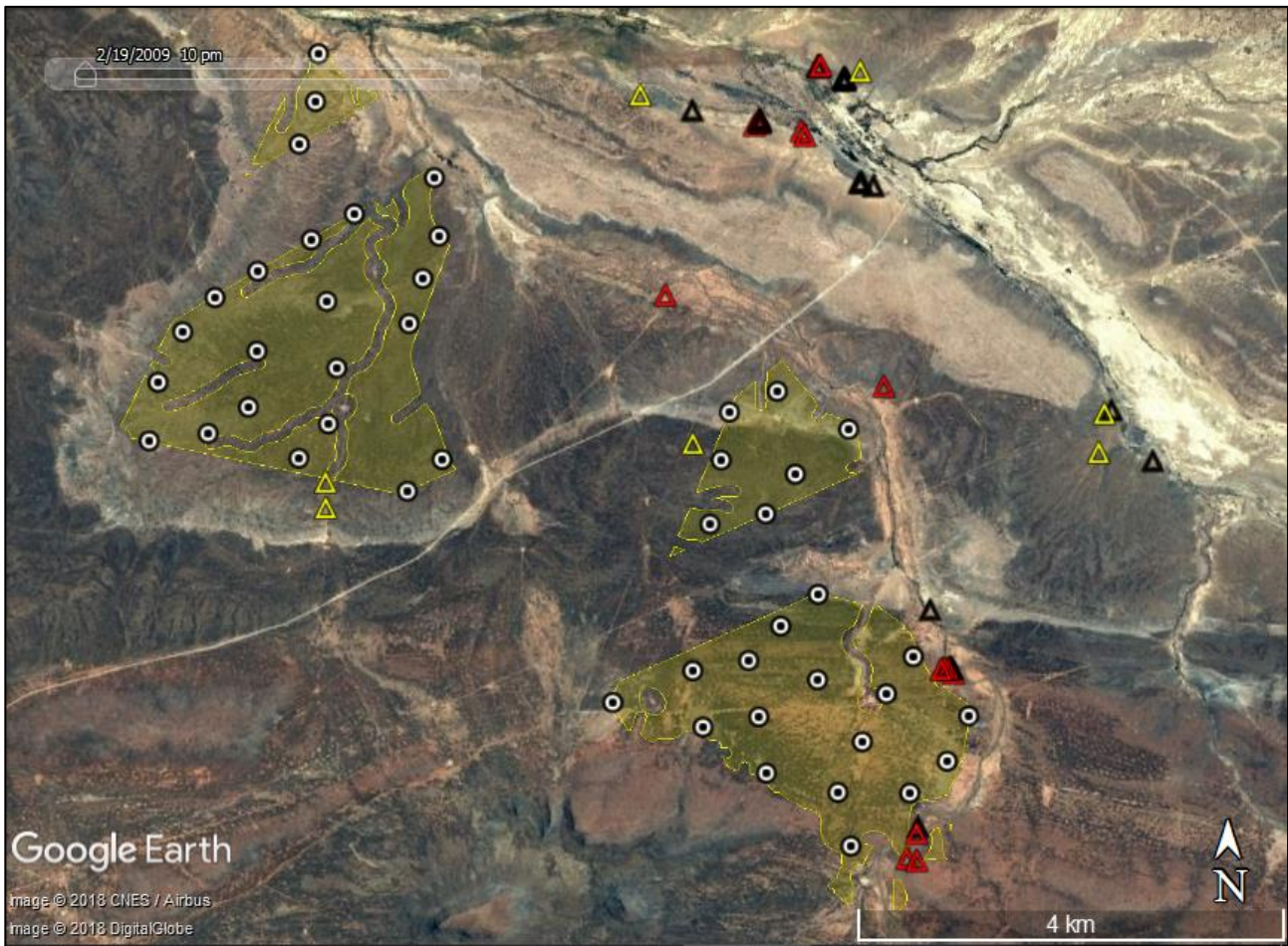


Figure 4.4: Google Earth map of the study area showing the turbines (white and black dots), graves (black triangles), historical sites (yellow triangles) and MSA sites (yellow triangles) of the original EIA survey.

5.4.1. Comparative Assessment

ASHA consulting conducted the heritage amendment assessment (**Appendix D**), and examined all the new turbine positions on aerial imagery. Despite the limitations of this desktop method, it is clear that the turbines, access roads and other infrastructure are located away from the most sensitive landscapes (essentially the riparian corridors). As such, the original impact assessment provided by Webley and Halkett (2011) remains a true reflection of the potential impacts that could occur through construction of the proposed project. No change in the assessed impact significance ratings is recommended. Furthermore, there are no particular advantages or disadvantages of the proposed amendment from a heritage perspective and no new mitigation measures are required.

