Amendment Report for the Application of Substantive Amendments to the Environmental Authorisation issued for the development of the 140 MW Rietrug WEF, Sutherland, Northern Cape Province

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DEA Reference number: 12/12/20/1782/1/AM2

February 2017

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Prepared for: South Africa Mainstream Renewable Power Developments (Pty) Ltd
DEA Ref Number: 12/12/20/1782/1/AM2

Commenting period on the Amendment Report: 17 February to 22 March 2017

You are kindly requested to submit any comments you may have on this report to Shawn Johnston at Sustainable Futures ZA within 30 days of this notification. For more information, please contact:

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1. INTRODUCTION

1.1 General overview

South Africa Mainstream Renewable Power Developments (Pty) Ltd (Mainstream) received Environmental Authorisation (EA), 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 to 1137 MW. Following this, a non-substantive amendment process was undertaken to extend the validity of the EA and an amended EA, dated 6 October 2015, was issued to Mainstream.

As stated above, the EA authorised Mainstream to develop a 747 MW to 1137 MW REF which included authorisation to construct 325 turbines on site. Based on the generation capacity of the wind turbines, this provision allocated roughly 650 MW to the Wind Energy Facility (WEF) component of the REF. Subsequent to the receiving EA to develop the REF, Mainstream applied for an amendment to the EA in order to split the EA into three separate projects. Mainstream received three EAs, dated 10 November 2016, and an amended EA 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:

1. Sutherland Wind Energy Facility (DEA Ref number: 12/12/20/1782/2 and 12/12/20/1782/2/AM1)
2. Sutherland 2 Wind Energy Facility (DEA Ref number: 12/12/20/1782/3 and 12/12/20/1782/3/AM1)
3. Rietrug Wind Energy Facility (DEA Ref number: 12/12/20/1782/1 and 12/12/20/1782/1/AM1)

As part of the approved WEFs, the EA authorised the construction of wind turbines with a hub height of up to 120 m and rotor diameter of up to 120 m. As part of this amendment application, Mainstream is proposing to amend the hub height and rotor diameter dimensions by increasing its hub height from 120 m to up to 150 m and increasing the rotor diameter from 120 m to up to 150 m. In addition to this, due to the proposed amendment in turbine specifications, the authorised layout will also change to accommodate the larger turbines. These amendments would be considered to be substantive i.e. a change in scope occurs resulting in increased level or nature of impact.

This Amendment Report has been produced to assess the potential impacts that the proposed amendments to the **Rietrug WEF** may have on the receiving environment. The content of the report has been based on the impact assessment included within the EIA process undertaken in 2011 (ERM, 2011) and the amendment process undertaken in 2016 (CSIR, 2016) and comparing it to the potential impacts that may be expected, based on specialist input, should these amendments be approved.

The Council for Scientific and Industrial Research (CSIR) has been appointed by Mainstream to manage the required amendment process.

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, Mainstream wishes to apply for a substantive amendment to the EA issued. Regulation 31 (Part 2) of the 2014 NEMA EIA Regulations 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 nature of impact where such level or 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 application for the amended hub height and rotor diameter were not considered as part of the in the initial EIA process or the amendment process undertaken, therefore these (potential) impacts need to be assessed according to the change in level or nature of impact.

2.2 Public Participation Process

Regulation 32 of the EIA Regulations state that:

"The holder must- (a) within 90 days of receipt by the competent authority of the application made in terms of regulation 31, submit to the competent authority 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- (i) 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 (ii) reflects the incorporation of comments received, including any comments of the competent authority".

All potential I&APs have been notified of the proposed amendment process via the placements of adverts in the Cape Times, Die Burger and Noordwester (same newspapers used for the original EIA process), placement of site notices at the farm boundaries, in Sutherland and Laingsburg and letters sent to I&APs included within the previous processes' databases. The registration process for this project was from 09 December 2016 – 01 February 2017.

Hard copies of the Amendment Report (this report) will be made available at the Karoo Hoogland Karoo Municipality, Sutherland Public Library, Laingsburg Public Library, Laingsburg Municipality, and Sutherland Observatory. This report will be distributed to I&APs for a 30-day commenting period (as per Section 32 of the EIA Regulations) where after it will be updated with the PPP undertaken (including a Comments and Response Report) and submitted to the DEA for decision-making (Section 32 (a) of the EIA Regulations).

All comments received and responses thereto will be sent to registered I&APs and uploaded onto the project website, following the PPP and finalisation of the Amendment Report.

3. Approved Rietrug WEF and Amendment Process

3.1 Approved Rietrug WEF

Mainstream received EA (DEA Ref number: 12/12/20/1782/1 and 12/12/20/1782/1/AM1) from the DEA to construct this 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 farm portions approved as part of the amended EA that form part of the amendment process for are Figure 1:

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

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

- 56 wind turbines with a hug height of 120 m and a rotor diameter of a 120 m;
- Internal and external electrical connections;
- 15 m wide access roads that are 15 km in length; and
- Additional infrastructure (includes a lay down area, a temporary site compound area for contractors and a borrow pit).

3.2 Proposed Amendments

The turbine technology available for the authorised specifications, i.e. a 120 m hub height and rotor diameter, is no longer the preferred wind turbine technology since these have become obsolete and more efficient turbines (i.e. megawatt output per turbine) is now available in the market. Mainstream therefore wishes to amend the authorised turbine specifications to up to 150 meter hub height and up to 150 m rotor diameter which is aligned with the preferred turbine technology currently available in the market. In addition to this, due to the proposed amendment in turbine specifications, the authorised layout will also change to accommodate the larger turbines.

