Proposed Emvelo Wind Energy Facility and Auxiliary Infrastructure, Mpumalanga

Draft for Public Comment

PREPARED FOR
Emvelo Wind Energy (Pty) Ltd

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Draft for Public Comment
14/12/16/3/3/2/2611

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ACRONYMS AND ABBREVIATIONS

Acronyms	Description
BAR	Basic Assessment Report
BSA	Blade Swept Area
CA	Competent Authority
CARA	Conservation of Agricultural Resources, 1983 (Act No. 43 of 1983)
CBA	Critical Biodiversity Area
DRDLEA	Department of Agriculture, Rural Development, Land and Environmental Affairs
dB	Decibel
DFFE	Department of Forestry, Fisheries and the Environment (National)
DMRE	Department of Mineral Resources and Energy
DoE	Department of Energy
DHSWS	Department of Human Settlement, Water and Sanitation
EAP	Environmental Assessment Practitioner
ECA	Environment Conservation Act, 1989 No. 73 of 1989)
EGI	Electricity Grid Infrastructure
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ESA	Ecological Support Area
ESA	Early Stone Age
ESKOM	Eskom Holdings SOC Limited

Acronyms	Description
EWT	Endangered Wildlife Trust
FEPA	Freshwater Ecosystems Priority Areas
GNR	Government Notice Regulation
GSDM	Gert Sibande District Municipality
HD	Historically Disadvantaged
HIA	Heritage Impact Assessment
HV	High Voltage
I&AP	Interested and Affected Party
IBA	Important Bird Area
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IPP	Independent Power Producer
IRP	Integrated Resource Plan
IUCN	International Union for Conservation of Nature
kV	Kilovolt
kWh	Kilowatt Hours
LSA	Late Stone Age
MBSP	Mpumalanga Biodiversity Sector Plan
MSA	Middle Stone Age
MW	Megawatt
NBA	National Biodiversity Assessment
NCR	Noise Control Regulations
NDP	National Development Plan
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NPAES	National Protected Area Expansion Strategy
NSD	Noise-sensitive Development
NSR	Noise Sensitive Receptors
NWA	National Water Act, 1998 (Act No. 36 of 1998)
OES	Ostrich Eggshell
ONA	Other Natural Areas
PAOI	Project Area of Influence
PES	Present Ecological State

Acronyms	Description
PGDS	Provincial Growth and Development Strategy
PPA	Power Purchase Agreement
PPP	Public Participation Process
PSEIA	Plan of Study for the Environmental Impact Assessment
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
RMPPP	Risk Mitigation Power Procurement Programme
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SANS	South African National Standards
SAWS	South African Weather Service
SCADA	Supervisory Control and Data Acquisition
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
SIA	Social Impact Assessment
SR	Scoping Report
SPL	Sound Pressure Level
SPV	Special Purpose Vehicle
SSV	Site Sensitivity Verification
VIA	Visual Impact Assessment
WEF	Wind Energy Facility
WULA	Water Use License Application

PUBLIC PARTICIPATION DETAILS

The Draft Environmental Impact Assessment (EIA) Report, with the required application form, has been submitted to the Department of Forestry, Fisheries and the Environment (DFFE), acting as the Competent Authority (CA).

Members of the public, local communities, and stakeholders are invited to comment on the Draft EIA Report available for public review and comment from the 10 March 2025 until the 10 April 2025 (both days inclusive), at the following locations:

Location	**Physical Address**
Hard Copy Location	
Ermelo Public Library	Msukaligwa Municipality Civic Centre, corner of Church and Smuts street, Ermelo, 2350, Mpumalanga
CD copies were available upon request.	
Electronic Copy Locations	
ERM Website	https://www.erm.com/public-information-sites/proposed-amsterdam-wind-energy-facility-and-auxiliary-infrastructure-cluster-mpumalanga/
Electronic Transfer	Interested and Affected Parties (I&APs) could request for copies to be shared via a One Drive folder.

EXECUTIVE SUMMARY

Emvelo Wind Energy Facility (Pty) Ltd ('the Project Applicant') is applying for EA to construct and operate the up to 260 MW Emvelo Wind Energy Facility (WEF) (the proposed Emvelo WEF) and its associated auxiliary infrastructure, which is includes one on-site substation, with capacity of up to 132 kV, to facilitate the connection between the WEF and the electricity grid. As well as an up to 132 kV over-head powerline of approximately 30 km (300 m corridor), traversing 35 land parcels, be constructed to connect the proposed WEF to the new Camden B substation (Figure 1). Environmental Resources Management Southern Africa (Pty) Ltd ('ERM') has been appointed to act as the independent Environmental Assessment Practitioner (EAP) to undertake the Scoping and Environmental Impact Assessment (S&EIA) process for Environmental Authorisation under Chapter 5 of the National Environmental Management Act, 1998 (Act 107 of 1998 - NEMA) as amended, for the Proposed Development

The Emvelo WEF, as accepted pursuant to the scoping report phase by the Department of Forestry, Fisheries and the Environment ("DFFE") by letter dated 19 November 2024 and signed by Ms. Masina Morudu[1], will now include properties that were assessed as part of the scoping process for the Emvelo WEF and the Rochdale WEF.

SITE LOCATION AND PROPOSED DEVELOPMENT DESCRIPTION

Emvelo WEF is proposed to comprise up to 24 turbines with a maximum output capacity of up to 260 MW. The WEF will be located on ten (10) land parcels and will have an anticipated lifespan of 25-30 years. The final design which will be requested for approval in the EA, will be determined based on the outcome of the specialist studies undertaken for the EIA phase of the development. The proposed turbine footprints and associated facility infrastructure will cover an area of up to 185 ha after rehabilitation, depending on final layout design.

It is proposed that an on-site substation with a capacity of 132 kV and an up to 132 kV Overhead Powerline (OHPL) of approximately 30 km (300 m corridor) in distance, traversing thirty-five (35) land parcels, be constructed to connect the proposed WEF to the proposed new Camden B substation.

ENVIRONMENTAL LEGISLATIVE REQUIREMENTS

The EIA Regulations, 2014, published in Government Notice (GN) No. R. 982 as amended provide for the control of certain Listed Activities. These activities are listed in GN No. R. 983 (Listing Notice 1 - Basic Assessment), R. 984 (Listing Notice 2 - Scoping & EIA Process) and R. 985 (Listing Notice 3 - Basic Assessment) of 4 December and are prohibited to proceed until environmental authorisation has been obtained from the competent authority, in this case, the Department of Forestry, Fisheries and the Environment (DFFE).

On 7 April 2017 in Government Gazette 40772 the Minister of Environmental Affairs published amendments in Government Notice (GN) Number R. 326 to the Environmental Impact Assessment (EIA) Regulations of 2014 that provide for the control of certain Listed Activities. These activities are listed in Listing Notice 1 (GN R327), Listing Notice 2 (GN R325) and Listing

[1] Ms. Morudu is the Designated Control Environmental Officer: National Integrated Authorisation, and at the behest of Dr. Sabelo Malaza the Chief Director: Integrated Environmental Authorisations in DFFE.

Notice 3 (GN R324). Activities triggered within Listing Notice 1 and 3 require Basic Assessment; activities within Listing Notice 2 require a Scoping & EIA Process.

As the proposed Emvelo WEF and associated infrastructure triggers activities in Listing Notices 1 - 3 and does not fall within a Renewable Energy Development Zone (REDZ), a full Scoping and EIA (S&EIA) process will be followed.

Listed Activities applicable to the proposed Emvelo WEF and associated infrastructure are presented in Table 0-1 below. All potential impacts associated with these Listed Activities will be considered and assessed in this S&EIA process.

TABLE 0-1 SUMMARY OF THE APPLICABLE LISTED ACTIVITIES IN TERMS OF THE NEMA, AS AMENDED

Listing Notice	Activities
LN1 GN R327[2]	11(i); 12 (ii, a, c); 14; 19; 24 (ii); 28 (ii); 48 (i)(a, c); and 56 (ii).
LN2 GN R325[3]	1; and 15.
LN3 GN R324[4]	4 (f)(i)(bb)(ee); 10(f,i)(bb)(ee); 12(f)(ii); 14(ii)(f)(i)(bb)(ff); 18(f)(i) (bb)(ee); 23 (ii, a, c)(f)(i)(bb)(ee)

Depending on the final design of the Emvelo WEF and associated infrastructure, there may be a requirement for the following additional permits / authorisations. These permits will be applied for should the project be authorised and be selected as a preferred bidder.

- Biodiversity Permits in terms of the National Environmental Management: Biodiversity Act (Act
- No 10 of 2004) (NEMBA);
- Waste Management License/s as required by the NEMA, Waste Act, 2008 (Act No. 59 of 2008);
- Water Use Licenses as required by the National Water Act, 1998 (Act No. 36 of 1998) (NWA); and
- Heritage License in term of the National Heritage Resources Act 25 of 1999.

ENVIRONMENTAL IMPACT PHASE

The Final Scoping Report (FSR) (ERM, October 2024) presented and assessed the initial proposed wind turbine layout and associated infrastructures of the Emvelo WEF and its associated infrastructure. In November 2024, the DFFE accepted the FSR.

In light of furthered studies undertaken by the applicant and feedback received during the public participation phase of the Draft Scoping Report, supplementary studies were undertaken by the applicant that identified additional sensitivities requiring avoidance, prompting a revision of the project layout and cluster connectivity This resulted in a reduced turbine

[2] "Listing Notice 1 of the EIA Regulations, promulgated under Government Notice R983 of 4 December 2014, as amended by Government Notice R327 of 7 April 2017."
[3] "Listing Notice 2 of the EIA Regulations, promulgated under Government Notice R984 of 4 December 2014, as amended by Government Notice R325 of 7 April 2017."
[4] "Listing Notice 3 of the EIA Regulations, promulgated under Government Notice R985 of 4 December 2014, as amended by Government Notice R324 of 7 April 2017."

number layout and reconfigured orientation. This led to the necessary alignment of applications (Rochdale 14/12/16/3/3/2/2612 and Emvelo 14/12/16/3/3/2/2611) in the latest sensitivity mapping.

The results of the specialists' scoping assessments, I&AP and DFFE comments on the FSR's, and other technical and financial constraints for the proposed development site were taken into consideration and a revised 'preferred layout' was produced.

This EIA report now presents and assesses the impacts associated with the EIA phase preferred layout of the Emvelo WEF.

SUMMARY OF SPECIALIST ASSESSMENTS RESULTS

Each of the specialist assessments followed a systematic approach to the identification and assessment of impacts, with the principal steps being:

- Description of existing environment / baseline conditions;
- Prediction of likely potential impacts, including cumulative impacts (both positive and
- negative);
- Assessment of likely potential impacts (positive and negative);
- Identification of appropriate mitigation measures; and
- Assessment of residual (potential) environmental impacts.

The individual assessment methodologies and baseline descriptions are set out in this report. The approaches are in line with the legal requirements and industry best practice guidelines and makes use of the experience and expertise of the EAP and the specialists.

Studies have been completed to quantify possible impacts and magnitude of impacts related to but not limited to the soil, land, aquatic, biodiversity, visual/landscape, heritage, noise, socio-economic and traffic and transportation and includes measures to mitigate and reduce the significance of impacts.

SOIL, LAND USE AND AGRICULTURE POTENTIAL

The site is classified as ranging from low to very high agricultural sensitivity by the screening tool. This site sensitivity verification verifies those parts of the site that are indicated as cropland in this assessment as being of high agricultural sensitivity (or very high for irrigated cropland), and the rest of the site as being of medium agricultural sensitivity.

In general, the soils across more than half of the site have insufficient capability for viable crop production and those on the remaining proportion are suitable for viable cropping. Soil limitations that prevent crop production are predominantly the result of limited depth due to underlying bedrock, clay, or hardpan, or the result of poor drainage. The crop-suitable versus unsuitable soils have been identified over time through trial and error. All the deep, well-drained, suitable soils are generally cropped and uncropped soils that are used for grazing can fairly reliably be considered to have various limitations that make them unsuitable for crop production.

In general, the agricultural production potential of the site is high, and it is within an area that makes a significant contribution to food production in the country. Due to the favourable climate, crop yields are high on the suitable soils with average maize yields of around 7 tons per hectare according to the farmers on site.

Due to the facts that the proposed development will exclude agricultural production from only a very small area of land, and that its negative impact is offset by economic and other benefits to farming, **the overall negative agricultural impact of the development (loss of future agricultural production potential) is assessed here as being of low significance and as acceptable.**

FRESHWATER AND WETLANDS

During this assessment, several sensitive aquatic habitats were observed and are shown in the maps provided in this report. Noteworthy areas were then avoided by the required infrastructure, and include the main riverine and wetland systems, while the access roads could will make use of existing roads thus previously disturbed areas.

If this is carried out, then the specialist has no objection to the authorisation of the proposed activities assuming that all mitigations and buffer zones are implemented.

Mitigation should focus on these areas and include measures to halt erosion and rehabilitate habitat in the sections affected by the construction. Without the implementation of mitigation measures, the project has potential to cause a Moderate cumulative impact upon aquatic biodiversity. However, with the adoption of mitigation, the proposed project will have a Low impact upon aquatic biodiversity.

As the proposed activities have the potential to create erosion the following recommendations are reiterated:

1. Vegetation clearing should occur in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment, and suitable dust and erosion control mitigation measures should be included in the generic EMPr, if not included already to mitigate.
2. All construction materials including fuels and oil should be stored in demarcated areas that are contained within berms / bunds to avoid spread of any contamination / leaks. Washing and cleaning of equipment should also be done in berms or bunds, to trap any cement / hazardous substances and prevent excessive soil erosion. Mechanical plant and bowsers must not be refuelled or serviced within or directly adjacent to any channel. It is therefore suggested that all construction camps, lay down areas, batching plants or areas and any stores should be located more than 50 m from any demarcated watercourses.
3. It is also advised that an Environmental Control Officer (ECO), with a good understanding of the local flora be appointed during the construction phase. The ECO should be able to make clear recommendations with regards to the re-vegetation of the newly completed / disturbed areas along aquatic features, using selected species detailed in this report.
4. All alien plant re-growth must be monitored and should these alien plants reoccur these plants should be re-eradicated. The scale of the operation does however not warrant the use of a Landscape Architect and / or Landscape Contractor.

It is further recommended from the project onset that all watercourse areas (inclusive of buffers) are included into any existing EMPr as reference, this to ensure a net benefit to the aquatic environment. This should from part of the suggested walk down as part of the final EMP preparation.

The specialist has no objection to the authorisation of the proposed activities assuming that all mitigations and buffer zones are implemented.

TERRESTRIAL BIODIVERSITY

The proposed WEF is unlikely to have significant cumulative impacts, nor result in any unacceptable loss or risk to terrestrial biodiversity on the site or regionally, regardless of the other WEF projects proposed in the area, as the layout has been aligned with minimising impacts and avoiding key ecological processes. WEF facilities generally have a low-density footprint that can accommodate sensitivities, and the overall footprint area is small in comparison to the total coverage area. The current and future threats to the represented grassland vegetation units would be posed by large scale clearing of habitat, which is usually associated with Agriculture, Mining and Forestry as well as urban development and expansion.

FAUNA

The expected impacts of the proposed development include habitat fragmentation, noise and visual disturbances, affecting animal behaviour and changes in their movement, including displacement, and distribution patterns across landscapes. Faunal integrity relies on inter-connected grassland habitats across landscapes. In addition, total area developed and associated impacts would need to be considered within the broader context of the two planned WEFs: Emvelo and Sheepmoor. High negative impacts can be reduced with mitigation to moderate negative impacts, and some positive impacts are also likely to result from the mitigation measures. The primary mitigation measures required to reduce the potential impacts on faunal SCC should include avoiding placement of turbines and access roads across high faunal sensitive areas; minimising destruction and disturbance of high sensitive grassland habitats; undertaking an alien plant and Oribi management plan starting at and to continue through the construction phase and extend to the decommission phase, and if high faunal sensitive areas are impacted, then secure conservation off-sets will be needed. Considering the lack of empirical data for wind farm impacts on non-volant mammals, such long-term monitoring may help to better inform on the impacts of future WEF projects on local populations of the highly threatened Oribi species. One indirect impact to consider is related to reducing the effect of artificial light at night (ALAN) pollution on local insect populations.

The no-go alternative is likely to lead to continuing loss of grassland habitat from alien plant invasions and agricultural activities. Although mitigation could reduce these high negative impacts and produce positive impacts, this is highly unlikely to occur. The no-go alternative is therefore not the preferred alternative.

Cumulative impacts may become more significant if added to existing or future impacts from other activities, such as other renewable energy projects, in the area. For example, any remaining Oribi sub-populations and any contiguous areas of intact grassland are considered as high conservation importance. The proposed development will occur in a broader area within a mosaic of habitat that is highly fragmented and disturbed. The overall cumulative impacts of the development are considered likely to be moderate negative, and potentially low positive after enhancements, including the required off-sets with regard to loss of any high faunal sensitive areas. Off-set areas to be determined for any high faunal sensitive areas that are to be developed; these should form part of a long-term conservation programme and to be determine by an off-set specialist.

Overall, it is the specialists' opinion that the proposed development will have an overall moderate negative significance on faunal SCC and therefore the proposed development can be approved in terms of the specific theme of this terrestrial animal species assessment: on the condition that all mitigation measures are implemented and that high sensitive faunal habitat is largely avoided and/or off-set, and an alien plant and Oribi management plan be undertaken, starting at pre-construction and extending to the operational phase, and into the decommissioning phase.

AVIFAUNA

The proposed Emvelo WEF will have several potential impacts on priority avifauna. These impacts are the following:

- Displacement of priority species due to disturbance linked to construction activities in the
- construction phase.
- Displacement due to habitat transformation in the construction phase.
- Collision mortality caused by the wind turbines in the operational phase.
- Electrocution on the 33 kV MV overhead lines (if any) in the operational phase.
- Collisions with the 33 kV MV overhead lines (if any) in the operational phase.
- Displacement of priority species due to disturbance linked to dismantling activities in the decommissioning phase.

The proposed Emvelo WEF 132kV grid connection will have several potential impacts on priority avifauna. These impacts are the following:

- Displacement of priority species due to disturbance linked to construction activities in the construction phase.
- Displacement due to habitat transformation in the construction phase.
- Collisions with the overhead lines in the operational phase.
- Mortality due to electrocutions on the proposed grid connection infrastructure in the operational phase.
- Displacement of priority species due to disturbance linked to dismantling activities in the decommissioning phase.

It is imperative that the proposed turbine layout adheres to the recommended avifaunal no-go areas and turbine exclusion zones, including the rotor-swept areas. For detailed information on the exclusion areas, please refer to Section 10 below. The proposed Emvelo WEF is expected to have high and medium impacts on avifauna pre-mitigation, which must be addressed through appropriate mitigation measures to reduce the impact significance to an overall medium and low risk.

The proposed Emvelo WEF Grid Connection will have a moderate impact significance on avifauna pre-mitigation which, in most instances, could be reduced to an overall low impact significance through the implementation of appropriate mitigation. From an avifaunal perspective, OHL Alternatives 1 and 2 are least preferred as they have the longest span and therefore pose a higher collision risk to birds. The Preferred OHL Alternative is preferred over OHL Alternative 3 as it avoids the 2.5 km No Disturbance Buffer around the Martial Eagle nest (coordinates provided on request).

In conclusion, the **proposed WEF development and its associated electrical grid infrastructure is supported by this Specialist, provided that the implementation of mitigation measures as recommended in this report are strictly adhered to.**

BATS

This report assessed impacts to bats that could occur because of the construction, operation and decommission of the Emvelo WEF and grid connection. The assessment was based on 16 months of baseline data on bat activity recorded at the project. Based on these data, the key issue for the WEF will be managing collision impacts to Cape serotine and Egyptian free-tailed bat, and cumulative impacts.

The first mitigation measure proposed to manage risk is to adhere to the no-go buffers which aim to spatially avoid impacts by buffering key habitat features used by bats. This measure is likely to be effective for most bat species recorded at the project, but additional mitigation measures are needed to avoid impacts to free-tailed bats, which forage high in the air, and to reduce residual impacts.

Turbine design can be effective, and it is recommended to maintain a minimum blade sweep of at least 30 m. However, free-tailed bats will still collide with turbine blades above this height and as such, the rotor diameter must be limited as much as practicable to minimize the space where collisions might occur. Additionally, blade feathering must be implemented to limit the rotation of turbine blades below the turbine cut-in speed when electricity is not being generated.

Mitigation measures to minimize residual impacts after the application of the above measures include smart curtailment and acoustic deterrents. As such, the project should consider the cost and feasibility of these measures. The residual impacts must be monitored using post-construction fatality monitoring for a minimum of two years (Aronson et al. 2020). Smart curtailment and/or acoustic deterrents must be used if this monitoring indicates that species fatality thresholds have been exceeded (MacEwan et al. 2018) to maintain the impacts to bats within acceptable limits of change and prevent declines in the impacted bat populations.

The overall impact to bats was assessed as moderate after the application of the mitigation measures proposed to avoid and minimize impacts to bats. However, on a species level, the project presents differential risk and impacts to bats must be managed adaptively during the operational phase, particularly for those species (e.g. Egyptian free-tailed bat and Cape serotine) for which high risk is predicted during some periods.

This adaptive management will be guided by the Environmental Management Programme for bats which must include the development of a Biodiversity Management Plan (BMP) to manage impacts to bats during the operation of the facility. The BMP for bats must be developed by a bat ecologist before the commencement of operation and must include the post-construction fatality monitoring plan design, fatality thresholds calculations and rationale (updated as required), and an adaptive management response plan that provides a timeous action pathway for mitigation, including roles and responsibilities, should fatality thresholds be exceeded. **Provided these measures are adhered to, the project assessed can be approved.**

NOISE

This study considers the potential noise impact on the surrounding environment due to the construction, operational and future decommissioning activities associated with the Emvelo WEF. It makes use of conceptual scenarios to develop noise propagation models to estimate potential noise levels. It was determined that the potential noise impacts, without mitigation, would be:

- of a medium significance for the daytime construction of the access roads. Mitigation is recommended and measures are available that could reduce this significance to low;
- of a low significance for the daytime construction traffic passing NSR;
- of a medium significance (at one receptor) for the daytime construction activities (hard standing areas, excavation and concreting of foundations and the erecting of the WTG and other infrastructure) at the Emvelo WEF. Mitigation is recommended and measures are available that could reduce this significance to low;
- of a medium (at least seven locations) and high (at least one location) significance for the night-time construction activities (such as the pouring of concrete, erecting the WTG) at the Emvelo WEF. Mitigation is available to reduce the significance of the noise impact to low;
- of a medium significance for the daytime operational activities at the Emvelo WEF. Mitigation is available to reduce the significance of the noise impact to low;
- of a high significance for night-time operational activities (noises from wind turbines) at the Emvelo WEF when considering the worst-case PWL. Mitigation is available to reduce the significance of the noise impact to low; and
- of a low significance for the potential decommissioning activities.

There is a potential for a cumulative noise impact at one receptor.

The proposed layout (turbine placement) would only be acceptable with the selection of correct mitigation measures, which could include a combination of:

- Relocating a number of NSR where noise levels could exceed the recommended noise limits (NSR as highlighted in Appendix E); and
- Reducing the noise emission levels (selecting a WTG with a lower sound PWL, using blade additions to reduce noise emission levels and potentially implementing a noise abatement plan during certain periods of time, wind speeds or meteorological conditions. Acoustic treatment of residential dwellings should only be considered after other mitigation measures were considered.

The applicant could also change the layout (locating WTG further from NSR, or reducing the number of WTG within 1,000m from NSR) to mitigate the noise impact, though the applicant should re-evaluate the noise impact should:

- the layout be revised (as part of amendment process post EA) where any WTG, located within 2,500 m from a confirmed NSR, are moved closer to the NSR;

- the layout be revised (as part of amendment process post EA) where any new WTG are introduced within 2,500m from an NSR;
- the layout be revised (as part of amendment process post EA) where the number of WTG within 2,500m from an NSR are increased; and
- the applicant selects to use a WTG with a SPL higher than 114.0 dBA (re 1 pW).

The applicant should also develop and implement an environmental noise monitoring programme at selected NSR living within the 42 dBA noise contour.

It is proposed that the applicant recommend to landowners that:

- no new residential dwellings be developed within areas enveloped by the 42 dBA noise level contour, and
- structures located within the 45 dBA noise level contour should not be used for permanent residential purposed.

HERITAGE, ARCHAEOLOGY AND PALAEONTOLOGY

A heritage survey was undertaken for the proposed Emvelo WEF. The desktop study noted sixty-three possible heritage sites. Most of these were farm labourers' settlements that could have graves. Many of these sites occur in areas that will not be affected by the WEF and related infrastructure. The field survey recorded twelve heritage sites were recorded within the study area. Most of these sites will not be affected by WEF. Those that are currently affected can be mitigated by relocating the turbine.

The field survey also confirmed that most of the desktop settlements have human graves associated with them. A 50m sensitivity buffer should be placed around each of these for possible graves. Unfortunately, the black wattle has damaged most of these sites, while agricultural activity would have destroyed these sites.

One cemetery will be currently affected by the OHL. This section of the line will need to be moved west of the cemetery. Wind Turbine 21 is located on ROCH05. The locality of the turbine will need to be slightly adjusted.

While the palaeontology is of very high sensitivity as it forms [part of the Vryheid formation, very few significant vertebrate fossils have been found in it]. A Chance Find Protocol should be implemented for the construction phase.

VISUAL/LANDSCAPE

The existing visual condition of the landscape that may be affected by the proposed Emvelo WEF and associated OHPL has been described. The study area's scenic quality has been rated high to low within the context of the sub-region. The Project site is in a moderate rated landscape type. Sensitive viewing areas and landscape types have been identified and mapped, indicating potential sensitivity to the Project, for users of the farmsteads, settlements, and towns and the R65 and the N2 roads.

The impact on the visual environment during the construction phase is assessed to have a potential medium severity over a regional area (but extend beyond the site boundary to at least at 10,0km) and would occur over the short-term (less than five years) resulting in a moderate consequence. The probability of the unmitigated impact is high resulting in a predicted significance of impact as moderate. The implementation of mitigation measures would not significantly reduce the anticipated impact, which would remain moderate.

The visual environment during the operational phase is assessed to have a high magnitude over a widespread area and would occur over the long-term (anticipated to be longer than 10 years). The probability of the unmitigated impact is high resulting in a predicted significance of impact as high. The impact would be unacceptable if effectively mitigated. Mitigation measures are feasible (specifically with regards night lighting, the location of turbines to avoid flicker on affected residential locations and the lack of I&AP concern of the project) and can reduce the visual impact over time. The impact with mitigation is predicted to reduce slightly to that of moderate.

The impact on the visual environment during the decommissioning phase is assessed to have a medium magnitude over a local area and would occur over the short-term (less than five years) resulting in a low consequence. The probability of the unmitigated impact is high resulting in a predicted significance of impact as moderate. The implementation of mitigation measures would reduce the anticipated impact, but it would remain moderate.

The significance of the cumulative impact of these projects on the visual environment during their operational phase is assessed to have a high magnitude and over the long-term. The probability of the unmitigated impact is high resulting in a predicted significance of impact as high. The implementation of mitigation measures and that receptor sensitivity to the project is low could reduce the anticipated impact, to moderate.

It is the opinion of Visual specialist that the visual impacts associated with the proposed Project are of a nature, scale and duration that will require mitigation to slightly reduce the impact during the operational phase. It must also be noted based on scoping PPP, I&APs did not consider visual and aesthetic concerns as an issue. The Visual Specialist believes that the impacts associated with the construction, operation and decommissioning phases can be mitigated from high to moderate provided the recommended measures are effectively implemented in the short term and managed in the long term and that the site is effectively rehabilitated during decommissioning. **The project is deemed acceptable from a visual perspective.**

TRAFFIC AND TRANSPORTATION

The proposed development and final layout can be supported from a traffic engineering point of view.

It **is recommended that the proposed development be considered favourably from a traffic engineering point of view** as the intended construction will have no significant negative impact on the surrounding road network.

The following recommendations are made:

- A comprehensive route assessment of the entire transportation route to verify clearance, load bearing and sweeping radius distances is recommended.
- A comprehensive Traffic Management Plan (TMP) is recommended prior to the commencement of the construction phase and the operational phase based on the final development plan and construction schedule.

- The proposed Primary Site Access intersection R65 and D1299, intersection R65 and D532, are recommended as the main development access, based on the implementation of safety considerations and mitigation measures outlined in the report.

It is recommended that the access points be priority controlled and widened to allow provision for acceleration lane and passing lane which will incorporate the turning characteristics of the expected abnormal vehicles.

WAKE EFFECT ANALYSIS

A wake effect impact analysis was not needed for the project as there are currently no surrounding operational within 35 km radius.

SOCIO-ECONOMIC

The findings of the SIA study indicate that the proposed Emvelo WEF and associated components will create a number of social and socio-economic benefits, including creation of employment and business opportunities during both the construction and operational phase.

The findings of the SIA also indicate that the potential negative impacts associated with both the construction and operational phase are likely to be Low Negative with mitigation. The potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented.

The establishment of the proposed Emvelo WEF and associated infrastructure is supported by findings of the SIA.

SPECIALIST IMPACT TABLE SUMMARY

CONSTRUCTION PHASE

Construction Phase		**Extent**	**Duration**	**Reversibility**	**Status**	**Significance**	**Probability**	**Magnitude**
Freshwater & Wetlands (Aquatics)								
Any physical disturbance could result in the spread of alien vegetation	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	Low
Loss of vegetation and in particular species	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	Low
Loss of any critical corridors and connect habitats that are linked to any future conservation plans	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	Low

Construction Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
It was recommended that all wetlands / riverine systems as well as the inclusive of buffers, be avoided	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	Low
Increased hard surfaces can result in increases in runoff generated by the site, thereby resulting in changes to localised hydrological regimes	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	Low
Potential impact on localised surface water quality	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	Low
Terrestrial Biodiversity								
Permanent or temporary loss of indigenous vegetation cover as a result of the activity	Without Mitigation	Site	Long term	Recoverable	Negative	Moderate	Definite	High
	With Mitigation	Site	Long term	Recoverable	Positive	Moderate	Probable	Low
Loss of flora species of	Without Mitigation	Local	Immediate	Recoverable	Negative	Low	Probable	Low

Construction Phase		**Extent**	**Duration**	**Reversibility**	**Status**	**Significance**	**Probability**	**Magnitude**
conservation concern during pre-construction site clearing activities.	With Mitigation	Local	Immediate	Recoverable	Negative	Low	Low Probability	Very Low
Loss of fauna species of conservation concern and potential loss of faunal habitat.	Without Mitigation	Local	Immediate	Recoverable	Negative	Low	Probable	Low
	With Mitigation	Local	Immediate	Recoverable	Negative	Low	Low Probability	Very Low
Invasion by exotic and alien invasive species	Without Mitigation	Local	Immediate	Recoverable	Negative	Low	Probable	Low
	With Mitigation	Local	Immediate	Recoverable	Positive	Low	Low Probability	Very Low
Disturbances to ecological processes may occur as a result of the activity	Without Mitigation	Local	Immediate	Recoverable	Negative	Low	Probable	Low
	With Mitigation	Local	Immediate	Recoverable	Negative	Low	Low Probability	Very Low
Ecological processes associated with Aquatic and Riparian habitat may be affected by the activity and erosion risk may be elevated.	Without Mitigation	Local	Immediate	Recoverable	Negative	Low	Probable	Low
	With Mitigation	Local	Immediate	Recoverable	Negative	Low	Low Probability	Very Low
Fauna								

Construction Phase		**Extent**	**Duration**	**Reversibility**	**Status**	**Significance**	**Probability**	**Magnitude**
Habitat fragmentation, noise and visual disturbances, affecting animal behaviour and changes in their movement and distribution patterns across landscapes.	Without Mitigation	Regional	Long Term	Recoverable	Negative	High	Definite	High
	With Mitigation	Regional	Medium Term	Recoverable	Negative	Moderate	Highly Probable	High
Disturbance and habitat loss associated with continued alien plant infestation and agricultural landuse practices	Without Mitigation	Regional	Long Term	Recoverable	Negative	High	Definite	High
	With Mitigation	Regional	Long Term	Recoverable	Negative	Moderate	High Probable	Moderate
Avifauna								
Habitat transformation: Wind Energy Facility	Without Mitigation	Local	Long-term	Recoverable	Negative	Moderate	Low Probability	Medium
	With Mitigation	Site	Short-term	Recoverable	Negative	Moderate	Low Probability	Medium
Displacement due to Disturbance	Without Mitigation	Local	Long-term	Recoverable	Negative	Moderate	Low Probability	Medium
	With Mitigation	Site	Short-term	Recoverable	Negative	Moderate	Low Probability	Medium

Construction Phase		**Extent**	**Duration**	**Reversibility**	**Status**	**Significance**	**Probability**	**Magnitude**
Displacement due to Disturbance: GRID	Without Mitigation	Site	Short-term	Recoverable	Negative	Moderate	Low Probability	Medium
	With Mitigation	Site	Short-term	Recoverable	Negative	Low	Low Probability	Medium
Habitat Transformation: GRID	Without Mitigation	Site	Short-term	Recoverable	Negative	Moderate	Low Probability	Medium
	With Mitigation	Site	Short-term	Recoverable	Negative	Low	Low Probability	Medium
Bats								
Modification & disturbance of bat habitat (roosting, foraging, commuting): Wind Energy Facility	Without Mitigation	Site	Immediate	Recoverable	Negative	Low	Low Probability	Low
	With Mitigation	Site	Immediate	Recoverable	Negative	Low	Improbable	Very Low
Archaeology, Paleontology and Heritage								
Graves/Cemeteries	Without Mitigation	Local	Permanent	Irreversible	Negative	Low	Probable	High
	With Mitigation	Site	Short-term	Recoverable	Negative	Low	Low Probability	Low
20th century settlements without graves	Without Mitigation	Site	Short-term	Irreversible	Negative	Low	Low Probability	Low

Construction Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
	With Mitigation	Site	Short-term	Irreversible	Negative	Low	Low Probability	Low
20th century settlements with graves	Without Mitigation	Site	Long-term	Irreversible	Negative	Low	Highly Probable	High
	With Mitigation	Site	Short-term	Recoverable	Negative	Low	Low Probability	Low
Late Iron Age settlements	Without Mitigation	Site	Long-term	Irreversible	Negative	Low	High Probability	Medium
	With Mitigation	Site	Long-term	Recoverable	Negative	Low	High Probability	Low
Ruins	Without Mitigation	Site	Long-term	Irreversible	Negative	Low	High Probability	High
	With Mitigation	Site	Long-term	Recoverable	Negative	Low	High Probability	Low
Isolated stone walled kraals	Without Mitigation	Site	Long-term	Reversible	Negative	Low	High Probability	High
	With Mitigation	Site	Long-term	Reversible	Negative	Low	High Probability	Low
Paeolontology	Without Mitigation	Site	Long-term	Reversible	Negative	Low	Low Probability	Low

Construction Phase		**Extent**	**Duration**	**Reversibility**	**Status**	**Significance**	**Probability**	**Magnitude**
	With Mitigation	Site	Long-term	Reversible	Positive	Low	Low Probability	Low
Visual								
WEF Change of the landscape characteristics and key views (visual intrusion and flicker effect) and change to the sense of place	Without Mitigation	Regional	Short term	Irreversible	Negative	Moderate	Highly Probable	Medium
	With Mitigation	Regional	Short term	Irreversible	Negative	Moderate	Highly Probable	Medium
OHPL Change of the landscape characteristics and key views (visual intrusion and flicker effect) and change to the sense of place	Without Mitigation	Regional	Short term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Regional	Short term	Irreversible	Negative	Moderate	Probable	Medium
Noise								
Construction noises from access road upgrading or construction activities	Without Mitigation	Local	Short-term	Reversible	Negative	Moderate	Highly Probable	Very High
	With Mitigation	Local	Short-term	Reversible	Negative	Low	Possible	Very High
Noises due to construction traffic passing NSR	Without Mitigation	Local	Short-term	Reversible	Negative	Low	Possible	Low
	With Mitigation	Local	Short-term	Reversible	Negative	Low	Possible	Low

Construction Phase		**Extent**	**Duration**	**Reversibility**	**Status**	**Significance**	**Probability**	**Magnitude**
Numerous simultaneous future daytime construction activities	Without Mitigation	Local	Short-term	Reversible	Negative	Moderate	Probable	High
	With Mitigation	Local	Short-term	Reversible	Negative	Low	Possible	Medium
Numerous simultaneous future night-time construction activities	Without Mitigation	Regional	Short-term	Reversible	Negative	High	Highly Probable	Very High
	With Mitigation	Regional	Short-term	Reversible	Negative	Low	Possible	Medium
Social								
Creation of employment and business opportunities	Without Mitigation	Regional	Short-term	N/A	Positive	Low	Probable	Medium
	With Mitigation	Regional	Short-term	N/A	Positive	Moderate	Highly Probable	Medium
Potential impacts on family structures and social networks associated with the presence of construction workers	Without Mitigation	Regional	Short-term	Recoverable	Negative	Moderate	Probable	Medium
	With Mitigation	Regional	Short-term	Recoverable	Negative	Low	Low Probable	Low
Influx of job seekers	Without Mitigation	Regional	Short-term	Recoverable	Negative	Low	Probable	Very Low
	With Mitigation	Regional	Short-term	Recoverable	Negative	Low	Low Probable	Very Low
Safety risk, stock theft and damage	Without Mitigation	Local	Short-term	Recoverable	Negative	Moderate	Probable	Medium

Construction Phase		**Extent**	**Duration**	**Reversibility**	**Status**	**Significance**	**Probability**	**Magnitude**
to farm infrastructure associated with presence of construction workers	With Mitigation	Site	Short-term	Recoverable	Negative	Low	Low Probability	Low
Potential noise, dust and safety impacts associated with movement of construction related activities and movement of traffic to and from the site	Without Mitigation	Local	Short-term	Reversible with compensation	Negative	Moderate	Probable	Moderate
	With Mitigation	Local	Short-term	Reversible with compensation	Negative	Low	Low Probability	Low
Potential loss of livestock and grazing and damage to farm infrastructure associated with increased incidence of grass fires	Without Mitigation	Local	Short-term	Recoverable	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short-term	Recoverable	Negative	Low	Low Probability	Low
The activities associated with the construction phase, such as establishment of access roads and the construction camp, movement of heavy vehicles and preparation of	Without Mitigation	Local	Short-term	Reversible with compensation and rehabilitation	Negative	Moderate	Highly Probable	Medium
	With Mitigation	Local	Short-term	Reversible with compensatio	Negative	Low	Probable	Low

Construction Phase		**Extent**	**Duration**	**Reversibility**	**Status**	**Significance**	**Probability**	**Magnitude**
foundations for the project etc. will damage farmlands and result in a loss of farmlands for grazing.				n and rehabilitation				
Traffic								
Increase in general peak hour traffic volumes	Without Mitigation	Regional	Short term	Recoverable	Negative	Moderate	Highly Probable	High
	With Mitigation	Local	Short term	Reversible	Negative	Low	Probable	Very Low
Increase in abnormal traffic volumes	Without Mitigation	National	Short term	Recoverable	Negative	Moderate	Highly Probable	High
	With Mitigation	National	Short term	Recoverable	Negative	Moderate	Probable	Medium
Impact of dust along gravel site access roads	Without Mitigation	Local	Immediate	Recoverable	Negative	Moderate	Highly Probable	High
	With Mitigation	Local	Immediate	Recoverable	Negative	Low	Low Probability	Medium
Deterioration of surrounding road network	Without Mitigation	Local	Short-term	Recoverable	Negative	Moderate	Highly Probable	Medium
	With Mitigation	Site	Immediate	Recoverable	Negative	Low	Low Probability	Low

OPERATION PHASE

Operation Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Freshwater & Wetlands (Aquatics)								
Spread of Alien Vegetation	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	Low
Terrestrial Biodiversity								
Loss of fauna species of conservation concern and potential loss of faunal habitat.	Without Mitigation	Local	Immediate	Recoverable	Negative	Low	Probable	Low
	With Mitigation	Local	Immediate	Recoverable	Negative	Low	Low Probability	Very Low
Invasion by exotic and alien invasive species could occur as a result of construction	Without Mitigation	Local	Immediate	Recoverable	Negative	Low	Probable	Low
	With Mitigation	Local	Immediate	Recoverable	Negative	Low	Low Probability	Very Low
Disturbances to ecological processes may occur as a result of the activity.	Without Mitigation	Local	Immediate	Recoverable	Negative	Low	Probable	Low
	With Mitigation	Local	Immediate	Recoverable	Negative	Low	Low Probability	Very Low
Fauna								
Habitat fragmentation, noise and visual disturbances, affecting animal behaviour and changes in their movement and distribution patterns across landscapes.	Without Mitigation	Regional	Long Term	Recoverable	Negative	High	Definite	High
	With Mitigation	Local	Immediate	Recoverable	Negative	Moderate	Highly Probable	High
Disturbance and habitat loss associated with continued alien plant infestation and	Without Mitigation	Regional	Long Term	Recoverable	Negative	High	Definite	High
	With Mitigation	Local	Immediate	Recoverable	Negative	Moderate	Highly Probable	High

Operation Phase		**Extent**	**Duration**	**Reversibility**	**Status**	**Significance**	**Probability**	**Magnitude**
agricultural landuse practices (ploughing, over-grazing)								
Avifauna								
Mortality due to Collisions with Power Lines (132 kV)	Without Mitigation	Regional	Long-term	Recoverable	Negative	High	Definite	High
	With Mitigation	Site	Long-term	Irreversible	Negative	Low	Low Probability	Medium
Mortality due to Electrocutions (132kV OHL and/or Substation Yard)	Without Mitigation	Site	Long-term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Long-term	Irreversible	Negative	Low	Low Probability	Medium
Mortality due to Electrocution (internal 33 kV cables) (if any)	Without Mitigation	Site	Short-term	Recoverable	Negative	Moderate	Low Probability	Medium
	With Mitigation	Site	Short-term	Recoverable	Negative	Low	Low Probability	Medium
Mortality due to Collisions with Wind Turbines	Without Mitigation	Regional	Long term	Irreversible	Negative	High	High	High
	With Mitigation	Regional	Medium term	Irreversible	Negative	Moderate	Probable	Medium
Bats								
Bat Fatality: Wind Energy Facility	Without Mitigation	Regional	Long-term	Recoverable	Negative	High	Definite	High
	With Mitigation	Regional	Long-term	Recoverable	Negative	Moderate	Probable	Medium
Displacement of bats: Wind Energy Facility	Without Mitigation	Regional	Long-term	Recoverable	Negative	Moderate	Probable	Medium
	With Mitigation	Regional	Long-term	Reversible	Negative	Low	Low Probability	Low
Light pollution: Grid Connection	Without Mitigation	Regional	Long-term	Recoverable	Negative	Moderate	Probable	Medium
	With Mitigation	Regional	Long-term	Reversible	Negative	Low	Low Probability	Low
Visual								
	Without Mitigation	Regional	Long term	Irreversible	Negative	High	Highly probable	High

Operation Phase		**Extent**	**Duration**	**Reversibility**	**Status**	**Significance**	**Probability**	**Magnitude**
Change of the landscape characteristics and key views (visual intrusion and flicker effect) and change to the sense of place	With Mitigation	Regional	Long term	Irreversible	Negative	Moderate	Probable	Medium
Change of the landscape characteristics and key views (visual intrusion and flicker effect) and change to the sense of place (OHPL)	Without Mitigation	Regional	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Regional	Long term	Irreversible	Negative	Moderate	Probable	Medium
Noise								
Numerous WTG operating simultaneously at Emvelo WEF (Day)	Without Mitigation	Local	Long-term	Reversible	Negative	Moderate	Definite	Very High
	With Mitigation	Local	Long-term	Reversible	Negative	Low	Possible	Medium
Night-time operation of WTG (Night)	Without Mitigation	Local	Long-term	Reversible	Negative	High	Definite	Very High
	With Mitigation	Local	Long-term	Reversible	Negative	Moderate	Possible	Medium
Social								
Development of infrastructure to improve energy security and support renewable sector	Without Mitigation	National	Long-term	N/A	Negative	Moderate	Highly Probable	High
	With Mitigation	National	Long-term	N/A	Positive	High	Definite	High
Creation of employment and business opportunities	Without Mitigation	Regional	Long term	N/A	Positive	Low	Low Probability	Low
	With Mitigation	Regional	Long term	N/A	Positive	Moderate	Highly Probable	Medium
	Without Mitigation	Regional	Long term	N/A	Positive	Low	Probable	Low

Operation Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Generate income for affected landowners	With Mitigation	Regional	Long term	N/A	Positive	Moderate	Definite	Medium
Benefits associated with the socio-economic development contributions	Without Mitigation	Regional	Long term	N/A	Positive	Moderate	Highly Probable	Medium
	With Mitigation	National	Long term	N/A	Positive	High	Definite	High
Visual impact and impact on sense of place	Without Mitigation	Regional	Long term	Reversible with rehabilitation	Negative	High	Definite	High
	With Mitigation	Regional	Long term	Reversible with rehabilitation	Negative	Moderate	Highly Probable	Medium
Potential impact on property values	Without Mitigation	Local	Long term	N/A	Negative	Low	Low Probability	Low
	With Mitigation	Local	Long term	N/A	Negative	Low	Low Probability	Low
Potential impact on tourism	Without Mitigation	Local	Long term	N/A	Negative	Low	Low Probability	Very Low
	With Mitigation	Local	Long term	N/A	Negative	Low	Low Probability	Very Low
Traffic								
Increase in general peak hour traffic volumes	Without Mitigation	Site	Immediate	Reversible	Negative	Low	Low Probability	Very Low
	With Mitigation	Site	Immediate	Reversible	Negative	Low	Low Probability	Very Low
Increase in abnormal traffic volumes	Without Mitigation	Regional	Immediate	Recoverable	Negative	Low	Probable	Medium
	With Mitigation	Regional	Immediate	Recoverable	Negative	Low	Low Probability	Medium
Impact of dust along gravel site access roads	Without Mitigation	Site	Immediate	Recoverable	Negative	Low	Low Probability	Low
	With Mitigation	Site	Immediate	Reversible	Negative	Low	Probable	Very Low
	Without Mitigation	Site	Immediate	Reversible	Negative	Low	Low Probability	Low

Operation Phase		**Extent**	**Duration**	**Reversibility**	**Status**	**Significance**	**Probability**	**Magnitude**
Deterioration of surrounding road network	With Mitigation	Site	Immediate	Reversible	Negative	Low	Low Probability	Low

Archaeology, Paleontology and Heritage								
Graves/Cemeteries	Without Mitigation	Local	Permanent	Irreversible	Negative	Low	Probable	High
	With Mitigation	Site	Short-term	Recoverable	Negative	Low	Low Probability	Low
20th century settlements without graves	Without Mitigation	Site	Short-term	Irreversible	Negative	Low	Low Probability	Low
	With Mitigation	Site	Short-term	Irreversible	Negative	Low	Low Probability	Low
20th century settlements with graves	Without Mitigation	Site	Long-term	Irreversible	Negative	Low	Highly Probable	High
	With Mitigation	Site	Short-term	Recoverable	Negative	Low	Low Probability	Low
Late Iron Age settlements	Without Mitigation	Site	Long-term	Irreversible	Negative	Low	High Probability	Medium
	With Mitigation	Site	Long-term	Recoverable	Negative	Low	High Probability	Low
Ruins	Without Mitigation	Site	Long-term	Irreversible	Negative	Low	High Probability	High
	With Mitigation	Site	Long-term	Recoverable	Negative	Low	High Probability	Low
Isolated stone walled kraals	Without Mitigation	Site	Long-term	Reversible	Negative	Low	High Probability	High

Archaeology, Paleontology and Heritage								
	With Mitigation	Site	Long-term	Reversible	Negative	Low	High Probability	Low
Paeolontology	Without Mitigation	Site	Long-term	Reversible	Negative	Low	Low Probability	Low
	With Mitigation	Site	Long-term	Reversible	Positive	Low	Low Probability	Low

DECOMMISSIONING PHASE

Decommission Phase		**Extent**	**Duration**	**Reversibility**	**Status**	**Significance**	**Probability**	**Magnitude**
Freshwater & Wetlands (Aquatics)								
Loss of vegetation and in particular species	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	Low
Loss of any critical corridors and connect habitats that are linked to any future conservation plans	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	Low
It was recommended that all wetlands / riverine systems as well as the inclusive of buffers, be avoided	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	Low
	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium

Decommission Phase		**Extent**	**Duration**	**Reversibility**	**Status**	**Significance**	**Probability**	**Magnitude**
Increased hard surfaces can result in increases in runoff generated by the site, thereby resulting in changes to localised hydrological regimes	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	Low
Potential impact on localised surface water quality	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	Low
Terrestrial Biodiversity								
No terrestrial biodiversity risks or impacts of significance are identified for the decommissioning phase.								
Avifauna								
Displacement or disturbance associated with the decommissioning (dismantling) of the wind turbines and associated infrastructure	Without Mitigation	Site	Immediate	Recoverable	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Immediate	Reversible	Negative	Moderate	Low Probability	Low
Displacement due to Disturbance: GRID	Without Mitigation	Site	Immediate	Recoverable	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Immediate	Reversible	Negative	Low	Low Probability	Low
Bats								
	Without Mitigation	Site	Immediate	Recoverable	Negative	Low	Probable	Medium

Decommission Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Disturbance of bats: Wind Energy Facility	With Mitigation	Site	Immediate	Reversible	Negative	Low	Low Probability	Low
Disturbance of bats: Grid Connection	Without Mitigation	Site	Immediate	Recoverable	Negative	Low	Probable	Medium
	With Mitigation	Site	Immediate	Reversible	Negative	Low	Low Probabilty	Low
Visual								
Change of the landscape characteristics and key views (visual intrusion and flicker effect) and change to the sense of place (Turbines)	Without Mitigation	Regional	Short-term	Recoverable	Negative	Moderate	Highly Probable	Medium
	With Mitigation	Regional	Short-term	Recoverable	Negative	Moderate	Highly Probable	Medium
Change of the landscape characteristics and key views (visual intrusion and flicker effect) and change to the sense of place (OHPL)	Without Mitigation	Regional	Short-term	Recoverable	Negative	Moderate	Highly Probable	Medium
	With Mitigation	Regional	Short-term	Recoverable	Negative	Moderate	Highly Probable	Medium
Noise								
Various decommissioning activities	Without Mitigation	Local	Short-term	Reversible	Negative	Low	Possible	Medium
	With Mitigation	Local	Short-term	Reversible	Negative	Low	Possible	Medium
Social								
Social impacts associated with the decommissioning phase are linked to	Without Mitigation	Local	Short term	Recoverable	Negative	Moderate	Highly Probable	Moderate
	With Mitigation	Local	Short term	Recoverable	Negative	Moderate	Probable	Low

Decommission Phase		**Extent**	**Duration**	**Reversibility**	**Status**	**Significance**	**Probability**	**Magnitude**
the loss of jobs and associated income								
Traffic								
Increase in general peak hour traffic volumes	Without Mitigation	Regional	Medium-term	Recoverable	Negative	Moderate	Probable	Medium
	With Mitigation	Local	Short-term	Reversible	Negative	Low	Probable	Low
Increase in abnormal traffic volumes	Without Mitigation	National	Short term	Recoverable	Negative	Moderate	Highly Probable	High
	With Mitigation	National	Short term	Recoverable	Negative	Moderate	Probable	Medium
Impact of dust along gravel site access roads	Without Mitigation	Local	Immediate	Recoverable	Negative	Low	Probable	Medium
	With Mitigation	Local	Immediate	Reversible	Negative	Low	Low Probability	Low
Deterioration of surrounding road network	Without Mitigation	Regional	Short-term	Recoverable	Negative	Low	Probable	High
	With Mitigation	Local	Short-term	Reversible	Negative	Low	Low Probability	Medium
Archaeology, Paleontology and Heritage								
Graves/Cemeteries	Without Mitigation	Local	Permanent	Irreversible	Negative	Low	Probable	High
	With Mitigation	Site	Short-term	Recoverable	Negative	Low	Low Probability	Low
20th century settlements without graves	Without Mitigation	Site	Short-term	Irreversible	Negative	Low	Low Probability	Low
	With Mitigation	Site	Short-term	Irreversible	Negative	Low	Low Probability	Low
	Without Mitigation	Site	Long-term	Irreversible	Negative	Low	Highly Probable	High

Archaeology, Paleontology and Heritage								
20th century settlements with graves	With Mitigation	Site	Short-term	Recoverable	Negative	Low	Low Probability	Low
Late Iron Age settlements	Without Mitigation	Site	Long-term	Irreversible	Negative	Low	High Probability	Medium
	With Mitigation	Site	Long-term	Recoverable	Negative	Low	High Probability	Low
Ruins	Without Mitigation	Site	Long-term	Irreversible	Negative	Low	High Probability	High
	With Mitigation	Site	Long-term	Recoverable	Negative	Low	High Probability	Low
Isolated stone walled kraals	Without Mitigation	Site	Long-term	Reversible	Negative	Low	High Probability	High
	With Mitigation	Site	Long-term	Reversible	Negative	Low	High Probability	Low
Paeolontology	Without Mitigation	Site	Long-term	Reversible	Negative	Low	Low Probability	Low
	With Mitigation	Site	Long-term	Reversible	Positive	Low	Low Probability	Low

CUMULATIVE PHASE

Cumulative Phase		**Extent**	**Duration**	**Reversibility**	**Status**	**Significance**	**Probability**	**Magnitude**
Freshwater and Wetlands								
Cumulative Impact for	Without Mitigation	Local	Long-term	Irreversible	Negative	Moderate	Probable	Medium

Cumulative Phase		**Extent**	**Duration**	**Reversibility**	**Status**	**Significance**	**Probability**	**Magnitude**
Aquatic Biodiversity	With Mitigation	Site	Long-term	Irreversible	Negative	Low	Low Probability	Low
Cumulative Phase		**Extent**	**Duration**	**Reversibility**	**Status**	**Significance**	**Probability**	**Magnitude**
Terrestrial Biodiversity								
Cumulative Impact on Terrestrial Biodiversity	Without Mitigation	Site	Long-term	Recoverable	Negative	Moderate	Definite	High
	With Mitigation	Site	Long-term	Recoverable	Negative	Moderate	Probable	Low
Cumulative Phase		**Extent**	**Duration**	**Reversibility**	**Status**	**Significance**	**Probability**	**Magnitude**
Avifauna								
Cumulative Impact on Birds: WEF	Without Mitigation	Local	Short-term	Reversible	Negative	Moderate	Probable	Medium
	With Mitigation	Local	Short-term	Reversible	Negative	Moderate	Probable	Medium
Cumulative Impact on Birds: Grid Connection Components	Without Mitigation	Local	Short-term	Reversible	Negative	Moderate	Probable	Medium
	With Mitigation	Local	Short-term	Reversible	Negative	Moderate	Probable	Medium

Cumulative Phase		**Extent**	**Duration**	**Reversibility**	**Status**	**Significance**	**Probability**	**Magnitude**
Cumulative Phase		**Extent**	**Duration**	**Reversibility**	**Status**	**Significance**	**Probability**	**Magnitude**
Bats								
Cumulative Impact On Bats	Without Mitigation	Regional	Long-term	Recoverable	Negative	High	Definite	High
	With Mitigation	Regional	Long-term	Reversible	Negative	Moderate	Probable	Medium
Cumulative Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Noise								
Numerous WTG operating simultaneously at Emvelo and Sheepmoor WEF	Without Mitigation	Local	Short-term	Reversible	Negative	High	Highly Probable	High
	With Mitigation	Local	Short-term	Reversible	Negative	Low	Probable	Medium
Cumulative Phase		**Extent**	**Duration**	**Reversibility**	**Status**	**Significance**	**Probability**	**Magnitude**
Paleontology								
Cumulative Impact on Paleontology	Without Mitigation	Low	High	Reversible	Negative	Low	Low	High
	With Mitigation	Low	High	Reversible	Positive	Low	Low	High

Cumulative Phase		**Extent**	**Duration**	**Reversibility**	**Status**	**Significance**	**Probability**	**Magnitude**
Cumulative Phase		**Extent**	**Duration**	**Reversibility**	**Status**	**Significance**	**Probability**	**Magnitude**
Visual/landscape								
Cumulative Visual/landscape Impact	Without Mitigation	High	Medium	Irreversible	Negative	High	High	Medium
	With Mitigation	High	Medium	Irreversible	Negative	Moderate	High	Medium
Cumulative Phase		**Extent**	**Duration**	**Reversibility**	**Status**	**Significance**	**Probability**	**Magnitude**
Socio-Economic								
Visual impacts associated with the establishment of more than one REF and the potential impact on the area’s rural sense of place and character of the landscape.	Overall impact of the proposed project considered in isolation	Medium	High	Reversible	Positive	Moderate	Low	High
	Cumulative impact of the project and other projects in the area	Medium	High	Reversible	Positive	High	Medium	High

Cumulative Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
No-development option would result in the lost opportunity for South Africa to improve energy security and assist to support with the development of clean, renewable energy	Overall impact of the proposed project considered in isolation	Local-International	Long term	N/A	Positive	Moderate	High Probability	High
	Cumulative impact of the project and other projects in the area	Local-International	Long term	N/A	Positive	Moderate	High Probability	High

Cumulative Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Traffic and Transportation								
Traffic and Transportation Cumulative Impact	Without Mitigation	Local	Short-term	Reversible	Negative	Moderate	Highly Probable	High
	With Mitigation	Local	Short-term	Reversible	Negative	Low	Probable	Very Low
Additional heavy vehicles/E80's/Abnormal vehicles on the external road network- Potential to	Without Mitigation	Local	Short-term	Reversible	Negative	High	Highly Probable	High
	With Mitigation	Local	Short-term	Reversible	Negative	Moderate	Probable	Very Low

Cumulative Phase	Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
require additional road rehabilitation.							

Cumulative Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Archaeology, Paleontology and Heritage								
Graves/Cemeteries	Without Mitigation	Local	Short Term	Irreversible	Negative	Low	Probable	High
	With Mitigation	Local	Short Term	Irreversible	Negative	Low	Low Probability	Low
20th century settlements without graves	Without Mitigation	Local	Short Term	Irreversible	Negative	Low	Low Probability	Low
	With Mitigation	Local	Short Term	Irreversible	Negative	Low	Low Probability	Low
20th century settlements with graves	Without Mitigation	Local	Short Term	Irreversible	Negative	Low	Highly Probable	High
	With Mitigation	Local	Short Term	Recoverable	Negative	Low	Low Probability	Low
Paeolontology	Without Mitigation	Site	Long-term	Reversible	Negative	Low	Low Probability	Low
	With Mitigation	Site	Long-term	Reversible	Positive	Low	Low Probability	Low
Ruins	Without Mitigation	Site	Long-term	Irreversible	Negative	Low	High Probability	High

Cumulative Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
	With Mitigation	Site	Long-term	Recoverable	Negative	Low	High Probability	Low
Isolated stone walled kraals	Without Mitigation	Site	Long-term	Reversible	Negative	Low	High Probability	High
	With Mitigation	Site	Long-term	Reversible	Negative	Low	High Probability	Low
Late Iron Age settlements	Without Mitigation	Site	Long-term	Reversible	Negative	Low	Low Probability	Low
	With Mitigation	Site	Long-term	Reversible	Positive	Low	Low Probability	Low
Farm Buildings	Without Mitigation	Site	Long-term	Reversible	Negative	Low	Low Probability	Low
	With Mitigation	Site	Long-term	Reversible	Positive	Low	Low Probability	Low

DFFE: INFORMATION REQUIREMENTS FOR WEF APPLICATIONS

The DFFE's requirements for information for all Wind Energy Facilities (WEFs) applications are included in this section of the report. Where the information is not provided in the tables below, the location of where it can be found in the report is indicated.

TABLE 0-2 DETAILS OF THE AFFECTED FARM PROPERTIES AND SG21 CODES

Farm Name	Portion No.	Farm No.	SG 21 Code
Emvelo WEF			
Portion 1 of Farm no. 272. Farm Schimmelhoek	01	272	T0IT00000000027200001
Portion 2 of Farm no. 272. Farm Schimmelhoek	02	272	T0IT00000000027200002
Portion 5 of Farm no. 272. Farm Schimmelhoek	05	272	T0IT00000000027200005
Portions RE of Farm no. 275 Farm	RE	275	T0IT00000000027500000
Portion 2 of Farm no. 274 Farm Schiedam	02	274	T0IT00000000027400002
Portion RE of Farm no. 274 Farm Schiedam	RE	274	T0IT00000000027400000
Portion 1 of Farm no. 274. Farm Schiedam	01	274	T0IT00000000027400001
Portion 5 of Farm no. 274 Farm Schiedam	05	274	T0IT00000000027400005
Portion 6 of Farm no. 274 Farm Schiedam	06	274	T0IT00000000027400006
Emvelo Grid Connection			
Portion 2 of Farm no. 274 Farm Schiedam	02	274	T0IT00000000027400002
Portion RE of Farm no. 274 Farm Schiedam	RE	274	T0IT00000000027400000

Farm Name	Portion No.	Farm No.	SG 21 Code
Portion 1 of Farm no. 274. Farm Schiedam	01	274	T0IT00000000027400001
Portion 5 of Farm no. 274 Farm Schiedam	05	274	T0IT00000000027400005
Portion 6 of Farm no. 274 Farm Schiedam	06	274	T0IT00000000027400006
Portion 2 of Farm no. 286 Farm Waaihoek	02	286	T0IT00000000028600002
Portion 3 of Farm no. 286 Farm Waaihoek	03	286	T0IT00000000028600003
Portion 4 of Farm no. 286 Farm Waaihoek	04	286	T0IT00000000028600004
Portion 6 of Farm no. 286 Farm Waaihoek	06	286	T0IT00000000028600006
Portion 9 of Farm no. 286 Farm Waaihoek	09	286	T0IT00000000028600009
Portion 11 of Farm no. 286 Farm Waaihoek	11	286	T0IT00000000028600011
Portion 12 of Farm no. 286 Farm Waaihoek	12	286	T0IT00000000028600012
Portion 13 of Farm no. 286 Farm Waaihoek	13	286	T0IT00000000028600013
RE Portion 7 of Farm no. 267 Farm Witpunt	07	267	T0IT00000000026700007
Portions 1 of Farm no. 288 Farm Zwartwater	01	288	T0IT00000000028800001
Portions 6 of Farm no. 288 Farm Zwartwater	06	288	T0IT00000000028800006
Portions RE of Farm no. 287 Farm Onverwacht	RE	287	T0IT00000000028700000
RE Portions 3 of Farm no. 289 Farm	03	289	T0IT00000000028900003

Farm Name	Portion No.	Farm No.	SG 21 Code
Weltevreden			
Portions 4 of RE Farm no. 289 Farm Weltevreden	04	289	T0IT00000000028900004
Portions 5 of Farm no. 289 Farm Weltevreden	05	289	T0IT00000000028900005
Portions 6/RE of Farm no. 289 Farm Weltevreden	06	289	T0IT00000000028900006
Portions 9 of Farm no. 289 Farm Weltevreden	09	289	T0IT00000000028900009
Portions 10 of Farm no. 289 Farm Weltevreden	10	289	T0IT00000000028900010
Portions 11 of Farm no. 289 Farm Weltevreden	11	289	T0IT00000000028900011
Portions RE of Farm no. 290 Farm Mooiplaats	RE	290	T0IT00000000029000000
Portions 1/RE of Farm no. 290 Farm Mooiplaats	01	290	T0IT00000000029000001
Portions 7 of Farm no. 290 Farm Mooiplaats	07	290	T0IT00000000029000007
Portions 8 of Farm no. 290 Farm Mooiplaats	08	290	T0IT00000000029000008
Portions 9/RE of Farm no. 290 Farm Mooiplaats	09	290	T0IT00000000029000009
Portions 11/RE of Farm no. 290 Farm Mooiplaats	11	290	T0IT00000000029000011
Portions 14/RE of Farm no. 290	14	290	T0IT00000000029000014

Farm Name	Portion No.	Farm No.	SG 21 Code
Farm Mooiplaats			
Portions 8 of Farm no. 291 Farm Bosjesspruit	08	291	T0IT00000000029100008
Portions 2 of Farm no. 292 Farm	02	292	T0IT00000000029200002
Portions 1 of Farm no. 322 Farm Welgelegen	01	322	T0IT00000000032200001
Portions 2 of Farm no. 322 Farm Welgelegen	02	322	T0IT00000000032200002
Access			
Portion 6 of Farm no. 270 Farm Roodewal	06	270	T0IT00000000027000006
Portion 7 of Farm no. 270 Farm Roodewal	07	270	T0IT00000000027000007
Portion 12 of Farm no. 270 Farm Roodewal	12	270	T0IT00000000027000012
Portion 23 of Farm no. 270 Farm Roodewal	23	270	T0IT00000000027000023
Portion 26 of Farm no. 270 Farm Roodewal	26	270	T0IT00000000027000026
Portion 2 of Farm no. 273 Farm Onverwacht	02	273	T0IT00000000027300002
Portion 4 Farm no. 273 Farm Onverwacht	04	273	T0IT00000000027300004
Portion 7 Farm no. 273 Farm Onverwacht	07	273	T0IT00000000027300007

Farm Name	Portion No.	Farm No.	SG 21 Code
Portions 3 of Farm no. 287 Farm Onverwacht	03	287	T0IT00000000028700003
Portions 4 of Farm no. 287 Farm Onverwacht	04	287	T0IT00000000028700004

TABLE 0-3 GENERAL SITE INFORMATION

General Site Components	Description / Dimensions
Copies of deeds of all affected farm portions	Submitted with the Application Form to the DFFE.
Location of the site	Approximately 30 km east of Ermelo within the Msukaligwa Local Municipality, and Gert Sibande District Municipality.
Facility Area	Up to 185 hectares. This is the permanent development footprint
Photos of areas that give a visual perspective of all parts of the site	Included in the Visual Report, (refer to Volume II)
Photographs from sensitive visual receptors (tourism routes, tourism facilities, etc.)	Included in the Visual Report, (refer to Volume II)

TABLE 0-4 WEF AND ASSOCIATED INFRASTRUCTURE TECHNICAL DETAILS

WEF Technical Details Components	Description / Dimensions
Maximum Generation Capacity	Up to 260 MW
Type of technology	Onshore Wind
Number of Turbines	Up to 24
WTG Hub Height from ground level	Up to 150 m
Blade Length	Up to 110 m
Rotor Diameter	Up to 220 m
Developer / Applicant	Emvelo Wind Energy Facility (Pty) LTD
DFFE Reference	14/12/16/3/3/2/2611
WEF Generation Capacity	Up to 260 MW
Site Access	Multiple access points proposed along existing public roads. Total width up to 15 m (12 m after rehabilitation) consisting of up to 3m width for underground 33 kV reticulation.
Hub Height from ground level	Up to 150 m
Blade Length	Up to 110 m
Rotor Diameter	Up to 220 m

WEF Technical Details Components	Description / Dimensions
Length of internal roads	Dependent on as built road design.
Width of internal roads	Up to 14 m to be rehabilitated to up to 9 m.
On-site substation capacity	Up to 132 kV
Proximity to grid connection	Approximately 30 km
Grid Connection Capacity	Up to 132 kV
Temporary turbine construction laydown and storage areas.	Crane platforms and hardstand laydown area up to 45 ha (Up to 1 ha per turbine)
Permanent footprint area dimensions, including roads, turbine hardstand areas, O&M buildings and battery pad.	O&M: Up to 1 ha Hardstand areas: Up to 1 ha Total area of final footprint (including roads): up to 185 ha
Operations and maintenance buildings (O&M building) with parking area	Up to 1 ha
Height of fencing	2.8 m
Type of fencing	Where site offices are required, temporary screen fencing used to screen offices from the wider landscape.

TABLE 0-5 SITE MAPS AND GIS INFORMATION

Site Maps and GIS Information	Report Reference
All maps/information layers are provided in ESRI Shapefile format.	
All affected farm portions must be indicated.	Figure 2: Site Locality
The exact site of the application must be indicated (the areas that will be occupied by the application).	Figure 2: Site Locality
A *status quo* map/layer must be provided that includes the following: Current use of land on the site including:	
Buildings and other structures	Figure 9: Buildings and Other Structures
Agricultural fields	Figure 5: Land Use and Land Cover
Grazing areas	Figure 5: Land Use and Land Cover
Natural vegetation areas (natural veld not cultivated for the preceding 10 years) with an indication of the vegetation quality as well as fine scale mapping in respect of Critical Biodiversity Areas and Ecological Support Areas	Figure 6: Important Ecological Areas
Critically endangered and endangered vegetation areas that occur on the site	Figure 6: Important Ecological Areas
Bare areas which may be susceptible to soil erosion	Figure 6: Important Ecological Areas
Cultural historical sites and elements	Figure 7: Environmental Sensitivity
Rivers, streams and water courses	Figure 6: Important Ecological Areas

Site Maps and GIS Information	Report Reference
Ridgelines and 20 m continuous contours with height references in the GIS database	Figure 5: Land Use and Land Cover
Fountains, boreholes, dams (in-stream as well as offstream) and reservoirs	Figure 6: Important Ecological Areas
High potential agricultural areas as defined by the Department of Agriculture, Forestry and Fisheries	Figure 5: Land Use and Land Cover
Indicate isolated residential, tourism facilities on or within 1 km of the site	Figure 7: Environmental Sensitivity
A slope analysis map/layer that include the following slope ranges: Less than 8% slope (preferred areas for turbines and infrastructure) Between 8% and 12% slope (potentially sensitive to turbines and infrastructure) Between 12%and 14% slope (highly sensitive to turbines and infrastructure) Steeper than 18% slope (unsuitable for turbines and infrastructure)	Figure 5: Land Use and Land Cover
A map/layer that indicate locations of birds and bats including roosting and foraging areas	Figure 7: Environmental Sensitivity
A site development proposal map(s)/layer(s) that indicate: Turbine positions Foundation footprint Permanent laydown area footprint Construction period laydown footprint Internal roads indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible).	Figure 3: Site Development Plan
River, stream and water crossing of roads and cables indicating the type of bridging structures that will be used.	Figure 7: Environmental Sensitivity
Substation(s) and/or transformer(s) sites include their entire footprint.	Figure 3: Site Development Plan
Cable routes and trench dimensions (where they are not along internal roads) Connection routes to the distribution/transmission network (the connection must form part of the EIA even if the construction and maintenance thereof will be done by another entity such as ESKOM).	Figure 3: Site Development Plan.
Cut and fill areas at turbine sites along roads and at substation/transformer sites indicating the expected volume of each cut and fill	This will be provided in the final design approval of the development layout.
Borrow pits	No borrow pits on site. Licensed borrow pits will be used to source material.

Site Maps and GIS Information	Report Reference
Spoil heaps (temporary for topsoil and subsoil and permanently for excess material) Buildings including accommodation	Temporary and permanent spoil heaps will be kept within demarcated construction areas and monitored by the ECO during the construction phase.

TABLE 0-66 PROPOSED EMVELO WEF SITE BOUNDARY AND INFRASTRUCTURE COORDINATES

Proposed Emvelo WEF						
FEATURE	LATITUDE (S)			LONGITUDE (E)		
	DEG	MIN	SEC	DEG	MIN	SEC
North West Corner WEF 0.1	26°	30ˈ	22˝	30°	18ˈ	28˝
North East Corner WEF 0.2	26°	31ˈ	30˝	30°	20ˈ	52˝
South East Corner WEF 0.3	26°	34ˈ	07˝	30°	19ˈ	42˝
South West Corner WEF 0.4	26°	33ˈ	23˝	30°	17ˈ	24˝
North West Corner WEF 0.5	26°	34ˈ	18˝	30°	20ˈ	21˝
South East Corner WEF 0.6	26°	37ˈ	27˝	30°	21ˈ	39˝
North East Corner WEF 0.7	26°	36ˈ	13˝	30°	23ˈ	01˝
South West Corner WEF 0.8	26°	36ˈ	40˝	30°	18ˈ	30˝
IPP Step-up station						
NW Corner	26°	35′	12″	30°	20′	52″
NE Corner	26°	35′	13″	30°	20′	56″
SE Corner	26°	35′	15″	30°	20′	55″
SW Corner	26°	35′	14″	30°	20′	52″
Eskom Sws Substation						
NW Corner	26°	35′	14″	30°	20′	52″
NE Corner	26°	35′	15″	30°	20′	55″

Proposed Emvelo WEF						
SW Corner	26°	35′	16″	30°	20′	52″
SE Corner	26°	35′	17″	30°	20′	55″
Laydown Area						
NW Corner	26°	31′	31″	30°	18′	34″
NE Corner	26°	31′	33″	30°	18′	43″
SE Corner	26°	31′	41″	30°	18′	38″
SW Corner	26°	31′	38″	30°	18′	30″
O&M Site Facilities (2/274)						
NW Corner	26°	36′	41″	30°	20′	42″
NE Corner	26°	20′	48″	30°	20′	48″
SW Corner	26°	36′	43″	30°	20′	41″
SE Corner	26°	36′	45″	30°	20′	47″
O&M Site Facilities (1/272)						
SW Corner	26°	32′	40″	30°	19′	40″
NE Corner	26°	32′	37″	30°	19′	44″
NW Corner	26°	32′	37″	30°	19′	40″
SE Corner	26°	32′	40″	30°	19′	43″
30 km Overhead line (Preferred)						
Start	26°	35′	16″	30°	20′	53″
	26°	38′	24″	30°	19′	13″
	26°	39′	47″	30°	17′	52″
End	26°	39′	18″	30°	05′	39″
30 km Overhead line (Alternative 1)						
Start	26°	35′	16″	30°	20′	53″
	26°	39′	14″	30°	13′	09″
	26°	38′	52″	30°	07′	58″
End	26°	39′	18″	30°	05′	39″
30 km Overhead line (Alternative 2)						
Start	26°	35′	16″	30°	20′	53″
	26°	39′	47″	30°	17′	52″
	26°	38′	31″	30°	06′	36″
End	26°	37′	38″	30°	04′	07″
30 km Overhead line (Alternative 3)						
Start	26°	35′	16″	30°	20′	53″

Proposed Emvelo WEF						
	26°	39′	47″	30°	17′	52″
	26°	38′	32″	30°	06′	30″
End	26°	39′	44″	30°	03′	51″

1. INTRODUCTION

1.1 PROJECT OVERVIEW

Emvelo Wind Energy Facility (Pty) Ltd (‘the Project Applicant’) is applying for EA to construct and operate the up to 260 MW Emvelo Wind Energy Facility (WEF) (the proposed Emvelo WEF) and its associated auxiliary infrastructure, which is includes one on-site substation, with capacity of up to 132 kV, to facilitate the connection between the WEF and the electricity grid. As well as an up to 132 kV over-head powerline of approximately 32 km (300 m corridor), traversing 35 land parcels, be constructed to connect the proposed WEF to the proposed new Camden B Substation (Figure 1-1). The proposed development is located approximately 30 km east of Ermelo within the Msukaligwa Local Municipality, and Gert Sibande District Municipality.

The Project Applicant appointed Environmental Resources Management Southern Africa (Pty) Ltd (ERM), to act as the Environmental Assessment Practitioner (EAP) and to undertake the Scoping and Environmental Impact Assessment (S&EIA) process for EA; in line with Chapter 5 of the National Environmental Management Act, 1998 (Act 107 of 1998 – NEMA), and the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended). It must be noted that the DFFE have granted permission for the inclusion of the electrical infrastructure into a single application with the Wind Energy Facility, but two Environmental Authorisations (one for the WEF and one for the electrical infrastructure) will be issued if the application is successful.

1.2 PURPOSE AND AIM OF THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT

The National Environment Management Act, 1998 (Act No 107 of 1998) (NEMA) promotes the use of scoping and EIA in order to ensure the integrated environmental management of activities.

Section 24(1) of NEMA states:

"In order to give effect to the general objectives of integrated environmental management laid down in this Chapter, the potential impact on the environment of listed activities must be considered, investigated, assessed and reported to the competent authority charged by this Act with granting the relevant environmental authorisation."

EIA is ultimately a decision-making process with the specific aim of selecting an option that will provide the most benefit, and cause the least impact. The EIA process should identify activities which may have a detrimental effect on the environment, and which would therefore require EA prior to commencement.

1.3 DFFE COMMENTS ON THE FINAL SCOPING REPORT

Table 1-1 below summarises the comments received from the DFFE on the FSR. This table further indicates where in this report the comments have been addressed.

