MAINSTREAM RENEWABLE POWER

Amendment Report for the Application of a Substantive Amendment to the Environmental Authorisation issued for the development of the 140 MW Rietrug Wind Energy Facility, Sutherland, Northern Cape Province

Rietrug FINAL AMENDMENT REPORT

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DEA Ref Number: 12/12/20/1782/1/AM3

November 2019

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REPORT DETAILS

Title:	**Amendment Report for the Application of a Substantive Amendment to the Environmental Authorisation issued for the development of the 140 MW Rietrug Wind Energy Facility, Sutherland, Northern Cape Province – FINAL AMENDMENT REPORT**
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Date:	November 2019

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1. INTRODUCTION

1.1 General overview

South Africa Mainstream Renewable Power Developments (Pty) Ltd (hereafter referred to as "Mainstream") received Environmental Authorisation, dated 22 February 2012, from the National Department of Environmental Affairs (DEA) to construct and operate the Sutherland Renewable Energy Facility (REF) with a collective generation capacity (wind and solar) of 747 MW (DEA Reference: 12/12/20/1782). On the 6 October 2015, DEA approved an amendment process to extend the validity of the Environmental Authorisation, the holder of the Environmental Authorisation, change in land portion names, exclusion of land portions, inclusion of listed activities and change in project name to extend the megawatt range from 747 to 1137 (DEA Reference: 12/12/20/1782/AM1).

Amendment 1

As stated above, the Environmental Authorisation authorised Mainstream to develop a 747 MW to 1137 MW REF which included authorisation to construct 325 turbines on site. Subsequent to the receiving Environmental Authorisation to develop the REF, Mainstream applied for an amendment to the Environmental Authorisation in order to split the Environmental Authorisation into three separate projects as indicated below. Mainstream received three Environmental Authorisations, dated 10 November 2016, and an amended Environmental Authorisation to rectify administrative errors, dated 25 November 2016, each authorising the construction of a WEF with a generation capacity of 140 MW. The three WEF projects are known as the:

1) **Rietrug WEF (DEA Ref number: 12/12/20/1782/1 and 12/12/20/1782/1/AM1/AM2) (subject of this Amendment Report);**
2) Sutherland WEF (DEA Ref number: 12/12/20/1782/2 and 12/12/20/1782/2/AM1/AM2); and
3) Sutherland 2 WEF (DEA Ref number: 12/12/20/1782/3 and 12/12/20/1782/3/AM1/AM2).

Amendment 2

As part of the approved WEFs, each Environmental Authorisation authorised the construction of a WEF consisting of wind turbines with a 120 m hub height and 120 m rotor diameter. Subsequently, Mainstream submitted a second amendment application to change the turbine specifications i.e. increase the hub height from 120 m up to 150 m and the rotor diameter from 120 m to up to 150 m. It should be noted that although the hub height and rotor diameter have increased, the turbine layout remains unchanged. Thereafter, in May 2017, the Amendment Reports were submitted to the DEA for consideration and decision-making in terms of Regulation 33 of the 2014 NEMA EIA Regulations (as amended). The amendments received Environmental Authorisations in August 2017 (DEA reference numbers: EAs for the Rietrug, Sutherland and Sutherland 2 WEFs (DEA Reference Numbers: 12/12/20/1782/1/AM2; 12/12/20/1782/2/AM2; and 12/12/20/1782/3/AM2, respectively).

Amendment 3: Current proposed amendment application

The wind turbines available on the market are constantly improving. As new technology becomes available the turbine specifications often change. These modifications mean that what is perceived as the optimal wind turbine option can change due to improved technology since the original approved Environmental Authorisation.

As part of this amendment application, Mainstream proposes the following amendments to the turbine specifications:

Aspect to be amended	Previously assessed and authorised	Current proposed amendment
Hub height	**Up to 150 m**	**Up to 200 m**
Rotor diameter	**Up to 150 m**	**Up to 200 m**

This amendment report has been compiled to assess the potential impacts of the wind turbine specifications of the Rietrug WEF may have on the receiving environment. The content of the report has been based on the impact assessment included within the original EIA process undertaken in 2011 (ERM, 2011) (see Appendix A), the amendment processes undertaken in 2016 (CSIR, 2016) and 2017 (CSIR, 2017) and comparing it to the potential impacts that may be anticipated, based on specialist inputs received for this Amendment Application, should these amendments be approved.

Specialists, where relevant, have been asked to re-evaluate the findings of their original reports based on the proposed new turbine specifications. **It should be noted that the larger turbine specifications have reduced the number of wind turbines required from 56 to 36. Furthermore, it should be noted that although the number of turbines has decreased, the turbine layout remains the same, with the exception of 3 turbines which were removed to avoid environmental sensitive areas** (**Figure 1**). The proposed amendments are deemed substantive as per Regulation 31 (Part 2) of the 2014 NEMA EIA Regulations, as amended, i.e. a change in scope occurred resulting in increased level or nature of impact**.**

In addition to the amendments to the turbine specifications noted above, Mainstream is also requesting an amendment to the contact details of the holder of the Environmental Authorisation. This is discussed in more detail in section 3.2.

The Council for Scientific and Industrial Research (CSIR) has been appointed by Mainstream to manage the current amendment process for the Rietrug WEF. An application for amendment has been submitted to the Department of Environment, Forestry and Fisheries (DEFF) (previously operating as DEA) and the Rietrug WEF received the following reference number: 12/12/20/1782/1/AM3.

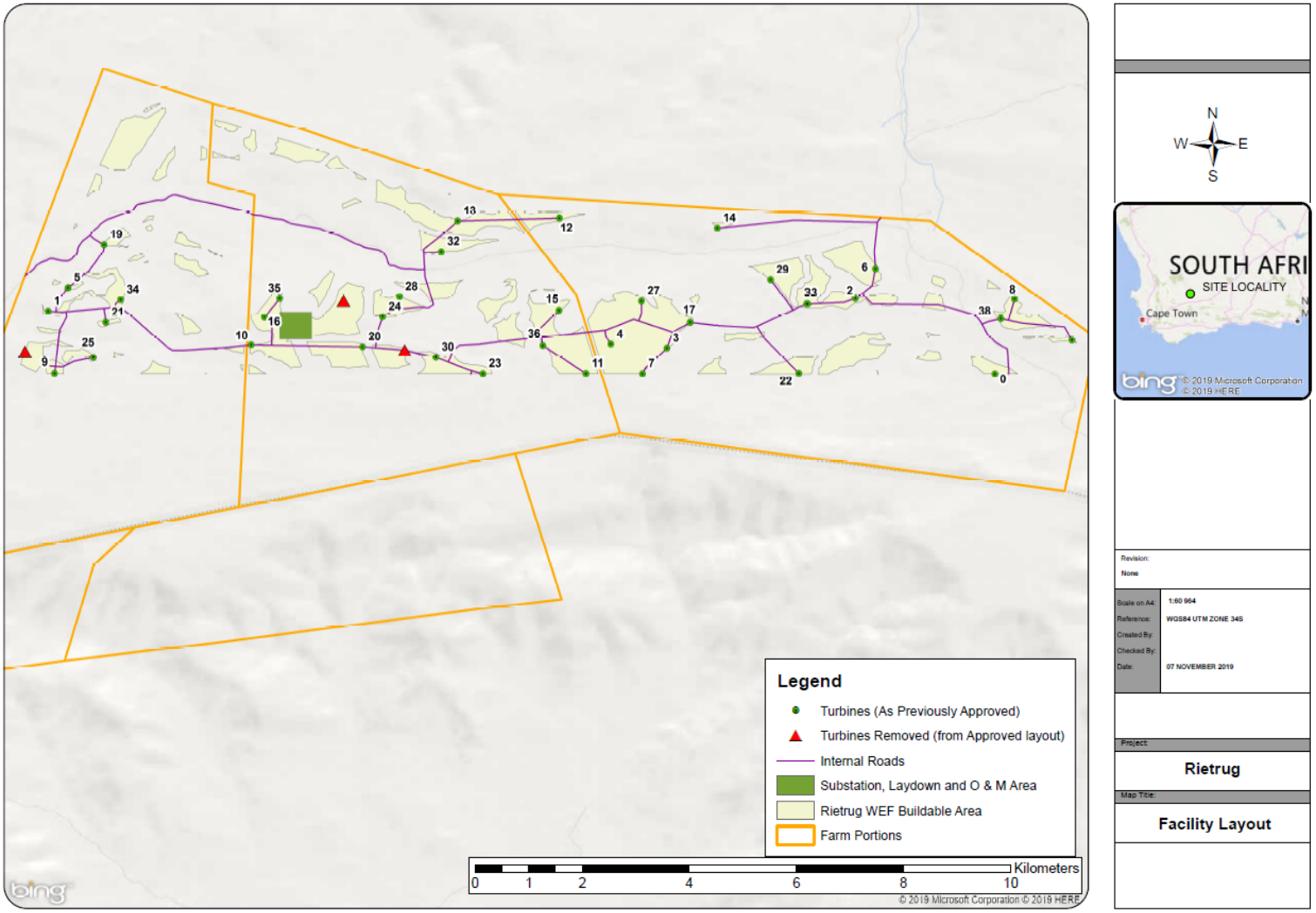

Figure 1: Locality map illustrating the authorised turbine layout overlaid with the proposed turbine layout for the Rietrug WEF

2. LEGISLATIVE REQUIREMENTS

2.1 Amendment process requirements

In terms of Regulation 31 and 32 of the 2014 National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations, as amended by 2018, Mainstream wishes to apply for a substantive amendment to the Environmental Authorisation issued. Regulation 31 (Part 2) of the 2014 NEMA EIA Regulations, as amended, states that:

"An environmental authorisation may be amended by following the process prescribed in this Part if the amendment will result in a change to the scope of a valid environmental authorisation where such change will 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 environmental authorisation; and the change does not, on its own, constitute a listed or specified activity."***

As per sub-regulation (a) the proposed amendment to the hub height and rotor diameter (i.e. from 150 m to up to 200 m) were not considered as part of the initial EIA process or the subsequent amendment processes undertaken by CSIR (2016 & 2017), therefore these (potential) impacts associated with the current proposed amendments need to be assessed according to the change in level or nature of impact.

2.2 Public Participation Process

Regulation 32 (1) of the 2014 NEMA EIA Regulations, as amended by 2018, state that:

"The applicant must within 90 days of receipt by the competent authority of the application made in terms of regulation 31, submit to the competent authority –

(a) a report, reflecting-
  (i) an assessment of all impacts related to the proposed change;
  (ii) advantages and disadvantages associated with the proposed change;
  (iii) measures to ensure avoidance, management and mitigation of impacts associated with such proposed change; and
  (iv) any changes to the EMPr.

which report-

(aa) had been subjected to a public participation process, which had been agreed to by the competent authority, and which was appropriate to bring the proposed change to the attention of potential and registered interested and affected parties, including organs of state, which have jurisdiction in respect of any aspect of the relevant activity, and the competent authority, and

(bb) reflects the incorporation of comments received, including any comments of the competent authority."

All potential I&APs have been notified of the release of the Draft Amendment Report for a 30-day commenting period (i.e. 4 October 2019 – 4 November 2019) via the following means:

Newspaper Advertisement:

In order to notify and inform the public of the proposed amendment process and invite I&APs to register on the project database and to comment on the Draft Amendment Report, the release of the Draft Amendment Report was advertised in two provincial newspapers (Cape Times and Die Burger) and one local newspaper(Noordwester). Afrikaans advertisements were placed in the Noordwester and Die Burger, whilst an English advertisement was placed in the Cape Times. The newspaper advertisements provided the details of the project and project website (i.e. https://www.csir.co.za/environmental-impact-assessment), as an indication of where information available on the project can be downloaded from. Proof of placement of the newspaper advertisements is included in Appendix B.1 of this Final Amendment Report.

Site Notice Boards:

Regulation 41 (2) (a) of the 2014 NEMA EIA Regulations (as amended) requires that a notice board providing information on the project and amendment process is fixed at a place that is conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of the site where the application will be undertaken or any alternative site. To this end, notice boards were placed at the locations shown in Table 1. A copy of the notice boards and photos taken as proof of placement thereof are included in Appendix B.2 of this Final Amendment Report.

Table 1: Site Notice Boards Placed for the Commencement of the Amendment Process

Location	Co-ordinates	Language
Sutherland Wind Energy Facility (Entrance)	32°36'33.38''S; 20°56'36.70"E	Afrikaans and English
Rietrug Wind Energy Facility (Entrance)	32°36'09.74''S; 21°00'36.51"E	Afrikaans and English
Sutherland 2 Wind Energy Facility (Entrance)	32036'09.74''S 21000'36.51"E	Afrikaans and English
Laingsburg Local Municipality Office, Western Cape (Municipal Notice Board at the Entrance)	33°11'51.00''S; 20°51'30.00"E	Afrikaans and English
Beaufort West Local Municipality Office & Public Library (Municipal Notice Board)	32°40'16.00''S; 21°30'49.00"E	Afrikaans and English
Muller General Dealer on Voortrekker Street, Merweville (Shop Entrance)	32°40'04.00''S; 21°30'54.00"E	Afrikaans and English
Sutherland OK Bazaar Mini Market	32°23'31.35''S; 20°39'44.19"E	Afrikaans and English
Karoo Hoogland Local Municipality, Sutherland, Northern Cape	32°23'35.11''S; 20°39'41.70"E	Afrikaans and English

Letter 1 to I&APs to Inform I&APs of the Amendment Process and availability of the Draft Amendment Report for comment

Written notification to inform I&APs of the current Amendment application and to inform them of the availability of the Draft Amendment Report for comment was sent to all I&APs and Organs of State registered on the project database via Letter 1 via email on 3 October 2019. The letter included notification of the proposed amendments and of the 30-day commenting period for the Draft Amendment Report, and a Comment and Registration Form was attached to the letter. Hard copies of the Draft Amendment report and electronic copies (USB) were sent via courier to the DEFF (Integrated Environmental Authorisations), the Department of Environmental Affairs (Biodiversity Conservation), and the Northern Cape Department of Environment and Nature Conservation (DENC). Hard copies were also sent via courier to the Laingsburg, Sutherland and Merweville Public Libraries. Electronic copies of the report were couriered to the Karoo Hoogland and the Laingsburg local municipalities as well as the Namakwa and Central Karoo District Municipalities. Electronic copies of the report were also couriered to the Department of Water and

Sanitation (DWS, based in Bellville), the Northern Cape DWS, the Northern Cape Department of Agriculture, the Northern Cape Department of Transport and Public Works as well as the SKA office. Proof of courier waybills and proof of the emails sent are included in Appendix B.5 of the Final Amendment Report. Copies of the comments received are included in Appendix B.6 of the Final Amendment Report.

Availability of information

The Draft Amendment Report was made available and distributed to ensure access to information on the project and to communicate the outcome of specialist studies. Copies of the report were placed at the Sutherland, Laingsburg and Merweville local libraries for I&APs and stakeholders to access for viewing. Key authorities were provided with either a hard copy and/or USB of the Amendment Report via courier as noted above. The Draft Amendment Report was uploaded to the project website (i.e. https://www.csir.co.za/environmental-impact-assessment).

Compilation of the Final Amendment Report for submission to DEFF

Following the 30-day commenting period of the Draft Amendment Report the comments received have been incorporated into the Final Amendment report. The comments are recorded in the Comments and responses trail (Appendix 7). Copies of the comments received are included in Appendix 6. A Hard copy and two electronic copies (USBs) will be submitted to the DEFF in line with Regulation 19 (1) (a) of the 2014 NEMA EIA Regulations (as amended) for decision-making. In line with best practice, I&APs on the project database will be notified via email of the submission of the Final Amendment Report to the DEFF for decision-making.

To ensure ongoing access to information, a copy of the Final Amendment Report will be placed on the project website (i.e. https://www.csir.co.za/environmental-impact-assessment).