The authorised turbine layout and associated road network and the proposed amended layout are shown in Figure 2 below. This map includes the various environmentally sensitive features that were considered as part of the original EIA (2011) and 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.

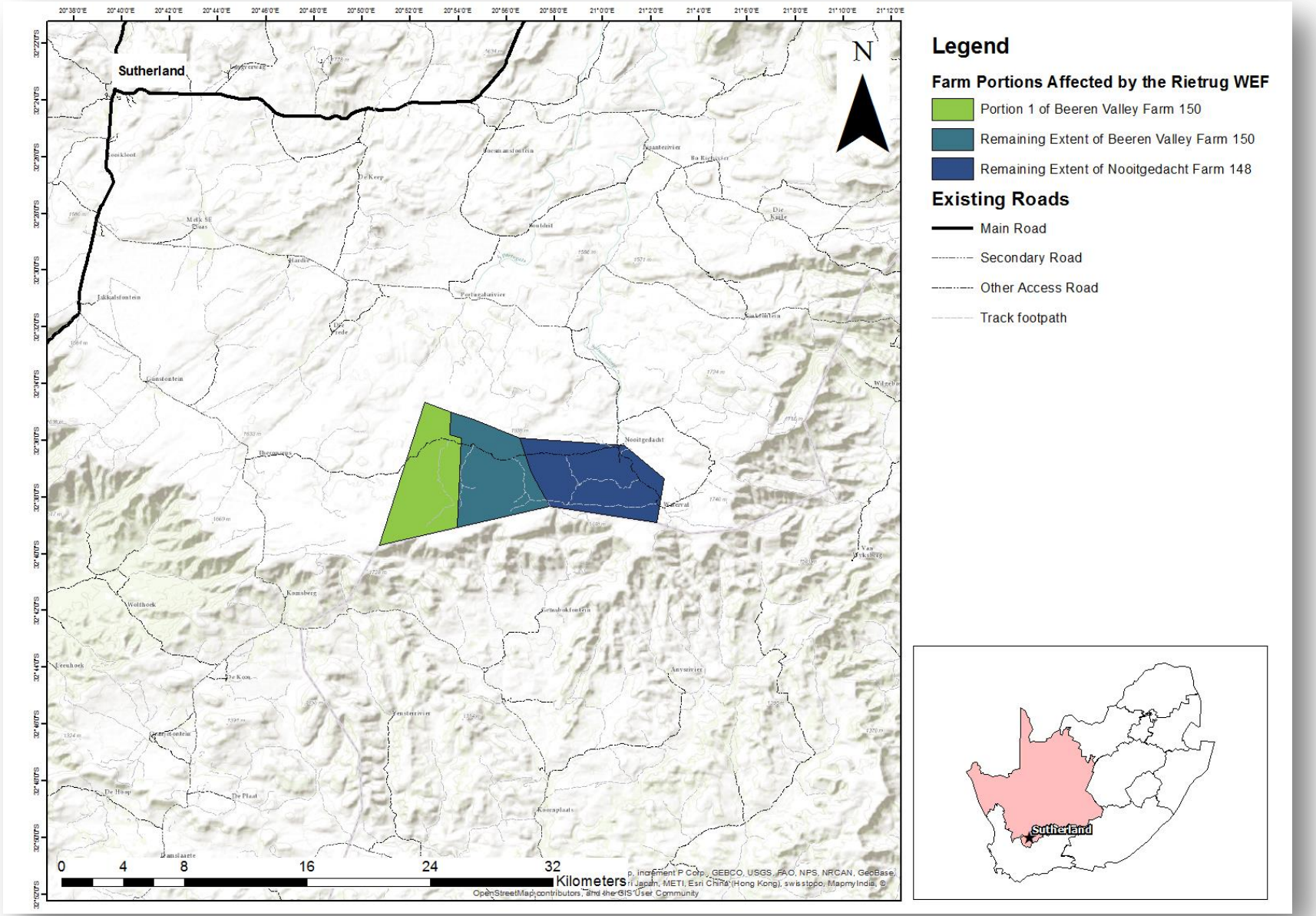

Figure 1. Location of the approved Rietrug WEF

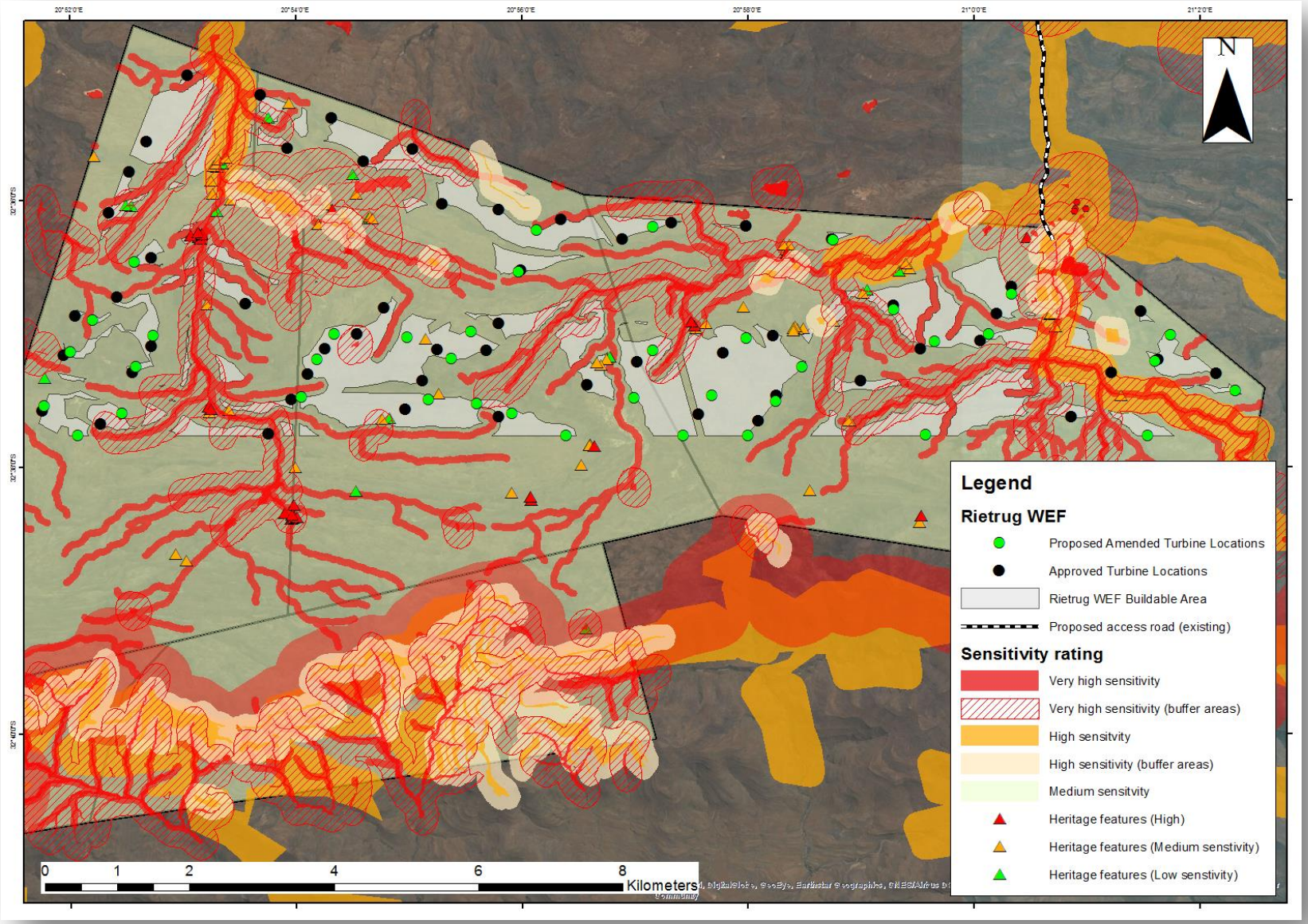

Figure 2. Proposed amendment layout (green dots) and approved layout as per the EA obtained in 2016 (black dots)

4. Impact assessment of the proposed amendments

4.1 Summary of impact assessment previously undertaken

The EIA undertaken in 2011 assessed the impact of developing the Sutherland REF. 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 facility. The pre-mitigation and residual impact significance, as detailed within the EIA Report, are included in Table 1 below. For the amendment process undertaken 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). Nevertheless, 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. Therefore, for this assessment, the findings of the original EIA have also been used.

Table 1. Summary of pre-mitigation and residual impacts during construction and operational phases (ERM, 2011).

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		
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 proposed amendments

Specialists have been appointed to provide an assessment on the proposed amendments to the WEF. The appointed specialists are detailed in **Error! Reference source not found.** below. The specialists were requested o confirm whether the original assessment ratings and management actions contained in the original EIA (ERM, 2011) and the Amendment Report (CSIR, 2016) remain unchanged, or whether these are positively or negatively impacted upon. This section summarises the findings of the specialists input. The full specialist input letters/reports are available on request.