Importantly however, the recommendations provided by Webley and Halkett (2011) are supported, and can be summarised and slightly modified as follows:

- » A palaeontological field survey must be commissioned prior to construction in order to map sensitive areas and to propose and plan any mitigation measures as may become necessary (including

monitoring of excavations where indicated by the palaeontologist). The survey should focus on the areas proposed for development but will necessarily need to search for good geological exposures in order to maximise the understanding of local palaeontological heritage;

- » An archaeological survey of the final WEF layout including all roads, laydown areas and other infrastructure must be commissioned prior to construction in order to determine whether there are any areas that need to be protected (by rerouting of alignments or micro-siting of turbines) or mitigated (through archaeological excavations, recording, etc); and
- » If any palaeontological or archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an appropriate specialist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

If these recommendations are included in the Environmental Authorisation for the amended WEF then, from a heritage perspective, the project may proceed. It is recommended that, for consistency, the same original recommendations provided by HWC are written into the EA (shown in **Figure 4.5** below).

- "Mitigation of the pre-colonial and colonial archaeology must involve micro-siting turbine positions during the EMP in consultation with the heritage specialist.
- Mitigation of the built environment must involve micro-siting turbine positions in the EMP in consultation with the heritage specialist, to avoid placing turbines or infrastructure directly over built environment features.
- Once the exact positions of infrastructure is known, a more detailed assessment of the access and construction roads, laydown areas, substation positions and cable routes needs to be undertaken by the heritage specialist to identify all marked graves. In the case of unmarked graves, there needs to be a protocol in place in order to deal with them on a case-by-case basis.
- Heritage Western Cape must be notified immediately if any human remains are uncovered during construction.
- A Palaeontological field survey and monitoring will be required at EMP stage. The report must be submitted to the APM Committee for review.
- If palaeontological resources are identified, mitigation may be required."

Figure 4.5: Heritage Western Cape Comments as per the comment letter dated 12th July 2011 (text extracted from the original EIA Comments and Responses report dated 2012).

5.4.2. Conclusion

It has been identified within the current heritage amendment assessment undertaken in comparison with the original impact assessment provided by Webley and Halkett (2011) for the proposed amendments, that the original study remains a true reflection of the potential impacts that could occur through construction of the proposed project. There is therefore no change in the assessed impact significance ratings. Furthermore, there are no particular advantages or disadvantages of the proposed amendment and no new mitigation measures are required.

5.5. Visual impact

The visual amendment comment letter (**Appendix E**) addresses the potential changes in visual impact significance in terms of the proposed amendments by comparison with the original assessment undertaken in 2011. The original Visual Impact Assessment (VIA) for the Perdekraal wind farm (February 2011) was based

on hub heights of 80m and a rotor diameter of 90m. The visual significance rating after mitigation at that time was medium to high, given the large number of turbines, the open Karoo landscape and the proximity of district roads to the site. Environmental Authorisation (4 December 2012) was subsequently granted for the proposed Perdekraal West wind energy facility for 65 wind turbines with a hub height of 90m and a rotor diameter of 120m.

5.5.1. Comparative Assessment

A viewshed analysis was undertaken to provide a comparison of the difference in hub height from 80m and the proposed 120m, (Figures 4.6 and Figure 4.7), also taking into account the fewer number of turbines proposed (47).