TABLE 1-1 COMMENTS RECEIVED FROM THE DFFE ON THE FINAL SCOPING REPORT

Ref	Name of Organisation	Date and Method	Phase of PP	Comment	Response
				General Comments	
1.	DFFE Ms Masina Morudu	19 November 2024 Per email	Final Scoping Phase	The meeting minutes in Appendix F of the Public Participation Report refers. The discussions during the meeting with the Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA) and the Mpumalanga Tourism & Parks Agency (MTPA) on 11 September 2024 are noted.	Comment has been acknowledged
2.				The table of coordinates on page x of the SR is noted. The EIAr must include: a. The corner coordinates for the Battery Energy Storage System. b. Bend point coordinates for the 132kV powerline alternatives; and the main access roads.	Coordinates of the bend points for the 132kV alternatives and main access roads have been included in the Draft EIA Report.
3.				The EIAr must include the approximate length of each grid connection alternative route, and these grid connection routes must be discussed in the "Alternatives" section of the EIAr.	The EIAr includes the approximate length of each grid connection alternative route and discussed in the alternative section accordingly
4.				You are requested to provide the estimated operational lifespan of the proposed Emvelo WEF and details of future plans for the site and infrastructure after decommissioning, as well as the possibility of upgrading the proposed infrastructure to more advanced technologies.	Lifespan of the proposed WEF is 25 – 30 years. There are several sustainable plans and strategies that can be implemented for decommissioning, repowering, or transitioning to new uses such as decommissioning and recycling, repowering and upgrading technology, Land restoration/biodiversity enhancements.
5.				The EIAr must confirm the availability of services identified on pages 124 to 126 of the final SR.	Water and waste services will be requested form the local municipality,

Ref	Name of Organisation	Date and Method	Phase of PP	Comment	Response
					or where services are not available, they will be outsourced to private contractors.
6.				If the EIAr contains listed activities and/or other information that differs from the application form, the application form must be amended accordingly and submitted to the Department with the EIAr.	The listed activities in Table 3.1 of the EIAr Report correspond with the listed activities in the application form.
				Battery Energy Storage System (BESS)	
No.				**Comment from DFFE**	**EAP Response**
7.				Applicable BESS technologies must be included under the Technology Alternatives section of the EIAr.	BESS is no longer included in the the final layout.
8.				A risk assessment study is not required for the Battery Energy Storage System (BESS), however, impacts associated with the risks must be identified, considered, and assessed as part of the EIAr.	BESS is no longer included in the the final layout.
				Public Participation	
No.				**Comment from DFFE**	**EAP Response**
9.				Comments on the draft EIAR must be obtained from this Department's Biodiversity Conservation Directorate at BCAdmin@dffe.gov.za and Protected Areas section (regarding the NPAES) at Tnethononda@dffe.gov.za. Further to that, these comments must be addressed and incorporated in the final EIAr.	When the EIA phase commences, the Draft EIA report and all appendices, including the public participation documentation will be submitted to the Directorate Biodiversity Conservation at Email; BCAdmin@dffe.gov.za and Protected Areas section (regarding the NPAES) at Tnethononda@dffe.gov.za
10.				Proof of correspondence with the various stakeholders must be included in the EIAr. This must indicate that this draft EIAr has been subjected to 30	Please refer to Volume III – PP Report, which includes written notice for the availability of the draft EIAr for comment

Ref	Name of Organisation	Date and Method	Phase of PP	Comment	Response
				days public participation process, stating the start and end date of the PPP.	
11.				Please ensure that comments from all relevant stakeholders are submitted to the Department with the EIAr.	Original copies of comments from stakeholders have been included as an appendix to Volume III – PP Report
12.				Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments. Please provide proof of written notice for the availability of the draft EIAr for comment.	Please refer to Volume III – PP Report, which includes written notice for the availability of the draft EIAr for comment
13.				All issues raised and comments received must be incorporated into the Comments and Response Report (CRR).	All comments and issues raised are addressed in this CRR.
14.				Comments from I&APs must not be split and arranged into categories. Comments from each submission must be responded to individually.	Comments from each submission has been responded to individually
15.				Please refrain from summarising comments made by I&APs. All comments from I&APs must be copied verbatim and responded to clearly. Please note that a response such as "noted" is not regarded as an adequate response to an I&AP's comments.	Comments have been captured verbatim and not summarised. All comments have been responded to clearly and 'noted' has been avoided in all responses.
16.				The CRR addresses comments on the draft SR, which have been received from organs of state, however, copies of these comments are not included in the report. Copies of original comments received from I&APs and organs of state, which have jurisdiction in respect of the proposed activity must be submitted to the Department with the EIAr.	Original copies of comments from I&APs and organs of state have been included as an appendix to Volume III – PP Report
17.				If applicable, the attendance registers and minutes of any meetings held by the Environmental Assessment Practitioner (EAP) with Interested and Affected	Attendance registers and minutes of any meetings held by the Environmental Assessment

Ref	Name of Organisation	Date and Method	Phase of PP	Comment	Response
				Parties (I&APs) and other role players must be included in the EIAr.	Practitioner (EAP) with Interested and Affected Parties (I&APs) and other role players been included as an appendix to Volume III – PP Report
18.				The newspaper advert proof in Appendix C of the Public Participation Report refers. Please submit a full page of the newspaper(s) containing the advertisement, ensuring that the name of the newspaper and date are visible.	This has been included as an Appendix in Volume III.
				Specialist Assessments	
No.				**Comment from DFFE**	**EAP Response**
19.				Interim and final comments from the South African Heritage Resources Agency (SAHRA) must be addressed and incorporated in the EIAr.	Please note comments from SAHRA was not provided during scoping phase. Comments received from SAHRA during EIA phase will be incorporated in the EIAr
20.				Specialist assessments must be conducted in accordance with the Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols"), and Government Notice No. 1150 of 30 October 2020 (i.e. protocols for terrestrial plant and animal species).	Specialist assessments have been conducted in accordance with the Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols"), and Government Notice No. 1150 of 30 October 2020.
21.				The following specialist studies will form part of the EIAr as indicated in Section 12.6 of the FSR: a. Soil and Agriculture Potential Impact Assessment; b. Freshwater and Wetlands (Aquatics) Impact Assessment; c. Terrestrial Biodiversity (Flora and Fauna) Impact Assessment; d. Avifauna Impact Assessment; e. Bat Impact Assessment;	The EIAr report encompasses all studies outlined

Ref	Name of Organisation	Date and Method	Phase of PP	Comment	Response
				f. Visual / Landscape and Flicker Impact Assessment; g. Heritage, Archaeology and Palaeontology Impact Assessment; h. Noise Impact Assessment; i. Socio-economic Impact Assessment; and j. Traffic and Transportation Impact Assessment.	
22.				Please note that the Department considers a 'no-go' area, as an area where no development of any infrastructure is allowed; therefore, no development of associated infrastructure including access roads is allowed in the 'no-go' areas.	The term "no-go" is often applied to various types of infrastructure by different specialists, however, its application can vary based on the specific environmental concerns being addressed. In the context of avifauna, certain areas may be designated as "no turbine areas" to protect sensitive bird species, while still permitting the development of other types of infrastructure.
23.				Should the specialist definition of 'no-go' area differ from the Departments definition; this must be clearly indicated. The specialist must also indicate the 'no-go' area's buffer if applicable.	The EAP acknowledges that the departments definition of a 'no-go' area is for any infrastructure, including the associated infrastructure such as access roads. Applicable buffer zones are shown on the sensitivity figures.
24.				Should the specialist studies provide more detail regarding any of the project activity thresholds, please ensure that the project activity descriptions are amended accordingly in the application form and EIAr.	Project activity descriptions was amended in the application form and EIAr according to the specialist studies.
25.				All specialist studies must be final, and provide detailed/practical mitigation measures for the preferred alternative and recommendations, and	Specialist studies are final, with no further studies recommended.

Ref	Name of Organisation	Date and Method	Phase of PP	Comment	Response
				must not recommend further studies to be completed post EA.	
26.				Should a specialist recommend specific mitigation measures, these must be clearly indicated.	Specific mitigation measures as recommended by specialists are clearly indicated the EIAr and EMPr.
27.				Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defendable reasons; and were necessary, include further expertise advice.	No contradicting recommendations were provided by specialists. Specialists' recommendations have been considered and included Section 12 of the EIAr to be included in EA and / or in the EMPr for implementation.
28.				Where applicable, each specialist study must provide a preferred grid connection alternative.	Three grid connection alternatives have been considered.

Layout & Sensitivity Maps

No.				Comment from DFFE	EAP Response
29.				Please provide a layout map which indicates the following: a. Wind turbine positions (numbered) and its associated infrastructure; b. Permanent laydown area footprint; c. Internal roads indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible); d. Wetlands, drainage lines, rivers, stream and water crossing of roads and cables indicating the type of bridging structures that will be used; e. The location of sensitive environmental features on site e.g. CBAs, heritage sites, wetlands, drainage lines etc. that will be affected by the facility and its associated infrastructure;	A layout map detailing the proposed layout of the facility, adhering to specialist recommendations have been included Section 1 of the EIAr.

Ref	Name of Organisation	Date and Method	Phase of PP	Comment	Response
				f. Substation(s) and/or transformer(s) sites including their entire footprint; g. All existing infrastructure on the site, especially roads; h. Buildings proposed within the substation footprint; i. Buffer areas; and j. All "no-go" areas.	
Cumulative Assessments					
30.				Regarding the identified similar projects within a 30km radius of the proposed development site, the cumulative impact assessment for all identified and assessed impacts must indicate the following: a. Identified cumulative impacts must be clearly defined, and where possible the size of the identified impact must be quantified and indicated, i.e., hectares of cumulatively transformed land. b. Identified cumulative impacts associated with the proposed development must be rated with the significance rating methodology used in the process. c. Detailed process flow and proof must be provided, to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project. d. The cumulative impacts significance rating must also inform the need and desirability of the proposed development. e. A cumulative impact environmental statement on whether the proposed development must proceed.	A preliminary assessment of cumulative impacts was made in the Scoping Phase and has been assessed further in the EIA Phase where a detailed process flow and methodology has been defined as recommended.
WEF Environmental Management Programme (EMPr)					

Ref	Name of Organisation	Date and Method	Phase of PP	Comment	Response
31.				A construction and operational phase EMPr for the WEF, which includes mitigation and monitoring measures must be submitted with the EIAr.	A construction and operational phase EMPr for the WEF, which includes mitigation and monitoring measures has been drafted and will be submitted with the EIAR.
32.				The EMPr must be developed in terms of Appendix 4 of the EIA Regulations, 2014 as amended and must include (but not limited to) the following plans and measures: a. A Re-vegetation and habitat rehabilitation plan to be implemented during the construction and operation of the facility. Restoration must be undertaken as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats; b. A Weed and invader plant management plan, to be implemented during construction and operation of the facility. The plan must include mitigation measures to reduce the invasion of alien species and ensure that the continuous monitoring and removal of alien species is undertaken; c. A Plant rescue and protection plan, which allows for the maximum transplant of conservation important species from areas to be transformed. This plan must be compiled by a vegetation specialist familiar with the site and be implemented prior to commencement of the construction phase; d. An Open space management plan, to be implemented during the construction and operation of the facility; e. A Traffic management plan for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. This plan must include measures to minimize impacts on local commuters	The content of the EMPr produced for the proposed development is in compliance in terms of Appendix 4 of the Environmental Impact Assessment Regulations, 2014, as amended, and includes, where relevant the plans and measures recommended by the Department.

Ref	Name of Organisation	Date and Method	Phase of PP	Comment	Response
				e.g. limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time and avoid using roads through densely populated built-up areas so as not to disturb existing retail and commercial operations; f. A Transportation plan for the transport of components, main assembly cranes and other large pieces of equipment; g. A Stormwater management plan, to be implemented during the construction and operation of the facility. The plan must ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion. The plan must include the construction of appropriate design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of storm water run-off; h. A Fire management plan to be implemented during the construction and operation of the facility; i. An Erosion management plan for monitoring and rehabilitating erosion events associated with the facility. Appropriate erosion mitigation must form part of this plan to prevent and reduce the risk of any potential erosion; j. An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems; k. Measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their catchments, and other environmental sensitive areas from construction impacts including the direct or indirect spillage of pollutants;	

Ref	Name of Organisation	Date and Method	Phase of PP	Comment	Response
				l. Dust management measures; m. Waste management measures; n. Emergency response; and, o. All recommendations and mitigation measures recorded in the EIAr and the specialist studies conducted. This includes the management and monitoring plans and procedures appended in the specialist studies.	
33.				The decommissioning chapter of the EMPr for the facility must contain information relating to the handling, repurposing or disposal of dysfunctional, severely damaged batteries, module and containers.	The decommissioning phase section of the EMPr for the facility contains information relating to the handling, repurposing or disposal of dysfunctional, severely damaged batteries, module and containers
34.				The EMPr must distinguish between impact management actions and impact management outcomes.	The EMPr ensures a structured approach, distinguishing between impact management actions and impact management outcomes.
35.				The EMPr must not contain any ambiguity. Where applicable, statements containing the word “should” or “may” are to be amended to “must”.	Where applicable, statements containing the words ‘should’ or ‘may’ have been removed.
				Generic Environmental Management Programme (EMPr)	
36.				The proposed development triggers Activity 11 of Listing Notice 1 (as amended). The relevant generic EMPr(s) must be included in the EIAr, over and above the EMPr for the WEF.	Applicable Generic EMPr(s) have been included in Volume I.
37.				Part B: Section 2 of the generic EMPr(s) must be completed, and a copy of the signed EMPr(s) must be submitted with the EIAr. Please note that Point 7.1.1 in Part B: Section 2 needs to match the details of the applicant as contained in the application form.	Signed Generic EMPr(s) have been included in Volume I.

Ref	Name of Organisation	Date and Method	Phase of PP	Comment	Response
				The generic EMPr(s) must be signed by the applicant and submitted with the EIAr. An unsigned Generic EMPr is regarded as incomplete.	
38.				If any specific environmental sensitivities/attributes are present on the site which require more specific impact management outcomes and impact management actions, not included in the pre-approved generic EMPr template, to manage impacts, those impact management outcomes and actions must be included in Part C of the generic EMPr.	Specific impact management outcomes and impact management actions have been included in Part C of the Generic EMPr(s).

2. TERMS OF REFERENCES

The primary objective of the S&EIA process is to present sufficient information to the CA and I&APs on predicted potential impacts and associated mitigation measures required to avoid or mitigate potential negative impacts, as well as to improve or maximise the potential benefits of the development.

In terms of legal requirements, the NEMA EIA Regulations 2014, as amended, regulate and prescribe the content of the EIA Report and specify the type of supporting information that must accompany the submission of the report to the authorities. Table 2-1 shows how and where the legal requirements are addressed in this EIA Report. Section 9 of this EIAr provides a summary of the Public Participation Process (PPP) and Volume III of this EIAr includes all Public Participation undertaken to date. As comments were received these have been collated and included in this EIAr.

As per the EIA Regulations 2014, as amended, 'the objective of the environmental impact assessment process is to, through a consultative process -

(a) determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;

(b) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted scoping report;

(c) identify the location of the development footprint within the approved site as contemplated in the accepted scoping report based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;

(d) determine the:

(i) nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and

(ii) degree to which these impacts –

(aa) can be reversed;

(bb) may cause irreplaceable loss of resources, and

(cc) can be avoided, managed or mitigated;

(e) identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted scoping report based on the lowest level of environmental sensitivity identified during the assessment;

(f) identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity;

(g) identify suitable measures to avoid, manage or mitigate identified impacts; and

(h) identify residual risks that need to be managed and monitored.'

The above activities are completed through consultation with:

- The lead authority involved in the decision-making for the application (in this case, the DFFE);
- I&APs, provincial and local governments, and other relevant organisations to ensure that local issues are well understood; and
- The specialist team to ensure that technical issues are identified.

TABLE 2-1 LEGISLATIVE REQUIREMENTS FOR SCOPE OF ASSESSMENT AND CONTENT OF ENVIRONMENTAL IMPACT ASSESSMENT REPORTS

Appendix 3 Requirements NEMA, 1998 (Act No. 107 of 1998)		Location in EIA
3 (1)	*An environmental impact assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-*	
(a)	*details of- the EAP who prepared the report; and the expertise of the EAP, including a curriculum vitae;*	Section 2 Appendix A
(b)	*the location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including- the 21 digit Surveyor General code of each cadastral land parcel; where available, the physical address and farm name; where the required information in items (i) and (ii) is not available, the co-ordinates of the boundary of the property or properties;*	Executive Summary Figure 1 and 2
(c)	*a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is- a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or on land where the property has not been defined, the coordinates within which the activity is to be undertaken;*	Figure 3
(d)	*a description of the scope of the proposed activity, including- all listed and specified activities triggered and being applied for; and a description of the associated structures and infrastructure related to the development;*	Section 3
(e)	*a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;*	Section 3 and 5
(f)	*a motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report;*	Section 5

Appendix 3 Requirements NEMA, 1998 (Act No. 107 of 1998)		Location in EIA
(g)	*a motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report;*	Section 8
(h)	*a full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including:*	
	details of the development footprint alternatives considered;	Section 7
	details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 9 Volume III
	a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	Section 9
	the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 6
	the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- *(aa) can be reversed;* *(bb) may cause irreplaceable loss of resources; and* *(cc) can be avoided, managed or mitigated;*	Section 10 and 11
	the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	Section 4 Volume II
	positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 10 and 11
	the possible mitigation measures that could be applied and level of residual risk;	Section 10 and 11
	if no alternative development footprints were investigated, the motivation for not considering such; and	Section 7
	a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report;	Section 8
(i)	*a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred development footprint within the approved site as contemplated in the accepted scoping report through the life of the activity, including -*	
	a description of all environmental issues and risks that were identified during the environmental impact assessment process; and	Section 10
	an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	Section 10

Appendix 3 Requirements NEMA, 1998 (Act No. 107 of 1998)		Location in EIA
(j)	*an assessment of each identified potentially significant impact and risk, including-* *cumulative impacts;* *the nature, significance and consequences of the impact and risk;* *the extent and duration of the impact and risk;* *the probability of the impact and risk occurring;* *the degree to which the impact and risk can be reversed;* *the degree to which the impact and risk may cause irreplaceable loss of resources; and* *the degree to which the impact and risk can be mitigated;*	Section 11
(k)	*where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;*	Section 12
(l)	*an environmental impact statement which contains-* *a summary of the key findings of the environmental impact assessment;* *a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and* *a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;*	Section 12 and 13 Figure 7
(m)	*based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;*	Section 12 and 13 Appendix B
(n)	*the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;*	Section 8
(o)	*any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;*	Section 13
(p)	*a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;*	Section 2 Volume II
(q)	*a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;*	Section 13
(r)	*where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;*	The proposed activity includes operational aspects.
(s)	*an undertaking under oath or affirmation by the EAP in relation to-* *the correctness of the information provided in the reports;*	Appendix A

Appendix 3 Requirements NEMA, 1998 (Act No. 107 of 1998)		Location in EIA
	the inclusion of comments and inputs from stakeholders and I&APs; *the inclusion of inputs and recommendations from the specialist reports where relevant; and* *any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties; and*	
(t)	*where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;*	Appendix B
(u)	*An indication of any deviation from the approved scoping report, including the plan of study, including-* *any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and* *a motivation for the deviation;*	n/a Specialist following the same methodology and protocols in the EIA phase and followed during the scoping phase. There are no deviations from the approved Plan of Study
(v)	*any specific information that may be required by the competent authority; and*	Section 13
(w)	*any other matters required in terms of section 24(4)(a) and (b) of the Act.*	n/a
3 (2)	*Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to an environmental impact assessment report the requirements as indicated in such notice will apply.*	Volume 4 Volume II

2.1 STRUCTURE OF THE EIA REPORT

The EIA report is set out in three volumes:

Volume I: EIA Report;

Volume III: Specialist Reports; and

Volume III: Public Participation Report (including Comments and Responses table).

2.2 DEVIATIONS FROM PLAN OF STUDY

There have been changes to the approved Plan of Study for the EIA. The Emvelo WEF will now include properties that were also evaluated during the scoping process for the Rochdale WEF. The DFFE has confirmed that this approach is reasonable and has allowed both the Rochdale and Emvelo WEFs, together known as the Amsterdam Cluster, to move forward to the EIA phase

2.3 THE APPLICANT

The Applicant, Emvelo Wind Facility (Pty) Ltd, appointed ERM, with the lead EAP being Stephanie Gopaul to co-ordinate and manage the S&EIA application process.

TABLE 2-2 DETAILS OF THE APPLICANT

Name of the Applicant	**Emvelo Wind Energy (Pty) Ltd**
Name of contact person for applicant (if other)	Andrew Pearson
Company Registration Number	2021/770255/07
BBBEE status	Level 4
Physical address	Portside, 5 Buitengracht St, Cape Town, 8001
Postal address	PO Box 548 Howard Place
Postal code	7450
Telephone	021 685 3240
E-mail	Andrew.mulilo.com

2.4 DETAILS OF THE EAP

The co-ordination and management of this environmental application process is being conducted by Environmental Resources Management South Africa (Pty) Ltd ('ERM') with the lead EAP being Stephanie Gopaul. Refer to Appendix A for the EAP's Declaration of Interest and Curriculum Vitae.

TABLE 2-3 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

Name of the EAP organisation	Environmental Resource Management Southern Africa (Pty) Ltd
Environmental Assessment Practitioner	Stephanie Gopaul
Consultant	Sadiya Salie
Postal address	2 Ncondo Place, Ridgeside Drive Umhlanga Ridge 4320, Durban, South Africa
Telephone	+2710 596 3506
Cellular	+27 (0)65 666 0066
E-mail	stephanie.gopaul@erm.com erm.arcusamsterdam@erm.com
EAP Qualifications	Masters in Environmental Management, University of the Free State, South Africa, 2012 BSc. Environmental and Engineering Geology, University of KwaZulu Natal, South Africa, 2005

2.4.1 THE SPECIALIST

The Applicant in consultation with the EAP, assembled a team of technical specialists to undertake studies for the proposed Emvelo WEF and associated infrastructure.

The specialists' fields of investigation are listed in Table 2-4 below. The areas of investigation were identified as relevant to the proposed development as per the results of the DFFE screening report generated, experience of the EAP, and consultation with the listed specialists who were selected based on their experience in the field of renewable energy projects, and the locality of the proposed development.

The same team of specialist undertook the scoping of the proposed development and have implemented the plan of study for EIA in their impact assessment reports (Volume II).

TABLE 2-4 LIST OF SPECIALIST INVESTIGATIONS

Discipline	Specialist	Specialist Organisation
Environmental Consultant	Lucien Barbeau	ERM
Soil and Agricultural Potential	Johann Lanz	Independent Consultant
Aquatic	Dr Brian Colloty	EnviroSci. Pty Ltd
Terrestrial Biodiversity and Plant	Jamie Pote	Independent Consultant
Animal Species	Jonathan Colville	Terrestrial Ecologist & Faunal Surveys
Avifauna	Albert Froneman	AfriAvian Environmental
Bats	Jonathan Aronson	Camissa Sustainability Consulting
Visual / Landscape and Flicker	Graham Young	Graham Young Landscape Architect
Heritage, Archaeology and Palaeontology	Gavin Anderson	UMLANDO: Archaeological Surveys & Heritage Management
Noise	Morné de Jager	Enviro Acoustic Research
Socio-Economic	Tony Barbour	Independent Consultant
Traffic and Transportation	Reabetswe Mokomele	SMEC South Africa

2.5 ASSUMPTIONS AND LIMITATIONS

The assumption is made that the information on which this report is based (baseline studies and project information, as well as existing information) is accurate and correct. The following assumptions and limitations are noted for the EIA report and the specialist studies conducted (Volume II) as part of the proposed developments' EIA process.

2.5.1 SOIL, LAND USE AND AGRICULTURE POTENTIAL

There were no specific assumptions, uncertainties or gaps in knowledge or data that affect the findings of this study.

2.5.2 FRESHWATER AND WETLANDS

To obtain a comprehensive understanding of the dynamics of both the flora and fauna of the aquatic communities within a study site, as well as the status of endemic, rare or threatened species in any area, assessments should always consider investigations at different time scales (across seasons/years) and through replication. No baseline long-term monitoring was undertaken as part of this assessment. However, a concerted effort was made to assess as much of the potential site, as well as make use of any available literature, species distribution data and aerial photography. Furthermore, based on the previous assessments undertaken between 2003 and 2023 in the area and this was not foreseen as a huge limiting factor.

Detailed site visits conducted within the region from March 2022 and a site-specific assessment in April & September 2023 were also conducted. The level of investigation undertaken is sufficient to inform this assessment.

It should be emphasised that information, as presented in this document, only has reference to the study area as indicated on the accompanying maps. Therefore, this information cannot be applied to any other area without detailed investigation.

For the purposes of this report, it is assumed that any existing roads and tracks will be used, while structures will be placed outside the wetlands and or watercourses. A further assumption is that water will be sourced from a licensed resource and not illegally abstracted from any surrounding watercourses, particularly if dust suppression is required for example at the laydown areas or along main or district roads.

2.5.3 TERRESTRIAL BIODIVERSITY

The findings and recommendations of this report may be susceptible to the following uncertainties and limitation:

- No assessment has been made of aquatic aspects relating to any wetlands, pans, and rivers/seeps, nor faunal aspects outside of the scope of a terrestrial biodiversity report. Refer to separate reports.
- Any botanical surveys based upon a limited sampling time-period, may not reflect the actual species composition of the site due to seasonal variations in flowering times. Additionally, the composition of fire adapted vegetation such as grassland may vary depending on level of maturity or time since last burn. It is also not feasible to sample every square meter of such an extensive site thoroughly, although the approach used is based on the specialists' extensive experience. As far as possible, site collected data has been undertaken to represent seasonal aspects and is supplemented with desktop and database-centred distribution data. In addition, measures are included in the project mitigations to address any shortcomings as far as possible and to reduce risks to an acceptable level.

2.5.4 FAUNA

The following limitations and assumptions apply to this assessment:

- It is assumed that all third-party information used (e.g. GIS data and species historical records) was correct at the time of generating this report.
- This impact assessment was undertaken based on the information provided by ERM, including a project layout and an edited Specialist Information Docket (October 2024) for the various infrastructure developments.
- The project site has only been visited once during early autumn (9–11 May 2023). The project area falls within a summer-rainfall region and therefore undertaking a site visit in early autumn limits the detection of faunal SCC at the project site (South African National Biodiversity Institute, 2020). The May 2023 site sensitivity assessment also relied on surveying and assessing broad habitat features and utilising ecosystem-level data, such as intact vegetation type, and known habitat and distributional records for faunal SCC.

- No micro-siting of turbine and access road has been undertaken in high sensitive areas in relation to the final project layout of January 2025 (see recommendations in Colville and Cohen, 2023a).
- Despite increasing prevalence, there is currently limited scientific evidence and empirical data on the impacts of wind farms on invertebrate and on non-volant mammals (Docrat, 2023; Helldin et al., 2012; Klich et al., 2024; Lopucki and Mróz, 2016; Tolvanen et al., 2023). This is especially evident for South Africa, where except for birds, there is almost no information based on scientific studies concerning the impacts of wind farms on other faunal elements, such as mammals and invertebrates. Consequently, there is limited local information and published guidance specifically on the impacts of wind farms on faunal SCC with regards to aspects such as habitat fragmentation and noise disturbances in grassland habitats such as found at the project site.
- The impacts from wind farms in South Africa should therefore ideally follow a precautionary approach, and provide mitigation measures around avoidance and minimisation, when it comes to sensitive faunal SCC and their associated habitats. This is especially important as new wind farm developments that will occur in remote areas with limited access roads are likely to have impacts at the population level of faunal SCC (Helldin et al., 2012).

2.5.5 AVIFAUNA

This study made the basic assumption that the sources of information used are reliable and accurate. The following must be noted:

- The SABAP2 dataset is a comprehensive dataset which provides a reasonably accurate snapshot of the avifauna which could occur at the proposed site. For purposes of completeness, the list of species that could be encountered was supplemented with personal observations, general knowledge of the area, and the results of the pre-construction monitoring conducted over four seasons;
- Conclusions in this study are based on experience of these and similar species at wind farm developments in different parts of South Africa. However, bird behaviour can never be predicted with absolute certainty;
- To date, only one peer-reviewed scientific paper has been published on the impacts that wind farms have on birds in South Africa (Perold et al. 2020). The precautionary principle was therefore applied throughout. The World Charter for Nature, which was adopted by the UN General Assembly in 1982, was the first international endorsement of the precautionary principle. The principle was implemented in an international treaty as early as the 1987 Montreal Protocol and, among other international treaties and declarations, is reflected in the 1992 Rio Declaration on Environment and Development. Principle 15 of the 1992 Rio Declaration states that: "in order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall be not used as a reason for postponing cost-effective measures to prevent environmental degradation." ;
- According to the specifications received from the proponent, the 33 kV medium-voltage lines will be buried next to the roads where practically feasible. It was therefore assumed

that there could be 33 kV overhead lines which could pose an electrocution risk to priority species;

- Priority species for wind energy developments were identified from the updated list of priority species for wind farms compiled for the Avian Wind Farm Sensitivity Map (Retief et al. 2012);
- Priority species for powerline developments (i.e., powerline sensitive species) were defined as species which could potentially be impacted by powerline collisions or electrocutions, based on specific morphological and/or behavioural characteristics. Species classes which fall under these categories are raptors, large terrestrial birds, waterbirds, and crows;
- The Project Area of Influence (PAOI) from an avifaunal perspective for the proposed 132 kV grid connection was assumed to be a 2 km buffer area around the proposed alignments. The 300m assessment corridor falls within this buffer area.

2.5.6 BATS

The core techniques used to assess bat activity in this study are acoustic monitoring and roost surveys, both of which have several limitations which will influence the findings and recommendations of this study.

Acoustic monitoring allows for rapid, passive collection of a large volume of bat activity data which can help identify the bat species present within a particular location and their associated spatio-temporal relative activity patterns. In the context of wind farms, acoustic monitoring is therefore a useful technique however, there are several constraints that must be acknowledged. These are discussed in detail by Voigt et al. (2021), Adams et al. (2012), and Kunz et al. (2007a) and fundamentally, include that acoustic monitoring cannot provide an indication of bat abundance or population size at a site. In addition, population demographics such as age and sex of bats cannot generally be determined from echolocation calls. Due to the large volume of data collected by bat detectors it is impractical and prohibitively time-consuming to inspect each file for echolocation calls and to identify the associated bat species. Specialised statistical software uses bat call reference libraries to automate the identification process but developing such libraries is challenging given the variation individual species display in their echolocation call structure and overlap between species. This study used the Wildlife Acoustics library "Bats of South Africa Version 5.4.2", but this excludes reference calls for most South African species thus these may have been overlooked. However, given the duration of the monitoring and spatial coverage of the detectors, the acoustic data provides a reasonable inventory of the species present, and a good indication of the relative magnitude of bat activity. Lastly, bat activity is notably variable in response to a number of factors such as land use change, climactic variability, variations in prey abundance and meteorological conditions which can vary over different time scales. Since this study is limited to 12 months, the baseline conditions presented here may not be representative of activity over longer time frames meaning risk may be misinterpreted.

The major limitation with roost surveys is finding roosting bats. Bats use a diversity of roosting sites including trees, buildings, crevices, and underground sites (caves and mines). The presence of these features at a site can help to target roost searches but evidence of bats may not always be apparent even if bats are present. Importantly, the absence of bat evidence in these situations does not equate to evidence of bat absence (Collins 2006). Thus, this study uses a precautionary approach and will apply buffers to roosts (largely buildings and rocky crevices) even if bats were not located given their potential role in supporting roosting bats.

It is difficult to assess the risk to bats during operation of the proposed facility based on acoustic data collected during pre-construction surveys. For example, Hein et al. (2013) showed that pre-construction bat activity was not a significant indicator of collision risk. Lintott et al. (2016) argued that environmental impact assessments do not predict the risks to bats accurately. This may partly be because it is hypothesized that bats may be attracted to wind turbines (Cryan and Barclay 2009, Guest et al. 2022) which some evidence suggests may be the case (Horn et al. 2008, Richardson et al. 2021). While this report makes predications about the potential risk to bats posed by the project, these carry a degree of uncertainty and must be verified by using post-construction surveys to ensure that the predictions are accurate and bat behaviour has not altered from pre-construction levels (Lintott et al. 2016).

Risk to bats was determined based on median bat activity per night derived from the bat activity dataset collected with acoustic monitoring. Median values were compared to height-specific fatality risk categories (high, medium, low) based on bat activity sampled in different South African terrestrial ecoregions. The Project Area of Influence (PAOI) is situated in the Highveld Grasslands ecoregion (Dinerstein et al. 2019) however reference values are not available for this ecoregion in MacEwan et al. (2020b). Instead, median values were compared to reference values for the Drakensberg Grasslands, Woodlands and Forest ecoregion. While bat activity levels differ between these two ecoregions this difference is small (MacEwan et al. 2020a). The lack of a direct reference for the Highveld Grasslands ecoregion is therefore not a major limitation and the comparison is suitable to provide an evaluation of risk.

2.5.7 NOISE

ACOUSTIC MEASUREMENTS

Ambient sound levels are the cumulative effects of innumerable sounds generated at various instances both far and near. A high measurement may not necessarily mean that the area is always noisy. Similarly, a low sound level measurement will not necessarily mean that the area is always quiet, as sound levels will vary over seasons, time of day, dependant on faunal characteristics (mating season, dawn chorus early hours of the morning, temperature etc.), vegetation in the area and meteorological conditions (especially wind).

Selecting an ideal measurement location could be difficult, with various criteria assessed to identify the viability of a certain location as a point to define ambient sound levels. When selecting a measurement location, the most important criteria would be:

1. Security of the instrument (minimise risk to the technician; prevent theft; sabotage of the equipment);

2. Safety of the equipment (ensure that it does not prevent, interfere or limit typical agricultural or household activities; ensure that the instrument are not in a location where an animal could damage the instrument); and lastly,

3. The suitability of the measurement location to define ambient sound levels (the presence of certain trees or equipment, wetland or other water resources will influence ambient sound level significantly).

As such, after ensuring that the instrument is safe and secure, there are various environmental factors that could influence ambient sound levels measured. These constraints and limitations are discussed below and could include:

- Seasonal changes in the surrounding environment can influence typical ambient sound levels, as many faunal species are more active during warmer periods than the colder periods. As an example, cicada is usually only active during warmer periods. Certain cicada species can generate noise levels up to 120 dB for mating or distress purposes, sometimes singing in synchronisation magnifying noise levels they produce from their tymbals(31);
- Defining ambient sound levels using the result of one 10-minute measurement may be very inaccurate (very low confidence level in the results) relating to the reasons mentioned above, and measurements over a longer-term period is critical;
- Some equipment that could influence measurements may be missed when deploying instruments, or, the equipment may not the audible. This could include equipment such as hidden water pumps and associated pipelines and outflows, ESKOM stepdown transformers, hidden compressors, inverters, condensers or other electrical equipment, etc. While not audible during deployment, such equipment may significantly influence ambient sound levels during quiet periods;
- Type, the number and sizes of trees in the vicinity of the instrument, as well as the distances between the microphone and these trees. Certain trees, especially fruiting trees could attract birds and other animals that will significantly impact on ambient sound levels;
- Type and number of animals in the vicinity of the microphone. Dogs, chickens, geese, etc. generate different noises randomly both night and day, and other livestock (sheep, goats, cattle, horses, etc.) kept in enclosures will also raise noise levels, especially if these animals are penned in large numbers;
- Measurements over wind speeds of 3 m/s could provide data influenced by wind-induced noises. However, when determining the ambient sound levels associated with increased wind speeds, it is desired to measure ambient sound levels at higher wind speeds;
- Ambient sound levels recorded near rivers, streams, wetlands, trees and bushy areas can be high due to faunal activity which can dominate the sound levels around the measurement point (specifically during summertime, rainfall event or during dawn chorus of bird songs). This generally is still considered naturally quiet and accepted as features of the natural environment, and in various cases sought after and pleasing. Ambient sound level data measured in such area however should not be used to develop an opinion in the potential prevailing ambient sound levels in the larger area;
- Exact location of a sound level meter in an area in relation to structures, infrastructure, vegetation, wetlands and external noise sources will influence measurements. It may determine whether you are measuring anthropogenic sounds from a receptors dwelling, or environmental ambient baseline contributors of significance (faunal, roads traffic, railway traffic movement etc.); and
- As a residential area develops the presence of people will result in increased dwelling related sounds. These are generally a combination of traffic noise, voices, animals and equipment (incl. TV's and Radios). The result is that ambient sound levels will increase as an area matures.

CALCULATING NOISE EMISSIONS – ADEQUACY OF PREDICTIVE METHODS

Limitations due to the calculations of the noise emissions into the environment include the following:

- Most sound propagation models do not consider refraction through the various temperature layers (specifically relevant during the night-times);
- Most sound propagation models do not consider the low frequency range (third octave 16 Hz – 31.5 Hz), and low frequency octave sound power levels are frequently not reported by equipment manufacturers. This would be relevant to facilities with a potential low frequency issue;
- Many environmental models consider sound to propagate in hemi-spherical way. Certain noise sources (e.g. a speaker, exhausts, fans) emit sound power levels in a directional manner;
- The impact of atmospheric absorption is simplified and very uniform meteorological conditions are considered. This is an over-simplification and the effect of this in terms of sound propagation modelling is difficult to quantify;
- Many environmental models are not highly suited for close proximity calculations;
- Acoustical characteristics of the ground are over-simplified, with ground conditions accepted as uniform; and
- Average hourly traffic volumes are assumed for the construction period, though, in practice there may be no traffic during an hour, with significantly higher traffic during a different period.

ADEQUACY OF UNDERLYING ASSUMPTIONS

Noise experienced at a certain location is the cumulative result of innumerable sounds emitted and generated both far and close, each in a different time domain, each having a different spectral character at a different sound level. Each of these sounds is also impacted differently by surrounding vegetation, structures and meteorological conditions that result in a total cumulative noise level represented by a few numbers on a sound level meter.

As previously mentioned, it is not the purpose of noise modelling to accurately determine a likely noise level at a certain receptor but to calculate a noise rating level that is used to identify potential issues of concern.

UNCERTAINTIES ASSOCIATED WITH MITIGATION MEASURES

Any noise impact can be mitigated to have a low significance; however, the cost of mitigating this impact may be prohibitive, or the measure may not be socially acceptable (such as the relocation of an NSR). These mitigation measures may be engineered, technological or due to management commitment.

For the purpose of the determination of the significance of the noise impact mitigation measures were selected that are feasible, mainly focussing on management of noise impacts using rules, policy and require a management commitment. This, however, does not mean that noise levels cannot be reduced further, only that to reduce the noise levels further may require significant additional costs (whether engineered, technological or management). The potential significance of a noise impact can also be reduced by changing the probability of increase noise levels annoying NSR. This can be done by a reduction in the noise levels, but also by improving attitudes towards the project.

It was assumed the mitigation measures proposed for the construction phase, if any is included and proposed in this report, will be considered during the planning phase, implemented during the construction phase and continued during the operational phase.

UNCERTAINTIES OF INFORMATION PROVIDED

While it is difficult to define the character of a measured noise in terms of numbers (third octave sound power levels), it is especially challenging to accurately model noise levels at a receptor from any operation. The projected noise levels are the output of a numerical model with the accuracy depending on the assumptions made during the setup of the model. The assumptions include the following:

- That octave sound power levels selected for processes and equipment accurately represent the sound character and power levels of these processes and equipment. The determination of octave sound power levels in itself is subject to errors, limitations and assumptions with any potential errors carried over to any model making use of these results;
- Sound power emission levels from processes and equipment changes depending on the load the process and equipment are subject to. While the octave sound power level is the average (equivalent) result of a number of measurements, this measurement relates to a period that the process or equipment was subject to a certain load (work required from the engine or motor to perform action). Normally these measurements are collected when the process or equipment is under high load. The result is that measurements generally represent a worst-case scenario;
- As it is unknown which processes and equipment will be operational (when and for how long), modelling considers a scenario where processes and equipment are under full load for a set time period. Modelling assumptions comply with the precautionary principle and operational time periods are frequently overestimated. The result is that projected noise levels would likely be over-estimated;
- Modelling cannot capture the potential impulsive character of a noise that can increase the potential nuisance factor, nor the potential effect of the modulation of amplitude of the noise;
- The XYZ topographical information is derived from the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Global Digital Elevation Model (DEM) data, a product of Japan's Ministry of Economy, Trade, and Industry (METI) and the National Aeronautical and Space Administration (NASA). There are known inaccuracies and artefacts in the data set, yet this is still one of the most accurate data sets to obtain 3D-topographical information;
- The impact of atmospheric absorption is simplified and very uniform meteorological conditions are considered. This is an over-simplification and the effect of this in terms of sound propagation modelling is difficult to quantify;
- Worst-case noise levels will be calculated, assuming a receiver height at a 4m height above surface level as recommended by the Institute of Acoustics (IOA, 2013) [67]. Together

with a 75% hard ground conditions, this will represent worst-case noise levels, only expected a few times per year (if ever);

- Average case noise levels will be calculated assuming a receiver height at a 2m height above surface level, together with a 50% medium ground conditions. This is based on a number of measurements conducted by the author, with this input parameters providing the potential typical maximum noise levels expected from the project at high wind speeds;
- Atmospheric conditions relating to an air temperature of 10oC and a 70% air humidity will be used to minimize the effect of air absorption as recommended by the Institute of Acoustics (IOA, 2013) [6, 67, 72]; and
- Acoustical characteristics of the ground are over-simplified with ground conditions accepted as uniform. Fifty (50%) and Seventy-five percent (75%) hard ground conditions will be modelled for the construction and operational phases respectively, representing a potential worst-case scenario [6, 67, 72].

Due to the uncertainties highlighted above, modelling generally could be out with as much as +10 dBA (the potential noise level is rather over-modelled), although realistic values ranging from less than 3 dBA to 5 dBA are more common in practice.

2.5.8 HERITAGE AND ARCHAEOLOGY

The main assumptions in the study were:

- the various features noted in the desktop study would still be visible.
- The various tracks noted on Google Earth would be accessible via 4x4
- The black wattle plantations would not hinder access to sites
- Vegetation would be low and thus site visibility would be good.
- Wind turbines would not be located on low lying land, and thus not all of these areas required assessment unless affected by transmission lines

The limitations to the study were:

- Black wattle plantations had exceeded in size as per Google Earth imagery and restricted access to areas. The plantations were at some times impenetrable.
- Some of the access tracks no longer existed
- Heavy rains had resulted in dense/tall vegetation. While the desktop and other sites were visible, the details of features were often obscured. This is especially the case for human graves at older settlements.

2.5.9 PALAEONTOLOGY

The study included desktop study based on information resources and the specialist expertise. The study outlined and mapped the recorded fossil sites, their scientific / conservation value and their geological context.

2.5.10 VISUAL/LANDSCAPE

The following assumptions limitations have been made in the study:

- The description of project components is limited to what has been supplied to the author prior to the date of completion of this report.

- The accuracy of the viewshed analysis depends on the quality of the input digital surface model (DSM). Readily available digital contours for the area are limited to 20m contours. GYLA have interpolated these down to 1m intervals to get better accuracy. However, these types of viewshed investigations (using readily available GIS software and terrain contours only) are limited in their accuracy due to their inability to incorporate vegetation information. To be more accurate at predicting absolute visibility, the analysis would require "a 3D model of a tree/plant and a layer indicating the spatial distribution and density of vegetation on the landscape" (Llobera 2007:799) and buffering all existing buildings, structures and infrastructure. The possibility of indicating both the spatial and density distribution of tree/plants, and the three-dimensional model representing vegetation and all structures, is currently not available to the author. Therefore, on-site observations are critical.
- Site photos taken in early winter (when the site visit was conducted) do not necessarily reflect the complete landscape character of the area as experienced through all seasons i.e. the density of the bush in the summer would further restrict visual access to the site. The weather was sunny with some cloud and haze conditions.

2.5.11 SOCIO-ECONOMIC

Technical suitability

It is assumed that the development site represents a technically suitable site for the establishment of the proposed WEF and associated infrastructure.

Strategic importance of the project

The strategic importance of promoting renewable and other forms of energy is supported by the national and provincial energy policies.

Fit with planning and policy requirements

Legislation and policies reflect societal norms and values. The legislative and policy context therefore plays an important role in identifying and assessing the potential social impacts associated with a proposed development. In this regard, a key component of the SIA process is to assess the proposed development in terms of its fit with key planning and policy documents. As such, if the findings of the study indicate that the proposed development in its current format does not conform to the spatial principles and guidelines contained in the relevant legislation and planning documents, and there are no significant or unique opportunities created by the development, the development cannot be supported.

Demographic data

Ward level data from the 2022 Census was not available at the time of preparing the report. These limitations do not have a material bearing on the findings of the SIA

2.5.12 TRAFFIC AND TRANSPORTATION

The assessment has been prepared based on the information provided by the Client and the following assumptions, amongst others:

- It was assumed that the construction period will last approximately 2 years with a 5-day working week resulting in 480 working days over 24 months.

- Construction trips were estimated without a detailed construction schedule programme.
- For the assessment of cumulative impacts, a conservative approach was adopted by assuming that all wind energy facilities within 35 km currently approved, planned or proposed would be constructed concurrently.
- WTG components will be imported and transported with abnormal vehicles from the most feasible port of entry/harbour.
- Haulage will occur on surfaced national and provincial roads and existing site access gravel roads.
- Construction material and labour force will be sourced locally.

3. ENVIRONMENTAL LEGAL FRAMEWORK

The proposed development requires EA prior to being constructed and operated. This section of the report highlights the important environmental legal considering during the S&EIA process.

3.1 THE NATIONAL ENVIRONMENT MANAGEMENT ACT, 1998 (ACT NO 107 OF 1998)

Section 2 of the National Environment Management Act, 1998 (NEMA) as amended, lists environmental principles that are to be applied by all organs of state regarding developments that may significantly affect the environment. Included amongst the key principles is the principle that all developments must be socially, economically and environmentally sustainable, and environmental management must place people and their needs at the forefront of its concern, to serve their physical, psychological, developmental, cultural and social interests equitably.

NEMA, as amended, also provides for the participation of potential and registered I&APs and it stipulates that decisions must take the interests, needs and values of all I&APs into account.

Chapter 5 of NEMA, as amended, outlines the general objectives and implementation of Integrated Environmental Management (IEM), the latter providing a framework for the integration of environmental issues into the planning, design, decision-making and implementation of plans and development proposals. Section 24 provides a framework for the granting of EAs.

To give effect to the general objectives of IEM, the potential impacts on the environment of listed activities must be considered, investigated, assessed and reported to the competent authority. Section 24(4) outlines the minimum requirements for procedures for the investigation, assessment and communication of the potential impact of activities.

3.2 ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REGULATIONS, 2014 AS AMENDED

The EIA Regulations 2014 as amended by GNR 326 of 2017 provide for the control of certain Listed Activities. These activities are listed in Government Notice No. R327 (Listing Notice 1 – Basic Assessment), R325 (Listing Notice 2 – Scoping & EIA Process) and R324 (Listing Notice 3 – Basic Assessment) of 7 April 2017, and are prohibited to commence until EA has been obtained from the competent authority, in this case, the Department of Forestry and Fisheries (DFFE).

The DFFE is the competent authority for all renewable energy proposals which will be bid into the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), as NEMA, as amended, states that:

"24C. (2) The Minister must be identified as the competent authority in terms of subsection (1) if the activity- (a) has implications for international environmental commitments or Relations"

EA, which may be granted subject to conditions, will only be considered upon compliance with GNR982, as amended by GNR326 of 7 April 2017.

Any EA obtained from the DFFE applies only to those specific listed activities for which the application was made. To ensure that all Listed Activities that could potentially be applicable to this proposal are covered by the EA, a precautionary approach is followed when identifying listed activities, that is, if an activity could potentially be part of the proposed development, it is listed.

The Listed Activities applicable to this proposed project are presented in Table 3-1 below. All potential impacts associated with these Listed Activities will be considered and adequately assessed in this authorisation process.

TABLE 3-1 NEMA LISTED ACTIVITIES APPLICABLE TO THE EMVELO WEF

Activity No(s):	**Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended in 2017.**	**Describe the portion of the proposed project to which the applicable listed activity relates.**
Listing Notice 1 GN R 327 Activity 11	*The development of facilities or infrastructure for the transmission and distribution of electricity—* *(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.*	The WEF facility will include the construction of one onsite 132 kV substation (i.e. the "IPP substation"), outside of an urban area or industrial complex. The Eskom Grid infrastructure will include the construction of an on site 132kV Eskom Switching station (adjacent to the IPP substation) and a 132 kV overhead transmission powerline to facilitate the connection between the WEF and the national grid. The facility will be constructed across various farm portions outside urban areas.
Listing Notice 1 GN R 327 Activity 12	*The development of—* *(ii) infrastructure or structures with a physical footprint of 100 square metres or more;* *where such development occurs—* *(a) within a watercourse;* *(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;*	The facility will entail the construction of built infrastructure and structures (such as wind turbines, hardstands, offices, workshops, O&M buildings, ablution facilities, onsite substations, laydown areas and security enclosures etc.). The infrastructure and structures are expected to exceed a footprint of 100 m^2 and some may occur within small drainage features and 32 m of the watercourses.
Listing Notice 1 GN R 327 Activity 14	*The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic meters or more but not exceeding 500 cubic meters.*	Construction of the facility will require dangerous goods in the form of hydrocarbon fuels (e.g., diesel), paints and solvents, oils and greases. Sewage and waste streams will be generated by the WEF. During construction of the WEF, the combined capacity of dangerous goods on site will exceed 80 m^3. The proposed on-site substation is likely to require the use of transformer oils/other hazardous substances during the operational phase.
Listing Notice 1 GN R 327 Activity 19	*The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells,*	The facility will entail the excavation, removal and moving of more than 10 m^3 of soil, sand, pebbles, or rock from nearby watercourses on site, mainly for

Activity No(s):	**Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended in 2017.**	**Describe the portion of the proposed project to which the applicable listed activity relates.**
	shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;	the purpose of constructing access roads.
Listing Notice 1 GN R 327 Activity 24	*The development of a road—* *(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;*	Roads with a reserve wider than 13.5 meters are proposed for the facility. As required by Eskom, a service and maintenance road of 8m wide is required to be constructed underneath the OHPL, for construction and maintenance purposes. Where roads are constructed along slopes, extensive cut and fill areas may be required extending the footprint well beyond the 13.5m width and up to 50m in some areas.
Listing Notice 1 GN R 327 Activity 28	*Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:* *(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.*	The facility will take place outside of an urban area and across several adjoining farm portions and will have an estimated total development footprint of more than 20 ha.
Listing Notice 1 GN R 327 Activity 48	*The expansion of* *(i) infrastructure or structures where the physical footprint is expanded by 100 square metre or more,* *Where such expansion occurs within a watercourse; and* *(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.*	The facility will require the upgrading of existing roads within the project area, as well as watercourse crossing upgrades, where such upgrades may take place within watercourses and within 32 m from the edge of these watercourses. The total footprint of the upgrades to be undertaken on the existing roads would be more than 100 m^2 within a watercourse, or within 32 m of a watercourse.
Listing Notice 1 GN R 327 Activity 56	*The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre-* *(ii) where no reserve exists, where the existing road is wider than 8 metres;*	Existing farm access roads will be widened or lengthened. These roads would currently have no road reserve and will be wider than 8 meters in some areas during construction phase of the development. Where roads are constructed along slopes, extensive cut and fill areas may be required extending the footprint well beyond the 13.5m width and up to 50m in some areas
Listing Notice 2 GN R 325 Activity 1	*The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more*	The WEF will have a total generation capacity output of more than 20 MW. The facility is not situated within a REDZ or a strategic power corridor. A full S&EIA process will be undertaken.

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended in 2017.	Describe the portion of the proposed project to which the applicable listed activity relates.
Listing Notice 2 GN R 325 Activity 15	*The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for- the undertaking of a linear activity; maintenance purposes undertaken in accordance with a maintenance management plan.*	The total development footprint of the facility is expected to be more than 20 ha. As a result, more than 20 ha of indigenous vegetation may be removed for the construction of the proposed projects.
Listing Notice 3 GN R 324 Activity 4	*The development of a road wider than 4 metres with a reserve less than 13,5 metres.* *f. Mpumalanga* *i. Outside urban areas:* *(bb) National Protected Area Expansion Strategy Focus areas;* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;*	Roads with a reserve wider than 4 meters are proposed for the facility. As required by Eskom, a service and maintenance road of 8m wide is required to be constructed underneath the OHL, for construction and maintenance purposes.
Listing Notice 3 GN R 324 Activity 10	*The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres.* *f. Mpumalanga* *i. Outside urban areas:* *(bb) National Protected Area Expansion Strategy Focus areas;* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;*	Construction of the facility will require dangerous goods in the form of hydrocarbon fuels (e.g., diesel), paints and solvents, oils and greases. Sewage and waste streams will be generated by the WEF. During construction of the WEF, the combined capacity of dangerous goods on site will not exceed 80 m^3. The proposed on-site substation is likely to require the use of transformer oils/other hazardous substances during the operational phase.
Listing Notice 3 GN R324 Activity 12	*The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.* *f. Mpumalanga* *ii. Within critical biodiversity areas identified in bioregional plans;*	The facility will require the clearance of natural vegetation in excess of 300 m^2 in areas of natural vegetation. A portion of the respective facility is located within a Critical Biodiversity area identified in bioregional plans in the Mpumalanga Province.
Listing Notice 3 GN R324 Activity 14	*The development of—* *(ii) infrastructure or structures with a physical footprint of 10 square metres or more;* *f. Mpumalanga* *i. Outside urban areas:* *(bb) National Protected Area Expansion Strategy Focus areas;*	The facility will likely entail the development of infrastructure with physical footprints of 10m^2 or more within a watercourse / surface water feature or within 32m from the edge of a watercourse / surface water feature. Although the layout will be designed to avoid the identified surface water features / watercourse as far as

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended in 2017.	Describe the portion of the proposed project to which the applicable listed activity relates.
	(ff) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	possible, some of the infrastructure / structures will likely need to traverse the identified surface water features / watercourses. The construction of the infrastructure (MV caballing and roads) for the development will occur within Critical Biodiversity Areas (CBAs) located outside of urban areas.
Listing Notice 3 GN R324 Activity 18	*The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.* *f. Mpumalanga* *i. Outside urban areas:* *(bb) National Protected Area Expansion Strategy Focus areas;* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;*	Internal access roads will be required to access the wind turbines, as well as the respective substation. Existing roads will be used wherever possible. Some existing internal access roads will thus likely be widened by more than 4 m or lengthened by more than 1 km. These roads will occur within the Mpumalanga Province, outside urban areas.
Listing Notice 3 GN R324 Activity 23	*The expansion of—* *infrastructure or structures where the physical footprint is expanded by 10 square metres or more;* *where such expansion occurs—* *(a) within a watercourse;* *(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;* *f. Mpumalanga* *i. Outside urban areas:* *(bb) National Protected Area Expansion Strategy Focus areas;* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;*	The facility will likely entail the development and expansion of roads by $10m^2$ or more within a surface water feature / watercourse or within 32 m from the edge of a surface water feature / watercourse. Although the layout will be designed to avoid the identified surface water features / watercourses as far as possible, some of the existing internal and access roads may likely need to traverse some of the identified surface water features / watercourses. The proposed developments occur within CBAs, and are located outside urban areas.

3.3 THE NATIONAL HERITAGE RESOURCES ACT, 1999 (ACT NO 25 OF 1999 - NHRA)

Section 38 (1) of the National Heritage Resources Act, 1999 (NHRA) lists development activities that would require authorisation by the responsible heritage resources authority. Activities considered applicable to the proposed project include the following:

- "(a) The construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
- (c) any development or other activity which will change the character of a site; and

- (i) exceeding 5000 m² in extent."

The NHRA, 1999, requires that a person intending to undertake such an activity must notify the relevant national and provincial heritage authorities at the earliest stages of initiating such a development. The relevant heritage authority would then in turn, notify the person whether a Heritage Impact Assessment Report should be submitted. According to Section 38(8) of the NHRA, 1999, a separate report would not be necessary if an evaluation of the impact of such development on heritage resources is required in terms of the Environment Conservation Act, 1989 (No. 73 of 1989) (ECA) (now replaced by NEMA, Act 107 of 1998) or any other applicable legislation. The decision-making authority must ensure that the heritage evaluation fulfils the requirements of the NHRA, 1999, and take into account any comments and recommendations made by the relevant heritage resources authority.

The Heritage Impact Assessment, which forms part of this S&EIA process will be submitted to the South African Heritage Resources Authority (SAHRA) for comment.

In South Africa, the law is directed towards the protection of human-made heritage, although places and objects of scientific importance are covered. The NHRA, 1999, also protects intangible heritage such as traditional activities, oral histories and places where significant events happened. While not specifically mentioned in the NHRA, scenic routes are recognised as a category of heritage resources which requires grading as the Act protects area of aesthetic significance.

The heritage impact assessment reports will be submitted to the SAHRA for comment.

3.4 NATIONAL DEPARTMENT OF AGRICULTURE, LAND REFORM AND RURAL DEVELOPMENT (DALRRD)

A renewable energy facility requires approval from the National Department of Agriculture, Land Reform and Rural Development (DALRRD) if the facility is on agriculturally zoned land. A *No Objection Letter* for the change in land use is required. This letter is one of the requirements for receiving municipal rezoning. This application requires a motivation backed by good evidence that the development is acceptable in terms of its impact on the agricultural production potential of the development site.

3.4.1 SUBDIVISION OF AGRICULTURAL LAND ACT, 1970 (ACT NO. 70 OF 1970 - SALA)

In terms of the Subdivision of Agricultural Land Act, 1970, any application for change of land use must be approved by the Minister of Agriculture. This is a consent for long-term lease in terms of the SALA. If DALRRD approval for the development has already been obtained in the form of the No Objection letter, then SALA approval should not present any difficulties. Note that SALA approval is not required if the lease is over the entire farm portion. SALA approval (if required) can only be applied for once the Municipal Rezoning Certificate and EA has been obtained.

3.5 CONSERVATION OF AGRICULTURAL RESOURCES, 1983 (ACT NO. 43 OF 1983)

The Conservation of Agricultural Resources Act (CARA), 1983 states that no degradation of natural land is permitted. The Act requires the protection of land against soil erosion and the prevention of water logging and salinization of soils by means of suitable soil conservation works to be constructed and maintained. The utilisation of marshes, water sponges and watercourses are also addressed.

Rehabilitation after disturbance to agricultural land is managed by the CARA. A consent in terms of CARA is required for the cultivation of virgin land. Cultivation is defined in CARA as "any act by means of which the topsoil is disturbed mechanically". The purpose of this consent for the cultivation of virgin land is to ensure that only land that is suitable as arable land is cultivated. Therefore, despite the above definition of cultivation, disturbance to the topsoil that results from the construction of a renewable energy facility and its associated infrastructure does not constitute cultivation as it is understood in CARA. This has been corroborated by Anneliza Collett (Acting Scientific Manager: Natural Resources Inventories and Assessments in the Directorate: Land and Soil Management of the Department of Agriculture, Land Reform and Rural Development (DALRRD)). The construction and operation of the facility will therefore not require consent from the Department of Agriculture, Land Reform and Rural Development in terms of this provision of CARA.

3.6 National Veld and Forest Fire Act, 1998 (Act No. 101 of 1998)

The purpose of the National Veld and Forest Fire Act, as amended by the National Fire Laws Amendment Act (Act 12 of 2001), is to prevent and combat veld, forest and mountain fires throughout South Africa. The Act applies to the open countryside beyond the urban limit and puts in place a range of requirements. It also specifies the responsibilities of landowners. The term 'owners' includes lessees, people in control of land, the executive body of a community, the manager of State land, and the chief executive officer of any local authority. The requirements include, but are not limited to, the maintenance of firebreaks and availability of firefighting equipment to reasonably prevent the spread of fires to neighbouring properties.

3.6.1 The Environment Conservation Act, 1989 (Act No.73 of 1989), the National Noise Control Regulations: GN R154 of 1992

The Environment Conservation Act, 1989 (ECA) allows the Minister of Environmental Affairs and Tourism (now the "Minister of Forestry, Fisheries and the Environment") to make regulations regarding noise, amongst other concerns. The Minister has made noise control regulations under the ECA.

In terms of section 25 of the ECA, the national noise-control regulations (NCR) were promulgated (GN R154 in *Government Gazette* No. 13717 dated 10 January 1992). The NCRs were revised under Government Notice Number R. 55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations.

Subsequently, in terms of Schedule 5 of the Constitution of South Africa of 1996 legislative responsibility for administering the NCR was devolved to provincial and local authorities.

These regulations define "**disturbing noise**" as:

> *"Noise level which exceeds the zone sound level or, if no zone sound level has been designated, a noise level which exceeds the ambient sound level at the same measuring point by 7 dBA or more".*

These Regulations prohibits anyone from causing a disturbing noise as defined above. The Noise Assessment will take these Regulations into consideration when identifying and assessing the potential noise impacts associated with the proposed development.

3.7 NATIONAL ENVIRONMENTAL MANAGEMENT: AIR QUALITY ACT, 2004 (ACT NO. 39 OF 2004)

Section 34 of the Air Quality Act, 2004 (AQA) makes provision for:

1. The Minister to prescribe essential national noise standards –

   For the control of noise, either in general or by specified machinery or activities or in specified places or areas; or

   For determining –

   a definition of noise; and

   the maximum levels of noise.

2. When controlling noise, the provincial and local spheres of government are bound by any prescribed national standards.

This section of the Act is in force, but no such standards have yet been promulgated.

An atmospheric emission license issued in terms of Section 22 may contain conditions in respect of noise. This however will not be relevant to this proposed development.

3.7.1 NATIONAL DUST CONTROL REGULATIONS, 2013

The National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004), makes provision for national dust control regulations. These regulations prescribe dust fall standards for residential and non-residential areas. These Regulations also provide for dust monitoring, control and reporting.

The acceptable dust fall out rates are:

Restriction Area	Dust Fall (D) (mg/m²/day, 30-day average)	Permitted Frequency of exceedance
Residential	D<600	Two within a year, not sequential months
Non- Residential	600 <D< 1200	Two within a year, not sequential months

These rates are to be adhered to by the developer during the life of the project.

3.8 NATIONAL WATER ACT, 1998 (ACT NO. 36 OF 1998 - NWA)

The National Water Act, 1998 (NWA) provides for constitutional requirements including pollution prevention, ecological and resource conservation and sustainable utilisation. In terms of this Act, all water resources are the property of the State.

A water resource includes any watercourse, surface water, estuary or aquifer, and, where relevant, its bed and banks. A watercourse is interpreted as a river or spring; a natural channel in which water flows regularly or intermittently; a wetland lake or dam into which or from which water flows; and any collection of water that the Minister may declare to be a watercourse.

Relevant water uses for the proposed construction of the WEF which will require access roads over watercourses and drainage channels and boreholes for construction water, in terms of Section 21 of the Act include but are not limited to the following:

- Section 21 (a): Abstraction of water from boreholes and rivers or dams;
- Section 21 (c): Impeding or diverting the flow of water in a watercourse;
- Section 21 (i): Altering the bed, banks, course or characteristics of a watercourse; and
- Section 21 (g): Storage of domestic waste in conservancy tanks.

GN 1199 of 18 December 2009 allows for GA for the above water uses based on certain conditions. It also stipulates that these water uses must be registered with the responsible authority.

Pollution of river water is a contravention of the NWA. Chapter 3, Part 4 of the NWA deals with pollution prevention and in particular the situation where pollution of a water resource occurs or might occur as a result of activities on land. The person who owns, controls, occupies or uses the land in question is responsible for taking measures to prevent pollution of water resources.

Chapter 3, Part 5 of the NWA deals with pollution of water resources following an emergency incident, such as an accident involving the spilling of a harmful substance that finds or may find its way into a water resource. The responsibility for remedying the situation rests with the person responsible for the incident or the substance involved.

3.8.1 PERMIT REQUIREMENTS

A Water Use License Application (WULA) or a GA may be required. This will be determined by the Department of, Water and Sanitation (DWS) during the WULA pre-application process.

This process will run separate to this EA application process.

3.9 NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT, 2004 (ACT NO. 10 OF 2004 - NEMBA)

3.9.1 THREATENED OR PROTECTED SPECIES LIST, 2015

Amendments to the Threatened or Protected Species (TOPS) list were published on 31 March 2015 in Government Gazette No. 38600 and Notice 256 of 2015. Certain flora and fauna that occur on the site may be threatened or protected.

3.9.2 ALIEN AND INVASIVE SPECIES REGULATIONS, 2016

The Act and Regulations set out various degrees of Invasive Species (Plants, Insects, Birds, Animals, Fish and Water Plants) and requires that certain of those invasive species are documented and, in some cases, removed from properties in South Africa.

The Regulations list 4 categories of invasive species that must be managed, controlled or eradicated from areas where they may cause harm to the environment, or that are prohibited to be brought into South Africa. A Terrestrial Ecology Assessment will be conducted as part of this S&EIA process to identify as well as propose ways in which to manage alien invasive species found at the proposed site area.

3.10 THE NATURE AND ENVIRONMENTAL CONSERVATION ORDINANCE NO. 19 OF 1974

The Ordinance was developed to protect both animal and plant species within the various provinces of the country which warrant protection. These may be species which are under threat, or which are already considered to be endangered and species are listed in the relevant documents. Specialists Assessment will be conducted as part of this S&EIA process to identify threatened or endangered species or species or concern present on site. These assessments will also propose methods in which to mitigate the associated impacts on such species.

3.11 NATIONAL FORESTS ACT, 1998 (ACT NO. 84 OF 1998 - NFA)

This act lists protected tree species and prohibits certain activities. The prohibitions provide that *"no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister".* Any protected tree species recorded within the proposed site area shall be managed in accordance with the NFA relevant.

3.12 ASTRONOMY GEOGRAPHIC ADVANTAGE ACT, 2007 (ACT. 21 OF 2007)

The Act provides for the preservation and protection of areas within the Republic that are uniquely suited for optical and radio astronomy. The Square Kilometer Array radio telescope is located in the declared Karoo Central Advantage Array and as such it is protected against harmful interference from wireless communication and electromagnetic emissions from electrical equipment. According to the DFFE Screening Tool, there were no Weather Radar installations within a 60km radius.

3.13 NATIONAL ROAD TRAFFIC ACT, 1996 (ACT NO. 93 OF 1996) (NRTA)

The technical recommendations for highways (TRH 11): *"Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads"* outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed.

Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts.

The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.

The South African National Roads Authority (SANRAL) and the Provincial Department of Transport would act as a Competent/Commenting Authority as a result of the proposed road infrastructure associated with the Emvelo WEF.

3.14 CIVIL AVIATION ACT, 2009 (ACT NO. 13 OF 2009) (CAA)

The Civil Aviation Act, 2009 (Act No. 13 of 2009) (CAA), governs civil aviation in the Republic. The Act provides for the establishment of a stand-alone authority mandated with the controlling, promoting, regulating, supporting, developing, enforcing and continuously improving levels of safety and security throughout the civil aviation industry. This mandate is fulfilled by the South African Civil Aviation Authority (SACAA), an agency of the Department of Transport (DoT).

The SACAA achieves the objectives of the Act by complying with the Standard and Recommended Practices (SARPs) of the International Civil Aviation Organisation (ICAO), while considering the local context when issuing the South African Civil Aviation Regulations (SA CARs). All proposed developments or activities in South Africa that potentially could affect civil aviation (such as Wind Farms) must be assessed by SACCAA in terms of the CARs and the South African Civil Aviation Technical Standards (SA CATs), in order to ensure civil aviation safety.

The SACAA and Air Traffic Navigation Services (ATNS) has been included as a stakeholder and will continue to be provided with an opportunity to comment on the application during the public participation process.

3.15 PROMOTION OF ACCESS TO INFORMATION ACT, 2000 (ACT NO. 2 OF 2002) (PAIA)

The PAIA gives effect to the constitutional right of access to any information held by the state and any information that is held by another person and that is required for the exercise or protection of any rights; and to provide for matters connected therewith. The PAIA will be adhered to during all stakeholder engagement activities undertaken as part of this S&EIA process.

3.16 NATIONAL ENVIRONMENTAL MANAGEMENT ACT: NATIONAL APPEALS REGULATIONS, 2014

The purpose of these regulations is to regulate the procedure contemplated in section 43(4) of the National environmental management act relating to the submission, processing and consideration of a decision on an appeal. This Act is used to help guide and understand the appeal process and the procedures may follow.

3.17 ADDITIONAL RELEVANT LEGISLATION

The applicant must also comply with the provisions of other relevant national legislation. Additional relevant legislation that has informed the scope and content of this S&EIA Report includes the following:

- Constitution of the Republic of South Africa, 1996 (Act No. 108, 1996);
- Aviation Act, 1962 (Act No. 74, 1962);
- National Environmental Management: Waste Act, 2008 (Act No. 59, 2008);
- National Environmental Management: Protected Areas Act, 2003 (Act No. 57, 2003);
- National Roads Act, 1998 (Act No. 7, 1998)
- Occupational Health and Safety Act, 1993 (Act No. 85 of 1993);
- National Veld and Forest Fire Bill of 10 July 1998;

- Fertiliser, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947;
- Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002);
- Independent Communications Authority of South Africa Act, 2000 (Act No. 13 of 2000; as amended); and
- Screening Report referred to in Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended.

3.18 CONVENTIONS AND TREATIES

3.18.1 THE PARIS AGREEMENT (2016)

South Africa is one of 195 countries that are signatory to The Paris Agreement. The Paris Agreement is a legally binding instrument within the United Nations Framework Convention on Climate Change (UNFCCC) that provides guidance for action on climate change, focusing on sustainable development and poverty eradication. It sets the goal of preventing increase in global average temperature to below 2 degrees Celsius and pursuing efforts to limit global temperature increase to 1.5 degrees Celsius. Previous Minister of the DFFE, Ms Edna Molewa, signed the Paris Agreement on Climate Change on behalf of South Africa on 22 April 2016.[5]

The proposed WEF fits the emission reduction targets of the Paris Agreement and its aim of sustainable development.

3.19 THE CONVENTION ON BIOLOGICAL DIVERSITY (CBD) (1993)

This is a multilateral treaty for the international conservation of biodiversity, the sustainable use of its components and fair and equitable sharing of benefits arising from natural resources. Signatories have the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction. South Africa became a signatory to the CBD in 1993, which was ratified in 1995.

The convention prescribes that signatories identify components of biological diversity important for conservation and monitor these components in light of any activities that have been identified which are likely to have adverse impacts on biodiversity. The CBD is based on the precautionary principle which states that where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimise such a threat and that in the absence of scientific consensus the burden of proof that the action or policy is not harmful falls on those proposing or taking the action.

3.19.1 THE RAMSAR CONVENTION (1971)

The Convention on Wetlands, called the Ramsar Convention, as it was adopted in the Iranian city of Ramsar in 1971 and came into force in 1975, is an intergovernmental treaty that provides the framework for the conservation and wise use of wetlands and their resources. Under the three pillars of the convention the Contracting Parties commit to work towards the wise use of

[5] https://www.environment.gov.za/mediarelease/southafrica_ratifies_parisagreement (accessed on 24 January 2019).

all their wetlands through national plans, policies and legislation, management actions and public education; designate suitable wetlands for their list of Wetlands of International Importance (the "Ramsar List") and ensure their effective management; and Cooperate internationally on transboundary wetlands, shared wetland systems, shared species, and development projects that may affect wetlands.

3.19.2 THE CONVENTION ON THE CONSERVATION OF MIGRATORY SPECIES OF WILD ANIMALS (CMS OR BONN CONVENTION) (1983)

An intergovernmental treaty, concluded under the sponsorship of the United Nations Environment Programme, concerned with the conservation of wildlife and habitats on a global scale. The fundamental principles listed in Article II of this treaty state that signatories acknowledge the importance of migratory species being conserved and agree to take action to this end "*whenever possible and appropriate*", "*paying special attention to migratory species the conservation status of which is unfavourable and taking individually or in cooperation appropriate and necessary steps to conserve such species and their habitat*".

3.19.3 THE AGREEMENT ON THE CONSERVATION OF AFRICAN-EURASIAN MIGRATORY WATERBIRDS (AEWA) (1999)

An intergovernmental treaty developed under the framework of the Convention on Migratory Species (CMS), concerned with the coordinated conservation and management of migratory waterbirds throughout their entire migratory range. Signatories of the Agreement have expressed their commitment to work towards the conservation and sustainable management of migratory waterbirds, paying special attention to endangered species as well as to those with an unfavourable conservation status. The assessment of the ecology and identification of sites and habitats for migratory waterbirds is required to coordinate efforts that ensure that networks of suitable habitats are maintained and investigate problems likely posed by human activities.

3.20 NATIONAL CLIMATE CHANGE RESPONSE WHITE PAPER (2011)

Climate change is already a measurable reality and along with other developing countries, South Africa is especially vulnerable to its impacts. This White Paper presents the South African Government's vision for an effective climate change response and the long-term, just transition to a climate-resilient and lower-carbon economy and society. South Africa's response to climate change has two objectives:

- Effectively manage inevitable climate change impacts through interventions that build and sustain South Africa's social, economic and environmental resilience and emergency response capacity.
- Make a fair contribution to the global effort to stabilise greenhouse gas (GHG) concentrations in the atmosphere at a level that avoids dangerous anthropogenic interference with the climate system within a timeframe that enables economic, social and environmental development to proceed in a sustainable manner.

3.21 POLICIES AND GUIDELINES

3.21.1 ENVIRONMENTAL IMPACT ASSESSMENT GUIDELINES

Relevant guidelines and policies as applicable to the management of the S&EIA process and to this application have also been taken into account, as indicated below:

- IEM Guideline Series (Series 3): Stakeholder engagement (2002);
- IEM Guideline Series (Series 4): Specialist studies (2002);
- IEM Guideline Series (Series 5): Impact Significance (2002);
- IEM Guideline Series (Guideline 5): Companion to the EIA Regulations 2010 (October 2012);
- IEM Guideline Series (Series 7): Cumulative Effects Assessment (2002);
- IEM Guideline Series (Guideline 7): Public Participation in the EIA process (October 2012);
- IEM Guideline Series (Series 7): Alternatives in the EIA process (2002);
- IEM Guideline Series (Guideline 9): Draft guideline on need and desirability in terms of the EIA Regulations 2010 (October 2012);
- DEA (2017) Guideline on Need and Desirability, Department of Environmental Affairs (DEA) Pretoria, South Africa (2017);
- IEM Guideline Series (Series 12): Environmental Management Plans (EMP) (2002); and
- IEM Guideline Series (Series 15): Environmental impact reporting (2002).

3.21.2 THE EQUATOR PRINCIPLES (EPS) 4, 2020

The principles applicable to the project are likely to include:

- Principle 2: Environmental and Social Assessment;
- Principle 3: Applicable Environmental and Social Standards;
- Principle 4: Environmental and Social Management System and Equator Principles Action Plan;
- Principle 5: Stakeholder Engagement;
- Principle 6: Grievance Mechanism;
- Principle 7: Independent Review;
- Principle 8: Covenants;
- Principle 9: Independent Monitoring and Reporting; and
- Principle 10: Reporting and Transparency.

These principles, among various requirements, include a requirement for an assessment process and an Environmental and Social Management Plan (ESMP) to be prepared by the client to address issues raised in the assessment process and incorporate actions required to comply with the applicable standards, and the appointment of an independent environmental expert to verify monitoring information.

3.21.3 SOUTH AFRICAN WIND ENERGY FACILITY GUIDELINES

The following guidelines are relevant to the proposed WEF and the potential impacts they may have on bats/avifauna and habitat that support bats/avifauna:

- South African Best Practice Guidelines for Pre-Construction Monitoring of Bats at Wind Energy Facilities. 5th Edition. 2020;
- South African Best Practice Guidelines for Operational Monitoring of Bats at Wind Energy Facilities. 5th Edition. 2020;
- South African Bat Fatality Threshold Guidelines. Edition 2. 2018;
- The Species Environmental Assessment Guideline (SANBI, 2020);

- Best-Practice Guidelines for assessing and monitoring the impact of wind-energy facilities on birds in southern Africa. Third Edition, 2015;
- Best Practice Guidelines for Verreaux's Eagle and Wind Energy (BirdLife South Africa, 2017), and the more recent draft update of these: Verreaux's Eagles and Wind Farms (BirdLife South Africa, 2021);
- The Southern African Bird Atlas Project 2 data, available at the pentad level (http://sabap2.adu.org.za/v1/index.php) (accessed at www.mybirdpatch.adu.org.za);
- IUCN 2021. The IUCN List of Threatened Species. 2021 - 3. http://www.iucnredlist.org/;
- Wind Energy Impacts on Birds in South Africa: A Preliminary review of the results of operational monitoring at the first wind farms of the Renewable Energy Independent Power Producer Procurement Programme in South Africa. BLSA. Occasional Report Series: 2;
- On a collision course: the large diversity of birds killed by wind farms in South Africa (Perold et al. 2020);
- Birds & Renewable Energy. Update for 2019. BirdLife South Africa. Birds and Renewable Energy Forum, 10 October 2019; and
- Avian Wind Farm Sensitivity Map. Birdlife South Africa. http://www.birdlife.org.za/conservation/birds-and-wind-energy/windmap.

3.21.4 INTERNATIONAL FINANCE CORPORATION (IFC) PERFORMANCE STANDARDS

The IFC's Performance Standards on Social and Environmental Sustainability (Referred to as Performance Standards hereinafter) is an environmental and social risk management tool provided by the IFC for its investment and financing clients, and is also one of the major applicable standards of the Equator Principles. As the global influence of the Equator Principles has continued to rise, more and more Equator Principles Financial Institutions (EPFI) have been applying the Performance Standards in their assessments of environmental and social impacts. Under this backdrop, the Performance Standards have become the world's leading system and tool for environmental and social risk management.

The IFC Performance Standards encompass eight topics as described in Table 3-2 below. Given that South Africa has a complex and well-balance environmental regulatory system, the IFC Performance Standards are wholly addressed in the NEMA, 1998, as amended, framework.

For reference purposes the Project Applicant, will be referred to as the 'Borrower' in Table 3-2. The project will not have adverse impacts on PS5: Land Acquisition and Involuntary Resettlement and PS7: Indigenous Peoples as there is no displacement or resettlement, and none such indigenous people are found in the proposed development area of influence.

TABLE 3-2 DESCRIPTION OF THE IFC PERFORMANCE STANDARDS

PS Description	Project Applicability
Performance Standard 1: Assessment and Management of Environmental and Social (E&S) Risks and Impacts **Objective:** Underscores the importance of identifying E&S risks and impacts and managing E&S performance throughout the life of a project.	