Table 2. Appointed specialists for the assessment of the proposed amendments

Specialist	Consultancy	Field of Study	Input provided
Henry Holland	Private Consultant	Visual	Visual considerations (Section 4.2.5)

Simon Bundy	SDP	Terrestrial ecology	Terrestrial impacts (Section 4.2.1)
Dr Jayson Orton	ASHA Consulting	Heritage	Heritage considerations (Section 4.2.6)
Chris van Rooyen	Private Consultant	Avifauna	Avifaunal impacts (Section 4.2.2)
Werner Marais	Animalia	Bats	Bat impacts (Section 4.2.3)
Morne de Jager	Enviro Acoustic Research cc (EAR)	Noise	Noise impacts (Section 4.2.4)

4.2.1 Terrestrial ecology

This opinion is based on:

1. A site reconnaissance of the region undertaken in November 2016.
2. Review of relevant literature and data associated with the region and wind energy facilities.
3. Consideration of the nature of physical drivers associated with the broader environment and the influence that changes in such parameters may have on these drivers.

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 3). 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 (SDP, 2017).

Figure 3. Image depicting nature of habitat along escarpment (SDP, 2017).

It is evident that the authorised REF (ERM, 2011) gave consideration to 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.

In respect of 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 wind turbine facilities, 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 EIA undertaken in 2011 evidently identified that impacts associated of the construction and operation of wind turbines on the local ecosystem(s) are considered to not be significant.

2. An increase in the rotor diameter is expected to alter the wind regime at a localised level around the turbines.

Given the above, Table 2 below, presents a qualitative review of the impacts that may arise from the proposed changes to the WEF.

