

Witberg Wind Energy Facility and associated infrastructure, Western Cape Province

Motivation for amendment of Environmental Authorisation

DEA Ref.: 12/12/20/1966/AM6

November 2018

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PROJECT DETAILS

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- Client** : Witberg Wind Power (Pty) Ltd
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PURPOSE OF THE REPORT

Witberg Wind Power (Pty) Ltd received an Environmental Authorisation (EA) for the construction of Witberg Wind Energy Facility and associated infrastructure in the Western Cape Province (DEA ref: 12/12/20/1966) on 13 October 2011. An appeal decision (Reference: LSA 105-439), dated 13 August 2013, was subsequently issued by the Minister of Environmental Affairs reducing the number of originally authorised wind turbines from 70 to 27 turbines, along with revised turbine specifications. However, a number of amendments to the EA and the authorised turbine specifications according to the appeal decision are now required. Firstly, the project is intended to be bid into future rounds of the Department of Energy's (DoE) Renewable Energy Independent Power Producers Procurement (REIPPP) Programme. There have been advancements to wind turbine technology since the issuing of the EA and the appeal decision. Therefore, the authorised turbines will no longer be most competitive for the project in terms of production and economic viability of the project.

In this regard, Witberg Wind Power (Pty) Ltd is considering an updated turbine model for the project. An amendment to the authorised turbine specifications are required as follows:

- » Range of Hub height: from 92m to a **range from 92m to up to 120m**;
- » Range of Rotor diameter: from 116m to a **range from 116m to up to 136m**; and
- » Range of Wind turbine capacity per wind turbine: from 3MW to a **range from 3MW to up to 5MW**.

In addition, an amendment to the wind farm layout is required to avoid sensitive areas, and to optimise the layout. Therefore, the number of wind turbines will be reduced from 27 wind turbines to **25 wind turbines**, and the wind turbines and associated infrastructure will be re-positioned within the originally assessed site.

In addition to the above amendments of turbine specifications and layout, the following Part 1 amendments are being applied for:

- » The contact person and relevant details are to be updated and added for the holder of the EA.
- » Minor spelling corrections are to be requested for the minor details of two (2) of the authorised listed activities in the EA.
- » An extension of the validity of the EA by a further two (2) years is requested.
- » Amendment to the height of the wind measuring masts from 80m to 120m (in line with new wind turbine hub height) is requested.
- » Condition 40 of the EA, as per additional conditions to be added to the EA, in the amendment of the EA (Ref: LSA 105-439), is requested to be amended so that Condition 40 is correctly addressed to the Holder of the EA (i.e. Witberg Wind Power (Pty) Ltd).
- » Amendment to consolidate all EAs, amendments and appeal decisions into one EA.

The above requested amendments are proposed for several reasons including:

- » To increase the efficiency of the facility and consequently the economic competitiveness thereof;
- » avoidance of sensitive areas (bat sensitivities and Verreux's Eagle nest buffer 1.5km);
- » For optimisation of the layout;
- » Updating and adding the relevant contact details of the Holder of the EA;
- » Correcting spelling errors contained in two (2) of the activities authorised in the EA;

- » Extension of the validity of the EA such that the project can be bid into future rounds of the REIPPP Programme;
- » Increase in the height of the wind measuring masts to enable monitoring of the wind resource at hub height; and
- » Amend Condition 40 to correctly address the Holder of the EA.
- » Given that there are a number of amendments and appeal decisions on the environmental authorisation it is also requested that all environmental authorisations and appeal decisions are consolidated into one EA. The reason for this is to have a consolidated EA which contains all the relevant conditions for the proposed development, thereby facilitating compliance monitoring by both the applicant and the DEA during implementation of the project.

The proposed amendments in themselves are not listed activities and do not trigger any new listed activity. No additional properties will be affected by the amendments as the proposed amendments are within the originally authorised development footprint.

In terms of Condition 5 of the Environmental Authorisation and Chapter 5 of the EIA Regulations of December 2014 (as amended, on 07 April 2017), it is possible for an applicant to apply, in writing, to the competent authority for a change or deviation from the project description to be approved. Savannah Environmental has therefore submitted an application for amendment for the above-mentioned amendments, on behalf of Witberg Wind Power (Pty) Ltd, to the Department of Environmental Affairs (DEA).

Savannah Environmental has prepared this motivation report in support of the amendment application on behalf of Witberg Wind Power (Pty) Ltd. This report aims to provide detail pertaining to the significance and impacts of the proposed change to the wind turbine specifications, the wind farm layout and increase in height of the wind measuring masts (amongst the other specified amendments listed above) in order for interested and affected parties to be informed of the proposed amendments and to provide an opportunity for comment to the public, and for the competent authority to be able to reach a decision in this regard. This report is supported by specialist studies in order to inform the final conclusion regarding the proposed amendments (refer to **Appendix A – H** of this report). This main report must be read together with these specialist studies in order to obtain a complete understanding of the proposed amendments and the implications thereof.

This motivation report will be made available to registered and potential interested and affected parties for a 30-day period from **14 November 2018 to 14 December 2018**. The availability of the report was advertised in the *Wocester Standard* (local newspaper) on **15 November 2018**. The Motivation Report was also made available at the Laingsburg Public Library (Van Riebeeck Street, Laingsburg). The report will be available for download at www.savannahsa.com/projects. CD copies are available on request from the contact person below. To obtain further information, register on the project database, or submit written comment please contact:

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All comments received during the review period will be included within a Comments and Responses (C&R) Report to be submitted to the DEA with the final motivation report.

1. OVERVIEW OF THE PROJECT

Location:

The authorised Witberg Wind Energy Facility (WEF) is located on a site ~9km west of Matjiesfontein in the Laingsburg Local Municipality, which falls within the jurisdiction of the Central Karoo District Municipality in the Western Cape Province. This development is to be constructed within the project site which comprises the following farm portions:

- » Remainder of the Farm Jantjesfontein 164;
- » Remainder of the Farm Besten Weg 150;
- » Remainder of Portion 1 of the Farm Besten Weg 150;
- » Remainder of the Farm Tweedside 151;
- » Remainder of the Farm Elandskrag 269; and
- » Portion 1 of the Farm Elandskrag 269.

Potential Environmental Impacts as determined through the EIA Process:

From the specialist investigations undertaken within the Environmental Impact Assessment (EIA) process for the wind energy facility (Final Environmental Impact Report (FEIR), dated July 2011), no environmental fatal flaws were identified. However, several 'no go' areas were identified on the site including areas of sensitivity in respect of birds, fauna and flora, and visual. In addition, the following environmental impacts were identified:

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

Witberg Wind Power (Pty) Ltd received an EA for the construction of Witberg Wind Energy Facility and associated infrastructure in the Western Cape Province (DEA ref: 12/12/20/1966) on 13 October 2011. An appeal decision (Reference: LSA 105-439), dated 13 August 2013, was subsequently issued by the Minister of Environmental Affairs reducing the number of originally authorised wind turbines from 70 to 27 turbines, along with revised turbine specifications, as guided by the inputs of the Independent Bird Specialist (Dr. Steve Percival – Shoney Renewables Consulting), who conducted a Collision Risk Modelling Report, dated 2013.

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

From the specialist investigations undertaken as part of the original Environmental Impact Assessment (EIA) for the wind energy facility, it was concluded that the majority of impacts were of minor to moderate significance with the implementation of appropriate mitigation measures. Environmental specifications for the management of potential impacts are detailed within the approved Environmental Management Programme (EMPr) which was approved as per Condition 13 of the EA.

The layout assessed during the EIA process undertaken for the project is illustrated in **Figure 1.1**. Areas of sensitivity identified during the EIA process include:

» Birds:

- This is a medium-sized proposed Wind Farm development, for a site with a moderate to high degree of sensitivity with respect to avifauna. There are no regionally or nationally critical populations of impact susceptible species within or close to the development area, and the proposed site does not impinge on any known major avian fly-ways or migration routes. However, it does seriously impinge on an important landscape feature – the Witberg ridge, and may have a significant negative effect on the avifauna of this ridge (including breeding pairs of large eagles and concentrations of localised endemic species) in both the construction and operational phases of the development.

» Bats:

- The higher lying areas on top of the Witberg where the turbines are proposed vary greatly from the lower lying flat areas and the mountain footslopes, where more favourable bat foraging habitat is provided. It has been noted however, that bats may roost in the rocky higher lying areas and move down to the mountain footslopes and lower valley to forage on a nightly basis. Potential roosts on the proposed windfarm site are mainly rock crevices. Additionally, bats may pass over the mountain on a nightly basis to reach foraging habitat on the other side, moving between the mountain peaks.

» Ecology:

- **Flora** – The vegetation of the project site includes the Matjiesfontein Quartzite Fynbos and the Matjiesfontein Shale Renosterveld. The Matjiesfontein Quartzite Fynbos should be viewed as a generally more sensitive vegetation type than the Matjiesfontein Shale Renosterveld.
 - Portions of the site fall within a Critical Biodiversity Area (CBA), as defined in the Central Karoo Biodiversity Assessment (Skownow *et al.*, 2009), located in the south eastern portion and eastern side of the site.
 - In terms of the listed plant species which occur in the area, a number of critically endangered species occur within the general area. These include *Gasteria disticha*, *Gibbaeum nebrownii* and *Protea convexa*. The first two species are associated with more arid environments and are not likely to occur within the area earmarked for development. *Protea convexa* occurs on north-facing slopes within the Matjiesfontein Quartzite Fynbos of the area. Several other listed species such as *Leucadendron teretifolium* and *Leucadendron cadens* were common at the site in areas earmarked for development. *Leucadendron teretifolium* is listed as Near Threatened while *Leucadendron cadens* is listed as Rare and is a narrow Witteberg endemic. Both of these species were very common along the tops of the ridges, and *Leucadendron teretifolium* formed dense populations in some places. Given the abundance and distribution of these species relative to the proposed footprint of the wind farm, it is inevitable that some individuals of these species would be lost should the development proceed. As both of these species are locally abundant, the loss of some individuals should not impact the viability of the local populations.
- **Fauna** – At least 50 mammal species potentially occur at the site. The diversity of habitats available at the site, which includes rocky uplands, densely vegetated kloofs and riparian areas, as well as open plains and low shrublands, a high proportion of the mammal species which potentially occur in the region are likely to be present at the site.

- The only mammal species of conservation concern which could be perceived to occur at the site is the Riverine Rabbit, *Bunolagus monticularis*, which is listed as Critically Endangered (IUCN 2010) and is regarded as the most threatened mammal in South Africa. It is highly unlikely the Riverine Rabbit occurs on the Witberg site where the turbines are located due to the fact that it has not been recorded in such high rocky ridges, and is generally found in the lower lying valleys and riverine corridors. Additional studies to ascertain the presence of the Riverine Rabbit at the site were not warranted given the marginal nature of the habitat as well as the fact that the development is not likely to significantly impinge on any potential habitat which may occur at the site.
 - Approximately 47 reptile species potentially occur at the site, comprising 5 chelonians, 15 snakes, 18 lizards or skinks, 2 chameleons and 7 geckos. Only two of these are listed by the IUCN, namely the Namaqua Plated Lizard which is listed as Near Threatened and Fisk's House Snake which is listed as Vulnerable. Both of these species are widely distributed and the site is not known to be an important area for either of them.
 - The semi-arid nature of the site and the paucity of above-ground water render the area generally unfavourable for amphibians.
 - Only eight amphibians are likely to occur at the site. There are no threatened amphibian species known to occur on the site, and that the site is generally unfavourable for amphibian habitation (apart from seasonally wet valleys between ridges).
- » Heritage (Including Palaeontology):
- Aspects of the Witberg site and surrounds that may be of heritage interest include numerous trace fossils in the Witpoort Formation sandstones, historic dry-packed stone walls, Stone Age artefacts, stone ruins and cairn, heritage cement and stone dams, two historic farm complexes (with four graves found in one of the complexes, and a Victorian house and stone barns, with a cement dam dating back to at least 1944 found in the other complex) and visual cultural landscape aspects associated with the sense of place of the area.
 - **Palaeontology** - All the geological horizons in the Study Area are potentially fossiliferous. Consequently, all excavations, whether for road cuttings or foundations, may reveal fresh fossiliferous rock of as-yet unknown significance. The greatest likelihood of new discoveries is in the Kweekvlei, Floriskraal, and Waaipoort Formations of the Witteberg Group, where the significance of any discoveries would be major. Note that if proper palaeontological surveys are conducted during excavation the potential finding of palaeontological resources for furthering scientific knowledge could have a positive impact.
- » Noise:
- The ambient noise level of 33 dBA¹ recorded at the Witberg site is considered typical for the area. The predicted LAeq due to the wind turbines would be less than 20 dBA at and beyond the site boundaries except to the west of land parcel Elandskrag RE/269 where the LAeq² would be between 25 dBA and 30 dBA. All levels would be less than the typical LReq.n³ of 35 dBA and there would therefore be no noise impact on land beyond the wind farm site boundaries.

¹ A-weighted decibels, abbreviated **dBA**, are an expression of the relative loudness of sounds in air as perceived by the human ear. In the A-weighted system, the decibel values of sounds at low frequencies are reduced.

² **LAeq** is the sound level in decibels equivalent to the total A-weighted sound energy measured over a stated period of time.

³ **LReq.n** is the sound rating level for night time.

- In terms of the Western Cape NCR the predicted noise levels would be less than the average measured daytime residual level of 33 dBA. The noise levels would not be considered to be a disturbing noise and no noise mitigation would be required.
- » Visual:
 - The proposed wind farm on the mountain ridgelines would have a low to medium visibility (the latter for a distance of 10 to 12 km), and highly visible for a section of 6km from the N1 National Road. From the main rail line, the wind farm would be medium or highly visible for a 12 to 15 km stretch, and marginally visible from Matjiesfontein, which is a tourist destination. The general area is otherwise sparsely populated, with only a few scattered farmsteads.
 - The physical presence of the proposed Wind Farm may alter the visual character of the landscape, as the proposed infrastructure, particularly the turbines, is in contrast to the rural surrounding landscape.
 - From the view shed analysis of the Final Layout (Alternative 3 – not the currently proposed layout) it can be determined that the Wind Farm would be visible from approximately 75% of the area within a 10 km radius because of the view-shadow effect of the topography.
 - The Witberg Wind Farm would be visible to motorists travelling on all of the above-mentioned roadways to varying degrees (medium to high visibility).
 - The Wind farm would have a high visibility from the secondary roads located on the site.
 - The Wind Farm would be visible from a 10 km distance by the rail line, with visibility ranging from low to high, as the rail line passes close and through a portion of the site.
- » Socio-economic:
 - There are no social recommendations for micro-siting of the wind turbines or associated infrastructure.

In terms of the appeal decision dated 13 August 2013 (Reference: LSA 105-439), the reduction of wind turbines from 70 to 27 turbines along with revised turbine specifications was approved due to avifaunal sensitivities. No-go areas were therefore identified and adhered to at the time in the revised wind turbine layout (Layout Revision 7) (**Figure 1.2**).