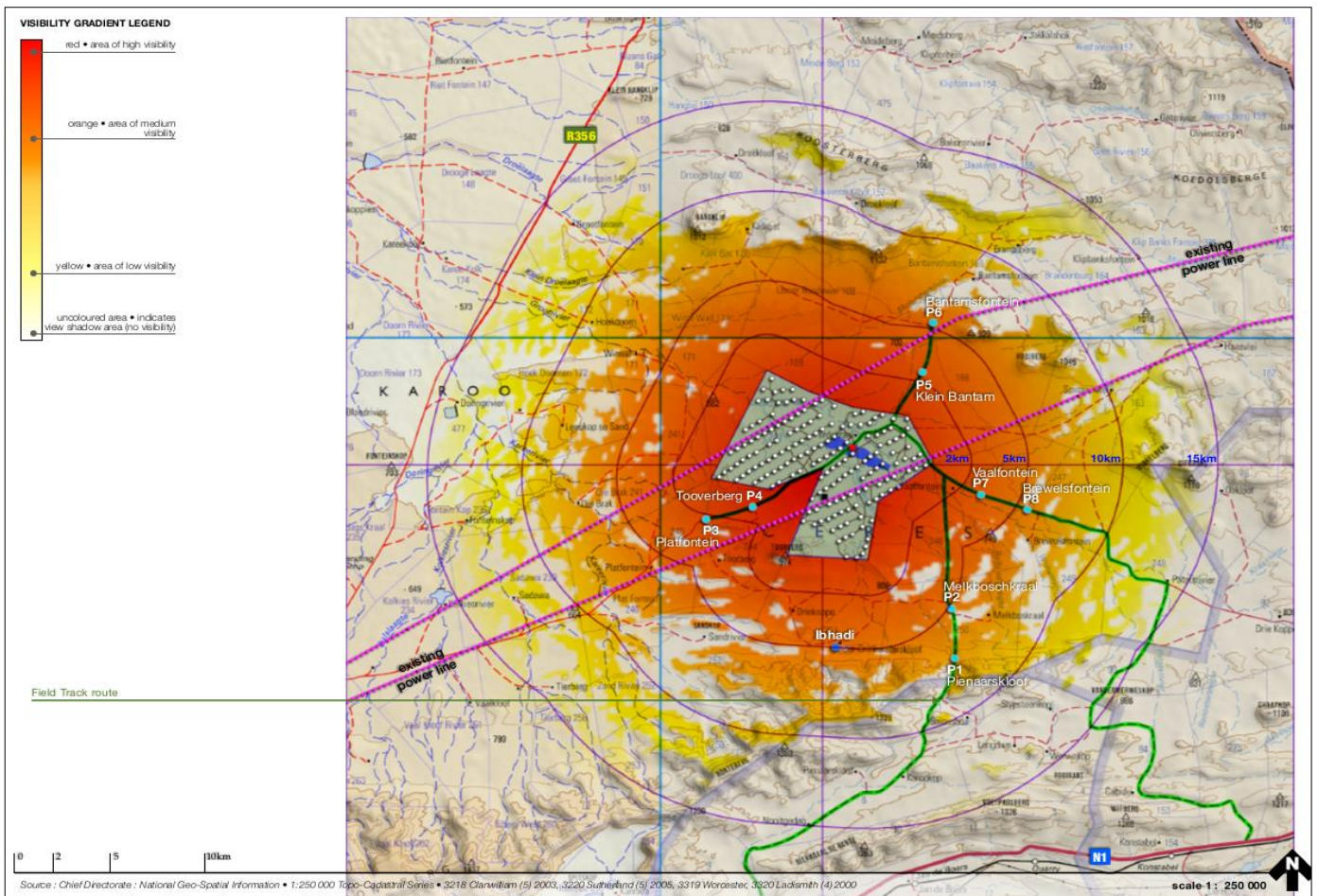


Figure 4.6: Perdekraal Viewpoints, Revised 2011 Viewshed and Distance Radii. Note that the layout reflected is for the combined Perdekraal East and West WEFs, which were subsequently split into two projects.