Table 2. Summary of impacts associated with changes in turbine parameters and significance of impacts

Possible habitat change	Possible faunal change	Significance of impact
1. Change in structure of vegetation at a physical level 2. Change in propagule dispersion modes and habitat species composition	1. Physiological changes in smaller mammals and invertebrates leading to ousting of species from some areas to the lee of the WEF. 2. Behavioural change in animals in and around turbines due to noise.	Low to Very low

Conclusion

From the above, it is evident that research is very scant in respect of the impacts of wind turbines on ecological processes and fauna, with the exception of research on bats and birds. In addition, the impact on the leeward wind regime associated with the change in the number of turbines and the design of the rotors remains unknown. Given these facts, a conclusion must be drawn that the impact of the amendments to the WEF remains unknown and cannot be determined given the present state of knowledge on this matter. Our general assumption would be that given the present authorisation of the WEF, the stated amendments and alterations to the design of the turbines **would not elicit any change in the broader ecological state of the subject site, going forward** (Bundy, 2017).

4.2.2 Avifaunal

Chris van Rooyen Consulting, who undertook the required 12-month pre-construction avifaunal monitoring on site, was approached by Mainstream to comment on the potential impact on avifauna of a proposed amendment to the turbine dimensions of the above three wind energy facilities. The proposed amendment comprises a change to a maximum rotor diameter of 150m (previously 120m) and a hub height of 150m (previously 120m).

The proposed changes to the turbine dimensions **do not materially affect the findings and recommendations of the Avifaunal Pre-construction Monitoring Report** which was completed in August 2016, especially with regard to the envisaged collision risk (van Rooyen, 2017).

Conclusion

As can be seen from a literature survey, the weight of published findings indicate that rotor swept area is not a key factor in the collision risk. In conclusion therefore we are of the opinion that the increase in turbine height and rotor size will not materially influence the collision risk to priority species at the proposed wind energy facilities.

The key mitigation measures proposed to reduce the risk of avian collisions with the turbines are appropriate buffer zones in high risk areas (already incorporated in the lay-out) and intensive carcass surveys during post-construction monitoring. Based on the results of these surveys, the selective curtailment of turbines could potentially be implemented, if deemed necessary. The effectiveness of this mitigation measure will depend on the thoroughness of the post-construction monitoring and the cooperation of the wind farm operator to implement curtailment when required to do so. The effectiveness of these mitigation measures will not be affected by the proposed change in turbine dimensions or layouts.

4.2.3 Bats

The proponent is requesting an amendment of the rotor diameter from 120 m to 150 m with the hub height increasing from 120 m to 150 m. This results in a 10 m increase of the lowest rotor swept height from 60 m to 70m.

A negative correlation between bat activity and height was found on site, in other words bat activity decreased with height above ground level (comparing 10m with 80m). Therefore, the increased lowest rotor swept height may be favourable as it may decrease possible risks to bats, and will be considered during the design of possible mitigation measures, if needed.

However, the increased rotor diameter results in a larger airspace affected around each turbine, meaning that each turbine is effectively a distance of approximately 10 m closer to sensitivities and their buffers. The final

preconstruction bat monitoring report recommends that turbines located within High Bat Sensitivities and their buffers must be removed or relocated, and that the turbines located within Moderate Bat Sensitivity areas and buffers must be prioritised during operational monitoring and will require mitigation measures outlined on conclusion of the full 12-month study. **Therefore, due to the increased rotor diameter all turbines should be a minimum of 10 m from high sensitivity buffers.**

Conclusion

In conclusion, from the results gathered and understanding and insight gained on the site, **it is not believed that the positive increased hub height in combination with the negative increased rotor diameter will result in a significant change to the proposed mitigation measures and outcomes of the preconstruction monitoring**. The effects of the increased diameter will be monitored during operational monitoring, similarly as to how the effects would have been monitored with the original rotor diameter. **On condition that the turbine layout is cognisant of the bat sensitivity map, Animalia has no objection to the proposed change of turbine dimensions** (Marais, 2017).

4.2.4 Noise

Enviro-Acoustic Research CC (EAR) was contracted by Mainstream to conduct an Environmental Noise Impact Assessment (ENIA) to determine the potential noise impact on the surrounding environment due to the proposed changes in the project. The changes include a layout amendment and increase in hub height and rotor diameter of the authorised turbines from 120 m (hub height and rotor diameter) to 150 m (hub height and rotor diameter).

This study considered local regulations and both local and international guidelines, using the terms of reference (ToR) as proposed by SANS 10328:2008 to allow for a comprehensive ENIA report.

Baseline Assessment

Ambient sound levels were previously measured (for other projects) at three (3) locations over a period of at least two (2) night-time periods, augmenting the data with a number of 10 minute measurements. Sound measurements indicated an area with a potential to become very quiet, with wind-induced noises impacting on the ambient sound levels.

Measurements illustrate the rural character of the area during periods with light or no winds, with mainly natural sounds defining the acoustic character. The area is considered Rural in terms of the SANS 10103:2008 Rating Level.

The potential Noise Sensitive Developments (NSD) present within the vicinity of the Rietrug WEF are shown in the figure below (Figure 4).

Figure 4. Potential Noise Sensitive Developments shown in green dots

Noise Impact Determination and Findings

With the modelled input data as used, this assessment indicated that the potential noise impact would be of a **very low significance during the construction and operational phase**. Please refer to Figure 5 below for the project noise rating levels of the Rietrug WEF during operation (assuming the turbine height is 150 m and the rotor diameter is 150 m).

Figure 5. Projected conceptual noise rating levels of the Rietrug WEF during operation (De Jager, 2017)

Cumulative noise impacts generally only occur when noise sources (such as other wind turbines) are closer than 2,000m from each other (around 1,000m 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.** Please refer to Figure 6 below for the cumulative noise rating levels.