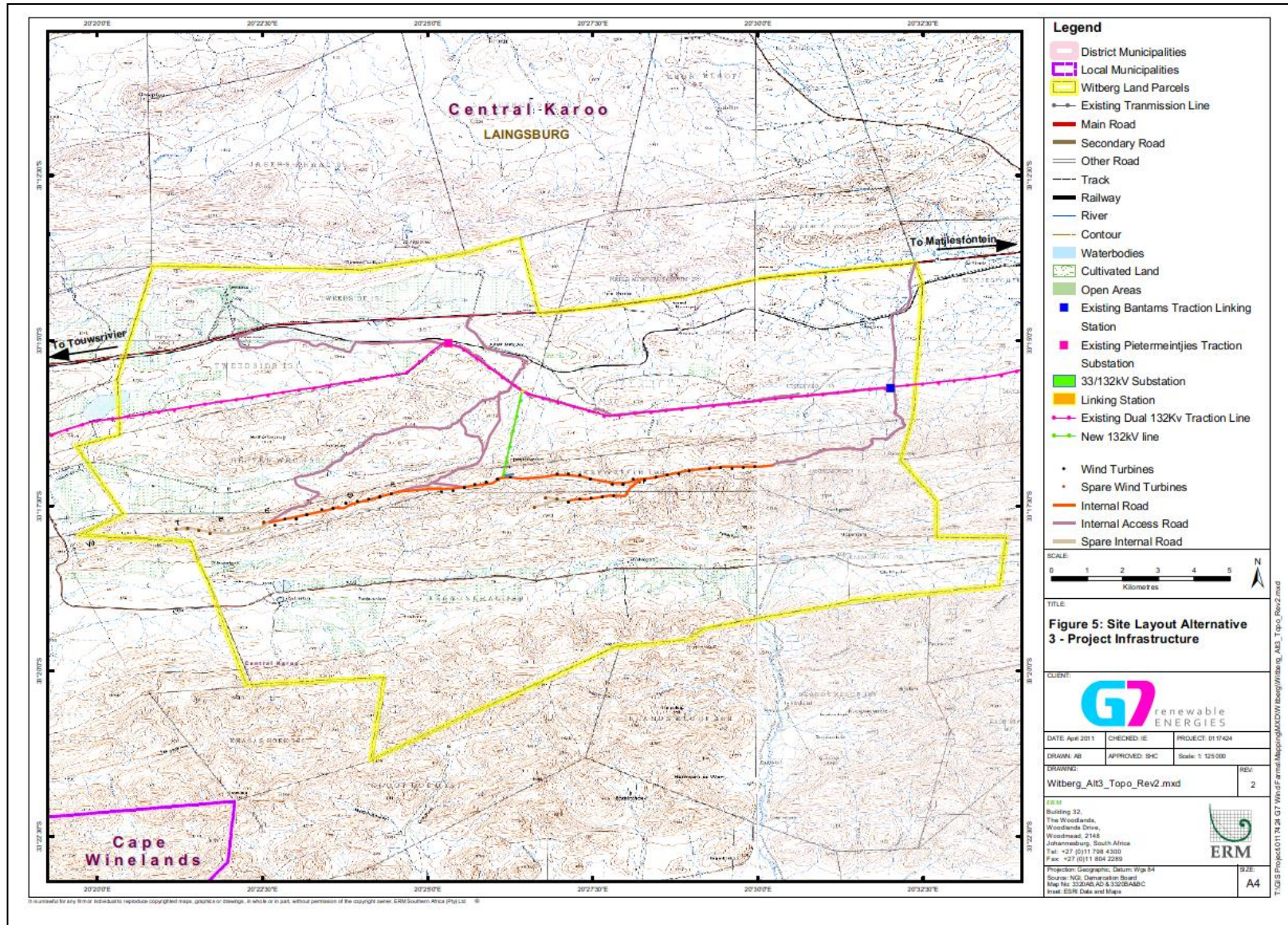


Figure 1.1: The turbine layout approved as part of the EIA process undertaken for the project in 2011 (A3 Map included in **Appendix I**).

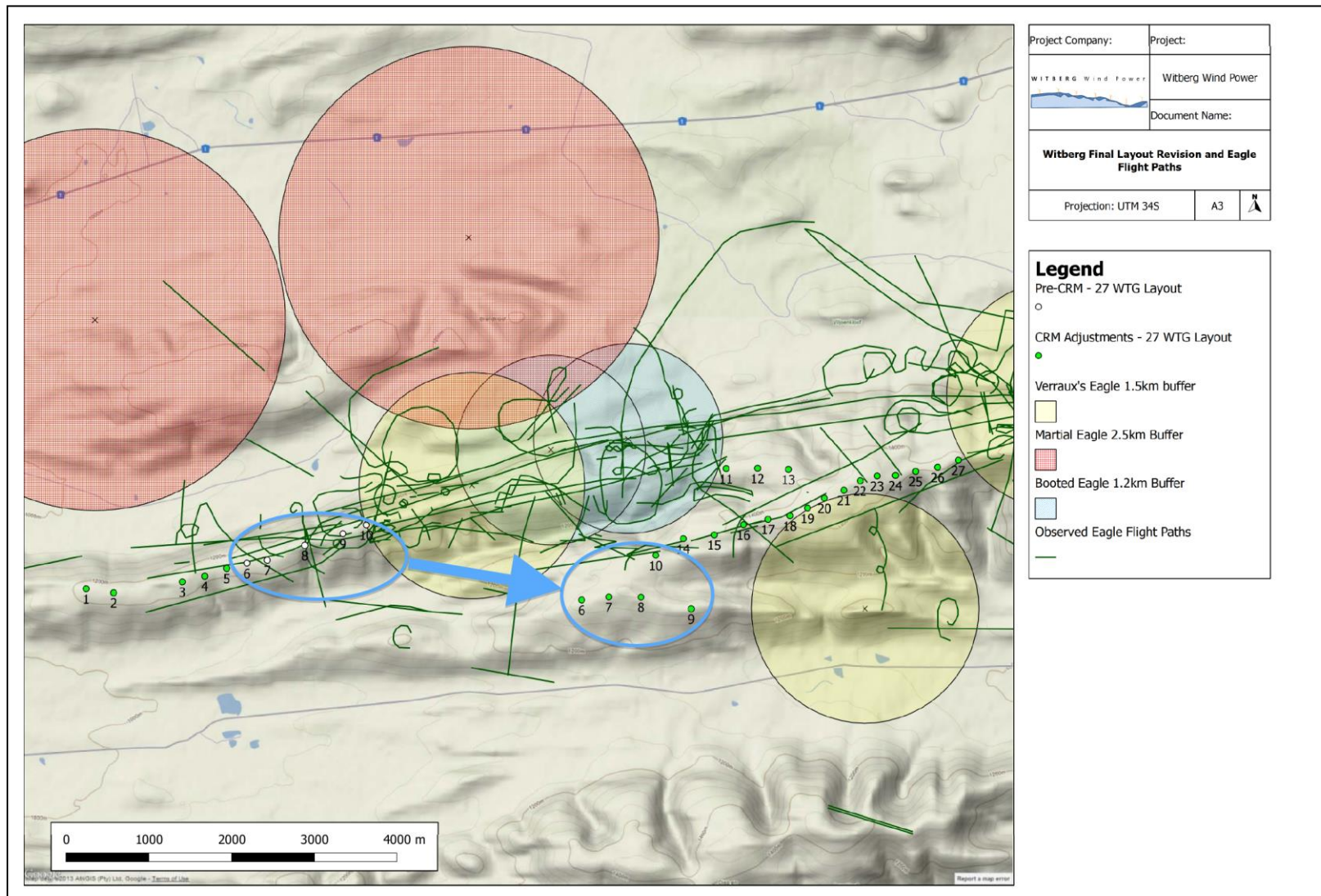


Figure 1.2: The turbine layout authorised as part of the appeal decision dated 2013 – Layout Revision 7 (A3 Map included in **Appendix I**).

2. DETAILS OF THE AMENDMENTS APPLIED FOR

2.1. Turbine specifications

The wind turbine rotor diameter, hub height and output capacity of each wind turbine is not specified in the EA dated 13th of October 2011. It is requested that these be added to the EA. In addition, the applicant is proposing the amendment of the turbine specifications that were authorised in terms of the amended appeal decision dated 13 August 2013. In terms of this decision, additional Condition 35 (to be added after Condition 34 of the original EA) was approved which stipulates 27 wind turbines with the dimensions to be restricted to 92m hub height and 116m rotor diameter. The request to change the wind turbine specifications are shown in **Bold** text as follows:

	Authorised turbine specifications as per the EIA report dated July 2011	Authorised turbine specifications as per appeal decision LSA 105-439 dated 13 August 2013	Proposed Amended turbine specifications
Rotor Diameter	90m	116m	Range from 116m to up to 136m
Hub height	80m	92m	Range from 92m to up to 120m
WTG rating	2 - 3MW	3MW	Range from 3MW to up to 5MW

These **changes in turbine specifications will not have an impact to the contracted capacity of the project** (i.e. 120MW), will fall within the originally authorised development area of the facility and do not trigger any new listed activities.

It is requested that these turbine specifications be amended and added into the project description on page 4 of the EA as follows:

- » **Range of Hub height: up to 120m;**
- » **Range of Rotor diameter: up to 136m; and**
- » **Range of Wind turbine capacity per wind turbine: up to 5MW.**

2.2. Wind Farm Layout

As per the appeal decision, Substitute Condition 1 approves Layout Revision 7. This layout illustrates the approved 27 wind turbines that were revised following the said appeal. The applicant is currently requesting that the layout be amended in order to avoid identified sensitive areas and optimise the layout. The approved Layout Revision 7 did not take full account of the Verreux Eagle nest 1.5km buffer and bat sensitivities. As such, the wind turbine layout has been reduced from 27 turbines to 25 wind turbines, and the wind layout and associated infrastructure have also been re-positioned to take into account the sensitivities. Additionally, the construction camp, substation and associated 132kV overhead power line have been re-positioned to optimise the layout. Approval of the amended wind farm layout is therefore requested.

The updated layout considering these amendments is illustrated in **Figure 2.1**. The sensitivity areas shown are classified as follows:

- » Very High Sensitivity – No-Go areas for wind turbines;
- » High Sensitivity – Acceptable with intensive mitigation measures;
- » Medium Sensitivity – Acceptable with mitigation measures; and
- » Low Sensitivity – Suitable for development.

In addition, the co-ordinates of the power line on Page 4 of the original EA dated 13th of October 2011 will need to be amended as follows (amendments are shown in **Bold** text):

From:

Alternative S1	Latitude	Longitude
Starting point of activity	S33° 17' 28.0"	E20° 23' 46.3"
Middle point of activity	S33° 17' 3.34"	E20° 26' 15.4"
End point of activity	S33° 16' 53.6"	E20° 29' 57.9"

To:

Alternative S1	Latitude	Longitude
Starting point of activity	S33°17'16.80"	E20°27'40.22"
Middle point of activity	S33°16'44.51"	E20°27'41.95"
End point of activity	S33°16'8.69"	E20°27'44.59"

2.3. Update and adding the new contact person and details of the Holder of the EA

The contact person and relevant details of the holder of the environmental authorisation as authorised in EA Amendment 5 (12/12/20/1955/AM5) need to be amended to reflect the new contact person, current postal address, and relevant cell phone and email contact details. The amendments are shown in **Bold** text as follows:

From:

Mr. Paolo Fagnoli
 Witberg Wind Power (Pty) Ltd
 Unit B103a Cape Quarter Piazza
 72 Waterkant Street
 Cape Town
 8001

Telephone Number: (021) 418 3940

Email Address: p.fagnoli@buildingenergy.it

To:

Mr. Matteo Brambilia
 Witberg Wind Power (Pty) Ltd
Postnet Suite 150
Private Bag X3
Roggebaai

8012

Telephone Number: (021) 418 3940

Cellphone Number: 079 180 3060

Email Address: m.brambilla@buildingenergy.it / s.harris@buildingenergy.it

2.4. Correct details in the listed activities as authorised in the original EA (12/12/20/1966) dated 13 October 2011

The correction of spelling errors in the listed activities as authorised in the original EA (12/12/20/1966) dated 13 October 2011 are requested for the following two activities as follows (the amendments are shown in **Bold** text):

From:

GN R.386 Item 1(m)

The construction of facilities or infrastructure, including associated structures or infrastructure, for any purpose in the one in ten year flood line of a river or stream, or within 32 metres from the back of a river or stream where the flood line is unknown, excluding purposes associated with existing residential use, but including (i) canals; (ii) channels; (iii) bridges; (iv) dams; and (v) weirs.

GN R.386 Item 7

The above ground storage of a dangerous good, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30 cubic metres and less than 1 000 cubic metres at any one location or site.

To:

GN R.386 Item 1(m)

The construction of facilities or infrastructure, including associated structures or infrastructure, for any purpose in the one in ten year flood line of a river or stream, or within 32 metres from the **bank** of a river or stream where the flood line is unknown, excluding purposes associated with existing residential use, but including (i) canals; (ii) channels; (iii) bridges; (iv) dams; and (v) weirs.

GN R.386 Item 7

The above ground storage of a dangerous good, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30 cubic metres **but** less than 1 000 cubic metres at any one location or site.

2.5. Extension of validity of Environmental Authorisation

Condition 6 of the original EA dated 13 October 2011 states that the proposed activity must commence within a period of three (3) years from the date of issue, which would expire on 13 October 2014. The amended authorisation dated 26 November 2013 extended the validity of the EA by a further two (2) years, of which expiry would be 26 November 2015. Subsequent to this amendment, extension of the validity period was authorised in the amended EA dated 28 September 2015 by a further two (2) years, of which the EA would lapse on the 26 November 2017. Condition 1 of the latest approved amendment of the Environmental Authorisation (EA) which extends the validity of the EA states that the activity must commence within a

period of three (3) years from the date of expiry of the amended EA dated 28 September 2015, of which the end of the current validity would be 28 September 2020. Witberg Wind Power (Pty) Ltd requests an extension of the validity of the EA by an additional two (2) years.

Condition 1 of the amended Environmental Authorisation dated 6th December 2017 is requested to be amended. The amendment is shown in **Bold** text as follows:

From:

“The activity must commence within a period of three (03) years from the date of expiry of the amended EA dated 28 September 2015 (i.e. the EA lapses on 28 September 2020).”

To:

“The activity must commence within a period of **five (05) years** from the date of expiry of the amended EA dated 28 September 2015 (i.e. the EA lapses on **28 September 2022**).”

2.6. Amendment to the height of the wind measuring masts as described in terms of the approved FEIR from 80m to 120m

The wind measuring mast heights, as described in terms of the approved FEIR, are requested to be amended to increase in line with the latest requested hub height specifications requested herein, from 80m to **120m**.