PS Description	Project Applicability
Borrowers are required to manage the environmental and social performance of their business activity, which should also involve communication between the Borrower/Investee, its workers and the local communities directly affected by the business activity. This requires the development of a good management system, appropriate to the size and nature of the business activity, to promote sound and sustainable environmental and social performance as well as lead to improved financial outcomes.	Section 2 of Chapter 1 of the NEMA, as amended, provides details of the environmental management principles that should be adhered to during the entire project life. Chapter 6 of the NEMA EIA Regulations, 2014 (as amended) outlines the requirements for Public Participation in respect of a project. This document represents the S&EIA process (equitable to an ESIA) undertaken for the proposed development, and comprehensively assesses the key environmental and social impacts and complies with the requirements of the NEMA EIA Regulations, 2014 (as amended). The proposed development will be managed in terms of environmental and social impacts through an approved Environmental Management Programme (EMPr) which is drafted as part of the EIA process. The following have been included as part of this Assessment: • Description of relevant Policy; • Identification of Risks and Impacts; • EMPr (included in the EIA phase); • Requirements for Monitoring and Review; • Stakeholder Engagement as part of PPP; • External Communication and Grievance Mechanism; and • Recommendation for ongoing Reporting to Affected Communities.
Performance Standard 2: Labour and Working Conditions **Objective:** Recognizes that the pursuit of economic growth through employment creation and income generation should be balanced with protection of basic rights for workers.	
For any business, its workforce is a valuable asset and a sound worker-management relationship is a key component of the overall success of the enterprise. By protecting the basic rights of workers, treating workers fairly and providing them with safe and healthy working conditions, Borrowers can enhance the efficiency and productivity of their operations and strengthen worker commitment and retention.	Whilst PS 2 is applicable to the proposed development, it will not be addressed in detail in this report as Labour and Working conditions are typically addressed prior to construction, once EA has been awarded. Recommendations are provided regarding development of a detailed Human Resources (HR) and Occupational Health and Safety (OHS) system by the Applicant. In terms of the proposed development, construction will require the appointment of an EPC contractor (and others) for completion. Appointment of contactors and employees will be 'fair and equal', and workers will be provided with a safe, healthy and inclusive work environment. The EMPr will incorporate the requirements for compliance with local and international Labour and Working legislation and good practice on the part of the contractors.
Performance Standard 3: Resource Efficiency and Pollution Prevention **Objective:** Recognizes that increased industrial activity and urbanization often generate higher levels of air, water and land pollution, and that there are efficiency opportunities.	
Increased industrial activity and urbanization often generate increased levels of pollution to air, water and land that may threaten people and the environment at the local, regional and global level. Borrowers are required to integrate pollution prevention and control technologies and practices (as technically and financially feasible as well as cost-effective) into their business activities.	The Project is not likely to have many large-scale and long-term impacts related to pollution. Measures to address air, water and land pollution will be contained in the EMPr. There are no material resource efficiency issues associated with the proposed development and the EMPr will include general resource efficiency measures. The project is not greenhouse gas (GHG) emissions intensive and the detailed assessment and reporting of emissions is not required. This project, however, seeks to facilitate resource efficiency and pollution prevention by contributing to the South African green economy. The project will not release industrial effluents and waste generation will be managed according to the EMPr. Hazardous materials are not a key issue; small quantities of construction

PS Description	Project Applicability
	materials (oil, grease, diesel fuel etc.) are the only wastes expected to be associated with the project. Land contamination of the site from previous land use is not a concern as the project area is mostly an agricultural area where low intensity agriculture / grazing is practiced.
Performance Standard 4: Community Health, Safety, and Security **Objective:** Recognizes that projects can bring benefits to communities but can also increase potential exposure to risks and impacts from incidents, structural failures, and hazardous materials.	
Business activities can increase the potential for community exposure to risks and impacts arising from equipment accidents, structural failures and releases of hazardous materials as well as impacts on a community's natural resources, exposure to diseases and the use of security personnel. Borrowers are responsible for avoiding or minimizing the risks and impacts to community health, safety and security that may arise from their business activities.	The requirements for PS 4 have been addressed in this report and will be managed in accordance with the EMPr. It is understood that the project infrastructure and equipment will be designed to good industry standards to minimise risks to communities, however a community health and safety plan should be compiled by the Applicant prior to construction to meet the requirements of IFC Performance Standard 4 (Community Health, Safety and Security). To ensure compliance with PS 4, Applicant will need to evaluate the risks and impacts to the health and safety of the affected community during the design, construction and operation of the proposed development and establish preventive measures to address them in a manner commensurate with the identified risks and impacts as contained in this report. Such measures need to adhere to the precautionary principle for the prevention or avoidance of risks and impacts over minimization and reduction.
Performance Standard 5: Land Acquisition and Involuntary Resettlement **Objective:** Applies to physical or economic displacement resulting from land transactions such as expropriation or negotiated settlements.	
Land acquisition due to the business activities of a Borrowers may result in the physical displacement (relocation or loss of shelter) and economic displacement (loss of access to resources necessary for income generation or as means of livelihood) of individuals or communities. Involuntary resettlement occurs when affected individuals or communities do not have the right to refuse land acquisition and are displaced, which may result in long-term hardship and impoverishment as well as environmental damage and social stress. Borrowers are required to avoid physical or economic displacement or minimize impacts on displaced individuals or communities through appropriate measures such as fair compensation and improving livelihoods and living conditions.	Not Applicable
Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	

PS Description	Project Applicability
Objective: Promotes the protection of biodiversity and the sustainable management and use of natural resources.	
Protecting and conserving biodiversity (including genetic, species and ecosystem diversity) and its ability to change and evolve, is fundamental to sustainable development. Borrowers are required to avoid or mitigate threats to biodiversity arising from their business activities and to promote the use of renewable natural resources in their operations.	In terms of protecting and conserving biodiversity, specialists have assessed the impacts of the proposed development within the area of influence and will recommend measures to prevent/avoid/mitigate these potential impacts during the EIA phase. Specialist methods include a combination of literature review, stakeholder engagement and consultation, and in-field surveys. This complies with the PS 6 general requirements for scoping and baseline assessment for determination of biodiversity and ecosystem services issues. The determination of habitat sensitivity was undertaken within the legal and best practice reference framework for South Africa.
Performance Standard 7: Indigenous Peoples Objective: Aims to ensure that the development process fosters full respect for Indigenous Peoples.	
Indigenous Peoples are recognized as social groups with identities that are distinct from other groups in national societies and are often among the marginalized and vulnerable. Their economic, social and legal status may limit their capacity to defend their interests and rights to lands and natural and cultural resources. Borrowers are required to ensure that their business activities respect the identity, culture and natural resource-based livelihoods of Indigenous Peoples and reduce exposure to impoverishment and disease.	Not Applicable. As per the international instruments under the United Nations (UN) Human Rights Conventions, no indigenous peoples are living within the study area. The Project does not involve displacement.
Performance Standard 8: Cultural Heritage **Objective:** Aims to protect cultural heritage from adverse impacts of project activities and support its preservation.	
Aims to protect cultural heritage from adverse impacts of project activities and support its preservation.	A cultural heritage impact assessment and paleontological impact assessment has been undertaken for the proposed development. Consultation will also take with the SAHRA.

4. METHODOLOGY

The EIA process formally commenced with notifying the CA, in this case the DFFE, of the proposed development through the submission of an application form. The EAP, along with the team of technical specialists, commenced the scoping phase to make informed decisions of the appropriate "scope" of the EIA process. The existing environmental baseline of the site proposed for development is established during this phase through a desktop assessment and site visits. The type of development is considered and its anticipated impacts on the existing environment informs the specialists' studies to be undertaken. The methodology of how these impacts should be assessed within the EIA phase is also determined. The EIA Phase must be undertaken in line with the approved PSEIA. The environmental impacts, mitigation and closure outcomes as well as the residual risks of the proposed activity must be set out in the EIA report.

A Draft Scoping Report (DSR) (ERM, September 2024) for the proposed development was made available for public and stakeholder comment for a prescribed 30-day consultation period. All comments received in response to the DSR were considered and as appropriate, incorporated into the FSR and Plan of Study for EIA (PSEIA). The FSR and PSEIA (ERM, October 2024) were then submitted to the DFFE for approval. Interested and Affected Parties (I&APs) were able to review FSR and PSEIA as submitted to the DFFE.

The FSR presented and assessed the initial proposed wind turbine layout and associated infrastructures of the Emvelo WEF and its associated infrastructure. In November 2024, the DFFE accepted the FSR. The results of the specialists' scoping assessments, DFFE comments on the FSR, and other technical and financial constraints for the proposed development site were taken into consideration and a revised preferred layout was produced.

This EIA report presents and assesses a revised mitigated layout for the proposed development and will be made available for a prescribed 30-day consultation period. Any comments received will be considered and incorporated as applicable into a Final EIA report. Once a Final EIA report has been submitted, the DFFE will make a decision within 57 days (Strategic Integrated Project) on whether to grant or refuse EA. I&APs will be notified of the availability of the Final EIA report for their review as per the FSR.

4.1 DFFE ENVIRONMENTAL SCREENING TOOL

In terms of GN R960 (promulgated on 5 July 2019) and Regulation 16 (1)(b)(v) of the EIA Regulations, 2014 (as amended), the submission of a Screening Report generated from the national web based environmental screening tool is compulsory for the submission of BA and EIA applications in terms of Regulation 19 and 21 of EIA Regulations, 2014 (as amended). The Screening Report generated for the proposed development is included in Volume II of this Report.

The screening report was generated based on the selected classification, i.e., Utilities Infrastructure / Electricity / Generation / Renewable / Wind. The screening report generated identified any two approved Renewable Energy Facilities within 35 km of the Mulilo WEF Cluster based on the data using the REEA_OR_2024_Q3. None of these have been constructed to date, and each of the planned projects will still be subject to a bidding process where only the most competitive projects will obtain a power purchase agreement required for the project to proceed to construction.

Based on the selected classification to produce the screening tool report, and the environmental sensitivities of the development footprint, the screening report generates a list of specialist assessments identified for inclusion in the assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study.

Table 4-1 provides a summary of the specialist assessments identified by the screening tool reports, and the response to each assessment in terms of the proposed development, based specialist site sensitivity verifications. Specialist assessments undertaken (Volume II) have considered the results of the DFFE Screening Tool in their terms of reference.

TABLE 4-1 SPECIALIST ASSESSMENTS IDENTIFIED IN TERMS OF THE NATIONAL WEB-BASED SCREENING TOOL FOR THE PROPOSED EMVELO WEF

Identified Specialist Assessment	Assessment Protocol	Identified Sensitivity	
		By DFFE Screening Report	**By Specialist / EAP**
Agriculture Theme	Protocol for the Specialist Assessment and Minimum Report Content Requirements of Environmental Impacts on Agricultural Resources by Onshore Wind and/or Solar Photovoltaic Energy Generation Facilities where the Electricity Output is 20 MW or more, gazetted on 20 March 2020. This protocol replaces the requirements of Appendix 6 of the Environmental Impact Assessment Regulations.	Very High Sensitivity	Medium Sensitivity
	Comment: This site sensitivity verification verifies those parts of the site that are indicated as cropland as being of high agricultural sensitivity (or very high for irrigated cropland), and the rest of the site as being of medium agricultural sensitivity with a maximum land capability of 7.		
Aquatic Biodiversity Theme	Protocol for the Specialist Assessment and minimum report content requirements for Environmental Impacts on Aquatic Biodiversity, gazetted on 20 March 2020.	Very High Sensitivity	High Sensitivity
	Comment: Based on the DFFE Screening Tool, the WEF and Grid Connection falls within areas of very high sensitivity. The specialist agrees with the environmental sensitivities identified on site. However, disputes the exact extent of the systems, as the Screening Tool shows a catchment wide representation of the aquatic waterbodies that were rated as sensitive.		
Archaeological and Cultural Heritage Theme	Site Sensitivity Verification Requirements where a Specialist Assessment is required but no specific assessment protocol has been prescribed, gazetted on 20 March 2020.	Low Sensitivity	Low Sensitivity
	Comment: The screening report states that the affected area is of low significance. The specialist disagrees with this as there have been no previous surveys in the general area with which the screening tool can compare. The survey results indicate the area is of low, medium and high significance.		
Bat Impact Theme	Not Determined	High Sensitivity	High Sensitivity

Identified Specialist Assessment	Assessment Protocol	Identified Sensitivity	
		By DFFE Screening Report	**By Specialist / EAP**
	Comment: Based on current taxonomic information and field data, no threatened species were recorded or expected to occur on site. The acoustic monitoring results show that the median number of bat passes/hour per night at height (50 m and 90 m) would classify the PAOI as low sensitivity for Cape serotine and moderate to high sensitivity for Egyptian free-tailed bat depending on season. The outcome of the site sensitivity verification (SSV) is that the overall sensitivity of the site varies by bat species and season, linked to their relative activity levels. However, the two sensitivities are based on different data types. The Screening Tool is based on broad scale habitat data whereas the SSV is based on bat collision risk with wind turbines derived from activity data collected within the project boundary, and is therefore a better approximation of the project sensitivity because collision is the primary impact.		
Landscape / Visual Theme	Site Sensitivity Verification Requirements where a Specialist Assessment is required but no specific assessment protocol has been prescribed, gazetted on 20 March 2020.	Very High Sensitivity	Medium Sensitivity
	Comment: According to specialist report, the study area landscape is defined to be moderate to low due to the varied landscape.		
Plant Species Theme	Protocol for specialist assessment and minimum report content requirements for Environmental Impacts on Terrestrial Plant Species, gazetted on 20 March 2020.	Medium Sensitivity	Medium Sensitivity
	Comment: The Screening Tool indicated that the Plant Theme Sensitivity as being of medium sensitivity. However, the very nature of the original vegetation in this area (Moist Sandy Highveld Grassland) is low growing and visually uniform, which does not provide much visual screening. Although the grassland vegetation is not overly sensitive to the development it does not assist in reducing the visual expose of the turbines.		
Avian Impact Theme	Protocol for the specialist assessment and minimum report content requirements for the Environmental Impact Assessment Regulations. 2014 (GNR 326, 7 April 2017) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).	Low Sensitivity	High Sensitivity
	Comment: A High sensitivity classification for the WEF Project Site and the Grid Connection PAOI was confirmed during the on-site surveys. Several species of conservation concern were recorded on site with conservation status ranging from Vulnerable to Endangered.		

Identified Specialist Assessment	Assessment Protocol	Identified Sensitivity	
		By DFFE Screening Report	**By Specialist / EAP**
Civil Aviation Theme	Protocol for the specialist assessment and minimum report content requirements for Environmental Impacts on Civil Aviation Installations, gazetted on 20 March 2020.	Medium Sensitivity	Medium Sensitivity
	Comment: The Screening Tool Report indicated that there are Civil Aviation Installations within 5km of the proposed development. As such, the Civil Aviation Theme is allocated a High Sensitivity rating. The Civil Aviation Authority has requested that the Project Proponent applies or Obstacle approval by following the process outlined in their website. This will be done as required prior to the commencement of construction activities.		
Defence Theme	Protocol for the specialist assessment and minimum report content requirements for Environmental Impacts on Defence Installations, gazetted on 20 March 2020.	Low Sensitivity	Low Sensitivity
	Comment: Site verification confirms the low sensitivity. During the public consultation, the South African National Defence Force (SANDF) will be consulted by the EAP / Project Applicant to confirm that there will be no impact on the defence installation of the development area and immediate surrounds. A site sensitivity verification report will be produced by the EAP for inclusion as part of the EIA process.		
Animal Species Theme	Protocol for specialist assessment and minimum report content requirements for Environmental Impacts on Terrestrial Animal Species, gazetted on 20 March 2020.	High Sensitivity	High Sensitivity
	Comment: The screening tool indicated "High" sensitivity for the two faunal SCC species. Considering the known habitat preferences for the two SCC species, it is the opinion of the specialists that the project area ranges from Low to High sensitivity; several areas representative of important habitat are considered High sensitivity and should ideally be excluded within the development footprint, and/or a process of micro-siting would be required if development occurs in these areas. The nature of the site and its suitability as habitat for the two species is discussed in the remainder of the report. The High sensitive areas are indicated on a constraints map.		
Noise Theme	Protocol for specialist assessment and minimum report content requirements for Noise Impacts, gazetted on 20 March 2020.	Very High Sensitivity	Very High Sensitivity
	Comment:		

Identified Specialist Assessment	Assessment Protocol	Identified Sensitivity	
		By DFFE Screening Report	**By Specialist / EAP**
	There are permanent or temporary residential activities, and these locations are located within 2,000m from the area where wind turbines may be developed. These residential activities are considered to be noise-sensitive and the areas are considered to have a "Very High" sensitivity to noise.		
Flicker Theme	Site Sensitivity Verification requirements where a specialist assessment is required but no Specific Assessment Protocol has been prescribed, gazetted 20 March 2020.	Very High Sensitivity	Not Determined
	Comment: The analysis of potential shadow flicker impacts from the development on the visual receptors indicates that the impacts are expected to be minor. It is not expected that the zone of influence will extend further that 2 km Magnitude of Visual Impact from any of the turbines. The impacts beyond 1 km will be very low intensity. Also, shadow flicker is not expected to be a significant environmental impact for any extended period.		
Traffic Theme	Site Sensitivity Verification Requirements where a Specialist Assessment is required but no specific assessment protocol has been prescribed, gazetted on 20 March 2020.	Not Determined	Not Determined
	Comment: Traffic assessment was identified as a required specialist assessment, but no environmental sensitivity was determined by the screening report. A desk-based traffic assessment was undertaken for the proposed development. A site visit will be undertaken for the EIA phase.		
Geotechnical Theme	Site Sensitivity Verification Requirements where a Specialist Assessment is required but no specific assessment protocol has been prescribed, gazetted on 20 March 2020.	Not Determined	Not Determined
	Comment: Geotechnical assessment was identified as a required specialist assessment, but no environmental sensitivity was determined by the screening report. The EAP is of the opinion that a Geotechnical Assessment for the development can and will only be undertaken prior to the commencement of the construction phase. The EAP has not included this assessment as part of the application process.		
Terrestrial Biodiversity Theme	Protocol for the Specialist Assessment and minimum report content requirements for Environmental Impacts on Terrestrial Biodiversity, gazetted on 20 March 2020.	Very High Sensitivity	Medium Sensitivity
	Comment:		

Identified Specialist Assessment	Assessment Protocol	Identified Sensitivity	
		By DFFE Screening Report	**By Specialist / EAP**
	Preferred areas would be low aquatic and/or terrestrial sensitivity areas, followed by moderate sensitivity areas (where strategic footprints would need to follow a clear mitigation process and rationale.		
Paleontology Theme	Site Sensitivity Verification Requirements where a Specialist Assessment is required but no specific assessment protocol has been prescribed, gazetted on 20 March 2020.	Very High Sensitivity	Very High Sensitivity
	Comment: The area is of very high paleontological sensitivity. Dr Alan Smith undertook a desktop Paleontological Impact Assessment (PIA) for the proposed Emvelo WEF. While the paleontology is of very high sensitivity as it forms part of the Vryheid formation, very few significant vertebrate fossils have been found in it.		
RFI (Radio Frequency Interference) Theme	Site Sensitivity Verification Requirements where a Specialist Assessment is required but no specific assessment protocol has been prescribed, gazetted on 20 March 2020.	Very High Sensitivity	Not Determined
	Comment: The screening tool described the study area as very high Radio Frequency Interference Theme (RFI) sensitivity. The South African Radio Astronomy Observatory (SARAO) will be included as a registered I&AP as part of the EIA process. During the public consultation of the proposed development the network operators will be consulted to determine if the closest proposed turbine will be within range which will affect the distribution from the radar stations.		
Socio-Economic Theme	Site Sensitivity Verification Requirements where a Specialist Assessment is required but no specific assessment protocol has been prescribed, gazetted on 20 March 2020.	Not Determined	Not Determined
	Comment: Socio-economic assessment was identified as a required specialist assessment, but no environmental sensitivity was determined by the screening report. Following the scoping assessment and verification, it is recommended that a full Social Impact Assessment be undertaken by a social specialist.		

4.2 SPECIALIST METHODOLOGY

In order to evaluate the potential environmental impacts, information relating to the existing environmental conditions were collected through field and desktop research; this is known as the baseline. Climate change is expected to affect the proposed development site over the lifetime of the proposed development; however, the nature, scale and severity of climate change effects are uncertain. Given this uncertainty, the existing environment is assumed to remain constant throughout the lifetime of the proposed development, and forms the current and future baseline for the impact assessments.

4.2.1 SOIL, LAND USE AND AGRICULTURE POTENTIAL

The assessment was based on an on-site investigation of the soils and agricultural conditions conducted on 11 May 2023. It was also informed by existing climate, soil, and agricultural potential data for the site (see references). The aim of the on-site assessment was to:

- ground-truth cropland status;
- ground truth the land type soil data and achieve an understanding of the general range and distribution patterns of different soil conditions across the site;
- gain an understanding of overall agricultural production potential across the site.

Soils were assessed based on the investigation of existing soil exposures in combination with indications of the surface conditions and topography. Soils were classified according to the South African soil classification system (Soil Classification Working Group, 2018). An interview was also conducted with farmers on the site for information on farming practices.

This level of soil assessment is considered entirely adequate for an understanding of on-site soil potential for the purposes of a wind farm assessment. For this purpose, only an understanding of the general range and distribution patterns of different soil conditions across the site is required. A more detailed soil survey would be extremely time-consuming and impractical to conduct, given the very large assessment area, and would not provide any additional data that would add value to the assessment of the agricultural impact of the wind farm.

This is because a wind farm extends over a very large surface area. The layout design of a wind farm is complex and there are multiple interacting factors that determine the turbine locations that will ensure the viability of the wind farm. Each turbine influences the amount of wind that the other turbines receive. Therefore, the location of one turbine cannot simply be shifted without requiring other turbines to be shifted as well, to retain the viability of all the turbines. To shift turbines to account for variation in soil conditions would be extremely complex and would require a level of soil mapping detail across the whole wind farm area that would be practically impossible to achieve. Even with this level of detail, it is highly unlikely that it would have any influence on agricultural impact.

An assessment of soils and long-term agricultural potential is in no way affected by the season in which the assessment is made, and therefore the date on which this assessment was done has no bearing on its results.

4.2.2 FRESHWATER AND WETLANDS

This study followed the approaches of several national guidelines with regards to wetland assessment. These have been modified by the author, to provide a relevant mechanism of assessing the present state of the study systems, applicable to the specific environment and in a clear and objective manner, assess the potential impacts associated with the proposed development site based on information collected within the relevant farm portions of a number of years for this and other proposed projects.

Current water resource classification systems make use of the Hydrogeomorphic (HGM) approach, and for this reason, the National Wetland Classification System (NWCS) approach was used in this study. It is also important to understand wetland definition, means of assessing wetland conservation and importance as well as understanding the pertinent legislation with regards to protecting wetlands.

4.2.3 TERRESTRIAL BIODIVERSITY

The assessment approach includes the following, as well as in accordance with the respective terrestrial biodiversity and species reporting protocols:

- Undertake a comprehensive desktop study to identify potential risks for terrestrial biodiversity inclusive of the national screening tool, relevant regional biodiversity planning frameworks, any previous studies as well as interrogation of applicable databases.
- Undertake seasonal site visits including a preliminary site visit to inform layout design, specifically in terms of broader landscape processes, followed by a more comprehensive site visit in order to assess undertake seasonal sampling and potentially the specific layout options, depending on project timeline.
- Detailed reporting comprising of a Terrestrial Biodiversity and Aquatic Screening Report. The screening report addresses the following (in line with the gazetted Assessment Protocol requirements):
  - Indicate any assumptions made and gaps in available information. Assessment of all the vegetation types and habitat units within the relevant Regional Planning Frameworks.
  - A desktop-based species list (flora and fauna) highlighting any potential species of special concern categories (endemic, threatened, Red Data species and other protected species requiring permits for destruction/relocation and invasive/exotic weeds) that could be present. Indicate the need for any permitting/licensing or detailed studies that may be required.
  - Aquatic screening will serve to identify and preliminarily assess aquatic features and processes including watercourses and wetlands and recommend no-go areas associated with these features.
  - Description and assessment of the vegetation/habitat units and site sensitivities ranked into very high, high, medium, low, or very low classes based on potential sensitivity and conservation importance using a standardised methodology (desktop based).

- A site ecological sensitivity map, indicting the sensitivities as described above, inclusive of any aquatic features as far as possible using most recent available aerial photography. No site verification will be conducted.
- A map indicating any buffers to accommodate Regional Planning requirements (if required).
- Recommendations based on the findings of the assessment.

4.2.4 FAUNA

DESKTOP STUDY

- Distributional records for the invertebrate SCC were extracted from digitized databases of several South African museums (e.g., Iziko Museum of South Africa, Ditsong National Museum of Natural History, South African National Collections of Insects).
- For both faunal SCC, online resources, such as the IUCN Red List of Threatened Species (https://www.iucnredlist.org/), the Orthoptera Species File Online (http://orthoptera.speciesfile.org/HomePage/Orthoptera/HomePage.aspx), and iNaturalist (https://www.inaturalist.org/) were also consulted for information on geographic distributions and habitat requirements.
- Published information on the two faunal SCC were investigated to further assess their distribution range, ecology, habitat, and any life history requirements.
- Ecosystem-level data and broad-scale habitat was assessed using the following resources:
- Vegetation Map of South Africa (SANBI, 2018; Skowno et al., 2019).
- Mpumalanga Biodiversity Sector Plan (MBSP) terrestrial assessment (MTPA, 2014a, 2014b; Lötter, 2015).
- Ecosystem Threat Status and Protection level of South Africa's ecosystems (Skowno et al., 2019; South African National Biodiversity Institute and Department of Forestry, 2021).
- Land cover based habitat modification (Skowno, 2020).
- South Africa's Important Bird Areas (IBA) (Marnewick et al., 2015): IBAs are selected using the presence of globally threatened species, groups of species with a restricted range (<50 000 km^2), species assemblages confined to a single biome, and congregations of one or more species.

SITE VISIT

- The project area was surveyed on 9–11 May 2023 to assess habitat quality, in terms of the type and amount of natural vegetation remaining. The extent of disturbance that the project area has experienced, in terms of changes to its vegetation and physical properties (e.g. soil) was also considered.
- Season: Autumn.
- Areas at and around selected points on the track surveyed by the specialists were investigated across the project area and photographed.

- At each picture site the surrounding habitat was characterised and the likelihood of any of the SCC being present was assessed.
- Within the project area, visual searching from viewing points using binoculars was used to detect the mammal SCC.
- Seasonal Relevance:
  - For the katydid SCC summer is the most appropriate time for detection (SANBI, 2020).
  - Autumn is an appropriate time for field detection of the mammal SCC.
  - It must be noted that this scoping report focused primarily on surveying the state of the habitat quality at the project area and its connectivity to surrounding natural vegetation and to areas of known biodiversity and conservation importance. In addition, the project site sits in an area of historically high land use activity and falls outside of any protective area. Seasonality need only be considered for surveys of animal SCC species should the required habitat be present.

4.2.5 AVIFAUNA

The following methods and sources were used to compile this report:

- Bird distribution data of the SABAP2 was obtained from the University of Cape Town (https://sabap2.birdmap.africa/), to ascertain which species occur within the Broader Area i.e. within a block consisting of 12 pentads. A pentad grid cell covers 5 minutes of latitude by 5 minutes of longitude (5'× 5'). Each pentad is approximately 8 × 9 km. From 2007 to date, a total of 179 full protocol lists (i.e., surveys lasting a minimum of two hours each) have been completed for this area. In addition, 218 ad hoc protocol lists (i.e., surveys lasting less than two hours but still yielding valuable data) have been completed.
- The national threatened status of all priority species was determined with the use of the most recent edition of the Red Data Book of Birds of South Africa (Taylor et al. 2015), and the latest authoritative summary of southern African bird biology (Hockey et al. 2005).
- The global threatened status of all priority species was determined by consulting the (2022.2) IUCN Red List of Threatened Species (http://www.iucnredlist.org/).
- A classification of the vegetation in the WEF project site was obtained from the Atlas of Southern African Birds 1 (SABAP 1) (Harrison et al. 1997) and the National Vegetation Map (2018) from the South African National Biodiversity Institute website (Mucina & Rutherford 2006 & http://bgisviewer.sanbi.org).
- The Important Bird Areas of Southern Africa (Marnewick et al. 2015) was consulted for information on potentially relevant Important Bird Areas (IBAs).
- Satellite imagery (Google Earth ©2023) was used in order to view the Broader Area on a landscape level and to help identify sensitive bird habitat.
- Priority species for wind energy developments were identified from the most recent (November 2014) list of priority species for wind farms compiled for the Avian Wind Farm Sensitivity Map (Retief et al. 2012).

- The South African National Biodiversity BGIS map viewer was used to determine the locality of the proposed site relative to National Protected Areas.
- The DFFE National Screening Tool was used to determine the assigned avian sensitivity of the WEF and Grid project site.
- The primary source of information on avifaunal diversity, abundance and flight patterns at the site were the results of a pre-construction programme conducted over four seasons (2022–2023) at the proposed Mulilo WEF Cluster (Emvelo WEF and Sheepmoor WEF project sites), as well as extensive additional species specific vantage point monitoring and wetland surveys. The primary methods of data capturing were walk transect counts, drive transect counts, focal point monitoring, vantage point counts and incidental sightings (see Appendix 3 for a detailed explanation of the monitoring methods).
- Information gained from pre-construction monitoring at four potential wind farm sites in close proximity to the current site, namely Ujekamanzi WEFs 1–2 and Camden WEFs 1–2 also assisted in providing a comprehensive picture of avifaunal abundance and diversity in the greater area, including the current study area.

TABLE 4-2 THE NUMBER OF SABAP2 LISTS COMPLETED FOR THE BROADER AREA

Pentad	Full protocol lists	Ad hoc protocol lists
2630_3005	43	11
2630_3010	58	15
2630_3015	26	17
2630_3020	7	10
2635_3005	26	44
2635_3010	29	5
2635_3015	23	8
2635_3020	18	1
2640_3005	29	14
2640_3010	7	32
2640_3015	15	36
2640_3020	4	25
Total	285	218

4.2.6 BATS

The Project Area of Influence (PAOI) was defined as the Area of Interest (AoI) of the development cluster plus a 10 km buffer given that bats are flying mammals (Scottish Natural Heritage 2019). This area was studied at a desktop level to determine which bat species (i.e., impact receptors) are likely to occur within the PAOI, to provide information on their natural history and conservation status, and to contextualise the project site within the larger social-ecological environment with respect to bats.

Bats were also studied through 15 months of acoustic monitoring in the AoI which began on 26 April 2022 and ended on 4 July 2023. After this, monitoring continued at one met mast location until 11 November 2023. Bat activity was sampled at 11 locations (Table 4-3) within the AoI with Wildlife Acoustics, Inc. SM4 bat detectors. At nine locations (AM4 – AM12), SMM-U2 microphones were positioned at the top of a 10 m aluminium mast. At the remaining two locations (AM1 and AM3), microphones were positioned on meteorological towers at 10 m, 50 m, and 90 m respectively. Equipment at AM12 was stolen and therefore data from this location were not available to be assessed in this report.

The bat detectors were programmed to record activity nightly, from 30 minutes before sunset to 30 minutes after sunrise, and this report summarises 518 nights of bat activity data. This monitoring period therefore spans of all four seasons providing a representative account of temporal bat activity patterns across a year. Acoustic data retrieved from each bat detector were processed using Kaleidoscope® Pro (Version 5.4.2, Wildlife Acoustics, Inc.). Bats were automatically identified using the embedded "Bats of South Africa Version 5.4.0" reference library and verified by inspecting echolocation files. The number of acoustic files recorded was used as a measure to quantify bat activity, whereby each file was considered one bat pass of the microphone.

Roost surveys were undertaken which entailed discussions with landowners to locate any known roosts or potential roosts with evidence of bats. In addition, buildings at farmsteads within the PAOI, as well as accessible rocky outcrops/crevices, were systematically surveyed during field visits in November 2022 (spring), and January 2023 (summer). The surveys aimed to directly observe roosting bats, locate evidence of roosting bats (e.g., culled insect remains, fur-oil-stained exit and entry points, guano/droppings), and assess the likelihood for each potential roost to support bats.

TABLE 4-3 SUMMARY OF THE BAT ACOUSTIC MONITORING SAMPLING LOCATIONS AND EFFORT

Bat Detector	Coordinates	# Sample Nights	Altitude (m)	Habitat Features
AM1 (Met mast)	-26.612298°S 30.317572°E	10m: 518 50 m: 226 90 m: 478	1,778	In Wakkerstroom Montane Grassland, 400 m west of small escarpment, 560 m north of farm dam, 440 m west of woodland patch, 560 m northeast of wetland
AM3 (Met Mast)	-26.587572°S 30.284137°E	10 m: 340 50 m: 435 90 m: 326	1,748	In Wakkerstroom Montane Grassland, 420 m west of farmstead, 420 m east of stream and seep wetland
AM4	-26.665933°S 30.321221°E	208	1,550	In Eastern Highveld Grassland, 360 m west of cultivated area, 230 m southeast of woodland, 240 m north

Bat Detector	Coordinates	# Sample Nights	Altitude (m)	Habitat Features
				east of stream, 430 m south east of depression wetland
AM5	-26.611025°S 30.363393°E	377	1,515	In Eastern Highveld Grassland, on border of cultivated areas and disturbed grassland, 470 m southeast of stream, wetland and woodland patch, 2.4 km northwest of farmstead
AM6	-26.562101°S 30.296970°E	242	1,732	In Wakkerstroom Montane Grassland, at edge of woodland patch, 80 m east of depression wetland, 255 m west of stream
AM7	-26.640015°S 30.306442°E	194	1,655	Within wooded valley, 60 m west of stream, 300 m east of seep wetland
AM8	-26.621551°S 30.277550°E	137	1,735	In Wakkerstroom Montane Grassland, 680 m west of woodland patch,167 m north of seep wetland
AM9	-26.549013°S 30.315353°E	51	1,667	In Eastern Highveld Grassland adjacent to wetland and surrounded by trees
AM10	-26.592367° S 30.336850°E	163	1,696	In Wakkerstroom Montane Grassland, above small escarpment in shallow wooded valley
AM11	-26.632172°S 30.265925°E	163	1,694	In Eastern Highveld Grassland adjacent to tree edge line, 220 m south east of wetland, installed at farmstead

Based on current taxonomic information and bat occurrence data, 23 species could occur within the PAOI (Table 4-4). The majority have a low likelihood of occurrence however the potential suite of species includes 10 high risk species, including fruit bats (Pteropodiae) and free-tailed bats (Molossidae) which are vulnerable to wind energy impacts in South Africa (MacEwan 2016, Aronson 2022).

TABLE 4-4 BAT SPECIES POTENTIALLY OCCURRING WITHIN THE PAOI

Common Name Species Name	Key Habitat Requirements*	Prob. Of Occurrence	Conservation Status		Wind Energy Risk$^{\delta}$
Natal Long-fingered bat *Miniopterus natalensis*	Temperate or subtropical species. Primarily in savannahs and grasslands. Roosts in caves, mines, and road culverts. Clutter- edge forager. Migratory.	**Confirmed (5,018 passes)**	LC/U	LC	

Common Name Species Name	Key Habitat Requirements*	Prob. Of Occurrence	Conservation Status		Wind Energy Risk[δ]
Lessor Long-fingered bat *Miniopterus fraterculus*	Temperate species, associated with grasslands. Cave-dependant but also roosts in tunnels and mines. Habitat includes savannah bushveld, moister mistbelt and coastal forest habitats. Clutter-edge forager. Migratory.	Moderate	LC/U	LC	
Cape Serotine *Laephotis capensis*	Arid semi-desert, montane grassland, forests, savannah and shrubland. Roosts in vegetation and human-made structures. Clutter-edge forager.	**Confirmed (50,243 passes)**	LC/S	LC	
Mauritian tomb bat *Taphozous mauritianus*	Savannah woodland preferring open habitat. Roosts on rock faces, the outer bark of trees or on the outer walls of buildings under the eaves of roofs. Forages in urban areas and over cultivation. Open- air forager.	High	LC/U	LC	
Little Free-tailed bat *Mops pumilus*	Semi-arid savannah, forested regions, woodland habitats. Roosts in narrow cracks in rock and trees but also in buildings. Open-air forager. Forages in urban areas and over cultivation.	**Confirmed (1,767 passes)**	LC/U	LC	
Midas Free-tailed bat *Mops midas*	Hot low-lying savannah and woodland. Roosts in narrow cracks in rock and trees but also in buildings. Open-air forager.	Low	LC/D	LC	
Egyptian Free-tailed bat *Tadarida aegyptiaca*	Desert, semi-arid scrub, savannah, grassland, and agricultural land. Roosts in rocky crevices, caves, vegetation, and human-made structures. Open-air forager.	**Confirmed (20,995 passes)**	LC/U	LC	
Wahlberg's Epauletted fruit bat *Epomophorus wahlbergi*	Roost in dense foliage of large, leafy trees. Associated with forest and forest-edge habitats but will forage in urban environments.	Low	LC/S	LC	
African Straw-coloured fruit bat *Eidolon helvum*	Non-breeding migrant in the PAOI.	Low	NT/D	LC	

Common Name **Species Name**	**Key Habitat Requirements***	**Prob. Of Occurrence**	**Conservation Status**		**Wind Energy Risk[δ]**
Egyptian Rousette *Rousettus aegyptiacus*	Distribution influenced by availability of suitable caves roosts.	Low	LC/S	LC	
Temminck's Myotis *Myotis tricolor*	Montane forests, rainforests, coastal forests, savannah woodlands, arid thicket, and fynbos. Roosts communally in caves (and mines) and closely associated with mountainous terrain. Migratory. Clutter-edge forager.	Low	LC/U	LC	
Welwitsch's Myotis *Myotis welwitschii*	Mainly open woodland and savannah but also high-altitude grassland, tropical dry forest, montane tropical moist forest, savannah and shrublands. Clutter-edge forager.	Low	LC/U	LC	
Yellow-bellied house bat *Scotophilus dinganii*	Occurs throughout the Savannah Biome but avoids open habitats such as grasslands and Karoo scrub. Roosts in hollow trees and buildings. Clutter-edge forager.	**Confirmed (169 passes)**	LC/U	LC	
Dusky Pipistrelle *Pipistrellus hesperidus*	Woody habitats, such as riparian vegetation and forest patches. Recorded roosting in narrow cracks in rocks and under the loose bark of dead trees. Clutter-edge forager.	Low	LC/U	LC	
Rusty Pipistrelle *Pipistrellus rusticus*	Savannah woodland and associated with open water bodies. Roosts in trees and old buildings. Clutter-edge forager.	Low	LC/U	LC	
Long-tailed Serotine *Eptesicus hottentotus*	Montane grasslands, marshland and well- wooded riverbanks, mountainous terrain near water. Roosts in caves, mines, and rocky crevices. Clutter-edge forager.	**Confirmed (368 passes)**	LC/U	LC	**Medium**
Egyptian Slit-faced bat *Nycteris thebaica*	Savannah, desert, arid rocky areas, and riparian strips. Gregarious and roosts in caves but also in mine adits,	Medium	LC/U	LC	**Low**

Common Name Species Name	Key Habitat Requirements*	Prob. Of Occurrence	Conservation Status		Wind Energy Riskδ
	Aardvark holes, rock crevices, road culverts, roofs, and hollow trees. Clutter forager.				
Geoffroy's Horseshoe bat *Rhinolophus clivosus*	Savannah woodland, shrubland, dry, riparian forest, open grasslands, and semi- desert. Roosts in caves, rock crevices, disused mines, hollow baobabs, and buildings. Clutter forager.	Medium	LC/U	LC	**Low**
Bushveld Horseshoe bat *Rhinolophus simulator*	Occurs in caves within areas of moist savannah, adjacent to rivers and savannah woodland, montane habitats, and coastal mosaics. Commonly associated with riparian forest and along wooded drainage lines. Roosts in caves and mines. Clutter forager.	Medium	LC/D	LC	**Low**
Blasius's Horseshoe bat *Rhinolophus blasii*	Savannah woodlands and are dependent on the availability of daylight roosting sites such as caves, mines, or boulder piles.Clutter forager.	Low	LC/D	NT	**Low**
Darling's Horseshoe bat *Rhinolophus darlingi*	Mesic woodland savannahs. Roosts in caves, boulder piles, mines, culverts, large hollow trees and disused buildings. Clutter forager.	Low	LC/U	LC	**Low**
Sundevall's Leaf-nosed bat *Hipposideros caffer*	Savannah, bushveld and/or coastal forests, near to rivers and other water sources. Roosts in caves, sinkholes, rock fissures, hollow trees, mines, and culverts. Clutter forager.	Low	LC/D	LC	**Low**
Percival's Short-eared Trident bat *Cloeotis percivali*	Savannah and woodland areas. Roosts in caves and mine tunnels. Clutter forager.	Low	LC/U	EN	**Low**

*Child et al. (2016), *Monadjem et al. (2020); [!] Child et al. (2016); [T]IUCN (2021); δ MacEwan et al. (2020b)

PRE-CONSTRUCTION BAT MONITORING RESULTS

Six bat species were confirmed to occur in the PAOI (Table 4-4) including four species classified as high risk from wind energy development: Natal Long-fingered bat, Cape Serotine, Little Free-tailed bat, and Egyptian Free-tailed bat. All of these species have a conservation status of Least Concern (both globally and regionally) and no red data species with a higher conservation status were detected. Although these species are currently classified as Least Concern, Rodhouse et al. (2019), Davy et al. (2020) and Frick et al. (2017) have all shown that in North America, Least Concern bats may be experiencing impacts due to wind farms that could result in changes to their conservation status. The global population trend is unknown for Natal Long-fingered bat, Little Free-tailed bat, and Egyptian Free-tailed bat but stable for Cape serotine. Given the unknown population trends for some of these species and the evidence of impacts from wind farms, ongoing monitoring and adaptive management will be essential to ensure their conservation status does not deteriorate.

A total of 80,051 bat passes were recorded over 518 sample nights. Most activity was attributed to Cape serotine (63 %) and Egyptian free-tailed bat (27 %). These species comprise the majority of bat fatalities at South African wind farms (Aronson 2022). Natal long-fingered bat accounted for 6 % of total activity. The remaining three species (Little free-tailed bat, Long-tailed serotine and Yellow-bellied house bat) were seldomly recorded and the magnitude of their activity suggests they would be at low risk of impacts. As such, the remainder of this section focuses on impacts to Egyptian free-tailed bat, Cape serotine and Natal long-fingered bat.

Based on MacEwan et al. (2020b), Cape serotine activity was predominantly low but high activity was recorded at AM5, AM8, AM9 and AM11, in summer and autumn (Table 3). The latter two monitoring stations were located at a farm dam and at a farmstead respectively indicating higher activity in relation to these landscape features. This species was also recorded at 50 m and 90 m but the magnitude of its activity was mostly low except for at AM3-50 during March and April when its activity suggests medium risk. Based on the dataset, this species is largely predicted to be at low collision risk. However, bats in the same family (Vespertilionidae) are known to be attracted to wind turbines in the United Kingdom (Richardson et al. 2021). Thus, although the data suggest a low collision risk, the installation of wind turbines in the landscape can alter bat activity patterns. Collision risk for this species will also depend on how close turbine blades reach the ground, with risk increasing the closer the blades reach the ground (Garvin et al. 2024).

The timeseries data showed that this species exhibits relatively low and stable activity levels across all seasons, with a modest peak in autumn, where its activity reaches a maximum of 0.69 bat passes per hour between 21:00 and 22:00. This peak, though limited, suggests a slight preference for early evening hours in the autumn months. Throughout spring, summer, and winter, however, the Natal long-fingered bat maintains very low activity, rarely exceeding 0.35 passes per hour at any given time. The hourly distribution shows that this species activity slightly tapers off in the late evening and early morning hours, with a marked decline around midnight. This pattern suggests that the Natal long-fingered bat may have brief foraging periods early in the night, possibly returning to roost sites earlier than other nocturnal species. This species is migratory, and although difficult to show, the peak in activity in autumn could be suggestive of some bats (e.g. females) moving through the site to roosting sites north elsewhere in Mpumalanga or Limpopo after mating.

4.2.7 NOISE

This study considered local regulations and both local and international guidelines, using the terms of reference proposed by SANS 10328:2008 for a comprehensive Environmental Noise Impact Assessment ('ENIA') and as proposed by the requirements specified in the Assessment Protocol for Noise that were published on 20 March 2020, in Government Gazette 43110, GN 320. The study also considered the noise limits as proposed by IFC which is based on studies completed by the World Health Organization ('WHO').

Residential areas and potential noise-sensitive developments/receptors/communities (NSR) were identified using aerial images as well as physical site visits, with the site visits verifying a number of structures used for residential activities. The potential noise impacts are assessed on these NSR in this noise study.

Ambient sound levels were measured over a 2-night period from 7 to 9 June 2023 at six locations in the vicinity of the WEF, resulting in more than 900 daytime and 500 night-time measurements. Each measurement was collected over a 10-minute period and included a number of sound level descriptors, including; equivalent values, minimum and maximum levels, statistical sound levels as well as spectral information. Confidence levels in the resulting data are high and it is expected that the ambient sound level data would be applicable of other locations in the area.

4.2.8 HERITAGE AND ARCHAEOLOGY

The method for Heritage assessment consists of several steps. The first step forms part of the desktop assessment. Here we would consult the database that has been collated by Umlando. These database contain archaeological site locations and basic information from several provinces (information from Umlando surveys and some colleagues), most of the national and provincial monuments and battlefields in Southern Africa (http://www.vuvuzela.com/googleearth/monuments.html) and cemeteries in southern Africa (information supplied by the Genealogical Society of Southern Africa). We use 1st and 2nd edition 1:50 000 topographical and 1937 aerial photographs where available, to assist in general location and dating of buildings and/or graves. The database is in Google Earth format and thus used as a quick reference when undertaking desktop studies. Where required we would consult with a local data recording centre, however these tend to be fragmented between different institutions and areas and thus difficult to access at times. We also consult with an historical architect, palaeontologist, and an historian where necessary.

The survey results will define the significance of each recorded site, as well as a management plan. All sites are grouped according to low, medium, and high significance for the purpose of this report. Sites of low significance have no diagnostic artefacts or features. Sites of medium significance have diagnostic artefacts or features and these sites tend to be sampled. Sampling includes the collection of artefacts for future analysis. All diagnostic pottery, such as rims, lips, and decorated sherds are sampled, while bone, stone, and shell are mostly noted. Sampling usually occurs on most sites. Sites of high significance are excavated and/or extensively sampled. Those sites that are extensively sampled have high research potential, yet poor preservation of features.

4.2.9 PALAEONTOLOGY

Geological maps, a literature review and personal experience were used in this research.

4.2.10 VISUAL/LANDSCAPE

The following method was used:

- Site visit was undertaken on the 31 May and 13 June 2023.
- The method used for the study was both a desk top study using Google Earth and a site inspection. Google Earth, the Surveyor General, SANBI, the South African protected and Conservation Areas Database – DFFE, and Environment Geographic Information Systems were used to identify homesteads and structures that may be visually impacted. This information was referenced during the site inspection, which took place on 31 May and 13 June 2023. The field study entailed travelling along public roads that surrounded and crossed the study area to determine the potential visibility from these areas. The route followed the R65 towards Amsterdam. The route turned off to the north following a route around the northern section of the Emvelo WEF section re-joining the R65 further east. The route then continued southwards past Sheepmoor where it linked up with the N2. From here the route followed the N2 back past the Camden power station to Ermelo.
- Project components: The physical characteristics of the project components were described and illustrated based on information supplied by the EAP.
- The landscape's character was described and rated in terms of its aesthetic appeal using recognised contemporary research in perceptual psychology as the basis, and its sensitivity as a landscape receptor.
- The sense of place of the study area was described as to its uniqueness and distinctiveness. The primary informant of these qualities was the spatial form and character of the natural landscape together with the cultural transformations associated with the historical/current use of the land.
- The visibility of the proposed Project was determined using on-site observations and a viewshed assessment.
- Illustrations, in basic simulations, of the proposed WEF and the proposed 132kV powerlines were overlaid onto panoramas of the landscape, as seen from nearby sensitive viewing points, to give the reviewer an idea of the scale and location of the proposed Project within its landscape context.
- Visual intrusion (contrast) of the proposed Project was determined by simulating its physical appearance from these sensitive viewing areas.
- The severity and significance of the visual impact of the proposed Project were rated based on the hacking method.
- Measures to mitigate the negative impacts of the proposed Project were recommended.

4.2.11 SOCIO-ECONOMIC

The terms reference and approach to the SIA is based on the Guidelines for SIA endorsed by Western Cape Provincial Environmental Authorities (DEA&DP) in 2007 and IAIA Guidance for Assessing and Managing Social Impacts (2015).

- Describing and obtaining an understanding of the proposed intervention (type, scale, and location), the settlements, and communities likely to be affected by the proposed project.
- Collecting baseline data on the current social and economic environment.
- Identifying the key potential social issues associated with the proposed project.
- Assessing and documenting the significance of social impacts associated with the proposed intervention.
- Identifying alternatives and mitigation measures.

In this regard the study involved:

- Review of socio-economic data for the study area.
- Review of relevant planning and policy frameworks for the area.
- Site visit and interviews with key stakeholders.
- Identifying the key potential social issues associated with the proposed project.
- Assessing the significance of social impacts associated with the proposed project.
- Identification of enhancement and mitigation measures aimed at maximizing opportunities and avoiding and or reducing negative impacts.

4.2.12 TRAFFIC AND TRANSPORTATION

The South African Traffic Impact and Site Traffic Assessment Standards (2014), and the Manual for Traffic Impact Studies (1995), form the basis for this traffic impact assessment. A Traffic Impact Assessment was compiled in line with guidelines for technical appraisal of the traffic impact of the proposed developments on the existing road network within a study area, during the construction, operation and decommissioning phases of the Emvelo WEF. A site visit is to be conducted once the position of the WTG has been finalised.

Traffic generation estimates used in the traffic assessment was based on the experience of similar projects. The following steps were undertaken and is considered the methodology used for the impact assessment:

- A road network was identified within the study area using desktop analysis and screening of the area.
- The number of vehicle trips generated during construction, operation and decommissioning phases were established.
- The mode of transport, vehicle type and size for each trip was determined.
- Peak-hour vehicles trip rates were generated for the various project phases.
- Significance and severity of development-related traffic was identified for the existing road network. Existing traffic volumes on the roads were compared against estimated traffic generated for the proposed development.
- Mitigation measures were identified.

4.3 IDENTIFICATION OF POTENTIAL IMPACTS

The identification of potential impacts covers the three phases of the proposed development: construction, operation and decommissioning. During each phase, the potential environmental impacts may be different. For example, during the construction phase, traffic volumes are far greater than during the operational life of a WEF.

The project team has experience from environmental studies for other projects in the locality of the proposed development. The team is, therefore, able to identify potential impacts addressed in the EIA based on their experience and knowledge of the type of development proposed and the local area. Their inputs inform the scope for the S&EIA process.

Each specialist assessment considered:

- The extent of the impact (local, regional or (inter) national);
- The intensity of the impact (low, medium or high);
- The duration of the impact and its reversibility;
- The probability of the impact occurring (improbable, possible, probable or definite);
- The confidence in the assessment; and
- Cumulative impacts.

Following identification of potential environmental impacts, the baseline information was used to predict changes to existing conditions and undertake an assessment of the impacts associated with these changes.

4.3.1 ASSESSMENT OF POTENTIAL IMPACTS

The potential impact that the proposed development may have on each environmental receptor could be influenced by a combination of the sensitivity or importance of the receptor and the predicted degree of alteration from the baseline state (either beneficial or adverse).

Environmental sensitivity (or importance) may be categorised by a multitude of factors, such as the rarity of the species; transformation of natural landscapes or changes to soil quality and land use. The overall significance of a potential environmental impact is determined by the interaction of the above two factors (i.e. sensitivity/importance and predicted degree of alteration from the baseline).

A 7-step approach for the determination of significance of potential impacts was developed by Arcus to align with the requirements of Appendix 3 of the EIA Regulations, 2014 (as amended). This 7-step approach was adapted from standard ranking metrics such as the Hacking Method, Crawford Method etc. and complies with the method provided in the EIA guideline document (GN 654 of 2010) and considers international EIA Regulatory reporting standards such as the newly amended European Environmental Impact Assessment (EIA) Directive (2014/52/EU).

Specialists, in their terms of references, were supplied with this standard method with which to determine the significance of impacts to ensure objective assessment and evaluation, while enabling easier multidisciplinary decision-making.

The approach is both objective and scientific based to allow appointed specialists and EAPs to retain independence throughout the assessment process.

The 7-Step approach for determining the significance of impacts pre, and post mitigation, is described below:

Step 1: Predict potential impacts by means of an appraisal of:

- Site Surveys;
- Project-related components and infrastructure;
- Activities related with the project life-cycle;
- The nature and profile of the receiving environment and potential sensitive environmental features and attributes;
- Input received during public participation from all stakeholders; and
- The relevant legal framework applicable to the proposed development

Step 2: Determination of whether the potential impacts identified in Step 1 will be direct (caused by construction, operation, decommissioning or maintenance activities on the proposed development site or immediate surroundings of the site), indirect (not immediately observable or do not occur on the proposed development site or immediate surroundings of the site), residual (those impacts which remain after post mitigation) and cumulative (the combined impact of the project when considered in conjunction with similar projects in proximity).

Step 3: Description and determination of the significance of the predicted impacts in terms of the criteria below to ensure a consistent and systematic basis for the decision-making process. Significance is numerically quantified on the basis score of the following impact parameters:

- Extent (E) of the impact: The geographical extent of the impact on a given environmental receptor.
- Duration (D) of the impact: The length of permanence of the impact on the environmental receptor.
- Reversibility ® of the impact: The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change
- Magnitude (M) of the impact: The degree of alteration of the affected environmental receptor.
- Probability (P) of the impact: The likelihood of the impact actually occurring.

A widely accepted numerical quantification of significance is the formula:

$$S=(E+D+R+M)*P$$

Where: *Significance=(Extent+Duration+Reversibility+Magnitude)*Probability*

The following has also been considered when determining the significance of a potential impact.

- Nature (N) of the impact: A description of what causes the effect, what will be affected, and how it will be affected.
- Status (S) of the impact: described as either positive, negative or neutral
- Cumulative impacts.
- Inclusion of Public comment.

The significance of environmental impacts is determined and ranked by considering the criteria presented in Table 4-5 below. All criteria are rank according to 'Very Low', 'Low', 'Moderate', 'High' and 'Very High' and are assigned scores of 1 to 5 respectively.

TABLE 4-5 DEFINING THE SIGNIFICANT IN TERMS OF THE IMPACT CRITERIA

Impact Criteria	Definition	Score	Criteria Description
Extent (E)	Site	1	Impact is on the site only
	Local	2	Impact is localized inside the activity area
	Regional	3	Impact is localized outside the activity area
	National	4	Widespread impact beyond site boundary. May be defined in various ways, e.g. cadastral, catchment, topographic
	International	5	Impact widespread far beyond site boundary. Nationally or beyond
Duration (D)	Immediate	1	On impact only
	Short term	2	Quickly reversible, less than project life. Usually up to 5 years.
	Medium term	3	Reversible over time. Usually between 5 and 15 years.
	Long term	4	Longer than 10 years. Usually for the project life.
	Permanent	5	Indefinite
Magnitude (M)	Very Low	1	No impact on processes
	Low	2	Qualitative: Minor deterioration, nuisance or irritation, minor change in species/habitat/diversity or resource, no or very little quality deterioration. Quantitative: No measurable change; Recommended level will never be exceeded.
	Moderate	3	Qualitative: Moderate deterioration, discomfort, Partial loss of habitat /biodiversity /resource or slight or alteration. Quantitative: Measurable deterioration; Recommended level will

Impact Criteria	Definition	Score	Criteria Description
			occasionally be exceeded.
	High	4	Qualitative: Substantial deterioration death, illness or injury, loss of habitat /diversity or resource, severe alteration or disturbance of important processes. Quantitative: Measurable deterioration; Recommended level will often be exceeded(e.g. pollution)
	Very High	5	Permanent cessation of processes
Reversibility ®	Reversible	1	Recovery which does not require rehabilitation and/or mitigation.
	Recoverable	3	Recovery which does require rehabilitation and/or mitigation.
	Irreversible	5	Not possible, despite action. The impact will still persist, and no mitigation will remedy or reverse the impact.
Probability (P)	Improbable	1	Not likely at all. No known risk or vulnerability to natural or induced hazards
	Low Probability	2	Unlikely; low likelihood; Seldom; low risk or vulnerability to natural or induced hazards
	Probable	3	Possible, distinct possibility, frequent; medium risk or vulnerability to natural or induced hazards.
	Highly Probable	4	Highly likely that there will be a continuous impact. High risk or vulnerability to natural or induced hazards
	Definite	5	Definite, regardless of prevention measures.

The significance (s) of potential impacts identified according to the criteria above has been colour coded for the purpose of comparison. This colour coding will be used in impact tables.

Significance is deemed Negative (-)			**Significance is deemed Positive (+)**		
0 – 30	31 – 60	61 – 100	0 – 30	31 – 60	61 – 100
Low	Moderate	High	Low	Moderate	High

Step 4: Determination of practical and reasonable mitigation measures based on specialists' inputs and field observations following the mitigation hierarchy (avoid, minimise, manage, mitigate, or rehabilitate).

Step 5: Evaluation of predicted residual impacts after implementation of mitigation measures.

Step 6: Determination of the significance of the impact taking into consideration the predicted residual impacts after implementation of mitigation measures.

Step 7: Based on an acceptable significance of the impact, determination of the need and desirability of the proposed development and an opinion as to whether the development should proceed or not.

The Assessment of the significance of potential impacts is then populated in an Impact Summary Table, see Section 10 and Section 11 of this Report for the specialists' impact assessments.

4.3.2 MITIGATION

The EIA proposes measures to avoid, reduce or remedy significant adverse impacts which were identified; these are termed mitigation measures. Where the assessment process identified any significant adverse impacts, mitigation measures were proposed to reduce those impacts where practicable. Such measures include the physical design evolutions such as movement of turbines and management and operational measures. Design alterations such as relocating turbines to avoid certain sensitive receptors are mitigation embedded into the design of the proposed development, i.e., embedded mitigation.

This strategy of avoidance, reduction and remediation is a hierarchical one which seeks:

First to avoid potential impacts;

- Then to reduce those which remain; and
- Lastly, where no other measures are possible, to propose compensatory measures.

Each specialist consultant identified appropriate mitigation and enhancement measures (where relevant).

4.3.3 CUMULATIVE IMPACT ASSESSMENT

In accordance with the EIA Regulations, consideration is also given to 'cumulative impacts'.

By definition, cumulative impacts are those that result from incremental changes caused by past, present or reasonably foreseeable future actions together with the proposed development. Cumulative impacts are the combined impacts of several developments that are different to the impacts from the developments on an individual basis. For example the landscape impact of one WEF may be insignificant, but when combined with another it may become significant.

For the purpose of this assessment cumulative impacts is defined and has been assessed in the future baseline scenario, i.e. cumulative impact of the proposed development = change caused by proposed development when added to the cumulative baseline. The cumulative baseline includes all other identified developments. In the cumulative assessment the effect of adding the proposed development to the cumulative baseline is assessed.

In line with best practice, the scope of this assessment will include all operational, approved or current and planned renewable energy applications (including those sites under appeal), within a 35 km radius of the site. Therefore, all potential projects are included, even though it is unknown how many of these will actually be constructed.

Renewable energy sites included for cumulative impact assessment are based on the knowledge and status of the surrounding areas at the time of the specialists compiling their assessments, these will be updated as applicable through the EIA process.

A preliminary assessment of cumulative impacts were made in the Scoping Phase and has been assessed further in this EIA Phase (refer to Section 11).

5. NEED AND DESIRABILITY

Reference is made to the DFFE 2017 Guideline on Need and Desirability which states that while the *"concept of need and desirability relates to the type of development being proposed, essentially, the concept of need and desirability can be explained in terms of the general meaning of its two components in which need refers to time and desirability to place – i.e. is this the right time and is it the right place for locating the type of land-use/activity being proposed? Need and desirability can be equated to wise use of land – i.e. the question of what is the most sustainable use of land."*

The Need and Desirability of the proposed development has been considered in terms of the regional location and the project's cumulative impact. The guidelines pose questions that should be considered in this investigation, which are addressed in the Table 5-1 and Table 5-2 below.

TABLE 5-1 ECOLOGICAL CONSIDERATIONS OF NEED AND DESIRABILITY FOR THE EMVELO WEF

"securing ecological sustainable development and use of natural resources"[6]			
Question		**Answer**	**Reference**
How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?		Through effective implementation of suggested mitigation and avoidance measures, it is unlikely that the development of the Emvelo Wind Energy Facility would significantly compromise the long-term ecological integrity and associated ecosystem services of the site.	Volume II: Terrestrial Biodiversity Impact Assessment
How were the following ecological integrity considerations taken into account?	*Threatened Ecosystems*	The proposed development area includes no threatened ecosystems as verified through the IUCN Red List of Ecosystems conservation tool.	Volume II: Terrestrial Biodiversity Impact Assessment
	Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure	An ecological sensitivity map of the site was produced by integrating information collected on-site with available ecological and biodiversity information. Sensitive features such as wetlands, drainage lines, water bodies, steep slopes and rocky outcrops were mapped and appropriately buffered. The proposed layout avoids all high-sensitive areas.	Volume II: Terrestrial Biodiversity Impact Assessment

[6] Section 24 of The Constitution of South Africa refers.

"securing ecological sustainable development and use of natural resources"[6]			
	Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs")	As is evident from land-use coverages, the wider area is highly fragmented because of land-use, including agriculture, mining, and urbanisation. Intact vegetation on the site and surrounding sites is considered to be of conservation value, being generally designated either Irreplaceable or Optimal CBA with Other Natural Area (ONA) associated with transformed (cultivated) land, mostly associated with remnant Eastern Highveld Grassland, being designated Irreplaceable CBA. The degraded, secondary vegetation (old lands) and cultivated areas are generally not designated a CBA status but in some cases are designated ESA: local corridor or ESA: species specific. Land use guidelines indicates that <u>Irreplaceable CBA sites must be avoided</u> in terms of the mitigation hierarchy, however for Optimal CBA (referred to as Important and necessary in MBCP), the guidelines indicate that, although not desirable, if small-scale land-use change is unavoidable, it <u>must be located and designed to be as biodiversity-sensitive as possible</u>. Portions of the proposed grid connection corridors will also traverse some more extensive designated CBA: Irreplaceable areas. It is not anticipated that the actual footprint or loss within these areas will be significant due to the limited footprint of pylons as well as the corridors generally being near or within existing powerline corridors. ESA areas can accommodate loss, but ecological processes and connectivity must be given consideration. Actual remaining extent are refined in vegetation mapping.	Volume II: Terrestrial Biodiversity Impact Assessment
	Conservation targets	The PAOI does not intersect with any NPAESs. There are no specific features of very high biodiversity value within the affected polygons and highly sensitive areas have been avoided for development. In addition, the site does not appear to fall on any significant gradients or corridors that are likely to be of high importance for biodiversity processes such as migration and faunal movement.	Volume II: Terrestrial Biodiversity Impact Assessment

"securing ecological sustainable development and use of natural resources"[6]			
	Ecological drivers of the ecosystem	Transformation of intact habitat on a cumulative basis would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations. Due to the presence of several other renewable energy developments (primarily solar developments which are more invasive in vegetation clearing) in the area, this is a potential cumulative impact of the development that is assessed.	Volume II: Terrestrial Biodiversity Impact Assessment
	Environmental Management Framework	The proposed Emvelo WEF complies with all policies and planning tools and has no intersections with EMFs or with any development zones according to the DFFE screening tool report.	n/a
	Spatial Development Framework	The spatial vision for Mpumalanga Province is "A sustainable, vibrant and inclusive economy, Mpumalanga". The SDF identifies a number of opportunities and challenges facing the province. The opportunities are linked to the province's natural resources, well developed economy, and established economies. The SDF identifies five spatial objectives, namely: • **Connectivity and corridor functionality:** The aim is to ensure connectivity between nodes, secondary towns, marginalised areas, the surrounding area, and to green open space systems. • **Sustainable concentration and agglomeration:** The aim is to promote the creation of an agglomeration economy that will encourage people and economic activities to locate near one another in urban centres and industrial clusters. • **Conservation and resource utilisation:** The aim is to promote the maximisation, protection and maintenance of ecosystems, scarce natural resources, high-potential agricultural land, and integrated open space systems. • **Liveability and sense of place:** The aim is to create settlements that contribute to people's sense of personal	Volume II: Social Impact Assessment

“securing ecological sustainable development and use of natural resources”[6]

and collective wellbeing and to their sense of satisfaction in being residents of a settlements

- **Rural diversity and transformation:** The aim is to create Urban-Rural anchors and choices for residents within the rural economy linked to access to markets, food security and security of land tenure. Connectivity and corridor functionality, Sustainable concentration and agglomeration, and Conservation and resource utilisation are of specific relevance the proposed development.

Connectivity and corridor functionality

The strategic objectives (SOs) that are relevant the study area and the proposed development include:

- Strategic Objective 2: Development of the existing corridors and building new linkages to increase capacity and economic opportunities and ensure connectivity to the surrounding areas.

- Strategic Objective 5: Decongestion of the coal haul roads and Improvement of Freight Network.

In terms of SO 2, the spatial linkages identified for development and upgrading include the upgrade of N17, N17/N2 Corridor and the N12 and N11 corridor. The site is flanked by the N2 to the south and N11 to the south west.

Sustainable concentration and agglomeration

Of specific relevance, Strategic Objective 4, Diversify Economy, focusses on the need to diversify the economy. The SDF notes that mining sector contributes 25% to Mpumalanga’s GVA. In addition, there are a number of other sectors

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		directly or indirectly dependent on mining such as manufacturing (specifically metal processing) and utilities (specifically power generation). The combined GVA of these three sectors makes up more than 40% of the provincial GVA. • However, the SDF recognises that mining is not a sustainable industry and resources are finite. There is therefore a need for a gradual shift from mining-oriented sectors to the sustainable economic sectors to maintain sustained growth of the provincial economy. Mpumalanga's Coal Mining and Coal Fired Power Plant region (located mainly in the Highveld area) will be come under increasing pressure due to environmental considerations. As a result, the region is likely to experience a decline in demand for coal and with it a decline in the associated employment it creates. There is therefore a need to diversify the regional economy and facilitate the gradual transition of economic activities in the region. The proposed development supports the objective of diversifying the provinces economy. **Conservation and resource utilisation** The strategic objectives (SOs) that are relevant the study area and the proposed development include: • Strategic Objective 2: Ensure conservation of all water resources and catchment Areas. • Strategic Objective 4: Promote a low carbon and climate resilient economy. • Strategic Objective 6: To optimally utilise the mining potential without compromising the long-term sustainability of the natural environment. **Strategic Objective 2: Ensure Conservation of all Water Resources and Catchment Areas**	

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		Achieving Strategic Objective 2, Ensure Conservation of all Water Resources and Catchment Areas is closely linked to diversifying the economy. The SDF notes that the provinces water resources are under pressure from high demand activities, including Eskom's power stations, mining, and industrial uses. The proposed development represents a low consumer of water. **Strategic Objective 4: Promote a Low Carbon and Climate Resilient Economy** Mpumalanga is home to 12 of Eskom's 15 coal-fired power stations; petrochemical plants including Sasol's refinery in Secunda; metal smelters; coal and other mines; brick and stone works; fertiliser and chemical producers; explosives producers; and other smaller industrial operations, making the Highveld one of South Africa's industrial heartlands (CER, 2017). As a result, the air quality within the Mpumalanga Province, especially within the Highveld area, is the poorest in South Africa. The Highveld region accounts for approximately 90 % of South Africa's scheduled emissions of industrial dust, sulphur dioxide and nitrogen oxides (Wells et al. 1996, as cited in Josipovic et al. 2009). Achieving Strategic 4, Promote a low carbon and climate resilient economy, is closely linked to diversifying the economy. The proposed development supports the development of a low carbon, climate resistant economy. **Strategic Objective 6: To optimally utilise the mining potential without compromising the long-term sustainability of the natural environment** Mining contributes R 49.6 billion (approximately 25%) to the provincial economy. The key mining sector is coal, which represents 83% of South Africa's coal production. The mining sector, specifically coal mining, creates employment opportunities and supports the manufacturing and power generation sector. However, mining is also associated with many issues	

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		including water and soil contamination, air pollution and environmental degradation. Achieving Strategic 6, To optimally utilise the mining potential without compromising the long-term sustainability of the natural environment is closely linked to diversifying and developing a low carbon climate resistant economy. The proposed development supports the objective of diversifying and developing a low carbon, climate resistant economy. In terms of the high-level composite spatial development framework, Ermelo is identified as a Regional Service Centre (red dot) and the development area located to the east of the town falls within area defined as a Tourism Belt. The economic sectors in the area include mining and power generation. The dominant land use in the study area is commercial agriculture.	
	Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.)	All global responsibilities to which South Africa is signatory or party to were assessed within this report. Applicable international treaties and conventions are: • UNFCCC Paris Agreement (2016) • The Equator Principles IIII (2020) • The Convention on Biological Diversity (CBD) (1993) • The Convention on the Conservation of Migratory Species of Wild Animals (CMS or Bonn Convention) (1983) • The Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) (1999) The proposed development complies with all international responsibilities.	n/a
How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what		The proposed development can disturb listed plant species and vegetation from clearing of the development footprint, soil erosion and alien plant invasion. Increased levels of pollution, noise, disturbance and human presence can impact negatively on faunal communities. Biodiversity value and ecological functioning of the proposed development area are potentially affected by the development.	Volume I App B: EMPr Volume II: Specialist reports

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measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	As part of the EIA process specialist studies were conducted to identify areas most environmentally suitable for development within the proposed development site boundary. As a result of these studies a development layout has been produced that avoids sensitive areas and identified constraints. The specialists have proposed mitigation measures to further reduce residual risks or enhance opportunities during construction, operation and decommissioning phases of the development. With implementation of these mitigation measures, all identified negative impacts are expected to be reduced to acceptable levels of medium or low negative significance. All mitigation measures proposed by the specialists are included in the EMPr for the project.	
How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	On a national level the development will lessen the country's dependency on coal, and contribute to lowering water consumption, pollution and environmental degradation per kW of electricity produced. The EMPr provides measures for avoidance and minimisation of pollution, as well as enhancing any potential positive impacts.	Volume I App B: EMPr
What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?	The generation of waste will largely be restricted to the construction phase of the project and consist of normal construction phase solid waste streams. The EMPr will detail specific mitigation measures that must be implemented for the appropriate management and minimisation of waste, during all phases of the project.	Volume I App B: EMPr

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	Registered service providers will be utilised to transport solid waste to registered landfills.	
How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	A Heritage Impact Assessment and a Visual Impact Assessment were conducted to assess the proposed layout. Mitigation measures have been identified by the heritage specialists to minimise and remedy residual impacts and enhance positive impacts.	Volume II: Heritage Impact Assessment & Visual Impact Assessment
How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	Wind is a renewable resource and will be the 'fuel' for the WEF to generate electricity. Therefore, the development will have a minimal impact on non-renewable resources.	n/a
How will this development use and/or impact on renewable	The WEF will use the renewable energy resource of wind to generate power. Construction of the WEF will require use of water, a renewable natural resource. Operation of the WEF will consume relatively small quantities of water when compared to alternative energy technologies such as coal. Impacts on the	n/a

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natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure		ecosystem caused by use of these renewable energy resources has been evaluated.	
	Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life)	The proposed WEF will reduce South Africa's dependency on non-renewable resources, particularly coal, as an energy source. Wind as an energy source is not dependent on water, as compared to the massive water requirements of conventional power stations, has a limited footprint and does not impact on large tracts of land, and poses limited pollution and health risks, specifically when compared to coal and nuclear energy plants.	n/a
	Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity,	The current land use is low-intensity grazing and the land is not suitable for other agricultural uses.	Volume II: Agricultural Impact Assessment; Social Impact Assessment

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responsible and equitable use of the resources? What measures were explored to enhance positive impacts?	*and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources this the proposed development alternative?)*	The proposed development will increase yield as the landowners will be paid for the use of their land. This will improve cash flow and financial sustainability of farming enterprises on site. The proposed development itself will not cause a significant change in land use, as the development site is primarily low intensity agriculture (grazing), which can still proceed once the development is constructed. Wind is a renewable resource and a wind energy facility is the best use thereof. Solar electricity generation would require a much greater infrastructure footprint to generate the equivalent energy of the proposed WEF.	
	Do the proposed location, type and scale of development promote a reduced dependency on resources?	The proposed WEF is predicted to reduce dependency on coal as an energy source. Wind as an energy source is not dependent on water, as compared to the massive water requirements of conventional coal fired power stations, has a limited footprint and does not impact on large tracts of land, and poses limited pollution and health risks, specifically when compared to coal and nuclear energy plants.	n/a
How were a risk-averse and cautious approach applied in terms of ecological impacts?	*What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?*	The findings and recommendations of this report may be susceptible to the following uncertainties and limitation: • No assessment has been made of aquatic aspects relating to any wetlands, pans, and rivers/seeps, nor faunal aspects outside of the scope of a terrestrial biodiversity report. Refer to separate reports. • Any botanical surveys based upon a limited sampling time-period, may not reflect the actual species composition of the site due to seasonal variations in flowering times. Additionally, the composition of fire adapted vegetation such as grassland may vary depending on level of maturity or	Volume II: Terrestrial Biodiversity Impact Assessment

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		time since last burn. It is also not feasible to sample every square meter of such an extensive site thoroughly, although the approach used is based on the specialists' extensive experience. As far as possible, site collected data has been undertaken to represent seasonal aspects and is supplemented with desktop and database-centred distribution data. In addition, measures are included in the project mitigations to address any shortcomings as far as possible and to reduce risks to an acceptable level.	
	What is the level of risk associated with the limits of current knowledge?	The risk associated with assumptions and limits of current knowledge is the potential for information being assessed to be incorrect. This would translate to erroneous impact identification and mitigation measures. However, due to the amount of site work conducted the risk associated with this is considered to be low.	n/a
	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	To counter the likelihood that the area has not been well sampled in the past and in order to ensure a conservative approach, the species lists derived for the site from the literature were obtained from an area significantly larger than the study area and are likely to include a much wider array of species than actually occur at the site. This is a cautious and conservative approach which takes the study limitations into account. The precautionary approach has been adopted for this study, i.e. assuming the worst-case scenario will occur and then identifying ways to mitigate or manage these impacts.	Volume II: Terrestrial Biodiversity Impact Assessment
How will the ecological impacts resulting from this development impact on	*Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise,*	Impacts on people's rights have been identified and assessed by the social specialist, visual specialist and noise specialist. Although the site has been classified as fatally flawed from a visual perspective, the turbines were placed in locations with optimal wind resource potential and if they are to be removed or relocated, the entire project would be jeopardized.	Volume II: Visual Impact Assessment; Social Impact Assessment;

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people's environmental right in terms following:	*odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?*	The significance of the potential negative health risks posed by the development (noise, shadow flicker, electromagnetic radiation) is expected to be moderate to low. The noise impact assessment found the level of noise impacts for the WEF are expected to be of low significance with mitigation. The operational impact on the sense of place is expected to be of low negative significance with or without mitigation.	Noise Impact Assessment
	Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?	Renewable energy has fewer negative health effects than other forms of non-renewable energy generation and will have overall positive health benefits	Volume II: Social Impact Assessment
Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?		The SIA conducted for the proposed Emvelo WEF indicates that during the construction and the operational phase of the proposed development project, various employment opportunities, with different levels of skills will be created. In addition this will also create local business opportunities benefitting the socio-economic development of the local communities. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the negative environmental and socio-economic impacts associated with a coal-based energy economy and the challenges created by climate change, represents a significant positive social benefit for society as a whole.	Volume II: Social Impact Assessment
Based on all of the above, how will this development positively or negatively impact on		The ecology, avifauna, bat and aquatic specialists have all concluded that the development does not have unacceptable negative impacts that cannot be mitigated to a low or medium level of significance.	Volume II: Specialist Reports

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ecological integrity objectives/targets/considerations of the area?		
Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?	Iterative specialists' constraints mapping identified the most suitable areas for development for which a development layout was then produced for assessment. The results of the specialist's studies further informed the development of the preferred layout.	Volume II: Specialist Reports
Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?	The proposed WEF is unlikely to have significant cumulative impacts, nor result in any unacceptable loss or risk to terrestrial biodiversity on the site or regionally, regardless of the other WEF projects proposed in the area, as the layout has been aligned with minimising impacts and avoiding key ecological processes. WEF facilities generally have a low-density footprint that can accommodate sensitivities, and the overall footprint area is small in comparison to the total coverage area. The current and future threats to the represented grassland vegetation units would be posed by large scale clearing of habitat, which is usually associated with Agriculture, Mining and Forestry as well as urban development and expansion.	Volume II: Terrestrial Biodiversity Impact Assessment

TABLE 5-2 SOCIO-ECONOMIC CONSIDERATIONS OF NEED AND DESIRABILITY FOR THE EMVELO WEF

<table>
<tr><th colspan="4">“promoting justifiable economic and social development”[7]</th></tr>
<tr><th colspan="2">Question</th><th>Answer</th><th>Reference</th></tr>
<tr><td>What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?:</td><td>The IDP (and its sector plans’ vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area,</td><td>Msukaligwa Integrated Development Plan

The Vision of Msukaligwa Municipality (MM) is to be “A Beacon of Service Excellence”. The associated mission to meet the vision is:

Enhancing community participation to steer development initiatives towards community needs.
Advocating and stimulating local economy to promote economic growth and development.
Improving good governance and measurable service delivery techniques.
Enhancing effectiveness and efficiency in the utilization of available resources.
Empowering our communities and the vulnerable groups in particular.
Working in partnership with all its stakeholders.
Continuously mobilizing resources to achieve high standards in service.

A SWOT analysis undertaken as part of the IDP process identified and number of opportunities and threats that are relevant to the development, namely.

Opportunities
Power utility, government services, mining, tourism, agriculture, and forestry.
National corridor developments (N2, N11 and N17).
Strategic location of the municipality.

Threats
Ageing infrastructure.</td><td>Volume II: Social Impact Assessment</td></tr>
</table>

[7]Section 24 of The Constitution of South Africa refers.

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		High unemployment rate. Mines that are not rehabilitated. Based on the outcome of the SWOT analysis a number of key focus areas were identified for attention over the 5-year IDP planning period of which the following are relevant. Unemployment and poor economic development. Insufficient access to basic services. Poor maintenance and upgrading of services infrastructure. Poor roads and storm water drainage system. Besides Ermelo to the west of the study area, the only other settlement located within relatively close proximity to the site is the rural settlement of Sheepmoor, located to the north of the N2 and in the southern portion of the study area. The community engagement process undertaken as part of the IDP process indicated that a number of key issues in the rural areas that are relevant to the development. These include: Basic services A number of the rural areas in the MM that do not have access to basic services, including potable water, electricity, and toilets. Some of these challenges can be addressed through the SED initiatives associated with the development. Skills development and job opportunities There is a need to support skills development and create employment opportunities. The initiatives listed in the IDP include building of skills development centres or multipurpose centres, employing local contractors on projects implemented within municipality, creating opportunities for skills transfers by contractors and the provision of bursaries and learnerships. The proposed development will create opportunities for skills development and employment.	