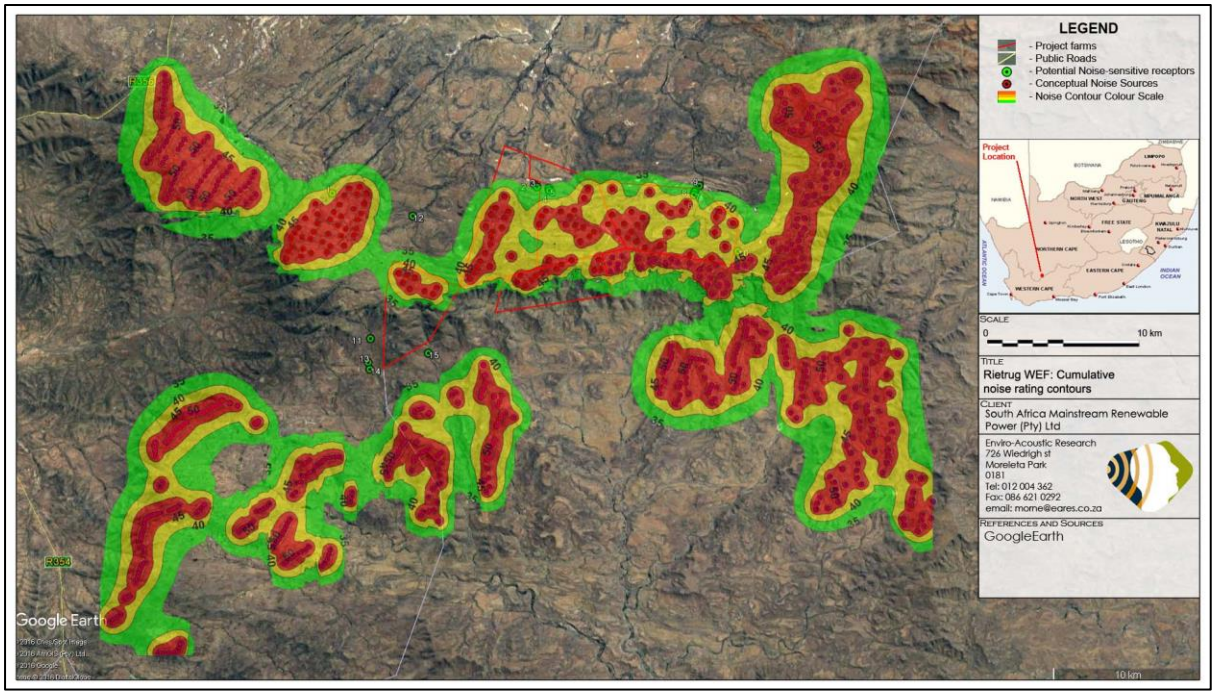

Figure 6. Projected conceptual night-time cumulative noise rating levels (Rietrug WEF and other WEFs in area) (De Jager, 2017.

This assessment indicates that the proposed amendment could have a slight noise impact on the surrounding area, as there are NSDs within the (potential) area of acoustical influence of the construction activities and operating wind turbines. Considering the findings of the previous noise impact assessment (Jongens, 2011), **the change in the layout resulted in a measurable reduction in noise levels at most NSDs.**

Management and Mitigation of Noise Impact

Mitigation options that should be included in the EMP

- The developer must investigate any reasonable and valid noise complaint if registered by a receptor staying within 2,000m 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.

Recommendations and Conclusions

Considering the very low significance of the noise impacts (inclusive of cumulative impacts), there is no reason that the proposed amendment to the hub height and rotor diameter (from 120m to 150m) and associated layout change of the Rietrug WEF should not be authorised

4.2.5 Visual

Two viewsheds were calculated for each project: 120 m high turbines (as per the EA) and 150 m high turbines (as per the proposed amendment). Visual exposure for each layout was calculated using the viewsheds and distances from turbines. Visual exposure is defined as the relative visibility of a project or feature in the landscape, and is related to the distance between the observer and the project. Exposure and visual impact tend to diminish exponentially with distance since the observed element comprises a smaller part of the view. Visual exposure is classified as follows:

- High – dominant or clearly noticeable;
- Moderate – recognisable to the viewer; and
- Low – not particularly noticeable to the viewer

The table below (Table 3) shows the viewshed areas for the two scenarios (i.e. turbines with a hub height of 120 m and turbines with a hub height of 150 m), as well as the number of buildings that will potentially have views of wind turbines (the screening effect of buildings and vegetation is not taken into account). An area within 20 km of the wind turbines was used to calculate the viewshed areas.

Table 3. Viewshed analyses for the two scenarios (Holland, 2017)

WEF Layout	Viewshed Area (within 20 km distance from turbines)	Visual Exposure (Number of Buildings Affected)			
		Low	Medium	High	Total
Rietrug WEF 120 m High Turbines	610 km^2	73	8	41	122
Rietrug WEF 150 m High Turbines	680 km^2	86	8	41	135

Discussion

The original VIA Report included the visual impact of 325 wind turbines in the area now approved for the Sutherland WEF, Sutherland 2 WEF and Rietrug WEF. Combined, the authorised three WEFs contain less than half the number of turbines originally proposed as part of Mainstream's Renewable Energy Facility (325 turbines versus the current combined total of 159 turbines). Wind turbines are highly visible structures in most landscapes due to their height, colour (in contrast with most background colours) and the motion of the blades. Their visibility is also a function of layout (i.e. where the turbines are located) and the topography of the landscape. Given that in total there will be fewer turbines constructed on site (compared to the original EA), it is more likely that a smaller number of visual receptors will be affected. The visual impact of the reduction in the total number of turbines was assessed as part of the amendment process undertaken in April 2016 and subsequently approved by the DEA.