Environmental decision-making

Subsequent to the decision-making phase, all registered I&APs, Organs of State and stakeholders on the project database will receive notification of the issuing of the decision on the amendment application and the appeal period. The 2014 NEMA EIA Regulations (as amended) [i.e. Regulation 4 (1)] states that after the Competent Authority has a reached a decision, it must inform the applicant of the decision, in writing, within 5 days of such decision. Regulation 4 (2) of the 2014 NEMA EIA Regulations, as amended, stipulates that I&APs need to be informed of the decision and associated appeal period within 14 days of the date of the decision. All registered I&APs will be informed of the outcome of the amendment application and the appeal procedure and its respective timelines. A letter (i.e. Letter 2) will also be sent via email to all registered I&APs, Stakeholders and Organs of State (where postal, physical and email addresses are available) on the database. The letter will include a copy of the Decision and information on the appeal process.

3. APPROVED RIETRUG WEF AND AMENDMENT PROCESS

3.1 Approved Rietrug WEF

Mainstream received Environmental Authorisation (DEA Ref number: 12/12/20/1782/1, 12/12/20/1782/1/AM1 and 12/12/20/1782/1/AM2) from the DEA to construct the Rietrug WEF in the Karoo Hoogland Municipality and the Namakwa District Municipality, Northern Cape Province. The proposed facility is approximately 23 km south of Sutherland and 50 km north of Laingsburg. The proposed Rietrug WEF is located on the farm portions shown in Figure 2 (the farm portions are the same as the ones included in the previous Amendment Application):

- Portion 1 of Beeren Valley Farm 150;
- Remaining Extent of Beeren Valley Farm 150; and
- Remaining Extent of Nooitgedacht Farm 148.

The key components of the **authorised Rietrug WEF** include, *inter alia*, the following:

- 56 wind turbines with a hub height of 150 m and a rotor diameter of 150 m;
- Internal and external electrical connections;
- 15 m wide access roads that are 8 km in length; and
- Additional infrastructure (including a lay down area, a temporary site compound area for contractors and a borrow pit).

The following proposed amendments are currently being applied for and assessed in the Amendment Report are provided in the subsequent sections:

3.1.1 Proposed amendments

AMENDMENT 1: AMENDMENTS TO AUTHORISED TURBINE DIMENSIONS

Mainstream wishes to apply for an increase from the authorised 150 m hub height and rotor diameter to **200 m hub height and rotor diameter**. The table below outlines the authorised project components and the specifications that the holder wishes to amend (the requested amendments are **highlighted in bold and yellow).**

Component	Description/Dimensions Authorised within the Environmental Authorisation	Description/Dimensions Proposed amendments to the Environmental Authorisation
Number of turbines	56	**Up to 36**
Hug height from ground level	150 m	**Up to 200 m**
Rotor diameter	150 m	**Up to 200 m**

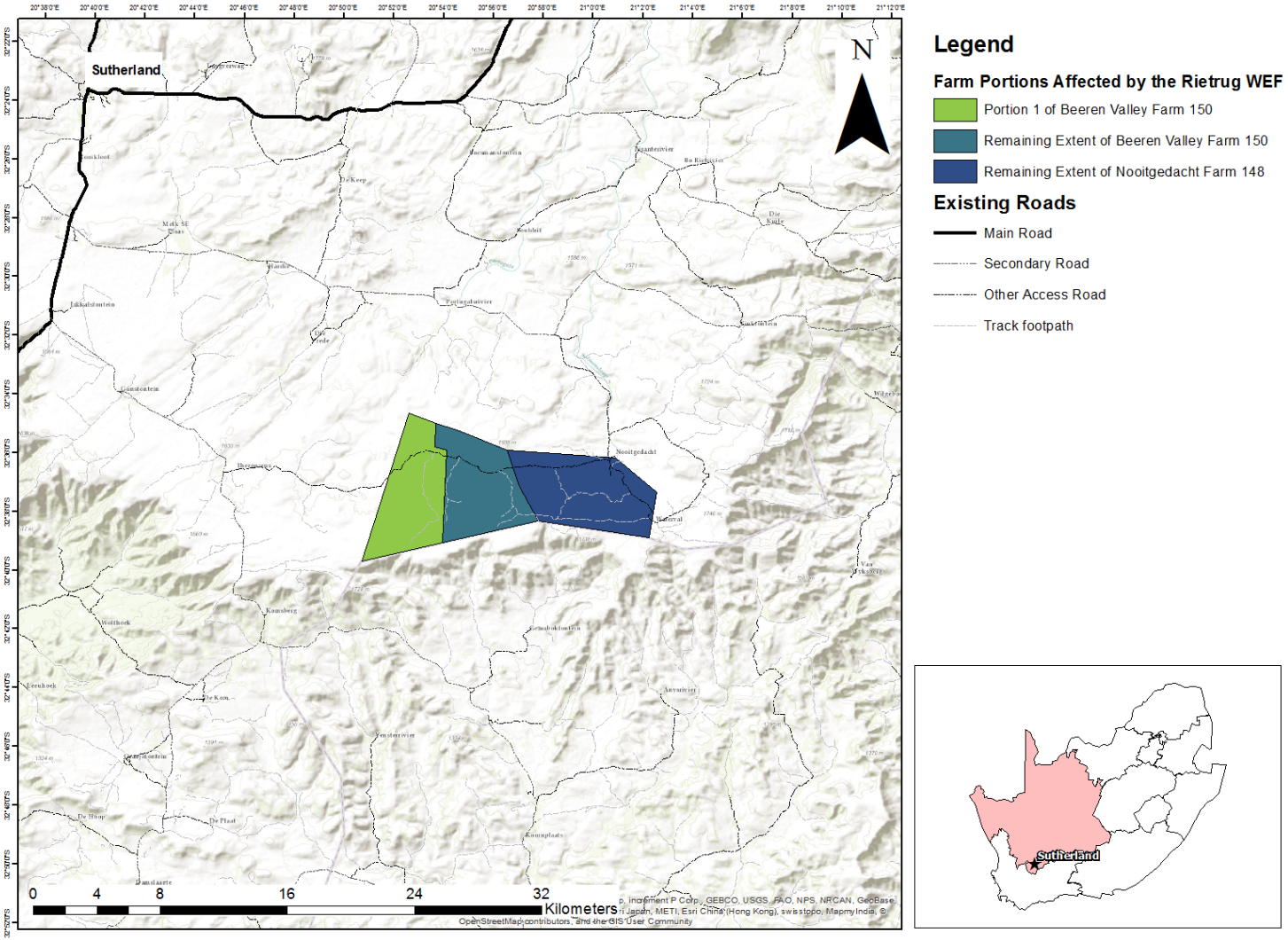

Figure 2: Map illustrating the affected land parcels for the proposed Rietrug WEF

AMENDMENT 2: AMENDMENT TO CONTACT DETAILS FOR THE HOLDER OF THE ENVIRONMENTAL AUTHORISATION

Due to the fact that the holder of the Environmental Authorisation is no longer employed by Mainstream, the name of the holder and the relevant contact details as described on page 2 of the Environmental Authorisation should be amended (as indicated in bold and yellow):

Existing contact details of holder of the Environmental Authorisation	**Proposed changes to contact details of holder of the Environmental Authorisation**
South Africa Mainstream Renewable Power Developments (Pty) Ltd	South Africa Mainstream Renewable Power Developments (Pty) Ltd
Mr Michael Mangnall	**Mr Eugene Marais**
PO Box 45063	PO Box 45063
CLAREMONT	CLAREMONT
7735	7735
Telephone Number: (021) 657 4052	Telephone Number: **(021) 657 4040**
Fax number: (021) 671 5665	Fax number: (021) 671 5665
Email address: Mike.mangnall@mainstreamrp.com	Email address: **Eugene.marais@mainstreamrp.com**

3.1.2 Motivation for proposed amendments

AMENDMENT 1: AMENDMENTS TO AUTHORISED TURBINE DIMENSIONS

1. **Improved technology certified and available subsequent to the original Environmental Authorisation**

The technology behind all renewable energies is currently advancing at a feverish pace and new developments are being brought to the market place at very short intervals. Thus, the wind turbine technology has moved along since the undertaking of the EIA for the Rietrug WEF and new and improved models are available that the applicant would like to consider as this stands to optimise the project.

2. **Better fit for purpose technology is available today to suit the wind resource of the site**

More modern turbines models are more efficient, and some are better suited to the local wind conditions on the site. Being in a position where these turbines can be considered will allow for the optimisation of the project driving improved overall efficiency.

3. **Larger Wind Turbine Generators require fewer turbines**

Larger turbines have larger generators per turbine. Larger generators result in fewer turbines which can increase the efficiency, energy production and profitability of the overall project. Having fewer turbines on site will lead to a smaller footprint which can also have environmental benefits.

4. **Market supply constraints for certain turbines including older technology**

Due to current considerable demand for wind energy across the world the demand for wind turbines is outstripping supply of certain manufacturers and thus waiting times have increased to the degree that projects are having to consider alternative models if their projects are to be implemented timeously.

In summary, the applicant (Mainstream) would like to increase the wind turbine envelope to allow them to consider a broader range of manufacturers and wind turbine models which can enhance the environmental, technical and financial feasibility / performance of the project and avoid potential implementation delays.

The turbine technology available for the authorised specifications, i.e. a 150 m hub height and 150 m rotor diameter, is no longer the preferred wind turbine technology since there are more efficient turbines available on the market (i.e. more megawatt output per turbine). Mainstream therefore wishes to amend the authorised turbine specifications **up to 200 m hub height and 200 m rotor diameter,** which is aligned with the preferred turbine technology currently available on the market. The increased wind turbine specifications have resulted in a decrease in the number of wind turbines required from 56 to **36**. However, it should be noted that the layout of the wind turbine remains unchanged i.e. the layout remains the same only the number of turbines is reduced.

5. Environmental Sensitivity

The authorised turbine layout and associated road network that was included in the Amendment Assessment Report (CSIR, 2017) are shown in Figure 3. This map considers the various environmentally sensitive features that were considered as part of the original EIA (2011), the amendment process (2016) and also the buildable area that was determined based on these sensitivities. The buildable area is effectively the 'development envelope' for this development whereby no turbines may be placed outside the boundary of the buildable area. The amended layout avoids all sensitive features that were identified on site and occur within the buildable area that was determined.

AMENDMENT 2: AMENDMENT TO CONTACT DETAILS FOR THE HOLDER OF THE ENVIRONMENTAL AUTHORISATION

The current contact person for the Environmental Authorisation, Mr Michael Mangnall, is no longer employed by Mainstream. Mr Eugene Marais is now acting as the contact / responsible person for the Environmental Authorisation. Accordingly, it is requested that the name and contact details for the holder of the Environmental Authorisation be amended, to ensure that the Department's records are correct, and to ensure that Mainstream receives all relevant Departmental communications. A written undertaking that Mr Eugene Marais is willing and able to assume responsibility of the Environmental Authorisation issued, and a company resolution authorising Mr Eugene Marais to act on behalf of Mainstream is included in Appendix 7 of the Application form that was submitted to DEFF.

It is noted that the holder of the Environmental Authorisation, South Africa Mainstream Renewable Power Developments (Pty) Ltd), remains unchanged, it is simply the contact person and contact details for the holder that are requested to be amended.

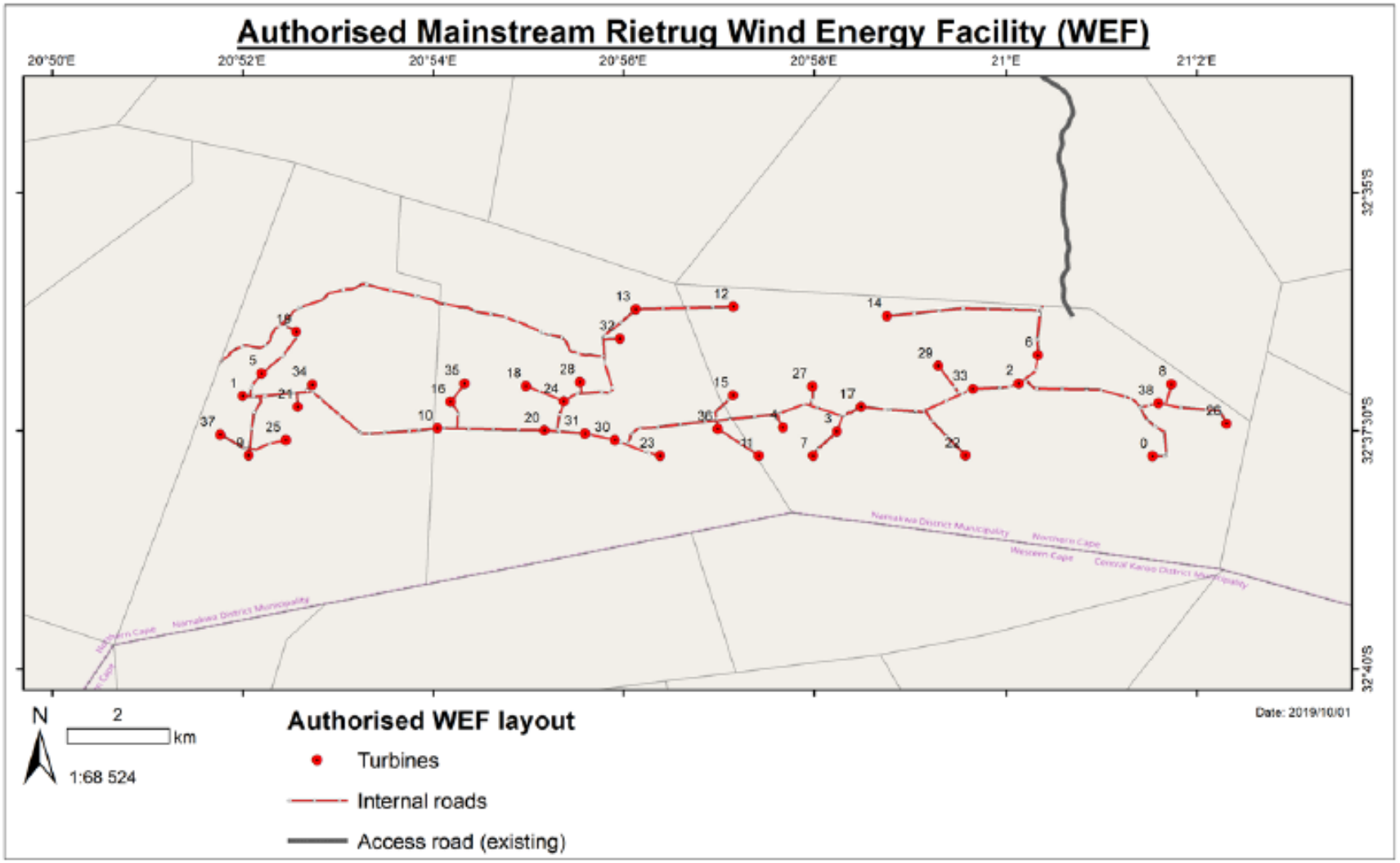

Figure 3: Approved layout as per the 2016 Environmental Authorisation

4. IMPACT ASSESSMENT OF THE PROPOSED AMENDMENTS

4.1 Summary of impact assessment previously undertaken

The EIA undertaken by ERM in 2011 assessed the impact of developing the Sutherland REF (ERM, 2011). The methodology used for this impact assessment as well as the impact assessment are included in Appendix A of this report. As previously noted, the Sutherland REF was a large development which proposed, *inter alia*, the construction of 325 wind turbines and included the development of a solar energy facility. A summary of the significance of impacts before and after mitigation (residual impact significance) is provided in Table 2. For the amendment process undertaken by CSIR in 2016, the assessment concluded that the split of the REF into three WEFs will most likely result in an overall lower negative impact significance than what was determined during the original EIA process (CSIR, 2016). Nonetheless, the amendment's assessment found that based on the worst case scenario and the precautionary approach, the significance of the impacts identified within the original EIA process were still valid and no changes were made.

For the second amendment process undertaken by CSIR in 2017, the assessment concluded that based on the information available to the Environmental Assessment Practitioner (EAP) and the specialist input received it was clear that no additional impacts were anticipated due to the increase in turbine height and rotor diameter (i.e. from 120 m to 150 m) (CSIR, 2017). The assessment of the second Amendment Application resulted in the same findings of the original EIA as shown in Table 2.