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		Sports and recreation There is a shortage of sports and recreation facilities and opportunities in many of the rural areas within the MM. The initiatives identified in the IDP to address this include the refurbishment of existing sports facilities, including the provision of ablution facilities, the construction of new sport facilities in remote areas and upgrading of security to prevent vandalism. Some of these challenges can be addressed through the SED initiatives associated with the development. Section E of the IDP lists the developmental goals, objectives, strategies, and performance indicators. The strategic goals that are relevant to the development include: Sustainable and reliable delivery of basic services. Reduced unemployment and poverty. Social cohesion and spatial transformation. The key priorities in terms of basic services with specific reference to rural areas includes the establishment of new and or up-grading of existing clinics, and the provision of mobile clinic services for more remote rural areas. The need for clinics outside Ermelo to operate 24 hours and seven days a week due to the absence of hospitals nearby was also raised as a key issue. reach the areas. In terms of community facilities, the needs identified included, community halls and more Thusong Centres. Centres also need to be established for disabled members of the community. The key priority in terms of unemployment and poverty is to support economic development and create employment opportunities. The strategic objectives that are relevant to the development include: To provide sustainable and reliable services to communities. To coordinate efforts to address unemployment and poverty.	

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		National Infrastructure Plan The South African Government adopted a National Infrastructure Plan in 2012. The aim of the plan is to transform the economic landscape while simultaneously creating significant numbers of new jobs and strengthening the delivery of basic services. The plan also supports the integration of African economies. In terms of the plan, Government will invest R827 billion over the next three years to build new and upgrade existing infrastructure. The aim of the investments is to improve access by South Africans to healthcare facilities, schools, water, sanitation, housing, and electrification. The plan also notes that investment in the construction of ports, roads, railway systems, electricity plants, hospitals, schools, and dams will contribute to improved economic growth. As part of the National Infrastructure Plan, Cabinet established the Presidential Infrastructure Coordinating Committee (PICC). The Committee identified and developed 18 strategic integrated projects (SIPS). The SIPs cover social and economic infrastructure across all nine provinces (with an emphasis on lagging regions) and consist of: Five geographically-focussed SIPs. Three spatial SIPs. Three energy SIPs. Three social infrastructure SIPs. Two knowledge SIPs. One regional integration SIP. One water and sanitation SIP. The three energy SIPS are **SIP 8, 9 and 10.** **SIP 8: Green energy in support of the South African economy**	

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		Support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP 2010). Support bio-fuel production facilities. **SIP 9: Electricity generation to support socio-economic development** Accelerate the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances. Monitor implementation of major projects such as new power stations: Medupi, Kusile and Ingula. **SIP 10: Electricity transmission and distribution for all** Expand the transmission and distribution network to address historical imbalances, provide access to electricity for all and support economic development. Align the 10-year transmission plan, the services backlog, the national broadband roll-out and the freight rail line development to leverage off regulatory approvals, supply chain and project development capacity.	
	Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),	**Msukaligwa Municipality Spatial Development Framework** The spatial vision for the MM is "a diversified, vibrant rural economy that make optimal use of natural resources, supported by a well-connected network of sustainable rural service and economic nodes, where people have access to services and economic opportunity". The SDF is informed by a number of spatial objectives, namely: • Provide a spatial structure that facilitates access to services for all communities.	Volume II: Social Impact Assessment

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		• Protect strategic water sources and sensitive eco-systems. • Provide space for the diversification of the local economy. • Eliminate past spatial settlement patterns. The provision of space of the diversification of the local economy is of specific relevance to the proposed development. A SWOT analysis was undertaken as part of the preparation of the SDF. The key outcomes of the analysis are summarised below. **Strengths** • Rich natural resource base – minerals, high potential agricultural land, water resources, natural environment (lakes region). **Weakness** • Typical rural population distribution making it difficult to reach people with services. • Remaining service backlogs (water, sanitation, refuse removal). • Increasing poverty levels. • Relatively low skills levels • Declining functional literacy. **Opportunities** • National projects to enhance regional links may strengthen the locational advantage of Ermelo / Wesselton. • Potential for tourism linked to natural assets.	

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		• Potential for larger scale beneficiation supported by current nodal structure and transport links. • Legislative investment by mines (social and labour plans) and the associated opportunity for service provision and socio-economic development. **Threats** • Declining coal reserves threatens mining economy and employment. Impact on mining sector also impacts on other related industries, such as manufacturing and transport. • Global and national move away from carbon-based economy will lead to decline in mining, coal power generation economy and employment. This will also impact on mining related industries. • Competing land uses – mining, agriculture, urban expansion, conservation • Climate change – decreased rainfall and increased temperatures will have impact on agriculture, forestry, and settlements. • Population growth exceeding expected and current economic growth. The results of the SWOT analysis informed the identification of a set of priority issues centred around natural resource management and human development. The issues that are relevant to the proposed development include: **Strategic water source areas** Msukaligwa is part of a catchment area which is classified as strategic water source area at a national scale. The preservation and sustainable use of these water sources is becoming increasingly important in view of climate change. Decisions about the future development of the area should take cognisance of	

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		this issue, and not sacrifice long term water security in favour of meeting short term economic or development targets. **Conflicting land uses** Msukaligwa is richly endowed with natural resources including water, high potential land, minerals, and sensitive ecosystems that occur in attractive natural landscapes. However, these natural resources and the demand to exploit them spatially overlap and often conflict. The SDF highlights the need to address and manage potential land use conflicts. **Reliance on Carbon Economy** The area's economy is currently strongly dependent on coal mining. In addition to coal mining, the area also hosts the Camden Power Station. The SDF notes that the eventual decline of the mining sector and coal-based power generation, based on declining coal deposits and a move away from a carbon-based economy, is a long-term certainty for the area. Emphasis in spatial planning should be on the creation of opportunities to diversify the economy to lessen the impact of the decline. The SDF highlights the risks posed by climate change, specifically given that large section of the economy is reliant on agriculture and forestry. The area is also the source area of some of the main strategic waterways of the country. The SDF identifies a number of structuring elements that inform the spatial concept for the MM. These include urban development nodes, transportation corridors, mining areas and commercial agriculture and conservation areas. The main town of Ermelo is designated as a Primary Node. The function of a Primary Node is to:	

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		• Provide higher order services to the growing urban population, as well as the rural catchment area surrounding the node. • Provide space for economic diversification and higher intensity economic development, with a focus on agriculture and related activities, mining, utilities, and power generation, as well as transport and logistics. Support should also be provided too industrial and commercial uses, as well as business incubation centres and innovation centres, training facilities and educational institutes. Emvelo, located in the southern part of the study area, is designated as Rural Node and has been identified as a site for the establishment of a Farmer Production Support Unit in terms of the Department of Rural Development and Land Reform's Agri-Park Programme. The economic focus on Emvelo is on forestry and agriculture (livestock, grains (maize and beans) and vegetables). Economic initiatives such as the establishment of grain silo, training in tree farming and provision of connecting infrastructure should be prioritised. The development of small agri-villages in consultation with Mondi/ Sappi is also identified as an initiative. The Socio-Economic Development (SED) spend linked to the proposed development could support for these initiatives. The N2 and N17 are identified as Primary Transportation Corridors, while the N11 is identified as a Secondary Corridor. The SDF notes that development of nodes along these corridors are proposed, in order to intensify development at specific points and achieve economies of scale. The SDF highlights the key role and spatial extent of mining in the MM, including reference to the Camden coal-fired power station south of Ermelo. Over the longer term the rehabilitation of mining areas and a range of alternative peri-urban uses should be considered for the impacted areas in view of the decrease reliance on coal. Commercial Agriculture also represents a key economic activity	

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		in the MM. However, the SDF notes that climate change will pose a risk to the agricultural sector. The structuring elements have been used to identify spatial focus areas. The areas of relevance to the development include: Agriculture and Forestry Focus Areas. Conservation and Tourism Focus Area. Mining and Peri-Urban Focus Areas. **Agriculture and Forestry Focus Areas** In terms of agricultural development, the SDF notes that the recommendations of the District Rural Development Plan for Gert Sibande District Municipality be implemented. The Plan identifies a number of rural intervention areas (RIAs). As indicated in Figure 2.4, the study area is not located in an RIA. The main land uses in the study area consist of Forestry (Strategic Water Resource Area, Green) and Commercial Farming (Brown). **Conservation and Tourism Focus Areas** The SDF notes that the entire Msukaligwa area is environmentally sensitive, and all human activity should be conducted in such a way as to minimise impact. The key areas of significance identified include: • The lakes region – this natural asset is not only an economic asset for tourism, but also an important ecosystem and an important mechanism to mitigate the impacts of climate change.	

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		• Strategic water source areas and river headwaters – the area makes an important contribution to national water security, and requires clean water for human development and economic activities such as agriculture. • Protected areas – a number of small, protected areas exist outside the lake's region. There areas are not only important ecologically, but also from a tourism perspective. The natural and cultural assets of Msukaligwa, notable the lakes region, has the potential to serve as a major attraction. In addition, the area's proximity to the large markets of Gauteng and good regional connectivity should be harnessed in attracting more local tourists. **Mining Areas** The SDF acknowledges the importance of the mining sector and notes that it will need to be accommodated over the short to medium term. However, of relevance to the proposed development the SDF refers to green industries and indicates that the existing site of the Camden Power Station and surrounds should be made available for new industrial development in the long term, to manage the long-term impact of the Power Station being decommissioned. The existing road and rail infrastructure render the area in the vicinity of the Power Station and the site itself highly accessible creating an opportunity for redevelopment with alternative uses requiring extensive space and good connectivity. The SDF also notes that the mining belt area holds other potential that should be harnessed with a long-term view of diversifying the local economy to soften the long-term impact of eventual decline in mining. The development area is located in an area of moderate to no mining potential with a limited number of mining activities (brown areas). The composite spatial development framework for the MM is informed by the various structuring elements.	

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	Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and	**Msukaligwa Municipality Spatial Development Framework** The spatial vision for the MM is "a diversified, vibrant rural economy that make optimal use of natural resources, supported by a well-connected network of sustainable rural service and economic nodes, where people have access to services and economic opportunity". The SDF is informed by a number of spatial objectives, namely: • Provide a spatial structure that facilitates access to services for all communities. • Protect strategic water sources and sensitive eco-systems. • Provide space for the diversification of the local economy. • Eliminate past spatial settlement patterns. The provision of space of the diversification of the local economy is of specific relevance to the proposed development. A SWOT analysis was undertaken as part of the preparation of the SDF. The key outcomes of the analysis are summarised below. **Strengths** • Rich natural resource base – minerals, high potential agricultural land, water resources, natural environment (lakes region). **Weakness**	Volume II: Social Impact Assessment

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		• Typical rural population distribution making it difficult to reach people with services. • Remaining service backlogs (water, sanitation, refuse removal). • Increasing poverty levels. • Relatively low skills levels • Declining functional literacy. **Opportunities** • National projects to enhance regional links may strengthen the locational advantage of Ermelo / Wesselton. • Potential for tourism linked to natural assets. • Potential for larger scale beneficiation supported by current nodal structure and transport links. • Legislative investment by mines (social and labour plans) and the associated opportunity for service provision and socio-economic development. **Threats** • Declining coal reserves threatens mining economy and employment. Impact on mining sector also impacts on other related industries, such as manufacturing and transport. • Global and national move away from carbon-based economy will lead to decline in mining, coal power generation economy and employment. This will also impact on mining related industries. • Competing land uses – mining, agriculture, urban expansion, conservation	

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		• Climate change – decreased rainfall and increased temperatures will have impact on agriculture, forestry, and settlements. • Population growth exceeding expected and current economic growth. The results of the SWOT analysis informed the identification of a set of priority issues centred around natural resource management and human development. The issues that are relevant to the proposed development include: **Strategic water source areas** Msukaligwa is part of a catchment area which is classified as strategic water source area at a national scale. The preservation and sustainable use of these water sources is becoming increasingly important in view of climate change. Decisions about the future development of the area should take cognisance of this issue, and not sacrifice long term water security in favor of meeting short term economic or development targets. **Conflicting land uses** Msukaligwa is richly endowed with natural resources including water, high potential land, minerals, and sensitive ecosystems that occur in attractive natural landscapes. However, these natural resources and the demand to exploit them spatially overlap and often conflict. The SDF highlights the need to address and manage potential land use conflicts. **Reliance on Carbon Economy** The area's economy is currently strongly dependent on coal mining. In addition to coal mining, the area also hosts the Camden Power Station. The SDF notes that the eventual decline of the mining sector and coal-based power generation, based on declining coal deposits and a move away from a carbon-based economy, is a long-term certainty for the area. Emphasis in spatial planning should be on the creation of opportunities to diversify the economy to lessen the impact of the decline. The SDF highlights the risks posed by climate change, specifically given that large section of the economy is reliant on agriculture and forestry. The area is also the source area of some of the main strategic waterways of the country. The SDF identifies a number of structuring elements that inform the spatial concept for the MM. These include urban development nodes,	

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		transportation corridors, mining areas and commercial agriculture and conservation areas. The main town of Ermelo is designated as a Primary Node. The function of a Primary Node is to: • Provide higher order services to the growing urban population, as well as the rural catchment area surrounding the node. • Provide space for economic diversification and higher intensity economic development, with a focus on agriculture and related activities, mining, utilities, and power generation, as well as transport and logistics. Support should also be provided too industrial and commercial uses, as well as business incubation centres and innovation centres, training facilities and educational institutes. Emvelo, located in the southern part of the study area, is designated as Rural Node and has been identified as a site for the establishment of a Farmer Production Support Unit in terms of the Department of Rural Development and Land Reform's Agri-Park Programme. The economic focus on Emvelo is on forestry and agriculture (livestock, grains (maize and beans) and vegetables). Economic initiatives such as the establishment of grain silo, training in tree farming and provision of connecting infrastructure should be prioritised. The development of small agri-villages in consultation with Mondi/ Sappi is also identified as an initiative. The Socio-Economic Development (SED) spend linked to the proposed development could support for these initiatives. The N2 and N17 are identified as Primary Transportation Corridors, while the N11 is identified as a Secondary Corridor. The SDF notes that development of nodes along these corridors are proposed, in order to intensify development at specific points and achieve economies of scale. The SDF highlights the key role and spatial extent of mining in the MM, including reference to the Camden coal-fired power station south of Ermelo. Over the longer term the rehabilitation of mining areas and a range of alternative peri-urban uses should be considered for the impacted areas in view of the decrease reliance on coal. Commercial Agriculture also	

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		represents a key economic activity in the MM. However, the SDF notes that climate change will pose a risk to the agricultural sector. The structuring elements have been used to identify spatial focus areas. The areas of relevance to the development include: Agriculture and Forestry Focus Areas. Conservation and Tourism Focus Area. Mining and Peri-Urban Focus Areas. **Agriculture and Forestry Focus Areas** In terms of agricultural development, the SDF notes that the recommendations of the District Rural Development Plan for Gert Sibande District Municipality be implemented. The Plan identifies a number of rural intervention areas (RIAs). As indicated in Figure 2.4, the study area is not located in an RIA. The main land uses in the study area consist of Forestry (Strategic Water Resource Area, Green) and Commercial Farming (Brown). **Conservation and Tourism Focus Areas** The SDF notes that the entire Msukaligwa area is environmentally sensitive, and all human activity should be conducted in such a way as to minimise impact. The key areas of significance identified include: • The lakes region – this natural asset is not only an economic asset for tourism, but also an important ecosystem and an important mechanism to mitigate the impacts of climate change. • Strategic water source areas and river headwaters – the area makes an important contribution to national water security, and requires clean water for human development and economic activities such as agriculture. • Protected areas – a number of small, protected areas exist outside the lake's region. There areas are not only important ecologically, but also from a tourism perspective. The natural and cultural assets of Msukaligwa, notable the lakes region, has the potential to serve as a major attraction. In addition, the area's proximity to the large markets of Gauteng and good regional connectivity should be harnessed in attracting more local tourists.	

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		Mining Areas The SDF acknowledges the importance of the mining sector and notes that it will need to be accommodated over the short to medium term. However, of relevance to the proposed development the SDF refers to green industries and indicates that the existing site of the Camden Power Station and surrounds should be made available for new industrial development in the long term, to manage the long-term impact of the Power Station being decommissioned. The existing road and rail infrastructure render the area in the vicinity of the Power Station and the site itself highly accessible creating an opportunity for redevelopment with alternative uses requiring extensive space and good connectivity. The SDF also notes that the mining belt area holds other potential that should be harnessed with a long-term view of diversifying the local economy to soften the long-term impact of eventual decline in mining. The development area is located in an area of moderate to no mining potential with a limited number of mining activities (brown areas). The composite spatial development framework for the MM is informed by the various structuring elements.	
	Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and	The dominant land use in the study area is commercial agriculture.	
	Municipal Economic Development Strategy ("LED Strategy").	The IDP highlights the importance of prioritising infrastructure development as economic enabler for economic development. The importance to supporting SMMEs is also noted. The provision of energy infrastructure, such as the proposed renewable energy facility, supports this programme and will create opportunities to support SMMEs.	Volume II: Social Impact Assessment;
Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?		Social impacts related to the construction phase:	Volume II: Social Impact Assessment;

Impact	**Significance** **No Mitigation/Enhancement**	**Significance** **With Mitigation/Enhancement**

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Creation of employment and business opportunities	Medium (Positive)	Medium (Positive)
Presence of construction workers and potential impacts on family structures and social networks	Medium (Negative)	Low (Negative)
Influx of job seekers	Low (Negative)	Low (Negative)
Safety risk, stock theft and damage to farm infrastructure associated with presence of construction workers	Medium (Negative)	Low (Negative)
Increased risk of grass fires	Medium (Negative)	Low (Negative)

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Impact of heavy vehicles and construction activities	Medium (Negative)	Low (Negative)
Loss of farmland	Medium (Negative)	Low (Negative)

Social impacts related to the operational phase:

Impact	**Significance** **No** **Mitigation/Enhancement**	**Significance** **With Mitigation/Enhancement**
Establishment of infrastructure to improve energy security and support renewable sector	High (Positive)	High (Positive)
Creation of employment and business opportunities during maintenance	Low (Positive)	Medium (Positive)

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Benefits associated with socio-economic contributions to community development	Medium (Positive)	Medium (Positive)
Benefits for landowners	Low (Positive)	Medium (Positive)
Visual impact and impact on sense of place	Low (Negative)	Low (Negative)
Impact on property values	Low (Negative)	Low (Negative)
Impact on tourism	Low (Negative)	Low (Negative)

The No-Development option would represent a lost opportunity for South Africa to improve energy security and supplement its current energy needs with clean, renewable energy. Given South Africa's current energy security challenges and its position as one of the highest per capita producers of carbon emissions in the world, this would represent a significant negative social cost.

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	Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	The proposed development will contribute towards local economic development and skills development programs of the local and district municipality through the support and co-operation between public and private sectors, creation of employment and business opportunities, and the opportunity for skills development and on-site training during both construction and operation phases. An important focus of the REIPPPP is to ensure that the build programme secures sustainable value for the country and enables local communities to benefit directly from the investments attracted into the area. In this regard Independent Power Producers (IPPs) are required to contribute a percentage of projected revenues accrued over the 20-year project operational life toward Socio-economic Development (SED) initiatives. These contributions are linked to Community Trusts and accrue over the 20-year project operation life and are used to invest in housing and infrastructure as well as healthcare, education, and skills development. Community Trusts provide an opportunity to generate a steady revenue stream that is guaranteed for a 20-year period. This revenue can be used to fund development initiatives in the area and support the local community. The long-term duration of the revenue stream also allows local municipalities and communities to undertake long term planning for the area. The revenue from the proposed WEF can be used to support several social and economic initiatives in the area, including: • Creation of jobs. • Education. • Support for and provision of basic services. • School feeding schemes. • Training and skills development.	Volume II: Social Impact Assessment

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		• Support for SMME's.	
How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?		The proposed development will contribute towards the local economic development strategies of the local and district municipality through the creation of employment and business opportunities, and the opportunity for skills development and on-site training during the construction, operation and decommissioning phase. The REIPPPP also contributes to Broad Based Black Economic Empowerment (BBBEE) and the creation of black industrialists. In this regard, Black South Africans own, on average, 34% of projects that have reached financial close (BW1-BW4), which is 4% higher than the 30% target. This includes black people in local communities that have ownership in the IPP projects that operate in or near their communities and represents the majority share of total South African Entity Participation.	Volume II: Social Impact Assessment
Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term? Will the impact be socially and economically sustainable in the short- and long-term?		Wind energy facilities are socially and economically sustainable in the short and long term. IPP projects require a minimum ownership of 2.5 % by local communities which represents a significant injection of capital into mainly rural areas of South Africa for the lifespan of the facility. In addition, local content minimum thresholds result in a substantial stimulus for establishing local manufacturing capacity.	Volume II: Social Impact Assessment
In terms of location, describe how the	*result in the creation of residential and employment*	The construction phase will extend over a period of approximately 18-24 months and create in the region of 200-250 employment opportunities. Members from	Volume II:

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placement of the proposed development will:	*opportunities in close proximity to or integrated with each other,*	the local communities in the area, specifically Ermelo, would be able to qualify for percentage of the low skilled and semi-skilled employment opportunities. Most of these employment opportunities will accrue to Historically Disadvantaged (HD) members of the community. The typical lifespan of WEFs is 20 to 25 years. During the operational phase there will be a significant decrease in employment opportunities. The operational phase of the proposed project will create in the region of 20 full time employment opportunities during the operational phase. Typical employees that might be required include: Technicians, electricians, engineers, IT specialists, environmental specialists, health and safety managers, and administrators (skilled); drivers and equipment operators (semi-skilled); construction workers and security staff (low-skilled). The recruitment process and the requirements for each skill level and each employment opportunity need to be clearly communicated to local communities to ensure that no unrealistic expectations are created.	Social Impact Assessment;
	reduce the need for transport of people and goods,	The need for transport of people and goods will be increased during the construction phase. Lower per capita carbon footprints are predicted due to the commercial forms of transport that will be employed to move the workforce (e.g. public transport, contractor buses).	Volume II: Traffic Impact Assessment;

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	result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport),	Not applicable.	n/a
	compliment other uses in the area,	Local communities and their service providers will benefit from the socio-economic development provided by the WEF and current land use will be able to continue.	Volume II Social Impact Assessment;
	be in line with the planning for the area,	The proposed WEF is in line with applicable international, national, provincial and local planning strategies.	Volume II Social Impact Assessment
	for urban related development, make use of underutilised land available with the urban edge,	The proposed development occurs away from the urban edge.	n/a
	optimise the use of existing resources and infrastructure,	Wind energy is a renewable, clean resource and reduces pollution and the reliance on non-renewable fossil fuels and water for electricity generation. Existing access roads will be utilised wherever possible.	n/a

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		It is expected that any construction water required will be delivered by tankers. Waste removal will be in accordance with best practice by qualified waste removal contractors to the nearest registered landfill. Portable sanitation facilities will be utilised during construction, so that no connection to the local sewerage system will be required. Any additional infrastructure required will be constructed by the developer.	
	opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),	No opportunity costs in terms of bulk infrastructure expansions in non-priority areas are predicted due to the proposed development. The proposed WEF is not located within a bulk infrastructure expansion area.	n/a
	discourage "urban sprawl" and contribute to compaction/densification,	Not applicable as the proposed development site lies outside of urban areas.	n/a
	contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing	The project will contribute to economic and infrastructure development in the Mpumalanga Province, in line with the Msukaligwa Integrated Development Plan.	n/a

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	infrastructure in excess of current needs,		
	encourage environmentally sustainable land development practices and processes,	Construction of the renewable energy Emvelo WEF project will assist South Africa in transitioning from a carbon-intensive resource use economy to a sustainable low carbon footprint economy. Sustainable land development is an overarching aspect of the proposed project development.	n/a
	take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),	• Feasibility of access for wind turbine delivery, the site is easily accessible from the national road; • Close proximity to the Eskom grid with available evacuation capacity; • Viable wind resource, therefore suited to wind farm development; • The proposed site is agricultural land and current land use is low intensity gazing; and Willingness of landowners to host a wind farm on their properties.	Section 7.2: Site Alternatives
	the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential),	The proposed development will create jobs and contribute towards socio-economic development in an area that does not have high economic potential. The WEF is likely to result in significant positive socio-economic opportunities.	Vol II: Social Impact Assessment
	impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic	While the proposed WEF has a generally 'high' visual impact significance, the turbines are located in locations with the highest resource wind potential. Impacts to the cultural landscape are unavoidable but only of a medium	Vol II: Social Impact Assessment; Visual

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	characteristics and sensitivities of the area, and	significance and no other aspects of heritage are expected to be impacted significantly.	Impact Assessment; Heritage Impact Assessment
	in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	The proposed development aligns with the Langeberg Municipality Integrated Development Plan. The proposed development is predicted to support the creation of a more integrated settlement.	Vol II: Social Impact Assessment
How were a risk-averse and cautious approach applied in terms of socio-economic impacts?:	*What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?*	One limitation that could be identified is that some of the provincial documents do not contain data from the 2022 Census. The data from the 2011 and 2016 Household Community Survey is therefore referred to.	Vol II: Social Impact Assessment
	What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?	The risk due to limits of current knowledge is considered to be low due to the positive socioeconomic impact expected from the proposed WEF.	Vol II: Social Impact Assessment

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	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	A risk-averse and cautious approach was utilised throughout the impact assessment process by all specialists. The precautionary approach has been adopted for this study, i.e. assuming the worst-case scenario will occur and then identifying ways to mitigate or manage these impacts. Mitigation measures to manage these impacts have been provided.	Vol II: Social Impact Assessment
How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following:	*Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?*	Negative impacts were identified by the Social Specialist. These are: The presence of construction workers on-site and in the area on the local communities. Potential influx of job seekers. The potential loss of farmlands for grazing of sheep and on associated farming activities. Potential safety risk for farmers, risk of livestock theft and theft of farming infrastructure. • The increased risk of potential grass fires associated with the construction phase. The potential impacts of heavy vehicles and construction related activities, damage to roads, and dust pollution. The potential loss of farmland. • Visual impact and associated impact on the sense of place. • The potential impact on tourism. The potential loss of employment opportunities and associated income (decommissioning impact).	Vol II: Social Impact Assessment App B: EMPr EIAr Section 10

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		The establishment of several renewable energy facilities (WEFs and SEFs), may potentially place pressure on property, local services, e.g. education, medical, accommodation, water supply, waste management etc. (cumulative impact). Measures to minimise, manage and remedy negative impacts are provided in Volume II: Social Impact Assessment and Section 9 of this Report.	
	Positive impacts. What measures were taken to enhance positive impacts?	Positive impacts were identified by the Social Specialist. These are: • Establishment of renewable energy infrastructure and the generation of clean, renewable energy; • The creation of local employment and business opportunities, and opportunities for skills development and on-site training; • Benefits associated with the local economic development initiatives; and • Benefits for landowners. Details of enhancement measures are provided in the Social Impact Assessment, Section 10 of this EIAr, and are included in the EMPr.	Vol II: Social Impact Assessment EIAr Section 10
Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socio-economic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?		It is not expected that the development's socio-economic impacts will result in significant ecological impacts. Although the development would result in some habitat loss across the site, this is not likely to affect the fauna and flora. Mitigation measures must be implemented to avoid the direct threat to the fauna. These specific mitigation measures should be implemented during construction and operation to reduce this risk. There are no impacts associated with the development of the Emvelo WEF on terrestrial biodiversity that cannot be mitigated to an acceptable level. As such, should all the proposed mitigation be implemented, the Emvelo WEF development is deemed acceptable from a terrestrial ecological impact perspective. In terms of cumulative impacts, the affected area has not been significantly impacted by renewable energy development to date and the contribution of the current wind farm development to cumulative impact is considered low and acceptable. It is thus the reasoned	Vol II: Terrestrial Biodiversity Assessment

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		opinion of the specialist that the Emvelo WEF development should be authorised subject to the various mitigation and avoidance measures as indicated.	
What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?		Iterative specialists' constraints mapping identified the most suitable areas for development for which a development layout was then produced for assessment. The results of the specialist's studies, including interviews by the Social Specialist, and Scoping phase PPP, further informed the development of the updated site layout.	Volume II: Specialist Assessment Reports
What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)?	*Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?*	The proposed development aligns with a variety of planning policies that consider environmental and spatial justice. Alternatives were 'scoped' out in the scoping phase and the most feasible environmentally and socially preferred location was chosen for approval in the EIA phase. Public consultation considers all person(s) and the application process will continue to consider all persons, and disadvantaged people who may be impacted by the development.	n/a
What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were		The proposed development will contribute to equitable access by supplying electricity to the national grid, and by providing local and regional socioeconomic benefits in terms of the REIPPPP Economic Development requirements, which includes a BBBEE scorecard on which wind projects are evaluated.	n/a

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taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?			
What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?		Construction, operation and decommissioning of the proposed development will be done according to environmental health and safety legislative requirements and applicable guidelines.	n/a
What measures were taken to:	*ensure the participation of all interested and affected parties,*	Public participation is being undertaken according to NEMA: EIA Regulations (2014) as amended and DFFE (2017) Public Participation Guidelines.	Section 9; Volume III
	provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,	The PPP is being undertaken in terms of legislative requirements and best practise guidelines. All notifications are provided in English and Afrikaans. Further languages are made available upon request.	Section 9; Volume III
	ensure participation by vulnerable and disadvantaged persons,	The PPP is being undertaken according to best practise guidelines and regulatory requirements; Notification of initiation of the PPP was provided in all required channels, i.e. newspaper adverts, site notices, local posters and written notifications.	Section 9; Volume III
	promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of	The proposed development fits into the various planning policies and the implementation of a Community Trust will assist the local strategies, including improving education facilities and youth development.	Vol II: Social Impact Assessment

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	knowledge and experience and other appropriate means,		
	ensure openness and transparency, and access to information in terms of the process,	Legislative requirements and best practice guidelines are followed throughout the process. The PPP is being undertaken in terms of legislative requirements and best practise guidelines.	Section 9; Volume III
	ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge, and	A PPP is being undertaken in terms of legislative requirements and best practise guidelines. A Social Impact Assessment forms part of the Scoping & EIA process. The independent Social Specialist ensures that all needs and values are taken into account.	Section 9; Volume III: Social Impact Assessment
	ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein were be promoted?	The Social Impact Assessment and PPP that are conducted according to legislation and guidelines ensure that women and youth are recognised and involved in the process. REIPPPP requirements place specific responsibilities on IPPs in terms of women and youth development.	Section 9; Volume III: Social Impact Assessment
Considering the interests, needs and values of all the interested and affected parties, describe how the		The proposed WEF has a good planning fit with all applicable policies and will result in substantial local socio-economic opportunities.	Volume II:

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development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?		The key challenges facing the region are poverty and inequality and a shortage of skills. As such the proposed development will be of benefit to the local area by creating job and business opportunities, particularly for unskilled and semi-skilled local workers.	Social Impact Assessment
What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?		Future workers on the proposed development will be educated on their rights to refuse work.	n/a
Describe how the development will impact on job creation in terms of, amongst other aspects:	*the number of temporary versus permanent jobs that will be created,*	An estimated 200-250 temporary employment opportunities will be created for 18 - 24 months during the construction phase. Approximately 20 full time employment opportunities will be created for the operational phase of the proposed development.	Volume II: Social Impact Assessment
	whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),	Members from the local communities in Emvelo would qualify for a percentage of low skilled and semi-skilled employment opportunities and several skilled opportunities. Most of these employment opportunities will accrue to Historically Disadvantaged (HD) members from the local community. Given relatively high local unemployment levels and limited job opportunities in the area, this will represent a significant, if localised, social benefit.	Volume II: Social Impact Assessment

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	the distance from where labourers will have to travel,	It is expected that most workers will reside in the nearby towns Sheepmoor and Ermelo.	Volume II: Social Impact Assessment
	the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits), and	Members from the local communities in Emvelo would qualify for some of the low skilled and semi-skilled employment opportunities and several skilled opportunities. The Most of these employment opportunities will accrue to Historically Disadvantaged (HD) members from the local community. Given relatively high local unemployment levels and limited job opportunities in the area, this will represent a social benefit. It will also be possible to increase the number of local employment opportunities through the implementation of a skills development and training programme linked to the operational phase. A percentage of the monthly wage bill earned by permanent staff would be spent in the regional and local economy. This will benefit local businesses in the relevant towns. The benefits to the local economy will extend over the anticipated 20-year operational pl of the project. The local hospitality industry is also likely to benefit from the operational phase. These benefits are associated with site visits by company staff members and other professionals (engineers, technicians etc.) who are involved in the company and the project but who are not linked to the day-to-day operations. Procurement during the operational phase will also create opportunities for the local economy and businesses.	Volume II: Social Impact Assessment

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	the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	The construction phase will extend over a period of approximately 18-24 months and create in the region of 200-250 employment opportunities that will benefit members from the local communities in the area	Volume II: Social Impact Assessment
What measures were taken to ensure:	*that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment, and*	All applicable planning policies and legislation were considered. The proposed development fits with all planning policies. Organs of State were pre-identified and registered on the I&AP database and these were updated, if required, as the development phases have progressed.	Volume I: EIA Report Volume III: PP Report
	that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	As registered I&APs all public correspondence including notifications of reports availability are provided.	Volume III: PP Report
What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?		The proposed development aims to uphold the principles of sustainable development. The project team consists of suitably qualified individuals that comply with all legal requirements.	Volume I: EIA Report Volume II: Specialist Reports

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Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	Specialist mitigation measures were identified during the EIA process and provided in the EIAr and EMPr. These measures are realistic and should they change, the EMPr must be submitted to the Department and made available for public to review and comment.	Volume I: Appendix B: EMPr
What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	An EMPr is submitted with EIAr. The EMPr is a legally binding document, which when enforced during construction, operational or decommissioning phases, hold the applicant or their representative liable for any remedial actions as a result of negligence.	Volume I: Appendix B: EMPr
Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	The alternative selection process includes the assessment of the No Development alternative, site alternatives, design layout alternatives and technology alternatives.	Section 7

"promoting justifiable economic and social development"[7]		
Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?	Cumulative impact on sense of place The potential cumulative impacts on the area's sense of place will be largely linked to potential visual impacts. In this regard the Scottish Natural Heritage study (2005) describes a range of potential cumulative landscape impacts associated with wind farms on landscapes. The relevant issues identified by Scottish Natural Heritage study include: • Combined visibility (whether two or more wind farms will be visible from one location). • Sequential visibility (e.g., the effect of seeing two or more wind farms along a single journey, e.g., road or walking trail). • The visual compatibility of different wind farms in the same vicinity. • Perceived or actual change in land use across a character type or region. • Loss of a characteristic element (e.g., viewing type or feature) across a character type caused by developments across that character type. The National Wind Farm Development Guidelines, DRAFT - July 2010, Environment Protection and Heritage Council (EPHC), Commonwealth of Australia and each Australian State and Territory) also note that cumulative impacts need to be considered in relation to dynamic as well as static viewpoints. The experience of driving along a tourist road, for example, needs to be considered as a dynamic sequence of views and visual impacts, not just as the cumulative impact of several developments on one location. The viewer may only see one renewable energy facility and the associated infrastructure at a time, but if each successive stretch of the road is dominated by views of renewable energy facilities, then that can be argued to be a cumulative visual impact	Volume II: Social Impact Assessment

"promoting justifiable economic and social development"[7]		
	The establishment of the WEF and other WEFs in the area will create the potential for combined and sequential visibility impacts. However, as indicated above, the area has been impacted by the Camden Power Station and associated transmission lines and large-scale coal mining. The findings of the Visual Impact Assessment (VIA) undertaken by GYLA (February 2025) indicate the significance of the cumulative impact of these projects on the visual environment during their operational phase is assessed to have a high magnitude and over the long-term. The probability of the unmitigated impact is high resulting in a predicted significance of impact as High Negative. The implementation of mitigation measures and that receptor sensitivity to the project is low could reduce the anticipated impact, to Medium Negative. Based on the findings of the VIA, the author notes that the project is deemed acceptable from a visual perspective.	

5.1 THE NEED AND DESIRABILITY OF RENEWABLE ENERGY FACILITIES

Renewable Energy Facilities play a role in mitigating or reducing climate change, addressing South Africa's energy resource constraints, and producing low-cost energy. In addition, operating these facilities in South Africa contribute significantly to the economic development of the areas in which they are located through the requirements of the REIPPPP adjudication process. This section of the report highlights the national, provincial, and local plans and policies that are in support of renewable energy facilities. Throughout this section, it is demonstrated that at all levels of governance and policy supports the development of renewable energy in order to address energy supply issues, and to promote economic growth in South Africa.

5.1.1 CLIMATE CHANGE, DIVERSIFICATION AND DECENTRALIZATION OF SUPPLY

The scientific consensus is that climate is changing and that these changes are in large part caused by human activities. Of these human activities, increase in carbon dioxide (CO2) levels due to emissions from fossil fuel combustion is regarded as a significant contributor to anthropogenic climate change. South Africa is one of the world's largest emitters of CO2 in absolute and per capita terms.

The National Climate Change Adaptation Strategy (NCCAS) for The Republic of South Africa Version UE10, 13 November 2019, explains that the South African primary sectors, such as agriculture and mining, which are natural resource dependent are high consumption uses of energy. The NCCAS is adopting a cluster approach to assist with the changing climate conditions and the affect it has on various sectors. An action in support of this proposed development is the approach to "create a more adaptive energy system to reduce dependence on a centralised system and increase distributed generation, especially in rural areas". "This will involve encouraging the development of an adaptive and decentralised energy system so that the system is more resilient to climate disruptions".

Renewable energy projects will play a significant role in meeting the targets of the Paris Agreement and assisting the transition to a low-carbon economy.

According to the Department of Energy's (DoE) total energy supply data of 2018, the primary source of energy in South Africa is coal, which provides approximately 65% of South Africa's energy, followed by crude oil with 18% and renewables with 11%. Natural gas contributes 3% while nuclear energy contributes approximately 2% . Electricity generation is dominated by the state-owned power company Eskom, which currently produces over 95% of the power used in the country.

If the National Development Plan (NDP) future hope is met, by 2030 South Africa will have an energy sector that promotes economic growth and development through adequate investment in energy infrastructure. The DoE Integrated Resource Plan (IRP) for Electricity 2019, was promulgated in October 2019 and replaced the IRP 2010 as the country's official electricity infrastructure plan. It calls for 37 696 MW of new and committed capacity to be added between 2019 and 2030 from a diverse mix of energy sources and technologies as ageing coal plants are decommissioned and the country transitions to a larger share of renewable energy. By 2030, the electricity generation mix is set to comprise of 33 364 MW (42.6%) coal, 17 742 MW (22.7%) wind, 8 288 MW (10.6%) solar photovoltaic (PV), 6 830 MW (8.7%) gas or diesel, 5 000 MW (6.4%) energy storage, 4 600 MW (5.9%) hydro, 1 860 MW (2.4%) nuclear and 600 MW (0.8%) concentrating solar power (CSP). Additionally, a short-term gap at least 2000 MW is to be filled between 2019 and 2022, thereby further raising new capacity requirements, while distributed or embedded generation for own-use is positioned to add 4 000 MW between 2023 and 2030. The IRP is intended to be frequently updated, which could impact future capacity allocations from various energy sources and technologies.

The NDP also includes that South Africa will have an adequate supply of electricity and liquid fuels to ensure that economic activities and welfare are not disrupted, and that at least 95% of the population will have access to grid or off-grid electricity.

A diversification of energy supplies and producers, particularly with respect to renewable energy sources, would lead to greater energy security and economic and environmental benefits. The deployment of various renewable technologies increases the diversity of electricity sources and, through local decentralised generation, contributes to the flexibility of the system and its resistance to central shocks.

According to the International Energy Agency, "renewable energy resources ... exist virtually everywhere, in contrast to other energy sources, which are concentrated in a limited number of countries. Reduced energy intensity, as well as geographical and technological diversification of energy sources, would result in far-reaching energy security and economic benefits."

5.1.2 ECONOMIC DEVELOPMENT AND JOB CREATION

South Africa's energy crisis, which started in 2007 and is ongoing, has resulted in widespread rolling blackouts (referred to as load shedding) due to supply shortfalls. The load shedding has had a significant impact on all sectors of the economy and on investor confidence. The mining and manufacturing sector have been severely impacted and will continue to be impacted until such time as there is a reliable supply to energy. The Minister of Mineral Resources and Energy, Gwede Mantashe, indicated in February 2023 that the cost of load shedding was estimated at R1 billion a day . The South African Reserve Bank indicated in February 2023 that stage 3 and stage 6 loadshedding cost the South African economy between R204 million and R899 million a day.

A survey of 3 984 small business owners in 2019 found that 44% said that they had been severely affected by load shedding with 85% stating that it had reduced their revenue, with 40% of small businesses losing 20% or more or revenue during due to load shedding period.

The REIPPP programme represents the country's most comprehensive strategy to date in achieving the transition to a greener economy. The main economic development (ED) beneficiaries of approved projects are currently communities living within a 50 km radius of renewable energy facilities.

REIPPPP contributes to Broad Based Black Economic Empowerment (BBBEE) and the creation of black industrialists. In this regard, Black South Africans own, on average, 34 % of projects that have reached financial close between bid window (BW) 1 and BW 4, which is 4% higher than the 30% target. This includes black people in local communities that have ownership in the Independent Procurement Programme (IPP) projects that operate in or near their communities and represents the majority share of total South African Entity Participation. The regulations require a minimum ownership of 2.5% by local communities in IPP projects as a procurement condition. This is to ensure that a substantial portion of the investments has been structured and secured as local community equity. An individual community's dividends earned will depend on the terms of each transaction corresponding with the relevant equity share. To date all shareholding for local communities have been structured through the establishment of community trusts. For projects in BW 1 to BW 4, qualifying communities will receive R25.5 billion net income over the life of the projects (20 years). The report notes that the bulk of the money will however only start flowing into the communities from 2028 due to repayment obligations in the preceding years (repayment obligations are mostly to development funding institutions). However, despite the delay this represents a significant injection of capital into mainly rural areas of South Africa. If the net projected income for the first seven bid windows (BW 1 – BW 4) was structured as equal payments overtime, it would represent an annual net income of R1.27 billion per year. Income to all shareholders only commences with operation of the facility. Revenue generated to date by the 85 operational IPPs amounts to R149.9 billion.

In addition to the financial investments into the economy and favourable equity structures aimed at supporting BEE, the REIPPPP also targets broader economic and socio-economic investment. This is through procurement spend and local content.

To date, a total of 63 291 job years have been created for South African citizens, of which 48 110 job years were in construction and 15 182 in operations. These job years should rise further past the planned target as more projects enter the construction phase. Employment opportunities across BW 1 - 4 are 143 % of the planned number during the construction phase (i.e., 33 707 job years), with 6 projects still in construction and employing people. The number of employment opportunities is therefore likely to continue to grow beyond the original expectations. By the end of December 2021, 85 projects had successfully completed construction and moved into operation. These projects created 44 172 job years of employment, compared to the anticipated 30 488. This was 45 % more than planned.

An important focus of the REIPPPP is to ensure that the build programme secures sustainable value for the country and enables local communities to benefit directly from the investments attracted into the area. In this regard, IPPs are required to contribute a percentage of projected revenues accrued over the 20-year project operational life toward socio-economic development (SED) initiatives. These contributions accrue over the 20-year project operation life and are used to invest in housing and infrastructure as well as healthcare, education, and skills development.

The minimum compliance threshold for SED contributions is 1% of the revenue with 1.5% the targeted level over the 20-year project operational life. For the current portfolio of projects, the average commitment level is 2%, which is 101% higher than the minimum threshold level. To date (across BW 1 - 4) a total contribution of R22.8 billion has been committed to SED initiatives. Assuming an even, annual revenue spread, the average contribution per year would be R1.1 billion. Of the total commitment, R18.5 billion is specifically allocated for local communities where the IPPs operate. With every new IPP on the grid, revenues and the respective SED contributions will increase.

In terms of ED and SED spend, education, social welfare, and health care initiatives have a SED focus. IPPs have supported 1 388 education institutions with a total of R437 million in contributions, from 2015 to the end of June 2021. A total of 1 276 bursaries, amounting to R210.8 million, have been awarded by 67 IPPs from 2015 until the end of June 2021. The largest portion of the bursaries were awarded to African and Coloured students (97.4%), with women and girls receiving 56.3% of total bursaries. The Northern Cape province benefitted most from the bursaries awarded, with 57.2%, followed by the Eastern Cape (20.2%) and Western Cape (14.1%). Enterprise development and social welfare are the focus areas that have received the second highest share of the contributions to date.

5.1.3 DIVERSIFICATION AND DECENTRALISATION OF SUPPLY

With its abundant coal supplies, approximately 89% of South Africa's energy needs are currently met through coal-fired generators, with nuclear energy contributing approximately 5% and the balance by pumped storage and hydroelectric (3.6%), renewable energy (2.4%) and gas turbines (0.1%). Electricity generation is dominated by state-owned power company Eskom, which currently produces over 96.7% of the power used in the country.

A diversification of energy supplies and producers, particularly with respect to renewable energy sources, would lead to greater energy security and economic and environmental benefits.

The deployment of various renewable technologies increases the diversity of electricity sources and, through local decentralised generation, contributes to the flexibility of the system and its resistance to central shocks.

According to the International Energy Agency, "renewable energy resources ... exist virtually everywhere, in contrast to other energy sources, which are concentrated in a limited number of countries. Reduced energy intensity, as well as geographical and technological diversification of energy sources, would result in far-reaching energy security and economic benefits."

The renewables programme has resulted in over 6,000 MW of generation capacity being allocated to bidders across a variety of technologies, principally in wind and solar in South Africa. Progress in this regard has been made under the DoE REIPPPP. According to the DoE's Integrated Resource Plan for Electricity 2010-2030, South Africa is aiming to procure 9,200 MW of wind power by 2030.

5.1.4 JUST ENERGY TRANSITION

According to the International Institute for Sustainable Development (IISD) in their 2018 report on "Strategies for Just Energy Transitions," energy transitions entail changes in how energy is generated and utilized, employing various technologies and resources. A low-carbon energy transition specifically denotes a move away from high-carbon energy sources like oil, gas, and coal towards low-carbon and zero-carbon alternatives such as renewables.

A just energy transition is a collaborative vision and process centered on dialogue, underpinned by a set of guiding principles, aimed at transforming energy production and consumption practices. Its goal is to mitigate adverse effects on workers and communities reliant on high-carbon industries slated for decline, while maximizing opportunities for new, sustainable employment in low-carbon sectors. The objective is to ensure an equitable distribution of both the costs and benefits associated with the transition.

Taking action sooner rather than later can render energy transitions more cost-effective and fair, presenting fresh avenues for nations to develop low-carbon sectors. However, breaking free from "carbon lock-in" poses significant challenges, necessitating focused political and media initiatives to expedite just energy transitions. Many nations have already initiated or are in the initial phases of these processes, and based on case studies and research, the following table outlines specific measures governments can adopt to commence or expedite a just energy transition (IISD, 2018).

According to JET IS (2022), the coal plant decommissioning will need R4,1 billion between 2023 and 2027. Coal plant-decommissioning costs reflect what Eskom has currently provided for in its planning. These costs exclude the costs of repurposing or repowering retired plants and other infrastructure investments.

As per the JET IS (2022), the infrastructure investment priorities are:

- To manage the decommissioning of the retiring coal generation fleet, in line with a revised Integrated Resource Plan (IRP), and in tandem with the development of renewable energy generation at scale and pace;
- To timeously strengthen the transmission grid infrastructure to accommodate the shift to renewable energy; and
- To modernise the electricity distribution system.

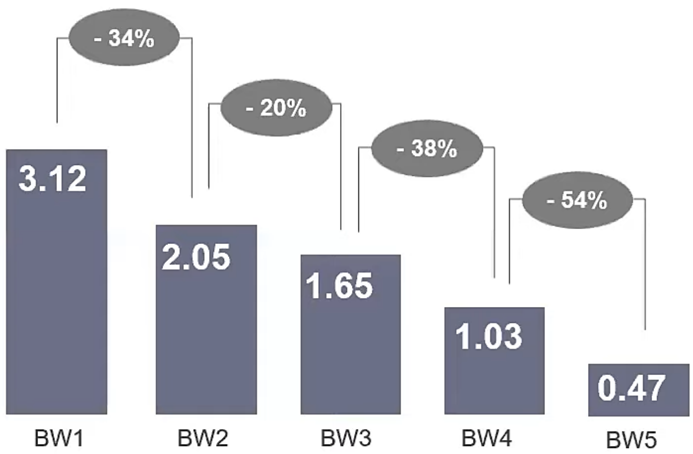
5.2 POLICIES IN SUPPORT OF RENEWABLE ENERGY

The development of renewable energy is strongly supported at a national, provincial, and local level. The development of and investment in renewable energy is supported by the National Development Plan (NDP), New Growth Path Framework and National Infrastructure Plan, which all refer to and support renewable energy. The development of renewable energy is also supported by the Msukaligwa Municipality Spatial Development Framework (MMSDF).

The need and desirability for renewable energy developments play a role in South Africa meeting its energy and climate change targets and provides a socio-economic boost at the local level in areas that are in need of it.

Aside from environmental considerations, investment in renewables have been driven by dramatic reductions in their costs. Figure 5-1 shows this trend and that in the six years between BW 4 and 5, the average price of electricity purchased through the REIPPPP fell by 54% (Magoro, 2021).

FIGURE 5-1 REIPPP AVERAGE BID PRICES IN APRIL 2021 TERMS (MAGARO, 2021)



5.3 NEED AND DESIRABILITY GUIDELINE

Reference is made to the DFFE 2017 Guideline on Need and Desirability[8] which states that while the "*concept of need and desirability relates to the type of development being proposed, essentially, the n and desirability can be explained in terms of the general meaning of its two components in which need refers to time and desirability to place – i.e. is this the right time and is it the right place for locating the type of land-use/activity being proposed? Need and desirability can be equated to wise use of land – i.e. the question of what is the most sustainable use of land*."

The guidelines pose questions that should be considered in this investigation, which will be addressed in EIA Phase.

[8]DEA (2017) Guideline on Need and Desirability. Department of Environmental Affairs (DEA), Pretoria, South Africa, ISBN: 978-0-9802694-4-4.

6. DESCRIPTION OF THE BASELINE ENVIRONMENT

In order to evaluate the potential environmental impacts, information relating to the existing environmental conditions or baseline environment is collected through field and desktop research. The baseline environment also extends into the future, although predictions of any changes can involve a high number of variables and may be subject to potentially large uncertainties. As a result, in most cases, the baseline is assumed to remain unchanged throughout the operation of the development. Where this is not the case, this is stated.

The baseline environment has been used to identify any potential sensitive receptors on and near the site, and it is used to assess what changes may take place during the construction, operation and decommissioning phases of the development and the effects, if any, that these changes may have on these receptors.

Within each technical assessment, the methods of data collection are discussed with the relevant specialists. Data is also collected from public records and other archive sources and where appropriate, extensive field surveys are carried out. The timing/seasonality of the work within the study area is also outlined within each assessment where applicable.

6.1 REGIONAL AND LOCAL CONTEXT

The study area is located within the Msukaligwa Municipality (MM) within the Mpumalanga Province. The MM is one of the seven Local Municipalities that make up the Gert Sibande District Municipality (GSDM).

The MM is a Category B municipality, established in 2001 following the completion of the demarcation process and first democratic local government election in 2000.

It is one of the seven local municipalities in Gert Sibande District Municipality. It was an amalgamation of the erstwhile Ermelo Transitional Council (TLC), Breyten TLC, Chressiemeer Transitional Rural Council (TRC), Lothair TRC, Davel TRC and Sheepmoor TRC.

6.2 BIOPHYSICAL CHARACTERISTICS

6.2.1 TOPOGRAPHY AND TERRAIN

The lower lying areas of the site and surrounding area fall within a gently to moderately undulating plains supporting short dense grassland (Eastern Highveld Grassland, impacted upon to various degrees over much of the area) dominated by the usual highveld grass composition, with small, scattered rocky outcrops with wiry, sour grasses and some woody species. Several herbs and forbs are also common to the unit. The area has high levels of transformation, primarily agriculture and mining (coal) with small wetlands, narrow stream alluvia and pans.

The above plains are interspersed with a mountainous escarpment just north of Sheepmoor to the south-east, west and east, comprised of low mountains and undulating plains with the vegetation comprising predominantly short montane grasslands (Wakkerstroom Montane Grassland) on the plateaus and the relatively flat areas, with short forest and Leucosidea thickets occurring along steep, mainly east-facing slopes and drainage areas. Leucosidea sericea is the dominant woody-pioneer species that invades areas because of grazing mismanagement. Acacia (wattle) and Eucalyptus thickets are also prevalent as well as commercial forestry across the units.

6.3 CLIMATE CONDITIONS

Msukaligwa Municipality falls under the central Mpumalanga climatic zone characterized by warm, rainy summers and dry winters with sharp frosts. Rainstorms are often violent (up to 80 mm per day) with severe lightning and strong winds, sometimes accompanied by hail. The winter months are droughty with the combined rainfall in June, July and August making up only 3.9% of the annual total (734 mm). The average daily maximum temperature in January (the hottest month) is 25.2°C and in July (the coldest month) is 16.7°C. Due to its position near the escarpment, the area is somewhat windier than is typical for the South - Eastern Mpumalanga Highveld, although the majority of winds are still light, and their direction is controlled by topography.

Table 6-1 below indicates the climatic conditions of the proposed Emvelo Wind Energy Facility.

TABLE 6-1 CLIMATIC CONDITIONS OF THE PROPOSED EMVELO WEF

	Parameter	**Value**
Climate	Köppen-Geiger climate description (Beck et al, 2018)	Temperate, dry winter, hot summer
	Mean Annual Rainfall (mm) (Schulze, 2009)	667
	Reference Crop Evaporation Annual Total (mm) (Schulze, 2009)	1,207
	Climate capability classification (out of 9) (DAFF, 2017)	6 (moderate-high)

6.4 GEOLOGY

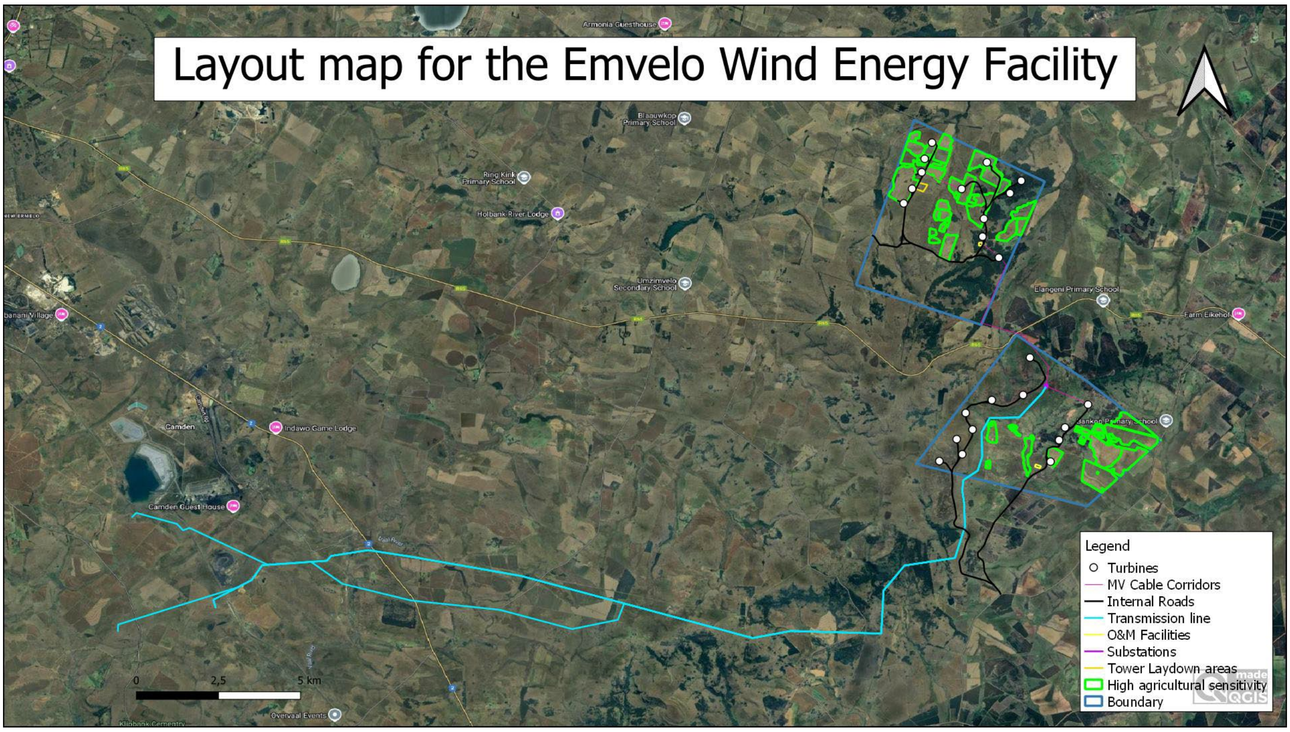
Msukaligwa Local Municipality is underlain predominantly by arenite and dolerite intrusions of the Karoo Supergroup. Other underlying rock types include quartz monzonite, granite and basalt. The central-western part of the study area is underlain by the Ermelo coal field, where the predominant rocks are sedimentary, i.e., sandstones, shales and siltstones of the Ecca Group that contains erinaceous strata of the coal-bearing Vryheid formation.

6.5 SOIL, LAND USE AND AGRICULTURAL POTENTIAL

The site falls within an area that is classified as a Protected Agricultural Area. A Protected Agricultural Area is a demarcated area in which the climate, terrain, and soil are generally conducive for agricultural production and which, historically, has made important contributions to the production of the various crops that are grown across South Africa. Within Protected Agricultural Areas, the protection, particularly of arable land, is considered a priority for the protection of food security in South Africa. However, there may be much variation within a Protected Agricultural Area and all land within it is not necessarily of sufficient agricultural potential to be suitable for crop production, due to site-specific terrain, soil, and other constraints. All land within a Protected Agricultural Area is therefore not necessarily worthy of prioritised protection as agricultural production land.

There are no existing impacts on the site that are relevant to agricultural impact.

FIGURE 6-1 SATELLITE IMAGE MAP OF THE ASSESSED AREA



AGRICULTURAL PRODUCTION POTENTIAL

In general, the soils across more than half of the site have insufficient capability for viable crop production and those on the remaining proportion are suitable for viable cropping. Soil limitations that prevent crop production are predominantly the result of limited depth due to underlying bedrock, clay, or hardpan, or the result of poor drainage. The crop-suitable versus unsuitable soils have been identified over time through trial and error. All the deep, well-drained, suitable soils are generally cropped and uncropped soils that are used for grazing can fairly reliably be considered to have various limitations that make them unsuitable for crop production.

In general, the agricultural production potential of the site is high, and it is within an area that makes a significant contribution to food production in the country. Due to the favourable climate, crop yields are high on the suitable soils with average maize yields of around 7 tons per hectare according to the farmers on site.

It should be noted that cropping potential changes with a changing agricultural economy over time. Poorer soils that may have been cropped with economic viability in the past, are abandoned as cropland because they become too marginal for viable crop production in a more challenging agricultural economy, with increased input costs.

6.6 NOISE

Most dwellings featuring in the vicinity of the project focus area are scattered in a heterogeneous fashion, typical of a rural farming area. Land use within the PFA is residential, wilderness (including ecotourism), some dryland crops (including forestry activities) and animal husbandry.

Noise sources are associated with typical household activities and associated agricultural activities. Noise from these sources will not be investigated or considered in this environmental noise impact assessment (ENIA).

The R65 transects the PFA in the north, though traffic on this road is generally very low. Noise from vehicular traffic will not be considered in this ENIA report. There are a number of small access roads leading from the R65, mainly to serve the farmers in the area. Traffic volumes on these small access roads are low and will be of no acoustical significance. Noise from vehicular traffic will therefore not be considered in this Environmental Noise Impact Assessment (ENIA) report

Potential noise-sensitive developments, receptors and communities (NSRs) were identified using tools such as Google Earth® up to a distance of 2,000 m from the project boundary.

Generally, noises from wind turbines:

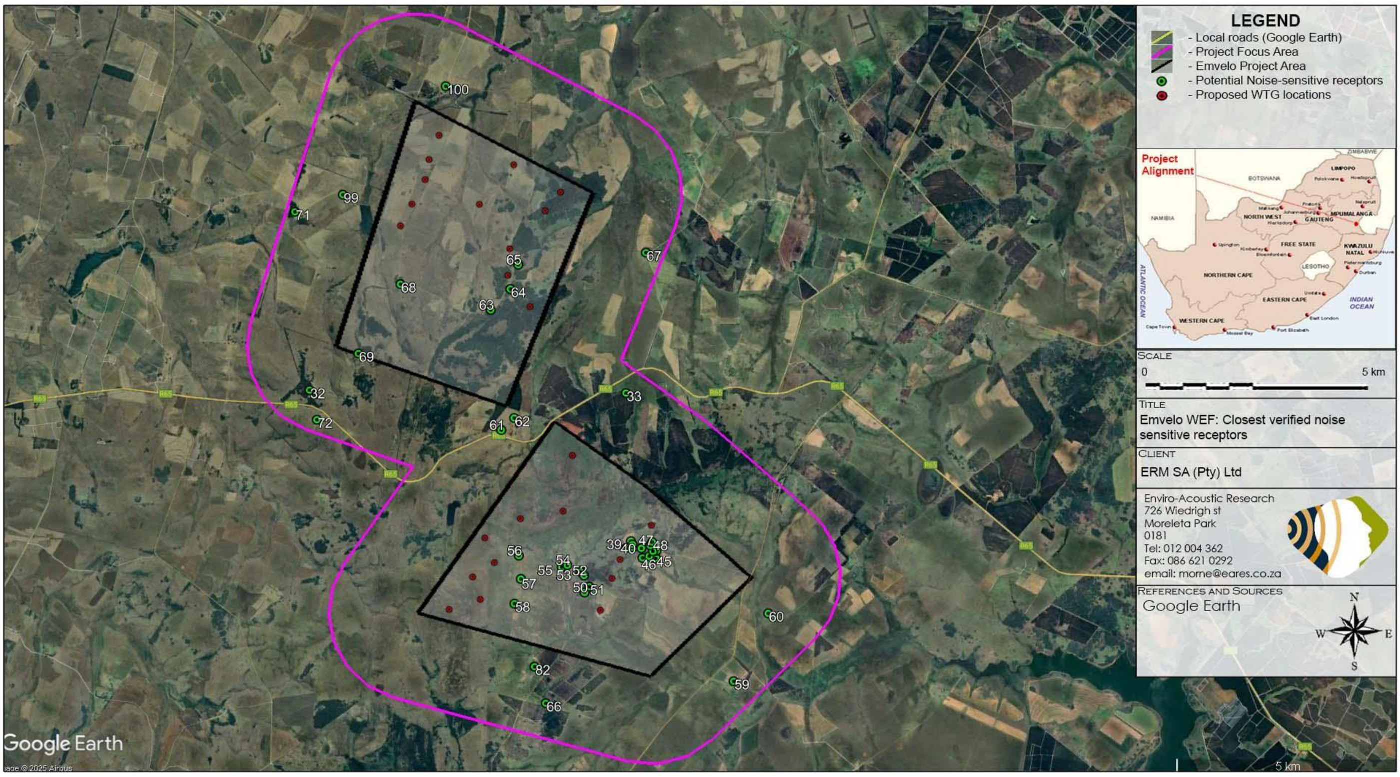
- could be significant within 500 – 800 m (depending on the WTG layout and the PWL of the WTG), with receptors[2] staying within 500 m from operational WTG subject to noises at a potentially sufficient level to be considered disturbing;
- are normally limited to a distance of approximately 1 000 – 1 500m from operational WTG (although this is subject to WTG layout[3] as well as the PWL of the WTG). Night- time ambient sound levels could be elevated and the potential noise impact measurable to significant; and
- likely to be audible up to a distance of 2,500m at night. Noises from the WTG are of a low concern at distances greater than 2,500m, although the sound of the WTGs may be audible at greater distances during certain metrological phenomena.

Considering the average fast-weighted sound level data collected in the area:

- daytime fast-weighted sound levels ranged from 24 to more than 70 dBA, with average daytime sound levels being 43.3 dBA. This is typical of a rural noise district and considering the developmental character, a rating level of 45 dBA (typical of a rural noise district) will be assumed for the daytime period; and
- night-time fast-weighted sound levels ranged from 21 to more than 58 dBA, with average night-time sound levels being 37.3 dBA. This is typical of a rural to suburban noise district, with a typical rating level of 35 dBA.

Significant ambient sound level data are available for the area, with this data also consulted to augment the data measured for this project.

FIGURE 6-2 STUDY AREA AND POTENTIAL NOISE-SENSITIVE RECEPTORS CLOSE TO EMVELO WEF



6.7 FRESHWATER AND WETLANDS (AQUATICS)

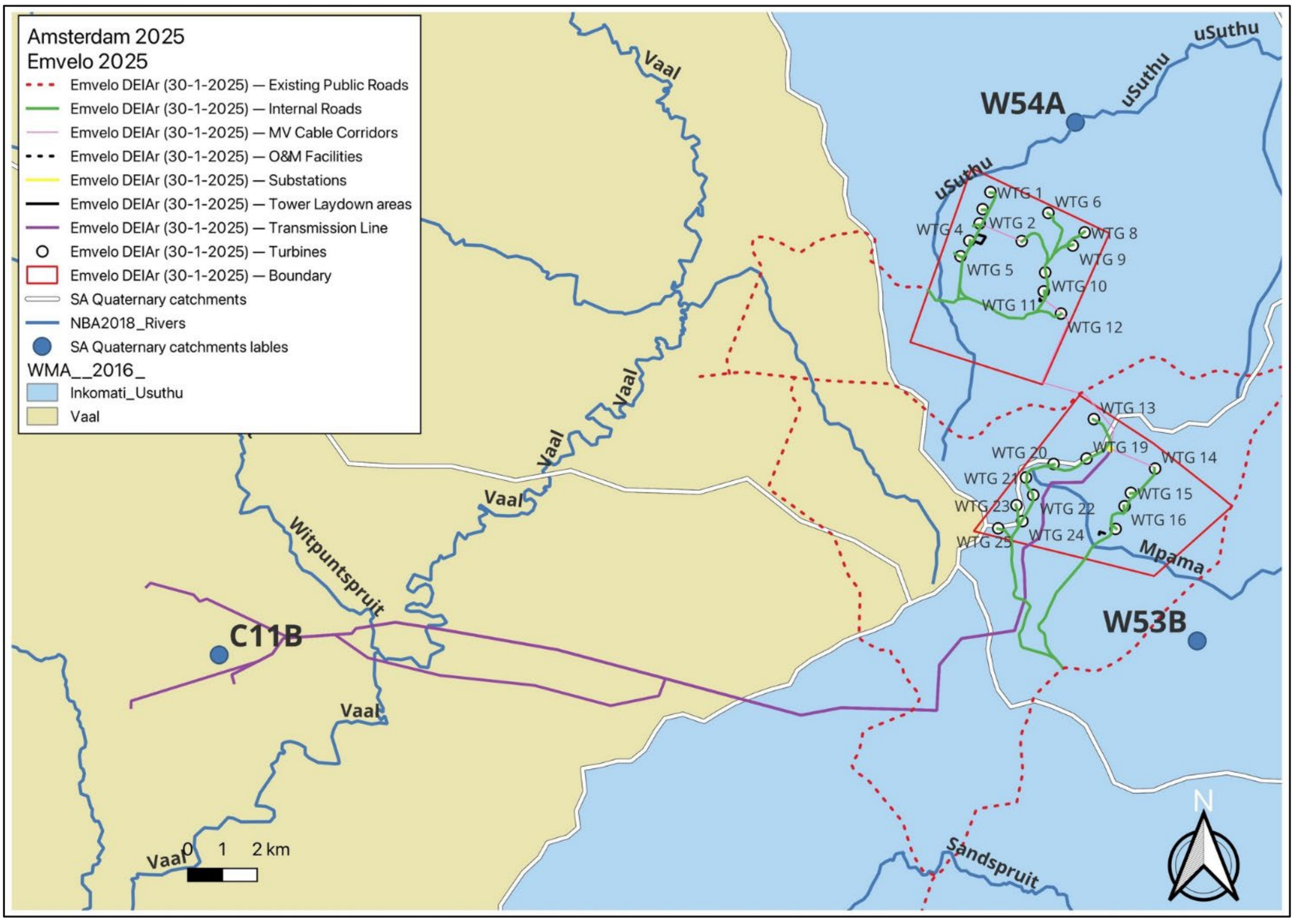
The baseline description was a summer and winter survey of the study area conducted in February/March 2022 (late summer) and a site-specific assessment in April (Autumn) & September (Later winter/spring) 2023.

The area typically recieves majority of its rainfall in early January into February.

The study area was dominated by a variety of aquatic features associated with catchments and rivers, characterised as follows:

- Mainstem Rivers: Floodplain dominated systems with floodplain wetlands (Figure 6-3). A few reaches did contain very narrow riparian zones, consisting mostly of a single row of willow trees associated with the Vaal River
- Valley Bottom Wetlands (Channelled and Unchanneled)
- Endorheic pans
- Seep wetlands

FIGURE 6-3 PROJECT LOCALITY MAP INDICATING THE VARIOUS QUATERNARY CATCHMENT BOUNDARIES (WHITE LINES) IN RELATION TO THE STUDY AREA (SOURCE DWS AND NGI)



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The proposed Wind Energy Facility (WEF) is located in the Inkomati-Usuthu Water Management Area, within the upper catchment of the Usuthu River (SQ W54A) and Mpama Rivers (SQ W53B), while the proposed grid connection options are located in the Upper Vaal River (SQ C11A & C11B) in the Vaal Water Management Area. Thus, several permanent rivers and a variety of wetland hydrogeomorphic types are anticipated both associated with the riverine valleys and bench or plateaux areas located between river valleys on higher lying areas (Figure 6-3

The study region is further characterised by several National Biodiversity Assessment (2018) Wetland Clusters, National Freshwater Ecosystem Area (NFEPAs) and Strategic Water Resources Areas.

The geology is mostly shales or sandstone of the Vryhied Group, with several intrusions associated with dolerite sills and dykes in areas associated with the Karoo Supergroup. This typically allows for the development of riverine areas, some with floodplains, interspersed by the rocky inselbergs and small ridges and or bench / plateaus observed.

Overall, these catchment and subsequent rivers / watercourses and wetlands range from a Largely Natural to transformed states. Current impacts occur in localised areas and included the following:

- Mining

- Large scale farming
- Forestry
- Erosion due small road crossings and tracks;
- Grazing; and
- Small to large river impoundments, and off channel farm dams.

In terms of the National Freshwater Ecosystems Priority Areas (NFEPA) assessment, all the watercourses within the site have been assigned a condition score of C (Nel et al. 2011), indicating that they are Moderately Modified, but still have biological significance, while the NBA (2018) data indicated that most mainstem system near the WEF, had a River Conservation Score of B (Usuthu) and B on the Vaal River. These scores were substantiated by observations made in the field within the study area, and due to the impacts or disturbance observed these scores would be upheld. The final EIA report will be supplied with more detailed analysis of the respective systems once the proposed layout has been refined, as there are just too many systems to assess individually at this stage.

Any ratings will the also be substantiated with an assessment of the study area catchments linked to Critical Biodiversity Areas (CBA) and Ecological Support Areas, as shown in the Mpumalanga CBA spatial data.

The National Freshwater Ecosystems Priority Areas (NFEPA) (Nel *et al*., 2011), also earmarked sub-quaternaries, based either on the presence of important biota (e.g. rare or endemic fish species) or conversely the degree of riverine degradation, i.e. the greater the catchment degradation the lower the priority to conserve the catchment. The important catchments areas are then classified as Freshwater Ecosystems Priority Areas (FEPAs). The study area falls within several FEPA and Upstream FEPA catchments associated with the Usuthu & Vaal river systems. This is large due to the presence of several important fish and aquatic invertebrate habitats that as well as the provision and maintenance of flows within the lower catchments.

Notably the following fish are commonly found in the study areas systems (Freshwater Biodiversity Information System - FBIS):

Fish Taxon	Conservation status
Enteromius anoplus (Weber, 1897)	Least concern
Enteromius pallidus (Smith, 1841)	Least concern
Enteromius paludinosus (Peters, 1852)	Least concern
Pseudocrenilabrus philander (Weber, 1897)	Least concern

The FBIS site data from 44 sites (https://freshwaterbiodiversity.org/map/#search//taxon=&search=&siteId=&collector=&category=&yearFrom=&yearTo=&months=&boundary=&userBoundary=&) spanning the study area also indicated a total of 200 aquatic invertebrate species, none currently listed as conservation needy as well as the following aquatic plants that were confirmed in this assessment.