The viewshed analysis shown in Table 3 above and in the figures below (Figure 7 and Figure 8) provides an indication of the potential effect that a change in turbine height may have on the significance of visual impacts as discussed in the original VIA Report. It is clear from the results that there is very little difference in viewshed area as well as the number of potential sensitive visual receptors that will be highly or moderately exposed to wind turbines. The change in number of buildings (as proxy for sensitive visual receptors) for moderate and

high visual exposure is, in all three cases, limited to farmsteads. In other words, the change in turbine height will not affect a higher number of farmsteads. There will be a few more buildings at some of the farmsteads that will potentially be highly exposed to the 150 m wind turbine and only moderately exposed to the 120 m wind turbines. Many of these buildings are not residences but other farm buildings. The most significant change occurs at distances beyond about 8 km from the turbines. For instance, there are 13 buildings for which 120 m turbines will not be visible but which will have low visual exposure to 150 m turbines. **In general, due to topography, the number of wind turbines and the height of wind turbines, an increase in turbine height will only affect visual receptors further away in that the rating might change from 'Not Visible' to 'Low' visual exposure.** The topography of the region, although highly varied, cannot efficiently hide structures of this height and number.

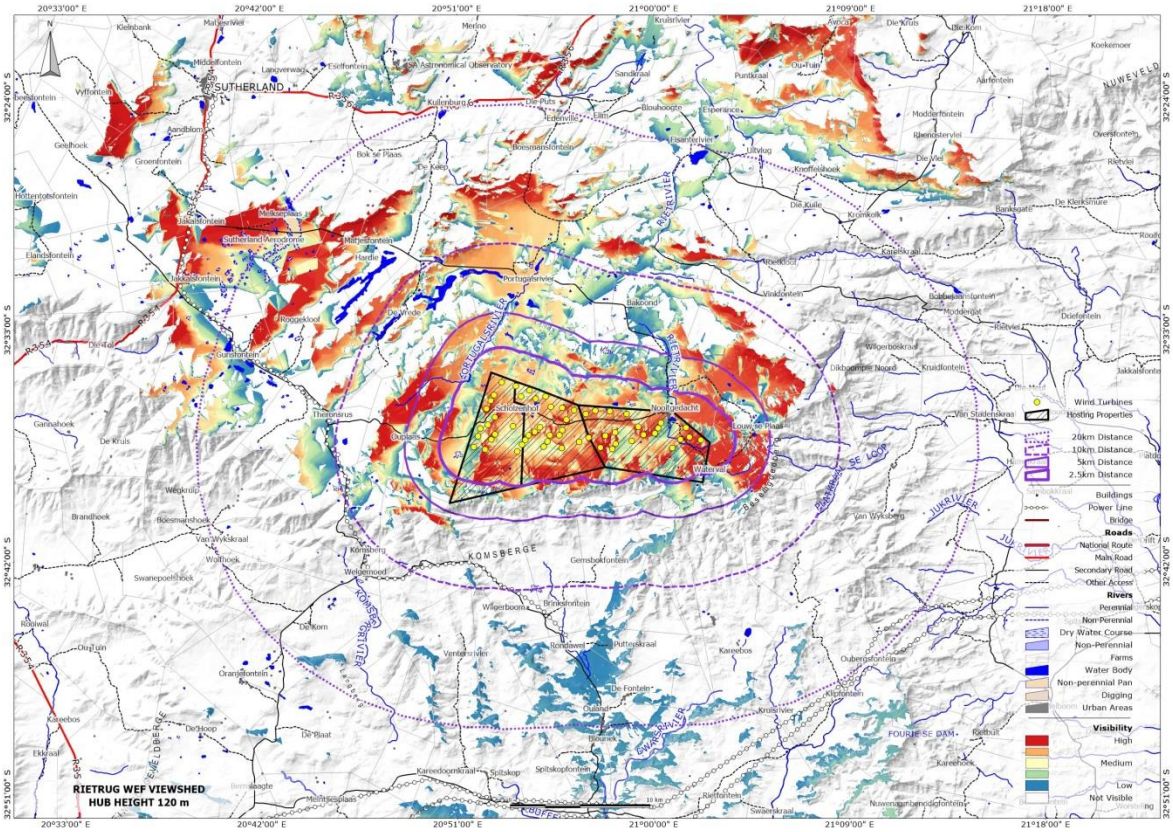

Figure 7. Cumulative viewshed for the Rietrug WEF with 120 m high wind turbines (Holland, 2017)