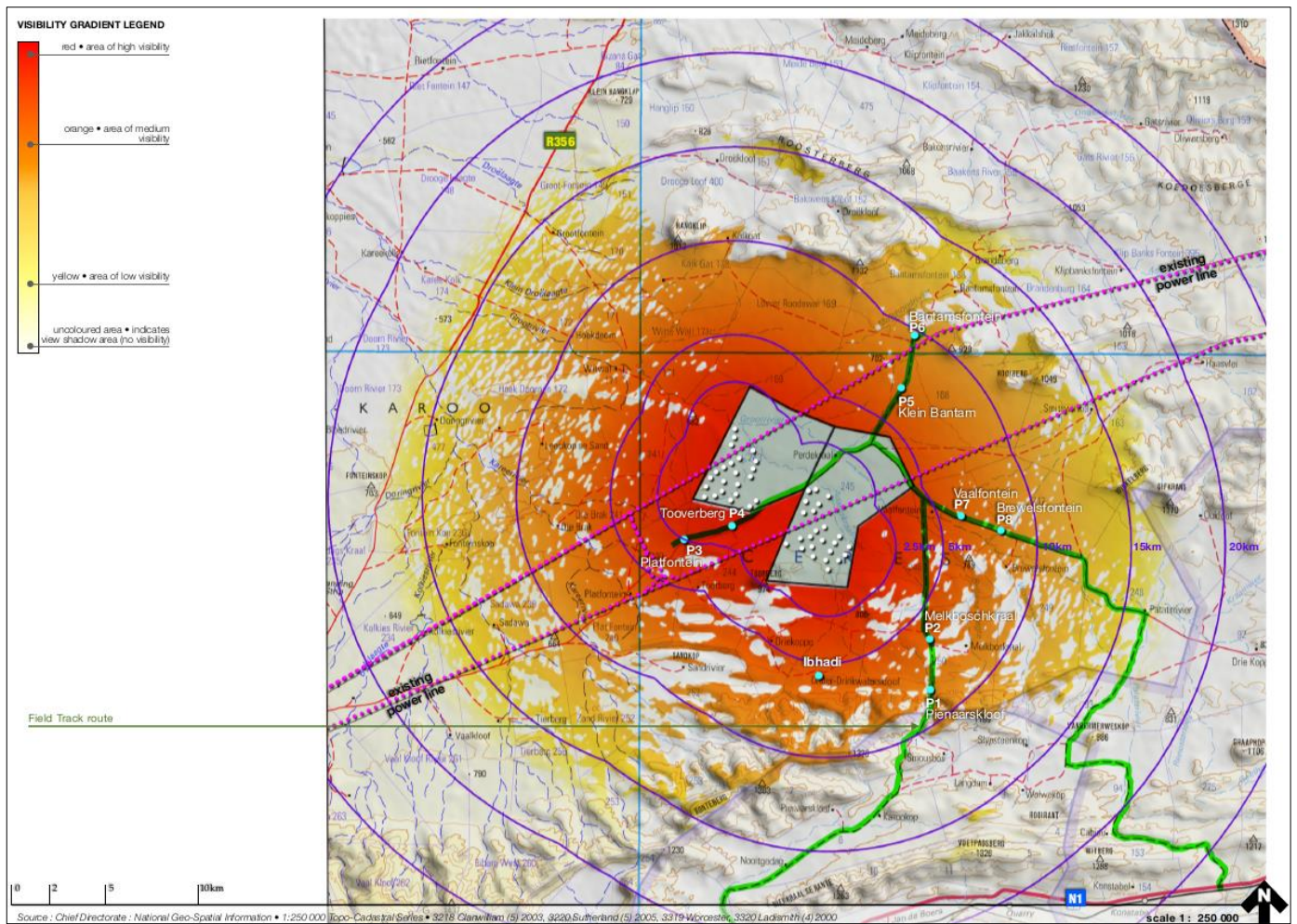


Figure 4.7: Perdekraal West Viewpoints, Revised Viewshed and Distance Radii considering 47 turbines with amended specifications.

The analysis indicated that with the proposed amendments, the viewshed would extend slightly further out, and that the proposed wind farm would potentially be more visible from the R356 Route. However, at a distance of 15 km the visibility of the wind farm from this road would be marginal.

The increase in the rotor diameter is also expected to extend the viewshed, but given the marginal visibility of the wind farm at 15 km, the difference is not expected to be significant.

In addition, the reduced number of turbines would tend to reduce the visual clutter effect of the proposed wind farm, particularly when seen on the skyline, helping to balance out any difference in the overall visual impact. The current amendments will therefore have a zero or a negligible effect on the significance of impacts identified in the original VIA Report (dated 2011).

The visual mitigations contained in the original VIA (2011) would still have relevance, and no new visual mitigations are deemed necessary.

5.5.2. Conclusion

The reduced number of wind turbines (47 turbines), together with the increased hub height, rotor diameter and blade tip height would result in similar overall visual impact significance ratings to that determined in the original VIA and subsequent amendments. The proposed amendments would result in no change in the overall visual impact significance ratings and no new visual mitigation measures are deemed necessary.

Provided that the visual mitigations listed in the original visual impact study (including post-construction rehabilitation of the site) are adhered to, the existing Environmental Authorisation for the Perdekraal West Wind Energy project should still be valid. Our opinion from a visual perspective is that the proposed amendments should be approved.

5.6. Noise impact

Ambient sound levels were measured at a number of locations from 26 to 28 September 2016 for a different project (the Karee and Kolkies WEFs) within 10 – 20 km from the proposed project site. The data is fully applicable to the project site for the purposes of the amended noise assessment (**Appendix F**) for assessing the proposed amendments. Four class-1 Sound Level Meters were used for these measurements. Three instruments were used for semi-continuous, longer measurements (2 night-time periods) with one instrument used for shorter measurements (10 minutes each). The sound level meters would measure “average” sound levels over a time period, save the data and start with a new measurement until the instrument was stopped. The long-term measurement locations were selected to be reflective of the typical environmental ambient sound levels that a receptor may experience in the area.