Table 2. Summary of pre-mitigation and residual impacts during the construction and operational phases in the initial EIA (ERM, 2011) as well as in the previous amendment processes (CSIR, 2016 & 2017)

PHASE	PRE-MITIGATION SIGNIFICANCE	RESIDUAL IMPACT SIGNIFICANCE
Terrestrial ecology (Loss of vegetation)		
Construction phase	High	Medium
Operational phase	Low	Low
Terrestrial ecology (Impact on fauna)		
Construction phase	High	Medium
Operational phase	High-medium	Medium-low
Avifaunal (Birds)		
Construction phase	High-medium	Medium
Operational phase	High-medium	Medium
Bats		
Construction phase	Low	Low
Operational phase	Low	Low

Noise		
Construction phase	Medium	Low-Medium
Operational phase	Medium	Low
Visual		
Operational phase	High	Medium-high
Heritage		
Construction phase	High	Low
Operational phase	Medium	Medium

4.2 Specialist input of the current proposed amendments

Specialists have been appointed to assess the amendments currently proposed for the Rietrug WEF. The appointed specialists are detailed in Table 3 below. The specialists were requested to confirm whether the original assessment ratings and management actions contained in the original EIA (ERM, 2011) and the Amendment Reports (CSIR, 2016 & 2017) remain unchanged, or whether these are positively or negatively impacted upon by the proposed amendments. This section summarises the findings of the specialists. The full specialist input letters/reports are available in Appendix C.

Table 3. Appointed specialists for the assessment of the current proposed amendments

SPECIALIST	CONSULTANCY	FIELD OF STUDY	INPUT PROVIDED
Simon Bundy	ECOCOAST	Terrestrial Ecology	Ecology impacts (Section 4.3)
Chris van Rooyen & Albert Froneman	Chris van Rooyen Consulting	Avifauna (Birds)	Avifaunal impacts (Section 4.4)
Monika Moir & Stephanie Dippenaar	Stephanie Dippenaar Consulting*	Bats	Bat impacts (Section 4.5)
Morne de Jager	Enviro Acoustic Research cc (EAR)	Noise	Noise impacts (Section 4.6)
Quinton Lawson & Bernard Oberholzer	QARC BOLA	Visual	Visual impacts (Section 4.7)
Dr Jayson Orton	ASHA Consulting	Heritage	Heritage impacts (Section 4.8)

Note: The initial Bat Impact Assessment was undertaken by David Jacobs (Specialist Reports on Bats – Proposed Renewable Facility at Sutherland (July 2010)) and Animalia Consultants (Pty) Ltd (Fifth and Final Progress Report of a 12-month Long-Term Bat Monitoring Study (January 2017)). Animalia did not undertake any more Bat Assessments at the time when the specialists were contacted to provide inputs for the amendment process. Hence, Stephanie Dippenaar Consulting has been appointed to undertake the bat assessment for this amendment application.

4.3 Terrestrial ecology

Mr Simon Bundy of Ecocoast was requested to provide an assessment of the proposed amendments to turbine specifications to determine if the proposed amendments will affect the assessment ratings previously provided by Mr Bundy in the Terrestrial Ecology assessment (Bundy, 2016) for the second Amendment application.

4.3.1 Receiving environment

The three WEFs, of which the Rietrug WEF is one of the three, fall within a region that is considered to lie abreast of an arid and hot environment and a warm temperate, dry and a warm summer environment. In addition, the region may also be described as being of rugged to undulating topography, with the WEFs lying adjacent to the central Great Escarpment (Figure 4). A combination of topographic and meteorological factors within this region gives rise to a number of climatic extremes. Such extremes, which include periods of extreme cold, as well as reduced edaphic structure, may be construed to be the effective drivers of the prevailing ecology. Vegetation in the region, is tolerant of extremely low temperatures (accounting for the prevalence of geophytes and annuals), while fauna within the region are able to migrate from points within the region or enter torpor in order to survive the lower temperature extremes.

Given the above habitat, it is evident that the meteorology of the area may be considered to be the prevailing ecological driver within the region. Other drivers may include “fire” and intensive browsing, with the latter being subject to more intensive “grazing” as livestock dominate within the area (Bundy, 2017).

Figure 4: Image depicting nature of habitat along the escarpment (SDP, 2017)

It is evident that the authorised Sutherland REF (ERM, 2011) considered the impact of turbines on the prevailing environment through specific ecological assessments, and that the placement of turbines

across the study area was based on such evaluations. Eugster (undated) identified that wind may influence eco-systems through two specific means, namely:

1. The 'effect of the vegetation surface on the wind, how it lowers wind speed near the ground, shelters niches from strong winds where small animals and plants can establish and live'; and
2. The effect that wind and turbulence may exert on many aspects of animal behaviour, plant growth and survival, and the overall metabolisms of organisms.

With reference to Point 1, it is evident that wind directions and force effectively give rise to a broader state and composition within an environment, which in turn drives habitat and faunal behaviour within that habitat. In the case of the latter the effects of wind may influence the physiology of some endemic species (particularly invertebrates), while in the interaction of animal species with the prevailing vegetation may be associated with the prevalence of winds and wind directions. As such, it is evident that the prevailing wind regime in a given area, significantly influences the nature and structure of vegetated habitats and influences directly and indirectly faunal behaviour in these habitats. It follows that any change in the wind regime, will result in some level of ecological change within an eco-system. Although not specifically subject to research, the influence of WEFs, with the removal of wind energy from the prevailing environment, is likely to see some minor, if not latent change in the ecology of those areas immediately to the lee of such facilities.

In addition to the above, it is generally understood that there is low level noise emanating from wind turbines. Such noise may influence animal physiology and behaviour, altering ecological states around turbines. Baldwin (2007) recorded the impact of continuous noise on rodent physiology and identified a significant alteration in laboratory animals, while Koper *et al.* (2012) identified that behavioural responses in fauna from noise pollution can be divided into the modification of vocal behaviour and displacement from important habitats.

Given the broad comments above, the following statements may be made in respect of the ecological impact of the changes proposed:

1. The authorized WEFs have evidently identified that impacts of the turbines on the local ecosystem(s) are not considered to be significant.
2. The reduction in the number of turbines will result in an evident reduction in the number of structures affecting the leeward wind regime (this was considered as part of the amendment 1 process, undertaken by CSIR in 2016).
3. An increase in the rotor diameter is expected to alter the wind regime at a localised level around the remaining, individual turbines (this statement is applicable to the amendment 2 and 3 processes, the latter currently under consideration).

Given the above, the section below provides an overview of the impacts that may arise from the proposed changes to the specifications of the wind turbines (i.e. an increase in the hub height and rotor diameter from 150 m to 200 m) and the assessment of the potential impacts.

4.3.2 Findings from the previous assessments

The EIA undertaken in 2011 evidently identified that impacts associated with the construction and operation of wind turbines on the local ecosystem(s) are considered to not be significant as indicated in Table 4. Table 4 provides a summary of the impact assessment for the loss of natural vegetation prior to

and after mitigation. This assessment rating was confirmed for this amendment by Mr Simon Bundy of Ecocoast (who also provided inputs for the previous amendments undertaken by CSIR (2016 and 2017).

Table 4. Impact assessment: terrestrial ecology (botany) (ERM, 2011)

Phase	Impact	Pre-mitigation significance	Residual impact significance
Construction phase	Loss of natural vegetation	High	Medium
Operational phase	Loss of natural vegetation	Low	Low

A summary of the impact on fauna before and after mitigation is provided in Table 5.

Table 5. Impact assessment: terrestrial ecology (fauna) (ERM, 2011)

Phase	Impact	Pre-mitigation significance	Residual impact significance
Construction phase	Impact on fauna	High	Medium
Operational phase	Impact on fauna	High-medium	Medium-low

4.3.3 Findings from current assessment

The specialist, Mr Simon Bundy of Ecocoast, confirmed in a letter dated 17 September 2019, that the proposed amendments do not result in any change to their impact assessment ratings contained in their report dated December 2016 for the previous amendment application.

4.3.4 Mitigation measures identified for current amendment

- The turbines should not be sited at points below the 1 600 m average mean sea level.
- The final footprint of each turbine, as well as support infrastructure should be subject to specific evaluation.

4.3.5 Conclusions

The proposed amendments are acceptable from a Terrestrial Ecological perspective. The proposed amendment will not result in additional impacts to terrestrial ecology and the assessments ratings contained in the Final EIA Report (ERM, 2011) and the amendment report (CSIR, 2016 and 2017) as shown in Tables 3 and 4 above are still applicable.

4.4 Avifauna (Birds)

Chris van Rooyen Consulting was appointed to undertake a re-assessment of the potential turbine collision impact in light of the proposed amendments to turbine specifications, to establish if the previous Avifaunal Assessment by Jenkins (2011) and Van Rooyen *et al.* (2016) remain the same or should be revised and if the original proposed mitigation measures need to be revised.

The proposed amendments comprise an increase in the maximum rotor diameter to 200 m (previously 150 m) and an increase in the hub height up to 200 m (previously 150 m). The current amendment also comprises a reduction in the number of turbines, i.e. from a maximum of 56 to 36.

4.4.1 Affected environment

The key species which were identified in the original Bird Specialist Study (Jenkins, 2011) and the subsequent pre-construction monitoring as being most at risk were Jackal Buzzard *Buteo rufofuscus*, Verreaux's Eagle *Aquila verreauxii*, and Martial Eagle *Polemaetus bellicosus.*

4.4.2 The relevance of turbine numbers and dimensions in avifaunal mortality risk

Most of the studies to date found turbine dimensions to play a relatively insignificant role in the magnitude of the collision risk relative to other factors such as topography, turbine location, morphology, behaviour and a species' inherent ability to avoid the turbines, and may only be relevant in combination with other factors, particularly wind strength and topography (see Howell 1997, Barrios & Rodriguez 2004, Barclay *et al.* 2007, Krijgsveld *et al*. 2009, Smallwood 2013, and Everaert 2014). Three studies found a correlation between hub height and mortality (De Lucas *et al.* 2008, Loss *et al.* 2013 and Thaxter *et al.* 2017).

In the most recent paper on the subject by Thaxter *et al*. 2017, the authors conducted a systematic literature review of recorded collisions between birds and wind turbines within developed countries. They related collision rate to species-level traits and turbine characteristics to quantify the potential vulnerability of 9 538 bird species globally. For birds, larger turbine capacity (megawatts) increased collision rates; however, deploying a smaller number of large turbines with greater energy output reduced total collision risk per unit energy output. In other words, although there was a positive relationship between wind turbine capacity and collision rate per turbine, the strength of this relationship was insufficient to offset the reduced number of turbines required per unit energy generation with larger turbines. Therefore, to minimize bird collisions, wind farm electricity generation capacity should be met through deploying fewer, large turbines, rather than many, smaller ones. In the current application for amendment the number of turbines has been reduced from 56 to 36.

The rotor diameter of 150 m for the Rietrug WEF translates into a rotor swept area of approximately 17 671 m² per turbine for each of the 56 authorised turbines. An increase of the rotor diameter to 200 m will result in a rotor swept area of approximately 31 415 m². This amounts to an increase of 77.8% in the rotor swept area per turbine.

4.4.3 The findings of the original bird impact assessment report

The original Bird Specialist study (Jenkins, 2011) identified risks (Table 6) of bird collisions with the wind turbines during the operational phase. A summary table of the impact assessment is shown in the table below (Table 6).

Table 6. Impact assessment: avifauna (ERM, 2011)

Phase	Impact	Pre-mitigation significance	Residual impact significance
Operational phase	Collisions of birds with turbines	High-medium	Medium

4.4.4 Re-assessment of collision mortality impact

Given the potential changes to the turbine specifications, a re-assessment of the potential collision impact was undertaken by Chris van Rooyen Consulting. The increase of 77.8 % in rotor swept area per turbine is significant, and unless the number of turbines is reduced, it will inevitably result in an increase in the overall residual collision risk for priority species from "**medium**" to "**high**". However, should the number of turbines be reduced, it will result in the residual collision rating of "medium" remaining unchanged, depending on the extent of the reduction in the number of turbines. The number of turbines for the proposed Rietrug WEF has been reduced from 56 to 36. In order to retain a residual impact significance rating of "medium", additional mitigation measures as proposed in Section 4.4.5 need to be implemented, should the proposed amendment application be approved (Van Rooyen and Froneman, 2019). There were no limitations identified to the proposed assessment.

4.4.5 Cumulative impacts

The cumulative impacts of the proposed WEF was re-assessed, taking into account the proposed amended turbine dimensions. In doing so, the following projects within a 20 km radius around the WEF were considered:

- Sutherland WEF (Applicant - Mainstream)
- Sutherland 2 WEF (Applicant - Mainstream)
- Suurplaat WEF (Applicant – Moyeng Energy)
- Maralla East WEF (Applicant – Mainstream)
- Maralla West WEF (Applicant – Mainstream)
- Hidden Valley WEF (Applicant – Great Karoo Wind Farm)
- Roggeveld WEF (Applicant - Building Energy/G7)
- Roggeveld II WEF (Applicant - Building Energy/G7)
- Komsberg East WEF (Applicant -Komsberg Wind Farms)
- Komsberg West WEF (Applicant -Komsberg Wind Farms)
- Great Karoo WEF (Applicant - ACED/EGP)
- Arusa WEF (Applicant - ACED/EGP)
- Soetwater WEF (Applicant - ACED/EGP)
- Gunstfontein WEF (Applicant – Gunstfontein Wind Farm)

After careful consideration, it was concluded that the original findings on the cumulative impact of the Rietrug WEF remains unaltered, taking into account the proposed amendments. The greatest potential concern is for the large raptor species, particularly Verreaux's Eagle and Martial Eagle, due to their low numbers and vulnerability to turbine collisions. The combined cumulative impact of renewable developments on priority species, and particularly wind energy developments on Red Data Verreaux's Eagle and Martial Eagle within the 20 km radius, is potentially significant at a local or even regional scale, even with the application of mitigation measures such as buffer zones around nests, should all of these projects eventually get to be constructed. The impact should be less severe at a national level, due to the large distribution ranges of the species, but should nonetheless be carefully monitored.

4.4.6 Revised mitigation measures

The mitigation measures originally proposed for the Sutherland WEF by Jenkins (2011) and Van Rooyen *et al.* (2016) need to be revisited in light of two factors:

- The proposed increase in the rotor diameter will result in an increased risk of collisions for priority species; and
- The "Best Practice Guidelines for Avian Monitoring and Impact Mitigation at Proposed Wind Energy Development Sites in Southern Africa", (Jenkins *et al*. 2011) revised in 2015, require that either all, or part of the pre-construction monitoring is repeated if there is a time period of three years or more between the data collection and the construction of the wind farm. This re-assessment is necessary in order to take cognisance of any changes in the environment which may affect the risk to avifauna, and to incorporate the latest available knowledge into the assessment of the risks. In order to give effect to this requirement, nest searches were repeated in June and July 2019 by Chris van Rooyen Consulting to ensure up to date information on the breeding status of priority species at the proposed Rietrug WEF.

Since the original Bird Specialist Studies were completed in 2011 and 2016, the local knowledge with regard to the impacts of wind turbines on avifauna in South Africa has increased significantly with the experienced gained from operational wind farms, see for example (Ralston-Patton *et al.* 2017). This has also resulted in the publication of two new sets of guidelines, one for Cape Vultures (Pfeiffer *et al.* 2018) and one for Verreaux's Eagles (Ralston-Patton, 2017), while work is almost finished on one for Black Harriers. Guidelines for a range of other sensitive species are also planned, including Martial Eagles, as they have proven to be highly vulnerable to wind turbine collisions.