2.7. Amendment of Condition 40 of the Additional Conditions to be added to the EA (Ref: LSA 105-439)

Condition 40 of the EA, as per additional conditions to be added to the EA in the amendment of the EA (Ref: LSA 105-439), is requested to be amended so that Condition 40 is correctly addressed to the Holder of the EA (i.e. Witberg Wind Power (Pty) Ltd. Condition 40 of the additional conditions to be added to the EA in the amendment of the EA (Ref: LSA 105-439), is requested to be amended. The amendment is shown in **Bold** text as follows:

From:

“Should any unanticipated negative impacts be recorded, G7 commits to reducing these impacts. Mitigation measures to achieve this include shutting down problematic turbines, if this is deemed necessary.”

To:

“Should any unanticipated negative impacts be recorded, **Witberg Wind Power (Pty) Ltd** commits to reducing these impacts. Mitigation measures to achieve this include shutting down problematic turbines, if this is deemed necessary.”

2.8. Consolidation of Environmental Authorisations and Appeal Decisions

Given that there are a number of amendments and appeal decisions on the environmental authorisation, it is requested that all environmental authorisations and appeal decisions are consolidated into one EA.

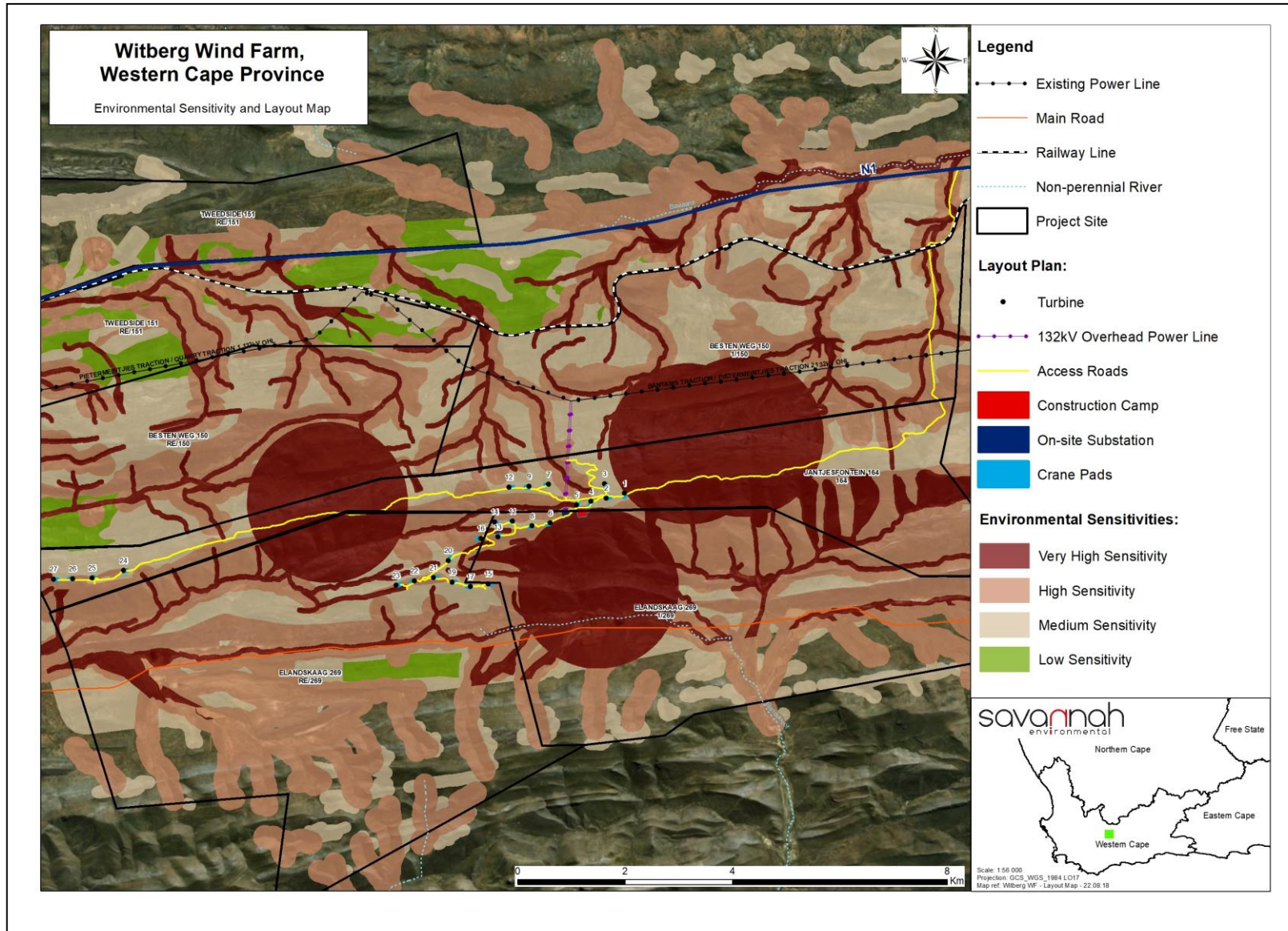


Figure 2.1: The updated 25 wind turbine wind farm layout for the Witberg Wind Energy Facility (A3 Map included in **Appendix J**).

3. MOTIVATION FOR THE PROPOSED AMENDMENTS

3.1. Technical Motivation for the Amendment of Turbine Specifications

The project is intended to be bid into future rounds of the Department of Energy's (DoE) Renewable Energy Independent Power Producers Procurement (REIPPP) Programme.

Wind turbine generators are constantly under development to increase the potential energy output per wind turbine. The more energy one turbine can produce, the less turbines are required. Following developments in technology after the issuing of the original EA, and in finalising the site development plan on the basis of the wind monitoring results from the site, as well as economic efficiency considerations, the applicant is proposing to install a turbine technology which is best suited to the conditions on the site. These amendments are proposed in order to increase the efficiency of the facility and consequently, the economic competitiveness thereof.

By potentially installing wind turbine generators with a larger rotor diameter, hub height and energy generation capacity, it will increase the energy output per turbine thereby reducing the number of turbines required and increasing the efficiency of the wind farm. The applicant proposes to amend the EA to allow for the use of such larger wind turbines before the site development plan is optimised so that the larger turbines can be considered, should DEA wish to authorise the amendment of the EA. Importantly, the overall output capacity of the wind energy facility will remain within the authorised capacity of 120MW.

3.2. Motivation for the Amendment of the Wind Farm Layout

The proposed amended of the wind farm layout is required to avoid identified sensitive areas (bat sensitivity areas and Verreux's Eagle nest 1.5km buffer). The wind turbines in very high sensitivity areas have therefore been removed where required, and re-positioned resulting in a reduction in wind turbine numbers from 27 wind turbines to a 25-wind turbine layout. Additionally, the construction camp, substation, linking station and associated 132kV overhead power line have been re-positioned to optimise the layout.

3.3. Motivation for the update and adding of the new contact person and details for the Holder of the EA

The contact person and relevant details for the Holder of the EA has changed and therefore is requested to be updated in the EA.

3.4. Correct the details in the listed activities as authorised in the original EA (12/12/20/1966) dated the 13th of October 2011

The correct wording for listed activities GN R.386 Item 1(m) and GN R.386 Item 7 is requested to be in accordance with the relevant Regulations. Therefore, the amendments to correct spelling errors are requested.

3.5. Extend the validity of the EA

The project is intended to be bid in future rounds of the Department of Energy's (DoE) Renewable Energy Independent Power Producers Procurement (REIPPP) Programme. A valid EA is required for future project development and bid submission purposes. Therefore, the validity of the EA is requested to be extended in order to remain valid should the Project become a Preferred Bidder in the next bidding round. The EA for the wind energy facility is therefore requested to be extended by an additional two (02) years from the date of validity.

3.6. Amendment to the height of the wind measuring masts as described in terms of the approved Final Environmental Impact Report (FEIR), from 80m to 120m

The wind measuring mast heights need to be increased to the currently proposed amended hub heights (120m) in order to record relevant and accurate wind data to inform the immediate planning and future operation efficiency of the proposed wind farm.

3.7. Amendment of Condition 40 of the Additional Conditions to be added to the EA (Ref: LSA 105-439)

Condition 40, of the additional conditions to be added to the EA in terms of the appeal decision dated 13th August 2013 (LSA 105-439), is currently addressed to G7 Renewable Energies. However, the Holder of the EA is Witberg Wind Power (Pty) Ltd. Therefore, Condition 40 is requested to be amended so that it is addressed to the correct Holder of the EA which is Witberg Wind Power (Pty) Ltd, accordingly.

3.8. Consolidation of Environmental Authorisations and Appeal Decisions

Given that there are a number of amendments and appeal decisions on the environmental authorisation it is also requested that all environmental authorisations and appeal decisions are consolidated into one EA. The reason for this is to have a consolidated EA which contains all the relevant conditions for the proposed development, thereby facilitating compliance monitoring by both the applicant and the DEA during implementation of the project.

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

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

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

In this instance, the proposed amended turbine specifications and amended layout were not assessed in the initial authorisation and subsequent amendments. The change does not however, on its own, constitute a listed or specified activity. Therefore, the application is made in terms of Regulation 31(a). As required, the following is considered for the proposed amendments:

- (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.

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

An amendment application for the requested amendments has been submitted to the DEA. The DEA has advised that this application is considered to be a Part 2 amendment as contemplated in terms of Regulation 31 of the EIA Regulations (2014), as amended. In terms of Regulation 32(1)(i), the following section provides an assessment of the impacts related to the Part 2 amendment, i.e. the proposed change in turbine specifications and amended layout. Understanding the nature of the proposed amendments and the impacts associated with the project (as assessed within the EIA and monitoring), the following have been considered:

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

The potential for change in the significance and/or nature of impacts based on the proposed amendments as described within this motivation report is discussed below. Specialist's assessment addendum reports are contained in **Appendix A-H**. Additional mitigation measures recommended by the specialists have been underlined within this report for ease of reference. These have been included within the EMPr for the project (refer to **Appendix K**. This section of the main report must be read together with these specialist studies in order to obtain a complete understanding of the proposed amendments and the implications thereof.

5.1. Collision Risk Modelling on Birds

A 25-wind turbine layout along with the requested turbine specifications amendments was ultimately assessed by Dr. Percival whom undertook the Collision Risk Modelling for this amendment application, as per his confirmation letter (**Appendix A**). However, prior to this, the collision risk modelling was undertaken for the proposed Witberg wind farm in which a 27-turbine layout was considered (**Appendix A**), with a larger (136m) rotor diameter and various hub height alternatives. The layout revision included moving turbines to ensure that there are none located within 1.5km of any Verreux's Eagle nest (as recommended by Birds Unlimited, 2015 – refer to **Appendix B**). The collision risk modelling report provides a comparison of the predicted collision risk to key bird species for the 27-wind turbine layout⁴ with the authorized 27-turbine scheme reported previously. The scope specifically included:

- » An update of the collision risk modelling using a 136m diameter rotor, for hub heights from 92-120m and an alternative 27-turbine layout; and
- » A re-assessment of the likely impacts of the alternative 27-turbine layout on birds.

⁴ The 27 wind turbine layout referred to is the amended 27 wind turbine layout which only took into account the Verreux's Eagle 1.5km nest buffer, which is the layout prior to the currently proposed 25 wind turbine layout which considered the Verreux's Eagle 1.5km nest buffer as well as bat sensitivity areas. A letter which considered the currently proposed 25 wind turbine layout is included in Appendix A.

The revised 27-turbine layout considered a larger rotor diameter (136m). Three different hub height options are also being considered as follows:

- » Scenario 1: 136m rotor diameter, 92m hub height;
- » Scenario 2: 136m rotor diameter, 105m hub height; and
- » Scenario 3: 136m rotor diameter, 120m hub height.

The wind turbine data used in the collision risk modelling is shown in **Table 1** below.

Table 1: Wind turbine data used in the July 2018 collision risk modelling

Specification	Value used in previous collision risk modelling (authorised 27-turbine scheme)	Scenario 1	Scenario 2	Scenario 3
Hub height	92m	92m	105m	120m
Rotor diameter	116m	136m	136m	136m
Height to blade tip	150m	160m	173m	188m
Minimum height of blade above ground	34m	24m	37m	52m
Rotational speed (variable – mean value)	11.9 (eastern turbine block), 11.68 (western turbine block)	9.8 (mean overall)	9.8 (mean overall)	9.8 (mean overall)
Blade maximum chord	3.28m	4.1m	4.1m	4.1m
Blade pitch (variable – mean value calculated from local wind speed data measured by WWP)	4.13° (eastern turbine block), 3.34° (western turbine block)	4.13° (eastern turbine block), 3.34° (western turbine block)	4.13° (eastern turbine block), 3.34° (western turbine block)	4.13° (eastern turbine block), 3.34° (western turbine block)
Turbine operation time (when not constrained by high/low wind speed or maintenance activity)	92% (eastern turbine block), 90% (western turbine block)	92% (eastern turbine block), 90% (western turbine block)	92% (eastern turbine block), 90% (western turbine block)	92% (eastern turbine block), 90% (western turbine block)

Two key species, Verreaux's Eagle and Booted Eagle were modelled for each of the three scenarios. The collision risks for Martial Eagle and Black Harrier were not modelled as the collision risk associated with both the authorized and the revised layouts would be zero (no flights of either species were recorded flying through the collision risk zone of either layout). No other key species were recorded flying through the collision risk zone at rotor height during the baseline surveys.

There were three key differences in relation to the collision risk modelling compared with the authorized 27-turbine layout: (a) a revised site layout and hence an updated collision risk zone; (b) updated minimum heights of blades above the ground resulting in a difference proportion of flights at rotor height, for three different hub heights; and (c) a larger rotor swept area resulting in an increased collision risk volume but reduced rotational speed.

Table 2 shows the predicted collision risks for each of the two key species that were recorded flying through the collision risk zone, for each of the three wind turbine scenarios. This Table also gives the context of their background mortality and the percentage increase over the baseline that each risk represents, for each scenario and for the authorized 27-turbine layout. For Verreaux's Eagle, the assessment summarised in the

table above assesses the collision risk against the adult population, as the large majority of records from the site relate to adult birds. Juveniles are assessed separately below.

Table 2: Collision risk for Verreaux's Eagle and Booted Eagle for each of the three wind turbine scenarios, and the increases that these represent over baseline mortality, and comparison with the 27-turbine layout shown in italics.

Species	Scenario	Rotor diameter (m)	Hub height (m)	Predicted collision risk (98% avoidance rate)	% increase over baseline mortality	Magnitude of effect	Likely significant effect?
Verreaux's Eagle	Revised 27-turbine layout: scenario 1	136	92	0.42	0.45%	Negligible	No
	Revised 27-turbine layout: scenario 2	136	105	0.37	0.40%	Negligible	No
	Revised 27-turbine layout: scenario 3	136	120	0.33	0.35%	Negligible	No
	<i>Authorized 27-turbine layout</i>	<i>116</i>	<i>92</i>	0.86	<i>0.92%</i>	<i>Negligible</i>	<i>No</i>
Booted Eagle	Revised 27-turbine layout: scenario 1	136	92	0.044	0.009%	Negligible	No
	Revised 27-turbine layout: scenario 2	136	105	0.043	0.009%	Negligible	No
	Revised 27-turbine layout: scenario 3	136	120	0.041	0.008%	Negligible	No
	<i>Authorized 27-turbine layout</i>	<i>116</i>	<i>92</i>	0.031	<i>0.006%</i>	<i>Negligible</i>	<i>No</i>

Collision risks for the revised 27-turbine layout were lower than for Verreaux's Eagle, but slightly higher for Booted Eagle those presented previously in the 2013 report for the authorized 27-turbine layout, with the higher hub height scenarios giving a reduced risk.