Daytime measured data indicated an area with elevated noise levels, but considering the spectral data and sounds heard, these sounds are mainly due to natural activities (wind-induced). Night-time measurements indicated a very quiet environment, even with low winds (around 0 – 2 m/s). Considering the measurements and measurements conducted in the last few years at similar areas, acceptable rating levels for the area would be typical of a rural noise district. For the purpose of the comparative amended noise assessment, the strictest rating level (rural) was used as defined in SANS 10103:2008 (35 dBA at night, 45 dBA during the day) for all the potential noise-sensitive developments living in the area.

5.6.1. Comparative Assessment

The comparative amended noise assessment used the sound power emission levels of the Goldwind GW140/3S WTG, together with the octave sound power emission levels of the Acciona AW125/3000 WTG. The spectral data from the Acciona was used, as using a sound power emission level alone could result in an over-estimated noise rating level.

Various construction activities would typically take place during the development of the facility, and may pose a noise risk to the closest receptors. The resulting future noise projections indicated that the construction activities of the wind turbines and associated infrastructure, as modelled for the conceptual scenario, will comply with the provincial Noise Control Regulations for construction and operational activities.

Therefore, the comparative amended noise assessment concluded that the potential noise impact would remain to be of a **low** significance during the construction and operational phase. Considering the modelled construction and operational noise levels, the proposed changes to the wind turbines (and minor

layout changes) will not lead to any other noise impacts, nor would it change the significance of the noise impact as defined in the original noise impact report (dated 2011). The findings and recommendations highlighted in the 2014 report would also remain. No additional mitigation is required.

5.6.2. Conclusion

Considering the modelled construction and operational noise levels, it is concluded that the proposed changes to the wind turbines specifications (and minor layout changes) will not lead to any other noise impacts, neither will it change the significance of the noise impact as defined in the original impact assessment report, nor will any further mitigation measures be required. The findings and recommendations highlighted in the 2014 report would remain the same.

Considering the possible **low** significance of the potential noise impact, the proposed amendment of the Perdekraal West WEF can be authorised from a noise perspective.

6. ADVANTAGES AND DISADVANTAGES OF THE PROPOSED AMENDMENTS

In terms of Regulation 32(1)(a)(ii), this section provides details of the advantages and disadvantages of the proposed amendment.

Advantages of the amendment	Disadvantages of the amendment
General	
<p>The increase in rotor diameter will increase the efficiency of the facility and consequently the economic viability thereof. Increased efficiency of a facility is considered to be beneficial to the environment as this will reduce the need for additional facilities to generate additional electricity.</p> <p>It is also beneficial from a macroeconomic perspective as it results in the lower cost per unit of energy, ultimately benefiting the South African public.</p>	None
<p>The number of wind turbines is proposed to be reduced from the 60 - 65 wind turbines originally approved, to the proposed 47 wind turbines. This would result in a reduced footprint and lower impacts on the environment (in terms of impacts on ecology and avifauna) if the amendment is granted. The significance of all identified impacts in this regard would be reduced.</p>	None
Avifauna	
<p>Overall reduction in construction footprint – reducing extent of peripheral degradation of habitat and possibly reducing disturbance caused by construction</p>	20% increase in rotor swept area – increasing collision mortality risk
<p>28% reduction in footprint of the final, built wind farm – reducing the amount of habitat finally lost to the destructive footprint of the facility</p>	10% increase in vertical reach of turbines – could <u>marginally</u> increase collision mortality risk.
Bats	

Advantages of the amendment	Disadvantages of the amendment
No turbines are positioned in areas of High bat sensitivity. All wind turbines full rotor swept areas therefore fall outside high bat sensitivity areas.	Twelve turbines still encroach into areas of Medium-High bat sensitivity. Stricter operational mitigation should be implemented on these turbines.
The majority of turbine bases (35 turbines) and their full rotor sweep are situated within areas of Low-Medium and Medium bat sensitivity.	The rotor swept area is larger than previously assessed, therefore, there is a larger potential impact area per turbine. This is particularly relevant to the high-flying, open-space foragers such as bats belonging to the <i>Molossidae</i> family.
There are fewer turbines overall.	None
The new layout reduces the risk of conservation important bat species being killed.	None
Ecology	
The amended layout has similar impact or is potentially a slight improvement on the original layout in terms of ecological impacts.	None
Heritage	
None	None
Visual	
Fewer wind turbines in the landscape.	Marginally increased extent of the viewshed.
Noise	
None	None

Based on the above, it can be concluded that the advantages of the proposed change outweigh the disadvantages from an environmental and technical perspective.