The original Bird Specialist Study (Jenkins, 2011) identified one suspected Verreaux's Eagle nest and recommended a 1.5 km turbine free buffer area around the nest. This study further recommended a 500 m turbine free buffer along the edge of the escarpment and also that one blade of each turbine be painted black in an experimental approach on a sample of high risk turbines to test the efficiency of this mitigation measure. The subsequent pre-construction bird monitoring (Van Rooyen *et al.* 2016) confirmed the presence of two active Verreaux's Eagle nests and recommended 3 km turbine free buffer areas around these in accordance with the BLSA guidelines specific to Verreaux's Eagles (Ralston-Paton, 2017). A 2 km turbine free buffer area was recommended around an inactive Verreaux's Eagle nest. The 500 m no-turbine buffer area along the escarpment was also recommended.

Searches for new raptor nests were repeated during June and July 2019. A new active Verreaux's Eagle nest was located at 32°39'50.76"S, 20°51'16.02"E and an inactive alternate nest of the same pair located at 32°39'43.41"S, 20°51'49.07"E. Although these nests are located further than 3 km away from the current lay-out, a pre-cautionary 3 km no-turbine buffer zone is recommended in case of potential future changes to the layout.

In order to retain a residual impact significance rating of "medium", the following additional mitigation measures need to be implemented, should the proposed amendment application be approved:

- The number of turbines needs to be reduced from the authorised 56 to a maximum of 36 turbines to reduce the collision risk for raptors;
- The 500 m turbine-free buffer zone along the edge of the escarpment should be increased to a minimum of 660 m; and

- A 3 km turbine-free buffer zone must be implemented around each of the two Verreaux's Eagle nests located at 32°39'50.76"S, 20°51'16.02"E and 32°39'43.41"S, 20°51'49.07"E.

The revised mitigation measures are subject to a walk-through by the avifaunal specialist prior to the construction commencing, to confirm the location and status of all priority species nests within the area of influence of the wind farm.

4.4.7 Conclusions

A re-assessment of the potential collision impact to birds was carried out for the proposed amendment. The increase of 77.8% in rotor swept area per turbine is significant, and unless the number of turbines is reduced, it will inevitably result in an increase in the overall residual collision risk for priority species from "medium" to "high". However, should the number of turbines be reduced, it will result in the residual collision rating of "medium" remaining unchanged, depending on the extent of the reduction in the number of turbines.

In order to retain a residual impact significance rating of "medium", additional mitigation measures as outlined in Section 4.4.5 need to be implemented, should the proposed amendment application be approved. The revised mitigation measures are subject to a walk-through by the avifaunal specialist prior to the construction commencing, to confirm the location and status of all priority species nests within the area of influence of the wind farm.

4.5 Bats

Stephanie Dippenaar Consulting was contracted by Mainstream to undertake an assessment of the proposed amendments to the turbine specifications with regard to the potential impacts to bats. An initial bat sensitivity study was conducted in 2010 (Jacobs, 2010) and a 12-month pre-construction monitoring study was carried out over 2015 – 2016 (Marias, 2017).

The purpose and scope of the bat specialist report are to assess whether the proposed amendments to turbine specifications will alter the impacts identified in the two original Bat Impact Assessments mentioned above.

4.5.1 Main negative impacts to bats

The main negative impact of turbines on bats is the encroachment of air space where bats forage or commute. Table 7 and Figure 4 indicate the increase in the volume of the total swept area, if turbine sweep is calculated as a sphere. For example, should 36 turbines be installed, with a hub height of 200 m and a rotor diameter of 200 m, there will be a 52.38 % increase in swept area. The lowest point of the sweep of the turbine blades is also indicated, as this could have an impact on bat mortality (see Literature review in Section 4.1 of the Bat specialist report (Moir & Dippenaar, 2019, included in Appendix C of this report).

Table 7: Changes in area of collision

Aspect to be amended	Previously assessed (56 turbines)	Proposed amendment (36 turbines)	Difference between previously assessed specifications and amendment
Total volume of the sweep of the turbine blades, if calculated as a sphere	0.098957 km^3	0.150792 km^3	0.051845 km^3 more airspace is occupied
Lowest point of the sweep of the turbine blades, from ground level	75 m	100 m	25 m higher from ground level

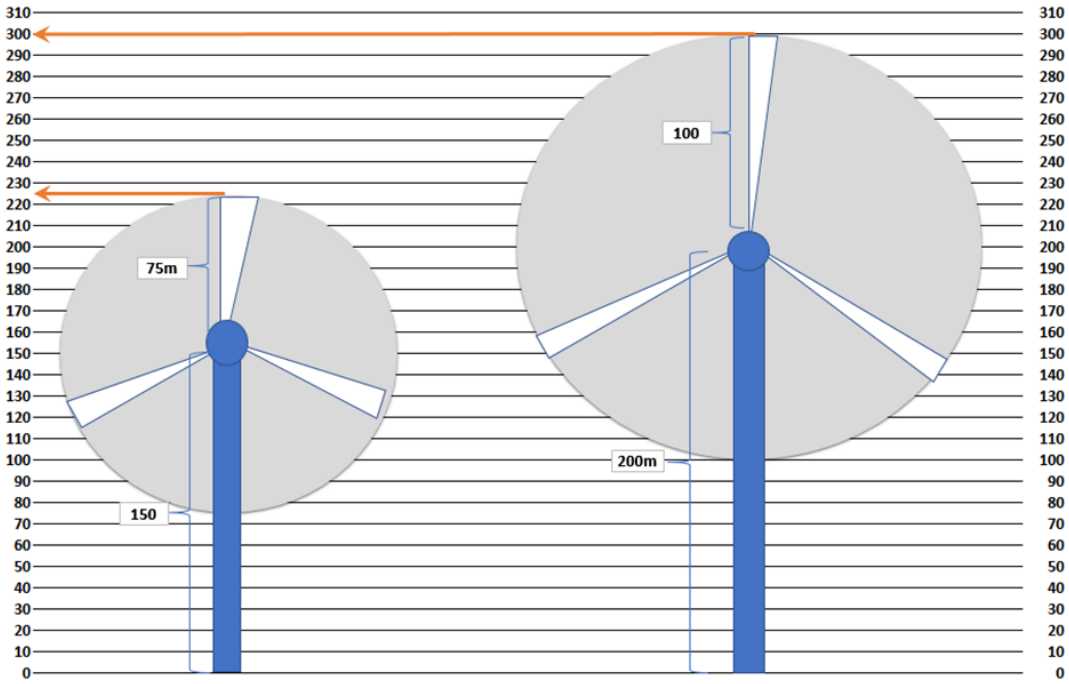

Figure 5: Changes in specifications of turbine dimension

4.5.2 The relevance of turbine numbers and dimensions in bat mortality risk

The proposed increased turbine dimensions result in a larger rotor swept area and greater overall height per turbine. The impact relevant to this amendment is the change in risk of direct collision of bats in flight with moving turbine blades. Two studies by Barclay *et al.* (2007) and Georgiakakis *et al*. (2012) reported a positive exponential relationship of bat mortalities with turbine tower height, with no effect of the size of rotor sweep area (blade diameter). Whereas Rydell *et al*. (2010) found significant positive effects of tower height and rotor swept area with bat mortality. Studies by Johnson *et al*. (2003) and Fiedler *et al.* (2007) corroborated findings of increased mortalities with increased turbine dimensions.

Thaxter *et al.* (2017) undertook the first global quantitative assessment from published literature of the effects of wind farms on bat and bird mortality. They detected a strong positive association between turbine capacity (MW) and collisions per turbine for both bats and birds. Per wind farm energy output, a large number of small turbines resulted in higher predicted mortality rates than fewer larger turbines. The modelled mortality rate was highest when 1000 0.01MW turbines were

used, thereafter the mortality rate decreased exponentially up to 1.2 MW turbines. The mortality for bats then increased again from 14 bats with 1.2 MW turbines, to 24 bats with 2.5 MW turbines. Thus, increasing the turbine dimensions with a reduction in total number of turbines would reduce mortality up to a point (1.2 MW turbines), thereafter mortality would increase with an increase in turbine dimensions.

The other consideration is that a greater turbine hub height increases the height of the lower blade tip from the ground, and may shift the species-specific risks towards open air foraging and high-flying species, such as the Molossidae family (Free-tailed bats), while reducing the risk for species flying closer to ground level (Wellig *et al.,* 2018). Wellig *et al*. (2018) investigated the vertical distribution of bat activity within the European Alps. They demonstrated a clear trend of decreased activity with increased height, most activity was recorded below 50 m height. Mathews *et al.* (2016) found greater species richness and activity levels at ground level than at heights between 30 and 80 m. Wind farm fatalities of clutter-edge foraging species, that do not typically occupy open air spaces high above the ground, have been found in South Africa (Aronson *et al.,* 2013; MacEwan, 2016). Additionally, the bat specialist/consultant has observed the trend of higher activity and species richness at lower monitoring systems, usually situated around 10 m, in most preconstruction bat monitoring studies conducted across South Africa. Therefore, it seems that the proportion of bat species at risk may decrease with increased hub height, but open-air high-flying species would have an increased mortality risk.

4.5.3 Cumulative impacts

The pertinent threat to bats, from the cumulative impact of several WEFs operating within a single general area, is mortality from turbine blade collision and barotrauma. In an area such as the Komsberg Renewable Energy Development Zone (REDZ) there is potential for significant loss of locally active bats and migratory bats that could essentially reduce the effective population size and may cause population crashes. The Amendment concurred with the Bat Monitoring Report (Marias, 2017), which states the cumulative impact as very high negative without mitigation and medium negative with mitigation.

According to the DEA (now operating as DEFF) Renewable Energy EIA Application Database for South Africa (First quarter 2019), there are currently several authorised wind farms within a 20 km radius of the Rietrug WEF, namely:

- Sutherland WEF (Applicant - Mainstream)
- Sutherland 2 WEF (Applicant - Mainstream)
- Suurplaat WEF (Applicant – Moyeng Energy)
- Maralla East WEF (Applicant – Mainstream)
- Maralla West WEF (Applicant – Mainstream)
- Hidden Valley WEF (Applicant – Great Karoo Wind Farm)
- Roggeveld WEF (Applicant - Building Energy/G7)
- Roggeveld II WEF (Applicant - Building Energy/G7)
- Komsberg East WEF (Applicant -Komsberg Wind Farms)
- Komsberg West WEF (Applicant -Komsberg Wind Farms)
- Great Karoo WEF (Applicant - ACED/EGP)
- Arusa WEF (Applicant - ACED/EGP)
- Soetwater WEF (Applicant - ACED/EGP)
- Kudusberg WEF (Applicant-G7)

- Gunstfontein WEF (Applicant – Gunstfontein Wind Farm)

Currently, there are no guidelines or recommendations of how to mitigate for the cumulative impact of wind farms within a greater area. This amendment assessment assumes all neighbouring facilities will implement appropriate mitigation measures informed by their pre-construction EIA studies, and that the mitigation measures proposed in this report are adhered to (Moir & Dippenaar, 2019).

4.5.4 Findings of the final progress report of 12-month pre-construction bat monitoring study

Acoustic monitoring was conducted at 80 m height for a period of 12 months (10 November 2015 – 17 November 2016) on the meteorological mast on site without system failures. The height at which monitoring took place is an important consideration for the proposed amendment to assess the relevance of the trends in species richness and activity levels detected at 80 m height, relative to the proposed amended turbine specifications. The height at which monitoring took place is below the lowest reach of the proposed amendment turbine sweep area, but if the specifications of the monitoring systems, namely SM3BAT, used at Rietrug WEF are taken into account, at least some data might have been recorded within the sweep of the turbines (Moir & Dippenaar, 2017).

As expected, higher activity levels and species richness were detected at the 10 m recording height than 80 m height. *Tadarida aegyptiaca* (Eqyptian free-tail bat) and *Neoromicia capensis* (Cape serotine bat) were the most abundant species on site, while *T. aegyptiaca* was the most abundant species at the 80 m monitoring height. It is a high-flying species with a high risk of collision with turbine blades (Sowler *et al*., 2017).

Bat activity levels varied substantially over the months of the year between the six monitoring systems deployed in the pre-construction EIA study; however, activity was reliably lower over the winter months (May – July). The peak activity periods identified in the EIA report are November 2015 – February 2016 and September – October 2016 (Marais, 2017). Activity levels were typically higher over the first half of the night immediately following sunset, with a smaller secondary peak two to three hours before sunrise. Section 7 (Proposed initial mitigation measures and details) of the final EIA report sufficiently mitigates for the higher activity periods and higher risk species (ERM, 2011).

4.5.5 Sensitivity map

The sensitivity map of the bat monitoring report (Marais, 2017) identified areas of moderate and high bat sensitivity and designated buffers of 150 m and 200 m, respectively. This Amendment assessment concurs with the mitigation measures in the bat monitoring report of Marais, 2017:

- **Moderate sensitivity areas and buffers (150 m):** Any turbines located within moderate buffer zones, or turbines with components within moderate buffer zones, are to receive priority during the operational monitoring study and mitigation measures must be applied from the start of operation, see Table 8 of this report.

- **High sensitivity areas and buffers (200 m):** These are 'no-go' areas for turbine placement. For this amendment, turbine blade tips must also be excluded from entering the buffer areas.

The Applicant must ensure that turbines are placed at an appropriate distance away from bat sensitive areas, based on the finalized turbine dimensions. The turbine layout should be approved by a bat specialist upon finalisation of turbine specifications.

Table 8: Wind turbine mitigation schedule taken from the Final EIA report (ERM, 2011)

	Terms of mitigation implementation
Peak activity (times to implement curtailment/ mitigation)	Met Mast (10m): 12 November 2015 – 01 May 2016; sunset – 01:00
Environmental conditions in which to implement curtailment/ mitigation	Met Mast (10m): Wind speed below 7.5m/s *and* Temperature above 14.0°C
Peak activity (times to implement curtailment/ mitigation)	Met Mast (80m): 12 November 2015 – 10 January 2016; sunset – 01:00
Environmental conditions in which to implement curtailment/ mitigation	Met Mast (80m): Wind speed below 7.5m/s *and* Temperature above 12°C
Peak activity (times to implement curtailment/ mitigation)	Met Mast (80m): 18 January – 29 February 2016; sunset – 01:00
Environmental conditions in which to implement curtailment/ mitigation -	Met Mast (80m): Wind speed below 7m/s *and* Temperature above 14°C
Peak activity (times to implement curtailment/ mitigation)	Met Mast (80m): 5 September – 30 October 2016; sunset – 02:00
Environmental conditions in which to implement curtailment/ mitigation	Met Mast (80m): Wind speed below 6.5m/s *and* Temperature above 9.0°C

4.5.6 Findings from the previous bat assessment

Mitigation conditions of the Final EIA report must be implemented to all turbines situated within the moderate bat sensitivity areas upon construction of the wind farm (Table 8- ERM, 2011). These mitigation measures should be refined as deemed necessary by the post construction bat specialist during post construction monitoring (Moir & Dippenaar, 2019). A summary of the impact assessment for bats with regard to mortality during the operational phase from the original EIA Report (ERM, 2011) is provided in Table 9. The significance of impacts was rated as low before and after mitigation.

Table 9. Impact assessment: bats (ERM, 2011)

Phase	Impact	Pre-mitigation significance	Residual impact significance
Operational phase	Mortality	Low	Low

A pre-construction monitoring study was done by Marais (2017). Marais (2017) rated the impact as very high negative before mitigation and reduced to low negative with mitigation (Table 10).

Table 10. Impact assessment: bats (Marais, 2017)

Phase	Impact	Pre-mitigation significance	Residual impact significance
Operational phase	Collision with turbines	Very high	Low

4.5.7 Findings of current assessment

Stephanie Dippenaar Consulting concurs with the assessment ratings in the final Bat Monitoring Report (Marais 2017), **i.e. low after mitigation**, on condition of implementation of the mitigation recommendations from the final EIA report (described in Table 8 of this report), and sensitivity buffer calculation recommended in section 4.5.5 of this report, and mitigations outlined in section 4.5.8 of this report. There were no limitations identified to the proposed assessment.