Plant Taxon	Conservation Status
Agrostis continuata Stapf	Not evaluated
Andropogon eucomus Nees	Least concern
Andropogon lacunosus J.G.Anderson	Least concern
Arundinella nepalensis Trin.	Not evaluated
Berula thunbergii (DC.) H.Wolff	Least concern
Brachiaria bovonei (Chiov.) Robyns	Least concern
Carex rhodesiaca Nelmes	Least concern
Chironia purpurascens (E.Mey.) Benth. & Hook.fil.	Least concern
Crinum bulbispermum (Burm.f.) Milne-Redh. & Schweick.	Least concern
Cyperus denudatus L.f.	Least concern
Cyperus macranthus Boeckeler	Not evaluated
Cyperus melanospermus (Nees) Valck.Sur.	Not evaluated
Cyperus nitidus Lam.	Not evaluated
Denekia capensis Thunb.	Not evaluated
Drosera collinsae N.E.Br. ex BurttDavy	Least concern
Echinochloa jubata Stapf	Least concern
Eleocharis dregeana Steud.	Least concern
Eleocharis limosa (Schrad.) Schult.	Least concern
Festuca caprina Nees	Not evaluated
Fimbristylis complanata (Retz.) Link	Least concern
Fuirena pubescens (Poir.) Kunth	Least concern
Geranium multisectum N.E.Br.	Least concern
Geranium wakkerstroomianum R.Knuth	Least concern
Gladiolus papilio Hook.f.	Not evaluated
Gunnera perpensa L.	Least concern
Hesperantha hygrophila Hilliard & B.L.Burtt	Least concern
Isolepis costata Hochst. ex A.Rich.	Not evaluated
Juncus effusus L.	Least concern
Juncus oxycarpus E.Mey. ex Kunth	Least concern
Lagarosiphon muscoides Harv.	Least concern
Leersia hexandra Sw.	Least concern

Plant Taxon	Conservation Status
Limosella major Diels	Least concern
Miscanthus junceus (Stapf) Pilg.	Least concern
Nymphoides thunbergiana (Griseb.) Kuntze	Least concern
Odontelytrum abyssinicum Hack.	Least concern
Ornithogalum flexuosum (Thunb.) U.Müll.-Doblies & D.Müll.-Doblies	Not evaluated
Pennisetum macrourum Trin.	Least concern
Persicaria decipiens (R.Br.) K.L.Wilson	Least concern
Persicaria madagascariensis (Meisn.) S.Ortiz & Paiva	Not evaluated
Pterygodium nigrescens (Sond.) Schltr.	Least concern
Ranunculus multifidus Forssk.	Least concern
Rhynchospora brownii Roem. & Schult.	Least concern
Rorippa nudiuscula (E.Mey. ex Sond.) Thell.	Least concern
Sacciolepis typhura (Stapf) Stapf	Least concern
Schoenoplectus muriculatus (Kük.) Browning	Not evaluated
Schoenoplectus paludicola (Kunth) J.Raynal, 1976	Least concern
Typha capensis (Rohrb.) N.E.Br.	Not evaluated
Veronica anagallis-aquatica L.	Not evaluated
Xyris gerrardii N.E.Br.	Least concern

FIGURE 6-4 VARIOUS WATERBODIES IDENTIFIED IN THE NATIONAL WETLAND INVENTORY V5.2 (2020)

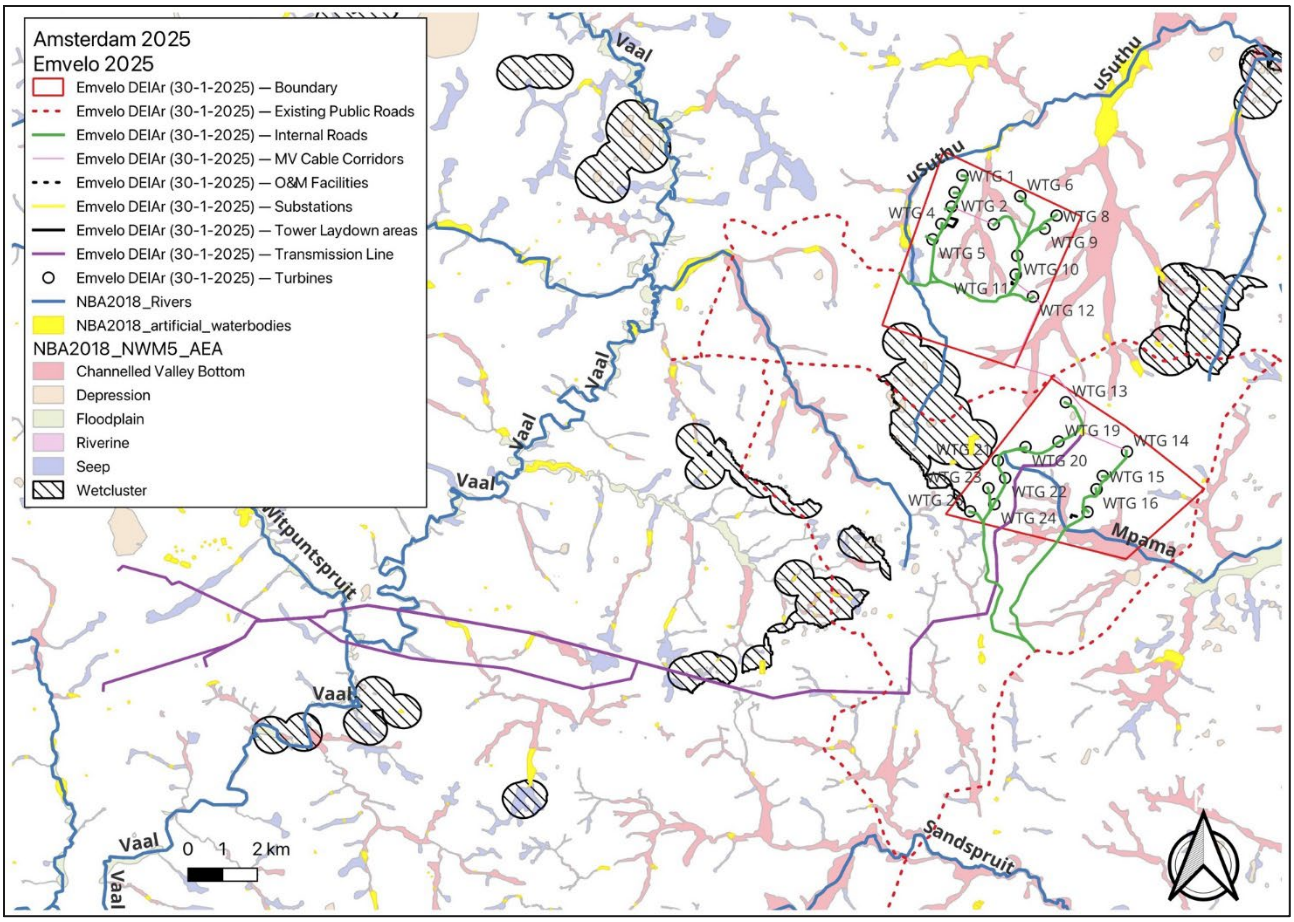


FIGURE 6-5 THE RESPECTIVE SUBQUATERNARY CATCHMENTS RATED IN TERMS OF FRESHWATER ECOSYSTEM PRIORITY AREAS (FEPAS) AND STRATEGIC WATER RESOURCE AREAS IN RELATION TO THE STUDY AREA

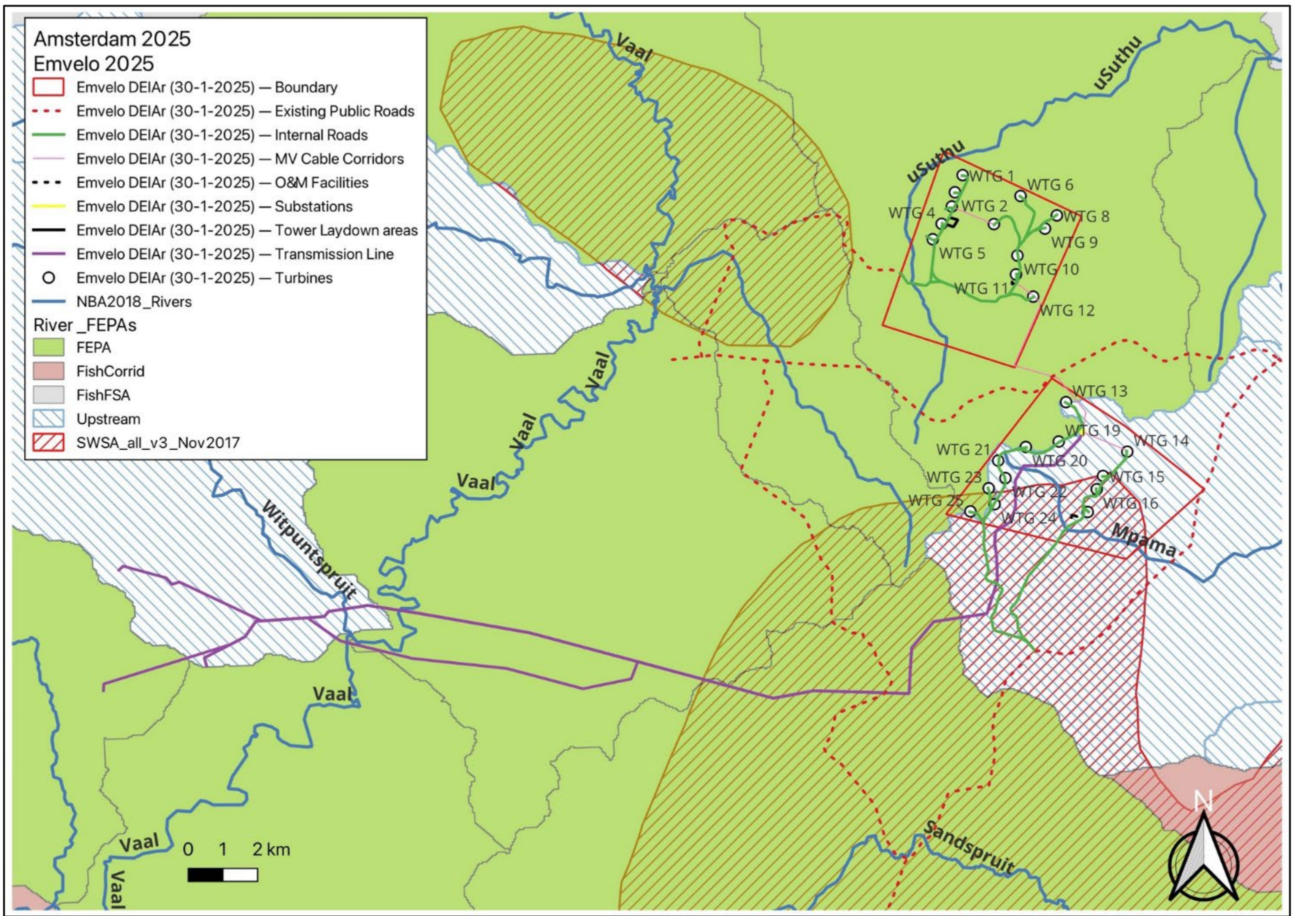
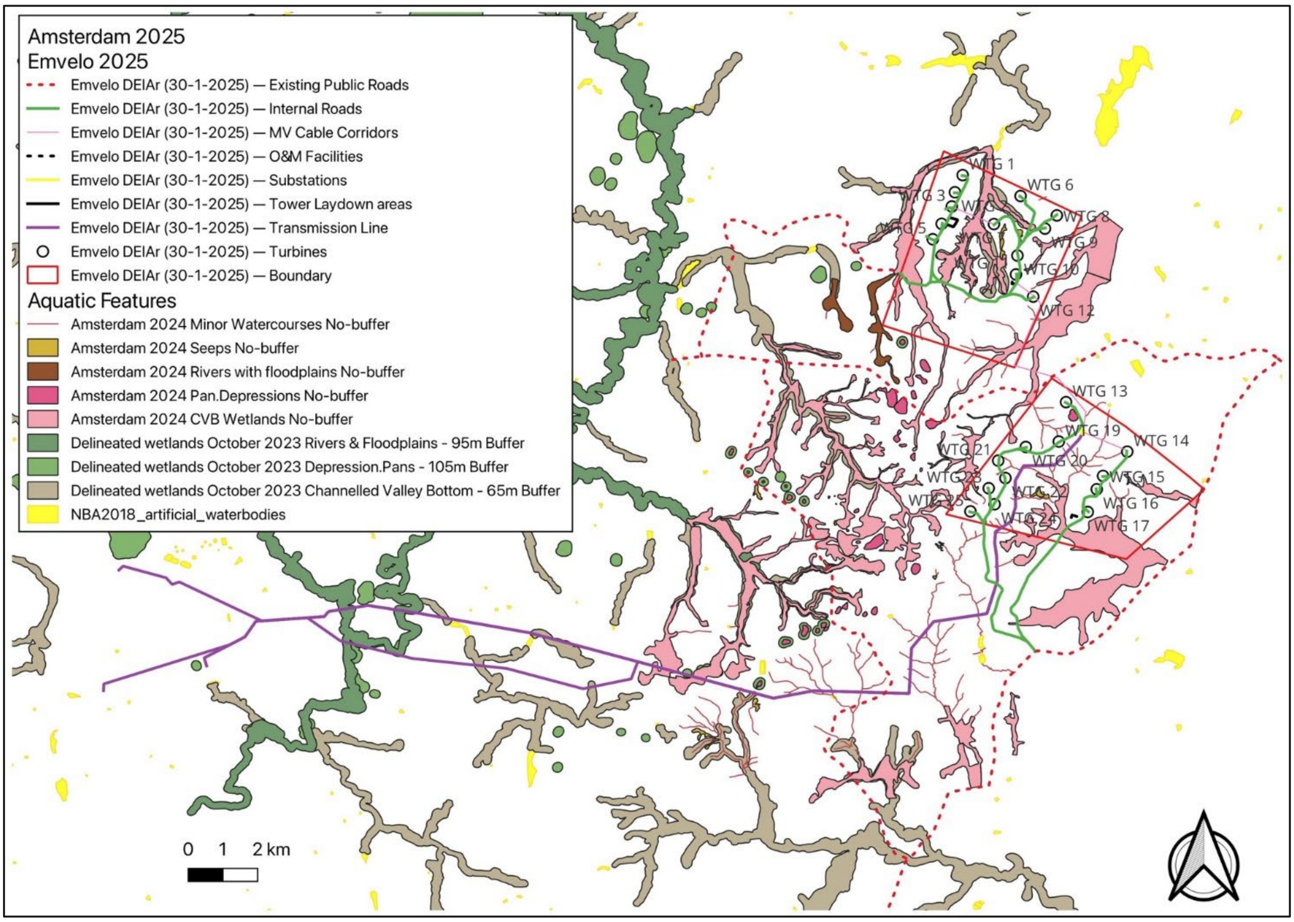


FIGURE 6-6 THE CONFIRMED WATERCOURSES AND WETLANDS WITHIN THE STUDY AREA



The Present Ecological State scores (PES) for the main watercourses in the study area were rated as follows (DWS, 2014 – where B = Largely Natural and C = Moderately Modified):

Subquaternary Catchment Number	Present Ecological State	Ecological Importance	Ecological Sensitivity
1630	B	Moderate	High
1710	B	Moderate	High
1678	C	High	Moderate
1693	C	High	High
1770	C	High	High

These scores were substantiated by observations made in the field within the study area, and due to the overall lack of impacts or disturbance these scores for each of the watercourses within the site should be upheld.

6.8 TERRESTRIAL BIODIVERSITY (FLORA AND FAUNA)

TOPOGRAPHY AND DRAINAGE

The project area consists of gently to moderately undulating landscape on the Highveld plateau supporting short to medium-high, dense, tufted grassland, interspersed with various levels of impact from agriculture and alien invasives. Where not disturbed scattered small wetlands, narrow stream alluvia, pans and occasional ridges or rocky outcrops are present.

TERRESTRIAL LANDSCAPE FEATURES OVERVIEW

The lower lying areas of the site and surrounding area fall within a gently to moderately undulating plains supporting short dense grassland (Eastern Highveld Grassland) dominated by the usual highveld grass composition (*Aristida, Digitaria, Eragrostis, Themeda, Tristachya* etc.) with small, scattered rocky outcrops with wiry, sour grasses and some woody species (*Acacia caffra, Celtis africana, Diospyros lycioides subsp lycioi¬des, Parinari capensis, Protea caffra, P. welwitschii* `and *Rhus magalismontanum*). Several herbs and forbs are also common to the unit. The area has high levels of transformation, primarily agriculture and mining (coal) with small wetlands, narrow stream alluvia, pans.

The above plains are interspersed with a mountainous escarpment just north of Sheepmoor to the south-east, west and east, comprised of low mountains and undulating plains with the vegetation comprising predominantly short montane grasslands (Wakkerstroom Montane Grassland) on the plateaus and the relatively flat areas, with short forest and *Leucosidea* thickets occurring along steep, mainly east-facing slopes and drainage areas. *Leucosidea* sericea is the dominant woody-pioneer species that invades areas because of grazing mismanagement. *Acacia* (wattle) and Eucalyptus thickets are also prevalent as well as commercial forestry across the units.

PRIMARY VEGETATION AND HABITAT

Vegetation has been mapped and is comprised of the following:

- Highveld Grassland
- Degraded Highveld
- Montane Grassland
- Degraded Montane Grassland
- Riparian/Riverine/Wetlands
- Secondary/Degraded/Old Lands
- Invaded/Cleared Invaded
- Cultivated/Transformed
- Dams

This overall landscape offers suitable habitat for a limited suite of animal species, although many animals have likely been displaced significantly by people and activities in the grassland areas. Other more cosmopolitan species are likely less affected. Specific Faunal or animal assessment is reported separately by faunal specialists. A breakdown of the approximate areas of the above vegetation communities (habitat) is provided below (Table 6-2).

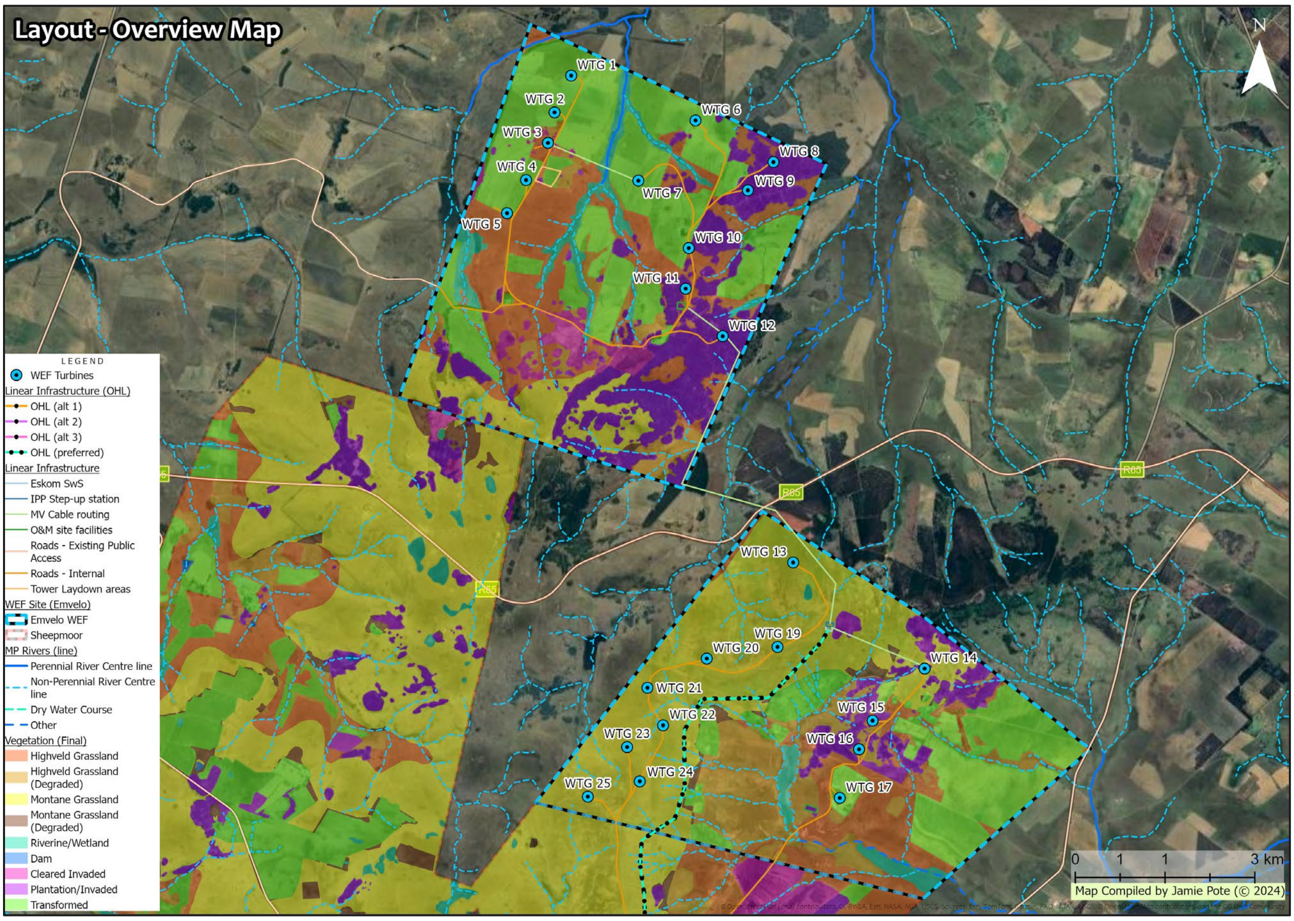
TABLE 6-2 VEGETATION COMMUNITY AREAS (EMVELO)

VEGETATION	AREA (HA)	PERCENT AREA
Transformed	1 283.7	27.6%
Montane Grassland	1 166.2	25.1%
Highveld Grassland	782.1	16.8%
Plantation/Invaded	672.2	14.5%
Highveld Grassland (Degraded)	437.3	9.4%
Riverine/Wetland	181.8	3.9%
Cleared Invaded	94.2	2.0%
Montane Grassland (Degraded)	24.9	0.5%
Dam	1.8	0.0%
	4 644.1	100.00%

Notably, transformed areas, primarily cultivated lands constitute 27.6 % and Montane Grassland 25.1 %. Remnant intact Highveld Grassland only constitutes 16.8 % and 14.5 % comprises dense invaded thickets. The entire remaining Highveld Grassland (782.1 Ha) on the site constitutes 0.002 % or the entire remaining extent of the vegetation unit (~380 000 Ha or 3 800 km2). Watercourses and wetlands have been delineated based on vegetation characteristics where they form distinct habitat. Being a terrestrial assessment, these might not include the smallest of aquatic features, which will be subject to the aquatic assessment protocols and outside the scope of this terrestrial biodiversity assessment. In terms of ecological processes, all watercourses, including these minor drainage lines, should still be avoided as far as possible, inclusive of buffers as per aquatic assessment. This landscape offers suitable habitat for a limited suite of animal species due to homogenous nature of the vegetation, although animals may have been displaced by to some extent in the grassland areas.

Vegetation is typical and representative of the vegetation unit. Exact composition and levels of disturbance are somewhat variable, dependant on various ecological factors, slope, aspect as well as historical and current land use and fire management practices. Due to having a low conservation status, the Montane Grassland would in principle provide a suitable footprint for the proposed activity, while intact Highveld grassland would provide less opportunity. The optimum approach is thus to limit loss of more sensitive habitat, and/or where unavoidable representative areas should be retained as ecological corridors.

FIGURE 6-7 ON-SITE MAPPED VEGETATION COMMUNITIES AND/OR HABITAT UNITS.



MAPPED VEGETATION

The Emvelo Wind Energy Facility site is situated to the east of Ermelo in Mpumalanga Province (Figure 6-7 On-site mapped vegetation communities and/or habitat units.). Fine scale on site mapping has been undertaken of the discrete vegetation units, communities and habitat utilising various tools including aerial photos (including historical imagery), Landsat land cover maps as well as on site verification. The represented habitats, as outlined above are described in more detail below.

Highveld Grassland

Natural/Near Natural Eastern Highveld Grassland at higher altitudes, mostly used for grazing and crops. Well-represented on the site, with some near natural to pristine remnant patches present, but most of the area has either been transformed or disturbed at some point historically, including areas that are mowed periodically for hay and other fodder resources. More natural habitat tends to be confirmed to slopes where utilisation is less. Rocky outcrops and rocky habitat tends to be uncommon but is present on some slopes and also occasionally present in flat areas where shallower soils are present. Rocky areas tend to not have the elevated diversity that is normally associated with fire refuge outcropping, most likely due to historical utilisation for grazing and possible fire management to promote grasses. Deemed no go where designated Irreplaceable as per regional planning.

Degraded Highveld Grassland

Areas of the above unit that are distinctly degraded through historical use or has been transformed in the distant past where secondary vegetation is established and cannot be conclusively confirmed to be natural or secondary. Compaction tends to be elevated to some extent and areas with shallower soils.

Montane Grassland

Natural/Near Natural Wakkerstroom Montane Grassland at higher altitudes and more prevalent in rocky mountainous areas, so transformation levels are significantly lower. Well-represented on the site, with near natural to pristine being present and common, although most areas show some level of historical utilisation for grazing and also high levels of localised alien tree infestation is prevalent. Rocky habitat including outcrops are present, often on slopes, plateaus and on edges of plateaus, with poor or shallow soils generally having an elevated presence of shrub and herbaceous species. The rocky shrub community is not well represented on the site, but generally has a higher overall non-graminoid diversity and is in a more pristine state in less accessible areas and where not having had dense alien infestations.

Degraded Montane Grassland

Areas of the above unit that are distinctly degraded through historical use or have been transformed in the distant past where secondary vegetation is established and cannot be conclusively confirmed to be natural or secondary.

Riparian/Riverine

Natural vegetation surrounding watercourses and seeps, most likely having riparian elements with some seep functionality. Grassland vegetation typical of the surrounding units, but having riparian elements, but usually lusher with taller growth. These areas would not be suitable due to ecological importance and are considered no-go areas. This category overlaps with the aquatic assessment designated delineated rivers and floodplain and channelled valley-bottom wetland systems.

Natural vegetation surrounding watercourses, generally comprising a fringe of grasses and small trees that tend to be lusher than the surrounding habitat as well as the typical riparian elements (sedges and reeds), usually where standing water or a perched water table is present for extended periods. Grassland elements tend to be lusher along lower order watercourses or where wet conditions persist longer than surrounding areas. Vary in size from incised watercourses with a thicket fringe, to shallow undifferentiated channels with grasses and/or a fringe of low shrubs.

Riverine areas should generally not be developed other than for crossings of linear features (access roads), including a 32 m watercourse buffer (or as per aquatic reporting). Where turbines may be in proximity to watercourses or wetlands or buffers, the laydown areas should be orientated away from rather than toward the watercourse (or buffer).

Secondary/Degraded/Old Lands

Old lands or other disturbed areas, where grasses regenerate from the surrounding landscape. These areas typically have lower species diversity and often lack characteristic species found in natural and near natural habitat. Such areas would most likely be the most suitable for the proposed activity having lower conservation priority and most likely also having marginal or lower agricultural suitability (which would likely be why it is no longer used).

Invaded

Areas having dense alien infestation where natural ecological processes are significantly altered, soil properties are often also altered and natural vegetation might be restricted to the occasional grass, herb or shrub scattered throughout the dense thicket clump. In areas where less dense, typical grass fires tend to burn at a significantly higher temperature, which can slowly alter soil properties and promotes proliferation and ultimately densification of the invasives. Several Critical Biodiversity Areas are identified within and directly adjacent to the site. Please refer to Figure 6-8.

Cultivated

The level of historical cropping and the inadequate rehabilitation of land that has occurred over time. Evidence of historical terracing is prominently visible, indicating past agricultural practices that may have significantly altered the landscape. Extensive areas that have been transformed for agricultural use either as pastures or crops and are either currently in use or have been in use during the assessment period. No irrigated pivots are present and lack of a large water supply in the area suggests that these are mostly dryland crops (i.e., not irrigated). Extensive currently cultivated areas are present, predominantly maize but also with some areas that are pastures. Areas that are currently old lands, may be used in the future, as crop rotation does appear to occur in the area, based on analysis of historical aerial photographs.

Transformed

Generally, where all indigenous vegetation has been removed and replaced with hardened surfaces such as houses, access roads, other infrastructure. Includes areas that are not currently used for agriculture. Transformed areas are present, including several dwellings.

Dams

Water storage dams and artificial wetland areas usually present as small impoundments along watercourses. No large dams are present within the site. These are usually comprised of small waterbodies surrounded by a fringe of typical riparian sedges, bulrushes and reeds. These dams while artificial do provide important habitat for a range of faunal species within a modified landscape. This category overlaps with the aquatic assessment designated artificial wetlands.

FLORA

Several threatened or protected, endemic and range restricted species are known from the surrounding area. Due to the localised nature of the impact, as well as the level of degradation of the site, the risk of a species suffering any significant loss is low to medium. The preliminary site screening to not specifically assess species composition, being undertaken during the winter months.

Potential Red Listed, Endemic and Protected Flora

The site falls within the general distribution range of several endemic species and other species of conservation concern, some with a highly localised distribution and/or some of which may be Critically Endangered, Endangered, Vulnerable or Rare. Some of these species are also only from a single or a few populations. Critically Endangered flora species are likely not present, but Endangered species are known to occur in the vicinity and suitable habitat is present. It is likely that some sporadic clusters of species are present but will require specific footprint surveys during the final walkdown due the extent of the site. It is unlikely that the proposed WEF will pose any risk to Species of Conservation Concern as no substantial populations were found. Sensitive species names have not been included as per reporting protocols.

SCIENTIFIC NAME	FAMILY	STATUS [9]	COMMENT/PRESENCE[10]
Gerbera aurantiaca	Asteraceae	EN A2ac, NEST (M)	A mistbelt grassland endemic, this species habitat has been over 90% transformed for commercial forestry plantations and crop and pasture cultivation over the past 120 years. There has also been extensive recent loss of habitat in the KwaZulu-Natal Midlands to urban development. Gerbera aurantiaca is a long-lived clonal species whose generation time is suspected to exceed 100 years. Subpopulations are scattered and there isn't a linear relationship between mistbelt grasslands and the presence of subpopulations, we therefore extrapolate a 50% loss of subpopulations from the 90% loss of habitat. Recent studies by I. Johnson and S. Johnson show that this species is a poor recruiter and has low seed viability as a result it is unlikely to be able to recover from the past loss of individuals. NOT RECORDED.
Sensitive species 998	-	EN A2bd, NEST (M)	The population is estimated to have declined at least 50% over the last three generations (60 years) due to persistent and consistent harvesting pressures for the medicinal plant trade and some loss of suitable habitat for afforestation and crop cultivation. It is a highly sought-after medicinal plant that has been exploited over its entire range both within and outside of South Africa. Widespread across the eastern highveld of Mpumalanga, the eastern Free State, and north-western KwaZulu-Natal. It occurs along the north and north-eastern borders of Lesotho and is also found in Swaziland, on the Eastern Highlands of Zimbabwe and the Chimanimani Mountains of Mozambique. Forest margins, west and south facing mountain slopes and near drainage lines or islands within wetlands. Preferred habitat (montane vleis) is excluded from footprints. NOT RECORDED.
Asparagus fractiflexus	Asparagaceae	EN A2c; B1ab(iii), NEST (M)	Gm 14. An extremely rare species from southern Mpumalanga, recorded only four times. Around 80% of its habitat in some parts of its range was transformed around the 1940-50s, which is within

[9] IUCN – NE – Not Evaluated, Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Least Concern (LC); End – Endemic; TNCO – Transvaal Provincial Nature Conservation Ordinance; Ex, Exotic/Invasive/Weed; NFA – National Forest Act; ToPS – Threatened or Protected Species, Not Threatened – Not an IUCN category.

[10] Common in : Gm 12 - Eastern Highveld Grassland; Gm 14 - Wakkerstroom Montane Grassland

SCIENTIFIC NAME	FAMILY	STATUS [9]	COMMENT/PRESENCE [10]
			the last three generations of this long-lived, resprouter (generation length 50 years). An overall 50% decline across the range is suspected. The open areas between plantations, which served as fire breaks and were important refugia, are now being planted up, causing ongoing loss of habitat. NOT RECORDED.
Geranium ornithopodioides	Geraniaceae	EN B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)	Gm 14, Not recorded
Aloe ecklonis	Asphodelaceae	LC, TNCO	Gm 12, Present
Corycium dracomontanum	Orchidaceae	LC, TNCO	Gm 14, Not recorded
Corycium nigrescens	Orchidaceae	LC, TNCO	Gm 14, Not recorded
Cyrtanthus tuckii var. transvaalensis	Amaryllidaceae	LC, TNCO	Gm 14, Present
Disa versicolor	Orchidaceae	LC, TNCO	Gm 14, Not recorded
Haemanthus humilis subsp. hirsutus	**Amaryllidaceae**	**LC, TNCO**	**Gm 12, Present**
Protea subvestita	Proteaceae	LC, TNCO	Gm 14, Not recorded
Hypoxis rigidula var. pilosissima	Hypoxidaceae	NE, TNCO	Gm 14, Gm 12, Present
Protea parvula	Proteaceae	NT A2c, TNCO	Gm 14, Not recorded
Eucomis bicolor	**Hyacinthaceae**	**NT A2d, TNCO**	**Gm 14, Present**
Bowkeria citrina	Scrophulariaceae	Rare	Gm 14, Not recorded
Khadia alticola	Aizoaceae	Rare, NEST (M)	Montane grassland in shallow, sandy, humus-rich soil pockets and crevices between rock plates above 2000 m. Steenkampsberg, Utrecht and Wakkerstroom. NOT RECORDED.
Lotononis amajubica	Fabaceae	Rare, NEST (M)	High mountain peaks of southern Mpumalanga, north-western KwaZulu-Natal and eastern Free State. Well-drained, high altitude grassland, 1600-1800 m. NOT RECORDED.

SCIENTIFIC NAME	FAMILY	STATUS [9]	COMMENT/PRESENCE[10]
Zaluzianskya distans	Scrophulariaceae	Rare, NEST (M)	Zaluzianskya distans is a widespread, but very rare species. It is not suspected to be in danger of extinction. This species occurs from the Mpumalanga Drakensberg Escarpment near Lydenburg southwards to the KwaZulu-Natal Drakensberg foothills near Himeville. Not under imminent threat and reasonable widespread. NOT RECORDED.
Sensitive species 321	-	Rare, TNCO, NEST (M)	Drakensberg Mountain Range from Mpumalanga through Lesotho and KwaZulu-Natal to the Eastern Cape. Montane and subalpine grassland 1 600-3 000 m, on grassy and sometimes stony or moist slopes. Not under imminent threat and reasonable widespread. NOT RECORDED.
Kniphofia linearifolia	Asphodelaceae	TNCO	Gm 14, Present
Sensitive species 1252	-	VU A2cd, TNCO, NEST (M)	There was a large population decline from 1955-1960 as a result of indiscriminate commercial harvesting for diosgenin, a substance that was used to manufacture cortisone and other steroid hormones. Exploitation of tubers for the local medicinal plant trade is ongoing and is preventing recovery. The overall decline is estimated to be >30% over the past 90 years (generation length estimated to be 30 years). NOT RECORDED.
Khadia carolinensis	Aizoaceae	VU A3c, NEST (M)	Coal reserves are found underneath the sandstones on which this species is found. Coal mining has had a small impact to date, but within the last five years many new applications for coal mining has been received. Should these applications be granted (and many more are likely to come in within the next few years), the habitat will be severely impacted by open cast mining. We estimate that up to 45% of the range (EOO) of this species could be destroyed within the next 10-20 years should the current applications go ahead. Well-drained, sandy loam soils among rocky outcrops, or at the edges of sandstone sheets, Highveld Grassland, 1700 m. The OHL route does traverse and area having a known population of this species but can be easily avoided as pylons can be carefully micro sited and have a very limited footprint. NOT RECORDED.
Sensitive species 41	-	VU B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v), NEST (M)	A widespread (EOO <19 940 km²), but relatively rare (AOO <2000 km²) habitat specialist, estimated to remain at between six and ten locations and declining due to severe ongoing habitat loss and degradation. This species' habitat is becoming increasingly rare due to ongoing loss and degradation. The main threat is damming of streams feeding into wetlands as well as wetland drainage for agriculture. This species requires year-round moist conditions to flourish but damming and drainage reduce water flow to wetlands causing prolonged dry conditions. Specific habitat is included in no go designation, not at risk. NOT RECORDED.

SCIENTIFIC NAME	FAMILY	STATUS [9]	COMMENT/PRESENCE[10]
Sensitive species 1201	-	VU B1ab(i,ii, iii,iv,v), NEST (M)	Restricted to a small area on the hilly, upper Mpumalanga escarpment (EOO 400 km²), known from six locations. It has lost habitat to commercial forestry plantations and most locations are threatened by encroachment from invasive alien species, especially wattles, which prefer rocky areas where they are protected from fire. It is also under development pressure from golf resorts. Site is outside of known range & no records in vicinity suggest local occurrence. NOT RECORDED.
Nerine platypetala	Amaryllidaceae	VU B1ab(i,ii, iii,iv,v), TNCO	Gm 14, Not recorded
Sensitive species 691	-	VU B1ab(ii,iii,v), NEST (M)	EOO between 445 and 11 158 km² and suspected to occur at fewer than 10 locations. It has lost habitat to crop cultivation in the past. It is currently threatened by ongoing degradation and habitat loss due to overgrazing and urban development. Crop cultivation is a past threat that lead to extensive loss of habitat. At present urban development on the banks of the Vaal Dam are causing ongoing loss of habitat. Invasive alien plants threaten a number of subpopulations. Habitat degradation by livestock has meant that several habitats in western Mpumalanga are currently under threat. This threat is however reversible as one subpopulation in Mpumalanga has had livestock removed and has recovered well. Preferred habitat - undulating grasslands in damp areas (seeps) is generally avoided. NOT RECORDED.
Pachycarpus suaveolens	Apocynaceae	VU B1ab(iii), NEST (M)	A showy plant known from eight historical locations and probably extremely rare. One location, last collected in Gauteng in 1929 has subsequently been lost to urban expansion and this species is likely to be locally extinct in Gauteng. The grasslands habitat across its range (EOO 19 900 km²) is extensively transformed by urban development, crop cultivation, mining and invasive alien plants. Mining is causing a continuing decline in habitat between Witbank and Carolina. Gauteng and Mpumalanga to Swaziland. Threatened by agriculture, mining and aliens. Seventy-five percent of the known localities occur in heavily transformed areas, with about 45% of the habitat within its known range already transformed (M. Lötter, pers. comm.). Around the Witbank-Carolina-Ermelo area there is substantial coal mining already, as well as renewed interest in coal mining. NOT RECORDED.
Sensitive species 851	-	VU B1ab(iii), NEST (M)	Suspected to have a very narrow distribution range, but due to taxonomic uncertainty, its range cannot be accurately defined. Its extent of occurrence (EOO) is possibly as small as 6244 km² but could be up to 22 664 km² if records from the eastern Free State and Lesotho are included. It is known from fewer than 10 locations and is declining across its range due to ongoing habitat loss and degradation.

SCIENTIFIC NAME	FAMILY	STATUS [9]	COMMENT/PRESENCE[10]
			Occurs in shallow vleis and marshes in high altitude montane grassland. NOT RECORDED.
Sensitive species 1219	-	VU B1ab(iii) +2ab(iii) , TNCO, NEST (M)	Gm 14. A rare species known from only a few, isolated subpopulations. It has a restricted range, with an extent of occurrence of 12 230 km², and an estimated area of occupancy of 104-112 km². It is known from five to ten locations and continue to decline due to ongoing habitat loss and degradation. Occurs in scattered, isolated subpopulations across the Mpumalanga Highveld, from Dullstroom to Graskop, and southwards to Barberton and Wakkerstroom Relatively common in the Wakkerstroom area. Site is outside of known range & no records in vicinity suggest local occurrence. NOT RECORDED.
Aspidoglossum xanthosphaerum	Apocynaceae	VU D2, NEST (M)	Recorded from four locations from a restricted range (EOO<500 km²). Potentially threatened by wetland drainage for crop cultivation and by livestock trampling and grazing. Montane grassland, marshy sites, 1800 m. Preferred habitat (montane wetlands) are excluded from footprints. NOT RECORDED.
Indigofera hybrida	Fabaceae	VU D2, NEST (M)	Known from three locations. Some habitat has been transformed to forestry plantations and agriculture and further habitat loss remains a potential threat. This is a very poorly known species. When Brown described the species in 1925, he speculated that it might be a hybrid because of its similarity to the widespread Indigofera hilaris. The taxon is however still recognised as a distinct species NOT RECORDED.

The final site visit was undertaken in mid-summer and proved to be a suitable season; however, the final site layout was not available at the time. All reasonable measures were taken to survey the range of habitat represented within the site; however, it is not feasible to sample 70 million square meter site with certainty. It is recommended that a final site walkdown be undertaken in order to inform the final layout design and inform micro0-siting of the footprints. Avoidance and Search and Rescue mitigation measures are deemed adequate to accommodate any small populations of Species of Conservation Concern that might not have been sampled and species that are Endangered or Critically Endangered are not deemed to be of significant concern. Most likely high-risk habitat, which includes remnant pockets of Highveld Grassland in good condition, wetlands and vleis, slopes and rocky outcrops on edges of plateaus have been identified and layout excludes these areas. Where suitable habitat is present (such as Montane Grassland in good condition) that is not excluded, is it deemed to be extensive to the extent that risks to any significant population will be low to negligible. The proposed development of the site for renewable energy provides a conservation opportunity, as it allows the farms to generate income without wide sale clearing of vegetation for agriculture with associated indirect impacts. This reduces the reliance of these farms on agriculture and high levels of utilisation. Furthermore, the development of a renewable facility will allow for the enhancement of any conservation opportunities that are identified during the ongoing construction and operational phases, for example protection of species of conservation concern and improvement of habitat, as outlines in the proposed trade off clearing of wattle thickets. These opportunities far outweigh any risks associated with loss of species of conservation concern, where measures will be in place to accommodate any specific issues during final layout design (walkdown) and construction (flora search and rescue). Wind Energy Facility projects pose a significantly different risk to terrestrial flora compared to other far more destructive development options including Mining, Agriculture (cultivation & high-density livestock), Forestry and Urban development, where extensive areas of habitat are cleared, and habitat is significantly fragmented. Wind Energy Facilities allow for very well-planned layout design and have specific measures at all stages of the development process to address ecological risks. Conservation objectives are highly compatible with Wind Energy development projects.

FAUNA

The habitats and microhabitats present on the project site are not unique and although highly fragmented, are widespread in the broader area, hence the local impact associated with the footprint would be of low significance if mitigation measures are adhered to. The site falls within the general distribution range of several flagged faunal species. Refer to specific faunal assessment reports for detailed faunal reporting. This report will only address general faunal aspects within general ecological and terrestrial biodiversity characteristics.

Mammals

National Environmental Screening Tool identifies several mammal species as possibly occurring in the area. Refer to separate survey and assessment by respective specialists.

Reptiles

Reptiles such as lizards, snakes and tortoises may be present. Site survey and assessment would be required to confirm, however no specific species flagged. Refer to separate faunal survey and assessment by respective specialists.

Amphibians

Amphibians are likely to be present due to the prevalence of watercourses and wetlands. Site assessment would be required to confirm, however no specific species flagged, and likelihood of impacts is low since most aquatic habitat is designated no-go, other than nominal necessary crossings for roads. Refer to separate faunal survey and assessment by respective specialists.

Invertebrates

National Environmental Screening Tool identifies a single invertebrate species as possibly occurring in the area. Refer to separate faunal survey and assessment by respective specialists.

Potential Red Listed and Protected Fauna

As per Table 6-3, Endangered or Critically terrestrial fauna species are flagged for the site. The site falls within the potential distribution range of a few faunal species of concern. No further avifaunal investigations have been undertaken but the single mammal and insect species that is flagged both have significantly more widespread distribution than the site. Since the project footprint is likely to be relatively contained, any disturbance or displacement associated with habitat destruction as a direct result of the activity is unlikely to pose a significant negative impact to terrestrial faunal species above background disturbance levels that are already present. Seasonal assessments of the fauna recommended for clarification of risk.

TABLE 6-3 FAUNA SPECIES OF SPECIAL CONCERN

Scientific Name	Common Name	Status[11]	Comment/Presence
Mammals			
Crocidura maquassiensis	Makwassie musk shrew	VU, NEST (M)	Possibly present, within range but no confirmed records nearby. Refer to separate faunal assessment.
Ourebia ourebi ourebi	Oribi	EN, NEST (M)	Present. Impacts are likely to be within acceptable limits due to limited WEF footprint and likely within the range of current baseline disturbance levels. Refer to separate faunal assessment and Oribi Management Plan.
Birds			
Balearica regulorum	Grey Crowned Crane	EN, NEST (H)	Refer to Avifaunal Assessment
Eupodotis senegalensis	White-bellied Bustard / Korhaan	VU, NEST (H, M)	Refer to Avifaunal Assessment
Hydroprogne caspia	Caspian Tern	VU, NEST (M)	Refer to Avifaunal Assessment
Sagittarius serpentarius	Secretary Bird	VU, NEST (H, M)	Refer to Avifaunal Assessment
Tyto capensis	African Grass Owl	VU, NEST (M)	Refer to Avifaunal Assessment
Geronticus calvus	Southern Bald Ibis	VU C1+2a(ii), NEST (H,M)	Refer to Avifaunal Assessment
Neotis denhami	Denhams Bustard	NEST (M)	Refer to Avifaunal Assessment
Reptiles			
None of concern	-	-	None flagged. Refer to separate faunal assessment.
Amphibians			
None of concern	-	-	- None flagged. Refer to separate faunal assessment
Invertebrates			
Clonia lalandei	Lalande's *Black-winged Clonia*	*VU* B1ab*(i,iii)*	Impacts are likely to be low as a result of WEF due to limited footprint and likely within the range of current baseline disturbance levels. Refer to separate faunal assessment.

11 IUCN: LC – Least Concern; VU – Vulnerable; EN – Endangered; CR – Critically Endangered; NT – Near Threatened.

TERRESTRIAL VEGETATION SENSITIVITY ASSESSMENT

Intactness

Intactness for the site is Low to High, with evidence of historical degradation evident, most likely as a result of historical and ongoing livestock grazing.

Alien Invasion

Alien invasion for the site is generally low in near-natural area, disturbed areas often have elevated invasive and weed populations. Extensive high density wattle infestations are also present, particularly in the northern areas. From the calculations done above, at least 20% of the project area shows elevated alien invasive and weed populations.

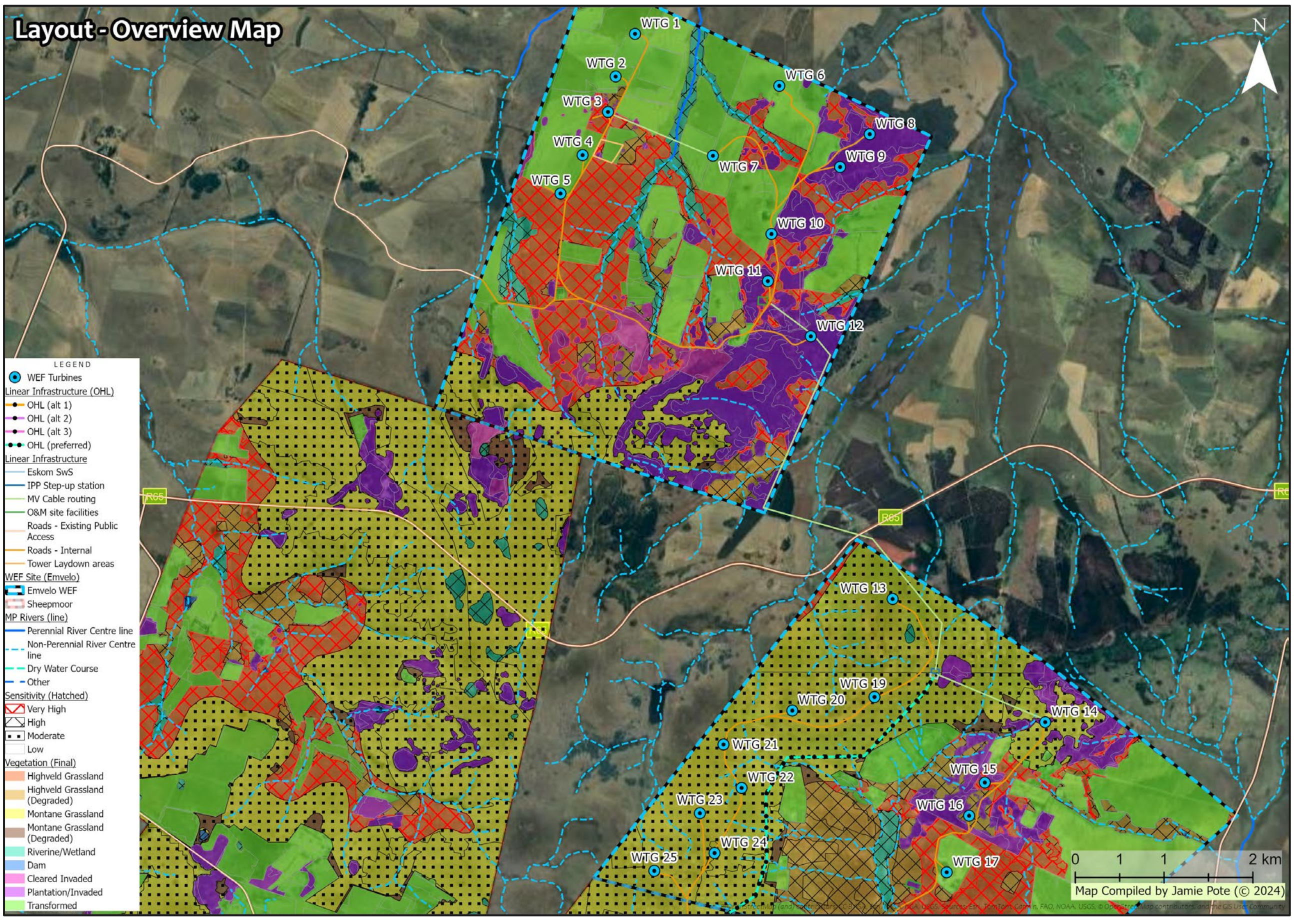
Degradation

Degradation is variable, but generally elevated due to historical utilisation for grazing. Extensive cultivation and other transformation are also present, with natural or near natural areas being patchy rather widespread.

Overall Sensitivity score

Due to the elevated conservation status of Eastern Highveld Grassland, intact remnant pockets of vegetation would be deemed to have a high to very high sensitivity. Where intact patches overlap with designated CBA, they are generally designated very high and high for remining intact areas. Riparian vegetation is also categorised as very high sensitivity due to ecological value and irreplaceable habitat and should be considered No-Go. Natural and near natural Wakkerstroom Montane Grassland would be categorised as moderate sensitivity as it is not deemed irreplaceable. It should be avoided as much as possible and attention must be given to bioregional planning designations, but some loss will not pose a significant risk to the vegetation unit. Transformed habitat would be deemed to have a low sensitivity where no natural vegetation remains.

FIGURE 6-8 OVERALL TERRESTRIAL BIODIVERSITY SENSITIVITY MAP



The vegetation sensitivities indicated are based on a hierarchical approach, with high being the most sensitive and low being the least sensitive. The recommended approach will be to avoid higher sensitivity areas as far as is technically possible and prioritise moderate and lower sensitivity areas. The very high sensitivity riverine areas (and buffers) and irreplaceable Highveld Grassland should be avoided in terms of any footprints other than for minimal access road (including watercourse) crossings, which should also prioritise crossing watercourses where there is already disturbance (such as existing road crossings).

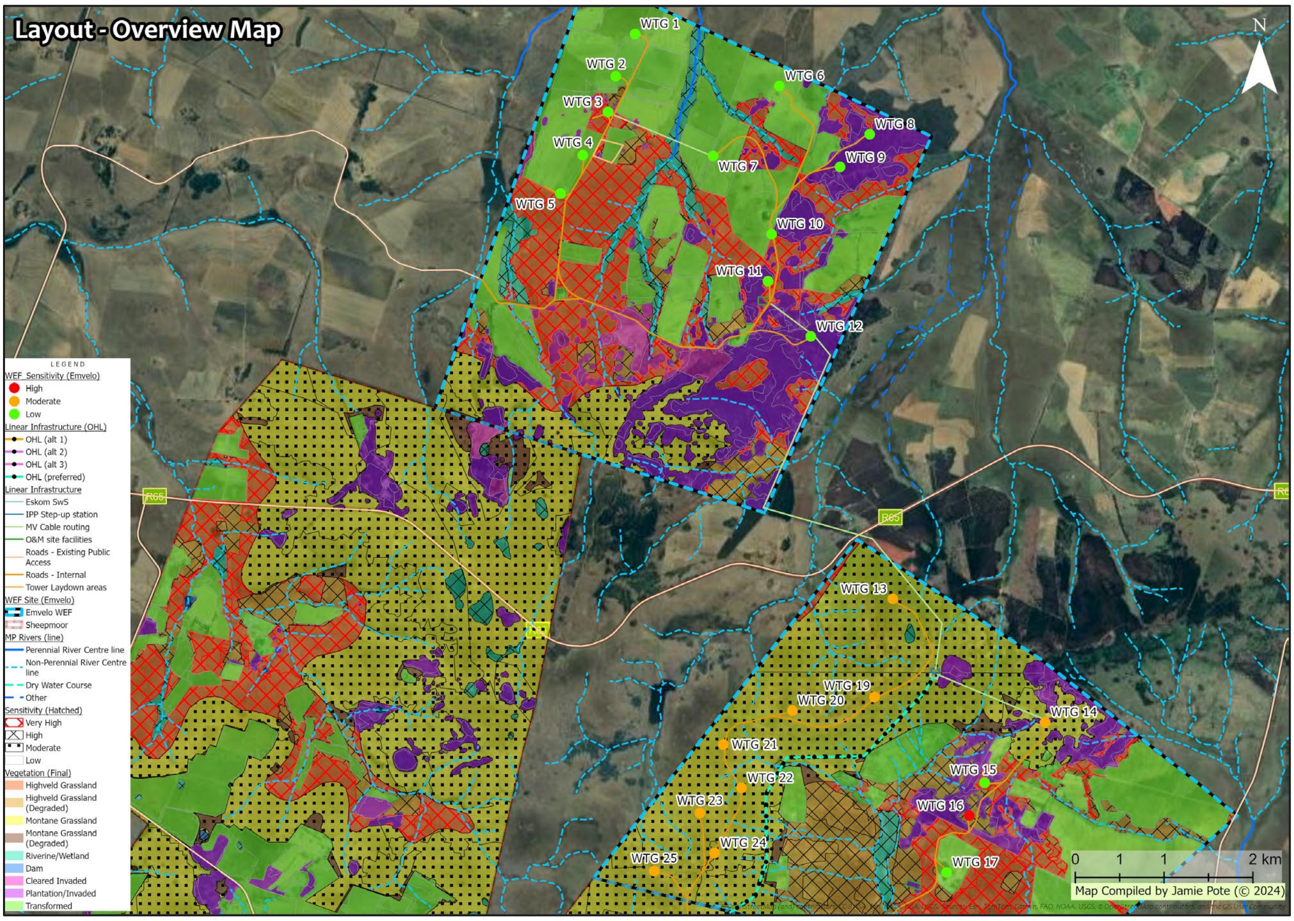
No-go areas

Potential No-Go areas would include all designated CBA (Irreplaceable) areas that are confirmed to be near natural or natural, as well as watercourses and wetlands, including any adjacent intact riparian vegetation and associated buffers (as per aquatic assessment). Any populations of Endangered or Critically Endangered species and/or important populations of Vulnerable species, where relocation is not feasible, would also potentially be considered No-Go areas. No such areas were identified for flora (plant) species. In general, WEF footprints are limited in extend and are not likely to incur significant risks or losses.

Critical Habitat

Based on site investigations, no flora Species of Conservation Concern, being endemic or range restricted species or having an elevated conservation status were found to occur. The Karoo padloper is considered to be a habitat specialist, preferring rocky outcrop areas with adequate rocky crevices, but also occasionally occur outside of such habitat. Suitable habitat within the site, specifically the footprint areas are not preferred habitat.

FIGURE 6-9 OVERALL TERRESTRIAL BIODIVERSITY SENSITIVITY MAP WITH ACTUAL TURBINE SENSITIVITY INDICATED



As per Figure 6-9, a total of 14 or 24 WTGs are located within low sensitivity transformed habitat (cultivated and invaded). Of the remaining 10, 9 are located within natural Montane Grassland (moderate sensitivity) and a single WTG (WTG 16) is situated within a small patch of degraded Highveld Grassland (Endangered, high sensitivity). This isolated patch of degraded highveld Grassland is surrounded by moderate to dense alien infestation and cultivated lands. Of those located in low sensitivity transformed or invaded habitat, 5 WTGs (WTGs 15, 11, 10, 5 & 3) are situated on edges or marginal to natural Highveld Grassland, where some loss of Highveld Grassland may occur, depending on final footprint configuration. The road network generally follows existing roads and tracks and invaded/cultivated areas as far as technically possible. Portions of roads are aligned within remnant Highveld Grassland but are mostly following existing roads. Assuming conservatively that each of the WTGs require clearing of 50 % of its footprint within natural Highveld Grassland and the total loss due to roads might be 10 Ha, a total loss of 12.5 Ha might be expected, although likely to be less. Since the entire remaining Highveld Grassland within the site is calculated at ~782.1 Ha, this loss represents only 1.6 % of the Highveld Grassland on the site and only 0.003 % of the entire remaining extent. The loss associated with this nominal footprint is thus negligible and not deemed to be significant and will not pose any risk to the conservation of the vegetation unit. Furthermore, the proposed recommended clearing of densely invaded areas of a 1:3 ratio (i.e. at least

~37.5 Ha) will more than adequately compensate for this loss. Furthermore, the management of the sites under an EMPr rather than just the status quo agriculture will provide management resources that will potentially benefit overall conservation significantly more than what the loss represents on the ground. The location of a single turbine in habitat that is categorised as high sensitivity is deemed acceptable as the specific patch is significantly degraded and isolated and has very limited, if any conservation potential.

6.9 FAUNA

INVERTEBRATE SPECIES OF CONSERVATION CONCERN

Clonia lalandei (Saussure, 1888) Lalande's Black-winged Clonia

- This species of katydid is endemic to South Africa and has an IUCN Red List Category and Criteria of Vulnerable B1ab(i,iii) (Bazelet and Naskrecki, 2014). Within South Africa, the species has a broad distribution occurring across the central parts of South Africa, having been recorded from the Free State, KwaZulu-Natal, and Mpumalanga Provinces.
- It occurs in grassland and savanna habitats but has only been collected from four localities with almost nothing known about its specific habitat requirements or ecology.
- It has an estimated extent of occurrence of 15,397 km^2 and its estimated geographic range falls just outside of the project area, approximately 12 km to the east (Bazelet and Naskrecki, 2014).
- The species has not been recorded from the project area; the closest known record is approximately ~92 kms north-east for a specimen collected from Barberton Montane Grassland habitat.

MAMMAL SCC

Ourebia ourebi ourebi (Zimmermann, 1783) Oribi

- The oribi (*Ourebia ourebi*) is a small, territorial antelope that occurs throughout sub-Saharan Africa where it typically inhabits open temperate grasslands.
- Thirteen subspecies are currently recognised, with the South African subspecies *O. ourebi ourebi* recognised as genetically distinct from other subspecies to the north. As such, oribi in South Africa should be managed as a distinct conservation unit (Jansen van Vuuren, Rushworth and Montgelard, 2017).
- It has a 2016 Regional Red List Status of Endangered C2a(ii) and is considered as the most threatened antelope species in South Africa with a minimum estimated total of approximately 2000 mature individuals remaining (Conservation Breeding Specialist Group Southern Africa et al., 2006; Shrader et al., 2016).
- *Ourebia ourebi ourebi* populations have become restricted to small, isolated populations in grasslands in the eastern half of South Africa, occurring in grasslands in Mpumalanga, Eastern Cape and KwaZulu-Natal provinces. A few subpopulations in southern and north-eastern Free State, and southern Limpopo are also known.
- Fragmentation of populations and declining population numbers (~13% decline between 1996-2014) are the result of several anthropogenic factors, including hunting

and poaching, habitat loss and fragmentation, and poor veld management (e.g. fencing, burning, overgrazing).

- Habitat requirements include both short grass for food and long grass for food and shelter. They are selective feeders with several species of grass making up most of their diet, (Themeda triandra, Hyparrhenia hirta, Panicum natalense, and Andropogon chinensis) (Shrader et al., 2016).
- They also appear to favour north and east facing slopes, with populations showing preferences for gentle slopes (less than ~10 degrees), gentle undulating plateaus, ridge tops, and spurs, and avoiding lowland areas (Conservation Breeding Specialist Group Southern Africa et al., 2006).
- Further loss of grasslands on flat and undulating terrain is considered a very real threat to the survival of this charismatic sub-species.
- Recent postings on iNaturalist indicate that Oribi are relatively frequently encountered within the broader grassland areas around the project site. For example, a 2020 photographic record form approximately 75 km south in Wakkerstroom Montane Grassland, a vegetation type found at the project site.

Based on the available ecosystem-level data for habitat and important biodiversity areas and from habitat assessment during the field site visit, the following constraints map showing areas of High faunal sensitivity was produced for the project site.

FIGURE 6-10 FAUNAL SENSITIVITY MAP GENERATED DURING THE SITE SENSITIVITY AND SCOPING PHASE (SEE COLVILLE AND COHEN, 2023A) OVERLAID ONTO THE LATEST 30 JANUARY 2025 PROJECT LAYOUT SHOWING PROJECT DEVELOPMENTS, INCLUDING ACCESS ROADS AND TURBINE PLACEMENT POSITIONS. THE HIGHLY SENSITIVE ESCARPMENT AREA (YELLOW-SHADED) WAS CONSIDERED THE MOST SIGNIFICANT FAUNAL HABITAT

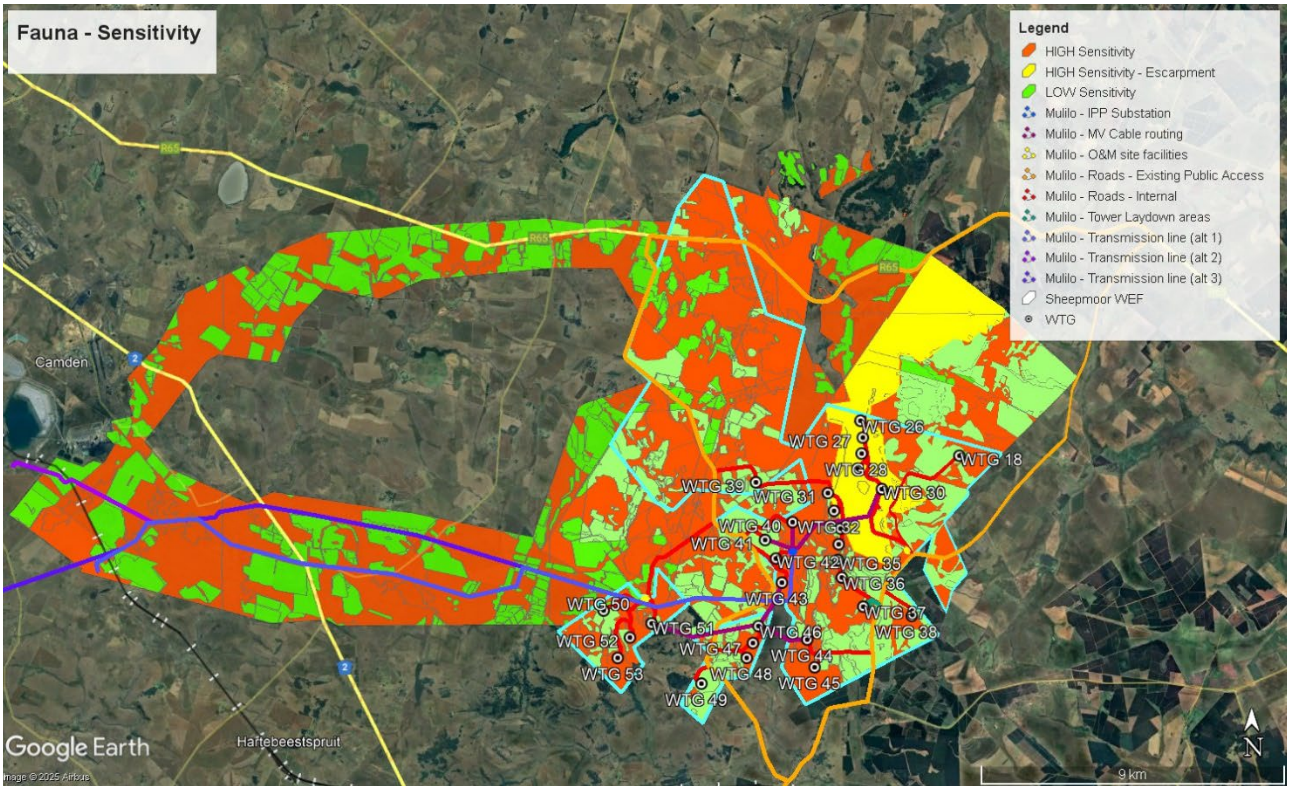
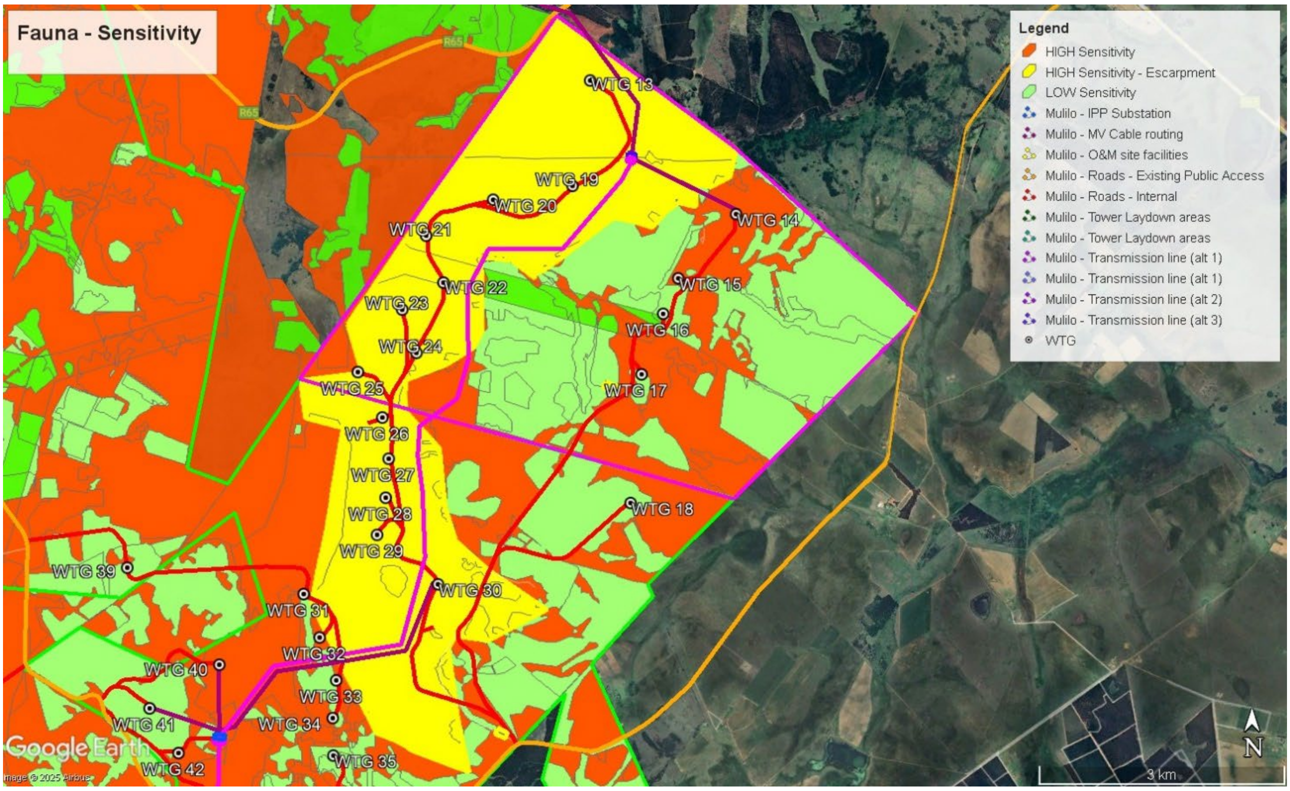


FIGURE 6-11 THE HIGH SENSITIVE ESCARPMENT AREA (YELLOW-SHADED) WAS CONSIDERED THE MOST SIGNIFICANT FAUNAL HABITAT; EIGHT TURBINES AND ACCESS ROADS AND OHPLS ARE PROPOSED FOR THIS AREA.



6.10 AVIFAUNA

The proposed Emvelo WEF and Grid Connection Project Site is situated in the Grassland Biome, in the Mesic Highveld Grassland Bioregion (Mucina & Rutherford 2006). The proposed site is comprised of undulating grassland plains, with small, scattered patches of dolerite outcrops in areas, low hills, pan depressions and drainage lines with associated wetland areas. Vegetation on site consists predominantly of Wakkerstroom Montane Grassland and Eastern Highveld Grassland. Wakkerstroom Montane Grassland comprises predominantly short montane grasslands on the plateaus and the relatively flat areas, with short forest and Leucosidea (ouhout) thickets occurring along steep, mainly east-facing slopes, and drainage areas (Mucina & Rutherford 2006). Eastern Highveld Grassland vegetation is comprised of a short, closed grassland cover, largely dominated by a dense Themeda triandra sward, often severely grazed to form a short lawn (Mucina & Rutherford 2006). The black wattle, Acacia mearnsii is an aggressive invader of riparian areas. Stands of alien Eucalyptus and Pinus species are scattered throughout the proposed development area.

The natural environment within the project area is impacted by anthropogenic disturbance. Overgrazing of grassland and wetland vegetation, especially during the dry season, causes degrading veld conditions and excessive trampling of wetlands. This is exacerbated by the intensified frequency with which grassland and wetland vegetation is burned especially during the dry season. Additionally, the proliferation of alien plant infestation in the broader landscape as well as the complete transformation of indigenous vegetation to crop fields for agriculture further contributes towards the overall habitat deterioration in the region.

MODIFIED ENVIRONMENT

Whilst the distribution and abundance of the bird species in the Broader Area are mostly associated with natural vegetation, as this comprises virtually all the habitat, it is also necessary to examine the few external modifications to the environment that have relevance for birds.

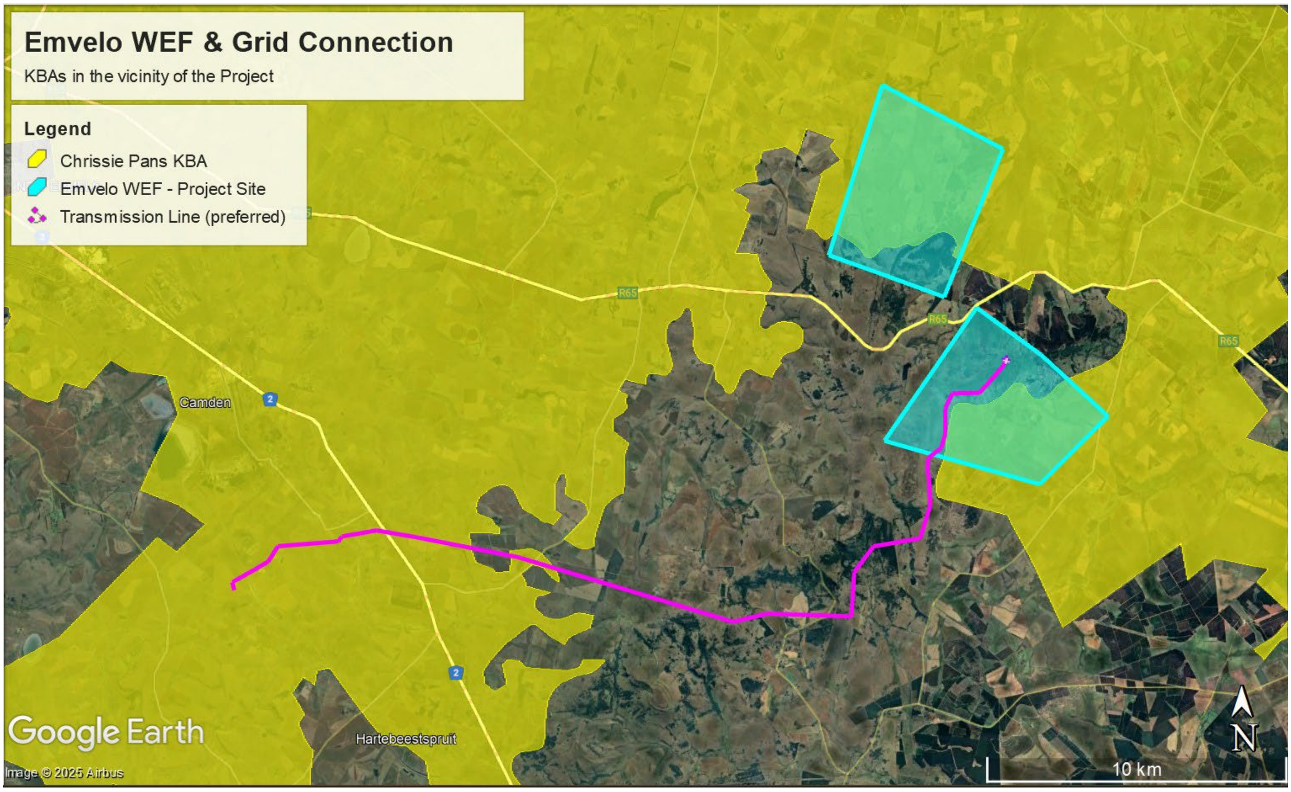
The following avifaunal-relevant anthropogenic habitat modifications were recorded within the Broader Area:

- Surface Water: The WEF Project Site and Grid Connection PAOI contains several man-made sources of surface water such as ground dams and boreholes. These sources of water are important for birds for drinking and bathing.
- Alien Trees: There are clumps and stands of alien trees throughout the WEF Project Site and Grid Connection PAOI. Alien trees could attract a variety of bird species for the purposes of nesting and roosting.
- Agriculture: The predominant land use for this area is livestock grazing with some crop farming, mostly maize, soya beans and pastures. Birds could be attracted to these areas in search of food

KEY BIODIVERSITY AREAS

The Project Site (Emvelo WEF & Grid Connection) overlaps with one Key Biodiversity Area (KBA), namely the Chrissie Pans KBA. This site KBA qualifies as a Key Biodiversity Area of international significance that meets the thresholds for 3 criteria described in the Global Standard for the Identification of KBAs. Based on current available information, six (6) species meet one or more KBA criteria for this KBA site. The KBA trigger species at this site include birds, mammals, and plants. The Chrissie Pans KBA site meets criterion A1 due to the presence of significant proportions of the global populations of 6 threatened species. The site regularly holds two (2) individual geographically restricted species, therefore meeting criterion B1. A quantitative analysis of irreplaceability indicates that the KBA site is 100% irreplaceable for the global persistence of one (1) species, therefore meeting criterion E. The KBA site holds a significant proportion of the global extent of one (1) threatened ecosystem (meeting criterion A2).

FIGURE 6-12 KEY BIODIVERSITY AREAS IN THE VICINITY OF THE PROPOSED PROJECT



NATIONAL PROTECTED AREAS

The closest protected area to the proposed development is the Nooitgedacht Dam Nature Reserve (70km). The avifauna in this protected area is not expected to be impacted by the proposed development due to the distance from the WEF and Grid project sites.

SITE ECOLOGICAL IMPORTANCE

In terms of the species assessment guidelines, the implications for the High SEI rating for suitable SCC habitat at the site indicates that the following general measures are considered appropriate for these areas – "Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities".

AVIFAUNA IN THE BROADER AREA

According to the Southern African Bird Atlas Project (SABAP2), a total of 253 bird species could potentially occur in the Broader Area where the proposed Emvelo WEF and Gird Connection Infrastructure are located. Of the 253 species, 38 species are classified as priority species for wind energy developments. The wind priority species include all species of conservation concern and although a few IBA trigger species are not included in this list the exclusion areas recommended for other similar species included as priority species offer adequate protection for these additional (particularly wetland associated) species. Of the wind energy development priority species in the Broader Area, 32 have been recorded during the pre-construction monitoring. Of the 253 species, 76 are considered powerline sensitive species of which 57 have been recorded during the pre-construction monitoring.

TABLE 6-4 WIND ENERGY PRIORITY SPECIES RECORDED IN THE BROADER AREA

Species Name	**Scientific Name**	**Full Protocol**	**Ad Hoc Protocol**	**Global Conservation Status**	**Regional Conservation Status**	**Recorded During Monitoring**	**Likelihood Of Regular Occurrence**	**Grassland**	**Woodland & Alien Trees**	**Drainage Lines & Wetlands**	**Dams**	**Agriculture**	**Collision With Turbines**	**Displacement - Habitat Transformation**	**Displacement - Disturbance**	**Electrocution MV Network**	**Collision MV Network**
African Fish Eagle	*Haliaeetus vocifer*	7,26	0,92	-	-	x	M			x	x		x		x	x	
African Harrier-Hawk	*Polyboroides typus*	15,64	2,29	-	-	x	H		x		x		x		x	x	
African Marsh Harrier	*Circus ranivorus*	4,47	0,46	-	EN	x	M	x		x	x		x		x	x	
Amur Falcon	*Falco amurensis*	26,26	9,63	-	-	x	H	x	x		x	x	x			x	
Black Harrier	*Circus maurus*	0,00	0,46	EN	EN		L	x			x		x		x	x	x
Black Sparrowhawk	*Accipiter melanoleucus*	15,08	1,38	-	-	x	M		x		x		x		x	x	
Black-bellied Bustard	*Lissotis melanogaster*	4,47	0,00	-	-	x	M	x				x	x	x	x		x
Black-chested Snake Eagle	*Circaetus pectoralis*	4,47	0,46	-	-	x	M		x		x		x		x	x	

Species Name	Scientific Name	Full Protocol	Ad Hoc Protocol	Global Conservation Status	Regional Conservation Status	Recorded During Monitoring	Likelihood Of Regular Occurrence	Grassland	Woodland & Alien Trees	Drainage Lines & Wetlands	Dams	Agriculture	Collision With Turbines	Displacement - Habitat Transformation	Displacement - Disturbance	Electrocution MV Network	Collision MV Network
Black-rumped Buttonquail	*Turnix nanus*	2,79	0,00	-	EN		L	x		x				x	x		
Black-winged Kite	*Elanus caeruleus*	65,92	14,22	-	-	x	H	x	x		x		x		x	x	
Black-winged Lapwing	*Vanellus melanopterus*	21,23	1,38	-	-	x	H	x		x		x	x	x			
Blue Crane	*Grus paradisea*	12,85	0,46	VU	NT	x	M	x		x	x	x	x	x	x		x
Blue Korhaan	*Eupodotis caerulescens*	0,56	0,00	NT	LC		L	x					x	x	x		x
Brown Snake Eagle	*Circaetus cinereus*	2,79	0,00	-	-	x	M		x		x		x		x	x	
Buff-streaked Chat	*Campicoloides bifasciatus*	7,82	0,00	-	-	x	M	x						x	x		
Cape Eagle-Owl	*Bubo capensis*	-[12]	-	-	-	x	M	x	x	x		x	x	x	x	x	x

[12] No Reporting Rate as this species was recorded during monitoring only and not through SABAP2.

Species Name	Scientific Name	Full Protocol	Ad Hoc Protocol	Global Conservation Status	Regional Conservation Status	Recorded During Monitoring	Likelihood Of Regular Occurrence	Grassland	Woodland & Alien Trees	Drainage Lines & Wetlands	Dams	Agriculture	Collision With Turbines	Displacement - Habitat Transformation	Displacement - Disturbance	Electrocution MV Network	Collision MV Network
Cape Vulture	*Gyps coprotheres*	3,35	0,00	VU	EN	x	M	x			x		x		x	x	x
Common Buzzard	*Buteo buteo*	39,11	16,97	-	-	x	H	x	x		x	x	x			x	x
Denham's Bustard	*Neotis denhami*	5,03	0,00	NT	VU	x	M	x				x	x	x	x		x
Forest Buzzard	*Buteo trizonatus*	-	-	NT	LC	x	M		x	x	x		x	x	x	x	x
Greater Flamingo	*Phoenicopterus roseus*	1,68	0,00	-	NT	x	M			x	x		x				x
Grey Crowned Crane	*Balearica regulorum*	15,64	0,46	EN	EN	x	H	x			x		x	x	x	x	x
Grey-winged Francolin	*Scleroptila afra*	15,08	0,00	-	-	x	M	x				x	x	x	x		
Jackal Buzzard	*Buteo rufofuscus*	32,40	8,72	-	-	x	H	x	x		x	x	x		x	x	
Lanner Falcon	*Falco biarmicus*	12,85	0,46	-	VU	x	M	x			x		x		x	x	
Lesser Flamingo	*Phoeniconaias minor*	1,12	0,00	NT	NT		L			x	x		x				x

Species Name	Scientific Name	Full Protocol	Ad Hoc Protocol	Global Conservation Status	Regional Conservation Status	Recorded During Monitoring	Likelihood Of Regular Occurrence	Grassland	Woodland & Alien Trees	Drainage Lines & Wetlands	Dams	Agriculture	Collision With Turbines	Displacement - Habitat Transformation	Displacement - Disturbance	Electrocution MV Network	Collision MV Network
Long-crested Eagle	*Lophaetus occipitalis*	13,97	14,22	-	-	x	M		x		x		x		x	x	
Marsh Owl	*Asio capensis*	1,68	0,46	-	-	x	M	x		x	x		x	x	x	x	x
Martial Eagle	*Polemaetus bellicosus*	5,59	0,00	EN	EN	x	M	x	x		x		x		x	x	
Northern Black Korhaan	*Afrotis afraoides*	0,56	0,00	-	-		L	x				x	x	x	x		x
Rufous-breasted Sparrowhawk	*Accipiter rufiventris*	1,68	0,00	-	-	x	M		x		x		x		x	x	
Secretarybird	*Sagittarius serpentarius*	24,02	2,29	EN	VU	x	H	x					x	x	x		x
Southern Bald Ibis	*Geronticus calvus*	26,82	4,13	VU	VU	x	H	x			x	x	x		x	x	x
Spotted Eagle-Owl	*Bubo africanus*	11,73	1,38	-	-	x	M		x	x			x		x	x	x

Species Name	Scientific Name	Full Protocol	Ad Hoc Protocol	Global Conservation Status	Regional Conservation Status	Recorded During Monitoring	Likelihood Of Regular Occurrence	Grassland	Woodland & Alien Trees	Drainage Lines & Wetlands	Dams	Agriculture	Collision With Turbines	Displacement - Habitat Transformation	Displacement - Disturbance	Electrocution MV Network	Collision MV Network
Western Osprey	*Pandion haliaetus*	0,56	0,00	-	-		L				x		x		x	x	
White Stork	*Ciconia ciconia*	10,61	2,29	-	-	x	M	x		x	x	x	x				x
White-bellied Bustard	*Eupodotis senegalensis*	12,29	0,00	-	VU	x	H	x				x	x	x	x		x
Yellow-breasted Pipit	*Anthus chloris*	1,12	0,00	VU	VU	x	M	x					x	x	x		

FOCAL POINTS

Three focal points (FP) of bird activity were identified:

- FP1: A large farm dam in a drainage line. This FP was surveyed once during each survey.
- FP2: Southern Bald Ibis colony (26°37'20.82" South, 30°18'36.43" East)
- FP3: Southern Bald Ibis colony (26°38'28.47" South, 30°17'37.67" East)

A Martial Eagle nest was discovered towards the end of the initial pre-construction monitoring campaign and subsequent additional monitoring effort was devoted to the nest to better understand the flight risk of the eagles around the nest.