7. REQUIREMENTS FOR ADDITIONAL MITIGATION AS A RESULT OF THE PROPOSED AMENDMENTS

As required in terms of Regulation 32(1)(a)(iii), consideration was given to the requirement for additional measures to ensure avoidance, management and mitigation of impacts associated with the proposed change. From the specialist inputs provided into this amendment motivation, it is concluded that the mitigation measures proposed within the EIA would be sufficient to manage potential impacts within acceptable levels. Updated mitigation measures are however provided by the Avifaunal and Bat specialists as provided in Sections 4.1 and 4.2, respectively. These additional mitigation measures are recommended based on additional information available regarding interactions of sensitive species with wind farms and not as a result of the proposed amended turbine specifications. These updated mitigation measures should be included within the approved project EMPr when the updated layout is finalised and submitted for final approval to the DEA.

8. PUBLIC PARTICIPATION

A public participation process is being conducted in support of a Part 2 application for amendment of the Environmental Authorisation for the Perdekraal West Wind Energy Facility (Site 1) in the Western Cape Province. This public participation includes:

- » The draft motivation report was made available for a public review period on www.savannahsa.com from **3 September 2018 until the 4 October 2018**.
- » Written notification to registered I&APs regarding the availability of the amendment motivation report was distributed on **3 September 2018** (refer to **Appendix G2**).
- » Advertisements were placed in the Worcester Standard newspaper on **6 September 2018** (refer to **Appendix G3**).
- » Site notices were placed at the site on **26 of July 2018** (refer to **Appendix G2**).

Comments received during the public review period will be included in the final submission to the DEA for consideration in the decision-making process. Comments will be included and responded to in the Comments and Responses Report (to be included as **Appendix G4**). Proof of attempts made to obtain comments from relevant Organs of State and key stakeholders will also be included in **Appendix G5**.

9. CONCLUSION

Based on the specialist findings, it is concluded that the proposed amendments to the turbine specifications and wind farm layout are not expected to result in an increase to the significance ratings for the identified potential impacts. In addition, the amended wind turbine positions considered avoids all identified no-go areas and areas of high sensitivity (refer to Figure 9.1 and Figure 9.2).

In some cases (avifauna and bats), the quantitative value has changed in terms of the magnitude of impacts, but this has not resulted in a change to the qualitative category (i.e. Low, Medium, High) of the significance rating after mitigation measures. This change in magnitude of impact is as a result of additional information available regarding interactions of sensitive species with wind farms and not as a result of the proposed amended turbine specifications. There is a reduction in significance in some impacts as a result of the reduced number of turbines and the location of these outside of identified high sensitivity areas. There are no new impacts identified as a result of the proposed amendments.

The amendment in itself does not constitute a listed activity. The mitigation measures described in the original EIA document are adequate to manage the expected impacts for the project. Additional mitigation measures have been recommended by the avifauna and bat specialists and, as a result of this proposed amendment, must be included within the project EMP when the updated layout is finalised and submitted to DEA for final approval.

Given the above, Perdekraal West Wind Farm (Pty) Ltd requests the following:

- » a reduction in the number of wind turbines from the authorised 60 – 65, to **up to 47**;
- » an increase to the rotor diameter for each wind turbine from the authorised to a maximum of 120m, to a range from **120m up to 155m**;

- » an increase in hub height from 70m to 120m, to a range **up to 120m**;
- » turbine capacity from 1.5 to 3.5 MW, to a range from **1.5MW up to 6MW**; and
- » increase in blade tip length from the authorised 105m to 180m, to a range from **130m up to 198m**.

This requested amendment will result in an optimisation of the layout assessed within the EIA. As required in terms of Condition 28 of the EA, the final layout must be submitted to the DEA for review and approval once a turbine supplier has been selected for the project.

Taking into consideration the conclusions of the studies undertaken for the proposed amendments associated with the revised turbine specifications and updated layout (as detailed in Appendix A – F), it is concluded that these amendments are considered acceptable from an environmental perspective, provided that the original and additional mitigation measures stipulated herein are implemented.