4.5.8 Mitigation measures

Mitigation conditions of the Final EIA report (ERM, 2011) must be implemented to all turbines situated within the moderate bat sensitivity areas as per the EIA report upon construction of the wind farm (Table 8). These mitigation measures should be refined as deemed necessary by the post construction bat specialist during post construction monitoring.

Of the impacts identified in the EIA, only bat mortalities due to direct blade impact or barotrauma during foraging activities (Section 5.2 of the EIA report of ERM, 2011), is relevant to this amendment. The impact was identified as Very High negative (score of -76) without mitigation and reduced to Low negative (score of -26) with mitigations. In order to maintain the impact as low negative, the following mitigations are proposed:

- Adhere to the bat sensitivity map as indicated in section 4.5.5 on the sensitivity map above (also in Section 4.2.2 of the bat specialist report for this amendment (Moir & Dippenaar, 2019) and avoid development in the demarcated high sensitivity areas and buffers. Medium sensitivity areas and buffers should preferably be avoided, but would there be turbine components in these areas, mitigation will have to be applied and curtailment need to be put into place from the onset of the wind farm, as described in Section 7 of the final EIA report (ERM, 2011), also see Section 4.5.4 and Table 8 above.
- All turbines must be curtailed below cut in speed and not allow for freewheeling from the start of operation. Bat activity is markedly higher over low wind speed periods. Preventing freewheeling should not affect energy production significantly but will be a substantial bat conservation mitigation measure.
- A maximum amount of 36 turbines, with a hub height of 200 m and a rotor diameter of 200 m, is proposed within the provided total output of 140 MW. If more than 36 turbines with these specifications are installed, then mitigations as described in Table 8 will be applicable. Should

smaller turbines be deployed, more turbines may be installed, but with agreement of a bat specialist.

- An operational bat monitoring study should already be in place at the start of the wind farm operation and should be implemented immediately after construction of turbines. Mitigation measures outlined by the bat specialist during the operational monitoring study should be applied with due diligence.
- Install bat detectors at height as advised by the post construction bat specialist, preferably at hub height at the appropriate turbines, with the deployment of the turbines; and
- A bat specialist walk through, as deemed necessary by the specialist, prior to construction, is proposed to confirm avoidance of priority species roost sites and appropriate buffer areas.

Considering the greater turbine dimensions proposed in the amendment application, the significance of the residual impact would remain as assessed in the Final EIA report (ERM, 2011) and the final bat monitoring report (Marais, 2017), i.e. low after mitigation, on condition of implementation of the above listed mitigation measures, the mitigation recommendations from the final EIA report (described in section 4.2.1 of the Bat specialist report and listed above in section 4.5.6), and sensitivity buffer calculation recommended in section 4.2.2 of the bat specialist report and in section 4.5.5 above on the sensitivity map of this report.

4.5.9 Conclusion

After review of relevant scientific literature and the long-term preconstruction monitoring report, the requested amendments to the turbine dimensions proposed for the Rietrug WEF would continue to have an overall negative impact to bats as identified during the bat monitoring study conducted in 2017 (Animalia, 2017). The mortality risk may be decreased for the lower flying species detected on site as the lower blade tip height increases with larger turbine dimensions. However, there is a higher risk of mortality for high flying species (which are the most abundant on site) as the rotor swept area and higher blade tip height are increased with larger turbine dimensions.

The impact would remain as assessed in the final Bat Monitoring Report (Marais, 2017), **i.e. low after mitigation,** on condition of implementation of the mitigation recommendations from the final EIA report (described in sections 4.2.1 and 4.2.3 of the Bat specialist report and section 4.5.8 and Table 8 above), and sensitivity buffer calculation recommended in section 4.2.2 of the Bat Specialist report and section 4.5.5 on the sensitivity map above.

The turbine layout must adhere to the sensitivity areas and buffers; and the layout should be approved by a bat specialist upon finalisation of turbine specifications.

To reduce bat mortality risk, a three-pronged consideration must be used when selecting the appropriate turbine technology for the wind farm:

- Turbine dimensions with a greater hub height (to increase lower blade tip height and reduce collision risk with lower flying species);
- Turbine dimensions with the smallest rotor diameter (to decrease total tip height and reduce collision risk with high flying species); and
- Least number of turbines required to generate the total megawatt output of the facility.

An operational monitoring study must be implemented immediately upon construction of the wind farm and be already in place when turbines are starting to operate. All applicable mitigation measures

should be incorporated in the EMPr and mitigation measures recommended by the Bat Specialist during the operational monitoring study must be implemented immediately and in real time (Moir & Dippenaar, 2019).

4.6 Noise

Enviro-Acoustic Research CC (EAR) (Morne de Jager) was contracted by Mainstream to determine the potential noise impact on the surrounding environment due to the proposed amendments to the turbine specifications of the project. The changes include a reduction in the number of turbines as well as an increase in hub height and rotor diameter of the turbines from 150 m to 200 m.

4.6.1 Motivation for amendment

The wind energy market is fast changing and adapting to new technologies as well as site specific constraints. Optimizing the technical specifications can add value through, for example, minimizing environmental impact and maximizing energy yield. As such the developer has been evaluating several turbine models, however the selection will only be finalized at a later stage once the most optimal wind turbine is identified (factors such as meteorological data, price and financing options, guarantees and maintenance costs, etc. must be considered).

The availability of more optimal or efficient wind turbines has resulted in a change in the wind turbine specifications. The proposed wind turbine will have the following specifications:

- A maximum sound power emission level of **105 dBA**;
- Rotor Diameter increase from up to 150 to **200 m**; and
- Hub height from up to 150 to **200 m**.

It should be noted that the change in wind turbine specifications such as the wind turbine hub height and rotor diameter does not relate to sound power emission levels, which depends on the model and make of a wind turbine. For the same model and make, a change in specifications such as hub-height and rotor diameter has an insignificant impact on sound power emission levels. Therefore, there is no advantage or disadvantage in terms of acoustics by changing the wind turbine specifications such as turbine hub height as well as rotor diameter. By changing the wind turbine model and make to a wind turbine with a lower sound power emission levels however will have a significant advantage on acoustics.

4.6.2 Findings from the previous assessment

EAR conducted an Environmental Noise Impact Assessment (ENIA) during 2017 to inform the previous Amendment Application for the proposed Rietrug WEF (de Jager, 2017). With the input data as used, this assessment indicated that the proposed project will have a noise impact of a low significance on all Noise Sensitive Developments (NSDs) in the area during both the construction and operational phases using the Siemens SWT 3.6 130 wind turbine for all wind speeds (Table 11). This wind turbine has a maximum sound power generation level of 106 dBA. The projected maximum noise levels would be less than 39 dBA at the closest NSD. The potential NSDs present within the vicinity of the proposed Rietrug WEF are shown in Figure 6.

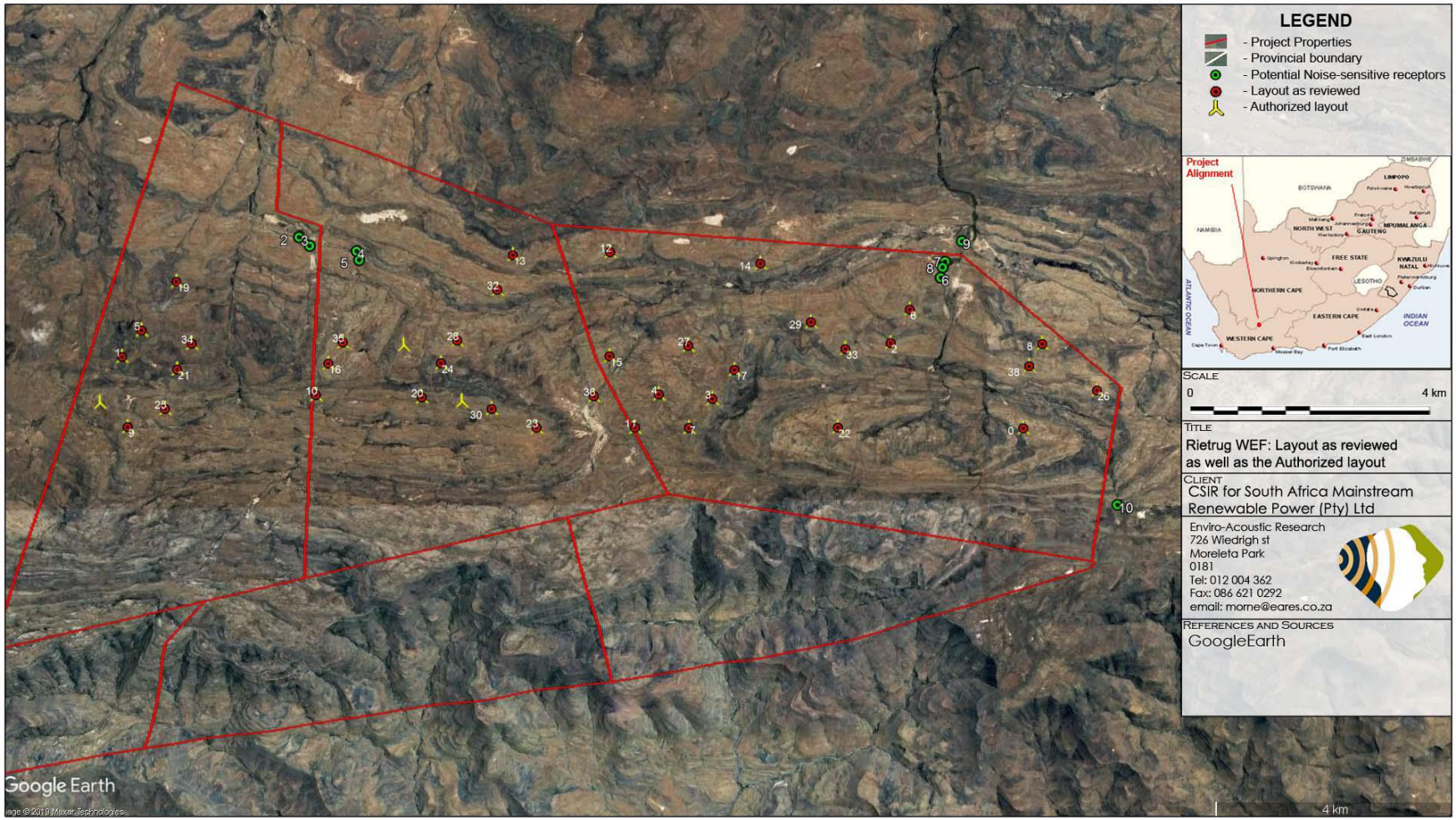

Figure 6: Locations of wind turbines as considered in this review (de Jager, 2019). Potential Noise Sensitive Developments shown in green dots.

Table 11. Impact assessment: noise (ERM, 2011)

Phase	Impact	Pre-mitigation significance	Residual impact significance
Construction and Operational phase	Wind noise at sensitive receptors	Medium	Low

4.6.3 Findings from the previous assessment

Making use of a wind turbine with a sound power emission level of 105 dBA will result in a noise level less than 38 dBA at the closest NSD. Therefore, subject to the condition that the sound power emission level of the selected wind turbine remains below 110 dBA, considering the location of the wind turbines and the potential noise impact, EAR is of the opinion that the proposed amendments will not increase the significance of the noise impact. The residual noise impact will therefore **remain low as per the previous NIA undertaken for the proposed wind farm (de Jager, 2017).**

4.6.4 Findings from the current assessment

The noise specialist concurs that the findings as contained in the previous document (report SAMRP-SWEF/ENIA/201701-Rev 2) are still valid (De Jager, 2017). Cumulative noise impacts generally only occur when noise sources (such as other wind turbines) are closer than 2 000 m from each other (around 1 000 m from the conceptual receptor located between them). The cumulative impact also only affects the area between the wind turbines of the various wind farms. The addition of the Rietrug WEF will not result in a cumulative noise impact significance and the cumulative noise impact will be very low. There were no limitations identified to the proposed assessment.

4.6.5 Mitigation measures for Noise Impact

The sound power emission level of the selected wind turbine must remain below 110 dBA.

EAR confirmed that the recommendations as contained in the Noise Assessment report for the previous Amendment Application (SAMRP-SWEF/ENIA/201701-Rev 2, de Jager, 2017), and as listed below, are still valid.

Mitigation options that should be included in the EMPr

- The developer must investigate any reasonable and valid noise complaint if registered by a receptor staying within 2 000 m from location where construction activities are taking place or operational wind turbine.

Special conditions that should be included in the Environmental Authorisation

- The potential noise impact must again be evaluated should the layout be changed where any wind turbines are located closer than 1,000 m from a confirmed NSD.
- The potential noise impact must again be evaluated should the developer make use of a wind turbine with a sound power emission level exceeding 106 dBA re 1 pW.
- The developer must investigate any reasonable and valid noise complaint if registered by a receptor staying within 2,000 m from location where construction activities are taking place or operational wind turbine.

4.6.6 Conclusions

Making use of a wind turbine with a sound power emission level of 105 dBA will result in a noise level less than 38 dBA at the closest NSD. Therefore, subject to the condition that the sound power emission level of the selected wind turbine remains below 110 dBA, considering the location of the wind turbines and the potential noise impact, **EAR is of the opinion that the proposed amendments will not increase the significance of the noise impact.** The residual noise impact will therefore remain **low** as per the previous noise assessments undertaken for the proposed wind farm. A full noise impact assessment with new modelling will not be required and the findings and recommendations as contained in the previous Noise assessment report (SAMRP-SWEF/ENIA/201701-Rev 2, EAR, 2017) are still valid. **EAR concludes that in terms of noise, the proposed amendments will be acceptable** (de Jager, 2019).

4.7 Visual

QARC (Quinton Lawson) and BOLA (Bernard Oberholzer) have been appointed to undertake an assessment of the potential visual impact associated with the proposed amendments of the Rietrug WEF. They also conducted the Visual Impact Assessment for the originally approved Sutherland REF in 2011 (Oberholzer & Lawson, 2011).

The current proposed amendment involves an increase in the hub height and rotor diameter of the wind turbines from 150 m (approved as part of Amendment 2) to 200 m hub height and 200 m rotor diameter. This represents a significant 25% increase in turbine height.

4.7.1 Current visual assessment for the amendment

A revised viewshed for the larger turbines has been prepared to determine the visual exposure on the surrounding landscape and receptors, and whether there would be any increase in visual impact significance (see Figure 7). The current viewshed provides a useful comparison with the viewshed of the previous Amendment 2 layout, there being fairly minimal difference in visual exposure, the visual effect of which would decrease with distance. There would also be little or no further visual effect on the Komsberg escarpment scenic resource.

Receptors in the form of surrounding farmsteads, that were previously in a view shadow, such as Hartbeesfontein and Waterval, would now fall within the viewshed of the proposed wind farm. However, distance is a mitigating factor in most cases.

4.7.2 Cumulative Visual impact

A comparison of the combined viewsheds of the three proposed wind farms for the previous Amendment 2 layout and the current layout is illustrated in Figure 8 and Figure 9. The difference in visual exposure between these two is shown in Figure 10. Again, the cumulative difference in visual exposure and on the escarpment is fairly minimal.