For Booted Eagle, the predicted collision risk of all three scenarios was very small both numerically and in a population context (though was marginally higher for the revised 27-turbine layout than the authorised 27-turbine layout). It represented considerably less than a 1% increase over the existing baseline mortality of the regional population (and was therefore classed as being of negligible magnitude). With such a negligible magnitude risk, there would not be likely to be any regionally significant population impact for this species for any of the scenarios assessed.

For Verreaux's Eagle, the authorized 27-turbine layout using a 116m rotor diameter turbine and 92m hub height, had a collision risk of 0.86 adult Verreaux's Eagle per year. It was concluded that this would be a negligible magnitude effect, less than a 1% increase over the baseline mortality, which would be of very low significance and not a significant impact.

The three scenarios currently investigated produced predictions of 0.42, 0.37 and 0.33 Verreaux's Eagle collisions per year, equivalent to increases over the baseline mortality of 0.45%, 0.40% and 0.35% respectively. All three were lower risk for this species than the authorized 27-turbine layout, with lower risks for the higher hub height scenarios. All of the risks would be negligible magnitude, and not significant, giving no material change to the conclusion reached previously.

5.1.1. Comparative Assessment

No comparative assessment was provided as no impact assessment was undertaken for the collision risk modelling assessment which was undertaken for the purposes of informing an appeal process. The potential impact rating significance on avifauna was however accounted for in the avifauna impact assessment report undertaken by Rob Simmons. The findings of this report are provided In **Section 4.2** below.

5.1.2. Conclusion

Overall the assessment update of the collision risk for three turbine scenarios (all with the revised 27-turbine layout) found a reduced collision risk for Verreaux's Eagle in comparison with the authorized 27-turbine layout with a 116m rotor diameter turbine and 92m hub height. For Booted Eagle a small increase in risk was found. Collision risk to both species was lowest for the highest hub height (reflecting a lower proportion of flights at rotor height for that scenario). This did not, however, make any material difference to the conclusions reached. There would be negligible magnitude collision risks to all of the key species assessed, which would not result in any significant ornithological impacts. All three of the new scenarios tested yielded negligible magnitude collision risks across the range of 92m-120m hub height which would not be significant, and the same conclusion would be valid for any hub height between those values. In other words, should Witberg Wind Power (Pty) Ltd in the future consider an alternative turbine with a hub height between 92m and 120m, no additional collision risk assessments would be required as the results included in this report would remain valid.

Further to the above, it must be noted that the wind turbine layout was subsequently amended following the assessment of the 27-wind turbine layout collision risk assessment results provided above, which reduced the number of wind turbines from a 27 wind turbine layout, to a 25 wind turbine layout after taking into consideration bat sensitivities and the Verreaux's Eagle 1.5km nest buffer. **A letter (Appendix A) was thereafter obtained from Dr. Percival after consideration of the currently proposed 25 wind turbine layout. It was stated in the letter that the new layout was examined in relation to the 27 revised wind turbine layout and that the ornithological baseline (specifically the flight lines obtained during the vantage point surveys), and was confirmed that the collision risk would likely be slightly reduced for both of the two species previously modelled (Verreaux's Eagle and Booted Eagle), and that this change would not have any material effect on the conclusions that reached in the above-mentioned report.**

5.2. Impacts on Birds

The bird (avifauna) impact assessment (**Appendix B**) contains an appraisal of the amendments made for the proposed Witberg Wind Energy Facility in the Karoo, and their likely impacts on the avian community, particularly the eagles. The avian component was previously reported on in 2012 (Anchor Environmental, refer to **Appendix B**) and the use of the area by juvenile Verreaux's Eagles, specifically in 2014 (Simmons and

Martins 2015, refer to **Appendix B**), including Collision-Risk Modelling (CRM: Percival 2013, refer to **Appendix A**).

Literature surveys suggest that the effect of the changes proposed on the authorised project are expected to be mainly negative because of the statistically significant increase in collisions for higher turbines (Loss et al. 2013, Simmons et al. MS). However, the Collision-Risk model (CRM) based on site-specific avifaunal data suggested lower eagle fatalities (Percival, 2018). This was reported to potentially affect a suite of collision-prone birds, highlighted by Turpie et al. (2012), Simmons and Martins (2015), particularly the Verreaux's Eagles *Aquila verreauxii* that breed in the area. Thus, impacts with the blades of the wind turbines, and the associated power line network, were identified as the biggest potential risks with turbines placed on the upland ridges or near foraging areas. Theoretically, if the rotor blade length is doubled, a four-fold greater risk area is assumed to be created if the turbines are placed in areas used by the species of concern. If hub height is also increased, then it was determined that birds flying higher could be impacted. A meta-analysis from North America reported a strongly significant effect of increased hub height on proportionately more avian fatalities, in a large sample of wind farms with turbines up to 80-m hub height. The statistical modelling used in the avifauna impact assessment, using data from North America and including South African turbines (not Witberg wind farm data) with hub heights up to 95-m, found that avian fatalities are forecast to double for turbines increasing from 92-m to 120-m hub height. However, to consider site specific data, a CRM was prepared by Dr S. Percival (2018) using the Band *et al* (2007) method. The CRM estimated 0.33 Verreaux's Eagle adult and juvenile fatalities annually (Percival 2018) with taller 120-m turbines, (and 0.37 eagles for 105-m turbines, and 0.42 eagles for 92-m turbines). It was concluded that by combining the two models it was estimated that between 0.66 Verreaux's Eagles (120-m turbines), 0.74 eagles (105-m turbines) and 0.84 eagles (92-m turbines) may be killed annually. For Booted Eagles, the equivalent figures are 0.08 Booted Eagle *Aquila hieraetus* fatalities (for all turbine heights) would occur per year. Further mitigations were therefore required if the level of eagle fatalities exceeds 1.0 Verreaux's Eagles per year to reach acceptable levels. **Potential** mitigations recommended for risky turbines include black-blade painting and shut-down-on-demand.

5.2.1. Comparative Assessment

Direct Mortality, Disturbance and Avoidance (Construction Phase):

Nature: Direct mortality, disturbance or avoidance of area around the wind farm for the raptors identified as "at risk" above due to human disturbance, heavy machinery, or overhead lines, during construction.				
	Authorised		Proposed Amendment	
	Without mitigation	With mitigation	Without mitigation	With mitigation
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Short Term (2)	Short Term (2)	Short Term (2)	Short Term (2)
Magnitude	Moderate (6)	Low (4)	Moderate (6)	Low (4)
Probability	Highly Probable (4)	Distinct Probability (3)	Highly Probable (4)	Distinct Probability (3)
Significance	36 (Medium)	21 (Low)	36 (Medium)	21 (Low)
Status (positive or negative)	Negative	Negative to Neutral	Negative	Negative to Neutral
Reversibility	High	High	High	High
Irreplaceable loss of resources?	No (Both Verreaux's and Booted Eagles)	Reduced	No (Both Verreaux's and Booted Eagles)	Reduced

	may suffer short term disturbance, displacement, and loss of breeding but return after construction)		may suffer short term disturbance, displacement, and loss of breeding but return after construction)	
Can impacts be mitigated?		Partially, yes		
Additional Mitigation:				
<p>» <u>Disturbance during wind farm construction was found to have greater impacts on birds in the UK than post-construction impacts (Pearce-Higgins et al. 2012). There are generally two classes of mitigation to avoid disturbing Red Data birds around wind farms during construction: (i) limit construction activities (building, blasting etc.) to seasons when birds are not breeding – to reduce disturbance causing nest failure; (ii) limit construction activities (building, worker-presence, power-line-stringing) from areas within 1000-m of known Red Data species' nests at times when eagles or other Red Data species are incubating/feeding small nestlings. Verreaux's Eagles start breeding in April-July and have a small nestling on the nest from June – August (Simmons 2005).</u></p> <p>» <u>We therefore, recommend as mitigations: (i) not constructing within 1000-m of Verreaux's Eagle nests or Booted Eagle nest during their early breeding season (May – June) or small-chick rearing season (June – July). For breeding Booted Eagles, the seasons to avoid are August – September; (ii) avoid blasting or causing noise disturbance in the same seasons anywhere within 3-km of active nests for all Red Data species.</u></p>				

Direct Mortality, Disturbance and Avoidance (Operation Phase):

Nature: Direct mortality, disturbance or avoidance of area around the wind farm for the raptors identified as "at risk" above due to human disturbance, heavy machinery, or overhead lines, during construction.				
	Authorised		Proposed Amendment	
	Without mitigation	With mitigation	Without mitigation	With mitigation
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Long Term (5)	Long Term (5)	Long Term (5)	Long Term (5)
Magnitude	High (8)	Moderate (6)	High (8)	Moderate (6)
Probability	Highly Probable (4)	Distinct Probability (3)	Highly Probable (4)	Distinct Probability (3)
Significance	56 (Medium-High)	36 (Medium)	56 (Medium-High)	36 (Medium)
Status (positive or negative)	Negative	Negative to Neutral	Negative	Negative to Neutral
Reversibility	Low	High	Low	High
Irreplaceable loss of resources?	No (Verreaux's Eagles are not uncommon, and the rarer Booted Eagles may be less susceptible to collision and displacement)	Reduced	No (Verreaux's Eagles are not uncommon, and the rarer Booted Eagles may be less susceptible to collision and displacement)	Reduced
Can impacts be mitigated?		Yes		
Can impacts be mitigated?		Partially, yes		
Additional Mitigation:				
There are generally five classes of mitigation for birds around wind farms: (i) re-position the turbines to avoid impacts or disturbance for the birds; (ii) redesign the turbines to alter the present pattern/shape/size of the turbines so birds see them more readily and avoid contact; (iii) curtail or shut-down-on-demand the turbines when collision-prone birds approach; (iv) manipulate the habitat to reduce the attractiveness of the site to collision-prone raptors; (v) reduce the overall number/height of turbines.				

Because the combination of the CRM (Percival 2018) and the Loss model forecasts that the taller turbines are predicted to increase fatalities to 0.72 adult + juvenile Verreux's Eagles per year (for 120-m turbines at 98% avoidance rates), this is judged to be an acceptable level of mortality because it reduces the number below one eagle per year, and it reduces the fatalities to below that for the already authorized turbine layout (0.92 adult + juvenile Verreux's Eagles for 92-m turbines). If the fatality rate is higher than these two models predict (i.e. >1.0 eagle per year) then mitigations will be required.

The following mitigations are recommended:

- » the turbines closest to the known eagle nests are moved to at least 1.5-km (the distance at which significant Verreux's Eagle flight activity falls away; Percival 2013);
- » Birdlife South Africa Verreux's Eagle guidelines recommend a 3-km buffer around all active nest and a 1.5-km no-go buffer (Ralston-Paton 2017). Since only seven eagle flights in 333 hours (a Passage Rate of 0.021 eagles/hour) were recorded we feel the 3-km buffer is not necessary and 1.5-km is recommended.
- » Post-construction, all turbines killing one or more Red Data bird per year will need to be fitted either with (a) the highly effective black-blade mitigation, or (b) automated deterrent or shut-down-on-demand; (this follows the Minister's recommendation too).

Operational phase monitoring is essential to determine the actual impacts on birds and therefore, the required mitigation measures and thresholds. This was also a stipulation of the EA. Such an approach requires a flexible Adaptive Management Plan to be implemented during operation. Such an Adaptive Management Plan must allow for changes to be implemented within a maximum time-frame of 3-4 weeks.

The Wind Farm must agree to follow the mitigation measures that may result from the operational monitoring and Adaptive Management Plan.

- (i) In accordance with the Adaptive Management Plan, appropriate mitigation measures, such as curtailment at specific environmental conditions or during high-risk periods (i.e. post construction monitoring shows 1 Red Data species killed at these turbines per year, then the use of appropriate automatic shut down or deterrent technology will have to be implemented in the case of mortality of Red Data species [defined as: 1 Red Data species killed per year]).

The operational monitoring study design must determine the turbines that require appropriate mitigation measures. Through such monitoring, we have found at other operational wind farms that 20% of the turbines are responsible for 67% of the fatalities, allowing specific risky turbines to be targeted (Simmons and Martins unpubl).

Two adaptive management mitigations are recommended if Red Data species are found to be killed:

- (i) investigate painting half a blade black to deter raptors, as undertaken by Norwegian wind farms to reduce white-tailed Eagle deaths with great success (Stokke et al. 2017).
- (ii) Implement the automated "Multi-sensor" video system, presently under test by J Avni, which deters incoming birds or feathers the blades, or turns off turbines as collision-prone species approach within 500-m of these turbines;

For all new overhead power lines to be fitted with diurnal and nocturnal bird diverters to reduce collisions and burying all internal power lines in the WEF, wherever that is possible.

5.2.2. Conclusion

Birdlife South Africa (BLSA) guidelines (Ralston-Paton 2017) dictate that turbines within 3.0-km of Verreaux's Eagle nests can only be justified with detailed avifaunal surveys. Recent pre-construction (2015) surveys show almost no use of this area by adult or juvenile eagles (7 flights in 333 hours of detailed monitoring), suggesting low risk to the birds there. However, BLSA do not allow turbines within 1.5 km of any nests, and this has been complied with in the currently proposed 25-turbine layout.

The impact zone of the originally proposed facility lies in the montane areas of the Karoo biome, an area that holds a suite of southern African endemic birds and some Red Data species (e.g. eagles, harriers and cranes). Previous surveys indicated that 11 collision-prone species (CPS) occur in the area of which five are Red Data species. The passage rate of the Verreaux's Eagles along the whole Witberg Ridge was high at 0.84 birds/hour. However, within the present 1.5-km buffers around each eagle nest a very low Passage Rate of 0.021 eagles/hour was recorded.

Detailed during- and post-construction monitoring, is required to determine the effectiveness of the suggested mitigations. Operational-phase monitoring is essential to determine the actual impacts on birds and, therefore, the required mitigation measures and thresholds. Such an approach requires a flexible Adaptive Management Plan to be implemented during operation. This plan must allow for: (i) changes to be implemented within a time-frame of 3-4 weeks; (ii) the wind farm has agreed to follow the mitigation measures as suggested by the Minister of Environment; and (iii) in accordance with the Adaptive Management Plan and the Environmental Authorisation, appropriate mitigation measures, such as black-blade or curtailment during specific environmental conditions or during high risk periods will be implemented. If data shows that more than one Red Data species is killed per year on the wind farm, then additional appropriate technology needs to be implemented at that turbine, as set out in the original EA.