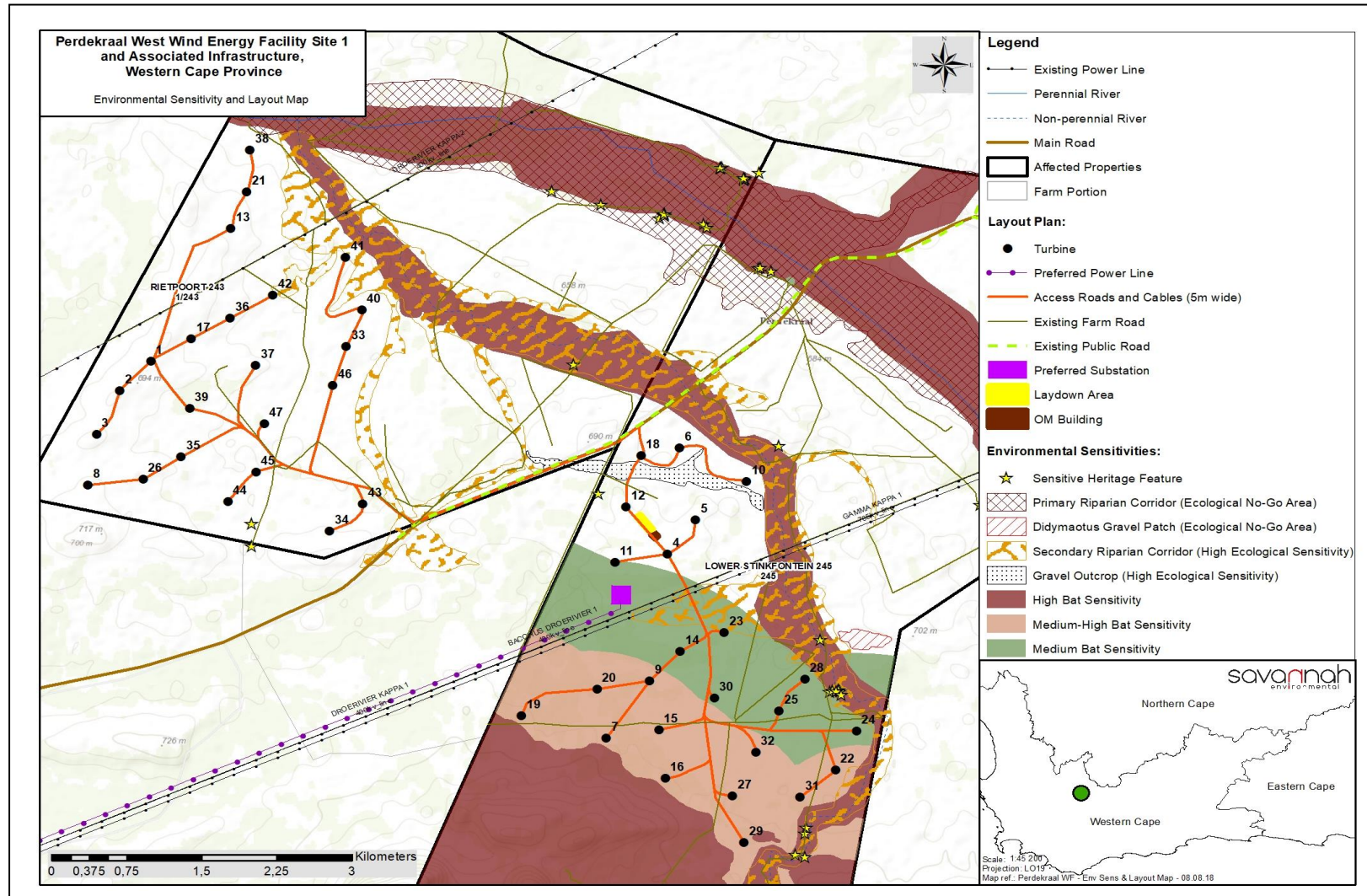


Figure 9.1: Updated wind farm layout⁷ with specialist environmental sensitivities (A3 Map included in **Appendix H**).

⁷ The power line and substation information provided here formed part of a separate environmental assessment process which was approved on 10 August 2016 (DEA Ref: 14/12/16/3/3/1/1550). This is provided for information purposes only as it has already been approved.