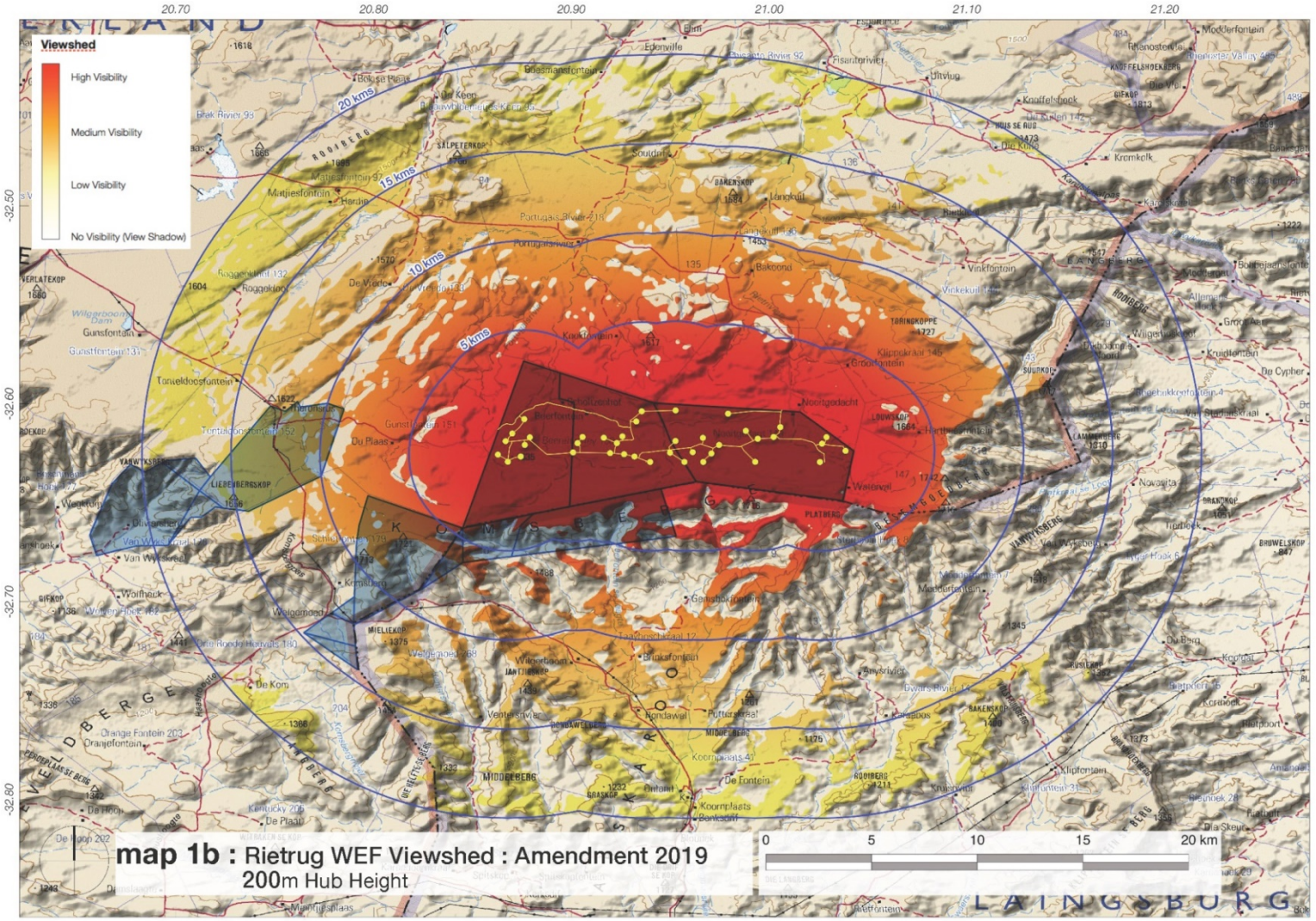

Figure 7: Rietrug WEF Viewshed: Amendment 2019: 200 m Hub Height (Oberholzer and Lawson, 2019).

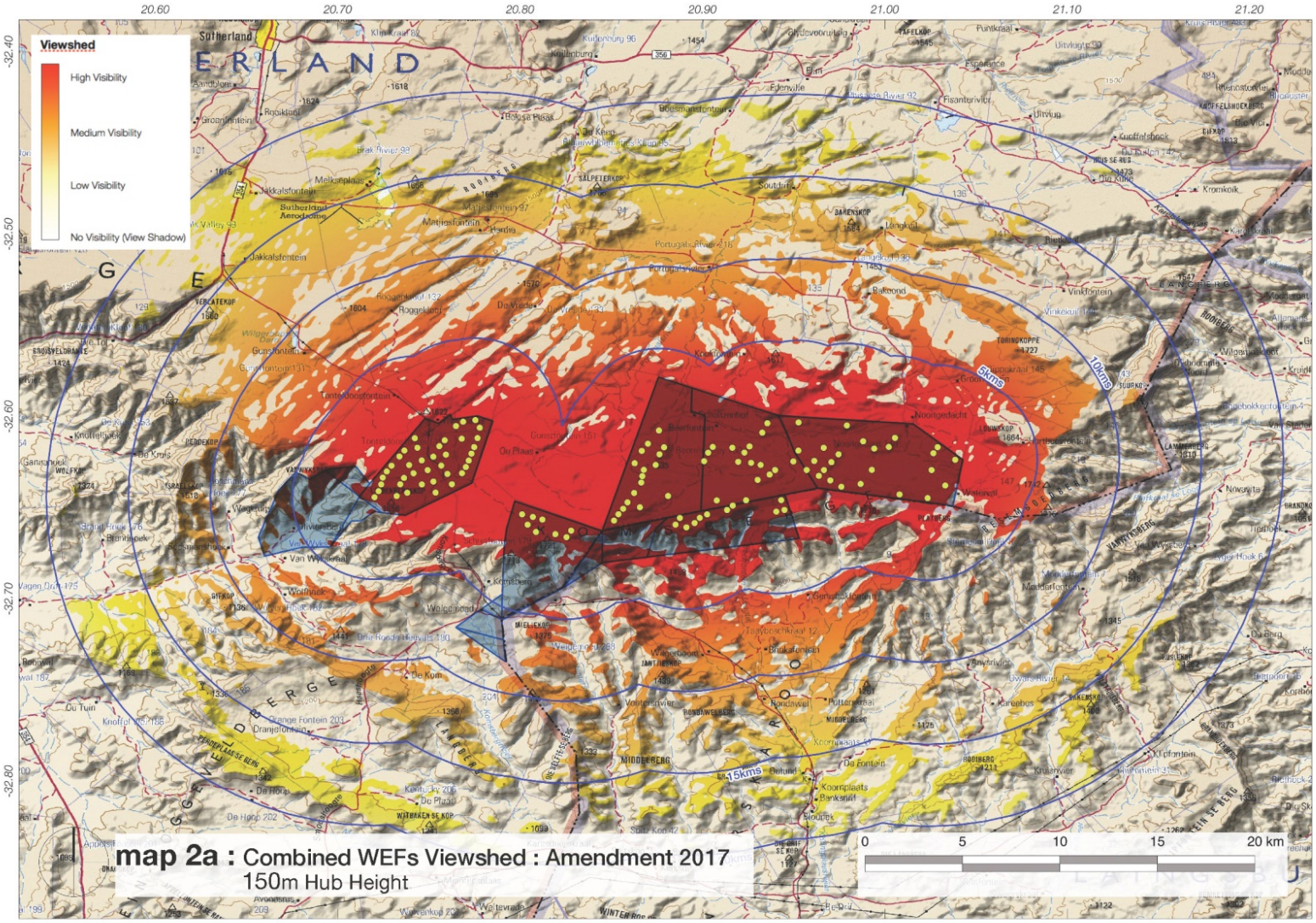

Figure 8: WEFs (Rietrug, Sutherland and Sutherland 2) viewshed: Amendment 2017: 150 m Hub Height (Oberholzer and Lawson, 2019).

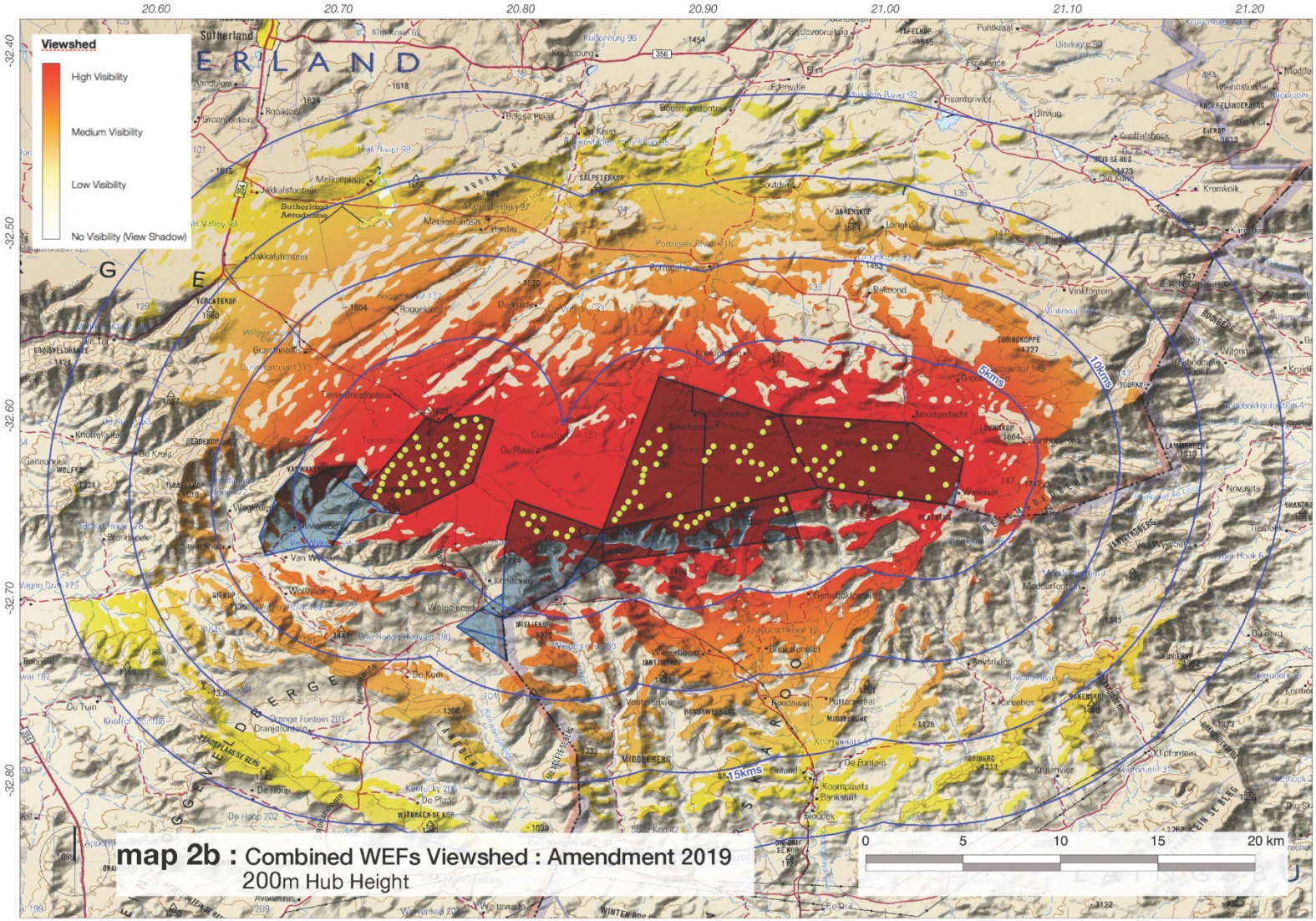

Figure 9:Combined WEFs (Rietrug, Sutherland, Sutherland 2) viewshed: Amendment 2019: 200 m Hub Height (Oberholzer and Lawson, 2019).

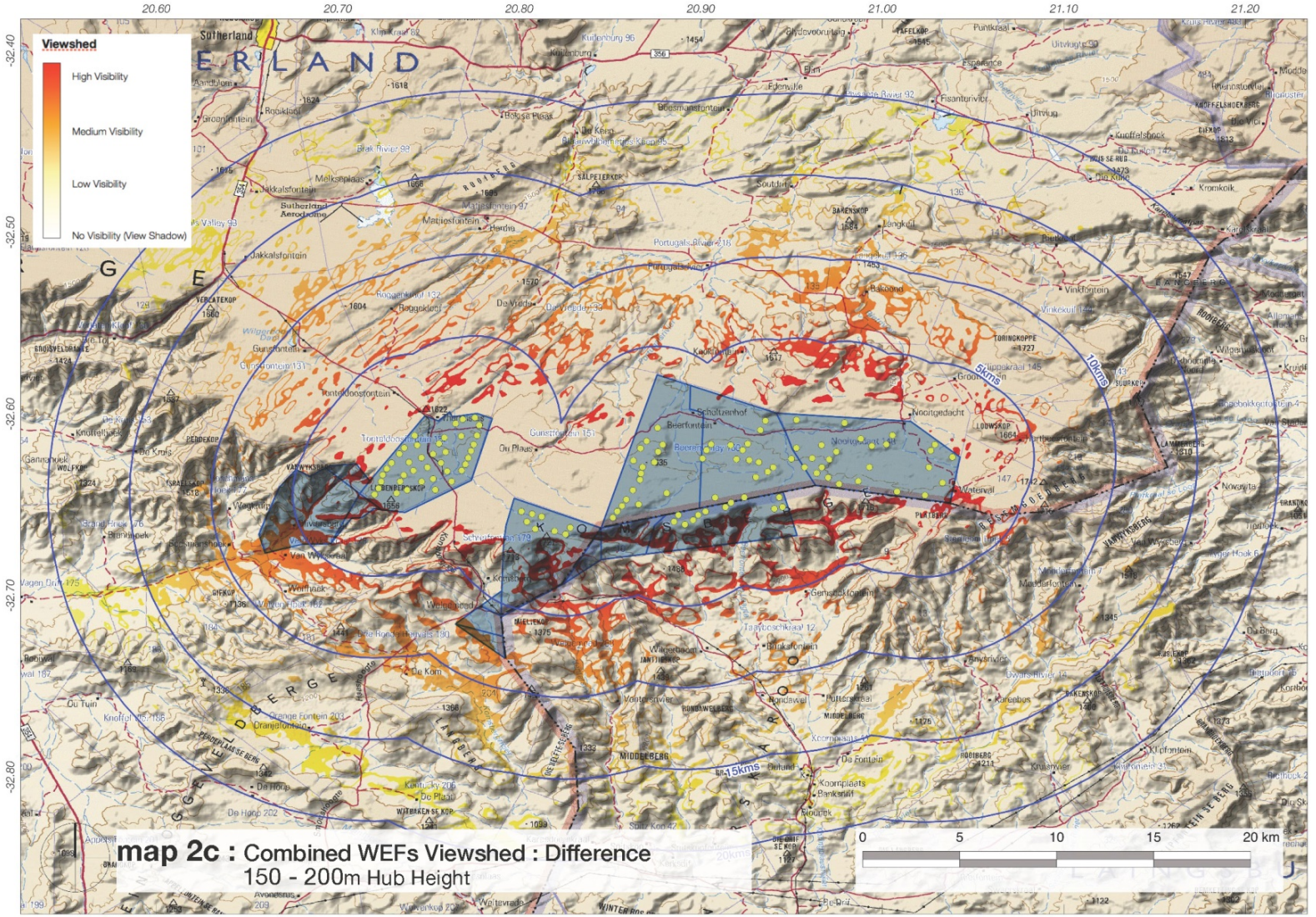

Figure 10: Combined viewshed of the Rietrug, Sutherland and Sutherland 2 wind energy facilities viewshed: Difference: 150-200 m Hub Height (Oberholzer and Lawson, 2019).

4.7.3 Findings from the previous assessments

The original layout included in the Final EIA Report (ERM, 2011), which was approved by DEA, involved a total of 325 turbines with a hub height of 120 m and rotor diameter of 120 m. The original Visual Impact Assessment (VIA) of 2011 indicated a visual impact significance rating of 'high' before mitigation, and a residual impact rating of 'medium-high' after mitigation, assuming (amongst others) a visual buffer of 500 m along the escarpment, and 500m from district roads (Table 12).

The layout for Amendment 2 involved an increase in the hub height of the turbines from 120 m to 150 m and an increase in the rotor diameter from 120 m to 150 m as well as a change in layout to cater for the higher turbines. The change in layout remained within the 'buildable areas' of the proposed wind farm, which avoid all environmental features identified for the site. A viewshed based on the current layout was prepared which showed that 'visual exposure' of the turbines on the surrounding landscape and receptors would marginally increase. As the turbines are set back from the Komsberg escarpment, (more than 1,25 km), there would be little visual effect on the escarpment scenic resource.