Overall, the potential avifaunal impacts identified with regards to direct mortality, disturbance and avoidance during both the construction and operation phase remained the same in terms of impact significance ratings. However, additional mitigation measures have been recommended to minimise potential impacts to avifauna. Ultimately, if these recommendations, and those of BLSA are followed, there is no reason why the Witberg wind farm cannot be developed.

5.3. Impacts on Bats

A bat addendum report (**Appendix C**) to the most recent bat pre-construction monitoring report dated June 2015 (refer to **Appendix C**), was compiled for the currently proposed amendments for the Witberg Wind Energy Facility (WEF).

The currently authorised turbine dimensions with a hub height of 92m and a rotor diameter of 116m, will result in a lowest rotor swept height above ground of 34m. Whereas, the proposed increased turbine dimensions of up to 120m hub height and up to 136m rotor diameter, will result in an increase of the lowest rotor swept height above ground to 52m. This will result in a total increase in lowest rotor swept height above ground level of 18m from the authorised wind turbine specifications in comparison to the proposed amended turbine specifications.

During the pre-construction study, the two stations with microphones at 60m recorded 1.8 and 6.5 times less bats, than at 10m height. This indicates a clear negative correlation between bat activity and height above

ground, meaning the probability of impacts on bats is less at 52m than at 34m. However, the larger rotor diameter of the proposed dimensions will also result in a larger airspace that poses a risk to bats. Thus, considering the decreased risk of 52m at the lowest rotor swept height, and the increased risk of the larger airspace occupied by a larger rotor diameter, the proposed turbine dimension change will have a negligible effect on the significance of impacts identified in the most recent bat pre-construction monitoring report dated June 2015.

The increase in the actual wind turbine generation output capacity per turbine is not relevant to impacts on bats, and was therefore not assessed.

The proposed increased heights of the measuring masts from 80m to 120m is not applicable to impacts on bats, since no collision impacts have been recorded for bats and wind measuring masts. Additionally, the pre-construction study indicated a decrease in bat activity with height above ground.

The pre-construction data was gathered from May 2011 to May 2012. Six bat monitoring stations were used to monitor bat activity levels, with two having microphones at height. During the study time frame, the South African Good Practice Guidelines for Surveying Bats in Wind Farm Developments 2nd edition (April 2011) was in use, and was undergoing refinement to the 3rd edition (Sowler and Stoffberg, 2012). The study was conducted in accordance with the guidelines that were current at that time. The study design differs from the 3rd edition guidelines (Sowler and Stoffberg, 2014) in that monitoring was carried out for only 15-25% of the likely bat activity periods over the year. This limitation was factored in to the re-analysis of the study data in 2015, on which the EIA was based and authorisation granted. The site environment has not changed significantly since the EIA assessment in 2015, extension of the validity of the authorisation by an additional 2 years will have a negligible effect on the significance of impacts identified in the EIA report.

Changes in the layout of the associated infrastructure will have a negligible effect on the significance of impacts identified in the original EIA bat report dated 2011. However, the proposed change in the turbine layout will decrease the significance of impacts originally identified in the EIA bat report dated 2011 for the operational phase. The currently authorised layout (Layout Revision 7 as per appeal decision LSA 105-439, dated 13 August 2013) has 1 turbine inside a high bat sensitivity buffer and 1 turbine in a moderate sensitivity buffer. The proposed layout has no turbines in high sensitivity buffers and 5 turbines inside moderate sensitivity buffers (Table 3 and Figures 4.1 – 4.). Due to the high significance and importance of high bat sensitivity areas and their buffers, they are prioritised over moderate sensitivity buffers.

Table 3: Turbines located within bat sensitive areas, authorised layout compared to the proposed layout.

Bat sensitivity area	Authorised layout (as per appeal decision LSA 105-439) dated 13 August 2013	Proposed layout
High	None	None
High buffer	Turbine 4	None
Moderate	None	None
Moderate buffer	Turbine 8	Turbines 11, 14, 21, 22 and 23

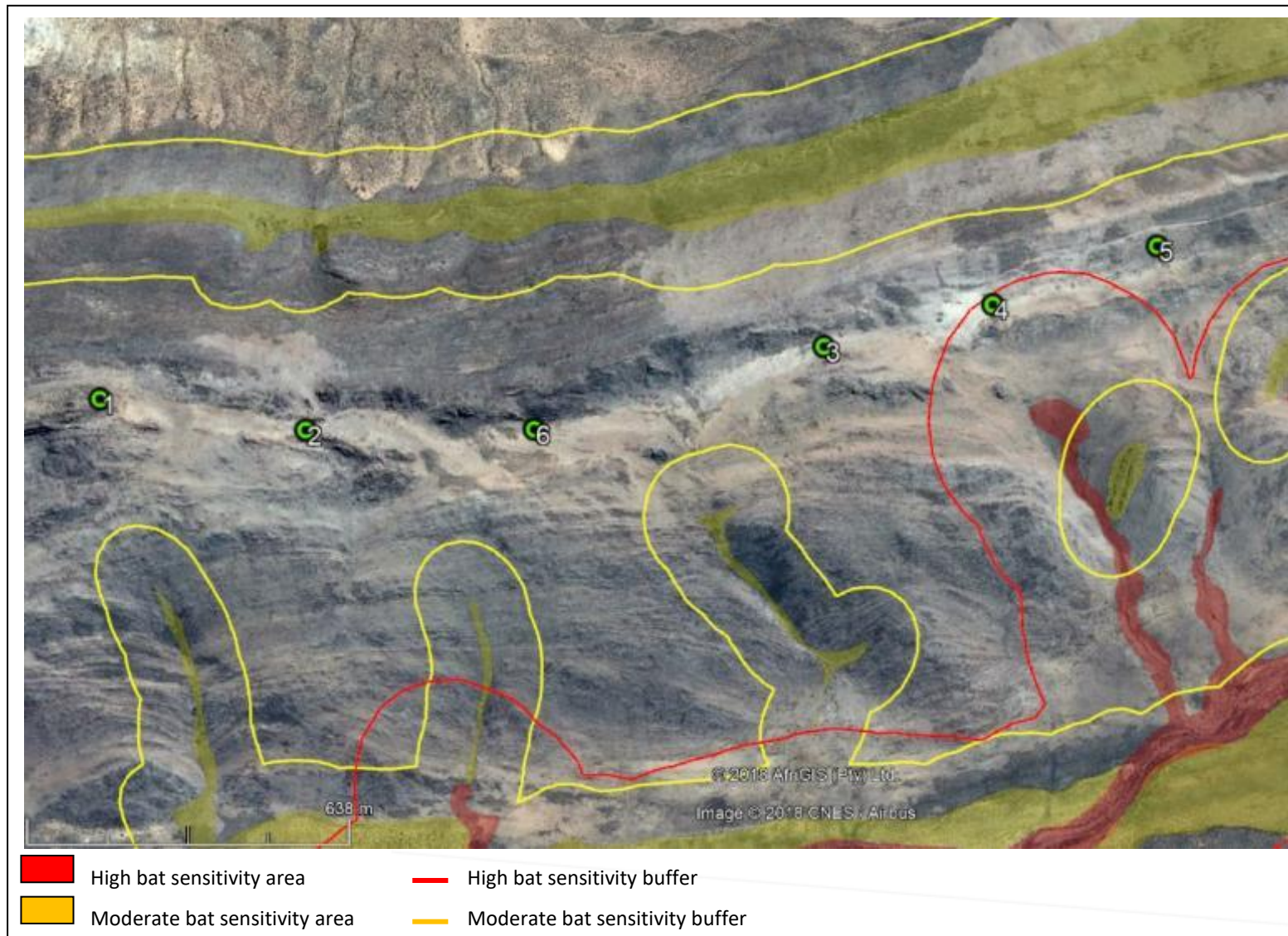


Figure 4.1: Bat sensitivity map in relation to the currently authorised layout, western cluster of turbines (turbine 4 in high sensitivity buffer).

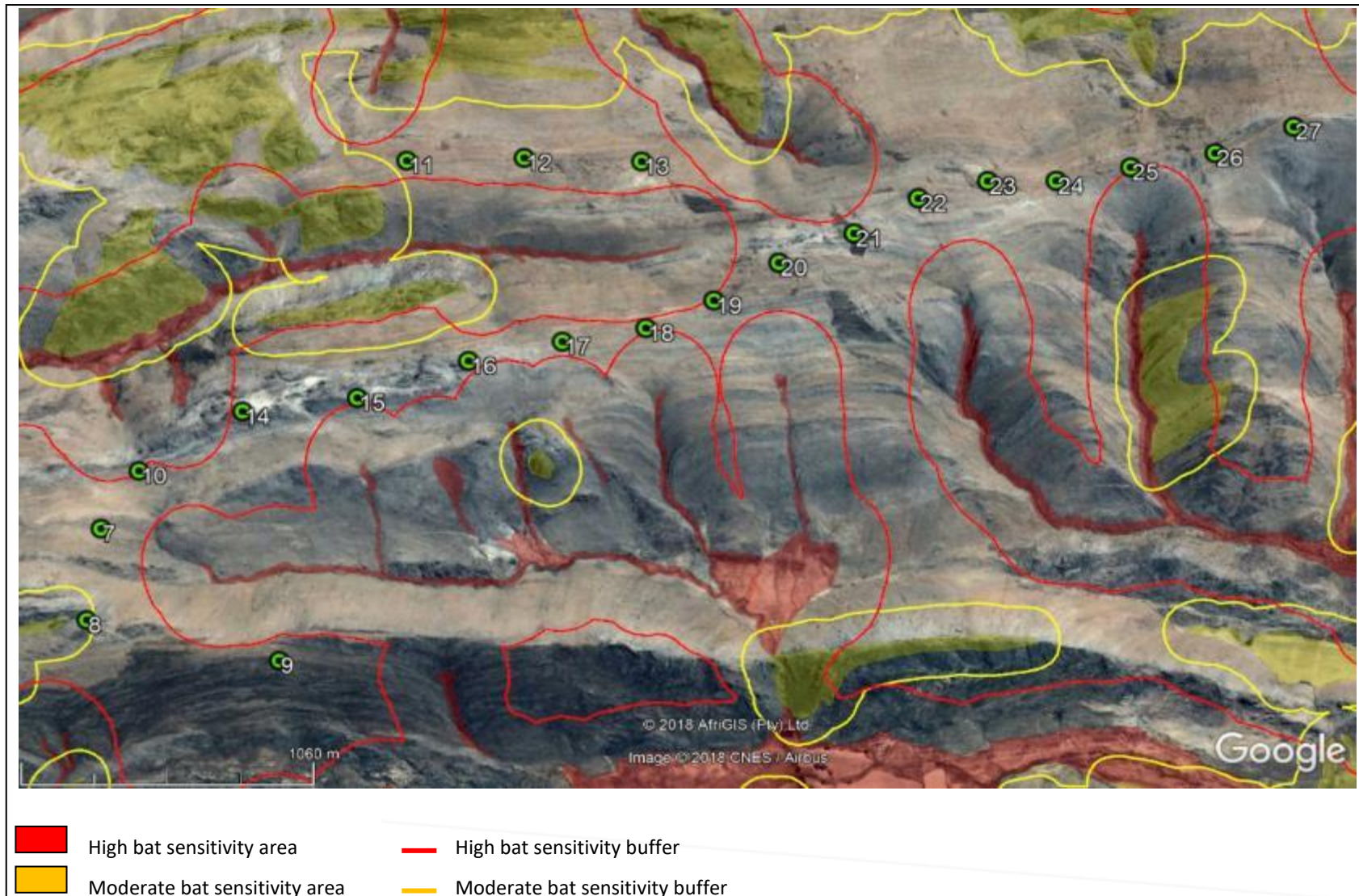


Figure 4.2: Bat sensitivity map in relation to the currently authorised layout, eastern part of site (turbines 10 and 25 on the border of the high sensitivity buffer, and turbine 8 in moderate sensitivity buffer).

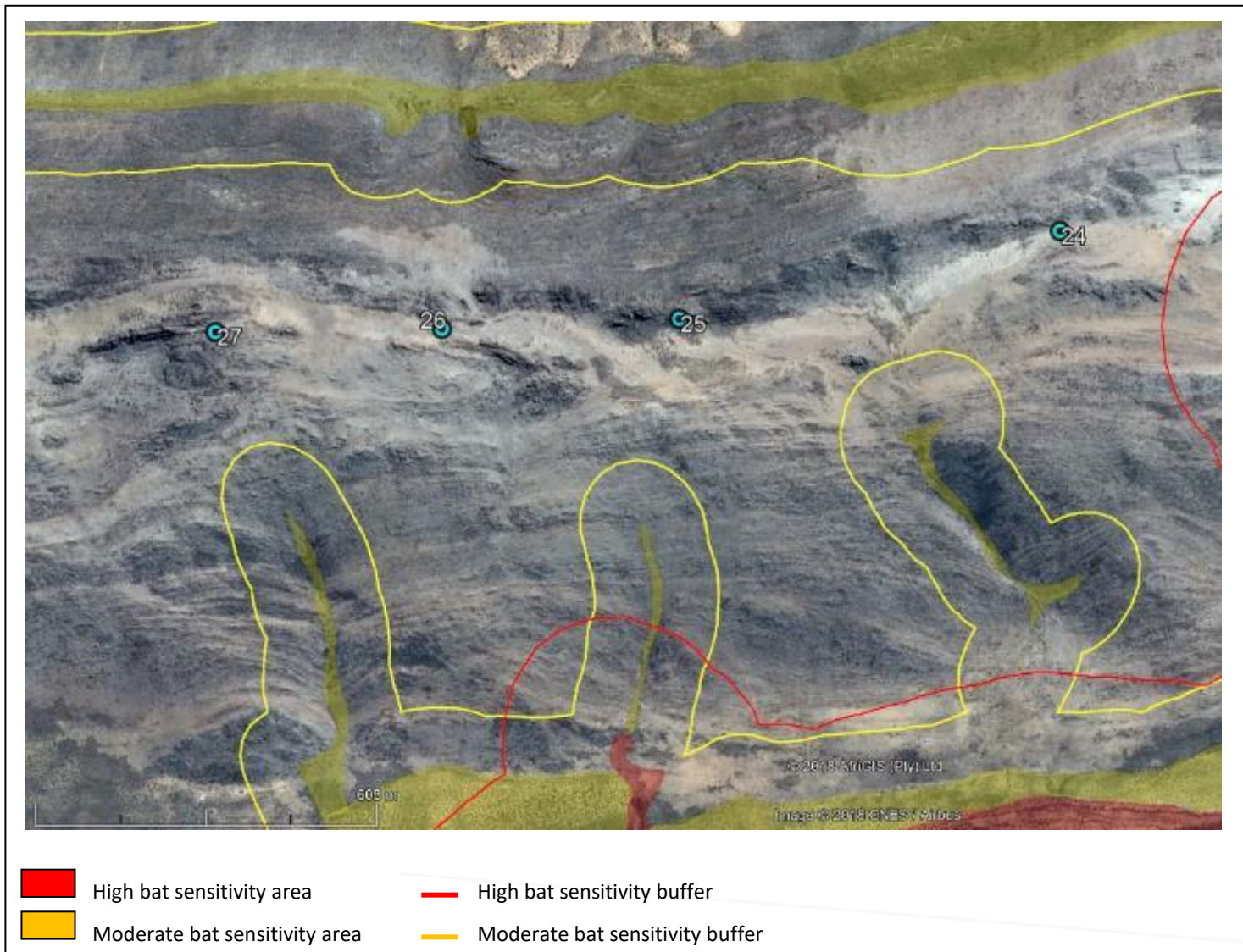


Figure 4.3: Bat sensitivity map in relation to the currently proposed layout, western cluster of turbines. No Turbines are in any sensitive areas or their buffers.