FLIGHT RISK MODELLING

Due to the discovery of a Martial Eagle nest within the proposed Emvelo WEF project footprints, extensive additional monitoring was performed to collect flight data of the adult eagles and the juvenile in the area. 37 hours, 34 minutes and 11 seconds of Martial Eagle flight time was recorded during an additional 60 hours of focussed observation time conducted in the area near and around the nest. The extensive dataset of Martial Eagle flight data was used to develop a flight risk model.

We scripted and used R and python workflows to prepare, pre-process and analyse all predictor variables. Predictors variables represented various facets of topography, drainage, and vegetation productivity. Topographical features included ruggedness, drainage, TWI, and topographical relief, whilst aspects of vegetation productivity were derived from remote sensing indices. We utilised an Artificial Neural Network (ANN) predictive modelling workflow to train and develop the flight risk model (FRM). ANNs are capable of learning complex patterns and relationships in data, making them suitable for a wide range of classification problems. The modelling workflow included data partitioning, model training, optimization of algorithms and hyperparameters, and model testing and validation.

Model training suggested that certain topographical features related to slope and ruggedness increased flight risk. Undulating slopes, wide gorges and valleys, particularly less steep features such as back-slopes, foot-slopes, toe-slopes, and terrace/floodplains positively influence flight risk. Additionally, the presence and quantity of perch structures in the form of linear power infrastructure and/or woody vegetation positively influenced flight risk, along with cumulative and minimum vegetation productivity.

The raw predictive FRM surface was further processed to derive two risk classes, namely high and medium risk classes around the nest. The risk classes were derived by the quantity of observed high risk flights being accommodated by each respective risk envelope. The high-risk class encompassed approximately 79 km^2, which is very comparable to the area covered by a 5 km circular buffer (78.5 km^2)

ENVIRONMENTAL SENSITIVITIES – WEF

The following environmental sensitivities were identified from an avifaunal perspective for the proposed wind energy facility:

Very High Sensitivity – All Infrastructure Exclusion Zones (i.e, "No-go Area")

- A 2.5 km No-Go zone around the identified Martial Eagle nest should be implemented and maintained to reduce the risk of collision mortality and displacement due to disturbance.
- All wetland No-Go areas as identified by the Aquatic Specialist should be buffered by an additional 110m on either side to reduce the risk of turbine collisions and to prevent the disturbance of priority species breeding and roosting in these areas. Priority species in this category include African Fish Eagle, African Grass Owl (recorded during dedicated wetland surveys), African Marsh Harrier, Black-winged Pratincole, Blue Crane, Grey Crowned Crane, Long-crested Eagle, Marsh Owl, and Sensitive Species Number 23.
- Sensitive Species 23 habitat – Fine scale habitat modelling and identification of wetland corridors for cryptic / low detection probability wetland species was conducted. High suitability wetland areas were identified by the habitat suitability model and further refined based on habitat surveys conducted during December 2024.
- Modelled Yellow-breasted Pipit habitat areas are considered No-Go zones. These high-quality grassland areas were identified to prevent displacement of birds due to disturbance and habitat destruction. The Yellow-breasted Pipit model output represents the habitat patches most suitable for the species' using a multi-year assessment of imagery indices etc. spanning 2019–2023. This is to account for variability related to drivers of habitat suitability for grassland habitat specialist species such as these endemic pipits. Primary drivers of variability include seasonal rainfall across years, burning/fire, and grazing intensity. The model boundaries will extend beyond suitable habitat into other habitats (forest edge, roads, etc.) in some areas as we have accounted for typical blade swept area (BSA) by buffering the habitat output. This output should be considered high sensitivity and avoided (no-go) given habitat loss/degradation is the primary issue. Currently Wind Turbine Generators (WTGs) 21 and 23 are located within the All-Infrastructure Exclusion (i.e. No-Go) Zone. These WTGs need to micro-sited out of this zone or removed from the layout completely.

High Sensitivity – Turbine Exclusion Zones.

- A Martial Eagle nest is located in a stand of alien trees north-west of the Project Site. The modelled No-turbine buffer zone must be implemented around the nest to reduce the risk of turbine collisions. Currently Wind Turbine Generators (WTGs) 12, 20 and 21 are located within the Turbine Exclusion Zone. WTG 13 is located near the edge of this turbine exclusion zone. These WTGs need to micro-sited out of this zone or removed from the layout completely
- There are two Southern Bald Ibis colonies located within the WEF Project Site. A shaped turbine exclusion zone has been delineated based on extensive and detailed modelled flight activity. The modelling workflow incorporated all the flight data collected within the area during the pre-construction monitoring. The model identifies high risk flight areas by considering associations between the underlying habitat and topography in relation to the recorded Southern Bald Ibis flight data and proximity to roosts. Currently WTG 25 is located near the edge of the Turbine Exclusion Zone. This WTG needs to micro-sited out of this zone or removed from the layout completely
- High Sensitivity grassland habitat for Yellow-breasted Pipit.
- All drainage lines should be buffered by 210 m on either side to reduce the risk of turbine collisions.

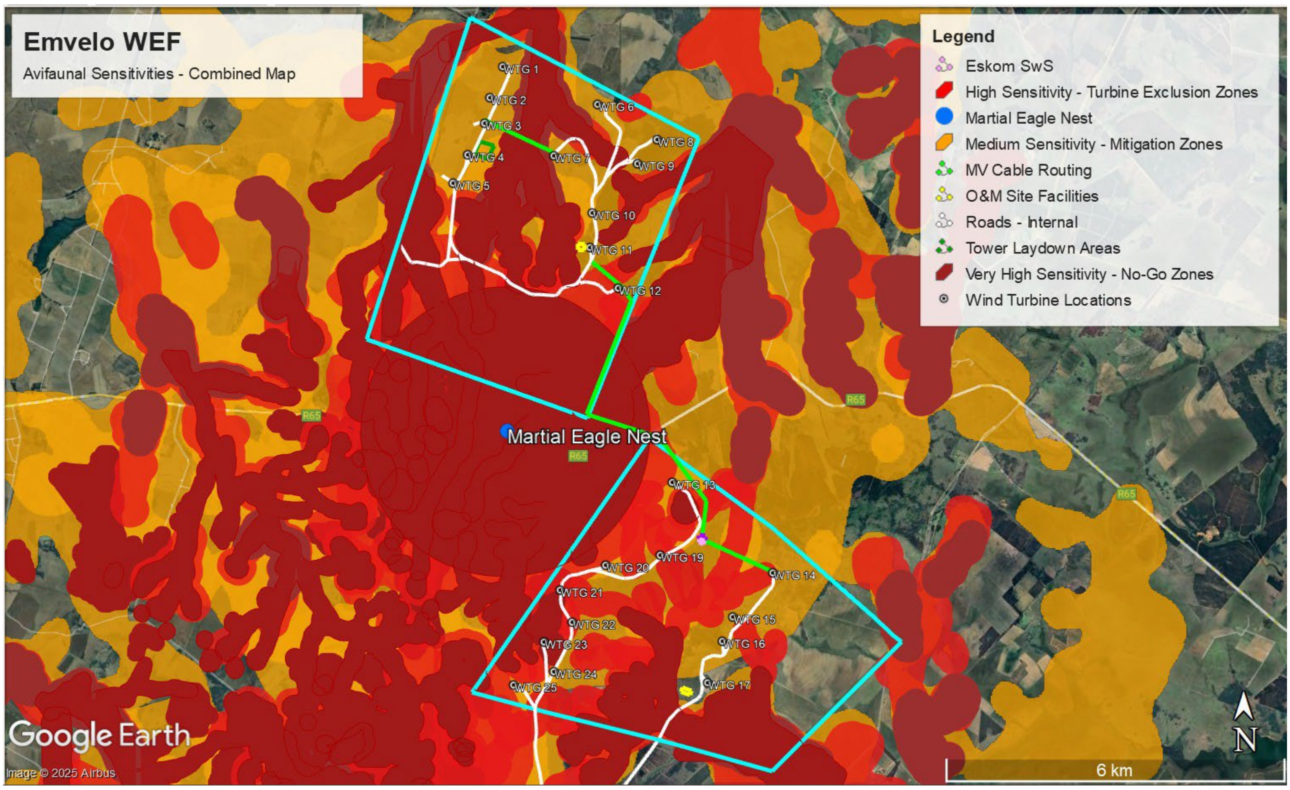
- Sensitive Species 23 habitat defined through detailed habitat modelling and then appropriately buffered, movement corridors were determined and buffered to accommodate for nocturnal movement and migration for Sensitive Species 23 (as listed by the National Screening Tool). These habitats are wetlands and/or rank grasslands, and as such would also be important for other threatened wetland species (Striped Flufftail, African Grass Owl, etc.).

Medium Sensitivity – Mitigation Zones.

- A Martial Eagle nest is located in a stand of alien trees north-west of the Project Site. Pro-active mitigation in the form of Shutdown on Demand (SDoD) or automated curtailment must be implemented in the medium risk zones. There are several turbines located within this zone.
- There are two Southern Bald Ibis colonies located inside the Project Site. Pro-active mitigation in the form of Shutdown on Demand (SDoD) or automated curtailment must be implemented in the medium risk zones. There are several turbines located within this zone.

  Sensitive Species 23 habitat defined through detailed habitat modelling and then appropriately buffered by 250 m, movement corridors were determined and buffered to accommodate for nocturnal movement and migration for Sensitive Species 23.These habitats are wetlands and/or rank grasslands, and as such would also be important for other threatened wetland species (Striped Flufftail, African Grass Owl, etc).

FIGURE 6-13 COMBINED AVIFAUNAL SENSITIVITY MAP



ENVIRONMENTAL SENSITIVITIES GRID CONNECTION

Due to the potential presence of several power line sensitive species, including SCC, which could utilise the whole PAOI and Broader Area, including the Grid Connection Development Area, for foraging, roosting, and nesting, the entire PAOI has been assessed to be a high sensitivity zone (Figure 6-1) from a collision impact perspective and an electrocution risk perspective. Therefore, Bird Flight Diverters to be applied to the entire span length of the OHLs and a bird-friendly pylon design must be used.

High Sensitivity: Surface Water & Grasslands – Line Marking Required.

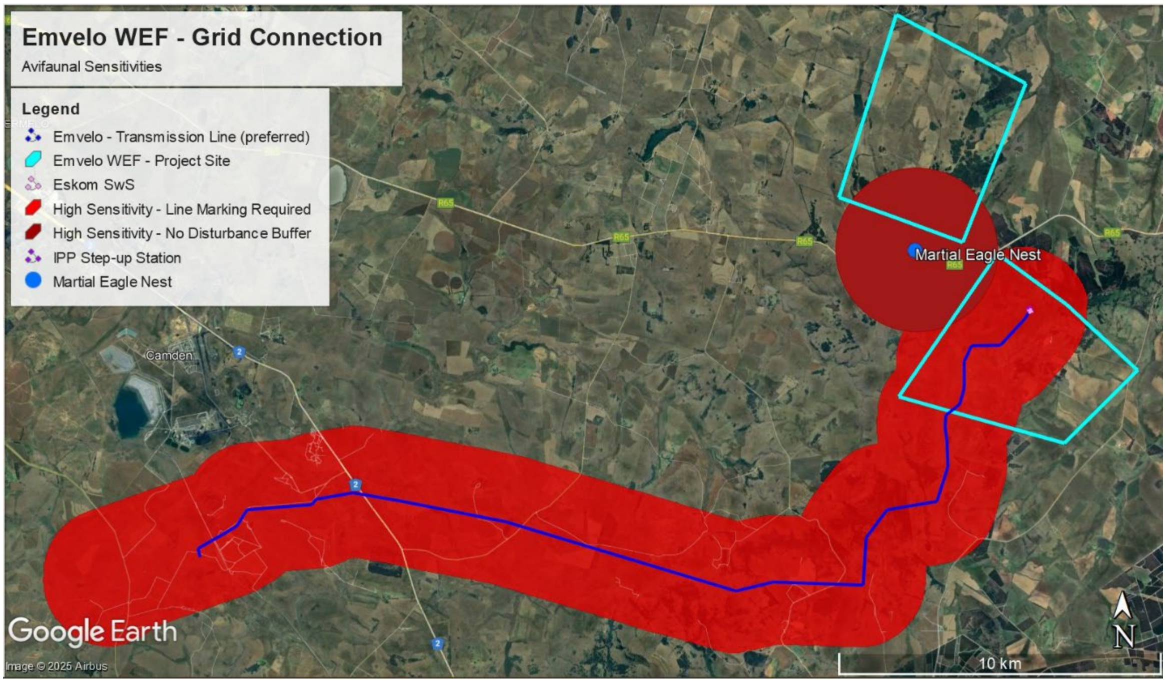
Surface water is crucially important for priority avifauna, including several SCC such as Martial Eagle, Lanner Falcon and Secretarybird, and many non-priority species, including several waterbirds. Drainage lines, dams, and wetlands attract waterbirds and several other bird species. Powerlines that are placed near these sources of surface water pose a collision risk to birds using the water for drinking and bathing. Drainage lines are also natural flight paths for birds. The grassland habitat in the area is crucially important to SCC such as Denham's Bustard, Secretarybird and Southern Bald Ibis, for foraging and roosting, all three SCC have been recorded in the PAOI.

Mitigation in the form of Bird Flight Diverters on the OHL is required. The entire length of the OHL should be fitted with Eskom approved Bird Flight Diverters. BFD design specification should conform to types of devices that will be visible at night e.g. LED type bird flight diverters.

High Sensitivity Seasonal No Disturbance Buffer – Breeding Red Data Species Nests.

Martial Eagle nest – A 2.5 km no disturbance buffer zone (Figure 6-14) must be implemented around the nest. No construction activity should take place in this zone from March to December, which is the breeding season for these eagles.

FIGURE 6-14 AVIFAUNAL SENSITIVITIES IDENTIFIED FOR THE EMVELO GRID CONNECTION. NOTE: DUE TO THE LARGE AMOUNT OF WETLANDS/DRAINAGE LINES AND NATURAL GRASSLANDS IN THE AREA IT IS RECOMMENDED THAT THE ENTIRE OHL BE FITTED WITH BIRD FLIGHT DIVERTERS. AND A BIRD-FRIENDLY PYLON DESIGN MUST BE USED FOR THE OHL TO MINIMIZE THE ELECTROCUTION RISK.



6.11 BATS

The Project Area of Influence (PAOI) is situated in the Grassland Biome and comprises predominantly Eastern Highveld Grassland vegetation. The landscape associated with this vegetation consists of slight to moderately undulating plains with small scattered rocky outcrops. The vegetation is short, dense grassland (Mucina and Rutherford 2006). Wakkerstroom Montane Grassland occurs in the middle of the PAOI, on low mountains and undulating plains. Here the vegetation comprises short montane grassland on plateaus and flat areas. On steep, east facing slopes and in drainage areas, short forest and thicket occurs. Both vegetation types are endemic, and Eastern Highveld Grassland is classified as Vulnerable while Wakkerstroom Montane Grassland is classified as Least Concern (SANBI 2018). The PAOI includes some low hills and wetland depressions and has largely been transformed by cultivation in the west, commercial forestry in the east and urban sprawl, including extensive areas of alien invasive trees. The PAOI is in a summer rainfall region and has a cool-temperate climate with dry winters, frequent occurrence of frost and large differences in both diurnal and seasonal temperature extremes (Mucina and Rutherford 2006).

Critical Biodiversity Areas (CBA), areas of high biodiversity value that must be maintained in a natural state, are located throughout the PAOI, classified as either “CBA Irreplaceable” and “CBA Optimal” (Figure 1). The former category comprises 1) areas required to meet conservation targets and those with irreplaceability values greater than 80 %, 2) areas which represent critical linkages or pinch-points in the landscape that must remain natural, and 3) Critically Endangered ecosystems (MTPA 2014). The latter category comprises areas that are not 'irreplaceable', but they are the most optimal land configuration to meet all biodiversity targets. Ecological Support Areas (ESA), not essential for meeting biodiversity targets but important in supporting the functioning of CBAs and delivering important ecosystem services, are also located throughout the PAOI.

Parts of the PAOI fall within a National Protected Areas Expansion Strategy (NPAES) Focus area (Moist Escarpment Grasslands), targeted for protected area expansion for improved ecosystem representation, ecological sustainability and resilience to climate change. Chrissiesmeer Protected Environment and Jericho Dam Nature Reserve overlap the north and east of the PAOI respectively.

Bat roosting sites in the PAOI are relatively limited and unlikely to support large congregations of bats, with no underground sites (e.g., caves, mines, sinkholes) known to be present. The closest known major bat roost is approximately 70 km north of the PAOI. Although occasional ridges and rocky outcrops are features of the landscape (Mucina and Rutherford 2006) these are not extensive. Some bat species could roost in these features. Bats are likely to roost in buildings associated with farmsteads within and bordering the AoI especially Cape Serotine and Egyptian Free-tailed Bat (Monadjem et al. 2020). Trees growing at these farmsteads and elsewhere on site where they form clumps, could also provide roosting spaces for bats, even though most are alien invasive species. Completed surveys of some buildings in the of the PAOI did not reveal the presence of roosting bats and as such were assessed as being of low relative suitability. However, these could be used by bats as night-roosts (locations used by bats to feed on captured prey, or to rest between foraging bouts) and should therefore still be considered, and avoided where possible, in the spatial planning.

Sensitive features in the PAOI at which bat foraging activity may be concentrated include farm buildings where they would forage for insects attracted to lighting (Rydell 1992, Jung and Kalko 2010), dams and wetland areas (Sirami et al. 2013), within and along the edge of woodland/tree patches, and over cultivated areas (Bohmann et al. 2011, Noer et al. 2012). Free-tailed bats (Molossidae) will fly at high altitudes, and their foraging habitat is essentially all airspaces (McCracken et al. 2008, Nguyen et al. 2019).

Based on current taxonomic information and bat occurrence data, 23 species could occur within the PAOI (Table 6-5). The majority have a low likelihood of occurrence however the potential suite of species includes 10 high risk species, including fruit bats (Pteropodiae) and free-tailed bats (Molossidae) which are vulnerable to wind energy impacts in South Africa (MacEwan 2016, Aronson 2022).

TABLE 6-5 BAT SPECIES POTENTIALLY OCCURRING WITHIN PAOI

Common Name Species Name	Key Habitat Requirements*	Prob. Of Occurrence	Conservation Status		Wind Energy Risk[δ]
			IUCN[†]	RSA[ǃ]	
Natal Long-fingered bat *Miniopterus natalensis*	Temperate or subtropical species. Primarily in savannahs and grasslands. Roosts in caves, mines, and road culverts. Clutter- edge forager. Migratory.	Confirmed (5,018 passes)	LC/U	LC	High
Lessor Long-fingered bat	Temperate species, associated with grasslands. Cave-dependant but also roosts in tunnels and	Moderate	LC/U	LC	High

Miniopterus fraterculus	mines. Habitat includes savannah bushveld, moister mistbelt and coastal forest habitats. Clutter-edge forager. Migratory.				
Cape Serotine *Laephotis capensis*	Arid semi-desert, montane grassland, forests, savannah and shrubland. Roosts in vegetation and human-made structures. Clutter-edge forager.	Confirmed (50,243 passes)	LC/S	LC	High
Mauritian tomb bat *Taphozous mauritianus*	Savannah woodland preferring open habitat. Roosts on rock faces, the outer bark of trees or on the outer walls of buildings under the eaves of roofs. Forages in urban areas and over cultivation. Open- air forager.	High	LC/U	LC	High
Little Free-tailed bat *Mops pumilus*	Semi-arid savannah, forested regions, woodland habitats. Roosts in narrow cracks in rock and trees but also in buildings. Open-air forager. Forages in urban areas and over cultivation.	Confirmed (1,767 passes)	LC/U	LC	High
Midas Free-tailed bat *Mops midas*	Hot low-lying savannah and woodland. Roosts in narrow cracks in rock and trees but also in buildings. Open-air forager.	Low	LC/D	LC	High
Egyptian Free-tailed bat *Tadarida aegyptiaca*	Desert, semi-arid scrub, savannah, grassland, and agricultural land. Roosts in rocky crevices, caves, vegetation, and human-made structures. Open-air forager.	Confirmed (20,995 passes)	LC/U	LC	High
Wahlberg's Epauletted fruit bat *Epomophorus wahlbergi*	Roost in dense foliage of large, leafy trees. Associated with forest and forest-edge habitats but will forage in urban environments.	Low	LC/S	LC	High
African Straw-coloured fruit bat *Eidolon helvum*	Non-breeding migrant in the PAOI.	Low	NT/D	LC	High
Egyptian Rousette *Rousettus aegyptiacus*	Distribution influenced by availability of suitable caves roosts.	Low	LC/S	LC	High
Temminck's Myotis *Myotis tricolor*	Montane forests, rainforests, coastal forests, savannah woodlands, arid thicket, and fynbos. Roosts communally in caves (and mines) and closely associated with mountainous terrain. Migratory. Clutter-edge forager.	Low	LC/U	LC	Medium-High
Welwitsch's Myotis *Myotis welwitschii*	Mainly open woodland and savannah but also high-altitude grassland, tropical dry forest, montane tropical moist forest, savannah and shrublands. Clutter-edge forager.	Low	LC/U	LC	Medium-High
Yellow-bellied house bat *Scotophilus dinganii*	Occurs throughout the Savannah Biome but avoids open habitats such as grasslands and Karoo scrub. Roosts in hollow trees and buildings. Clutter-edge forager.	Confirmed (169 passes)	LC/U	LC	Medium-High
Dusky Pipistrelle *Pipistrellus hesperidus*	Woody habitats, such as riparian vegetation and forest patches. Recorded roosting in narrow cracks in rocks and under the loose bark of dead trees. Clutter-edge forager.	Low	LC/U	LC	Medium-High
Rusty Pipistrelle *Pipistrellus rusticus*	Savannah woodland and associated with open water bodies. Roosts in trees and old buildings. Clutter-edge forager.	Low	LC/U	LC	Medium-High

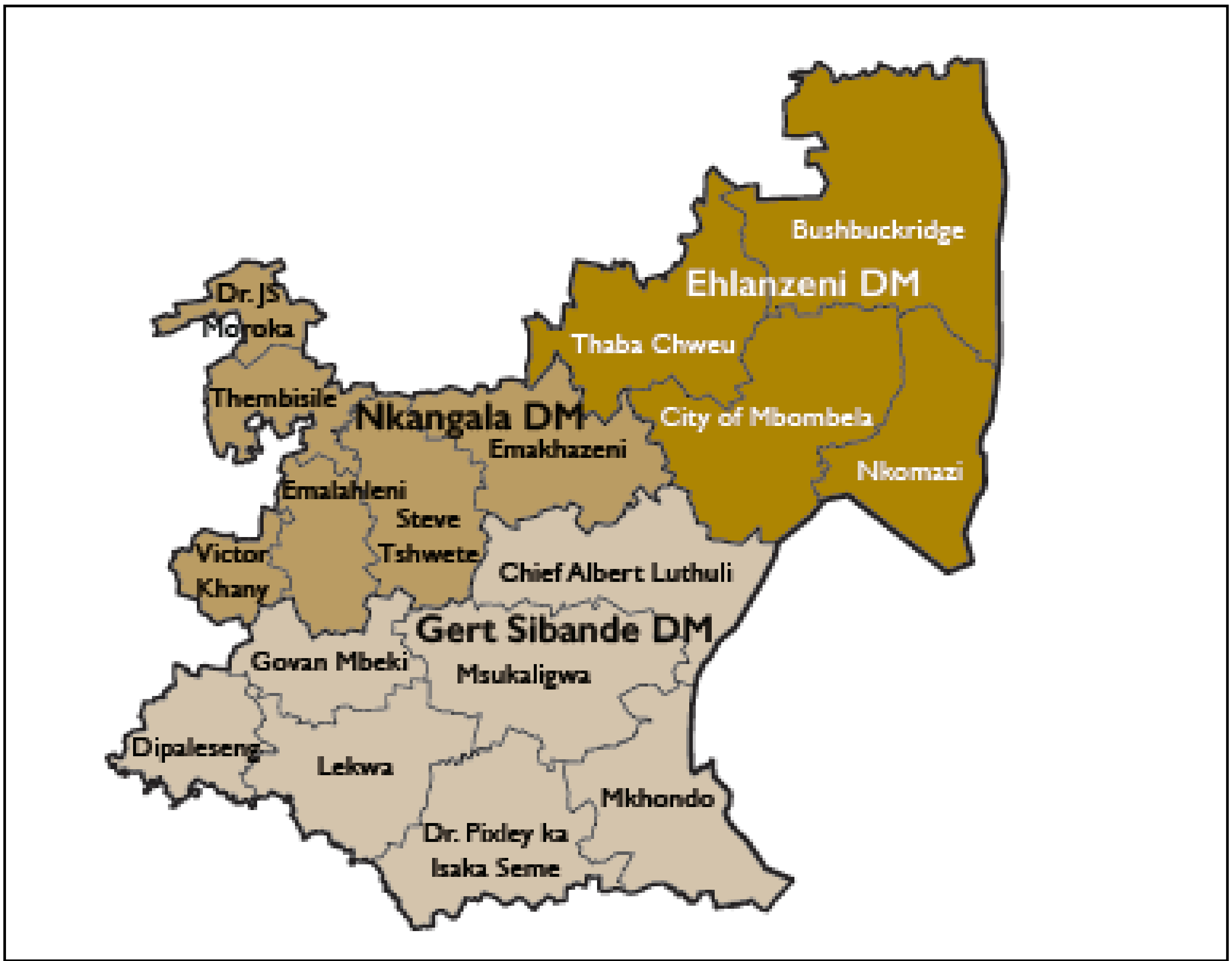
Long-tailed Serotine *Eptesicus hottentotus*	Montane grasslands, marshland and well-wooded riverbanks, mountainous terrain near water. Roosts in caves, mines, and rocky crevices. Clutter-edge forager.	Confirmed (368 passes)	LC/U	LC	Medium
Egyptian Slit-faced bat *Nycteris thebaica*	Savannah, desert, arid rocky areas, and riparian strips. Gregarious and roosts in caves but also in mine adits, Aardvark holes, rock crevices, road culverts, roofs, and hollow trees. Clutter forager.	Medium	LC/U	LC	Low
Geoffroy's Horseshoe bat *Rhinolophus clivosus*	Savannah woodland, shrubland, dry, riparian forest, open grasslands, and semi- desert. Roosts in caves, rock crevices, disused mines, hollow baobabs, and buildings. Clutter forager.	Medium	LC/U	LC	Low
Bushveld Horseshoe bat *Rhinolophus simulator*	Occurs in caves within areas of moist savannah, adjacent to rivers and savannah woodland, montane habitats, and coastal mosaics. Commonly associated with riparian forest and along wooded drainage lines. Roosts in caves and mines. Clutter forager.	Medium	LC/D	LC	Low
Blasius's Horseshoe bat *Rhinolophus blasii*	Savannah woodlands and are dependent on the availability of daylight roosting sites such as caves, mines, or boulder piles.Clutter forager.	Low	LC/D	NT	Low
Darling's Horseshoe bat *Rhinolophus darlingi*	Mesic woodland savannahs. Roosts in caves, boulder piles, mines, culverts, large hollow trees and disused buildings. Clutter forager.	Low	LC/U	LC	Low
Sundevall's Leaf-nosed bat *Hipposideros caffer*	Savannah, bushveld and/or coastal forests, near to rivers and other water sources. Roosts in caves, sinkholes, rock fissures, hollow trees, mines, and culverts. Clutter forager.	Low	LC/D	LC	Low
Percival's Short-eared Trident bat *Cloeotis percivali*	Savannah and woodland areas. Roosts in caves and mine tunnels. Clutter forager.	Low	LC/U	EN	Low

*Child et al. (2016), *Monadjem et al. (2020); ! Child et al. (2016); †IUCN (2021); $^{\delta}$ MacEwan et al. (2020b)

6.12 SOCIO-ECONOMIC

The study area is located within the Msukaligwa Municipality (MM) within the Mpumalanga Province. The MM is one of the seven Local Municipalities that make up the Gert Sibande District Municipality (Figure 6-15). The town of Ermelo is the administrative seat of the MM. The study area is located approximately 20-30 km east of Ermelo.

FIGURE 6-15 LOCATION OF MSUKALIGWA MUNICIPALITY WITHIN THE GERT SIBANDE DISTRICT MUNICIPALITY AND MPUMALANGA PROVINCE



POPULATION

The population of the MM in 2022 was 199 314, compared to 164 608 in 2016 (Community Household Survey 2016). Of this total, 26.4% were under the age of 15, 69.4% fell within the economically active age group of 15 to 64, and the remaining 4.6% were 65 and older. The MM therefore had a high percentage of the population that fall within the economically active group of 18-65. The figures are similar to those for the GSDM, namely, 27.3%, 67.6% and 5.1% respectively.

The dependency ratio is the ratio of non-economically active dependents (people younger than 15 or older than 64) to the working age population group (15-64). The higher the dependency ratio the larger the percentage of the population dependent on the economically active age group. This in turn translates to reduced revenue for local authorities to meet the growing demand for services. Based on the 2022 Census data the dependency ratio for the MM was 44.6% compared to 52.6% in 2011. This represents a socio-economic improvement. However, the current high unemployment rates in South Africa, specifically youth unemployment, is likely to have a negative impact on the improved dependency ratio.

In terms of race groups, Black Africans made up 91.6% of the population on the MM, followed by Whites, 6.9% and Asian or Indians, 0.9%, and Coloureds, 0.6%. This figures for the GSDM are similar. The main first language spoken in the MM was isizulu, 79.1%, followed by Siswati, 7.3% and Afrikaans, 6.2%.

HOUSEHOLDS AND HOUSE TYPES

The total number of households in the MM in 2022 was 67 826 compared to 51 090 in 2016, which constituted approximately 18% of the total number of households in the GSDM. Of these 85% were formal houses, 11% were shacks or informal dwellings. The majority of dwellings in the MM are therefore formal structures.

In terms of household heads, approximately 38.9% of the households in the MM and 39.1% of the households in the GSDM in 2016 were headed by women[13]. These figures were similar to the provincial figure of 39.71%. The high percentage of households headed by women reflects the likelihood that the men have left the area in search of employment opportunities in Gauteng. Women headed households tend to be more vulnerable.

HOUSEHOLD INCOME

Based on the data from the 2011 Census, 12.6% of the population of the MM had no formal income, 4.1% earned less than R 4 800, 7.1% earned between R 5 000 and R 10 000 per annum, 17.7% between R 10 000 and R 20 000 per annum and 20.9% between R 20 000 and 40 000 per annum (2016). The poverty gap indicator produced by the World Bank Development Research Group measures poverty using information from household per capita income/consumption. This indicator illustrates the average shortfall of the total population from the poverty line. This measurement is used to reflect the intensity of poverty, which is based on living on less than R3 200 per month for an average sized household (~ 40 000 per annum). Based on this measure, in the region of 62.4% of the households in the MM and 65.2% in the GSDM live close to or below the poverty line. The low-income levels reflect the rural nature of the local economy and the limited formal employment opportunities outside in the urban areas. This is also reflected in the high unemployment rates. The low-income levels are a major concern given that an increasing number of individuals and households are likely to be dependent on social grants. The low-income levels also result in reduced spending in the local economy and less tax and rates revenue for the MM. This in turn impacts on the ability of the MM to maintain and provide services.

Household income levels are likely to have been impacted by the COVID-19 pandemic. The number of households in the MM and GSDM that live close to or below the poverty line is likely to have increased over the last 18 months. This, coupled with the high dependency ratio, is a major cause of concern for the area.

EMPLOYMENT

The official unemployment rate in the MM in 2016 was 15.6%, while 42.6% were employed, and 36.4% were regarded as not economically active. However, the COVID-19 pandemic is likely to have resulted in an increase in unemployment rates in the MM. South Africa's unemployment rate was 32.1% in Q4 of 2023, while the youth unemployment rate was 43.4% in Q3 2023, the highest recorded youth employment rate in the world.

[13] Data form the 2022 Census was not available at the time of preparing the report.

EDUCATION

In terms of education levels, the percentage of the population over 20 years of age in the MM with no schooling in 2022 was 10.9%, an increase from 10.6% in 2016. The figure for the GSDM in 2022 was 10.3% compared to 10.8% in 2016. The percentage of the population over the age of 20 with matric in 2016 was 34.12%, compared to 34.3% and 36.1% for the GSDM and Mpumalanga[14]. The education levels for the MM are therefore similar to the DM and Provincial figures.

ECONOMIC OVERVIEW

The economic growth rate for Msukaligwa was at 3.0% per annum on average over the period 1996 to 2017 and forecasted average annual GDP growth for 2017-2022 relatively low at 1.3%. The contribution of Msukaligwa to the Mpumalanga economy was around 4.3%, making it the fifth largest local economy in the province. It is the second largest economy in the District, contributing around 15.5%. The key economic sectors in the MM in 2017 in terms of contribution to GDP were mining (20.3%), community services (18.5%), trade (including industries such as tourism) (18.2%) and finance (14.2%) (Table 3.4). Despite the importance of agriculture, it only contributed 6% to GDP in 2017. The IDP notes that the MM has a comparative advantage in economic sectors such as agriculture, transport, and mining.

6.13 HERITAGE, ARCHAEOLOGY AND PALAEONTOLOGY

The black wattle woodlots have greatly expanded and covered many of the settlements form the desktop study. There was no evidence of these settlements where access through the woodlots was possible. The Black Wattle has literally destroyed the sites and any potential graves. The situation is exacerbated by the current program of removing the black wattle being removed by bulldozers in some areas.

Many of the desktop sites are also in fields that have been converted to agricultural activity. While several areas have kept known graves intact, within these fields, others have not. In this way, large wattle woodlots and agricultural fields were omitted from the survey. Grasslands were not omitted.

A general statement regarding settlements and graves can be made from the survey. Those settlements that were surveyed tend to have human graves associated with them. The desktop settlements that could not be surveyed for various reasons, many still have graves associated with them. They would be subsurface and in various states of preservation. These latter settlements should be treated as sensitive for potential graves, but do not need to be treated as a red flag.

The Emvelo WEF consisted of large maize fields at the base and in the valley, and steep hills. The hills have been overgrown with black wattle and many of the access roads/tracks are now covered. This made site access a problem in a few areas. These sites can be re-assessed if they are to be affected during the final site walkthrough. Table 6-6 lists the recorded sites.

[14] Data form the 2022 Census was not available at the time of preparing the report.

TABLE 6-6 LOCATION AND DESCRIPTION OF RECOREDED SITES

Name	Latitude	Longitude	Description
EMVE003	-26.678342368	30.275034825	Klipfontein farm
EMVE004	-26.681143700	30.274493393	Cemetery
EMVE005	-26.640561011	30.327702841	Farmhouse
EMVE006	-26.602617800	30.330840200	modern cemetery
EMVE007	-26.600501450	30.330320888	Graves, walling
EMVE008	-26.599500959	30.330142801	House ruins
EMVE009	-26.590699717	30.355348755	Kraal
EMVE012	-26.608061255	30.355924805	Cemetery
ROCH01	-26.552153366	30.296971172	Cemetery
ROCH02	-26.529418294	30.333862690	House floors?
ROCH03	-26.539703196	30.331149323	House still used
ROCH04	-26.548868529	30.323932706	Mooifontein
ROCH05	-26.549668938	30.297065110	Schimmelhoek

EMVE04

The site is located next to the maize fields and beside the road. The site is a cemetery to the Senekal and Joubert families that lived at Klipfontein. The graves date from 1892 to 1968 and are all of adults, except for one child.

Significance: The site is of high significance.

Mitigation: It is unlikely that the cemetery will be affected. A 50m buffer needs to be placed around the site. The site will need to be visibly demarcated before construction phase commences if any activity occurs within 50m of it. The demarcation should be 20m from the grave.

EMVE06

The site is located on the slopes of the hill. The site consists of recent cemetery with 30+ graves. The graves are stone cairns in an east-west orientation.

Significance: The site is of high significance.

Mitigation: It is unlikely that the cemetery will be affected. A 50m buffer needs to be placed around the site. The site will need to be visibly demarcated before construction phase commences if any activity occurs within 50m of it. The demarcation should be 20m from the grave.

EMVE012

The site is located near the base of a hill and next to the road. The site consists of fifteen graves in an informal cemetery (fig. 19). The area is~20m x 30m in size and the graves are in an east-west orientation. The cemetery appears to be more recent in age. The site is in the current laydown area. Part of the laydown area will need to be moved.

Significance: The site is of high significance.

Mitigation: It is unlikely that the cemetery will be affected. A 50m buffer needs to be placed around the site. The site will need to be visibly demarcated before construction phase commences if any activity occurs within 50m of it. The demarcation should be 20m from the grave.

ROCH01

The site is located beside the road 200m south of Schimmelhoek. The site consist of the Bothma family cemetery and dates from at least 1881 to 1935 (fig. 20). There are at least seven marked graves. The five infants share two graves. The cemetery shows the hardships of the 19th century where the parents lost five infants all under the age of two years.

Significance: The site is of high significance.

Mitigation: A 50m buffer needs to be placed around the site. The site needs to be clearly demarcated before construction begins. The site will need to be visibly demarcated before construction phase commences if any activity occurs within 50m of it. The demarcation should be 20m from the cemetery.

ROCH03

The site is located on the top of a broad hill and is related to S39 from the desktop. The site is still in use and consists of several buildings and a kraal. There was no-one at the settlement when I recorded it, thus I did not enter it, nor take photos.

Significance: The site is of high significance since it is still being used since the 1960s.

Mitigation: The people from the site need to be included in the PPP and queried regarding human graves.

ROCH04

The site is at the base of the hill overlooking the valley. The site is Mooifontein from the desktop study. The site consists of a farmhouse, a large kraal and several sandstone and/or dolerite buildings that have been added through time.

The site probably dates to the late 19th century or early 20th century and thus the buildings are protected.

Significance: The site is of possible medium to high significance for the buildings and vernacular architecture.

Mitigation: If the buildings are to be affected, then the site requires a Built Environment assessment. A general 100m radius around the site should be placed for potential historical middens.

ROCH05

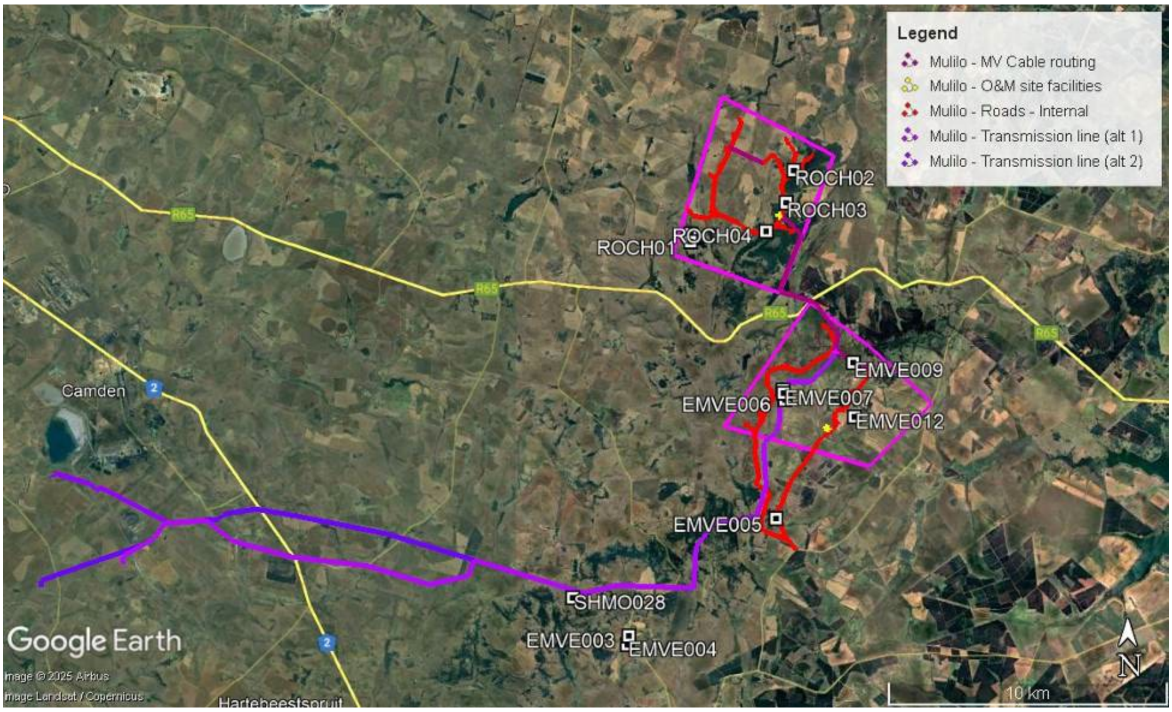
The site is located near the base of the hill and is associated with Schimmelhoek from the desktop, even though the farm was incorrectly placed on the topographical map. The site is also directly related to ROCH01 as that is the family cemetery. Schimmelhoek is also the farm where the Boer forces rested the night before the Battle of Onverwacht, and thus the Bothma's were probably pro-Bittereinders, as they had given permission for the Boer encampment. The cemetery at ROCH01 directly relates to the people who lived at this farm.

The site consists of three main houses that appears to have been built at different times and probably relates to the growing family (Figure 6-16). The earliest building could date to around 1876 when the farm was first surveyed and sold. South of the houses is the garden area with fruit trees and a sheep dip. The main kraal is 60m x 20m in diameter. No middens were visible but would occur as there is at least 70 year of occupation.

All of the structures are older than 60 years in age and are protected by the heritage legislation

Currently wind Turbine 21 is located on this site. The turbine will need to be moved.

FIGURE 6-16 LOCATION OF RECORDED SITES FOR THE EMVELO WEF IN RELATION TO THE TURBINES



6.14 PALEONTOLOGY

The area is of very high palaeontological sensitivity. Dr Alan Smith undertook a desktop PIA for the proposed Emvelo WEF. He states:

"The SAHRIS Palaeosensitivity Map considers the Vryheid Formation as a Very High Palaeosensitivity Zone. In practise, no vertebrate fossils have been recorded from the Vryheid Formation in this area, however invertebrate trace fossils are common (Tavener Smith et al, 1989; Mason and Christie, 1985; Hastie et al., 2019), but these are of no particular value, in this area.

Groenewald (2018) pointed out that the aquatic marine reptile, *Mesosaurus* (earliest known reptile from the Karoo Basin), as well as the fish, *Palaeoniscus capensis*, have been recorded in the Whitehill Formation in the southern part of the basin (MacRae, 1999), which is correlated with the Vryheid Formation... The Vryheid Formation in this area has its provenance in the north (Tavener Smith, 1982). The Whitehill Formation source is in the south. There is also a southerly source to the lower Vryheid Formation (Hastie et al., 2019), but this regime does not extend north of Vryheid. The Vryheid Formation is generally believed to be marine (Hastie et al., 2019) but no significant fossils have been discovered. The lack of vertebrate fossils is problematic. In the marine case it may be due to the water being heavily silted but this is speculation."

This area is mostly non-fossiliferous Karoo Dolerite and no further mitigation is required.

The chance of significant fossils being found on this site are **Low,** but not **Zero. Consequently a "Chance Find Protocol"** has been included to cover this eventuality. No further palaeontological work is required, unless triggered by the "**Chance Find Protocol**", which must form part of the Environmental Management Programme (EMPr) for the site'.

OVERHEAD POWERLINE

The 1969 topographical map indicated that there were several settlements, or homesteads, kraals and farm buildings along the route. The location of these features are given in Table 6-7 Location of desktop sites. Some of these sites will be directly affected by the transmission line, while most are in the footprint our just outside of the footprint.

TABLE 6-7 LOCATION OF DESKTOP SITES

Name	Latitude	Longitude	Description
k4	-26.639329513	30.158493982	Kraal
Ruin 2	-26.599368725	30.330021317	Ruin
s13	-26.546130499	30.323444652	Settlement
s29	-26.637677613	30.120726334	Settlement
s3	-26.662677585	30.130601041	Settlement
s30	-26.636981297	30.121591442	Settlement
s31	-26.641623441	30.135345100	Settlement
s34	-26.611814709	30.259626834	Settlement
s35	-26.587853931	30.288226500	Settlement
s46	-26.550681623	30.311582320	Settlement
s67	-26.606786970	30.291934198	Settlement

FIGURE 6-17 LOCATION OF RECORDED SITES FOR PREFERRED OHL

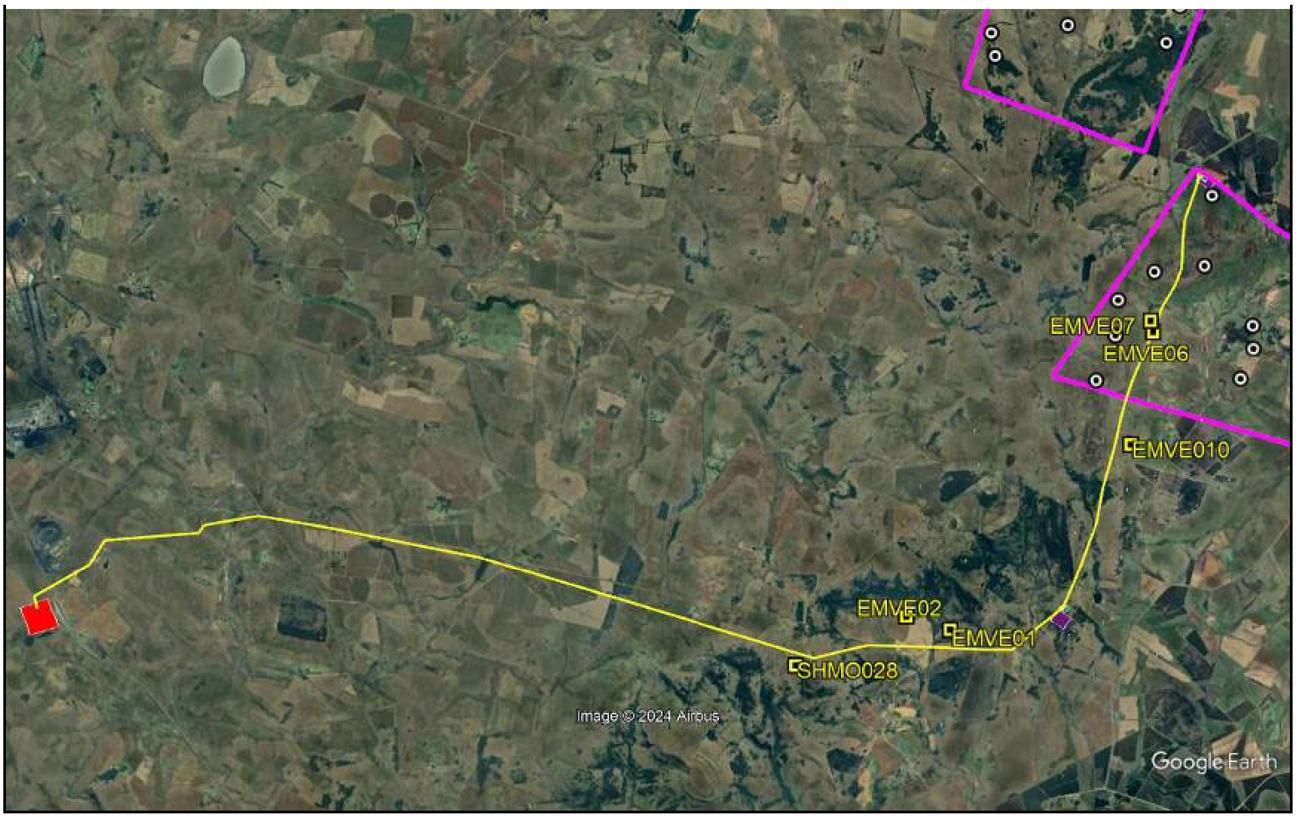


TABLE 6-8 LOCATION OF RECORDED SITES

Name	Latitude	Longitude	Description
EMVE07	-26.600501450	30.330320888	LIA or HP settlement
EMVE08	-26.599500959	30.330142801	House ruins
SHMO09	-26.570522600	30.287594200	Row of Stellae
SHMO011	-26.574274200	30.295731100	settlement 59, x5 houses
SHMO016	-26.609387400	30.278318600	graves,
SHMO017	-26.606701315	30.291456770	HP settlement
SHMO020	-26.611976600	30.265673200	walling and settlement S68

EMVE06

The site is located on the slopes of the hill. The site consists of recent cemetery with 30+ graves. The graves are stone cairns in an east-west orientation.

Significance: The site is of high significance.

Mitigation: It is unlikely that the cemetery will be affected. A 50m buffer needs to be placed around the site. The site will need to be visibly demarcated before construction phase commences if any activity occurs within 50m of it. The demarcation should be 20m from the grave.

The Preferred OHL will have shallow foundations and will have little palaeosensitivity impact. The chance of significant fossils being found on this site are Low, but not Zero. Consequently a "Chance Find Protocol" has been included to cover this eventuality.

No further palaeontological work is required, unless triggered by the "Chance Find Protocol", which must form part of the Environmental Management Programme (EMPr) for the site

6.15 VISUAL AND LANDSCAPE

The study area consists of a landscape that varies from flat with wide open grasslands and agricultural lands, to rolling with low ridges, valleys, ridges, escarpments, and flat-topped hills. In the east the landscape drops down to the edge of the Mpumalanga escarpment with steeper valleys and ridges. The study area comprises gently undulating land originally covered with Eastern Highland Grassveld with Wakkerstroom Montane Grassland on the eastern edge (Mucina and Rutherford 2006:460). Most of the area is not often ploughed due to the clay soils. However, the very nature of the original vegetation in this area is low growing and visually uniform which does not provide much visual screening. Although the grassland vegetation is not overly sensitive to the development it does not assist in reducing the visual expose of the turbines. The vegetation is typical of the Highveld ambience, and it is this together with the topography which provides the Highveld sense of place.

The area in the northern sector of the study area exhibits a high aesthetic appeal imparted by the rolling topography, farmsteads, streams and rivers, dams and lakes, and farmlands.

The area further to the east forms the edge of the upper reaches of the escarpment and is well forested with timber plantations which may assist in screening the visibility of the turbines (i.e., visual absorption capacity (VAC) is high for the eastern sections of the study area.

The landscape in the west and south western parts of the study area are visually intruded by existing power lines, views of the Camden Power Station and settlements such as Sheepmoor, which do not have the aesthetic appeal of the north. Although the hills to the far south of the N2 exert a powerful sense of place.

The study area is well populated (refer to Figure 6-20 which illustrates potential receptor locations)[15], especially in the central/south which was borne out by the site visit.

The study area's visual quality (resource) can be categorised into five landscape character zones. The area north of the R65 exhibits a high visual quality due to the rural agricultural ambience. The area to the east is more diverse with a mixture of grasslands, hills and valleys and timber production. The area to the south of the R65 to the N2 is a mix of farming, grazing settlements roads, power lines and game farms. In the far south and southwest are grassland covered rolling hills that reach elevations of over 1700m above sea level. The area north of the R65 exhibits a high visual quality due to the rural agricultural ambience and presence of water bodies (dams, vleis, pans and rivers) and the Chrissiesmeer Protected Environment.

[15] It is noted that the potential receptor locations have been identified by building locations on the Surveyor General data base. Not all these building would necessary be of a residential (sensitive viewing location) nature. .

Visual receptors include people living in, visiting, or travelling through or adjacent to the study area and other local public roads (specifically the R65 road that connects Ermelo with Amsterdam to the east and the N2 which connects Ermelo with Piet Retief to the south-east).

The towns of Ermelo and Amsterdam and smaller settlements such as Sheepmoor and Lothar are within the study area. As the area is predominantly a farming community there are several farmsteads that fall within the study area. Activities and businesses that rely of the visual environment such as lodges, bed and breakfast establishments were not specifically observed in the study area although a game farm was noted on the eastern edge of the site.

Although not all homesteads may be occupied fulltime, many of these will be in direct line of sight and within the 0-1km zone for the OHPL and a 0-5km zone for the turbines, where the magnitude of impact could be high. Other potential sensitive receptors include local towns and villages such as Ermelo, Sheepmoor, Lothair, Amsterdam and Camden, travellers on the main roads such as the N2, N11, R65 and secondary public roads, activities and institutions that rely on the aesthetic environment such as game farms, nature reserves, lodges, and B&B’s

FIGURE 6-18 PANORAMA VIEW POINT LOCATIONS

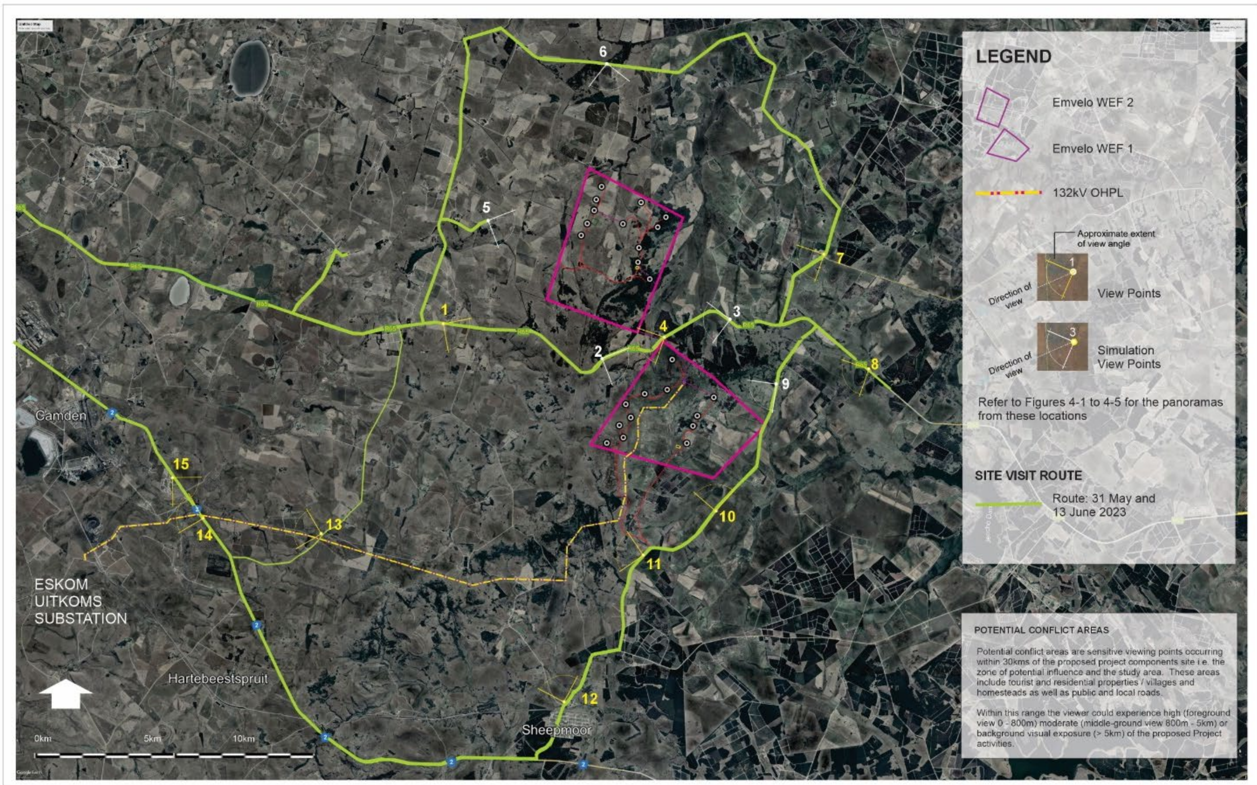


FIGURE 6-19 LANDSCAPE CHARACTER AND SENSITIVITIES

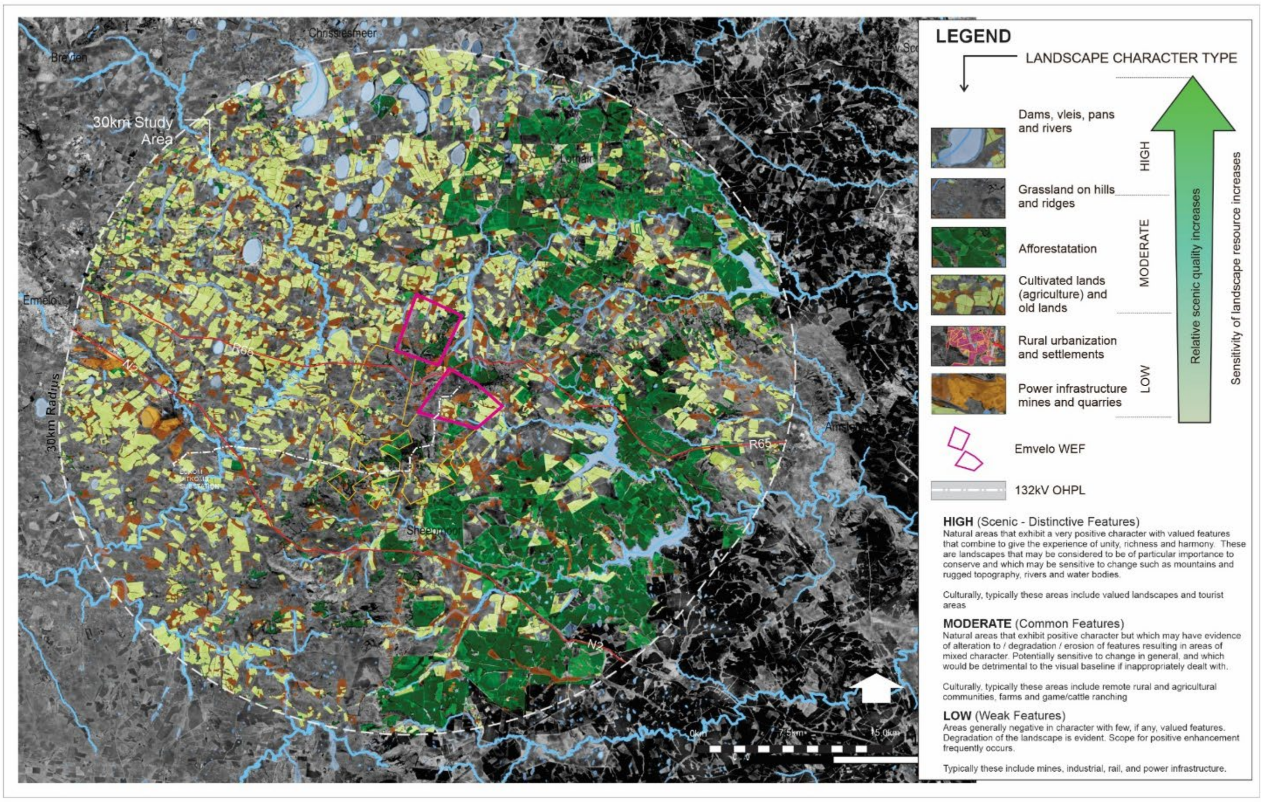
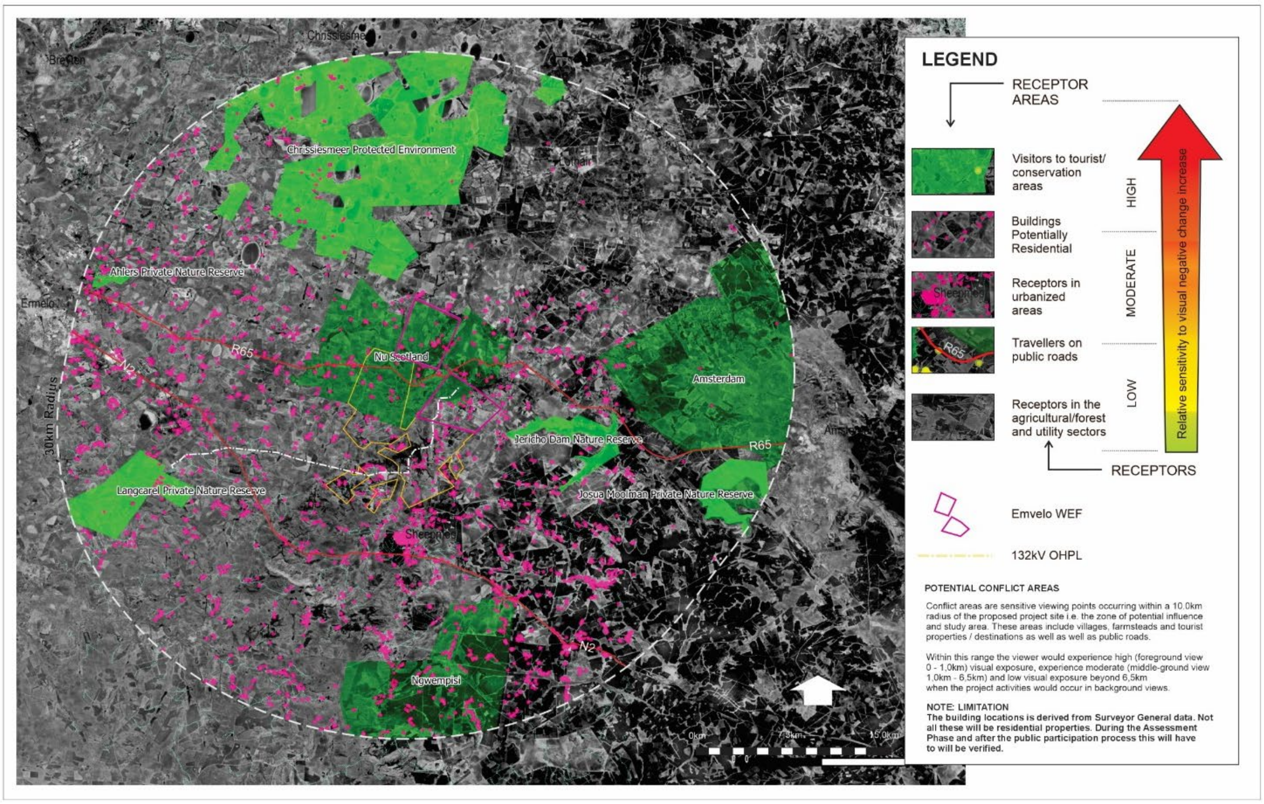


FIGURE 6-20 RECEPTOR SENSITIVITIES



IMPLICATION FOR THE PROJECT

The project will alter the visual ambience of the area and will have a potentially substantial negative effect on the visual quality of the landscape. The industrial nature of the turbines will contrast with the rural agricultural ambience. The turbine structures will visually stand out and contrast with the low and uniformly textured vegetation of the grassland landscape and agricultural lands. These landscape character types combine to present a low VAC (Visual Absorption Capacity) which does not assist in screening the proposed development, nor does it assist in blending it with the landscape.

The area to the east of the project site is more diverse with a mixture of grasslands, hills and valleys and timber production.

This area is visually more diverse and presents a medium VAC which allows for some visual screening and blending with the visual environment. However, the magnitude and scale of the turbines will always be dominant in the visual environment.

The area to the west and south of the N2 is a mix of farming, grazing settlements roads, power lines and game farms.

This area exhibits a mixed landscape which is a combination of both agricultural and industrial images. As with the previous zone, the diversity allows for some visual screening and blending with the visual environment. However, the magnitude and scale of the turbines will tend to be visually dominant.

In the far south and south-west are grassland covered rolling hills that reach elevations of over 1700m above sea level.

The low and uniformly textured vegetation of the grassland landscape type and the agricultural lands visually contrast with the turbine structures making them visible in the landscape. These features combine to present a low Visual Absorption Capacity (VAC) which does not assist in screening the proposed development, nor does it assist in blending it with the landscape. The industrial nature of the turbines will contrast with the rural agricultural ambience.

SENSE OF PLACE

The sense of place for the project area is overwhelmingly rural agricultural in nature. The original vegetation type for this area was mainly undisturbed grasslands which have now been modified to that of grazing and in patches to that of ploughed lands for maize crop production. The rural nature of the study area continues further to the east where that grassland ambience is replaced with that of extensive timber plantations. The area to the west and south of the study area has a mixed industrial/agricultural nature created by the presence of transmission powerlines, the Camden power station, the N2, settlements such as Sheepmoor and the eastern edges of Ermelo.

6.16 TRAFFIC AND TRANSPORTATION

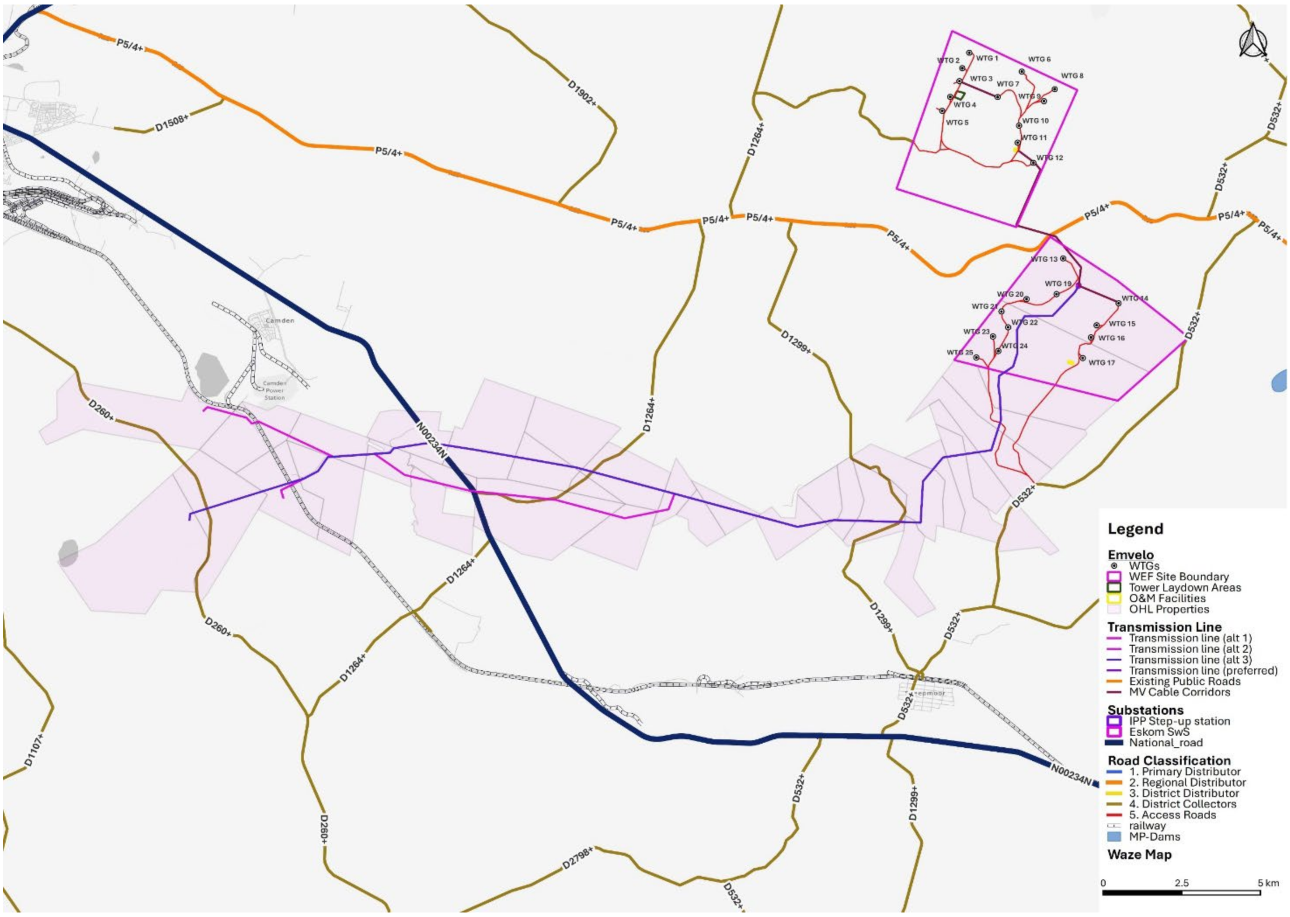
6.16.1 SURROUNDING ROAD NETWORK HIERARCHY

The primary study area for the development extents up to a 20 km radius boundary encompassing the - Emvelo WEF, The study area contains key regional routes, local routes and intersections near the development on which the expected traffic generated by the development may have a significant impact.

Figure 6-21 shows the extent of the project limits in relation to the surrounding road network which comprises of national and provincial routes.

- National Roads (N) – A road whose main function is to facilitate regional distribution of traffic (intercity movement). are a class of trunk roads and freeways which connect major cities. They form the highest category in the South African route numbering scheme and are designated with route numbers beginning with "N", from N1 to N18.
- Regional Routes (R) – Regional routes (also sometimes known as minor regional routes) are the third category of road in the South African route numbering scheme. They are designated with the letter "R" followed by a two to three-digit number. They serve as feeders connecting smaller towns to the national and provincial routes.
- District Roads (D) – A road which collects (or distributes) traffic in a local district.

FIGURE 6-21 ROAD NETWORK HIERARCHY (SOURCE: HTTPS://WWW.DFFE.GOV.ZA/)



The hierarchy of the road network in the immediate vicinity of the development site is summarised in Table 6-9. Additionally, general existing typical road cross-sections, road conditions, and intersections as observed during the site visit are included in Appendix D – Existing Road Cross-Sections, Intersections and Road Conditions.

TABLE 6-9 SURROUNDING ROAD NETWORK

Road Name	Class	Description	Road Ownership
N2 National Road	1	A paved/tarred single carriageway (undivided road) with a single lane per direction. N2 National Road is a major primary east-west link between the towns of Ermelo and Piet Retief which are situated to the west and east of the proposed development, respectively. N2 National Road consists of approximately 110 km road length between Ermelo and Piet Retief. N2 National Road has a typical cross-section width of at least 7.6 m. N2 National Road connects to other National Roads namely, the N17 and the N11 in Ermelo to the northwest and continues in the southeast direction to Durban. N2 National Road caries high traffic volumes with a significant proportion of heavy vehicles/trucks.	South African National Roads Agency (SANRAL)
Road D532/Station St	4	Road D532 is a primary north-south local gravel road which connects the N2 National Road to the R65. Road D532 has less than 3km road length of paved section which starts from the N2 National Road and ends in the local community of Sheepmoor. This road section is named Station St. The paved section Station St has a cross-section width of 6.6m and gravel road width of up to 10m. Road D532 is approximately 23km in length between the N2 National Road and the R65. Road D532 carries very low traffic volumes.	Mpumalanga Department of Public Works, Roads and Transport
R65	2	A paved/tarred single carriageway (undivided road) with a single lane per direction. The R65 is a primary east-west regional road connecting the towns of Amsterdam and Ermelo which are situated to the east and west of the proposed development, respectively. The R65 has varying roadway widths of between 7.6m to 11.6m. The R65 consists of approximately 77km road length between Ermelo and Amsterdam. The R65 carries moderate traffic volumes.	Mpumalanga Department of Public Works, Roads and Transport
Road D1299	4	Road D1299 is a primary north-south local gravel road which connects the N2 National Road to the R65. Road D1299 has a typical roadway width of up to 8m Road D1299 consists of approximately 24km road length between the N2 National Road and the R65. Road D1299 carries very low traffic volumes.	Mpumalanga Department of Public Works, Roads and Transport

Road Name	Class	Description	Road Ownership
Road D1264	4	Road D1264 is a primary north-south local gravel road which connects Road P168/1+ to the R65. Road D1264 has a typical roadway width of up to 8m Road D1264 consists of approximately 15km road length between Road P168/1+ and the R65. Road D1264 carries very low traffic volumes.	Mpumalanga Department of Public Works, Roads and Transport

The following intersections were included in the study area:

- R65 (P5/4)/D1299;
- R65 (P5/4)/D1264;
- R65 (P5/4)/D532(North); and
- R65 (P5/4)/D532(South).

Key intersections within the study area are summarised below in terms of the junction configuration and control.

- Intersection of R65 and Road D1299;
  - T-Junction;
  - R65 main road with right of way in the west-east direction;
  - D1299 minor side road (south) with a yield control;
- Intersection of R65 and D1264 (Access Road to Emvelo WEF 2);
  - T-Junction;
  - R65 main road with right of way in the west-east direction;
  - D1264 Access Road is a minor side road (north) with a stop control;
- Intersection of R65 and Road D532 (North);
  - T-Junction;
  - R65 main road with right of way in the east-west direction; and
  - D532(north) minor side road (north) with a yield control.
- Intersection of R65 and Road D532 (South)
  - T-Junction;
  - R65 main road with right of way in the west-east direction;
  - D532(south) is a minor side road (north) with a stop control

6.16.2 LAND USE

The proposed Emvelo WEF, located in the rural expanse near Ermelo, integrates with the existing landscape and local activities. Ermelo is located approximately 32 km to the west of the site. This integrated coexistence is expected to largely persist during the facility's construction, operation, and eventual decommissioning. The wind farm will integrate with existing rural activities like livestock farming and grain cultivation, using turbines to harness wind energy.

6.16.3 TRAFFIC VOLUMES

MPUMALANGA PROVINCIAL ROAD ASSET MANAGEMENT SYSTEM (RAMS)

To understand current traffic volumes and patterns of traffic on the road network in the immediate vicinity of the development site, the Average Annual Daily Traffic (AADT) volumes were sourced from the Provincial Road Network Database of the Mpumalanga Department of Roads and Public Works (Mpumalanga Provincial Road Asset Management System (RAMS)) which comprised the AADT between the year 2009 and 2019.

Figure 6-22shows a link volume strip chart for both paved and unpaved/gravel roads obtained from the provincial Road Network Information System. According to this database, the historical daily traffic volumes on the immediate road network generally varied from low to low-medium. An extract of the historical and projected AADT volumes on the immediate road network to the current year (2025) is indicated in Table 6-10.

FIGURE 6-22 TRAFFIC AADT

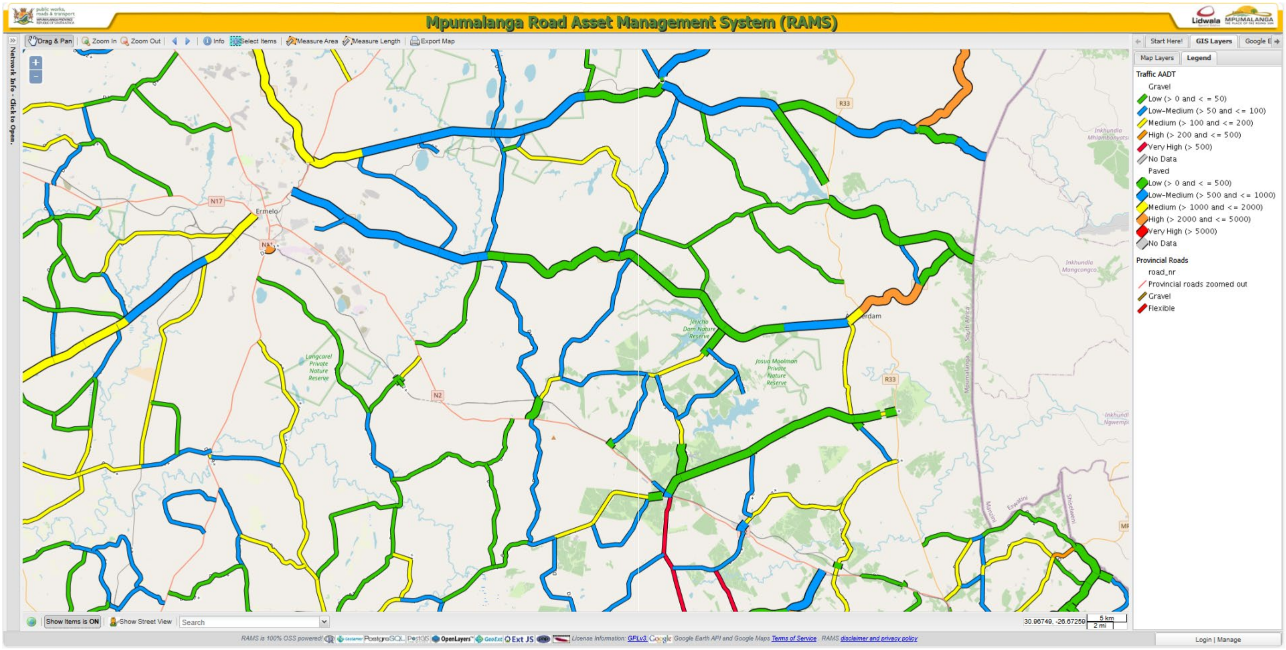


TABLE 6-10 PROJECTED ROAD LINK TOTALS FINAL

Road Link Nr	Type	Last Date Counted	Light (vpd)	Heavy (vpd)	Very Heavy (vpd)	Taxi (vpd)	Bus (vpd)	Total (vpd)	Current Year	Years to Grow	AADT LIGHT	AADT HEAVY	AADT VERY HEAVY	AADT TAXI	AADT BUS	AADT TOTAL
D532_080+	flexible	2018/08/08	193	15	6	11	21	246	2025	7	254	21	8	14	30	327

Road Link Nr	Type	Last Date Counted	Light (vpd)	Heavy (vpd)	Very Heavy (vpd)	Taxi (vpd)	Bus (vpd)	Total (vpd)	Current Year	Years to Grow	AADT LIGHT	AADT HEAVY	AADT VERY HEAVY	AADT TAXI	AADT BUS	AADT TOTAL
D1264_020+	gravel	2018/07/30	56	7	1	3	2	69	2025	7	74	10	1	4	3	91
D532_050+	gravel	2015/06/25	59	11	17	0	0	87	2025	10	87	18	28	0	0	133
P5/4_060+	flexible	2013/06/12	297	31	4	15	5	352	2025	12	476	56	7	21	9	569
D532_040+	gravel	2013/06/12	59	6	1	0	3	69	2025	12	94	11	2	0	5	112
D1299_030+	gravel	2018/08/08	50	1	1	7	4	63	2025	7	66	1	1	9	6	83

SANRAL YEARBOOK

Additional traffic information was obtained from 11 SANRAL permanent and temporary counting stations located along the N2 National Road and the R65.