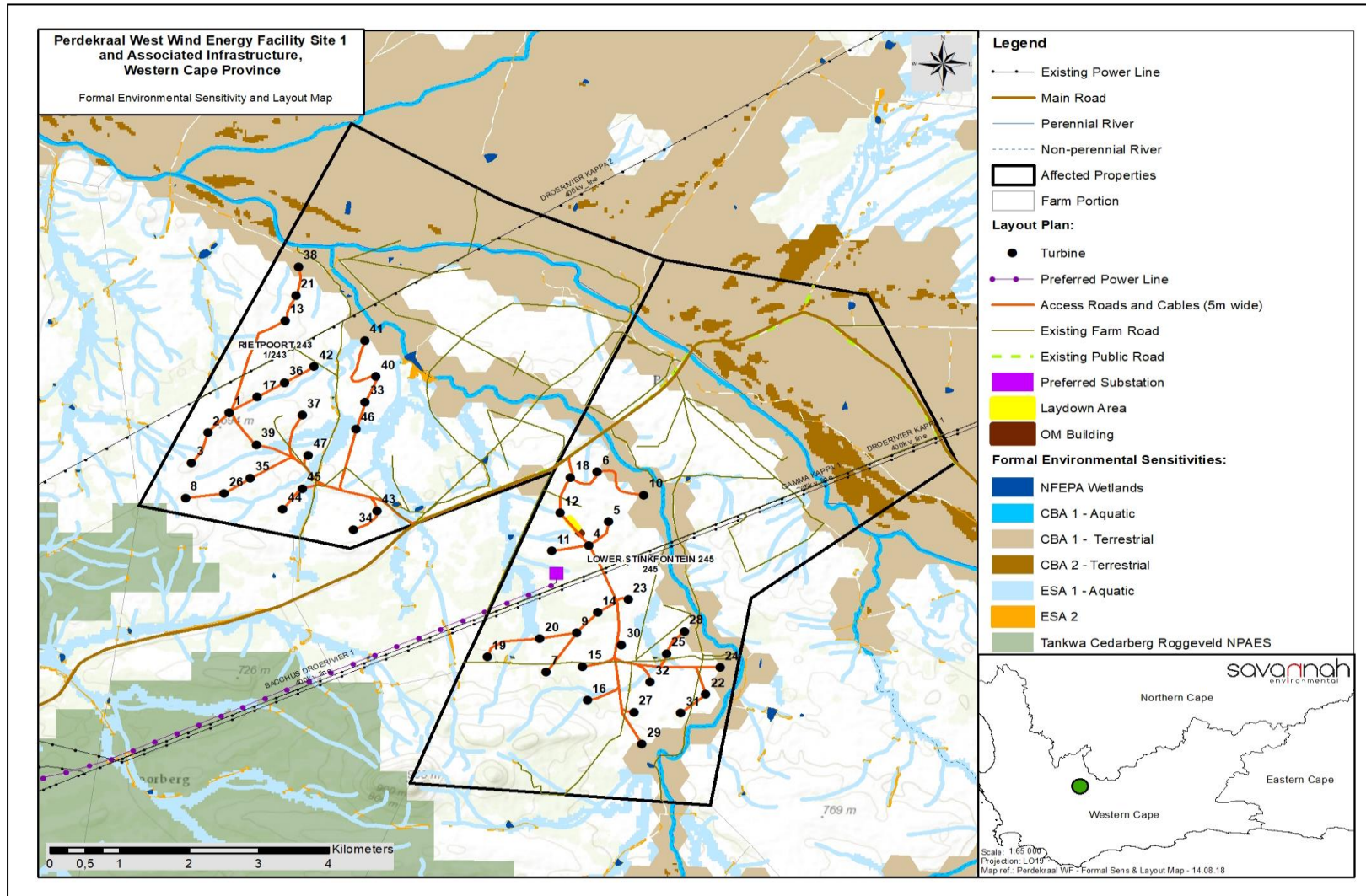


Figure 9.2: Updated wind farm layout⁸ with Formal Environmental Sensitivities (A3 Map included in **Appendix H**).

⁸ The power line and substation information provided here formed part of a separate environmental assessment process which was approved on 10 August 2016 (DEA Ref: 14/12/16/3/3/1/1550). This is provided for information purposes only as it has already been approved.

**APPENDIX A:
AVIFAUNAL SPECIALIST REPORT**

**APPENDIX B:
BAT SPECIALIST REPORT**

**APPENDIX C:
ECOLOGY SPECIALIST REPORT**

**APPENDIX D:
HERITAGE SPECIALIST REPORT**

**APPENDIX E:
VISUAL SPECIALIST REPORT**

**APPENDIX F:
NOISE SPECIALIST REPORT**

**APPENDIX G:
PUBLIC PARTICIPATION DOCUMENTATION**

APPENDIX H:
A3 MAPS