Table 12. Impact assessment: visual (ERM, 2011)

Phase	Impact	Pre-mitigation significance	Residual impact significance
Operational phase	Visual impact on fixed positions and temporary receptors	High	Medium-high

4.7.4 Findings from the current assessment

The increase in height of the wind turbines (i.e. from 150 m to 200 m) in the current amendment application would result in the visual impact significance ratings **being similar to those of the previously authorised layout, i.e. 'high' significance before mitigation and 'medium-high' significance after mitigation.** There were no limitations identified to the proposed assessment.

4.7.5 Mitigation measures

No additional mitigation measures were included in the current visual assessment of Oberholzer and Lawson (2019).

4.7.6 Conclusions

The increase in height of the wind turbines would result in the visual impact significance ratings being similar to those of the previously authorised layout, **i.e. 'high' significance before mitigation and 'medium-high' significance after mitigation. This being the case, the visual specialists concluded that the Amendment 3 layout could be authorised from a visual perspective (Oberholzer and Lawson, 2019).**

4.8 Heritage environment

ASHA Consulting (Jayson Orton) was appointed to provide comments on the proposed amendments in terms of impacts to heritage. The study area is very remote and located a long distance from major roads which means that very few people will see the facility. There are few houses in the area and some are unoccupied. The overall number of turbines was reduced during the previous and current amendment applications which means that impacts to ground-based heritage will be less than originally assessed.

4.8.1 Findings from the previous assessment

A summary of the impacts on the visual landscape during the operational phase from the original Final EIA (ERM, 2011) is listed in Table 13. The impacts were identified as having a medium significance before and after mitigation.

Table 13. Impact assessment: visual (ERM, 2011)

Phase	Impact	Pre-mitigation significance	Residual impact significance
Operational phase	Cultural heritage or visual sense of place	Medium	Medium

4.8.2 Findings from the current assessment

With no further changes to the footprint there will be no further changes to these impacts, and it is only the visual/contextual impacts to the landscape and any other visually sensitive heritage features that are relevant to the present amendment application. There will be no new impacts as a result of the changed dimensions. An increase in turbine height and rotor diameter from 150 m to 200 m (a 25% height and diameter increase) will likely make very little difference to the overall impacts to the landscape, especially considering that the original height was already very substantial. Significant reduction of visual impacts from far smaller turbines through screening or shifting turbines is not possible and thus this change in dimension will not affect the significance rating of the impact assessment. There were no limitations identified to the proposed assessment.

4.8.3 Conclusion

ASHA Consulting concludes that because the significance of impacts will remain unchanged, the Amendment application to increase the turbine height and rotor diameter from 150 m to 200 m for the three WEFs of concern (including the Rietrug WEF) is acceptable in terms of impacts to heritage resources and that, as was the case with the previous dimension-based amendment, no further heritage-related work is required. The proposed increase in hub height and rotor diameter should be authorised (Orton, 2019).

4.9 Conclusion from the specialist studies

The specialists have assessed the potential impacts which the proposed changes in the turbine specifications (i.e. an increase in the hub height and rotor diameter from 150m to 200 m) may have on

the affected environment. It is emphasised that the implementation of the proposed amendments to the Environmental Authorisation and to the proposed Rietrug WEF will not result in additional or unacceptable environmental impacts. This was confirmed by the specialists on the project team (section 4.3-4.8) and the specialist's inputs found in Appendix C of this report. The turbine layout was not amended, with the exception of 3 turbines which were removed to avoid environmental sensitive areas, and still remains within the approved buildable area (Figure 11).

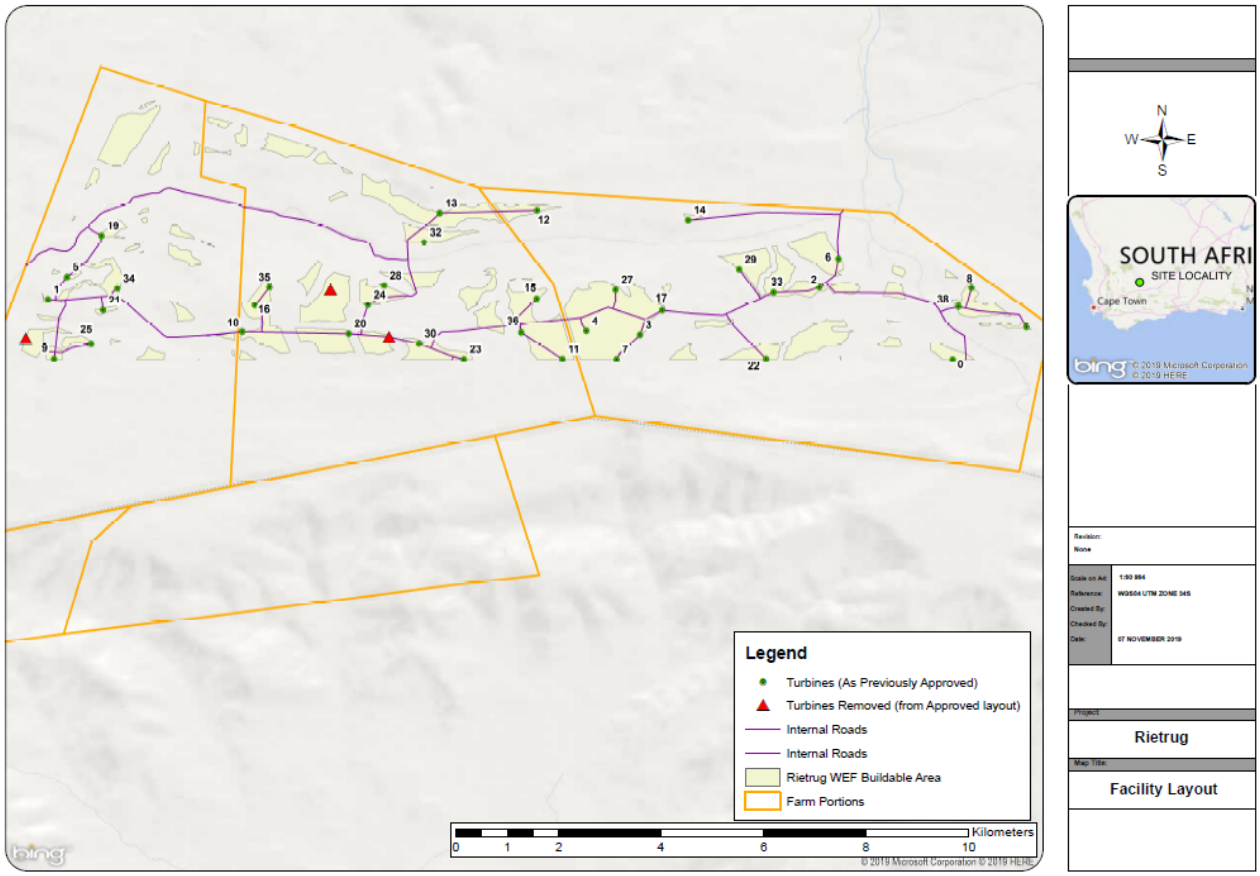

Figure 11: Authorised layout and current layout of the proposed Rietrug Wind Energy Facility

5. SECTIONS WITHIN THE ENVIRONMENTAL AUTHORISATION THAT ARE REQUESTED TO BE AMENDED

The following section lists the proposed sections in the Environmental Authorisation dated 10 November 2016 that are requested to be amended:

AMENDMENT 1: AMENDMENT OF TURBINE SPECIFICATIONS IN THE ENVIRONMENTAL AUTHORISAITON

Page 4-5 of the Environmental Authorisation:

"The 140 MW Rietrug Wind Energy Facility will comprise the following:

- Up to 56 wind turbines with a height of up to 120 m and rotor diameter of up to 120 m;
- The wind turbines will be connected to another by means of medium voltage cables. The cables will be buried approximately 1 m below ground level;
- An internal gravel road network will be constructed to facilitate movement between turbines on site. These roads will be up to 15 m wide and 8 km in length and will include drainage and cabling;
- Some existing public roads may need to be upgraded to facilitate the turbine transport;
- A hard standing laydown area of a maximum of 10, 000 m^2 will be constructed; and
- A site compound will be constructed for all contractors, this would be approximately 5, 000 m^2 in size."

Is hereby requested to be amended to (the proposed amendments are indicated in bold):

"The 140 MW Rietrug Wind Energy Facility will comprise the following:

- **Up to 36 wind turbines with a height of up to 200 m and rotor diameter of up to 200 m;**
- The wind turbines will be connected to another by means of medium voltage cables. The cables will be buried approximately 1 m below ground level;
- An internal gravel road network will be constructed to facilitate movement between turbines on site. These roads will be up to 15 m wide and 8 km in length and will include drainage and cabling;
- Some existing public roads may need to be upgraded to facilitate the turbine transport;
- A hard standing laydown area of a maximum of 10, 000 m^2 will be constructed; and
- A site compound will be constructed for all contractors, this would be approximately 5, 000 m^2 in size."

Page 5 of the Environmental Authorisation:

Technical details of the proposed facility:

Component	**Description/Dimensions Authorised within the EA**
Location of the site	Sutherland Karoo Hoogland Local Municipality Namakwa District Municipality Northern Cape
Farm Names	Portion 1 of Beeren Valley Farm 150 Remaining Extent of Beeren Valley Farm 150 Remaining Extent of Nooitgedacht Farm 148
Site access	Secondary road off the R354

Export capacity	140 MW
Proposed technology	Wind turbines
Number of turbines	56
Hug height from ground level	120 m
Rotor diameter	120 m
Width and length of internal roads	15 m wide and 8 km in length

Is hereby requested to be amended to (the proposed amendments are indicated in bold and grey):

Technical details of the proposed facility:

Component	**Description/Dimensions Authorised within the EA**
Location of the site	Sutherland Karoo Hoogland Local Municipality Namakwa District Municipality Northern Cape
Farm Names	Portion 1 of Beeren Valley Farm 150 Remaining Extent of Beeren Valley Farm 150 Remaining Extent of Nooitgedacht Farm 148
Site access	Secondary road off the R354
Export capacity	140 MW
Proposed technology	Wind turbines
Number of turbines	**36**
Hug height from ground level	**200 m**
Rotor diameter	**200 m**
Width and length of internal roads	15 m wide and 8 km in length

AMENDMENT 2: AMENDMENT OF CONTACT DETAILS OF THE HOLDER OF THE ENVIRONMENTAL AUTHORISATION

First/cover page of the Environmental Authorisation:

Mr Michael Mangnall
South Africa Mainstream Renewable Power Developments (Pty) Ltd
PO Box 45063
CLAREMONT
7735

Telephone number: (021) 657 4045

Email Address: Mike.Mangnall@mainstreamrp.com

Is hereby requested to be amended to:

Mr Eugene Marais
South Africa Mainstream Renewable Power Developments (Pty) Ltd
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CLAREMONT
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Telephone number: (021) 657 4040
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Page 2 of the Decision of the Environmental Authorisation:

Mr Michael Mangnall
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Email Address:	Mike.Mangnall@mainstreamrp.com

Is hereby requested to be amended to:

Mr Eugene Marais
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CLAREMONT
7735

Telephone number:	**(021) 657 4040**
Cell phone number:	**(073) 871 5781**
Fax Number:	**(021) 671 5665**
Email Address:	**Eugene.marais@mainstreamrp.com**

Specific conditions:

Page 13 of the Environmental Authorisation

Avifauna and bats:

The following conditions must be added:

Avifauna:

- The 500 m turbine-free buffer zone along the edge of the escarpment should be increased to a minimum of 660 m;
- A 3 km turbine-free buffer zone must be implemented around each of the two Verreaux's Eagle nests located at 32°39'50.76"S, 20°51'16.02"E and 32°39'43.41"S, 20°51'49.07"E; and
- The revised mitigation measures are subject to a walk-through by the avifaunal specialist prior to the construction commencing, to confirm the location and status of all priority species nests within the area of influence of the wind farm.

Bats:

- Avoid development in the demarcated high sensitivity areas and buffers. Medium sensitivity areas and buffers should preferably be avoided, but would there be turbine components in these areas, mitigation will have to be applied and curtailment need to be put into place from the onset of the wind farm, as described in Section 7 of the final EIA report.
- All turbines must be curtailed below cut in speed and not allow for freewheeling from the start of operation.
- An operational bat monitoring study should already be in place at the start of the wind farm operation and should be implemented immediately after construction of turbines. Mitigation measures outlined by the bat specialist during the operational monitoring study should be applied with due diligence.
- Install bat detectors at height as advised by the post construction bat specialist, preferably at hub height at the appropriate turbines, with the deployment of the turbines; and
- A bat specialist walk through, as deemed necessary by the specialist, prior to construction, is proposed to confirm avoidance of priority species roost sites and appropriate buffer areas.

Page 13-14 of the Environmental Authorisation

Vegetation, wetlands and water resources

The following conditions must be added:

- The turbines should not be sited at points below the 1 600 m average mean sea level.
- The final footprint of each turbine, as well as support infrastructure should be subject to specific evaluation.

Page 16 of the Environmental Authorisation

Noise:

The following conditions must be added:

- The potential noise impact must again be evaluated should the layout be changed where any wind turbines are located closer than 1,000 m from a confirmed Noise Sensitive Development (NSD).
- The potential noise impact must again be evaluated should the developer make use of a wind turbine with a sound power emission level exceeding 106 dBA re 1 pW.
- The developer must investigate any reasonable and valid noise complaint if registered by a receptor staying within 2,000 m from location where construction activities are taking place or operational wind turbine.

6. NATIONAL PLANNING INITIATIVES

In 2013 the National DEA commissioned the Strategic Environmental Assessment (SEA) for Wind and Solar PV development (Phase 1), which aims to identify strategic geographical areas best suited for the roll-out of large scale wind and solar PV energy projects, referred to as Renewable Energy Development Zones (REDZs). Eight REDZs have been identified and assessed in the SEA, namely: REDZ 1: Overberg; REDZ 2: Komsberg; REDZ 3: Cookhouse; REDZ 4: Stormberg; REDZ 5: Kimberley; REDZ 6: Vryburg; REDZ 7: Upington; and REDZ 8: Springbok (CSIR, 2015). The proposed Rietrug WEF falls within REDZ 2: Komsberg, as shown in Figure 12. The eight REDZs were gazetted for implementation on 16 February 2018 in Government Gazette 41445, Government Notice 114. The Gazette documented notice given by the Minister of Environmental Affairs of procedures to be followed when applying for environmental authorisation for large scale wind and solar photovoltaic energy development activities, identified in terms of section 24(2)(a) of the NEMA.

The proposed project is therefore aligned with national planning priorities. On a local and provincial level, the implementation of the proposed project will contribute to the objectives of the Provincial Spatial Development Framework (PSDF) and Integrated Development Plan (IDP) through the generation of electricity through renewable sources; the creation of employment opportunities during the construction and operational phases of the project and local socio-economic development.