Historically, ADT volumes along the N2 ranged between 2339 to 7251 vehicles per day, with a high proportion of truck traffic comprising up to 25% of the daily traffic. Between 574 to 1401 heavy vehicles were recorded between 2014 to 2023 along the N2 compared to very low truck volumes (49 ADTT, 8% ADT) observed on the R65 at station 6127.

TABLE 6-11 HISTORICAL TRAFFIC VOLUMES

Station	ADT (To Ermelo)	ADTT (To Ermelo)	ADT (To Piet Retief)	ADTT (To Piet Retief)	ADT (Road Total)	ADTT (Road Total)	ADTT (%)	Full days counted	Last year counted
1112	3591	659	3660	742	7251	1401	19%	346	2023
19576	1995	349	1962	399	3957	748	19%	16	2017
19584	3671	572	3397	614	7068	1186	17%	15	2016
19585	3398	462	3359	621	6757	1083	16%	17	2023
6127	296	25	294	24	590	49	8%	188	2020
19276	2519	449	2520	479	5039	924	18%	15	2017
19277	2580	491	2586	483	5166	974	19%	14	2017
19278	2088	463	2091	462	4179	925	22%	14	2017

Station	ADT (To Ermelo)	ADTT (To Ermelo)	ADT (To Piet Retief)	ADTT (To Piet Retief)	ADT (Road Total)	ADTT (Road Total)	ADTT (%)	Full days counted	Last year counted
Z633	1721	398	618	175	2339	574	25%	7	2014
Z634	1895	369	1930	396	3825	765	20%	7	2014
19279	2006	415	1884	400	3890	815	21%	14	2017

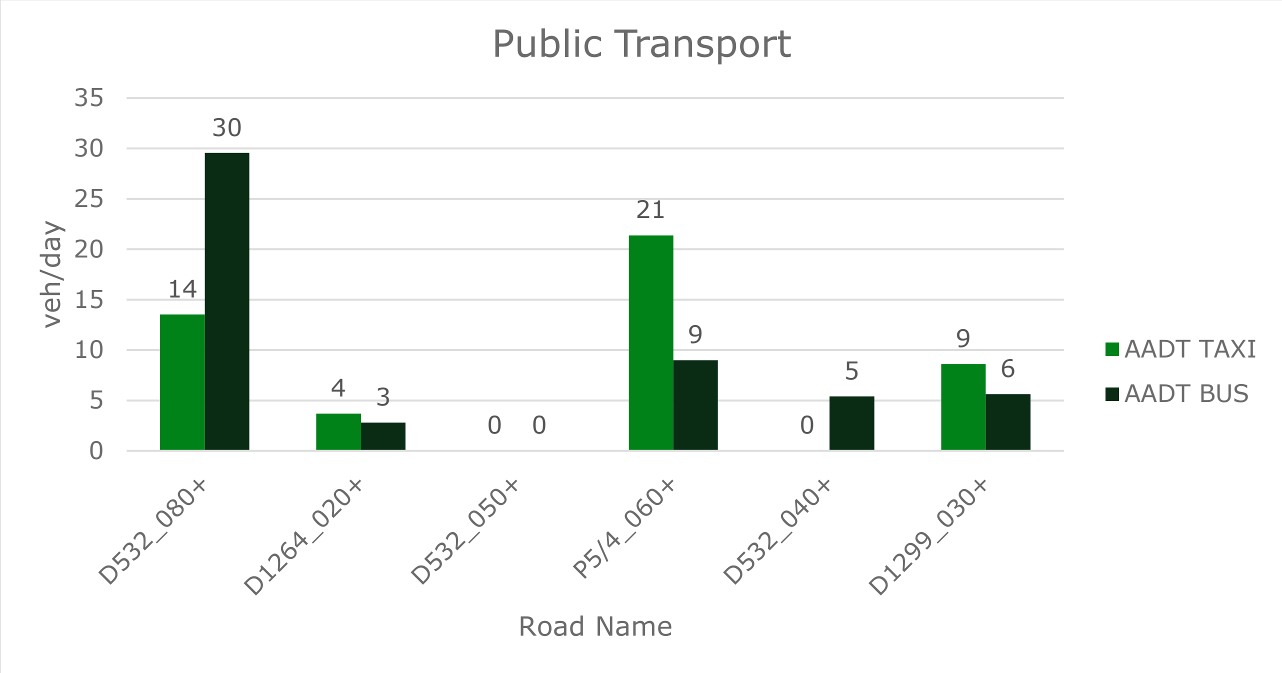
FIGURE 6-23 TYPICAL HEAVY VEHICLES ALONG THE N2

6.16.4 NON-MOTORISED TRANSPORT AND PUBLIC TRANSPORT

The roads surrounding the development site can be categorised as rural roads with no provision for non-motorised transport (NMT) and public transport (PT) facilities as the demand is very low.

The following summary indicates the total number of buses and minibus taxis along the R65, D1299, D532 based on the provincial database. Observed public transport modes mainly comprised provincial scholar transport services along D532_080+ serving the local community of Sheepmoor residential township. The majority of taxis and buses is expected to travel along the N2 as a lower number was recorded along both sections D1299_30 and D532_50.

FIGURE 6-24 PUBLIC TRANSPORT



7. ASSESSMENT OF THE ALTERNATIVES

In accordance with the requirements of Appendix 1 of the 2014 EIA Regulations (as amended), an assessment report must contain consideration of all alternatives, which can include activity alternatives, site alternatives, location alternatives and the "No Development" alternative. At a minimum, this chapter must address:

- The consideration of the No Development alternative as a baseline scenario;
- A comparison of reasonable and feasible selected alternatives; and
- The provision of reasons for the elimination of an alternative.

Alternatives are required to be assessed in terms of social, biophysical, economic and technical factors.

When assessing alternatives, they should be "practical", "feasible", "relevant", "reasonable" and "viable", and that I&APs should be provided with an opportunity to provide input into the process of formulating alternatives. In this instance, this chapter provides an overview of the alternatives that have been considered for this development.

7.1 THE NO DEVELOPMENT SCENARIO OR "NO-GO OPTION"

This scenario assumes that the proposed development does not proceed. It is equivalent to the future baseline scenario in the absence of the proposed development. Relative to the proposed development, the implications of this scenario include:

- The land-use remains agricultural, with no further benefits derived from the implementation of a complementary land use;
- Certain unsustainable farming practices continue such as overgrazing, and alien vegetation is not managed or removed;
- There is no change to the current landscape or environmental baseline;
- There will be no change to the current security of the area as roads will not be upgraded, access control will not be formalized and thus the current farm robberies, stock theft and runaway fires will persist.
- No additional electricity will be generated on-site or supplied through means of renewable energy resources. This would have negative implications for the South African government in achieving its proposed renewable energy target, given the need for increased generation;
- There would be a lost opportunity for South Africa to generate renewable energy. This would represent a significant negative social cost;
- There is no opportunity for additional employment (permanent or temporary) in the local area where job creation is identified as a key priority; and
- The national and local economic benefits associated with the proposed project's REIPPPP commitments and broader benefits would not be realised.

The purpose of the proposed development is to generate renewable electricity and export this to the national grid. Other socio-economic and environmental benefits will result from the proposed development such as:

- Reduced air pollution emissions - burning fossil fuels generates CO2 emissions which contributes to global warming. Emissions of sulphurous and nitrous oxides are produced which are hazardous to human health and impact on ecosystem stability;
- Water resource saving – conventional coal-fired power stations use large quantities of water during their cooling processes. WEFs require limited amounts of water during construction and a minimal amount of water during operation. As a water stressed country, South Africa needs to be conserving such resources wherever possible;
- Improved energy security – renewables can be deployed in a decentralised way close to consumers, improving grid strength while reducing expensive transmission and distribution losses. Renewable energy projects contribute to a diverse energy portfolio;
- Exploit significant natural renewable energy resources – biomass, solar and wind resources remain largely unexploited;
- Sustainable energy solutions – the uptake of renewable energy technology addresses the country’s energy needs, generation of electricity to meet growing demands in a manner which is sustainable for future generations; and
- Employment creation and other local economic benefits associated with support for a new industry in the South African economy.

The development compliments agriculture by providing an additional income source, without excluding agriculture from the land, or decreasing production. Therefore, the negative agricultural impact of the no-go alternative is more significant than that of the development, and so, purely from an agricultural impact perspective, the proposed development is the preferred alternative between the development and the no-go.

If the project were not implemented, then the site would stay as it currently is and likely continue to degrade due to the prevalence of grazing and or erosion within the water courses. This would continue into the long-term with a Low intensity that would impact on the regional scale due to loss of important habitat. Little in the way of mitigation could be proposed due to the social needs of the surrounding residents and their requirement for grazing areas. Many fauna species are to some degree negatively affected by farming including many predators which are targeted due to their negative impact on livestock, while some species may also be vulnerable to habitat loss or degradation and may experience depressed populations within the farming landscape. Uncontrolled poaching of vulnerable species (Oribi and other antelope) is currently a problem that would be managed under the proposed project. In terms of vegetation and plant species, extensive grazing may result in changes in composition towards less palatable species and a reduction in plant cover. It is however important to recognise that the development does not represent an alternative to extensive livestock farming, but rather an additional impact and stressor independent of the current land use. Overall, the no-go alternative is considered to result in a low negative impact on terrestrial biodiversity through the lack of implementation of a number of management plans proposed as part of the project.

Although the heritage impacts with implementation would be greater than the existing impacts, the loss of socio-economic benefits is more significant and suggests that the No-Go option is less desirable in heritage terms.

Although the proposed development will likely affect the avifaunal community on site, they do not appear to have pushed key species towards extinction in most cases. The no-go alternative will result in the current status quo being maintained as far as the avifauna is concerned. The low human population in the area is definitely advantageous to sensitive avifauna, especially Red Data species. The no-go option would eliminate any additional impact on the ecological integrity of the proposed development site as far as avifauna is concerned. The No-Go alternative therefore has much lower impacts on avifauna than the proposed project, and would be preferred from an avifaunal perspective. However, since the No-go constraints/buffers have already been taken into account, and with the recommended mitigation measures implemented going forward, the preference for developing the project is also acceptable.

The primary goal of the project is to assist in providing additional capacity to Eskom to assist in addressing the current energy supply constraints. The 'No Development' alternative would not assist the government in addressing climate change, energy security and economic development. Addressing climate change is one of the benefits associated with the implementation of this proposed development. Climate change is widely considered by environmental professionals as one of the single largest threats to the environment on a local, national and global scale. Energy supply constraints and the associated load shedding have had a significant impact on the economic development of the South African economy. South Africa also relies on coal-powered energy to meet more than 90% of its energy needs. South Africa is therefore one of the highest per capita producers of carbon emissions in the world and Eskom, as an energy utility, has been identified as the world's second largest producer carbon emissions.

The No-Development option would represent a lost opportunity for South Africa to improve energy security and supplement is current energy needs with clean, renewable energy. Given South Africa's current energy security challenges and its position as one of the highest per capita producers of carbon emissions in the world, this would represent a significant negative social cost

Based on the above, the 'No Development' alternative is not a preferred alternative.

7.2 SITE SELECTION

The Applicant identified the Emvelo WEF after conducting a series of pre-feasibility assessments by considering aspects such as climatic conditions (wind speed databases, pre-dominant wind directions), grid connection scenarios, site geography and topography, avifauna nest survey to identify restrictive no go buffers, ecological features and site accessibility.

Feasibility studies undertaken by the Project Applicant indicated that the Emvelo WEF site is suitable to develop and operate a wind farm as it satisfies the following criteria:

- Alignment with the Just Energy Transition (JET) and the need for renewbale energy to replace coal power stations in Mpumamlanga.
- Potential Eskom Grid capacity available;
- Feasibility of access for wind turbine delivery as the site is easily accessible from the national road;
- Viable wind resource;
- The surrounding area is not densely populated;
- The proposed site is largely agricultural land;
- Willingness of landowner to host a wind farm on their property; and

- No environmental fatal flaws identified in the screening assessment.

The unique features of this site eliminates the possibility of alternatives with similar site conditions. Alternatives are restricted to on-site aspects such as turbine footprints and layouts, roads and related infrastructure options.

The no development scenario would represent a lost oppurtunity for South Africa to improve energy security and promote renewable energy. According to all specialist studies undertaken, the site is suitable for the construction and operation of the WEF.

7.3 DESIGN EVOLUTION ALTERNATIVES

Following the selection of a suitable site, consideration is given to the design of the WEF. It is important that wind turbines are sited in the optimum position to maximise the wind energy yield whilst minimising E&S impacts as far as possible.

Information collated during the scoping phase was used to inform the design of the preliminary WEF and associated infrastructure layout progressively. This approach was adopted with respect to this proposed development, and where potentially significant impacts were identified, efforts were made to avoid these through evolving the design of the proposed development. Best practice advises that the EIA should be an iterative process rather than a post design environmental appraisal. In this way, the findings of the technical environmental studies were used to inform the design for EA of a development.

Various wind turbine designs and layouts were considered for the site in order to maximise the electricity generation capacity and efficiency, whilst taking into account environmental constraints.

During the scoping phase, 48 turbine locations, and two laydown and on-site substation alternative were provided to the specialists. This layout has been adjusted, based on the initial scoping assessment and specialists' findings. Due to the design evolution of the Emvelo WEF turbine positions have been revisited. A design evolution summary report is presented in Appendix C of this EIA Report.

The layout of up 24 turbines was presented and assessed in full detail during this EIA phase is considered the 'preferred layout' for Sheepmoor WEF development.

7.4 ALTERNATIVES

Alternative renewable energy technologies include hydro-electric power, photovoltaic solar or concentrated solar power. The site itself has no resource for hydro-electricity and a solar electricity generation would require a much greater infrastructure footprint and water consumption (for cleaning panels) to generate the equivalent energy of the proposed WEF. The question if wind energy technology is the best technology for the proposed location was answered as part of the Need and Desirability assessment (Section 5).

Wind energy presents less of an impact on the continued use of the land for grazing, as it does not result in the shading that occurs from solar facilities which affects vegetation and consequently farming practices. Whilst there are potential impacts associated with wind energy which are not associated with solar, such as collision risk with avifauna, there are different potential impacts for solar facilities such as loss of habitat and foraging areas for avifauna and other ecological receptors.

Based on the site's physical characteristics and existing land uses, the wind energy technology is best suited to the site.

The No-go alternative would potentially see the high sensitive grassland habitats of the project area becoming increasingly disturbed through agricultural activities and alien plants, as currently seen in parts of the project area. The No-go alternative with mitigation, would likely see a long-term positive impact on faunal SCC and grassland habitats; however, it is unlikely that these mitigation measures would ever be implemented.

8. THE PREFERRED ALTERNATIVE

The proposed Emvelo WEF is located approximately 30 km east of the town of Ermelo within the Msukaligwa Local Municipality, and Gert Sibande District Municipality, Mpumalanga Province.

The proposed Emvelo WEF will consist of the components listed below. It is important to note at the outset that the exact specifications of the project components will be determined during the detailed engineering design phase prior to construction (subsequent to the issuing of an EA, should such an authorisation be granted), but that the information provided below is seen as the worst-case scenario.

The proposed development will consist of:

- Up 24 wind turbines, with a maximum hub height of up to 150 m and a rotor diameter of up to 220 m;
- Temporary laydown areas which will accommodate the crane platforms and hardstand laydown area;
- Cabling between the turbines, to be laid underground where practical and feasible;
- One on-site substation with capacity of up to 132 kV to facilitate the connection between the WEF and the electricity grid;
- 132 kV over-head powerline of approximately 22.3 km (300 m corridor);
- Internal roads (existing roads will be upgraded wherever possible);
- A temporary site camp establishment and concrete batching;
- Operation and Maintenance (O&M) buildings; and
- Total permanent development footprint of up to 185 ha after rehabilitation.

8.1 WIND ENERGY FACILITY COMPONENTS

The WEF will comprise components described below. It should be noted that as the design of the proposed development is not yet finalised, all dimensions are maximums, as is required by the EIA process. The final design may include infrastructure which is of equal or less than dimensions to those stated below, but not more than.

8.1.1 WIND TURBINE GENERATORS AND HARDSTAND AREAS

The proposed Emvelo WEF will comprise of 24 turbines (each turbine with an approximate capacity of 8 MW) with a maximum combined output capacity of up to 260 MW with an anticipated lifespan of 25-30 years.

The turbines will be three-bladed horizontal-axis design with a WTG hub height from ground level is anticipated to be up to 150 m, with a blade length and rotor diameter of up to 100 m and 200 m respectively. The height of the complete structure is approximately up to 250 m. The exact turbine model has not yet been selected and will be identified based on the wind resource distribution, technical, commercial and site-specific considerations.

The proposed turbine development footprint and associated facility infrastructure will cover an area of up to 185 ha depending on the final design.

Each turbine will require a transformer that will be located within the turbine tower. Each turbine will have a circular foundation which will be placed alongside the hardstand, resulting in that area being permanently disturbed by the turbine foundation. The dimensions of the turbines provided in this report are preliminary and will be finalized at a later stage of the Project.

The precise location of the turbines within the WEF site has been finalised and confirmed during the EIA process, following the assessment of technical and environmental constraints. Figure 8-1 to Figure 8-3 indicate a typical wind energy operation sequence as well as the different components of a wind turbine.

FIGURE 8-1 AN ILLUSTRATION OF TYPICAL COMPONENTS OF A WTG

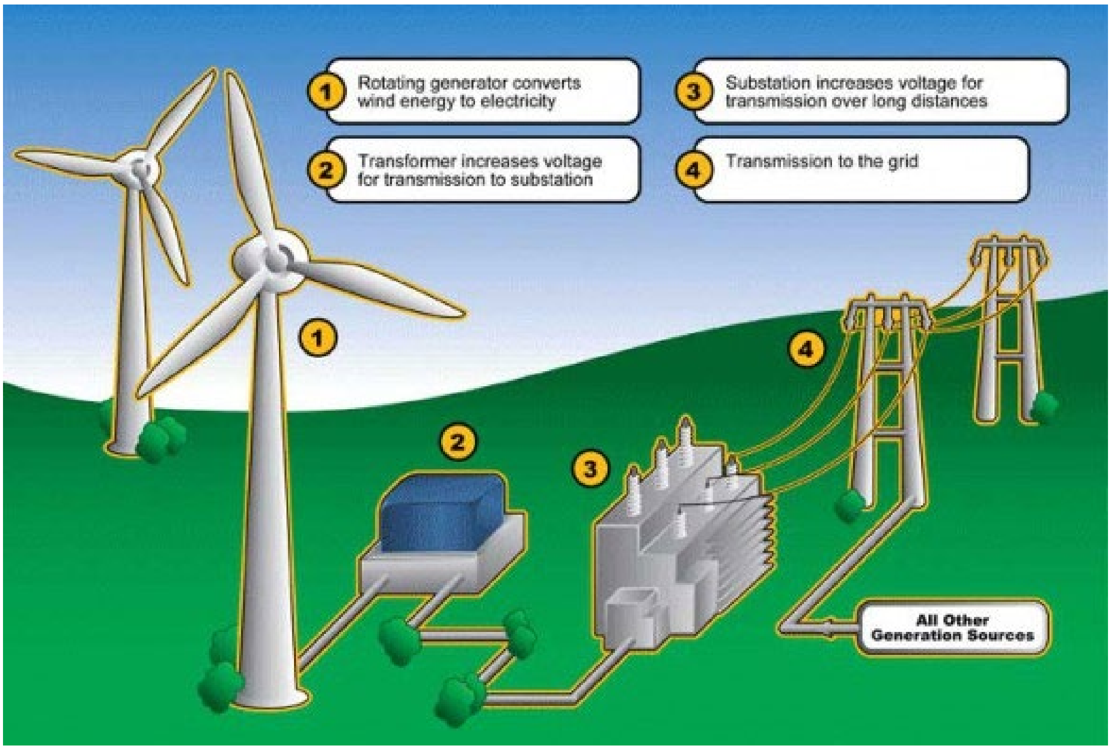


FIGURE 8-2 THE INSIDE OPERATION OF A TYPICAL WIND TURBINE

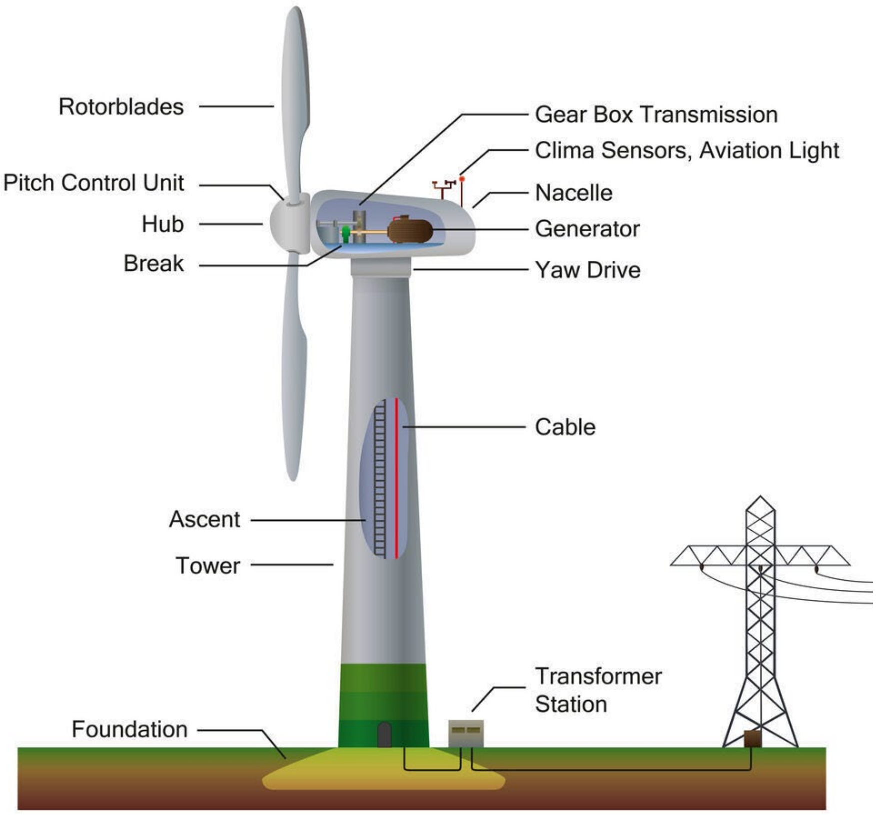
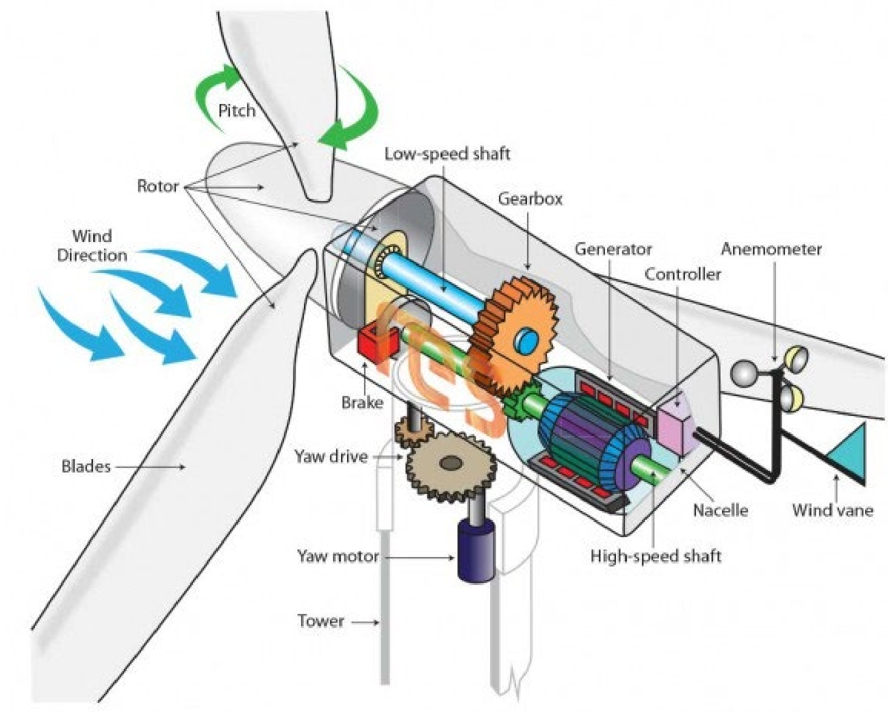


FIGURE 8-3 THE INSIDE OPERATION OF A TYPICAL WIND TURBINE



8.1.2 ELECTRICAL CABLING AND ON-SITE SUBSTATION

Medium-voltage (MV) power lines internal to the WEF will be entrenched and located adjacent to the access roads and /or within the footprint of the internal roads to an onsite Facility Substation. The 132 kV high-voltage (HV) powerline that transmits power from the proposed Sheepmoor WEF Substation to the Eskom Switching Station on site will be strung overhead, supported either on monopole or lattice tower structures.

8.1.3 LAYDOWN AREAS AND SITE OFFICES

Individual turbine temporary laydown areas including crane boom laydown areas, blade laydown areas and other potential temporary areas will be up to a maximum 45 ha. The construction laydown area will be located within the permanent footprint area of up to 185 ha.

8.1.4 INTERNAL SITE ACCESS ROADS

The majority of the access road will follow existing, gravel farm roads that may require widening up to 15 m (inclusive of storm water infrastructure). Where new sections of road need to be constructed (/lengthened), this will be gravel/hard surfaced access road and only tarred if necessary.

A network of gravel internal access roads and a perimeter road (cumulatively up to 33 km in length), each with a width of up to ~ 14 m, will be constructed to provide access to the various components of the WEF. Where roads cross slopes, incertain areas, substantial cut and fill may be required increasing the impacted footprint area up to 50m on each side of the road.

Site access is proposed directly off an unnamed gravel road surrounding the site; however, this will be confirmed based on the outcome of the traffic impact assessment.

8.2 GRID COMPONENTS

The proposed grid connection to serve the Emvelo Wind Energy Facility (Pty) Ltd will include the following components:

- An on-site substation with a capacity of up to 132kV, occupying an area of up to approximately 1ha. The proposed substation will be a step-up substation and will include an Eskom portion and an IPP portion, hence the substation has been included in the EIA for the WEF and for the grid infrastructure to allow for handover to Eskom. The applicant will remain in control of the low voltage components (i.e. 33kV components) of the substation, while the high voltage components (i.e. 132kV components) of this substation will likely be ceded to Eskom shortly after the completion of construction; and
- A 132kV overhead power line connecting the on-site substation thereby feeding the electricity into the national grid. The approximate distance of the OHPL will be 22.3 km traversing thirty-five (35) land parcels, be constructed to connect to the Camden B Substation.

8.3 SERVICE PROVISION

8.3.1 HEALTH AND SAFETY

The IFC guidelines for Health and Safety are based on the Occupational Health and Safety Act (OHSA) of America and are subsequently aligned with South African legislation (OHS Act no 85 of 1993). It is understood that the project infrastructure and equipment will be designed to good industry standards to minimise risks personnel working at the proposed development site.

Sheepmoor Wind Energy Facility (Pty) Ltd will institute a Health and Safety (H&S) Plan prior to construction, for all persons working at the proposed development site. The plan will need to evaluate the risks and impacts to the health and safety of the affected community during the design, construction and operation of the proposed development, and establish preventive measures to address them in a manner commensurate with the identified risks and impacts within this assessment. Such measures need to adhere to the precautionary principle for the prevention or avoidance of risks and impacts over minimization and reduction.

8.3.2 WATER REQUIREMENTS

Water will be sourced from either the Local Municipality, supplied from a contractor and trucked in, from existing boreholes located within the application site or from a new borehole if none of these options are available. Note, however, that should municipal water supply not be confirmed, the Applicant will investigate other water sources considering any necessary and relevant legal requirements.

High water use is only anticipated during the first six months of the construction phase mainly for purposes of the turbine foundations, roads and dust suppression. Thereafter the water usage will decrease drastically. The anticipated water usage for the proposed development for the duration of the construction phase includes the following:

- Drinking;
- Ablution facilities;
- Access Road construction;
- Dust suppression;
- Fire-fighting reserve;
- Cleaning of facilities; and
- Construction of foundations for the WEF infrastructure, i.e., turbines and substation, etc.

The water use requirement during the operational phase will be primarily for human consumption and sanitation purposes.

8.3.3 STORMWATER MANAGEMENT

Stormwater drainage systems will be constructed and kept separate from the sewerage effluent system on site to ensure that stormwater run-off from site is appropriately managed. Water from these systems is not likely to contain any chemicals or hazardous substances and will be released into the surrounding environment based on the natural drainage contours.

Wastewater and sludge will be managed by local authorities and service providers. All wastewater will be handled in accordance with the *Guidelines for the Utilisation and Disposal of Wastewater Sludge Volumes 1 to 6 (Herselmann & Snyman, 2006)*.

8.3.4 WASTE

During the construction phase, it is estimated that the WEF would generate solid waste, which includes (but is not limited to) packaging material, building rubble, discarded bricks, wood, concrete, plant debris and domestic waste. Solid waste will be collected and temporarily stockpiled within designated areas on site during construction, and thereafter removed and disposed of at a nearby registered waste disposal facility on a regular basis as per agreement with the local municipality. Where possible, recycling and re-use of materials will be encouraged.

During the operational phase, the WEF will typically produce minor quantities of general non-hazardous waste mainly resulting from the O&M and office areas. General waste will be collected and temporarily stockpiled in skips in a designated area on site and thereafter removed and disposed of at a nearby registered waste disposal facility (or registered landfill) on a regular basis as per agreement with the local municipality. Where possible, recycling and re-use of materials will be encouraged.

Any hazardous waste such as chemicals or contaminated soil as a result of spillages, which may be generated during the construction and operational phases, will be temporarily stockpiled within a designated area on site and thereafter removed off site by a suitable service provider for safe disposal at a registered hazardous waste disposal facility.

The Project will adopt the 4R principle for solid waste management, which includes (in order or priority) to:

- Refuse single use plastics as much as possible;
- Reduce the use of non-recyclable products;
- Reuse solid wastes where possible to convert it into other useful products; and

Recycle all wastes where possible.

8.3.5 SEWAGE

The Wind Energy Facility will require sewage services during the construction and operational phases. Low volumes of sewage or liquid effluent are estimated during both phases. Liquid effluent will be limited to the ablution facilities during the construction and operational phases. Portable sanitation facilities (i.e., Chemical toilets) will be used during the construction phase, which will be regularly serviced and emptied by a registered contractor on a regular basis.

The Applicant may consider a conservancy tank system which will be employed on site during the operational phase for which a registered company will be contracted to store and transport sewage from site to an appropriate municipal wastewater treatment facility.

8.3.6 ELECTRICITY

Electricity on site will be from on-site diesel generators, as well as sourced from the national grid distribution networks.

8.4 EMPLOYMENT

In addition to the workforce required during the construction phase (which is anticipated to be up to 350 staff at the peak of construction), the Project is anticipated to require an additional 14 staff during the operational phase of the Project.

8.5 SUMMARY OF PROJECT INFORMATION

Project Component		Detail
DFFE Reference		To be confirmed
Site Access		Locality to be confirmed. Total width up to 15 m (12 m after rehabilitation) consisting of up to 3 m width for underground 33 kV reticulation.
WEF Maximum Generation Capacity		Up to 260 MW
Number of Turbines		Up to 24
Hub Height from ground level		Up to 120 m
Blade Length		Up to 110 m
Rotor Diameter		Up to 220 m
Length of internal roads		Unknown at this point.
Width of internal roads		Up to 14 m to be rehabilitated to up to 9 m.
On-site substation capacity		Up to 132 kV
Proximity to grid connection		Approximately 22.3 km
Grid Connection Capacity		Up to 132 kV
Area occupied by both permanent and construction laydown areas	Temporary turbine construction laydown and storage areas.	Crane platforms and hardstand laydown area up to 45Ha
	Construction laydown/staging area which will also accommodate the O&M buildings	Will be located within the permanent footprint area.
	Permanent footprint area dimensions, including roads, turbine hardstand areas, O&M buildings and battery pad.	O&M: Up to 1 ha Hardstand areas: Up to 1 ha Total area of final footprint (including roads): up to 185 ha
Operations and maintenance buildings (O&M building) with parking area		Up to 1 ha
Height of fencing		2.8 m
Type of fencing		Where site offices are required, temporary screen fencing used to screen offices from the wider landscape.

9. PUBLIC PARTICIPATION PROCESS

The first stage of public consultation was undertaken during the initial notification phase prior to the completion and public review of the Draft Scoping Report. In July 2023, advertisements were placed in the Highveld Newspaper and the Mpumalanga Newspaper; site notices were erected on the site; and written notices were sent out to the affected landowners, surrounding landowners and occupiers of the site as well as to key stakeholders and organ of state. The objective of this phase was to inform the National, Provincial and local Government Authorities, relevant public, private sector entities, NGOs and local communities about the project and capture their initial views and issues of concern that is important for the formulation of a plan of study and to allow the public to register as I&APs. Following the initial phase, notification letters were sent to all I&APs informing them of the availability of the draft scoping report for public review and comment, which took place for a period of 30-days from the 22 August 2024 to 21 September 2024 (both days inclusive).

The Emvelo and Sheepmoor WEF projects have previously undergone a Public Review and Comment process that ran from Friday, 19 July 2024 until the Tuesday, 20 August 2024 (both days inclusive). Due to the lapse of the previous application, the proposed development underwent a new application process.

Therefore, an additional 30-day scoping Public Participation period was undertaken from 22 August to 21 September 2024, to ensure compliance with the regulations and will augment the public participation process that was undertaken during the lapsed application process.

All issues raised for all applications (Sheepmoor, Emvelo and Rochdale) during the initial and scoping phase hasve been taken into consideration and included in the EIA report. Volume II contains the Comments and Response Report which addresses all Interested and Affected Parties (I&APs) comments received for all applications to date Volume III – Public Participation Report, expands on the PPP conducted to date.

Further to the above, and in light of the refinement of the layout (and associated reduction of applications from three to two), we have amalgamated all I&AP lists for all projects, amalgamated all comments for all projects and we have published an additional call for I&APs through the running of two Newspaper advertisements on the 5th and 6th of March 2025. The above has been undertaken to ensure compliance with the Public Participation Process regulations.

The primary aims of the public participation process (PPP) are:

- To inform I&APs of the proposed development;
- To identify issues, comments and concerns as raised by I&APs;
- To promote transparency and an understanding of the project and its potential consequences;
- To assist in identifying potential environmental (biophysical and socio-economic) impacts associated with the proposed development; and
- To ensure that all I&AP issues and comments are accurately recorded, addressed and documented in the comments and responses report.

9.1 EIA PHASE PUBLIC PARTICIPATION

During the EIA phase the following tasks will be undertaken for public participation:

- Notification letters to be sent out to registered I&APs, key stakeholders, and organs of state to inform them of the availability of the Draft Environmental Impact Assessment Report (DEIAR) for review and comment (30 days);
- The Comments and Reponses Report will be updated, recording comments and/or queries received and the responses provided;
- Notification letters to all registered I&APs, key stakeholders, and organs of state to inform them of the decision by the DFFE and the appeal procedure; and
- Placement of advertisements in the same local and regional newspapers to inform I&APs of the decision taken by the DFFE.

Furthermore, I&APs will also be able to register on the I&AP database throughout the duration of the EIA process and registered I&APs will be informed about the progress of the application.

The public participation in the EIA phase has the following objectives:

- Inform I&APs about the EIA process followed to date;
- Present the specialist studies undertaken, impacts and proposed mitigation measures;
- Present the results of the Environmental Impact Assessment; and
- Collect concerns and expectations and take them into consideration in the EIA.
- Details of the above information is attached in a public participation report (Volume II).

In light of furthered studies undertaken by the applicant and feedback received during the public participation phase of the Draft Scoping Report, supplementary studies were undertaken by the applicant that identified additional sensitivities requiring avoidance, prompting a revision of the project layout and cluster connectivity. Consequently, this resulted in a reduced turbine number layout and reconfigured orientation. This his had led to the necessary alignment of applications (Rochdale 14/12/16/3/3/2/2612 and Emvelo 14/12/16/3/3/2/2611) in the latest sensitivity mapping.

The results of the specialists' scoping assessments, I&AP and DFFE comments on the FSR's, and other technical and financial constraints for the proposed development site were taken into consideration and a revised 'preferred layout' was produced.

This EIA report thus presents and assesses the impacts associated with the EIA phase preferred layout of the Emvelo WEF.

9.2 SUMMARY OF COMMENTS

- Initial Scoping Phase
- During the initial notification phase, no comments / queries / questions / concerns were received from I&APs.
- Scoping Phase
- During the scoping phase comment was received from the DFFE, other authority and I&APs. Responses to comments received is provided in Section 6 of the PP Report (Volume III), with EAP / specialist / applicant responses, and the original comment and responses has been appended to the PP report (Volume III).

- Leading up to the initiation of PP on the DEIARs, focus group meetings were held with the DFFE (competent authority) on 13th of February 2025 and the MPA and MPTA on 28th February 2025 to discuss the newly conducted studies, updated specialist information and our updated plan of study. Specifically, it is important to note that the focus group discussion held with the competent authority assisted the advising on the proposed rework of the cluster, and provided confirmation that our proposal is not prohibited by the EIA Regulations (as amended).

10. ASSESSMENT OF POTENTIAL IMPACTS

10.1 SOIL, LAND USE AND AGRICULTURAL POTENTIAL

Due to the facts that the proposed development will exclude agricultural production from only a very small area of land, and that its negative impact is offset by economic and other benefits to farming, the overall negative agricultural impact of the development (loss of future agricultural production potential) is assessed here as being of low significance and as acceptable.

As identified in the study, it is important to note that wind farms have both positive and negative effects on the production potential of land. It is the net sum of these positive and negative effects that determines the extent of the change in future production potential. The positive effects are:

1. increased financial security for farming operations - Reliable and predictable income will be generated by the farming enterprises through the lease of land to the energy facility. This will increase financial security and could improve farming operations and productivity through increased investment into farming.
2. improved security against stock theft and other crime due to the presence of security infrastructure and security personnel at the energy facility.
3. an improved road network, with associated storm water handling system. The wind farm will construct turbine access roads of a higher standard than the existing farm roads which will give farming vehicles better access to farmlands. This will be especially relevant during wet periods when access to croplands for spraying etc is limited by the current farm roads.

There are two additional effects, but because they are highly unlikely to influence agricultural production, they are not considered further. They are:

- Prevention of crop spraying by aircraft over land occupied by turbines – ground based or using drones for spraying are effective, alternative methods that can be used without implications for production or profitability.
- Interference with farming operations - Construction (and decommissioning) activities are likely to have some nuisance impact for farming operations but are highly unlikely to have an impact on agricultural production.

The loss of agricultural potential by soil degradation can effectively be prevented for renewable energy developments by generic mitigation measures that are all inherent in the project engineering and/or are standard, best-practice for construction sites. Soil degradation does not therefore pose a significant impact risk.

Due to the facts that the proposed development will exclude agricultural production from only a very small area of land, and that its negative impact is offset by economic and other benefits to farming, the overall negative agricultural impact of the development (loss of future agricultural production potential) is assessed here as being of low significance and as acceptable.

The agricultural protocol requires an indication of the potential losses in production and employment from the change of the agricultural use of the land as a result of the proposed development. As this assessment has shown, the agricultural use of the land will be integrated with the renewable energy facility, and it will continue with no discernible change in terms of production. The expected losses in production and employment will therefore be zero.

GENERIC MITIGATION MEASURES

A system of storm water management, which will prevent erosion on and downstream of the site, will be an inherent part of the engineering design on site. Any occurrences of erosion must be attended to immediately and the integrity of the erosion control system at that point must be amended to prevent further erosion from occurring there. As part of the system, the integrity of the existing contour bank systems of erosion control on croplands, where they occur on steeper slopes, must be kept intact.

Any excavations done during the construction phase, in areas that will be re-vegetated at the end of the construction phase, must separate the upper 40 cm of topsoil from the rest of the excavation spoils and store it in a separate stockpile. When the excavation is back-filled, the topsoil must be back-filled last, so that it is at the surface. Topsoil should only be stripped in areas that are excavated. Across the majority of the site, including construction lay down areas, it will be much more effective for rehabilitation, to retain the topsoil in place. If levelling requires significant cutting, topsoil should be temporarily stockpiled and then re-spread after cutting, so that there is a covering of topsoil over the entire cut surface.

10.2 NOISE

10.2.1 CONSTRUCTION

A potential significant source of noise during the construction phase is additional traffic to and from the site, as well as traffic on the site. The use of a borrow pit(s), on site crushing and screening and concrete batching plants will significantly reduce heavy vehicle movement to and from the site. Construction traffic is expected to be generated throughout the entire construction period, expected to take approximately 18 – 24 months, however, the volume and type of traffic generated will be dependent upon the construction activities being conducted, which will vary during the construction period. Noise levels due to traffic can be estimated using various different noise algorithms.

Impact Phase: Construction						
Potential impact description: Construction noises from access road upgrading or construction activities Based on the site measurements, daytime ambient sound levels ranged from 24.8 to more than 72 dBA, averaging at 43.3 dBA (for the six measurement locations). Daytime ambient sound levels are thus typical of a rural noise district. Construction noises might be audible over large distances during quiet periods (during low wind conditions). Daytime construction activities should not change the existing ambient sound levels, with this report recommending a daytime noise limit of 52 dBA. The projected noise levels, the change in ambient sound levels as well as the potential noise impact is defined per NSR summarized in this table.						
	Magnitude	Extent	Duration	Status	Probability	Reversibility

Impact Phase: Construction						
Without Mitigation	Very High	Local	Short term	Negative	Highly Likely	Reversible
Score	5	2	2		5	1
With Mitigation	Very High	Local	Short term	Negative	Possible	Reversible
Score	5	2	2		3	1

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	Moderate Negative Impact (50)	Low Negative Impact (30)
Can the impact be reversed?	Impact is fully reversible once construction activities cease	
Will impact cause irreplaceable loss or resources?	Low loss of resource (quiet environment away from busy roads).	
Can impact be avoided, managed or mitigated?	Potential construction impacts can be mitigated	

Mitigation measures to reduce residual risk or enhance opportunities:
- Considering potential future operational noise levels, the applicant can relocate certain NSR (such as NSR42, 63 and 64, where noise levels may also be high during the operational phase);
- The applicant should discuss the potential noise levels associated with road construction activities with NSR;
- The applicant can locate access roads further than 60 m from NSR.

Residual impact	There will be a residual impact stemming from future operational activities, though the nature of the noises will be different from construction activities. There will be no residual noise impact after the WEF cease to operate.

Impact Phase: Construction

Potential impact description: Noises due to construction traffic passing NSR
Based on the site measurements, daytime ambient sound levels ranged from 24.8 to more than 72 dBA, averaging at 43.3 dBA (for the six measurement locations). Daytime ambient sound levels are thus typical of a rural noise district. Construction traffic noises might be audible over large distances during quiet periods (during low wind conditions).

Noises from construction traffic passing NSR should not change the existing ambient sound levels, with this report recommending a daytime noise limit of 52 dBA (see also section 6.4.1.3). The projected noise levels, the change in

ambient sound levels as well as the potential noise impact is defined per NSR in Appendix E, Table 3 and summarized in this table.

	Magnitude	Extent	Duration	Status	Probability	Reversibility

Impact Phase: Construction						
Without Mitigation	Low	Local	Short-term	Negative	Possible	Reversable
Score	2	2	2		3	1
With Mitigation	Low	Local	Short-term	Negative	Possible	Reversable
Score	2	2	2		3	1

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	Low Negative Impact (21)	Low Negative Impact (21)
Can the impact be reversed?	Impact is fully reversible once construction activities cease	
Will impact cause irreplaceable loss or resources?	Low loss of resource (quiet environment away from busy roads).	
Can impact be avoided, managed or mitigated?	Potential construction impacts can be mitigated	

Mitigation measures to reduce residual risk or enhance opportunities:
The applicant should discuss the project activities with NSR staying within 60 from the access roads;
The applicant can locate access roads further than 60 m from NSR;
The applicant should add a component covering noise in the health and safety induction process. Employees and
contractors should understand that noises could impact on the quality of living of people.

Residual impact	There will be a residual impact stemming from future operational activities, though the nature of the noises will be different from construction activities. There will be no residual noise impact after the WEF cease to operate.

Impact Phase: Construction

Potential impact description: Numerous simultaneous future daytime construction activities
Based on the site measurements, daytime ambient sound levels ranged from 24.8 to more than 72 dBA, averaging at 43.3 dBA (for the six measurement locations). Daytime ambient sound levels are thus typical of a rural noise district. Construction traffic noises might be audible over large distances during quiet periods (during low wind conditions).

Daytime construction activities should not change the existing ambient sound levels, with this report recommending a daytime noise limit of 52 dBA. The projected noise levels, the change in ambient sound levels as well as the potential noise impact is defined per NSR and summarized in this table.

	Magnitude	Extent	Duration	Status	Probability	Reversibility
Without Mitigation	High	Local	Short-term	Negative	Probable	Reversible
Score	4	2	2		3	1

Impact Phase: Construction

With Mitigation	Moderate	Local	Short-term	Negative	Possible	Reversible
Score	3	2	2		3	1

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	Moderate negative Impact	Low Negative Impact (24)
Can the impact be reversed?	Impact is fully reversible once construction activities cease	
Will impact cause irreplaceable loss or resources?	Low loss of resource (quiet environment away from busy roads).	
Can impact be avoided, managed or mitigated?	Potential construction impacts can be mitigated	

Mitigation measures to reduce residual risk or enhance opportunities:

- Considering potential future operational noise levels, the applicant can relocate certain NSR (such as NSR 64, etc), where noise levels may also be high during the operational phase;
- The applicant can reduce the number of WTG closer than 800m from the identified NSR, or relocate WTG further from identified NSR where operational noise levels will be high (reducing the locations where construction activities may take place);
- A combination of the mitigation highlighted in points 1 and 2.

Residual impact	There will be a residual impact stemming from future operational activities, though the nature of the noises will be different from construction activities. There will be no residual noise impact after the WEF cease to operate.

Impact Phase: Construction

Potential impact description: Numerous simultaneous future night-time construction activities

Based on the site measurements, night-time ambient sound levels ranged from 24.8 to more than 72 dBA, averaging at 43.3 dBA (for the six measurement locations). Daytime ambient sound levels are thus typical of a rural noise district. Construction traffic noises might be audible over large distances during quiet periods (during low wind conditions).

Night-time construction activities should not change the existing ambient sound levels, with this report recommending a night-time noise limit of 52 dBA. The projected noise levels, the change in ambient sound levels as well as the potential noise impact is defined per NSR and summarized in this table.

	Magnitude	Extent	Duration	Status	Probability	Reversible
Without Mitigation	Very High	Regional	Short-term	Negative	Highly Likely	Reversible
Score	5	3	2		4	1
With Mitigation	Moderate	Regional	Short-term	Negative	Possible	Reversible

Impact Phase: Construction					
	3	3	2	3	1

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	High negative impact	Low Negative Impact (27)
Can the impact be reversed?	Impact is fully reversible once construction activities cease	
Will impact cause irreplaceable loss or resources?	Medium to low loss of resource (quiet environment away from busy roads).	
Can impact be avoided, managed or mitigated?	Potential construction impacts can be mitigated	

Mitigation measures to reduce residual risk or enhance opportunities:

- Where possible, night-time construction activities closer than 1,000m from NSR should not be permitted;
- Plan construction schedule that such simultaneous activities are only required at one WTG location (WTG located within 1,000m from an NSR). Other simultaneous construction activities can continue, but should take place further than 1,000m from NSR;
- Warning NSR of when construction activities may take place at night;
- Minimise active equipment at night, planning the completion of noisiest activities (such a pile driving, rock breaking and excavation) during the daytime period;
- Considering potential future operational noise levels, the applicant can relocate certain NSR (such as NSR 64, 38, 65, 48, 41, 40, 47, 39, 43, 51, 50, 42, 56, 49, 46, 52, 44, 57, 53, 45, 58, 63, 54 and 55) where operational noise levels may also be high;
- The applicant can reduce the number of WTG closer than 800m from the identified NSR, or relocate WTG further from identified NSR where operational noise levels will be high (reducing the locations where construction activities may take place);
- The applicant should add a component covering noise in the health and safety induction process. Employees and contractors should understand that noises could impact on the quality of living of people;
- A combination of the mitigation highlighted in points 1, 2, 5 and 6.

Residual impact	There will be a residual impact stemming from future operational activities, though the nature of the noises will be different from construction activities. There will be no residual noise impact after the WEF cease to operate.

10.2.2 OPERATIONAL

Impact Phase: Operational

Potential impact description: Numerous WTG operating simultaneously at Emvelo WEF

WTG will only operate during period with increased winds, when ambient sound levels could be higher than periods with no or low winds. As discussed and motivated, ambient sound levels will likely be higher, with this assessment assuming an ambient sound level of 41.5 dBA (ambient sound level measurements indicate that actual ambient sound levels may be higher) at a wind speed of 8 m/s (at a height of 10m). This assessment recommends a daytime upper noise limit of 52 dBA.

Numerous WTG of the WEF operating simultaneously during the day will increase ambient sound levels due to air-borne noise from the WTG.

	Magnitude	Extent	Duration	Status	Probability	Reversibility

Impact Phase: Operational

Without Mitigation	Very High	Local	Long-term	Negative	Definite	Reversible
Score	5	2	4	5	1	
With Mitigation	Moderate	Local	Long - term	Negative	Possible	Reversible
Score	3	2	4		3	1

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	Moderate Negative Impact (60)	Low Negative Impact (30)
Can the impact be reversed?	Impact is fully reversible once operational activities cease	
Will impact cause irreplaceable loss or resources?	Low loss of resource (quiet environment away from busy roads).	
Can impact be avoided, managed or mitigated?	Potential operational impacts can be mitigated	

Mitigation measures to reduce residual risk or enhance opportunities:

- Considering potential future night-time operational noise levels, the applicant can relocate certain NSR (such as NSR 64, 38, 65, 48, 41, 40, 47, 39, 43, 51, 50, 42, 56, 49, 46, 52, 44, 57, 53, 45, 58, 63, 54 and 55) where operational noise levels will be high;
- The applicant can reduce the number of WTG closer than 800m from the identified NSR;
- The applicant can relocate WTG further from identified NSR where operational noise levels will be high (reducing the locations where construction activities may take place);
- Together with a combination of the mitigation measures raised in points 1, 2, and 3; the applicant can add noise reducing additions to the blades of certain WTG (such as serrated trailing edges);
- Together with a combination of the mitigation measures raised in points 1, 2, 3, and 4; the applicant can design and implement a noise abatement plan that would reduce the noise emissions from the WTG during certain times or
- conditions.

Residual impact	There will be a residual impact stemming from operational activities, with the residual noise impact stopping once the WEF cease to operate.

Impact Phase: Operational

Potential impact description: Numerous WTG operating simultaneously at Emvelo WEF

WTG will only operate during period with increased winds, when ambient sound levels could be higher than periods with no or low winds. As discussed and motivated, ambient sound levels will likely be higher, with this assessment assuming an ambient sound level of 41.5 dBA at a wind speed of 8 m/s (at a height of 10m).

Numerous WTG of the WEF operating simultaneously at night will increase ambient sound levels due to air-borne noise from the WTG.

	Magnitude	Extent	Duration	Status	Probability	Reversibility

Impact Phase: Operational						
Without Mitigation	Very High	Local	Long - term	Negative	Definite	Reversible
Score	5	2	4		5	1
With Mitigation	Moderat e	Local	Long - term	Negative	Possible	Reversible
Score	3	2	4		3	1

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	High negative impact	Low Negative Impact (30)
Can the impact be reversed?	Impact is fully reversible once operational activities cease	
Will impact cause irreplaceable loss or resources?	Medium loss of resource (quiet environment away from busy roads).	
Can impact be avoided, managed or mitigated?	Potential operational impacts can be mitigated	

Mitigation measures to reduce residual risk or enhance opportunities:

- Considering potential future night-time operational noise levels, the applicant can relocate certain NSR (such as NSR 64, 38, 65, 48, 41, 40, 47, 39, 43, 51, 50, 42, 56, 49, 46, 52, 44, 57, 53, 45, 58, 63, 54 and 55) where operational noise
- levels will be high;
- The applicant can reduce the number of WTG closer than 800m from the identified NSR;
- The applicant can relocate WTG further from identified NSR where operational noise levels will be high (reducing the locations where construction activities may take place);
- Discussions with NSR at locations where night-time projected noise levels will slightly exceed the recommended night- time noise limit (45 – 48 dBA). NSR should be informed about the potential issues associated with long-term exposure to high noise level. If acceptable to the NSR, the applicant could consider the acoustic treatment of the dwellings to ensure compliance with Table 1 of SANS 10103. Each dwelling must be treated on a case-to-case base, as this option is mainly available to housing structures of proper construction (concrete or brick, with a roof with a ceiling space);
- Together with a combination of the mitigation measures raised in points 1, 2, 3 and 4; the applicant can add noise
- reducing additions to the blades of certain WTG (such as serrated trailing edges);

10.2.3 DECOMMISSIONING

Impact Phase: Decommissioning

Potential impact description: Various decommissioning activities

Based on the site measurements, daytime ambient sound levels ranged from 24.8 to more than 72 dBA, averaging at 43.3 dBA (for the six measurement locations). Daytime ambient sound levels are thus typical of a rural noise district. Construction traffic noises might be audible over large distances during quiet periods (during low wind conditions).

Daytime decommissioning activities should not change the existing ambient sound levels, with this report recommending a daytime noise limit of 52 dBA. The projected noise levels, the change in ambient sound levels as well as the potential noise impact might be similar (or less) than typical daytime construction noises.

Assuming that mitigation measures as recommended for the construction and operational phases will be implemented, decommissioning activities would likely have a much lower noise impact than the construction and operational phase.

	Magnitude	Extent	Duration	Status	Probability	Reversibility
Without Mitigation	Moderate	Local	Short-term	Negative	Possible	Reversible
Score	3	2	2		3	1
With Mitigation	Moderate	Local	Short-term	Negative	Possible	Reversible
Score	3	2	2		3	1

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	Low Negative Impact (24)	Low Negative Impact (24)
Can the impact be reversed?	Impact is fully reversible once decommissioning activities cease	
Will impact cause irreplaceable loss or resources?	Low loss of resource (quiet environment away from busy roads).	
Can impact be avoided, managed or mitigated?	Potential construction impacts can be mitigated	

Mitigation measures to reduce residual risk or enhance opportunities:
Mitigation measures are not required or recommended for the decommissioning phase.

Residual impact	There will be no residual noise impact after the decommissioning phase.

10.3 FRESHWATER AND WETLANDS (AQUATICS)

The following construction and decommissioning potential impacts were assessed with regard aquatic environment that would be affected by the proposed development:

- Impact 1: Loss of habitat containing protected species or Species of Special Concern

- Impact 2: Loss of any critical corridors, important catchment areas and connected habitats that are linked to any Critical Biodiversity Areas or Ecological Support Areas
- Impact 3: The potential spread of alien vegetation
- Impact 4: Loss of riparian and or wetland habitat
- Impact 5: Changes to the hydrological regime and increased potential for erosion
- Impact 6: Changes to water quality

It was determined that the impacts upon aquatic biodiversity associated with the project are of Low significance, after mitigation. This assumes that the mitigations listed below are considered coupled to the fact that the overall layouts have avoid any of the High / No-Go areas, unless making use of areas with impacts such as existing farm roads. However, it is assumed that the final layout will orientate the hardstands, crane pads, blade laydowns and construction camps outside of any of the No-Go areas.

10.3.1 CONSTRUCTION AND OPERATION PHASE

Impact Phase: Construction and Operation					
Nature of the impact: Any physical disturbance could result in the spread of alien vegetation (direct)					
Description of Impact: During construction, complete clearing of the roads and turbine areas, as well any ancillary structures (offices and substations) will be required. This disturbance then allows for the alien species to colonise the soils, if left unmanaged.					
Impact Status: Negative					
	Extent	**Duration**	**Reversibility**	**Magnitude**	**Probability**
Without Mitigation	Local	Long Term	Irreversible	Medium	Probable
Score	2	4	5	2	3
With Mitigation	Site	Short Term	Recoverable	Low	Low Probability
Score	1	2	3	1	2
Significance Calculation	**Without Mitigation**			**With Mitigation**	
S=(E+D+R+M)*P	Moderate Negative Impact (39)			Low Negative Impact (14)	
Was public comment received? Not yet					
Has public comment been included in mitigation measures? Note still in the draft phase and that comment will be obtained during the NEMA comment periods					
Mitigation measures to reduce residual risk or enhance opportunities: 1. Alien vegetation management must be initiated at the beginning of the construction period and must extend into any remaining areas into the operation phase on the facility					

Impact Phase: Construction and Operation	
2. The revegetation of any temporary sites as well as any previously degraded areas must begin from the onset of the project, with the involvement of a botanist to assist with the revegetation specifications Regeneration of alien vegetation must be monitored once all areas have been cleared, forming part of a long-term alien vegetation management plan	
Residual impact	Very low and acceptable, with adoption of mitigation measures and monitoring

10.3.2 CONSTRUCTION AND DECOMMISSIONING PHASE

Impact Phase: Construction and Decommissioning					
Nature of the impact: Loss of vegetation and in particular species / habitats that could contain listed as Critically Endangered and or Vulnerable species (direct)					
Description of Impact: Activities resulting in physical disturbance of aquatic systems which provide ecosystem services, especially where new crossings are made, or large hard engineered surfaces are placed within the buffer zones. Loss can also include a functional loss, through change in vegetation type via alien encroachment, reducing aquatic biodiversity. However no aquatic vegetation or fauna with conservation concern were observed during this assessment, coupled to the fact that any sensitive areas will be avoided					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Local	Long Term	Irreversible	Medium	Probable
Score	2	4	5	2	3
With Mitigation	Site	Short Term	Recoverable	Low	Low Probability
Score	1	2	3	1	2
Significance Calculation	Without Mitigation			With Mitigation	
S=(E+D+R+M)*P	Moderate Negative Impact (39)			Low Negative Impact (14)	
Was public comment received? Not yet					
Has public comment been included in mitigation measures? Note still in the draft phase and that comment will be obtained during the NEMA comment periods					
Mitigation measures to reduce residual risk or enhance opportunities: • The development of the stormwater management plan and Aquatic Rehabilitation and Monitoring plan, coupled to micro-siting of the final layout prior to construction. • Where large cut and fill areas are required, these must be stabilised and rehabilitated during the construction process, to minimise erosion and sedimentation. • Suitable stormwater management systems must be installed along roads and other areas and monitored during the first few months of use. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, spreaders, etc). • To minimise the impact of the access roads: • Use existing roads or upgrade existing tracks rather than constructing entirely new roads wherever possible and has been included in the proposed layout.					

- Use the smallest possible working corridor. Outside the working corridor, all watercourses are to be considered no go areas. Where intrusion is required, the working corridor must be kept to a minimum and demarcated clearly before any construction commences.
- Removal of vegetation must only be when essential for the continuation of the project. Do not allow any disturbance to the adjoining natural vegetation cover or soils.
- Where required, all pipe culverts must be removed and replaced with suitable sized box culverts, where road levels are raised. Crossings that are installed below the natural ground level are to be constructed with an appropriate drop inlet structure on the upstream side to ensure that head cut erosion does not develop because of the gradient change from the natural ground level to the invert level of the culvert.
- The channel profile, regardless of the current state of the river / water course, will be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist, with a preference for low level drifts where possible.
- Water diversions must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse. Sandbags used in any diversion or for any other activity within a watercourse must be in a good condition, so that they do not burst and empty sediment into the watercourse. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns. Under no circumstance shall a new channel or drainage canals be excavated to divert water away from construction activities.
- Any fauna (frogs, snakes, etc.) that are found within the construction area must be moved to the closest point of similar habitat type outside of the areas to be impacted.
- All disturbed areas beyond the construction site that are intentionally or accidentally disturbed during the construction phase must be rehabilitated.
- It is the contractor's responsibility to continuously monitor the area for newly established alien species during the contract and establishment period, which if present must be removed. Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the re-infestation of the cleaned areas.

Impact Phase: Construction and Decommissioning					
Nature of the impact: Loss of any critical corridors and connect habitats that are linked to any future conservation plans (direct) is not expected as these can been avoided, coupled to the fact that hydrological connections will be retained through avoidance or the inclusion of ecological buffers.					
Description of Impact: Activities resulting in physical disturbance of aquatic systems which provide ecosystem services, especially where new crossings are made, or large hard engineered surfaces are placed within the buffer zones and have been included in any Critical Biodiversity Areas. it is assumed that the final layout will orientate the hardstands, crane pads, blade laydowns and construction camps outside of any of the No-Go areas.					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Local	Long Term	Irreversible	Medium	Probable
Score	2	4	5	2	3
With Mitigation	Site	Short Term	Recoverable	Low	Low Probability
Score	1	2	3	1	2
Significance Calculation	Without Mitigation			With Mitigation	
S=(E+D+R+M)*P	Moderate Negative Impact (39)			Low Negative Impact (14)	
Was public comment received? Not yet					
Has public comment been included in mitigation measures? Note still in the draft phase and that comment will be obtained during the NEMA comment periods					

Impact Phase: Construction and Decommissioning	
Mitigation measures to reduce residual risk or enhance opportunities: • The aquatic systems have been mapped to a finer scale and have taken cognizance of any potential CBAs. As High / No-Go have been avoided by the major infrastructure such as turbines, the aquatic zones associated within the CBA / ESAs have also been avoided. Roads will need to traverse these areas, thus it is important to try and select existing areas with impacts / crossings where possible, coupled to the assumptions above • The development of the stormwater management plan and Aquatic Rehabilitation and Monitoring plan, coupled to confirmation of the final layout prior to construction is made by the aquatic specialist. • Where large cut and fill areas are required, these must be stabilised and rehabilitated during the construction process, to minimise erosion and sedimentation. • Suitable stormwater management systems must be installed along roads and other areas and monitored during the first few months of use. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, spreaders, etc). • To minimise the impact of the access roads: • Use existing roads or upgrade existing tracks rather than constructing entirely new roads wherever possible and has been included in the proposed layout. • Use the smallest possible working corridor. Outside the working corridor, all watercourses are to be considered no go areas. Where intrusion is required, the working corridor must be kept to a minimum and demarcated clearly, before any construction commences. • Removal of vegetation must only be when essential for the continuation of the project. Do not allow any disturbance to the adjoining natural vegetation cover or soils. • Where required, all pipe culverts must be removed and replaced with suitable sized box culverts, where road levels are raised. Crossings that are installed below the natural ground level are to be constructed with an appropriate drop inlet structure on the upstream side to ensure that head cut erosion does not develop as a result of the gradient change from the natural ground level to the invert level of the culvert. • The channel profile, regardless of the current state of the river / water course, will be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist, with a preference for low level drifts where possible. • Water diversions must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse. Sandbags used in any diversion or for any other activity within a watercourse must be in a good condition, so that they do not burst and empty sediment into the watercourse. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns. Under no circumstance shall a new channel or drainage canals be excavated to divert water away from construction activities. • Any fauna (frogs, snakes, etc.) that are found within the construction area must be moved to the closest point of similar habitat type outside of the areas to be impacted. • All disturbed areas beyond the construction site that are intentionally or accidentally disturbed during the construction phase must be rehabilitated. • It is the contractor’s responsibility to continuously monitor the area for newly established alien species during the contract and establishment period, which if present must be removed. Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the re-infestation of the cleaned areas.	
Residual impact	Very low and acceptable with adoption of mitigation measures

Impact Phase: Construction and Decommissioning
Nature of the impact: It was recommended that all wetlands / riverine systems as well as the inclusive of buffers, be avoided. <u>it is assumed that the final layout will orientate the hardstands, crane pads, blade laydowns and construction camps outside of any of the No-Go areas.</u>
Description of Impact: During construction, complete clearing of the roads and turbine areas, as well any ancillary structures (offices and substations) will be required, which may impact the

Impact Phase: Construction and Decommissioning					
aquatic function or any corridors or connections between aquatic systems. However, all Very High Sensitivity / No-Go areas have been avoided by the proposed layout by also making use of existing road crossings or considering any of the proposed buffers.					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Local	Long Term	Irreversible	Medium	Probable
Score	2	4	5	2	3
With Mitigation	Site	Short Term	Recoverable	Low	Low Probability
Score	1	2	3	1	2
Significance Calculation	**Without Mitigation**			**With Mitigation**	
S=(E+D+R+M)*P	Moderate Negative Impact (39)			Low Negative Impact (14)	
Was public comment received? Not yet					
Has public comment been included in mitigation measures? Note still in the draft phase and that comment will be obtained during the NEMA comment periods					

Mitigation measures to reduce residual risk or enhance opportunities:

- The development of the stormwater management plan and Aquatic Rehabilitation and Monitoring plan, coupled to confirmation of the final layout prior to construction is made by the aquatic specialist.
- Where large cut and fill areas are required these must be stabilised and rehabilitated during the construction process, to minimise erosion and sedimentation.
- Suitable stormwater management systems must be installed along roads and other areas and monitored during the first few months of use. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, spreaders, etc).
- To minimise the impact of the access roads:
- Use existing roads or upgrade existing tracks rather than constructing entirely new roads wherever possible and has been included in the proposed layout.
- Use the smallest possible working corridor. Outside the working corridor, all watercourses are to be considered no go areas. Where intrusion is required, the working corridor must be kept to a minimum and demarcated clearly, before any construction commences.
- Removal of vegetation must only be when essential for the continuation of the project. Do not allow any disturbance to the adjoining natural vegetation cover or soils.
- Where required, all pipe culverts must be removed and replaced with suitable sized box culverts, where road levels are raised. Crossings that are installed below the natural ground level are to be constructed with an appropriate drop inlet structure on the upstream side to ensure that head cut erosion does not develop as a result of the gradient change from the natural ground level to the invert level of the culvert.
- The channel profile, regardless of the current state of the river / water course, will be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist, with a preference for low level drifts where possible.
- Water diversions must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse. Sandbags used in any diversion or for any other activity within a watercourse must be in a good condition, so that they do not burst and empty sediment into the watercourse. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns. Under no circumstance shall a new channel or drainage canals be excavated to divert water away from construction activities.
- Any fauna (frogs, snakes, etc.) that are found within the construction area must be moved to the closest point of similar habitat type outside of the areas to be impacted.

Impact Phase: Construction and Decommissioning	
• All disturbed areas beyond the construction site that are intentionally or accidentally disturbed during the construction phase must be rehabilitated. • It is the contractor's responsibility to continuously monitor the area for newly established alien species during the contract and establishment period, which if present must be removed. Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the re-infestation of the cleaned areas.	
Residual impact	Very low and acceptable with adoption of mitigation measures

Impact Phase: Construction and Decommissioning					
Nature of the impact: Increased hard surfaces can result in increases in runoff generated by the site, thereby resulting in changes to localised hydrological regimes.					
Description of Impact: During construction, complete clearing of the roads and turbine areas, as well any ancillary structures (offices and substations) will be required, which may impact the aquatic function or any corridors or connections between aquatic systems. However, these areas must be by the proposed layout by also making use of existing road crossings or by considering any of the proposed buffers.					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Local	Long Term	Irreversible	Medium	Probable
Score	2	4	5	2	3
With Mitigation	Site	Short Term	Recoverable	Low	Low Probability
Score	1	2	3	1	2
Significance Calculation	**Without Mitigation**			**With Mitigation**	
S=(E+D+R+M)*P	Moderate Negative Impact (39)			Low Negative Impact (14)	
Was public comment received? Not yet					
Has public comment been included in mitigation measures? Note still in the draft phase and that comment will be obtained during the NEMA comment periods					
Mitigation measures to reduce residual risk or enhance opportunities: • No stormwater discharged may be directed to delineated aquatic zones or the associated buffers. • A stormwater management plan finalised prior to construction, detailing the structures and actions that must be installed to prevent the increase of surface water flows directly into any natural systems. • Effective stormwater management must include measures to slow, spread and deplete the energy of concentrated flows thorough effective stabilisation (gabions and Reno mattresses) and the re-vegetation of any disturbed areas • To minimise the impact of the access roads: • Use existing roads or upgrade existing tracks rather than constructing entirely new roads wherever possible and has been included in the proposed layout.					

Impact Phase: Construction and Decommissioning	
• Use the smallest possible working corridor. Outside the working corridor, all watercourses are to be considered no go areas.. Where intrusion is required, the working corridor must be kept to a minimum and demarcated clearly, before any construction commences. • Removal of vegetation must only be when essential for the continuation of the project. Do not allow any disturbance to the adjoining natural vegetation cover or soils. • Where required, all pipe culverts must be removed and replaced with suitable sized box culverts, where road levels are raised. Crossings that are installed below the natural ground level are to be constructed with an appropriate drop inlet structure on the upstream side to ensure that head cut erosion does not develop as a result of the gradient change from the natural ground level to the invert level of the culvert. • The channel profile, regardless of the current state of the river / water course, will be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist, with a preference for low level drifts where possible. • Water diversions must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse. Sandbags used in any diversion or for any other activity within a watercourse must be in a good condition, so that they do not burst and empty sediment into the watercourse. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns. Under no circumstance shall a new channel or drainage canals be excavated to divert water away from construction activities. • Any fauna (frogs, snakes, etc.) that are found within the construction area must be moved to the closest point of similar habitat type outside of the areas to be impacted. • All disturbed areas beyond the construction site that are intentionally or accidentally disturbed during the construction phase must be rehabilitated. • It is the contractor's responsibility to continuously monitor the area for newly established alien species during the contract and establishment period, which if present must be removed. Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the re-infestation of the cleaned areas.	
Residual impact	Very low and acceptable with adoption of mitigation measures

Impact Phase: Construction and Decommissioning					
Nature of the impact: Potential impact on localised surface water quality (indirect)					
Description of Impact: During construction or decommissioning, earthworks will expose and mobilise earth materials, and a number of materials as well as chemicals will be imported and used on site and may end up in the surface water, including soaps, oils, grease and fuels, human wastes, cementitious wastes, paints and solvents, etc. Any spills during transport or while works area conducted in proximity to a watercourse has the potential to affect the surrounding biota. This can result in possible deterioration in aquatic ecosystem integrity and species diversity.					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Local	Long Term	Irreversible	Medium	Probable
Score	2	4	5	2	3
With Mitigation	Site	Short Term	Recoverable	Low	Low Probability
Score	1	2	3	1	2
Significance Calculation	Without Mitigation			With Mitigation	

Impact Phase: Construction and Decommissioning		
S=(E+D+R+M)*P	Moderate Negative Impact (39)	Low Negative Impact (14)
Was public comment received? Not yet		
Has public comment been included in mitigation measures? Note still in the draft phase and that comment will be obtained during the NEMA comment periods		
Mitigation measures to reduce residual risk or enhance opportunities: • All liquid chemicals including fuels and oil must be stored in with secondary containment (bunds or containers or berms) that can contain a leak or spill. Such facilities must be inspected routinely and must have the suitable PPE and spill kits needed to contain likely worst-case scenario leak or spill in that facility, safely. • Washing and cleaning of equipment must be done in designated wash bays, where rinse water is contained in evaporation/sedimentation ponds (to capture oils, grease cement and sediment). • Mechanical plant and bowsers must not be refueled or serviced within 100m of a river channel or wetland. • All construction camps, lay down areas, wash bays, batching plants or areas and any stores should be beyond any demarcated water courses and their respective buffers. • Littering and contamination associated with construction activity must be avoided through effective construction camp management. • No stockpiling should take place within or near a water course. • All stockpiles must be protected and located in flat areas where run-off will be minimised and sediment recoverable. • ECO monitors the site on a daily basis to ensure plant is in working order (minimise leaks), spills are prevented and if they do occur, are quickly rectified.		
Residual impact	Low risk and acceptable, with adoption of mitigation measures and monitoring	

10.4 TERRESTRIAL BIODIVERSITY (FLORA AND FAUNA)

The main impacts likely to result from the proposed activity are summarised in Table 10 below.

Impact	Nature Of Impact
Vegetation	Permanent or temporary loss of indigenous vegetation cover because of site clearing. Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint.
Flora Species	Loss of flora species of special concern during pre-construction site clearing activities.
Faunal Species, Habitat & Processes	Loss of Faunal Species, Habitat & Processes: Activity will result in the loss of faunal species and faunal habitat as well as disruptions to faunal processes.
Alien Invasive Species	Susceptibility of post construction disturbed areas to invasion by exotic and alien invasive species and removal of exotic and alien invasive species during construction. Post construction disturbed areas having no vegetation cover are often susceptible to invasion by weedy and alien species, which can not only become invasive but also prevent natural flora from becoming established.
Erosion	Susceptibility of some areas to erosion because of construction related disturbances. Removal of vegetation cover and soil disturbance may result in some areas being susceptible to soil erosion after completion of the activity.

Impact	**Nature Of Impact**
Ecological Processes	Disturbances to ecological processes: Activity may result in disturbances to ecological processes.
Aquatic and Riparian processes	Aquatic and Riparian processes: Aquatic habitat is present and could be affected.

10.4.1 CONSTRUCTION PHASE

Impact Phase: Construction					
Nature of the impact: Permanent or temporary loss of indigenous vegetation cover as a result of the activity					
Description of Impact: Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint. The proposed footprint comprises an insignificant portion of the vegetation unit regionally and extensive areas of natural vegetation are present surrounding the site. Core habitat areas have been identified for avoidance during the preliminary sensitivity mapping and accommodated in the design.					
Impact Status: Negative to Positive					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Site	Long-term	Recoverable	High	Definite
Score	1	4	3	3	5
With Mitigation	Site	Long-term	Recoverable	Low	Probable
Score	1	4	3	2	3
Significance Calculation	Without Mitigation			With Mitigation	
S=(E+D+R+M)*P	Moderate Negative Impact (55)			Moderate Positive Impact (31)	
Was public comment received?	NO				
Has public comment been included in mitigation measures?	NO				

Mitigation measures to reduce residual risk or enhance opportunities:

- Recommended clearing of alien invaded areas in a ratio of 1:3 for direct loss of natural grassland habitat (as a trade-off or offset), in conjunction with the mitigation measures below as well as post construction rehabilitation of the initial temporary disturbance footprint and implementation of a sound environmental management programme for the duration of the project lifespan can potentially and effectively result in a net positive impact. The loss of vegetation as a result of the loss of the expected project footprint (~18o Ha) is far outweighed by the potential improvement that can be achieved on the remaining habitat of the site (~7 000 Ha) through the positive management measures that can be implemented through the EMPr on farmland where there are currently no EMPr in place.
- Site layout to avoid more sensitive vegetation as far as technically viable. Most of the risks associated with this impact have been reduced through identification of risk areas during the initial assessment phases and careful layout design in response to the respective sensitivity.
- Site layout design has effectively reduced this impact to negligible levels with only a very small proportion of the footprint occurring in or near higher sensitivity areas. Very High Sensitivity or No-Go habitat has largely been avoided and reduced to an acceptable level.

Impact Phase: Construction	
• Mitigation measures and management actions are proposed to enhance areas of habitat as a trade-off in order to offset this nominal loss of elevated sensitivity areas. • Blanket clearing of vegetation must be limited to the site and footprint. No blanket vegetation clearing outside of footprint to take place. • Topsoil must be striped and stockpiled separately during site preparation and replaced on completion in areas where revegetation or rehabilitation will take place. • Any site camps and laydown areas requiring clearing must be located within already disturbed areas and away from watercourses.	
Residual impact	*Residual risks include possible clearing of natural or near natural vegetation outside of the proposed footprint.*

Impact Phase: Construction					
Nature of the impact: Loss of flora species of conservation concern during pre-construction site clearing activities.					
Description of Impact: *Species of conservation concern are present within the affected area, which could be destroyed during site clearing. The proposed footprint comprises a negligible portion of the vegetation unit regionally and locally and extensive areas of natural vegetation are present surrounding the site. All species are widespread species, and removal will not result in any significant impact to any flora species or population. While present in the area, species of conservation concern are not prevalent within the WEF project site and generally in inaccessible areas or remnant vegetation that are excluded.*					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Local	Immediate	Recoverable	Low	Probable
Score	1	1	3	2	4
With Mitigation	Local	Immediate	Recoverable	Very Low	Low Probability
Score	1	1	3	1	2
Significance Calculation	Without Mitigation		With Mitigation		
S=(E+D+R+M)*P	Low Negative Impact (28)		Low Negative Impact (12)		
Was public comment received?	NO				
Has public comment been included in mitigation measures?	NO				
Mitigation measures to reduce residual risk or enhance opportunities: • A pre-construction site walkdown to be conducted before commencement to identify SCC's that may require relocation or to microsite turbine positions. A search and rescue must be undertaken before construction commences. Any flora search and rescue will likely include a few individuals of widespread, cosmopolitan or common but protected species. • Respective permits to be obtained prior to construction commencing.					
Residual impact	*Residual risks include possible loss of species of conservation concern outside of the proposed footprint.*				

Impact Phase: Construction					
Nature of the impact: Loss of fauna species of conservation concern and potential loss of faunal habitat.					
Description of Impact: Faunal species of conservation concern are present within the affected area, which could be destroyed during site clearing. All species are widespread species, and removal will not result in any significant impact on any flora species or population. Species may include transient fauna species. Activities associated with site preparation and killing of perceived dangerous fauna, may lead to increased mortalities among faunal species.					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Local	Immediate	Recoverable	Low	Probable
Score	1	1	3	2	4
With Mitigation	Local	Immediate	Recoverable	Very Low	Low Probability
Score	1	1	3	1	2
Significance Calculation	Without Mitigation		With Mitigation		
S=(E+D+R+M)*P	Low Negative Impact (28)		Low Negative Impact (12)		
Was public comment received?	NO				
Has public comment been included in mitigation measures?	NO				

Mitigation measures to reduce residual risk or enhance opportunities:

- High sensitivity areas as identified by the respective faunal specialists to be avoided and specific mitigation measures as per specialists to be implemented.
- Blanket clearing of vegetation must be limited to the footprint.
- The habitats and microhabitats present on the project site are not unique and are widespread in the general area, hence the local impact associated with the footprint would be of low significance if mitigation measures are adhered to.
- Small mammals within the habitat on and around the affected area are generally mobile and likely to be transient to the area. They will most likely vacate the area once construction commences. As with all construction sites there is a latent risk that there will be some accidental mortalities. Specific measures are made to reduce this risk. The risk of species of Conservation Concern is low, and it is unlikely that there will be any impact to populations of such species because of the activity.
- Reptiles such as lizards are less mobile compared to mammals, and some mortalities could arise. It is recommended that a faunal search and rescue be conducted before construction commences, although experience has shown that there could still be some mortalities as these species are mobile and may thus move onto site once construction is underway. A retile handler should be on call for such circumstances.
- Should any amphibian migrations occur between wetland areas during construction, appropriate measures (including temporarily suspending works in the affected area) should be implemented.
- A pre-commencement faunal search and rescue is recommended, but not necessarily required. Respective permits to be obtained beforehand.
- No animals are to be harmed or killed during the course of operations including use of snares.