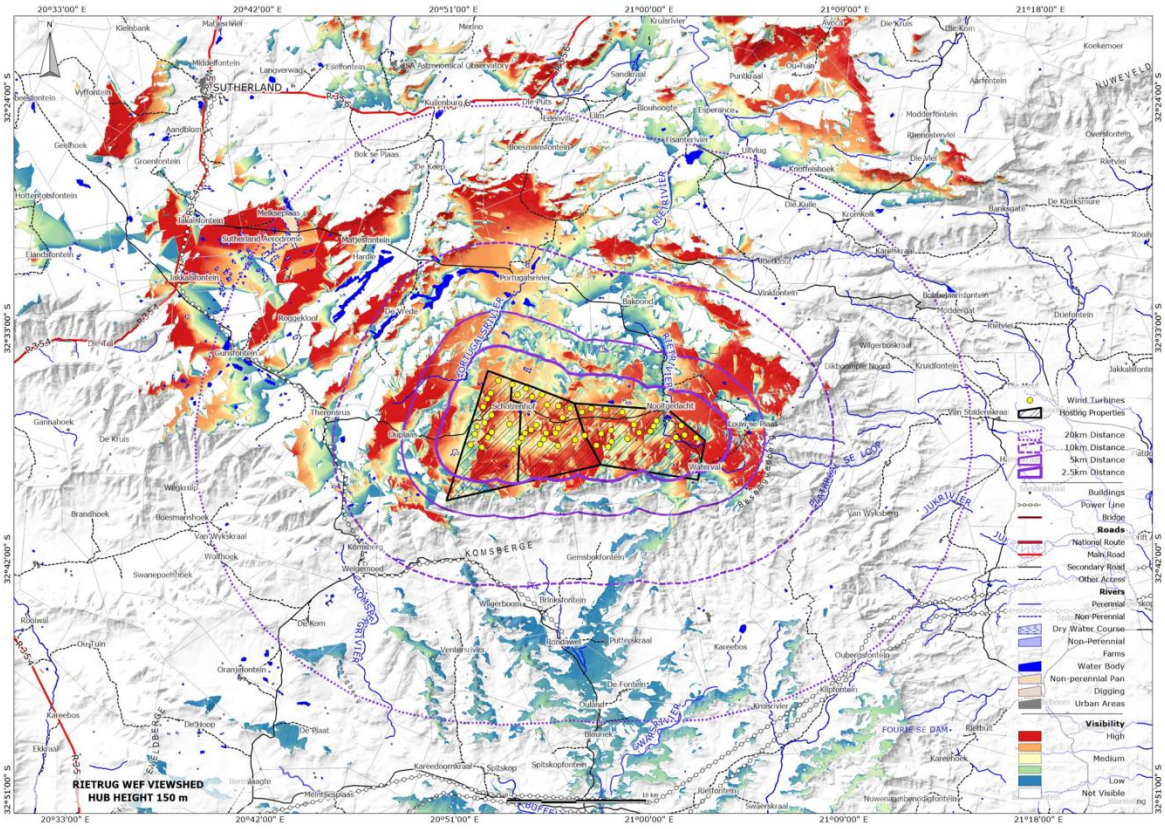

Figure 8. Cumulative viewshed for the Rietrug WEF with 150 m high wind turbines (Holland, 2017)

Conclusions

The change in height of wind turbines from 120 m to 150 m will not introduce any new visual impacts and the significance of potential visual impacts as assessed in the original VIA Report will at worst remain the same (for all three projects combined – there will be fewer wind turbines to cause visual impact, as per the EAs issued in 2016 compared to the 2011 project layout). The original VIA Report (Oberholzer and Lawson, 2011) rated the visual impact on fixed positions and temporary receptors as High before mitigation with residual impact significance after mitigation as Medium-High. Mitigation measures listed in the VIA Report remain valid and include:

- A visual buffer of 500 m for the wind turbines from the local district roads.
- A 250 m setback of the wind turbines from farm boundaries should be observed.

In conclusion, the change in turbine height for these three projects will not alter the significance of visual impact as assessed in the VIA Report for which the original project received Environmental Authorisation. The change in turbine height will also not affect the significance of visual impact for each separate project (Sutherland, Sutherland 2 and Rietrug WEF) since the criteria used to assess the visual impact remains the same for each project (there are highly sensitive visual receptors in each case which will be highly exposed to wind turbines and visual intrusion on their existing views is likely to be high). **There is no reason, in terms of visual concerns, why the amended project should not receive authorisation if the original project received it** (Holland, 2017).

4.2.6 Heritage environment

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. An increase in turbine height and rotor diameter from 120 m to 150 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 and that there are now considerably fewer turbines planned in total. It is likely that the contextual/visual impacts to the landscape and any other visually sensitive heritage features will, in fact, be reduced. There will be no new impacts.

Having fewer turbines and related roads (Amendment 1, undertaken in 2016) is likely to create a benefit (positive impact) that will substantially outweigh the negative impact introduced by a 25% greater turbine height and rotor diameter (Amendment 2, this application). It is thus my opinion that the Amendment application to increase the turbine height and rotor diameter from 120 m to 150 m of concern here is totally acceptable in terms of impacts to heritage resources and that, as was the case with the earlier amendment, no further heritage-related work is required. **The proposed increase in hub height and rotor diameter should be authorised** (Orton, 2016)**.**

5. CONCLUSION

5.1 Environmental sensitivity map overlain with the proposed amended layout

Based on the studies outlined above and the findings thereof, a map has been produced (Figure 9) to show all the environmental features and their respective buffers (where applicable) that were identified by the various specialists. The map, in turn, was used to determine the buildable area of the WEF. As stated previously, the buildable area is the development envelope of the Rietrug WEF which determines the development constraints for this project.

The proposed amended layout, which incorporates the larger 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 EA issued.