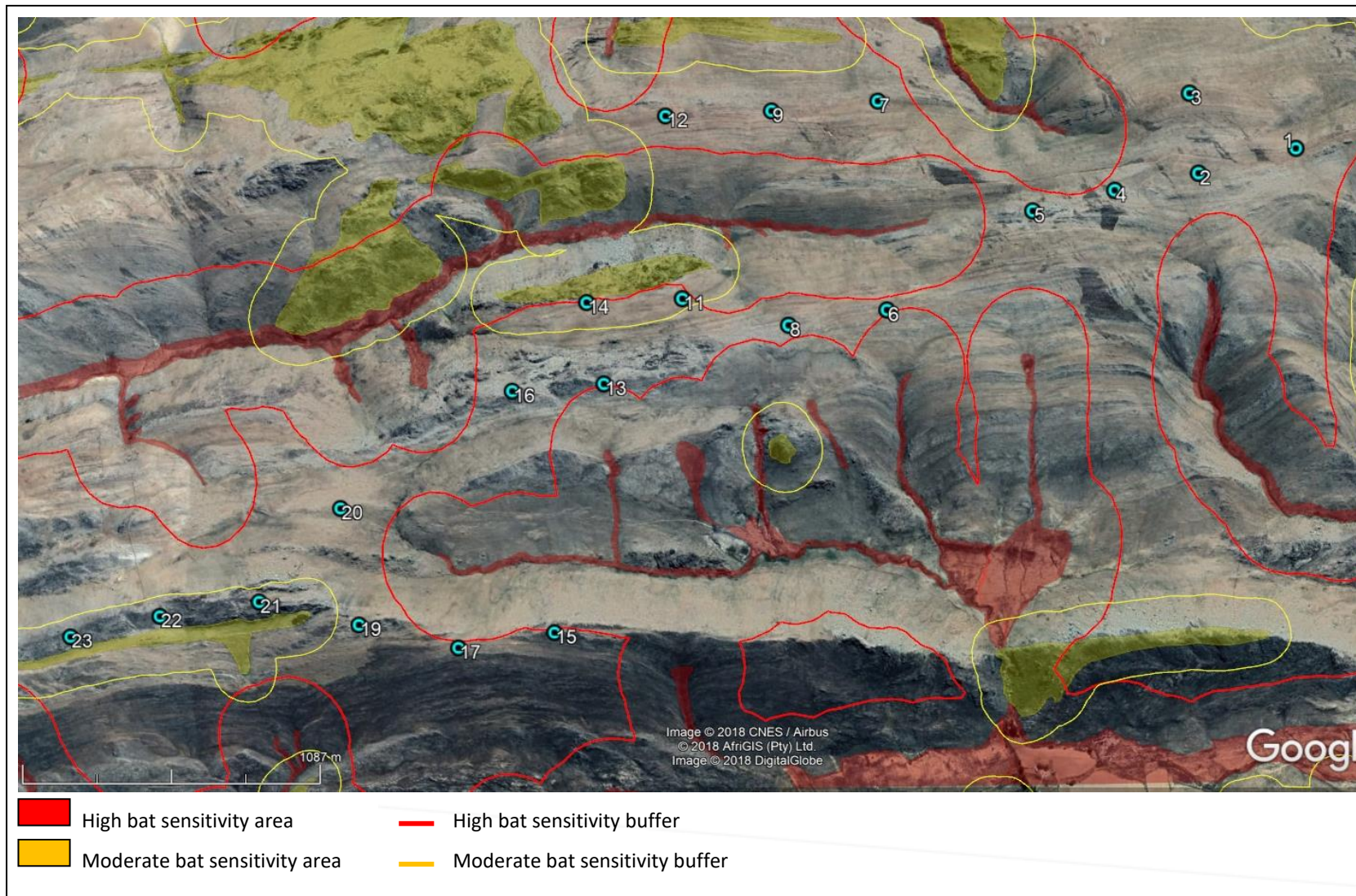


Figure 4.4: Bat sensitivity map in relation to the currently proposed layout, eastern part of site (no turbines in the high sensitivity buffer, and turbines 11, 14, 21, 22 and 23 in moderate sensitivity buffer).

5.3.1. Comparative Assessment

Change in Turbine Layout (Operation Phase):

Nature: Foraging and/or migrating bats can be killed by moving turbine blades, this happens either by direct impact or due to barotrauma.				
	Authorised		Proposed Amendment	
	Without mitigation	With mitigation	Without mitigation	With mitigation
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)	Long term (4)	Long term (4)
Magnitude	High (8)	Low (4)	High (8)	Low (4)
Probability	Highly probable (4)	Improbable (2)	Probable (3)	Improbable (2)
Significance	52 (Medium)	18 (Low)	39 (Medium)	18 (Low)
Status (positive or negative)	Negative	Negative	Negative	Negative
Reversibility	Low	Medium	Low	Medium
Irreplaceable loss of resources?	No	No	No	No
Can impacts be mitigated?	Yes	N/a	Yes	N/a
Additional Mitigation:				
<u>Correct turbine placement out of high sensitivity buffers, and it's also preferable to avoid moderate sensitivity buffers where possible. Where needed curtailment or acoustic deterrents may also be implemented.</u>				
Specific mitigations are as follows:				
<u>The mitigations are based on the passive data collected over the 12-month pre-construction monitoring study (June 2015). They infer mitigation be applied during the peak activity periods and times, and when the advised wind speed and temperature ranges are prevailing (considering conditions in which 80% of bat activity occurred). Both the temperature and wind speed parameters indicated in the pre-construction monitoring report must be present simultaneously to infer mitigation. This is due to the fact that they have synergistic or otherwise contradictory influences on bat activity and are never considered in isolation. In general, bat activity is negatively correlated to wind speed and positively correlated to temperature.</u>				
<u>Currently the most effective method of mitigation, after correct turbine placement, is alteration of blade speeds and cut-in speeds in environmental conditions favourable to bats.</u>				
<u>A basic "6 levels of mitigation" (by blade manipulation or curtailment), from light to aggressive mitigation is presented below:</u>				
<ol style="list-style-type: none"> 1. <u>No curtailment (free-wheeling is unhindered below manufacturer's cut-in speed so all momentum is retained, thus normal operation).</u> 2. <u>Partial feathering (45-degree angle) of blades below manufacturer's cut-in speed in order to allow the free-wheeling blades half the speed it would have had without feathering (some momentum is retained below the cut-in speed).</u> 3. <u>Ninety-degree feathering of blades below manufacturer's cut-in speed so it is exactly parallel to the wind direction as to minimize free-wheeling blade rotation as much as possible without locking the blades.</u> 4. <u>Ninety-degree feathering of blades below manufacturer's cut-in speed, with partial feathering (45-degree angle) between the manufacturer's cut-in speed and mitigation cut-in conditions.</u> 5. <u>Ninety-degree feathering of blades below mitigation cut-in conditions.</u> 6. <u>Ninety-degree feathering throughout the entire night.</u> 				

It is recommended that curtailment initially start off at Level 3 during the dates, times and environmental conditions set out in the Table below. Then depending on the results of the post construction mortality monitoring the curtailment can be either relaxed or intensified (moving down or up in the levels) up to a maximum intensity of Level 5. This is an adaptive mitigation management approach that will require changes in the mitigation plan to be implemented immediately and in real time during the post construction monitoring.

The times and date periods when mitigations should be applied initially at the start of the facility operational life:

	Authorised layout: Applies to Turbines 4, 8, 10, 25	Proposed layout: Applies to Turbines 11, 14, 15, 23
Spring peak activity (times to implement curtailment/ mitigation)	Based on monitoring station W2 60m data: <u>15 September - 15 October</u> <u>Sunset – 00:00; and 5:00 – sunrise</u>	Based on monitoring station W2 60m data: <u>15 September - 15 October</u> <u>Sunset – 00:00; and 5:00 – sunrise</u>
Environmental conditions in which to implement curtailment/ mitigation	<u>Below 5.5m/s measured at 60 height</u> <u>Above 15.5°C measured at 60m height</u>	<u>Below 5.5m/s measured at 60 height</u> <u>Above 15.5°C measured at 60m height</u>
Autumn peak activity (times to implement curtailment/ mitigation)	Based on monitoring stations W3 10m and W4 60m data: <u>01 February to 15 May</u> <u>Sunset – 00:00; and 5:00 – sunrise</u>	Based on monitoring stations W3 10m and W4 60m data: <u>01 February to 15 May</u> <u>Sunset – 00:00; and 5:00 – sunrise</u>
Environmental conditions in which to implement curtailment/ mitigation	<u>Below 8.5m/s measured at 60m</u> <u>Above 18.5°C measured at 60m</u>	<u>Below 8.5m/s measured at 60m</u> <u>Above 18.5°C measured at 60m</u>

Residual Risks:

Even with the correct turbine placement and curtailment implemented, the possibility remains for bats to be impacted by turbine blades.

5.3.2. Conclusion

Considering the decreased risk of 52m at the lowest rotor swept height, and the increased risk of the larger airspace occupied by a larger rotor diameter, the proposed turbine dimension change will have a negligible effect on the significance of impacts identified in the most recent bat pre-construction monitoring report dated June 2015. The proposed changes in output capacity per turbine and heights of measuring masts is not applicable to impacts on bats. No collision impacts have been recorded of bats with measuring masts. However, the proposed change in the turbine layout will decrease the significance of impacts originally identified in the EIA report for the operational phase. This is primarily since the proposed layout has no turbines located in high bat sensitivity buffers, and respects the sensitivity map better. Therefore, the proposed turbine layout is preferable above the authorised layout, and the recommended mitigation measures need to be adhered to for both layout options. The specialist has no objection to the proposed changes of turbine dimensions, output capacity, measuring mast heights and the extension of the validity period.

5.4. Ecological Impact

A statement letter was prepared by the ecologist (**Appendix D**) in reference to the authorized Witberg Wind Energy Facility (WEF), for comment on the ecological implications of the proposed changes to the layout and turbine specifications that would be included in the Amendment.

The specialist confirmed review of the amended layout in reference to both the previously amended and approved layout as well as the ecological sensitivity of the site. The previous layout consisted of 27 turbines while the current proposed amended layout has been reduced to 25 turbines. The amendment includes increasing the size and output of the turbines and in terms of impacts on terrestrial ecology, this would not be likely to generate any additional impacts or noticeably increase any previously assessed impacts. The increase in the size of the turbines is offset by the reduction in the number of turbines. As such, the change in the turbine number and specifications is not considered to have material additional or reduced impact on terrestrial ecology and as such, no changes to the previously assessed impacts are recommended as a result of the changes to the turbines.

The amendment includes some changes to the layout including the repositioning of some of the turbines. While the majority of turbines are in close proximity to their original positions, with minimal potential change in impact, three turbines have been lost from the east of the site and repositioned on ridges to the west. The revised positions have been interrogated and found to be within acceptable positions where their impact is likely to be similar as the previous wind turbine positions, and no additional impact can be anticipated as a result of the changes. Consequently, there is no change to the assessed impacts as a result of the change in turbine positions. The additional changes to the layout such as access roads, power line, construction camp and substation position, have also been reviewed and no changes to the impact of the development on terrestrial ecological features were found to have occurred. As such, it was concluded that the change to the layout of the development has not had an impact on the previously assessed impacts associated with the development.

Although, no additional impacts are likely to occur as a result of the amendment, it should be noted that the effected environment is considered sensitive and a variety of plant species of high conservation concern are known from the immediate area. As previously noted, and reiterated, the need for a pre-construction walk-through of the entire development footprint with local adjustment to the routing of access roads and micro-siting of turbines where deemed necessary should occur should the development proceed to construction. A pre-construction walk-through of the facility would also be required in order to comply with the permit conditions for the development as a variety of protected species may be impacted and a permit from CapeNature would thus be required.

Since the original study was conducted in 2010, there is some potential for the receiving environment to have changed in the intervening period till now. However, conditions at the time of the original assessment were very favourable and the fynbos vegetation in the development area was mature and well-developed. As a result, the original assessment is considered to provide a good characterization of the receiving environment, which would not have changed significantly since the original sample period. In addition, there has not been significant additional transformation or habitat loss in the immediate environment of the wind farm, with the result that cumulative impacts associated with the development are not likely to have changed significantly since the original assessment.

5.4.1. Comparative Assessment

It was concluded that the change to the layout of the development has not had an impact on the previously assessed impacts associated with the development. Therefore, no comparative assessment was required. In addition, all original mitigation measures proposed will remain the same, and must be included in the EMPr, and implemented accordingly.

5.4.2. Conclusion

The findings of the ecological statement are contingent on the layout, as provided for the assessment. There are a variety of sensitive and threatened species at the site which are vulnerable to impact and which can be affected by changes to the development layout. Should the development proceed to construction, the final development footprint should be subject to a pre-construction walk-through to inform the final placement of roads and turbines as well as locate and identify species of conservation concern that are within the development footprint. Some search and rescue of plant species of conservation concern may also be required, which is to be determined as part of the pre-construction walk-through.

Overall, there have been no change or increase in potential impacts from an ecological perspective. The Witberg Amended layout is therefore supported in terms of terrestrial ecology impacts as it will not result in an increase in the significance in any of the assessed ecological impacts and is not considered substantially different from the previous 27 turbine layout. As such the proposed amendments to the turbine specifications and layout are regarded as acceptable from an ecological perspective.

5.5. Impacts on Heritage

ACO Associates CC have been appointed by Savannah Pty Ltd to provide an assessment (**Appendix E**) of an amended layout for the Proposed Witberg Wind Energy Facility (Witberg Wind Energy Facility DEA ref. 12/12/20/1966) to be situated on the Witberg Ridge in the Laingsburg Municipality of the Western Cape Province. The proposed amendments also include a number of non-spatial amendments which have been assessed accordingly, where relevant.

During the original EIA heritage impact assessment (2011), it was determined that the main heritage impacts related to possible impacts to palaeontology and the setting or cultural landscape. Impacts to archaeology, built environment and graves were of low significance.

The proposed new layout will not change the impacts to palaeontology which relates to the construction of the turbines bases in potentially sensitive rock formations, and particularly the access road where deep cuttings and incline changes will cause impacts. The significance of these is moderate negative without mitigation, however scientific benefit can be obtained if suitable mitigation is carried out (Hart 2011).