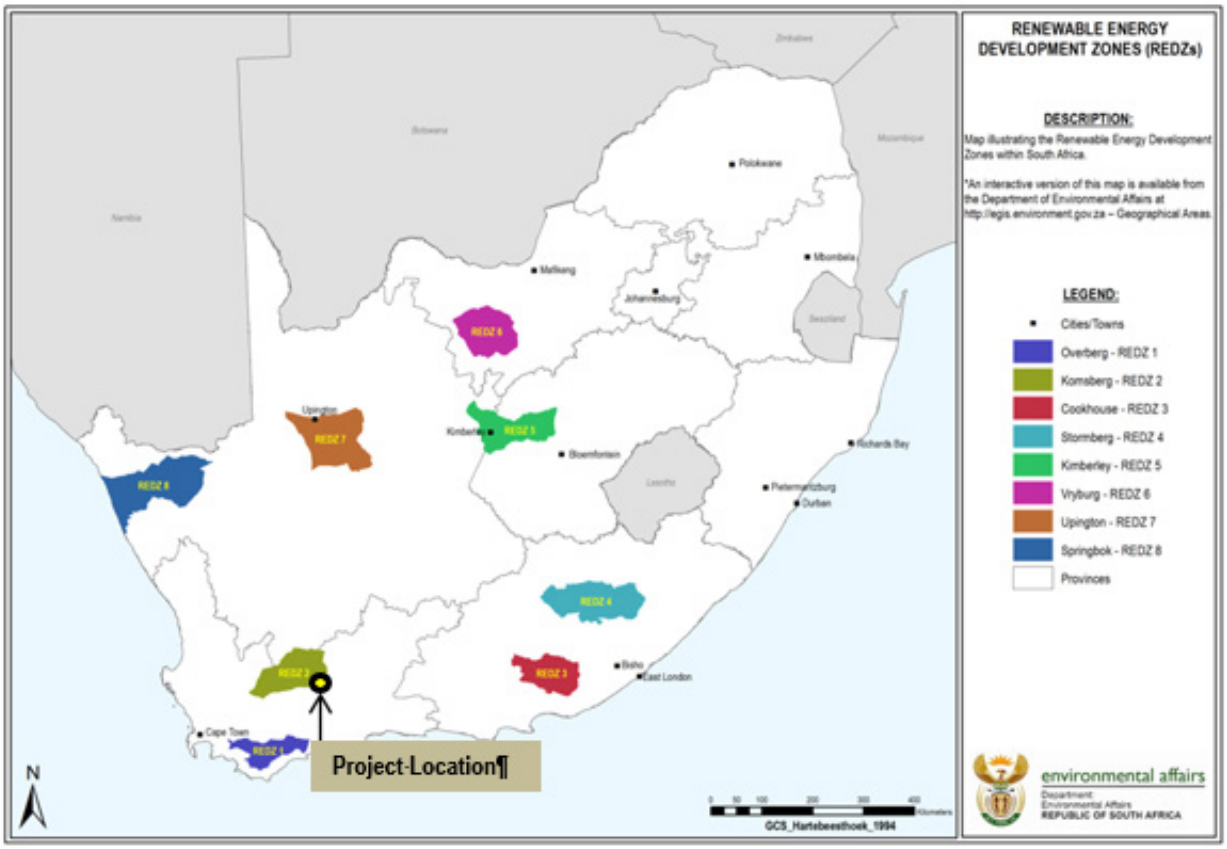

Figure 12: REDZs identified in the SEA (Phase 1 (REDZ 1: Overberg; REDZ 2: Komsberg; REDZ 3: Cookhouse; REDZ 4: Stormberg; REDZ5: Kimberley; REDZ 6: Vryburg; REDZ 7: and Upington; REDZ 8: Springbok) (CSIR, 2015). The proposed project falls within the REDZ 2: Komsberg.

7. CONCLUSION

7.1.1 Summary of amendments required

The proposed amendments currently being applied for are listed in Table 14. It is emphasised that the implementation of the proposed amendments to the Environmental Authorisation and to the proposed Rietrug WEF will not result in additional or unacceptable environmental impacts.

Specialists were appointed to re-evaluate their respective assessments to determine what impact the turbine specifications will have on the surrounding environment. To accommodate the recommended buffers, the number of turbines got reduced. However, it should be noted that the location of the turbines remains unchanged.

This was confirmed by the specialists on the project team (section 4.3-4.8) and the specialists' inputs found in Appendix C of this report.

Table 14. The amendments currently being applied for in this amendment application (the proposed amendments are shown in bold and yellow)

COMPONENT	FROM	TO
Wind turbine generators	Up to 56 turbines Turbine Hub Height of up to 150 m Rotor Diameter of up to 150 m	**Up to 36 turbines** **Turbine Hub Height of up to 200 m** **Rotor Diameter of up to 200 m**
Contact details of the holder of the Environment	Mr Mike Mangnall Tel no: (021) 671 5665 Email address: Mike.mangnall@mainstreamrp.com	**Mr Eugene Marais** **Tel no: (021) 657 4040** **Email:Eugene.marais@mainstreamrp.com**

7.1.2 Summary of impacts

The specialists presented in Table 3 have been consulted and provided with all the information pertaining to the proposed amendments to the turbines specifications as indicated in Table 14 above for the proposed Rietrug WEF. The feedback and conclusion from the specialists were that the proposed amendments do not alter the originally identified impacts, assessment of these impacts, impact significance or recommended management and mitigations measures. Additional mitigation measures were provided by the specialists (see section 4.3-4.8) and Appendix C of this report. These additional mitigation measures have been included in the updated EMPr which is included in Appendix D of this report.

A summary of the impacts identified, and the significance ratings thereof as contained in the original approved Final EIA Report (ERM 2011) and in the subsequent Amendment reports (CSIR, 2016 and 2017) are provided in Table 14. The full impact assessment tables are available in Appendix A. These impacts have been deemed to be mitigatable and acceptable, since this project has received Environmental Authorisation from the DEA (now operating as DEFF) in 2012 and the amendment applications have been approved in 2016 and 2017. No additional impacts have been identified by the specialists to occur due to the amendments currently proposed. The specialists confirmed that the significance ratings of the impacts from the previous initial EIA undertaken by ERM (2011) and the subsequent amendment reports prepared by CSIR (2016 & 2017) are still applicable for this Amendment Application (see Table 15). The specialists are therefore of the opinion that the proposed amendments can be authorised.

It is emphasised that the number of turbines have been reduced from 56 to 36. It should be noted that although the number of turbines have decreased, the turbine layout remains the same, with the exception of 3 turbines which were removed to avoid environmental sensitive areas. The turbines are therefore still within the approved buildable area of the Rietrug WEF.

Table 15. Summary of significance of pre-mitigation and residual impacts during construction and operational phases for the current amendment application for the Rietrug WEF

PHASE	PRE-MITIGATION SIGNIFICANCE	RESIDUAL IMPACT SIGNIFICANCE
Terrestrial ecology (Loss of vegetation)		
Construction phase	High	Medium
Operational phase	Low	Low
Terrestrial ecology (Impact on fauna)		
Construction phase	High	Medium
Operational phase	High-medium	Medium-low
Avifaunal (Birds)		
Construction phase	High-medium	Medium
Operational phase	Medium-high	Medium
Bats		
Construction phase	Low	Low
Operational phase	Low	Low
Noise		
Construction phase	Medium	Low-Medium
Operational phase	Medium	Low
Visual		
Operational phase	High	Medium-high
Heritage		
Construction phase	High	Low
Operational phase	Medium	Medium

7.1.3 Advantages and disadvantages of granting the amendments

The 2014 NEMA EIA Regulations, as amended, require that the advantages and disadvantages of granting the application must be outlined. In terms of advantages, granting the amendment application will mean that the latest turbines technology will be utilised and the wind farm will operate optimally. Hence the financial viability and the likelihood of the project proceeding will not be affected. Granting the amendment would therefore increase the possibility of the social benefits of the project being realised, such as

contributing to corporate social investment, aiding the local economy and potentially creating employment opportunities in the area. In terms of disadvantages, this project will have an impact on the environment, as assessed during previous studies and confirmed during this assessment. However, these impacts are deemed acceptable by the specialists who recommend that the amendment be granted.

7.1.4 Environmental sensitivity map overlain with the proposed layout

Based on the specialist studies outlined above and the findings thereof (see Appendix C of this report), a project sensitivity map has been produced (Figure 13) to show all the environmental features and their respective buffers (where applicable) that were identified by the various specialists have been adhered to. The map, in turn, was used to determine the buildable area of the Rietrug WEF.

Figure 14 indicates the Environmental sensitivity map overlain with the turbine locations for the Rietrug WEF.

The proposed layout, which incorporates larger, but fewer turbines avoids all environmental features that were identified on site, avoids areas that were recommended by the specialists in the previous section and adheres to the provisions included within the Environmental Authorisation issued.

7.1.5 Recommendation of the EAP

The proposed amendments do not influence the findings of the authorised Final EIA report (ERM, 2011) or amendments (CSIR, 2016 and 2017). Based on the information available to the EAP and the specialist input received and outlined within Section 4.3-4.8 and included in Appendix C of this report, it is clear that no additional impacts are anticipated due to the increase in turbine height and rotor diameter (from 150 m to 200 m). The specialists confirmed that the significance ratings as contained in the original EIAr (ERM, 2011) are still applicable. In addition to this, the layout of the proposed Rietrug WEF avoids the environmental sensitive features and buffers as identified by the specialists. **It is therefore the opinion of the EAP that the proposed amendments of the turbine specifications can be approved.**

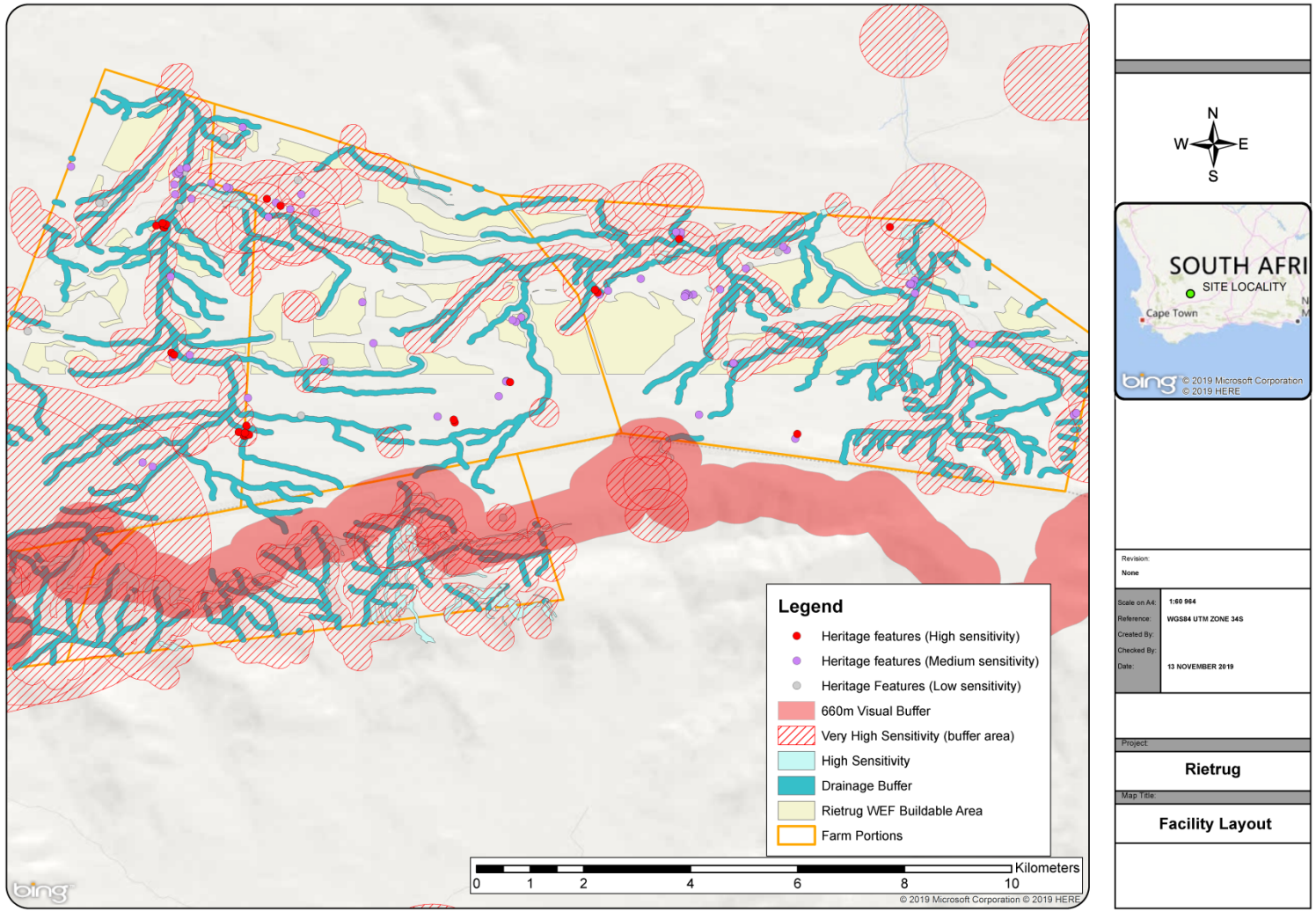

Figure 13: Environmental sensitivity map for the Rietrug WEF

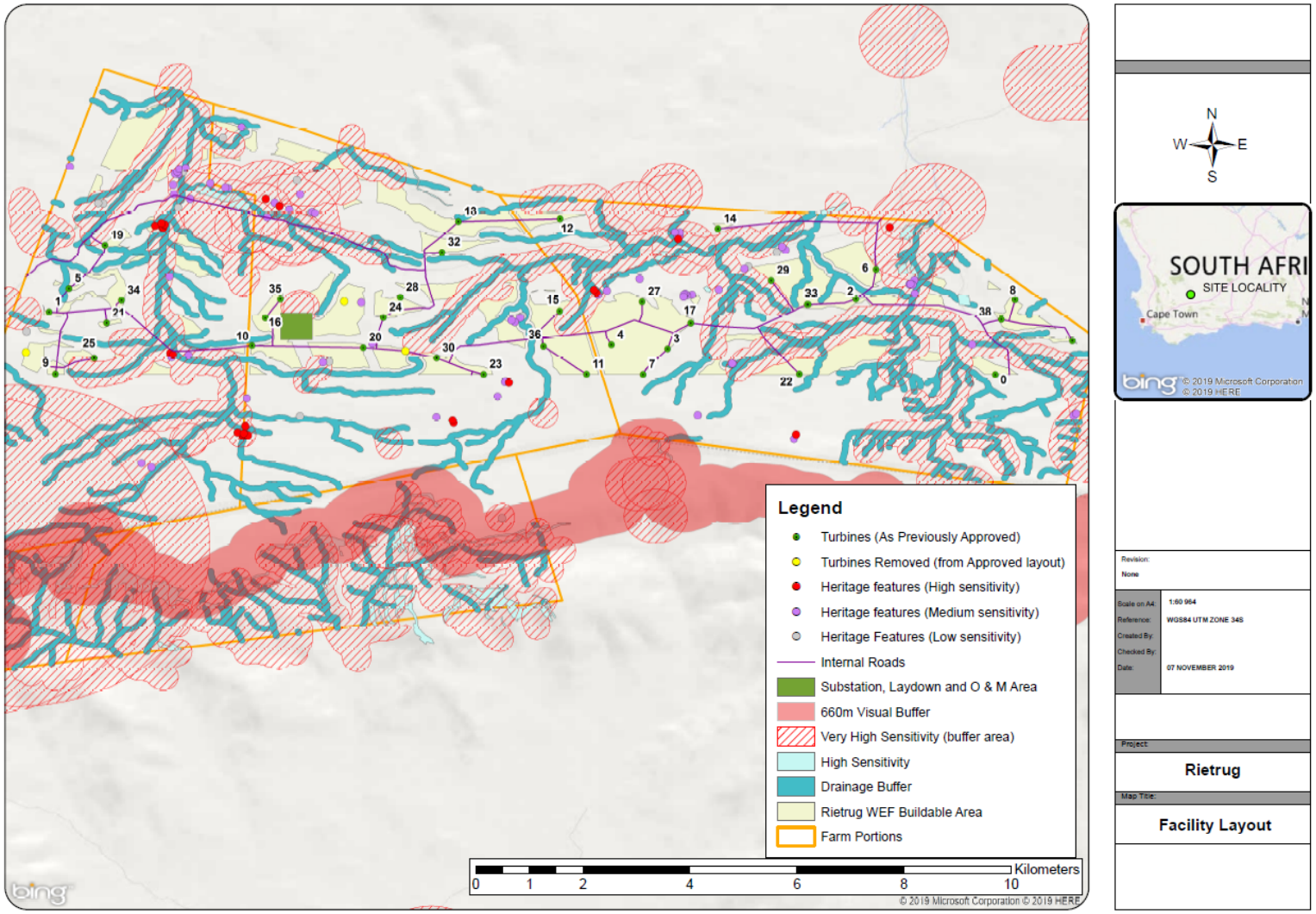

Figure 14: Environmental sensitivity map overlain with the turbine locations for the Rietrug WEF

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