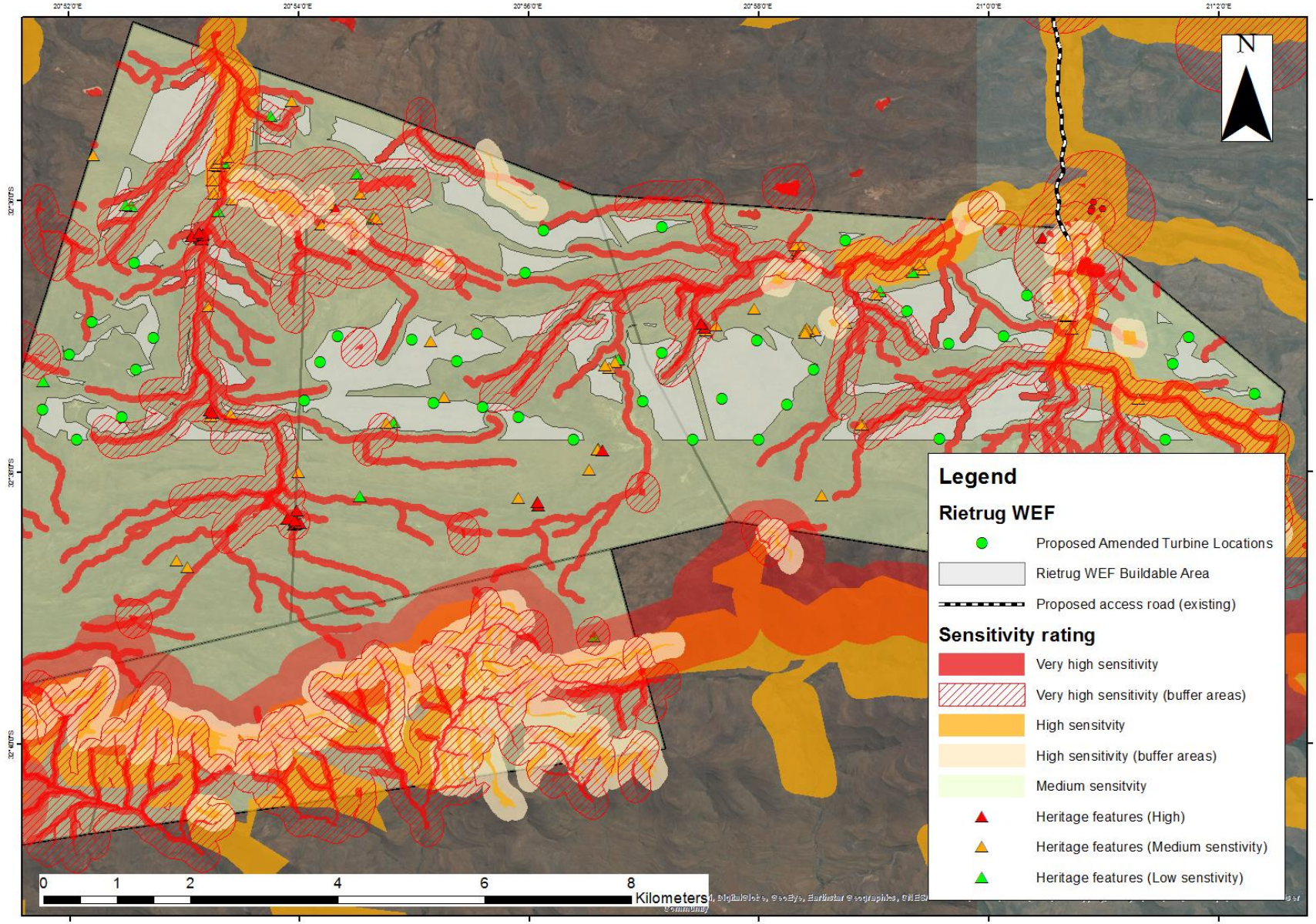

Figure 9. Environmental sensitivity map overlain with the amended turbine locations for the Rietrug WEF

5.2 Recommendation of the EAP

The EIA Regulations require that the advantages and disadvantages of granting the application must be outlined. In terms of advantages, granting the amendment application will mean that Mainstream will be enabled to construct turbines on site which are in line with the current turbine technology available in the market. This will, in turn, enable Mainstream to have a feasible project to potentially bid in the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). In terms of disadvantages, this project will have an impact on the environment, as assessed during previous studies and confirmed during this assessment. However, **the impacts have been deemed to be mitigatable and acceptable, since this project has received EA from the DEA and no additional impacts have been identified to occur due to proposed amendments being implemented.**

It is proposed that the Rietrug WEF, should the amendments applied for be granted, will consist of the following components, detailed in Table 4.

Table 4. Rietrug WEF components and respective dimensions

Component	Description /demission
Wind turbine generators	Up to 56 turbines Height of up to 150 m and rotor diameter of up to 150 m
Internal and external electrical connections	The wind turbines will be connected to another by means of medium voltage cables. The cables will be buried approximately 1m below ground level
Access roads	• An internal gravel road network will be constructed to facilitate movement between turbines on site. • Roads will be 15 m wide and 8 km in length, including drainage and cabling. • Some existing public roads may need to be upgraded to facilitate the turbine transport.
Additional infrastructure (includes a laydown area, a temporary site compound area for contractors and a borrow pit)	• A hard standing laydown area of a maximum of 10,000m^2 will be constructed. • A site compound will be constructed for all contractors, this would be approximately 5,000m^2 in size. • A number of borrow pits may be distributed around the site. These will be backfilled as far as possible once construction is complete.

Based on the information available to the EAP and the specialist input received and outlined within Section 4.2 of this report, it is clear that no additional impacts are anticipated due to the increase in turbine height and rotor diameter. In addition to this, the amended layout still occurs within the buildable area and avoids all environmental sensitive features identified. **It is therefore the opinion of the EAP that the proposed amendments of the turbine specifications and associated layout can be approved.**

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