In terms of impacts to the cultural landscape or setting, the 2011 study found that there would be a high negative impact that could not be easily mitigated without reducing the number of turbines and placing them as far from Matjiesfontein as possible. The reduction of the number of turbines is likely to be an improvement with the significance of the impact shifting from high negative to medium negative. The Visual Impact Assessment (VIA) suggests (refer to **Section 4.7** below and **Appendix G**) that the overall impact of the turbines will remain largely unchanged from that already authorized. In heritage terms an advantage of the amended layout, which now sees turbines less dominantly placed 11 km from Matjiesfontein as

opposed to 9 km in the original proposal, will help alleviate visual impacts from the heritage town. From this perspective the amendment is supported.

The power lines, access road and substation sites are all situated within the already Heritage Western Cape (HWC) approved envelope of land that was comprehensively surveyed in 2011. This survey, which in fact exceeded the study area of the 2018 amendment, established that the heritage sensitivity was related to palaeontology. The significance ratings and mitigation recommended remains unchanged for this component in terms of the proposed amended layout.

5.5.1. Comparative Assessment

Setting and Cultural Landscape (Operation Phase):

Nature of impact: Setting and cultural landscape				
The impact relates to the affect the proposal will have on the setting around the site, especially with respect to important heritage sites such as Matjiesfontein that has a remote sense of place on the edge of the great Karoo. The industrialising of the surrounding rural and remote areas will have an impact on the sense of place. This impact related mostly to the operational phase of the project.				
	Authorised		Proposed amendment	
	Without mitigation	With mitigation	Without mitigation	With mitigation
Extent	Low (1)	Low (1)	Low (1)	Low (1)
Duration	Permanent (5)	Permanent (5)	Permanent (5)	Permanent (5)
Magnitude	High (8)	High (8)	Medium (5)	Medium (5)
Probability	Definite (5)	Definite (5)	Probable (3)	Probable (3)
Significance	70 (high)	70 (high)	33 (Medium)	33 (Medium)
Status (positive or negative)	Negative	Negative	Negative	Negative
Reversibility	Very low	Very low	Very low	Very low
Irreplaceable loss of resources?	No	No	No	No
Can impacts be mitigated?	No	No	No	No
Mitigation: No mitigation possible. Please refer to original visual impact assessment (Section 4.7).				
Cumulative impacts:				
Since 2012 when the first EIA was completed, the amount of Wind Energy Facilities has increased. In particular on the Sutherland Escarpment and Moordenaars Karoo and Tanqua Karoo has seen a number of proposals. While these are not directly in sight of Witberg, there is a regional change of character in terms of loss of wilderness qualities and sense of place.				
Residual Risks:				
Residual risks are few and relate to chance encounters of archaeological and palaeontological material after the proposed development is in place.				

5.5.2. Conclusion

With the proposed amendment of the layout, the result was that the potential impact in terms of setting and cultural landscape decreased in significance from a High significance rating to a Medium significance rating. The heritage assessment therefore finds that the amended layout and turbine specifications along with the non-spatial amendments proposed should be supported. No other potential impacts identified

have changed and no new potential impacts have been identified. In addition, the mitigation measures remain unchanged. From a heritage perspective, the proposed amendments are considered acceptable.

5.6. Noise Impacts

A noise report was compiled by Dr. Brett of Safetech (**Appendix F**) as an addendum to the original Noise Impact Report that was issued by Jongens Keet Associates (March 2011). The purpose of this addendum report is to determine if the 27-turbine project layout⁵ with proposed amended turbine layout and specifications will comply with the noise emission limits as contained in the Department of Environmental Affairs - Environmental Authorisation (12/12/20/1966) issued in 2011.

The following noise sensitive areas have been used in the remodelling as identified in **Figure 4.5** below.

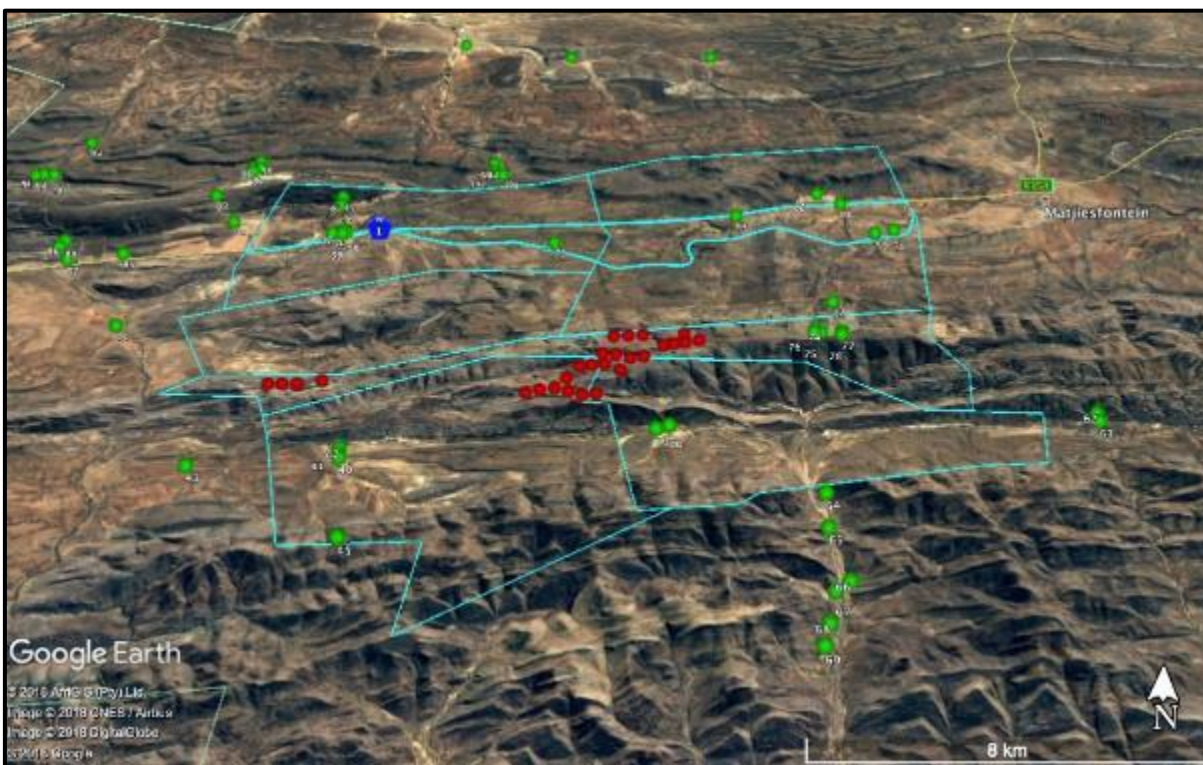


Figure 4.5: Noise Sensitive Areas

Wind Turbines in Red, Noise Sensitive Areas in Green, Wind Farm Boundary in Blue

The masking effect of the wind noise will mitigate the noise impact. The results are however based on no wind noise masking, which in reality rarely occurs when the turbines are operational. The maximum noise rating limit (24 hour day/night) for rural areas in SANS 10103:2008 is 45 dB(A). The modelling results indicate that the SANS 10103:2008 limit of 45 dB(A) will not be exceeded at any of the noise sensitive areas. This includes the cumulative impacts from the other windfarms. The Witberg Wind Farm along with any of the

⁵ The 27 wind turbine layout referred to is the amended 27 wind turbine layout which only took into account the Verreux's Eagle 1.5km nest buffer, which is the layout prior to the currently proposed 25 wind turbine layout which considered the Verreux's Eagle 1.5km nest buffer as well as bat sensitivity areas. A letter which considered the currently proposed 25 wind turbine layout is included in **Appendix F**.

alternatives currently proposed may therefore proceed and the proposed amendment is acceptable and can be authorised by the Competent Authority.

It is highly likely that the wind noise will provide a masking effect. Furthermore, the modelling assumes the receiver is outdoors at all times.

If the final number of turbines is reduced or the layout changed such that no turbine is moved closer to a noise sensitive area, then remodelling will not be required, provided the final turbine choice sound power level is not greater than that, that was used in this report (108.1 dBA).

The overall environmental impact of the changes made to the project scope is rated as low and has not changed from the original noise impact assessment. No additional mitigation measures are required. In addition, there are no additional advantages or disadvantages in relation to the project impacts. The entire site as proposed may be developed with no constraints.

5.6.1. Comparative Assessment

It was concluded that the change to the wind turbine specifications and the layout of the proposed development has not had an impact on the previously assessed impacts associated with the development. Therefore, no comparative assessment was required. In addition, all original mitigation measures proposed will remain the same, and must be included in the EMP, and implemented accordingly.

5.6.2. Conclusion

The overall environmental noise impact significance remains low taking into account the changes to the turbine specifications and layout. The amended project description does not exceed the SANS 10103:2008 limit of 45 dB(A) at any of the noise sensitive receptors using the data that was modelled. It was recommended that based on the results presented, the granting of an Amended Environmental Authorisation with respect to the noise impacts is deemed acceptable and recommended. The overall environmental impact of the changes made to the project scope is rated as low and has not changed from the original noise impact assessment. No additional mitigation measures are required. The entire site as proposed may be developed with no constraints.

Further to the above, it must be noted that the wind turbine layout was subsequently amended following the assessment of the 27 wind turbine layout results provided above, which reduced the number of wind turbines from a 27 wind turbine layout, to a 25 wind turbine layout after taking into consideration bat sensitivities and the Verreux's Eagle 1.5km nest buffer. A letter (**Appendix F**) was thereafter obtained from Dr. Williams after consideration of the currently proposed 25 wind turbine layout. It was stated in the letter that further reduction in turbines will thus reduce the noise impacts from that which was modelled in August 2018, as per the noise addendum report.

5.7. Visual Impact

An amendment report was prepared jointly by Quinton Lawson of QARC and Bernard Oberholzer BOLA (**Appendix G**) to provide a comparison between the previous authorised 27 turbine layout and the proposed amended 27 turbine layout⁶.

The analysis indicated that the proposed amendments would result in a negligible change to the viewshed (zone of visual exposure) as indicated in **Figure 4.6**. Photomontages have also been prepared to indicate the visibility of the amended proposals from selected viewpoints, (**Figures 4.7 to Figure 4.9**).

The visual analysis indicates that the current amendments will have a zero or a negligible effect on the significance of impacts identified in the original VIA Report and subsequent authorised amendment.

⁶ The 27 wind turbine layout referred to is the amended 27 wind turbine layout which only took into account the Verreaux's Eagle 1.5km nest buffer, which is the layout prior to the currently proposed 25 wind turbine layout which considered the Verreaux's Eagle 1.5km nest buffer as well as bat sensitivity areas. A letter which considered the currently proposed 25 wind turbine layout is included in **Appendix G**.

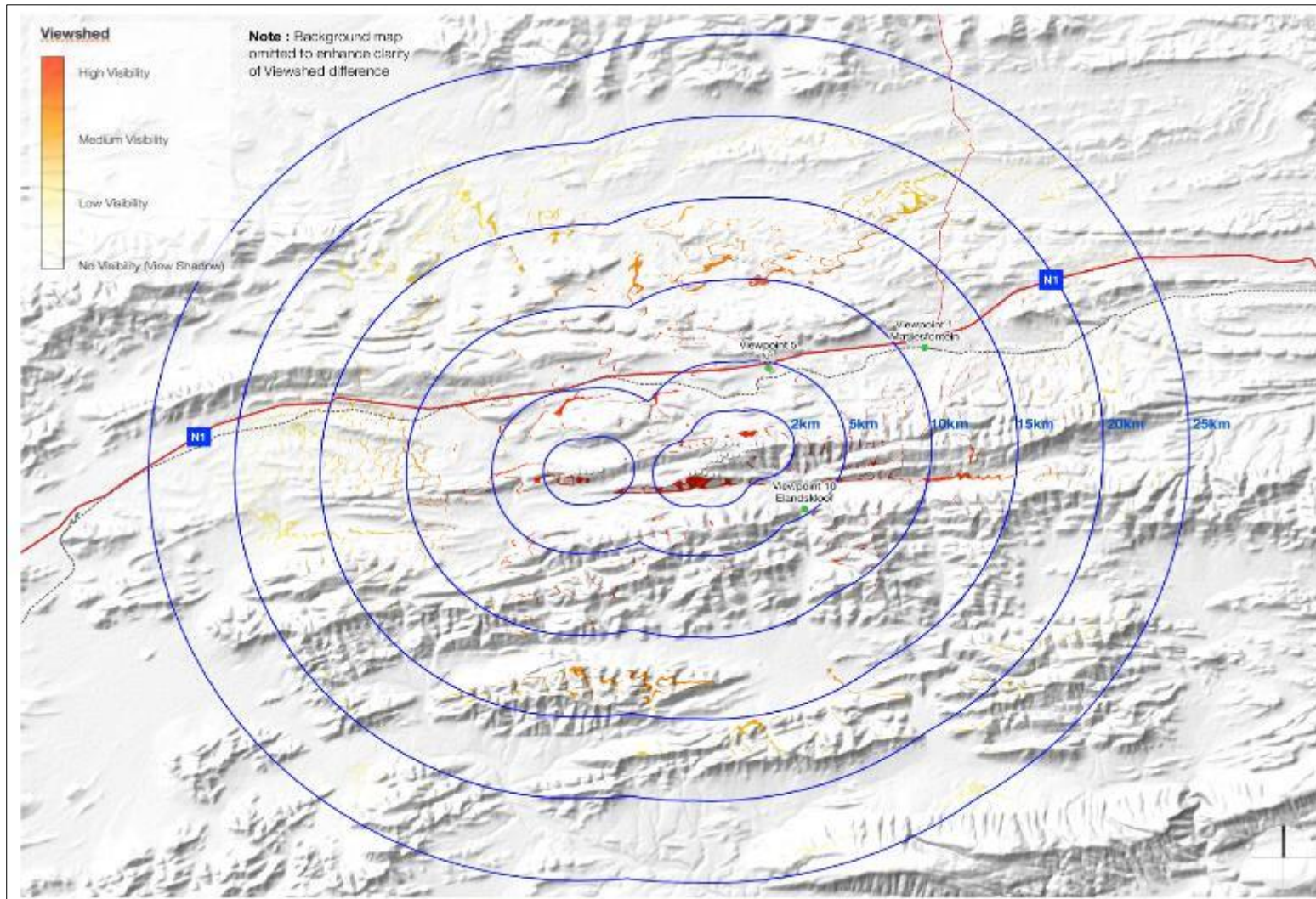


Figure 4.6: Witberg difference in increased viewshed between previously authorised turbine specifications and layout, and the amended 27 turbine specifications and layout.

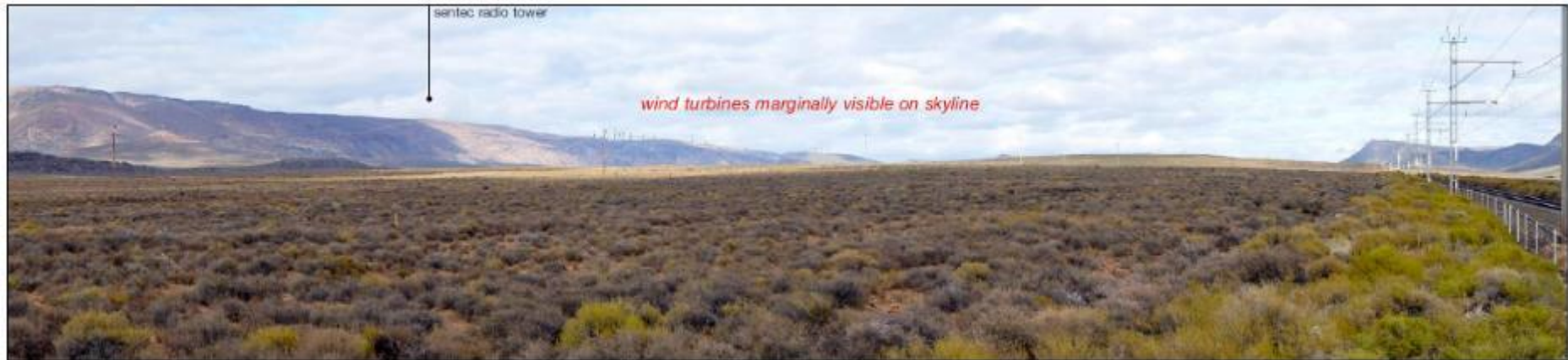


Figure 4.7: Viewpoint 1 – 2018 amendment looking south-west from Matjiesfontein Rail Crossing.



Figure 4.8: Viewpoint 5 – 2018 amendment looking east from N1 Memorial.



Figure 4.9: Viewpoint 10 – 2018 amendment looking north from Elandskloof Gate.

5.7.1. Comparative Assessment

The increased hub height, rotor diameter and blade tip height would result in similar overall visual impact significance ratings to that determined in the original VIA and subsequent authorised amendment, as indicated above. The proposed amendments to the wind turbines and related infrastructure would therefore result in no change in the overall visual impact significance ratings in relation to those of the previous authorised proposals, and no comparative assessment was required. In addition, the layout of the wind farm has already been through a number of iterations based on the specialist studies and engineering considerations. The visual mitigations contained in the original VIA of 2011 would still have relevance, and no new visual mitigations are deemed necessary.

5.7.2. Conclusion

The proposed amendments to the 27 wind turbines and related infrastructure would result in no change in the overall visual impact significance ratings in relation to those of the previous authorised proposals. As the baseline visual environment has not changed since the previous authorisation, the extension of the validity of the Environmental Assessment by two years will have no bearing on the visual environment. Provided that the visual mitigations listed in the original visual impact study (including post-construction rehabilitation of the site) are adhered to, the existing Environmental Authorisation for the Witberg WEF should still be valid. Our opinion from a visual perspective is that the proposed amendments should be approved.

Further to the above, it must be noted that the wind turbine layout was subsequently amended following the assessment of the 27 wind turbine layout collision risk assessment results provided above, which reduced the number of wind turbines from a 27 wind turbine layout, to a 25 wind turbine layout after taking into consideration bat sensitivities and the Verreaux's Eagle 1.5km nest buffer. A letter (**Appendix G**) was thereafter obtained after consideration of the currently proposed 25 wind turbine layout. It was confirmed in the letter that having reviewed the changes to the layout that any changes or updates to the amended VIA are not necessary and that the original findings will not be affected.

5.8. Social Impact

The proposed amendments to the turbine specifications and the amended 27 turbine wind farm layout⁷ were considered within the social amendment assessment (**Appendix H**). The core findings are presented below.

In 2011, the area had a dependency ratio of 52,6 and, between 2001 and 2011, a population growth rate of 1,79%. There was an official unemployment rate of 17,9% and an official youth unemployment rate of 22% in the area in 2011.

Considering the nature of the proposed amendments in association with the original Social Impact Assessment (SIA) undertaken for the project, it is unlikely that the proposed amendments will have any significant effect in respect of the social impacts associate with the project. The only areas of some relevance would be associated with:

⁷ The 27 wind turbine layout referred to is the amended 27 wind turbine layout which only took into account the Verreaux's Eagle 1.5km nest buffer, which is the layout prior to the currently proposed 25 wind turbine layout which considered the Verreaux's Eagle 1.5km nest buffer as well as bat sensitivity areas. A letter which considered the currently proposed 25 wind turbine layout is included in **Appendix H**.

- » Noise;
- » Visual;
- » Shadow flicker;
- » Blade throw and; and
- » Fire linked.

Although these issues could result in social impacts in the sense that they may overlap with the social in respect of health and safety and a sense of place, they actual fall with the domain of other areas of specialisation and would best be addressed by the relevant specialist.

As the proposed amendments to the project are largely of a technical nature, apart from the proposal to extend the validity period of the environmental authorisation by an additional 2 years, it is unlikely that these amendments will result in any socially based advantages and disadvantages and therefore the impact assessment undertaken during the EIA phase remains valid.

5.8.1. Comparative Assessment

The proposed amendments to the wind turbines and related infrastructure would therefore result in no change in the overall social impact significance ratings in relation to those of the previous authorised proposals, and no comparative assessment was therefore required. The social mitigations contained in the original SIA report (2011) would still have relevance, and no new social mitigations are deemed necessary.

5.8.2. Conclusion

On this basis it is feasible to accept that if there are any health hazards and/or visual effects associated with the proposed amendments to the project that these can be acceptably mitigated in terms of the recommendations of the appropriate specialist. From a social perspective, no changes to the originally identified social impacts have been identified as a result of the proposed amendments. Moreover, no new or additional impacts have been identified. The proposed changes will therefore result in no (zero) changes to the significance rating within the original SIA report (2011) that was used to inform the approved EIA. In addition to this, no new mitigation measures are required. Lastly, the proposed amendments will not have any socially based advantages or disadvantages. The proposed amendments can therefore be supported provided that the recommended mitigation measures as per the original social impact report (dated 2011) are adhered to.

Further to the above, it must be noted that the wind turbine layout was subsequently amended following the assessment of the 27 wind turbine layout results provided above, which reduced the number of wind turbines from a 27 wind turbine layout, to a 25 wind turbine layout after taking into consideration bat sensitivities and the Verreaux's Eagle 1.5km nest buffer. A letter (**Appendix H**) was thereafter obtained after consideration of the currently proposed 25 wind turbine layout. It was confirmed in the letter that the changes are most unlikely to result in any significant adjustments to the impacts as identified in the original social impact assessment report, dated 2011. These changes are also most unlikely to result in any additional social impacts. Consequently, there is no change in respect of the "Short Amendment Report" date 1 August, 2018 as provided herein.

6. ADVANTAGES AND DISADVANTAGES OF THE PROPOSED AMENDMENTS

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

General	
Advantages of the amendment	Disadvantages of the amendment
The increase in rotor diameter, hub height and generation capacity for each wind turbine will increase the efficiency of the facility and consequently the economic viability thereof. Increased efficiency of a facility is considered to be beneficial to the environment as this will reduce the need for additional facilities to generate additional electricity.	None
The proposed amendments are beneficial from a macro-economic perspective as it results in the lower cost per unit of energy, ultimately benefiting the South African public.	None
Birds	
Advantages of the amendment	Disadvantages of the amendment
The proposed amendments (increased hub height and fewer turbines) will result in a change (decrease) to the significance of the impact(s) assessed for birds in the original EIA. The significance will change in a positive manner (lower impact) if the turbine height is increased (to between 105m and 120-m). However, if the models incorrectly forecast the predicted fatalities the significance of the impact can be reduced to acceptable levels (<1 eagle per year) through the mitigation suggested.	In general, the change in hub height of the proposed turbines is expected to have a negative influence on the mortality experienced by sensitive birds in the study area, although still below 0.86 fatalities.
The amended layout is more beneficial as wind turbines have been removed and re-positioned outside of very high sensitivity areas.	None
With all mitigations considered, and the marking of the overhead lines, the risks to collision-prone birds on the WEF site can be reduced to minimal acceptable levels.	None
Overall, the currently proposed amendments (i.e. 25 turbines with hub heights of between 92m and 120-m) is likely to incur fewer eagle fatalities than the authorised 27 turbines of 92-m HH, with all turbines outside the 1.5 km buffer for all eagle nests.	None
Bats	
Advantages of the amendment	Disadvantages of the amendment
In terms of the proposed amendments to the turbine dimensions, lowest rotor swept height increased from 32m to 52m which means the probability of impacts to bats is less at 52m than at 34m.	The amendment to the turbine dimensions will also however have a larger rotor airspace occupied which could result in increased risk of bat impacts.

Decreased risk of impacts to bats as wind turbines have been re-positioned out of high sensitivity areas into moderate sensitivity areas.	None.
Ecology	
Advantages of the amendment	Disadvantages of the amendment
The revised positions have been interrogated and found to be within acceptable positions where their impact is likely to be similar as the previous positions and no additional impact can be anticipated as a result of the changes. Consequently, there is no change to the assessed impacts as a result of the change in turbine positions.	None
The additional changes to the layout such as access roads, power line, construction camp and substation position, have also been reviewed and no changes to the impact of the development on terrestrial ecological features were found to have occurred.	None
Heritage	
Advantages of the amendment	Disadvantages of the amendment
The amendment has resulted in a decrease in the impacts to setting and landscape.	None
Visual	
Advantages of the amendment	Disadvantages of the amendment
In terms of wind turbine layout amendments, the relocation of three turbines further west (further from Matjiesfontein) could be seen as an advantage.	None
The relocation of the substation on the same ridge as the turbines could also be seen as an advantage. The relatively low height of the substation and 4,5km distance from the N1 means that visibility would not be a major issue. Nevertheless, the substation should be micro-sited to be as far south on the flattish ridge as possible to reduce its visibility from the north.	None
The powerline connection further east means that it will be slightly further away from the N1 National Road, which could be seen as an advantage in visual terms.	None
The increase in height of the wind measuring mast from 80 to 120m would have little or no visual effect, given the slender nature of the mast and the distance to any visual receptors.	None
Noise	
Advantages of the amendment	Disadvantages of the amendment
None	None
Social	
Advantages of the amendment	Disadvantages of the amendment
None	None

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

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

As required in terms of Regulation 32(1)(a)(iii), consideration was given to the requirement for additional measures to ensure avoidance, management and mitigation of impacts associated with the proposed change. From the specialist inputs provided into this amendment motivation, it is concluded that the mitigation measures proposed within the EIA would largely be sufficient to manage potential impacts within acceptable levels. Additional mitigation measures have however been recommended by the Avifaunal and Bat specialists for inclusion in an updated EMPr in **Appendix K**.

8. PUBLIC PARTICIPATION

A public participation process is being conducted in support of the Part 2 amendment application for the amendment of the Environmental Authorisation for the Witberg Wind Farm and associated infrastructure in the Western Cape Province.

A full Interested and Affected Party (I&AP) database is included in **Appendix I1**. It must be noted that the project is to be developed on the same farm portions as originally authorised, all of which, are privately owned. The amendment to the EA will therefore not result in impacts on any additional interested and affected parties.

The public participation for the proposed amendment process will include:

- » The draft motivation report has been made available for public review on www.savannahsa.com from **14 November 2018 until 14 December 2018**.
- » Written notification to registered I&APs regarding the availability of the amendment motivation report was distributed on **14 November 2018** (refer to **Appendix I2**).
- » Written notification to Organs of State regarding the availability of the amendment motivation report was distributed on **14 November 2018** (refer to **Appendix I3**).
- » An advertisement was placed in the Worcester Standard (local newspaper) on **15 November 2018** (refer to **Appendix I4**).
- » A hard copy of the draft motivation report was placed at the Laingsburg Public Library (Van Riebeeck Street, Laingsburg) on **14 November 2018**.
- » Site notices were placed at the site on **26 July 2018** (refer to **Appendix I4**).

Comments received during the public review period will be included in the final submission to the DEA for consideration in the decision-making process. Comments will be responded to and included in the Comments and Responses Report (refer to **Appendix I5**). Proof of requests made to obtain comments will be included in **Appendix I6**.

9. CONCLUSION

Based on the specialist findings (**Appendix A to H**), it is concluded that the proposed amendments to the turbine specifications and wind farm layout are not expected to result in any additional impacts or an increase to the significance ratings for the identified potential impacts. The amended wind turbine positions currently considered avoids all identified very high sensitivity areas (refer to **Figure 2.1**). Several specialist studies show that the potential impacts will remain the same as per the EIA studies. These include avifauna, ecology, noise, visual and social. It must be noted that in the case of avifauna impacts, whilst the potential impact on eagle fatalities during the operation phase based on the amendments of the wind turbine specifications and layout are expected to be reduced, there is no quantitative or qualitative change in the significance ratings. In the case of bats, a decrease in operation phase bat mortality was found in which the potential impact decreased from a Medium significance to a Low significance post-mitigation. Finally, the potential impact was assessed to be decreased based on the proposed wind farm layout and wind turbine specification amendments from a heritage perspective, with regards to the setting and cultural landscape. The potential impacts decreased from a High significance rating to a Medium significance rating.

The proposed amendments in themselves are not listed activities and do not trigger any new listed activity. No additional properties will be affected by the amendments as the proposed amendments are within the original authorised development footprint.

The mitigation measures described in the original EIA document are adequate to manage the expected impacts for the project in terms of ecology, noise, visual, social and heritage. **Additional mitigation measures have however been recommended by the avifauna and bat specialists and, as a result of this proposed amendment, have been included within the project EMPr provided herein.**

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

- » An amendment to the authorised turbine specifications are required as follows:
 - Range of Hub height: from 92m, to a **range from 92m to up to 120m**;
 - Range of Rotor diameter: from 116m, to a **range from 116m to up to 136m**; and
 - Range of Wind turbine capacity per wind turbine: from 3MW to a **range from 3MW to up to 5MW**.
- » In addition, an amendment to the wind farm layout is required to avoid sensitive areas, and to optimise the layout. Therefore, the number of wind turbines will be reduced from 27 wind turbines to **25 wind turbines**, and the wind turbined and associated infrastructure will be re-positioned.
- » The contact person and relevant details are to be updated for the holder of the EA.
- » Minor spelling corrections are to be requested for the minor details of two (2) of the authorised listed activities in the EA.
- » An extension of the validity of the EA by a further two (2) years is requested.
- » Amendment to the height of the wind measuring masts from 80m to **120m** (in line with new wind turbine hub height) is requested.
- » Condition 40 of the EA, as per additional conditions to be added to the EA, in the amendment of the EA (Ref: LSA 105-439), is requested to be amended so that Condition 40 is correctly addressed to the Holder of the EA (i.e. Witberg Wind Power (Pty) Ltd).
- » Amendment to consolidate all EAs, amendments and appeal decisions into one EA.

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

It is furthermore recommended that an ecological pre-construction walk-through is undertaken prior to construction to inform the final placement of roads and turbines, as well as locate and identify species of conservation concern that are within the development footprint. This recommendation should be included in the updated EA.