Impact Phase: Construction	
Residual impact	*Residual risks include possible clearing of areas outside of the proposed footprint, killing of perceived harmful fauna during construction or not relocating any species, but are likely to be negligible.*

Impact Phase: Construction

Nature of the impact: Invasion by exotic and alien invasive species could occur as a result of construction

Description of Impact: Exotic (weed) and alien invasive species may proliferate during and after construction in disturbed areas. Areas disturbed during construction, having no vegetation cover, including temporary stockpile areas, are often susceptible to invasion by weedy and alien invasive species, which can not only become invasive but also prevent natural flora from becoming established.

Impact Status: Negative to Positive

	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Local	Immediate	Recoverable	Low	Probable
Score	1	1	3	2	4
With Mitigation	Local	Immediate	Recoverable	Very Low	Low Probability
Score	1	1	3	1	2

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	Low Negative Impact (28)	Low Positive Impact (12)
Was public comment received?	NO	
Has public comment been included in mitigation measures?	NO	

Mitigation measures to reduce residual risk or enhance opportunities:

- Alien species (including alien invasive trees) and weeds must be removed from the site as per CARA/NEMBA requirements.
- A suitable weed management strategy to be implemented during construction and operation phases as outlined in the EMPr section of this report. It is imperative that any actions are implemented timeously as once alien and weed species generate seeds, the problem is exacerbated.
- After clearing and construction is completed, an appropriate cover may be required, should natural re-establishment of grasses not take place in a timely manner along road verges. This will also minimise dust.
- Recommended clearing of alien invaded areas in a ratio of 1:3 for loss of natural grassland habitat, in conjunction with ongoing alien vegetation management of the project footprint will likely result in a net positive impact.

Residual impact	Residual risks are primarily related to inadequate initial and ongoing implementation of the weed management plan.

Impact Phase: Construction					
Nature of the impact: *Disturbances to ecological processes may occur as a result of the activity.*					
Description of Impact: *Activity may result in disturbances to ecological processes. The proposed footprint comprises a negligible portion of the vegetation unit regionally and locally and extensive areas of natural vegetation are present surrounding the site. The site is already significantly fragmented as a result of commercial agriculture, alien invasion and other land uses and the additional fragmentation as a result of the activity will be negligible compared to baseline levels.* Core corridors and connectivity areas have been identified for avoidance during the preliminary sensitivity mapping and accommodated in the design.					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Local	Immediate	Recoverable	Low	Probable
Score	1	1	3	2	4
With Mitigation	Local	Immediate	Recoverable	Very Low	Low Probability
Score	1	1	3	1	2
Significance Calculation	Without Mitigation		With Mitigation		
S=(E+D+R+M)*P	Low Negative Impact (28)		Low Negative Impact (12)		
Was public comment received?	NO				
Has public comment been included in mitigation measures?	NO				
Mitigation measures to reduce residual risk or enhance opportunities: Blanket clearing of vegetation must be limited to the development footprint, and the area to be cleared must be demarcated before any clearing commences. Rehabilitation or revegetation should be implemented on completion of construction.					
Residual impact	*Residual risks include possible clearing of natural or near natural vegetation outside of the proposed footprint.*				

Impact Phase: Construction					
Nature of the impact: *Ecological processes associated with Aquatic and Riparian habitat may be affected by the activity and erosion risk may be elevated.*					
Description of Impact: *Diversion and increased velocity of surface water flows during construction and operation could alter the hydrological regime and result in changes to water quality as well as loss of riparian vegetation / aquatic habitat. Removal of vegetation cover and soil disturbance during construction may result in some areas being susceptible to soil erosion, in particular during unexpected heavy rainfall. Aquatic Features are present but have largely been avoided via careful layout planning in response to initial sensitivity mapping and recommendations.*					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Local	Immediate	Recoverable	Low	Probable

Impact Phase: Construction					
Score	1	1	3	2	4
With Mitigation	Local	Immediate	Recoverable	Very Low	Low Probability
Score	1	1	3	1	2
Significance Calculation	Without Mitigation			With Mitigation	
S=(E+D+R+M)*P	Low Negative Impact (28)			Low Negative Impact (12)	
Was public comment received?	NO				
Has public comment been included in mitigation measures?	NO				

Mitigation measures to reduce residual risk or enhance opportunities:
All riverine habitats including watercourses and wetlands to be avoided as per aquatic specialist recommendations, other than minimal strategic crossings for access and linear infrastructure.
Stormwater discharge from hard stands and roads into watercourses to be protected against erosion.
Suitable measures must be implemented in areas that may be susceptible to erosion (such as slopes) and all. Any excavations or excavated areas must be protected from erosion.
Topsoil must be stripped and stockpiled separately and protected from erosion and replaced on completion.
If natural vegetation re-establishment does not occur natural (bushveld typically regenerates well with minimal intervention), a suitable local grass seed mix must be applied.

Residual impact	*Alien invasion management is an ongoing issue and will require ongoing implementation. Failure to do so may result in a regression.*

10.4.2 OPERATIONAL PHASE

Impact Phase: Operation					
Nature of the impact: Loss of fauna species of conservation concern and potential loss of faunal habitat.					
Description of Impact: Faunal species of conservation concern are present within the affected area and are likely to be mobile during operational phase (excluding avifauna), which could result in mortalities.					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Local	Immediate	Recoverable	Low	Probable
Score	1	1	3	2	4
With Mitigation	Local	Immediate	Recoverable	Very Low	Low Probability
Score	1	1	3	1	2
Significance Calculation	Without Mitigation			With Mitigation	

Impact Phase: Operation		
S=(E+D+R+M)*P	Low Negative Impact (28)	Low Negative Impact (12)
Was public comment received?	NO	
Has public comment been included in mitigation measures?	NO	
Mitigation measures to reduce residual risk or enhance opportunities: Ongoing monitoring to be undertaken of the entire project footprint during operations and any hotspots identified. Suitable mitigation measures or responses to be devised and implemented accordingly. Roads to have suitable speed control measures, in particular in the vicinity or watercourse crossings and where any rocky outcrops might be traversed. Ongoing monitoring to be conducted along fences for snares. No killing of fauna to be permitted w.r.t the WEF operations.		
Residual impact	*Residual risks include possible clearing of areas outside of the proposed footprint, killing of perceived harmful fauna during construction or not relocating any species, but are likely to be negligible.*	

Impact Phase: Operation					
Nature of the impact: Invasion by exotic and alien invasive species could occur as a result of construction					
Description of Impact: Exotic (weed) and alien invasive species may proliferate after construction in disturbed areas. Areas disturbed during construction, having no vegetation cover, including temporary stockpile areas, are often susceptible to invasion by weedy and alien invasive species, which can not only become invasive but also prevent natural flora from becoming established.					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Local	Immediate	Recoverable	Low	Probable
Score	1	1	3	2	4
With Mitigation	Local	Immediate	Recoverable	Very Low	Low Probability
Score	1	1	3	1	2
Significance Calculation	Without Mitigation		With Mitigation		
S=(E+D+R+M)*P	Low Negative Impact (28)		Low Negative Impact (12)		
Was public comment received?	NO				
Has public comment been included in mitigation measures?	NO				
Mitigation measures to reduce residual risk or enhance opportunities: Alien species (including alien invasive trees) and weeds must be removed from the site as per CARA/NEMBA requirements on an ongoing basis.					

Impact Phase: Operation	
Ongoing monitoring to be undertaken of the entire project footprint during operations and any hotspots identified. Suitable mitigation measures or responses to be devised and implemented accordingly. A suitable weed management strategy to be implemented during the operational phases as outlined in the EMPr. It is imperative that any actions are implemented timeously as once alien and weed species generate seeds, the problem is exacerbated.	
Residual impact	Residual risks are primarily related to inadequate initial and ongoing implementation of the weed management plan.

Impact Phase: Operation					
Nature of the impact: Disturbances to ecological processes may occur as a result of the activity.					
Description of Impact: *Activity may result in disturbances to ecological processes. The proposed footprint comprises a negligible portion of the vegetation unit regionally and locally and extensive areas of natural vegetation are present surrounding the site. The site is already significantly fragmented as a result of commercial agriculture, alien invasion and other land uses and the additional fragmentation as a result of the activity will be negligible compared to baseline levels.* Core corridors and connectivity areas have been identified for avoidance during the preliminary sensitivity mapping and accommodated in the design.					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Local	Immediate	Recoverable	Low	Probable
Score	1	1	3	2	4
With Mitigation	Local	Immediate	Recoverable	Very Low	Low Probability
Score	1	1	3	1	2
Significance Calculation	Without Mitigation		With Mitigation		
S=(E+D+R+M)*P	Low Negative Impact (28)		Low Negative Impact (12)		
Was public comment received?	NO				
Has public comment been included in mitigation measures?	NO				
Mitigation measures to reduce residual risk or enhance opportunities: Blanket clearing of vegetation must be limited to the development footprint, and the area to be cleared must be demarcated before any clearing commences. Rehabilitation or revegetation should be implemented on completion of construction.					
Residual impact	*Residual risks include possible clearing of natural or near natural vegetation outside of the proposed footprint.*				

10.4.3 DECOMMISSIONING PHASE

No terrestrial biodiversity risks or impacts of significance are identified for the decommissioning phase.

10.5 FAUNA

The various identified faunal impacts are assessed below for the different phases (construction/operational) of the proposed wind farm development. Impacts are based on the information as provided to date by ERM, and any changes to these or to the project would require a reassessment.

The final layout plan of 30 January 2025 places several turbines, new access roads, and OHPL alternatives within high sensitive areas. Several of these areas appear to offer ideal habitat for the Oribi, katydid, and the high sensitive escarpment area is likely of general importance for a range of faunal groups, representative of a large contiguous and ecologically intact area of mostly good-quality montane grassland.

Overall, the impact significance during the different phases of the proposed development is considered high negative and moderate negative when mitigation is considered, although it is uncertain if mitigation would fully reduce impacts due to the potentially large total amount of high sensitive habitat loss. Lack of micro-siting of turbine and roads further limits confidence in assessing final impacts. Main impacts will likely come from the building of access road, especially in high sensitive areas where no established roads currently exist. Although turbines have relatively small footprints and impacts during construction can be limited to a certain degree, the main impacts from turbines are likely to come during their operational phase. Access roads could also have continued impacts during the operational phase (Helldin et al., 2012). All OHPL alternatives should have low-medium impacts during construction, if no associated servitude road is built. During their operation phase they should have limited impacts on faunal SCC, although long-term avoidance by mammals of habitat associated with OHPLs has been observed in some cases (Tyler et al., 2014).

10.5.1 CONSTRUCTION PHASE

	Impact Phase: Construction
	Nature of the impact: Habitat fragmentation, noise and visual disturbances, affecting animal behaviour and changes in their movement and distribution patterns across landscapes.
	Description of Impact: Detailed description of impact Habitat fragmentation, disrupting ecological corridors and altering ecosystems which can fragment populations and isolate species; and noise and visual disturbances, affecting animal behaviour and their habitat choice and use. Some animal species will actively avoid areas near turbines, leading to their displacement or changes in their movement and distribution patterns across landscapes. Increased vehicle movement on access roads related to turbine maintenance, increased human activities around turbines and other project infrastructure, could further compound these impacts. Consequences of such impacts can result in the loss of populations of faunal SCC; restrict

	Impact Phase: Construction					
	movement of fauna through ecological corridors; and the fragmentation of sub-populations of faunal SCC across high sensitive grassland habitats.					
	Impact Status: Negative					
	Extent	Duration	Status	Reversibility	Magnitude	Probability
Without Mitigation	Regional	Long Term	Negative	Recoverable	High	Definite
Score	3	4		3	4	5
With Mitigation	Regional	Medium Term	Negative	Recoverable	High	Highly Probable
Score	3	3		3	4	4
Significance Calculation	Without Mitigation			With Mitigation		
S=(E+D+R+M)*P	High negative Impact (70)			Moderate negative Impact (52)		
Was public comment received?	NO					
Has public comment been included in mitigation measures?	NO					
	Mitigation measures to reduce residual risk or enhance opportunities: • If possible, micro-siting of turbine and access roads pre-construction; even small adjustments in placement can help avoid ecologically sensitive areas. • If high sensitive areas are to be developed, then off-sets will be required. • Clearing of natural vegetation should be kept to a minimum where possible. • The smallest possible working corridor, particularly close to sensitive habitats, must be used. • A ~5 m buffer zone should also be considered for any development close to any high sensitive areas. • No construction vehicles are allowed within no-go areas. • Limiting the number and speed of vehicle movements to, from, and within the project area. • All temporary/permanent security fences will need to be modified (e.g. maintaining a gap, at reasonable intervals, between the base of the fence and the ground of approx. 30 cm) to allow small and medium-sized animals to move freely through and to not act as a barrier to dispersal. • Any drainage/water run-off trenches required to be built alongside roads should be shallow and broad with low-angle sides (<30 degrees) so as not to trap fossorial invertebrates (e.g. dung beetles) and small vertebrates (e.g. moles, snakes, tortoises). • Alien invasive vegetation found on the project area should be removed by an alien plant clearing team during the construction phase; invasive alien plants are seen as a significant threat to faunal SCC. • Restoration and rehabilitation: Natural vegetation or biodiversity features impacted from construction-related activities that could not be completely avoided and/or minimised through re-vegetating of temporary-use and lay-down areas as soon as reasonably practicable after the construction phase.					

		Impact Phase: Construction
		• Providing toolbox talks to onsite personnel to ensure that they are aware of the biodiversity mitigation measures for construction phase of the project.
Residual impact		*Vegetation and soil disturbance, and alterations to local landuse patterns are likely to remain even after site restoration.*

	Impact Phase: Construction -- No-go alternative				
	Nature of the impact: Disturbance and habitat loss associated with continued alien plant infestation and agricultural landuse practices (ploughing, over-grazing).				
	Description of Impact: Loss of local populations of faunal SCC through continued loss of remaining patches of grassland habitat from alien plants, over-grazing, and agriculture. Consequences of such impacts can result in the loss of populations of SCC; Further fragmentation of sub-populations of SCC across grassland habitats.				
	Impact Status: Negative				
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Regional	Long Term	Recoverable	High	Definite
Score	3	4	3	4	5
With Mitigation	Regional	Long Term	Recoverable	Moderate	High Probable
Score	3	4	3	3	4
Significance Calculation	Without Mitigation		With Mitigation		
S=(E+D+R+M)*P	High negative Impact (65)		Moderate (+) Impact (52)		
Was public comment received?	NO				
Has public comment been included in mitigation measures?	NO				
	Mitigation measures to reduce residual risk or enhance opportunities: • Alien invasive vegetation found on the project area should be removed; invasive alien plants are seen as a significant threat to faunal SCC. • Management plans for grassland habitats (e.g. alien plant removal, fire regime plan) can be implemented to favour maintaining functioning grassland ecosystems and faunal habitat.				
Residual impact		*Yes, potentially positive in terms of restoration and management of sensitive grassland habitats and associated faunal SCC. However, there is low confidence that these mitigation measures would be implemented*			

10.5.2 OPERATIONAL PHASE

The management of high sensitive areas to reduce impacts and possibly add biodiversity benefits through alien plant clearing are likely to be a key compensatory aspect for this project during the operational phase and potentially represent a positive impact. Management plans should also include implementing a grazing and fire management programme for intact grassland habitats. In addition, the high sensitive grassland habitats would ideally need a long-term conservation strategy to be implemented. If high sensitive areas are to be developed, then an off-set would be required.

Considering that the proposed layout falls over high sensitive areas, key to understanding and mitigating operational impacts, especially considering the lack of empirical data around impacts on non-volant species in South Africa, will involve an Oribi monitoring programme beginning before and continuing after the operational phase of a wind farm, ideally over several years. The planned Oribi management plan would represent a strong mitigation measure to reduce impacts on this highly threatened antelope species. Mitigation measures will certainly be able to reverse or ameliorate several impacts; however, the noise and visual disturbances of turbines are an innate aspect of wind farms and some noise and visual disturbances of turbines will remain. Continued monitoring will allow for adaptive management of impacts.

Overall, the impact significance during the operational phase of the proposed development is considered moderate negative on faunal SCC, after mitigation.

Impact Phase: Operation					
Nature of the impact: Habitat fragmentation, noise and visual disturbances, affecting animal behaviour and changes in their movement and distribution patterns across landscapes.					
Description of Impact: Detailed description of impact Habitat fragmentation, disrupting ecological corridors and altering ecosystems which can fragment populations and isolate species; and noise and visual disturbances, affecting animal behaviour and their habitat choice and use. Some animal species will actively avoid areas near turbines, leading to their displacement or changes in their movement and distribution patterns across landscapes. Increased vehicle movement on access roads related to turbine maintenance, increased human activities around turbines and other project infrastructure, could further compound these impacts. Consequences of such impacts can result in the loss of populations of faunal SCC; restrict movement of fauna through ecological corridors; and the fragmentation of sub-populations of faunal SCC across high sensitive grassland habitats.					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Regional	Long Term	Recoverable	High	Definite
Score	3	4	3	4	5
With Mitigation	Regional	Medium Term	Recoverable	High	Highly Probable
Score	3	3	3	4	4
Significance Calculation	Without Mitigation		With Mitigation		
S=(E+D+R+M)*P	High Negative Impact (70)		Moderate Negative Impact (52)		
Was public comment received?	NO				
Has public comment been included in mitigation measures?	NO				
Mitigation measures to reduce residual risk or enhance opportunities: • If high sensitive areas are to be developed, then off-sets will be required. • Implementation of an Oribi management plan for project area.					

Impact Phase: Operation		
• Implementation of a grazing and fire management plan for the high sensitive areas. • Ongoing eradication of alien invasive plants across the project area as part of an alien plant management plan. • Vegetation management in accordance with the recommendations from the botanist. • Modifications to any fencing to facilitate animal movement can include leaving a gap at reasonable intervals between the base of the fence and the ground of approx. 30 cm in height. This can occur across the full extent of the fence, or at regular intervals. • Possible options to mitigate the negative impacts of artificial lights could include: • Fixtures on lights to cover the light bulb and direct the light to where it is needed. • Use timers and motion sensors • An outdoor lighting plan should be developed that includes an overall reduction of nocturnal lighting. • Limiting the number and speed of vehicle movements within the project area to and from turbines. Speed bumps should be installed on internal roads and speed limits and animal crossing warning signs should be erected. • Providing toolbox talks to onsite personnel to ensure that they are aware of the biodiversity mitigation measures for the operational phase of the project.		
Residual impact		*Some of the grassland habitat found at the project site is found outside of the project area, and the removal and rehabilitation of areas infested with alien plants may create new grassland habitat. However, with only approx. 33% of Eastern Highveld Grassland habitat remaining, irreplaceable loss of habitat is a possibility.*

Impact Phase: Operation -- No-go alternative					
Nature of the impact: Disturbance and habitat loss associated with continued alien plant infestation and agricultural landuse practices (ploughing, over-grazing).					
Description of Impact: Loss of local populations of faunal SCC through continued loss of remaining patches of grassland habitat from alien plants, over-grazing, and agriculture. Consequences of such impacts can result in the loss of populations of SCC; Further fragmentation of sub-populations of SCC across grassland habitats.					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Regional	Long Term	Recoverable	High	Definite
Score	3	4	3	4	5
With Mitigation	Regional	Long Term	Recoverable	Moderate	High Probable
Score	3	4	3	3	4
Significance Calculation	**Without Mitigation**		**With Mitigation**		
S=(E+D+R+M)*P	**High negative Impact (65)**		**Moderate negative Impact (52)**		
Was public comment received?	NO				
Has public comment been included in mitigation measures?	NO				
Mitigation measures to reduce residual risk or enhance opportunities:					

Impact Phase: Operation -- No-go alternative
• Alien invasive vegetation found on the project area should be removed; invasive alien plants are seen as a significant threat to faunal SCC. • Management plans for grassland habitats (e.g. alien plant removal, fire regime plan) can be implemented to favour maintaining functioning grassland ecosystems and faunal habitat.

Residual impact	*Yes, potentially positive in terms of restoration and management of sensitive grassland habitats and associated faunal SCC. However, it is unlikely any of these mitigation measures would be implemented.*

10.5.3 DECOMMISSIONING PHASE

Impact Phase: Decommissioning					
Nature of the impact: Noise and visual disturbances, affecting animal behaviour and changes in their movement and distribution patterns across landscapes.					
Description of Impact: Detailed description of impact Noise and visual disturbances, affecting animal behaviour and their habitat choice and use. Some animal species will actively avoid areas near decommissioning activities, leading to their displacement or changes in their movement and distribution patterns across landscapes. Increased vehicle movement on roads related to decommissioning, increased human activities, would further compound impacts. Consequences of such impacts could result in the loss of faunal SCC; restrict movement of some fauna through ecological corridors; and the fragmentation of sub-populations of faunal SCC across grassland habitats.					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Local	Short Term	Recoverable	Moderate	Probable
Score	2	2	3	3	3
With Mitigation	Local	Short Term	Recoverable	Low	Probable
Score	2	2	3	2	3
Significance Calculation	Without Mitigation		With Mitigation		
S=(E+D+R+M)*P	Moderate (-) Impact (30)		Low (-) Impact (27)		
Was public comment received?	NO				
Has public comment been included in mitigation measures?	NO				
Mitigation measures to reduce residual risk or enhance opportunities: • The smallest possible working corridor, particularly close to sensitive habitats, must be used. • A ~5 m buffer zone should also be considered for any decommissioning activities close to any high sensitive areas. • No construction vehicles are allowed within no-go areas. • Limiting the number and speed of vehicle movements to, from, and within the project area. • All temporary/permanent security fences will need to be modified (e.g. maintaining a gap, at reasonable intervals, between the base of the fence and the ground of approx. 30 cm) to allow small and medium-sized animals to move freely through and to not act as a barrier to dispersal.					

Impact Phase: Decommissioning

- Revegetation of disturbed areas (turbine placement areas, access roads, etc.) as they become available, using topsoil and indigenous plants from the site where possible.
- Reinstatement of original vegetation, as far as feasible, after decommissioning.
- Continuation of alien plant monitoring and clearing, Oribi monitoring programme, and ensuring any conservation areas are retained.
- Providing toolbox talks to onsite personnel to ensure that they are aware of the biodiversity mitigation measures for decommissioning phase of the project.

Residual impact	*Some vegetation and soil disturbance are likely to remain even after restoration of developed areas afrer decommissioning, with low negative impacts.*

10.6 AVIFAUNA

10.6.1 CONSTRUCTION PHASE

Impact Phase: Construction						
Potential impact description: Habitat Transformation						
	Extent	Duration	Reversibility	Status	Magnitude	Probability
Without Mitigation	Regional	Medium term	Recoverable	Negative	Moderate	Probable
Score	3	3	3		3	3
With Mitigation	Local	Medium term	Recoverable	Negative	Moderate	Probable
	2	3	3		3	3
Significance Calculation		Without Mitigation			With Mitigation	
S=(E+D+R+M) *P		Moderate Negative Impact (36)			Moderate negative Impact (33)	
Can the impact be reversed?		Partially, with rehabilitation				
Will impact cause irreplaceable loss of resources?		No				
Can impact be avoided, managed, or mitigated?		Yes				

Mitigation measures to reduce residual risk or enhance opportunities:

- No construction should take place in All Infrastructure Exclusion Zones as indicated in Section 6.5 of this report.
- No construction activities within 2.5 km of the Martial Eagle nest (coordinates on request) should take place in the period March to December, which is the breeding season for these eagles.
- Removal of indigenous vegetation must be restricted to a minimum within the approved development footprint and must be rehabilitated to its former state where possible after construction.
- Construction of new roads should only be considered if existing roads cannot be upgraded.
- The recommendations of the terrestrial biodiversity including animal and plant species specialist studies must be strictly implemented, especially as far as limitation of the activity footprint is concerned to limit the impact of habitat transformation on priority species.
- No construction should take place in all infrastructure exclusion zones as indicated in Section 6.5 of this report.

Impact Phase: Construction	
• Eradication and effective control of alien invasive species must be undertaken according to the approved Alien Invasive Plant Species Management Plan during all phases of the proposed development. • Should agricultural activities continue during WEF operations, proper grazing management systems should be implemented to prevent overgrazing, limit trampling and improve soil condition of grassland and wetland habitats across the project site. Controlled burns or prescribed fires are essential in managing grassland and wetland biodiversity and ecosystem health and should be implemented during WEF operations according to an approved Fire Management Plan. • Following construction, rehabilitation of all disturbed areas (e.g., temporary access tracks and laydown areas) must be undertaken. A habitat restoration plan is to be developed by a specialist and included within the EMPr	
Residual impact	Medium, given the sensitivity of the grassland and wetland habitats in the area.

Impact Phase: Construction						
Potential impact description: Displacement due to Disturbance						
	Extent	Duration	Reversibility	Status	Magnitude	Probability
Without Mitigation	Regional	Medium term	Reversible	Negative	Moderate	Probable
Score	3	3	1		3	3
With Mitigation	Local	Medium term	Reversible	Negative	Moderate	Probable
Score	2	3	1		3	3
Significance Calculation			Without Mitigation		With Mitigation	
S=(E+D+R+M) *P			Moderate negative Impact		Moderate negative Impact	
Can the impact be reversed?			Yes			
Will impact cause irreplaceable loss or resources?			No			
Can impact be avoided, managed, or mitigated?			Yes			

Mitigation measures to reduce residual risk or enhance opportunities:

- No construction should take place in All Infrastructure Exclusion Zones as indicated in Section 6.5 of this report.
- No construction activities within 2.5 km of the Martial Eagle nest (coordinates on request) should take place in the period March to December, which is the breeding season for these eagles.
- Construction activity should be restricted to the immediate footprint of the infrastructure as far as possible. Access to the remainder of the area should be strictly controlled to prevent unnecessary disturbance of priority species.
- Measures to control noise and dust should be applied according to current best practice in the industry.
- No construction should take place in all infrastructure exclusion zones as indicated in Section 6.5 of this report unless existing roads are to be upgraded.

Impact Phase: Construction	
Residual impact	Medium post-mitigation on condition that all relevant required mitigation measures are implemented, given the overall sensitivity of the avifaunal habitats in the area.

10.6.2 CONSTRUCTION PHASE GRID

Impact Phase: Construction						
Potential impact description: Displacement due to Disturbance						
	Extent	Duration	Reversibility	Status	Magnitude	Probability
Without Mitigation	Regional	Short term	Reversible	Negative	Moderate	Low
Score	3	2	1		3	2
With Mitigation	Local	Short term	Reversible	Negative	Low	Low
Score	2	2	1		2	2
Significance Calculation			Without Mitigation		With Mitigation	
S=(E+D+R+M) *P			Moderate negative impact		Low negative impact	
Can the impact be reversed?			Yes			
Will impact cause irreplaceable loss or resources?			No			
Can impact be avoided, managed, or mitigated?			Yes			

Mitigation measures to reduce residual risk or enhance opportunities:

- Martial Eagle nest – A 2.5 km no disturbance buffer zone must be implemented around the nest. No construction activity should take place in this zone from March to December, which is the breeding season for these eagles.
- Construction activity should be restricted to the immediate footprint of the infrastructure as far as possible. Access to the remainder of the area should be strictly controlled to prevent unnecessary disturbance of priority species.
- Measures to control noise and dust should be applied according to current best practice in the industry.
- No construction should take place in all infrastructure exclusion zones as indicated in Section 6.5 of this report unless existing roads are to be upgraded.

Residual impact	Yes, but acceptable (low significance) with mitigation

Impact Phase: Construction						
Potential impact description: Habitat Transformation						
	Extent	Duration	Reversibility	Status	Magnitude	Probability
Without Mitigation	Regional	Long term	Recoverable	Negative	Moderate	Low
Score	3	4	3		3	2

Impact Phase: Construction						
With Mitigation	Local	Medium term	Recoverable	Negative	Low	Low
Score	2	3	3		2	2

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M) *P	Moderate negative impact	Low negative impact
Can the impact be reversed?	Partially, with rehabilitation	
Will impact cause irreplaceable loss of resources?	No	
Can impact be avoided, managed, or mitigated?	Yes	

Mitigation measures to reduce residual risk or enhance opportunities:

- Removal of indigenous vegetation must be restricted to a minimum within the approved development footprint and must be rehabilitated to its former state where possible after construction.
- Construction of new roads should only be considered if existing roads cannot be upgraded.
- The recommendations of the terrestrial biodiversity including animal and plant species specialist studies must be strictly implemented, especially as far as limitation of the activity footprint is concerned to limit the impact of habitat transformation on priority species.
- No construction should take place in all infrastructure exclusion zones as indicated in Section 6.5 of this report.
- Eradication and effective control of alien invasive species must be undertaken according to the approved Alien Invasive Plant Species Management Plan during all phases of the proposed development.
- Should agricultural activities continue during operations, proper grazing management systems should be implemented to prevent overgrazing, limit trampling and improve soil condition of grassland and wetland habitats across the project site. Controlled burns or prescribed fires are essential in managing grassland and wetland biodiversity and ecosystem health and should be implemented during WEF operations according to an approved Fire Management Plan.

Following construction, rehabilitation of all disturbed areas (e.g., temporary access tracks and laydown areas) must be undertaken. A habitat restoration plan is to be developed by a specialist and included within the EMPr.

Residual impact	Yes, but acceptable (low significance) with mitigation

10.6.3 OPERATIONAL PHASE

IMPACT PHASE: OPERATIONAL					
Potential impact description: Mortality due to Collisions with Wind Turbines					
Magnitude	Extent	Duration	Reversibility Status	Status Probability	Probability Reversibility

IMPACT PHASE: OPERATIONAL					
Without Mitigation	Regional	Long term	Irreversible	Negative	High
	3	4	5		4
With Mitigation	Regional	Medium term	Irreversible	Negative	Probable
	3	3	5		3
Significance Calculation		Without Mitigation		With Mitigation	
S=(E+D+R+M)*P		High Negative Impact (64)		Moderate negative Impact (42)	
Can the impact be reversed?		No			
Will impact cause irreplaceable loss or resources?		Potentially yes (breeding SCC)			
Can impact be avoided, managed, or mitigated?		Yes			

Mitigation measures to reduce residual risk or enhance opportunities:
No turbines (including the rotor swept area) should be located in turbine exclusion zones as indicated in Section 6.5 of this report.
Wind turbines (WTGs) located within the medium risk zones (as indicated in Section 6.5 of this report) must be subject to Shut Down on Demand (SDoD), either Observer SDoD or Automated SDoD, as well as proactive curtailment based on environmental and weather conditions conducive to bird flight activity. Analysis of Martial Eagle tracking data has revealed strong correlations between flight activity and variables such as time of day, wind speed, and temperature. These correlations will be further refined prior to the wind farm becoming operational, also see section 5.8.7.1 for more information.
Sensitive Species 23: All WTGs within the modelled medium risk zone (see Section 6.5) would need to implement dynamic, real-time nocturnal curtailment.
Dynamic real-time habitat mapping and assessment for the species will need to be conducted every 7-14 days (semi-monthly) from October onward, using the latest satellite imagery, supplemented with on-site weather station rainfall and soil moisture data. This near real-time, dynamic modelling will generate a habitat suitability index by integrating rainfall (water levels), wetland saturation, and vegetation state. Vegetation state will consider both structural components influenced by grazing and burning, as well as seasonal productivity measured through remotely sensed habitat suitability time-series analysis. Structural assessments will be conducted using drone-derived Digital Terrain Model (DTMs), while productivity trends will be monitored across the growing season to capture phenological and productivity changes. When the dynamic habitat suitability index indicates favourable habitat conditions following the onset of late spring-early summer (October) rainfall, WTGs in the medium risk mitigation zone must be curtailed at night (from dusk until dawn). Habitat condition thresholds (favourable/unfavourable) derived from the dynamic habitat suitability index has been calibrated using observed species presence-absence datasets. This habitat condition tracking tool can be deployed in near real time and will issue notifications to the designated avifaunal specialist if favourable conditions are triggered via an online webapp.
Live-bird monitoring and carcass searches should be implemented in the operational phase to assess collision rates, as per the most recent edition of the Best Practice Guidelines at the time (Jenkins et al. 2015). Given the sensitivity of the site, live-bird monitoring should be conducted for at least the first 5 years of operation and be reassessed thereafter to determine the continued frequency of such monitoring as informed by a site-specific Biodiversity Management Plan. Carcass searches must be conducted annually for the lifespan of the facility to assess collision rates.
All wind turbines must have at least one blade painted according to a CAA approved pattern to reduce the risk of raptor collisions (Blade Patterning Guidelines 2024). See Appendix 12.
If at any time estimated collision rates to be determined by Collision Risk Modelling during the EIA phase of the project indicate unacceptable mortality levels of priority species, i.e., if during operation it exceeds these mortality thresholds, additional measures will have to be considered,

IMPACT PHASE: OPERATIONAL	
recommended by the specialist, and implemented timeously as part of an adaptive management strategy.	
Residual risk	A residual risk of mortality through collisions remains, however with appropriate mitigations measures detailed above the significance of this risk is expected to be medium.

IMPACT PHASE: OPERATIONAL						
Potential impact description: Mortality due to Collisions with Power Lines (132 kV)						
	Extent	Duration	Reversibility	Status	Magnitude	Probability
Without Mitigation	Local	Local Term	Irreversible	Negative	High	High
Score	2	4	5		4	4
With Mitigation	Local	Long term	Irreversible	Negative	Moderate	Moderate
Score	2	4	5		3	3
Significance Calculation			Without Mitigation		With Mitigation	
S=(E+D+R+M) *P			High		Moderate	
Can the impact be reversed?			No			
Will impact cause irreplaceable loss or resources?			No			
Can impact be avoided, managed, or mitigated?			Yes			

Mitigation measures to reduce residual risk or enhance opportunities:

- No turbines (including the rotor swept area) should be located in turbine exclusion zones as indicated in Section 6.5 of this report.
- Wind turbines (WTGs) located within the medium risk zones (as indicated in Section 6.5 of this report) must be subject to Shut Down on Demand (SDoD), either Observer SDoD or Automated SDoD, as well as proactive curtailment based on environmental and weather conditions conducive to bird flight activity. Analysis of Martial Eagle tracking data has revealed strong correlations between flight activity and variables such as time of day, wind speed, and temperature. These correlations will be further refined prior to the wind farm becoming operational, also see section 5.8.7.1 for more information.
- **Sensitive Species 23:** All WTGs within the modelled medium risk zone (see Section 6.5) would need to implement dynamic, real-time nocturnal curtailment.
    - Dynamic real-time habitat mapping and assessment for the species will need to be conducted every 7-14 days (semi-monthly) from October onward, using the latest satellite imagery, supplemented with on-site weather station rainfall and soil moisture data. This near real-time, dynamic modelling will generate a **habitat suitability index** by integrating rainfall (water levels), wetland saturation, and vegetation state. Vegetation state will consider both structural components influenced by grazing and burning, as well as seasonal productivity measured through remotely sensed habitat suitability time-series analysis. Structural assessments will be conducted using drone-derived Digital Terrain Model (DTMs), while productivity trends will be monitored across the growing season to capture phenological and productivity changes. When the dynamic habitat suitability index indicates favourable habitat conditions following the onset of late spring-early summer (October) rainfall, WTGs in the medium risk mitigation zone must be curtailed at night

IMPACT PHASE: OPERATIONAL	
(from dusk until dawn). Habitat condition thresholds (favourable/unfavourable) derived from the dynamic habitat suitability index has been calibrated using observed species presence-absence datasets. This habitat condition tracking tool can be deployed in near real time and will issue notifications to the designated avifaunal specialist if favourable conditions are triggered via an online webapp. • Live-bird monitoring and carcass searches should be implemented in the operational phase to assess collision rates, as per the most recent edition of the Best Practice Guidelines at the time (Jenkins et al. 2015). Given the sensitivity of the site, live-bird monitoring should be conducted for at least the first 5 years of operation and be reassessed thereafter to determine the continued frequency of such monitoring as informed by a site-specific Biodiversity Management Plan. Carcass searches must be conducted annually for the lifespan of the facility to assess collision rates. • **All wind turbines** must have at least **one blade painted according to a CAA approved pattern** to reduce the risk of raptor collisions (Blade Patterning Guidelines 2024). • If at any time estimated collision rates to be determined by Collision Risk Modelling during the EIA phase of the project indicate unacceptable mortality levels of priority species, i.e., if during operation it exceeds these mortality thresholds, additional measures will have to be considered, recommended by the specialist, and implemented timeously as part of an adaptive management strategy	
Residual impact	There will be a residual impact which is potentially of medium negative significance with the implementation of mitigation measures.

IMPACT PHASE: OPERATIONAL						
Potential impact description: Mortality due to Electrocutions (132kV OHL and/or Substation Yard)						
	Extent	Duration	Reversibility	Status	Magnitude	Probability
Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Moderate
Score	2	4	5		3	3
With Mitigation	Local	Longer term	Irreversible	Negative	Low	Low
Score	2	4	5		2	2

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M) *P	High	Moderate
Can the impact be reversed?	No	
Will impact cause irreplaceable loss or resources?	No	
Can impact be avoided, managed, or mitigated?	Yes	
Mitigation measures to reduce residual risk or enhance opportunities: • A bird-friendly pylon design should be used. • Additional mitigation in the form of insulating sleeves on jumper cables present on strain pylons and terminal pylons must be implemented. • Monitor the electrocution mortality in the substation complex. Apply additional mitigation if any SCC are electrocuted.		
Residual impact	There is a potential residual impact of low significance with mitigation.	

IMPACT PHASE: OPERATIONAL							
Potential impact description: Mortality due to Electrocution (internal 33 kV cables) (if any)							
	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	Local	Longer term	Irreversible	Negative	Low	Low	Local
Score	2	4	5		2	2	2
With Mitigation	Local	Short term	Reversible	Negative	Low	Low	Local
Score	2	2	1		2	2	2
Significance Calculation			Without Mitigation			With Mitigation	
S=(E+D+R+M) *P			Moderate			Low	
Can the impact be reversed?			No				
Will impact cause irreplaceable loss or resources?			No				
Can impact be avoided, managed, or mitigated?			Yes				
Mitigation measures to reduce residual risk or enhance opportunities: Underground cabling should be used as much as is practically and ecologically possible. If the use of overhead lines is unavoidable due to technical reasons, the Avifaunal Specialist must be consulted timeously to ensure that a bird-friendly pylon design is used, and that appropriate mitigation is implemented pro-actively for complicated pylon structures e.g., insulation of live components to prevent electrocutions on terminal structures and pole transformers. Regular inspections of the overhead sections of the internal reticulation network must be conducted during the operational phase to look for carcasses, as per the most recent edition of the Best Practice Guidelines at the time (Jenkins *et al.* 2015).							
Residual impact	There is a potential residual impact of low significance with mitigation.						

10.6.4 DECOMMISSIONING PHASE

IMPACT PHASE: DECOMMISSIONING						
Potential impact description: Displacement due to Disturbance: WEF						
	Extent	Duration	Reversibility	Status	Magnitude	Probability
Without Mitigation	Regional	Short term	Reversible	Negative	Moderate	Low
Score	3	2	1		3	2
With Mitigation	Local	Short term	Reversible	Negative	Low	Low
Score	2	2	1		2	2
Significance Calculation			Without Mitigation		With Mitigation	
S=(E+D+R+M) *P			Moderate negative impact		Moderate negative impact	
Can the impact be reversed?			Yes			
Will impact cause irreplaceable loss of resources?			No			

IMPACT PHASE: DECOMMISSIONING	
Can impact be avoided, managed, or mitigated?	Yes

Mitigation measures to reduce residual risk or enhance opportunities:

- A site specific EMPr must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere to the EMPr and should apply good environmental practice during construction.
- Dismantling activity should be restricted to the immediate footprint of the infrastructure as far as possible. Access to the remainder of the area should be strictly controlled to prevent unnecessary disturbance of priority species.
- Martial Eagle nest – A 2.5 km no disturbance buffer zone must be implemented around the nest. No dismantling activity should take place in this zone from March to December, which is the breeding season for these eagles.
- Measures to control noise and dust should be applied according to current best practice in the industry.
- No off-road driving should be allowed.

Residual impact	Yes, but acceptable (low significance) with mitigation

IMPACT PHASE: Decommissioning

Potential impact description: Displacement due to Disturbance: GRID

	Extent	Duration	Reversibility	Status	Magnitude	Probability
Without Mitigation	Regional	Short term	Reversible	Negative	Moderate	Low
Score	3	2	1		3	2
With Mitigation	Local	Short term	Reversible	Negative	Low	Low
Score	2	2	1		2	2

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M) *P	Moderate negative impact	Low negative impact
Can the impact be reversed?	Yes	
Will impact cause irreplaceable loss of resources?	No	
Can impact be avoided, managed, or mitigated?	Yes	

Mitigation measures to reduce residual risk or enhance opportunities:

- A site specific EMPr must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere to the EMPr and should apply good environmental practice during construction.
- Dismantling activity should be restricted to the immediate footprint of the infrastructure as far as possible. Access to the remainder of the area should be strictly controlled to prevent unnecessary disturbance of priority species.
- Martial Eagle nest – A 2.5 km no disturbance buffer zone must be implemented around the nest. No dismantling activity should take place in this zone from March to December, which is the breeding season for these eagles.
- Measures to control noise and dust should be applied according to current best practice in the industry.
- No off-road driving should be allowed.

Residual impact	Yes, but acceptable (low significance) with mitigation

10.7 BATS

Impacts to bats that are likely to occur because of the construction, operation and decommissioning of the wind energy facility and grid connection are identified and assessed in the following section. The unit of analysis against which impacts were assessed is the local bat community and their associated habitats within the PAOI. Impacts considered for assessment include habitat modification and disturbance, displacement, fatality due to collisions with wind turbine blades, and light pollution since these are the major impacts likely to be associated with the project (Kunz et al. 2007b, Cryan and Barclay 2009, Bará and C. Lima 2024, Voigt et al. 2024). For each impact, the respective mitigation measures were categorised into those aimed at first avoiding impacts, then minimising impacts, and finally restoring areas impacted.

10.7.1 CONSTRUCTION WEF

IMPACTS

Removal of native vegetation, noise and dust generated during construction activities, and the presence of new infrastructure in the landscape, will negatively and indirectly impact bats by removing habitat used for foraging and commuting, through disturbance, and displacement (Kunz et al. 2007b, Millon et al. 2015, Millon et al. 2018, Bennun et al. 2021, Leroux et al. 2022, Tolvanen et al. 2023).

Construction of WEF infrastructure could result in destruction (direct impact) of bat roosts (rocky crevices, buildings) and disturbance (indirect impact) of bat roosts potentially resulting in roost abandonment. Bat mortality can occur if roosts which contain bats are destroyed. Installation of new infrastructure in the landscape (e.g., buildings, turbines, road culverts) can provide new roosting spaces for some bat species, attracting them to areas with wind turbines and potentially increasing the likelihood of collisions.

MITIGATION (AVOID)

Habitat modification impacts can be avoided by buffering habitat and landscape features (Table 8) that bats use to spatially limit the potential for bats to interact with project infrastructure, and to avoid impacting key bat habitat (Barré et al. 2018, Leroux et al. 2022). All key habitat features were buffered by 200 m as per best practise (Rodrigues 2015, MacEwan et al. 2020b).

To align with regional conservation and integrated development planning, the Mpumalanga Biodiversity Sector Plan Handbook (MTPA 2014) was consulted to guide spatial risk in the AoI. The intention was to align biodiversity conservation policy objectives with renewable energy policy objectives, attempting to minimize trade-offs between conflicting goals (Jackson 2011, Gasparatos et al. 2017). The handbook includes a map of terrestrial areas that are important for conserving biodiversity and ecological processes – Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) respectively.

CBA Irreplaceable Areas were categorised as No-Go because the conservation goals for these areas are to maintain them in a natural state with no loss of ecosystems, functionality or species, and with no flexibility in land-use options (MTPA 2014). CBA optimal and areas with Highveld grassland were classified as high risk. Although the primary objective of the CBA optimal areas is to maintain these spaces in a natural state with no loss of ecosystems, functionality or species, some flexibility in land-use options is permitted (MTPA 2014), therefore these areas must be avoid as much as possible. The remaining areas were assigned low or medium risk where all infrastructure development should be prioritized. These included modified land, areas with invasive alien trees (plantations), ESA, and other Natural Areas. Similarly, in ecological supports areas (ESAs), the objective is to maintain habitats in a natural, or near-natural, state with limited loss of ecosystems or functionality. Hence, these areas were classified as medium risk, permitting the siting of turbines in these spaces.

All turbines will be subjected to a post-construction bat fatality monitoring program which will monitor residual impacts at turbines located in CBA optimal and ecological support areas, as well as turbines in low-risk areas. The results of this monitoring will inform management actions where needed to ensure alignment with the MTPA objectives to limit impacts to biodiversity.

TABLE 10-1 FEATURES USED TO ASSIGN SPATIAL RISK CATEGORIES IN THE AOI FOR BATS (CHIROPTERA)

Risk Level			
Low	Medium		
Heavily modified land	NPAES	CBA Optimal	CBA Irreplaceable Areas
Moderately modified land	ESA Landscape corridor	Highveld Grassland	Minor Watercourses (50 m buffer)
Cleared Invaded	ESA Local corridor		Farm Dams (200 m buffer)
Transformed	Other Natural Areas		Pan depressions (200m buffer)
Plantation/Invaded	Montane Grassland		Houses (200 m buffer)
			Buildings (200 m buffer)
			Seeps (200 m)
			CVB Wetlands (200 m)
			Rivers with floodplains (200 m buffer)
			Rocky Outcrops (200 m buffer)

No infrastructure (including O&M buildings) may be placed within buffered No-Go areas Figure 10-1). However, road infrastructure may need to be routed through sensitive areas for practical reasons. Existing road networks should be used as much as possible in these cases to limit the creation of additional roads which have known impacts on wildlife (Perumal et al. 2021).

Both of the O&M buildings are located within partially No-Go areas. The first area (Figure 10-2) is classified as No-Go based on its proximity to wetland habitat. This building must be microsited. The second O&M building is in an area classified as No-Go due to the presence of buildings which could be used by bats for roosting. These buildings must be surveyed to confirm if they are used by bats. If not, the buffer can be relaxed to a lower category. If bats are present, the O&M building must be relocated.

FIGURE 10-1 BUILDING (BLACK TRIANGLE) MUST BE SURVEYED FOR PRESENCE OF ROOSTING BATS TO DETERMINE POSITION OF O&M BUILDING

FIGURE 10-2 O&M BUILDING MUST BE MICROSITED TO NOT OVERLAP WITH NO-GO AREA (DARK RED)

To avoid bats roosting in new project infrastructure, all buildings must be properly sealed to prevent bats from roosting. If bats colonize these spaces, a suitably qualified bat ecologist must be engaged to remove them.

Disturbance effects can be avoided by restricting construction activities to daylight hours (i.e., no construction at night) and avoiding blasting near rocky outcrops.

MITIGATION (MINIMIZE AND RESTORE)

Modification and disturbance of bat habitat is likely to have species specific effects depending on species foraging guild, season, and distance to wind turbines (Barré et al. 2018, Leroux et al. 2022). For example, clutter edge species (e.g., Cape serotine) are more likely to be impacted by habitat modification given their greater association with physical habitat features compared to high-flying species (e.g., Egyptian free-tailed bat). As such, buffers may not be effective to fully remove all impacts.

Beyond avoidance, measures to minimize further impacts include minimizing the clearing of native vegetation, minimizing disturbance and destruction of rocky outcrops, and applying good construction abatement control practices to reduce emissions and pollutants (e.g., noise, erosion, waste) created during construction. Where native trees, rocky outcrops or buildings need to be removed (although this must be avoided), these features must be examined by a suitably qualified bat ecologist before construction commences to search for roosting bats. Following construction, all areas disturbed must be rehabilitated through native species planting within all areas under the projects control.

<table>
<tr><th colspan="6">IMPACT PHASE: CONSTRUCTION</th></tr>
<tr><td colspan="6">Nature of the impact: MODIFICATION & DISTURBANCE OF BAT HABITAT (ROOSTING, FORAGING, COMMUTING)</td></tr>
<tr><td colspan="6">Description of impact
Removal of native vegetation, noise and dust generated during construction activities, and the presence of new infrastructure in the landscape, will negatively and indirectly impact bats by removing habitat used for foraging and commuting, through disturbance, and displacement. Construction of WEF infrastructure could result in destruction and/or disturbance to bat roosts, and inadvertently provide new roosting spaces for some bat species in risky locations.</td></tr>
<tr><td></td><td>Extent (E)</td><td>Duration (D)</td><td>Reversibility (R)</td><td>Magnitude (M)</td><td>Probability (P)</td></tr>
<tr><td>Without Mitigation</td><td>1</td><td>1</td><td>3</td><td>2</td><td>2</td></tr>
<tr><td>With Mitigation</td><td>1</td><td>1</td><td>2</td><td>1</td><td>1</td></tr>
<tr><td>Significance Calculation</td><td colspan="3">Without Mitigation</td><td colspan="2">With Mitigation</td></tr>
<tr><td>S=(E+D+R+M)*P</td><td colspan="3">Low Negative Impact (14)</td><td colspan="2">Low Negative Impact (5)</td></tr>
<tr><td>Was public comment received?</td><td colspan="5">No</td></tr>
<tr><td>Has public comment been included in mitigation measures?</td><td colspan="5">No, no comments received</td></tr>
<tr><td colspan="6">Mitigation measures to reduce residual risk or enhance opportunities:
• Limit potential for bats to roost in project infrastructure (e.g., buildings, turbines) by ensuring they are properly sealed such that bats cannot gain access.
• No construction activities at night.
• No placement of infrastructure (except roads) in no-go areas.
• No blasting near rocky crevices.
• Minimize clearing of native vegetation
• Minimize disturbance and destruction of rocky outcrops, native trees and buildings, and where this is required, these features should be examined for roosting bats.
• Apply good construction abatement control practices to reduce emissions and pollutants (e.g., noise, erosion, waste) created during construction.
• Rehabilitate all areas disturbed during construction (including aquatic habitat).</td></tr>
<tr><td>Residual impact</td><td colspan="5">Residual impacts are likely to be minor although buffer distances have been shown to be ineffective at avoiding and minimizing risk to bats because these are two small for some species (Barré et al. 2018, Tolvanen et al. 2023).</td></tr>
</table>

10.7.2 OPERATIONAL WEF

IMPACTS

Bat mortality (direct impact) through collisions with wind turbine blades is the principal impact of wind energy facilities on bats during operation of the facility (Cryan and Barclay 2009, Arnett et al. 2016, Voigt et al. 2024). Displacement of bats from their preferred areas may also occur due to turbine noise emissions (Ellerbrok et al. 2024, Voigt et al. 2024).

MITIGATION (AVOID)

Collisions can be avoided by not placing wind turbines in the vicinity of bat habitats which for bats includes both physical landscape features themselves (near wetlands, vegetation etc.) and open airspace away from these features (Schnitzler et al. 2003). Risk of collision impact is related to bat morphology with fast flying, open-air species more likely to be impacted than low-flying species who forage closer to the ground, in edge spaces near vegetation, or in dense cluttered spaces (Schnitzler et al. 2003, Thaxter et al. 2017, Aronson 2022). Impacts to low-flying species can be further avoided by ensuring blades do not sweep close to ground level.

The species principally at collision risk from the proposed project are Cape serotine and Egyptian free-tailed bat since other species were recorded less often. High risk was identified for Cape serotine at ground level (represented by 10 m) at some locations (Table 3) but generally low risk at height (above 50 m). Activity is likely to decrease exponentially between these two heights (Wellig et al. 2018) meaning risk would decrease from high at 10 m to low at 50 m and above. The size of the rotor swept area should account for this because the lower the blades sweep the ground, the higher risk they will present to bats (Garvin et al. 2024). It is therefore recommended to maintain a minimum blade sweep of 30 m to avoid collision impacts as much as possible. There is limited published emperical evidence for this specific height but based on the activity of Cape serotine this is likely to be a reasonable height were risk would reduce from high to moderate or low. Collision impacts can also be avoided by not installing wind turbines within or adjacent to key bat habitats, and adhering to the No-Go buffers.

The specific turbine height assessed in this report has a 140 m hub height and 220 m rotor diameter, based on the minimum blade sweep of 30 m. This represents a likely hub height and the maximum blade length being applied for. This reports therefore assesses the worst-case scenario for bats; namely the largest rotor swept area. Should the turbine size change, the adjusted/blade tip buffers must be updated to account for any changes in the hub height or blade length. No turbines are within buffered areas and hence the turbine layout is acceptable in its current form.

Mitigation (Minimize and Restore)

For some high-flying species such as Egyptian free-tailed bat, the habitat or land use below does not generally influence their activity (Monadjem et al. 2020) which makes habitat based mitigations (e.g., buffers) less effective. This species was recorded at 50 m and 90 m, where median activity levels suggest high risk during autumn and spring (Table 5). Mitigation to avoid impacts to higher-flying species should include the choice of turbine design since this has the potential to influence bat fatality (Barclay et al. 2007) but the impact of turbine size on bat fatality is poorly understood. Generally, impacts to high-flying species should be avoided by limiting the size of the rotor swept area as much as practicable since they are active across much of the rotor swept zone.

However, due to the characteristics of the species present on site, i.e., high risk, open-air foraging species, residual impacts could occur since there is still likely to be a high degree of risky airspace even with a minimized rotor swept area. In addition, some bats may be attracted to turbines (Horn et al. 2008, Cryan and Barclay 2009, Richardson et al. 2021, Guest et al. 2022, Leroux et al. 2022) once installed and operational and therefore additional mitigation measures would be needed to minimize impacts.

The first additional mitigation measure to minimize residual collision impacts is the use of blade feathering to prevent free-wheeling of blades below the turbine cut-in speed. This has been shown to reduce bat fatality with the benefit of not impacting on energy production (Young et al. 2011, Good et al. 2012).

During operation, bat fatality monitoring must be undertaken to search for bat carcasses beneath wind turbines to measure the residual impact of the WEF on bats for a minimum of two years (Aronson et al. 2020). Mitigation measures that are known to further minimize bat fatality if needed based on the fatality monitoring results include curtailment and/or acoustic deterrents (Arnett et al. 2013, Romano et al. 2019, Weaver et al. 2020). These techniques must be used if post-construction fatality monitoring indicates that species fatality thresholds have been exceeded (MacEwan et al. 2018) to minimize impacts, maintain the impacts to bats within acceptable limits of change and prevent declines in the impacted bat population. The bat fatality thresholds for the project were determined based on area of influence of the turbines of 2,007 hectares. This was based on a minimum convex polygon around all turbines, plus an additional buffer around this space of 110 m corresponding to the turbine blade length. Based on the bat fatality threshold for the Highveld Grasslands ecoregion (MacEwan et al. 2018), the bat fatality threshold for the Emvelo project is 16 bats per least concern species.

A Biodiversity Management Plan (BMP) for bats must be developed by a bat ecologist before commencement of operation which includes the post-construction fatality monitoring plan design, fatality thresholds calculations and rationale, and an adaptive management response plan that provides a timeous action pathway for mitigation (e.g. curtailment or deterrents) should fatality thresholds be exceeded. Smart curtailment approaches which shut down turbines based on real time bat acoustic activity data are favoured over blanket curtailment because these will be less disruptive to turbine operation.

Since displacement of bats is likely driven by turbine noise, this can be minimized by serration of the back edges of the blade, by using a low-noise blade airfoil design or with blade trailing-edge brushes (Bošnjaković et al. 2024; Ellerbrok et al. 2024).

IMPACT PHASE: OPERATION					
Nature of the impact: BAT FATALITY					
Description of impact Bat mortality (direct impact) through collisions and/or barotrauma with wind turbine blades is the principal impact of wind energy facilities on bats.					
	Extent (E)	Duration (D)	Reversibility (R)	Magnitude (M)	Probability (P)
Without Mitigation	3	4	3	4	5

IMPACT PHASE: OPERATION					
With Mitigation	3	4	2	3	3

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	High Negative Impact (70)	Moderate Negative Impact (36)
Was public comment received?	No	
Has public comment been included in mitigation measures?	No, no comments received	

Mitigation measures to reduce residual risk or enhance opportunities:

- No placement of turbines and infrastructure (apart from associated infrastructure such as buildings, roads, MV cables and the OHPL) within no-go areas;
- Maintain a minimum blade sweep of 30 m to avoid impacts to lower flying bats such as clutter-edge species (e.g., Cape serotine, Natal long-fingered bat).
- Minimize the rotor diameter
- Feather blades to prevent free-wheeling below the turbine cut-in speed
- Implement post-construction fatality monitoring and apply smart curtailment or deterrents if fatality thresholds are exceeded.

Residual impact	Curtailment and deterrents can successfully reduce bat fatality (Arnett 2011, Arnett et al. 2016, Weaver et al. 2020), but not completely. Through the application of fatality thresholds, residual impacts should be minimized.

IMPACT PHASE: OPERATION

Nature of the impact: DISPLACEMENT

Description of impact
Avoidance of wind turbines by bats, in some cases over several hundred meters distance, has been observed for various species in different habitats, including farmland, resulting in displacement impacts (Tolvanen et al. 2023, Voigt et al. 2024). Displacement, likely caused by wind turbine operation (e.g., wake turbulences and noise emissions), tends to increase with the number and size of turbines.

	Extent (E)	Duration (D)	Reversibility (R)	Magnitude (M)	Probability (P)
Without Mitigation	3	4	3	3	3
With Mitigation	3	4	2	2	2

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	Moderate Negative Impact (39)	Low Negative Impact (22)
Was public comment received?	No	
Has public comment been included in mitigation measures?	No, no comments received	

Mitigation measures to reduce residual risk or enhance opportunities:

IMPACT PHASE: OPERATION	
• Reduce turbine noise emissions by serration of the back edges of the blade, by using a low-noise blade airfoil design or with blade trailing-edge brushes or similar (Bošnjaković et al. 2024; Ellerbrok et al. 2024).	
Residual impact	Residual impacts are likely to be minor although buffer distances have been shown to be ineffective at avoiding and minimizing risk to bats because these are two small for some species (Barré et al. 2018, Tolvanen et al. 2023).

10.7.3 DECOMMISSIONING PHASE WEF

IMPACTS

Impacts during the decommissioning phase will be indirect and involve disturbance to bats through excessive noise and dust, and damage to vegetation.

MITIGATION (AVOID)

Disturbance effects can be avoided by restricting decommissioning activities to daylight hours (i.e., no works at night).

MITIGATION (MINIMIZE AND RESTORE)

Disturbance can be minimized by applying good abatement control practices to reduce emissions and pollutants (e.g., noise, erosion, waste) created during decommissioning works. All areas disturbed must be rehabilitated through native species planting within all areas under the projects control.

IMPACT PHASE: DECOMMISSIONING					
Nature of the impact: DISTURBANCE OF BATS					
Description of impact Impacts during the decommissioning phase will be indirect and involve disturbance to bats through excessive noise and dust, and damage to vegetation.					
	Extent (E)	Duration (D)	Reversibility (R)	Magnitude (M)	Probability (P)
Without Mitigation	Site	Immediate	Recoverable	Moderate	Probable
Score	1	1	3	3	3
With Mitigation	Site	Immediate	Reversible	Low	Low probability
Score	1	1	1	2	2
Significance Calculation	Without Mitigation		With Mitigation		
S=(E+D+R+M)*P	Low Negative Impact (24)		Low Negative Impact (12)		
Was public comment received?	No				

IMPACT PHASE: DECOMMISSIONING	
Has public comment been included in mitigation measures?	No, no comments received
Mitigation measures to reduce residual risk or enhance opportunities: - No decommissioning activities at night. - Apply good abatement control practices to reduce emissions and pollutants (e.g., noise, erosion, waste) created during decommissioning activities. - Rehabilitate all areas disturbed during construction (including aquatic habitat).	
Residual impact	Residual impacts are likely to be minor since ceasing project activities on site is likely to benefit bats.

10.7.4 CONSTRUCTION OHPL

The direct impact of grid connection infrastructure is collisions with powerlines. Insectivorous bats are unlikely to collide with powerlines since they can avoid these obstacles using echolocation but fruit bats do collide with powerlines (Tella et al. 2020). The likelihood of occurrence for fruit bats species in the AoI is low. Indirect impacts include loss of habitat to construct substations and OHL pylons, and ecological light pollution (Longcore and Rich 2004).

IMPACT PHASE: CONSTRUCTION					
Nature of the impact: MODIFICATION & DISTURBANCE OF BAT HABITAT (ROOSTING, FORAGING, COMMUTING)					
Description of impact Vegetation clearing for grid connection infrastructure (access roads, substation buildings, pylons), as well as noise and dust generated during the construction phase, will impact bats by removing habitat used for foraging and commuting, through disturbance, and displacement (Kunz et al. 2007b, Millon et al. 2018, Bennun et al. 2021). This impact is likely to have species specific effects; clutter edge species (e.g., Cape serotine) are more likely to be impacted by habitat modification given their greater association with physical habitat features compared to high-flying species (e.g., Egyptian free-tailed bat). Construction of grid connection infrastructure could result in destruction (direct impact) of bat roosts (trees, buildings) and disturbance (indirect impact) of bat roosts potentially resulting in roost abandonment. Bat mortality can occur if roosts which contain bats are destroyed. Installation of new infrastructure in the landscape (e.g., buildings) can inadvertently provide new roosting spaces for some bat species, attracting them to areas with wind turbines and potentially increasing the likelihood of collisions.					
	Extent (E)	Duration (D)	Reversibility (R)	Magnitude (M)	Probability (P)
Without Mitigation	Site	Immediate	Recoverable	Low	Low probability
Score	1	1	3	2	2
With Mitigation	Site	Immediate	Recoverable	Very low	Improbable
Score	1	1	3	1	1
Significance Calculation	Without Mitigation			With Mitigation	
S=(E+D+R+M)*P	Low Negative Impact (14)			Low Negative Impact (6)	
Was public comment received?	No				

IMPACT PHASE: CONSTRUCTION	
Has public comment been included in mitigation measures?	No, no comments received

Mitigation measures to reduce residual risk or enhance opportunities:

- Limit potential for bats to roost in project infrastructure (e.g., buildings) by ensuring they are properly sealed such that bats cannot gain access.
- No construction activities at night.
- No placement of pylons within 200 m of key habitat features specifically including buildings, dams/wetlands, and rivers/streams. The OHL itself is permitted to cross over No-Go Areas for practical routing reasons but pylon positions must avoid No-Go Areas where feasible. Therefore the maximum possible span should be implemented to avoid the sensitive area while ensuring the technical feasibility of the development.
- No blasting near rocky crevices.
- The construction compounds, laydown areas, and batching plants must avoid No-Go areas.
- Minimize clearing of native vegetation
- Minimize disturbance and destruction of rocky outcrops, native trees and buildings, and where this is required, these features should be examined for roosting bats.
- Apply good construction abatement control practices to reduce emissions and pollutants (e.g., noise, erosion, waste) created during construction.
- Rehabilitate all areas disturbed during construction (including aquatic habitat).

Residual impact	Residual impacts are likely to be minor although buffer distances have been shown to be ineffective at avoiding and minimizing risk to bats because these are two small for some species (Barré et al. 2018, Tolvanen et al. 2023).

10.7.5 OPERATION PHASE OHPL

IMPACT PHASE: OPERATION

Nature of the impact: LIGHT POLLUTION

Description of impact
Construction of grid infrastructure will increase ecological light pollution from artificial lighting associated with the substation and other operational and maintenance buildings. Light pollution can alter ecological dynamics (Horváth et al. 2009). Lighting attracts and can cause direct mortality of insects, reducing the prey base for bats, especially bat species that are light-phobic. These species may also be displaced from previous foraging areas due to lighting. Other bat species forage around lights, attracted by higher numbers of insects. This may bring these species into the vicinity of the project and indirectly increase the risk of collision with wind turbines.

	Extent (E)	Duration (D)	Reversibility (R)	Magnitude (M)	Probability (P)
Without Mitigation	Regional	Long term	Recoverable	Medium	Probable
Score	3	4	3	3	3
With Mitigation	Regional	Long term	Reversible	Low	Low probability
Score	3	4	2	2	2

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	Moderate Negative Impact (39)	Low Negative Impact (22)
Was public comment received?	No	

IMPACT PHASE: OPERATION	
Has public comment been included in mitigation measures?	No, no comments received

Mitigation measures to reduce residual risk or enhance opportunities:

- No placement of substations and operational and maintenance buildings within no-go areas.
- Avoid excessive lighting
- Use of motion-sensor lighting, avoid sky-glow by using hoods and downward facing lighting, increase spacing between lighting units, and use low pressure sodium lights (Rydell 1992, Stone 2012).

Residual impact	Given the limited extent of light pollution currently in the region, the application of the above mitigation measures is likely to result in minor residual impacts.

10.7.6 DECOMMISSIONING PHASE OHPL

IMPACT PHASE: DECOMMISSIONING

Nature of the impact: DISTURBANCE OF BATS

Description of impact
Impacts during the decommissioning phase will be indirect and involve disturbance to bats through excessive noise and dust, and damage to vegetation.

	Extent (E)	Duration (D)	Reversibility (R)	Magnitude (M)	Probability (P)
Without Mitigation	Site	Immediate	Recoverable	Medium	Probable
Score	1	1	3	3	3
With Mitigation	Site	Immediate	Reversible	Low	Low probability
Score	1	1	2	2	2

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	Low Negative Impact (24)	Low Negative Impact (12)
Was public comment received?	No	
Has public comment been included in mitigation measures?	No, no comments received	

Mitigation measures to reduce residual risk or enhance opportunities:
- No decommissioning activities at night.
- Apply good abatement control practices to reduce emissions and pollutants (e.g., noise, erosion, waste) created during decommissioning activities.
- Rehabilitate all areas disturbed during construction (including aquatic habitat).

Residual impact	Residual impacts are likely to be minor since ceasing project activities on site is likely to benefit bats.

10.8 SOCIO-ECONOMIC

The key social issues identified during the study. The identification of key issues was based on:

- Review of project related information.

- Review of key policy and planning documents.
- Site visit and interviews with key stakeholders.
- Experience with similar projects.

10.8.1 CONSTRUCTION PHASE

Potential positive impacts

- Creation of employment and business opportunities.

Potential negative impacts

- Impacts associated with the presence of construction workers on local communities.
- Impacts related to the potential influx of jobseekers.
- Increased risks to livestock and farming infrastructure associated with the construction related activities and presence of construction workers on the site.
- Increased risk of grass fires associated with construction related activities.
- Nuisance impacts, such as noise, dust, and safety, associated with construction related activities and vehicles.
- Impact on productive farmland.

Impact Phase: Construction					
Nature: Creation of employment and business opportunities during the construction phase					
	Extent	**Duration**	**Magnitude**	**Reversibility**	**Probability**
Without Enhancement	Regional	Short term	Moderate	N/A	Probable
Score	3	2	3		3
With Enhancement	Regional	Short term	Moderate	N/A	Highly probable
Score	3	2			
Significance		Low (24)		Medium (32)	
Status		Positive		Positive	
Can impact be enhanced?		Yes			
Enhancement:					

Employment

- Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase.
- Where reasonable and practical, the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. However,

Impact Phase: Construction

due to the low skills levels in the area, most skilled posts are likely to be filled by people from outside the area.

- Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase.
- Where feasible, efforts should be made to employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria.
- Before the construction phase commences the proponent should meet with representatives from the MM to establish the existence of a skills database for the area. If such a database exists, it should be made available to the contractors appointed for the construction phase.
- The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that the proponent intends following for the construction phase of the project.
- The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.

Business

- The proponent should liaise with the MM with regards the establishment of a database of local companies, specifically BBBEE companies, which qualify as potential service providers (e.g., construction companies, catering companies, waste collection companies, security companies etc.) prior to the commencement of the tender process for construction service providers. These companies should be notified of the tender process and invited to bid for project-related work.

Note that while preference to local employees and companies is recommended, it is recognised that a competitive tender process may not guarantee the employment of local labour for the construction phase.

Residual impacts: Opportunity to up-grade and improve skills levels in the area.

The presence of construction workers poses a potential risk to family structures and social networks. While the presence of construction workers does not in itself constitute a social impact, the way construction workers conduct themselves can impact on local communities. The most significant negative impact is associated with the disruption of existing family structures and social networks. This risk is linked to potentially risky behaviour, mainly of male construction workers, including:

- An increase in alcohol and drug use.
- An increase in crime levels.
- The loss of partners to construction workers.
- An increase in teenage and unwanted pregnancies.
- An increase in prostitution.
- An increase in sexually transmitted diseases (STDs), including HIV.

The objective will be to source as many of the low and semi-skilled workers locally. These workers will be from the local community and form part of the local family and social networks. This will reduce the risk and mitigate the potential impacts on the local community. As indicated above, due to the presence of the mining and energy sectors, there are likely to suitably qualified personnel and companies in Ermelo that can provide the required services and products. Non-local workers are likely to be accommodated in Ermelo. Given the established energy and mining sectors the presence of contractors will not be unique to the area and Ermelo. The potential risk posed by non-local workers to the local community is therefore likely to be limited.

While the risks associated with construction workers at a community level are likely to be low with mitigation, at an individual and family level they may be significant, especially in the case of contracting a sexually transmitted disease or an unplanned pregnancy. However, given the nature of construction projects, it is not possible to totally avoid these potential impacts at an individual or family level.

Impact Phase: Construction					
Nature: Potential impacts on family structures and social networks associated with the presence of construction workers					
	Extent	**Duration**	**Magnitude**	**Reversibility**	**Probability**
Without Mitigation	Regional	Short term	Moderate	Recoverable	Probable
Score	3	2	3	3	3
With Mitigation	Regional	Short term	Moderate	Recoverable	Low Probable
Score	3	2	2	3	2
Significance		Medium (33)		Low (20)	
Status		Negative		Negative	
Can impact be mitigated?		Yes, to some degree. However, the risk cannot be entirely eliminated			

Mitigation:

- The proponent, in consultation with the MM should investigate the option of establishing a Monitoring Committee (MC) to monitor and identify potential problems that may arise during the construction phase.
- Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase.
- Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase.
- The SEP and CHSSP should include a Grievance Mechanism that enables stakeholders to report and resolve incidents.
- Where possible, the proponent should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories.

Impact Phase: Construction
• The proponent and contractor should develop a Code of Conduct (CoC) for construction workers. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be subject to appropriate disciplinary action and/or dismissed. All dismissals must comply with the South African labour legislation. The CoC should be signed by the proponent and the contractors before the contractors move onto site. The CoC should form part of the CHSSP. • The proponent and the contractor should implement an HIV/AIDS and Tuberculosis (TB) awareness programme for all construction workers at the outset of the construction phase. The programmes should form part of the CHSSP. • The contractor should provide transport for workers to and from the site on a daily basis. This will enable the contactor to effectively manage and monitor the movement of construction workers on and off the site. • The contractor must ensure that all construction workers from outside the area are transported back to their place of residence within 2 days for their contract coming to an end. • No construction workers, except for security personnel, should be permitted to stay overnight on the site.
Residual impacts: Impacts on family and community relations that may, in some cases, persist for a long period of time. Also, in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent residual/cumulative impacts on the affected individuals and/or their families and the community.

Large construction projects have the potential to attract people to the area in the hope that they will secure a job, even if it is a temporary job. These job seekers can in turn become "economically stranded" in the area or decide to stay on irrespective of finding a job or not. While the proposed project on its own does not constitute a large construction project, the establishment of a number of renewable energy projects in the area may attract job seekers to the area. As in the case of construction workers employed on the project, the actual presence of job seekers in the area does not in itself constitute a social impact. However, the way in which they conduct themselves can impact on the local community. The main areas of concern associated with the influx of job seekers include:

- Impacts on existing social networks and community structures.
- Competition for housing, specifically low-cost housing.
- Competition for scarce jobs.
- Increase in incidences of crime.

These issues are similar to the concerns associated with the presence of construction workers. Based on the findings of the SIA the potential for economically motivated in-migration and subsequent labour stranding is likely to be negligible. This is due to the relatively short duration of the construction phase. The risks associated with the influx of job seekers associated with the project are therefore likely to be low.

Impact Phase: Construction
Nature: Potential impacts on family structures, social networks and community services associated with the influx of job seekers

Impact Phase: Construction					
	Extent	**Duration**	**Magnitude**	**Reversibility**	**Probability**
Without Mitigation	Regional	Short term	Moderate	Recoverable	Probable
Score	3	2	1	3	3
With Mitigation	Regional	Short term	Very Low	Recoverable	Low Probable
Score	3	2	1	3	2
Significance		Low (27)		Low (18)	
Status		Negative		Negative	
Can impact be mitigated?		Yes, to some degree. However, the risk cannot be entirely eliminated			

Mitigation:

It is impossible to stop people from coming to the area in search of employment. However, as indicated above, the proponent should ensure that the employment criteria favour residents from the area. In addition:

- Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase.
- Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase.
- The proponent should implement a "locals first" policy, specifically regarding unskilled and low skilled opportunities.
- The proponent should implement a policy that no employment will be available at the gate.
- The contractor must ensure that all construction workers from outside the area are transported back to their place of residence within 2 days for their contract coming to an end.

Residual impacts: Impacts on family and community relations that may, in some cases, persist for a long period of time. Also, in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent residual/cumulative impacts on the affected individuals and/or their families and the community.

The presence on and movement of construction workers on and off the site poses a potential safety threat to local famers and farm workers in the vicinity of the site. In addition, farm infrastructure, such as fences and gates, may be damaged and stock losses may also result from gates being left open and/or fences being damaged, or stock theft linked either directly or indirectly to the presence of farm workers on the site.

Based on the comments from affected landowners stock theft, illegal hunting and arson were identified as key concerns. Security is therefore a key issue. The establishment of the WEF and the associated project related security (construction and operational phase) has the potential to improve security in the area and would represent a project benefit. This includes establishing a network of CCTV cameras along key access roads and intersections. Based on the interviews undertaken during the SIA the proponent has discussed security related matters with the affected landowners.

Impact Phase: Construction					
Nature: Potential risk to safety of farmers and farm workers, livestock and damage to farm infrastructure associated with the presence of construction workers on site					
	Extent	**Duration**	**Magnitude**	**Reversibility**	**Probability**
Without Mitigation	Local	Short term	Moderate	Recoverable	Probable
Score	2	2	3	3	3
With Mitigation	Site	Short term	Low	Recoverable	Low Probability
Score	1	2	2	3	2
Significance		Medium (30)		Low (16)	
Status		Negative		Negative	
Can impact be mitigated?		Yes			

Mitigation:

- The proponent should liaise with the local landowners and security companies and install CCTV cameras along key access roads in the study area.
- The proponent should enter into an agreement with the local farmers in the area whereby damages to farm property etc. during the construction phase will be compensated for. The agreement should be signed before the construction phase commences.
- The developer(s) and local farming community should co-ordinate (and if necessary, upgrade) security arrangements, such as establishment of security cameras at strategic locations (see above).
- All farm gates must be closed after passing through.
- Contractors appointed by the proponent should provide daily transport for low and semi-skilled workers to and from the site.
- The proponent should consider the option of establishing a MC (see above) that includes local farmers and develop a Code of Conduct for construction workers. The MC should be established prior to commencement of the construction phase. The Code of Conduct should be signed by the proponent and the contractors before construction activities commence.
- The proponent should hold contractors liable for compensating farmers and communities in full for any stock losses and/or damage to farm infrastructure that can be linked to

Impact Phase: Construction
construction workers. This should be contained in the Code of Conduct to be signed between the proponent, the contractors, and neighbouring landowners. The agreement should also cover loses and costs associated with fires caused by construction workers or construction related activities (see below). • The Environmental Management Programme (EMPr) must outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock if ingested. • Contractors appointed by the proponent must ensure that all workers are informed at the outset of the construction phase of the conditions contained in the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms. • Contractors appointed by the proponent must ensure that construction workers who are found guilty of stealing livestock and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation. • It is recommended that no construction workers, except for security personnel, should be permitted to stay over-night on the site.
Residual impacts: No, provided losses are compensated for.

The construction activities on site and movement of heavy construction vehicles during the construction phase has the potential to create noise and dust impacts, damage local roads and create safety impacts for other road users. The nuisance related impacts associated with the construction phase, including traffic related impacts associated with the transport of materials to the site, be effectively managed if the required mitigation measures are implemented. This includes ensuring that construction related activities are timed to minimise the impact on farming activities, specifically during the planting and harvesting season.

Impact Phase: Construction					
Nature: Potential noise, dust and safety impacts associated with movement of construction related activities and movement of traffic to and from the site					
	Extent	Duration	Magnitude	Reversibility	Probability
Without Mitigation	Local	Short term	Moderate	Recoverable	Probable
Score	2	2	3	3	3
With Mitigation	Site	Short term	Low	Recoverable	Low Probability
Score	1	2	2	3	2
Significance		Medium (30)		Low (16)	
Status		Negative		Negative	
Degree to which impact can be reversed		N/A for positive social/ socio-economic impacts			
Degree to which impact may cause irreplaceable loss of resources		N/A for positive social/ socio-economic impacts			
Can impact be mitigated?		Yes			
Mitigation: • Construction related activities should be timed to minimise the impact on farming activities, specifically during the planting and harvesting season.					

Impact Phase: Construction
• The movement of construction vehicles on the site should be confined to agreed access road/s. • Establishment of a Grievance Mechanism that provides local farmers and other road users with an effective and efficient mechanism to address issues related to construction related impacts, including damage to local gravel farm roads. • Damage to internal farm roads should be repaired during and on completion of the construction phase (within 1 month). • The movement of heavy vehicles associated with the construction phase should be timed to avoid times and days of the week, such as weekends, when the volume of traffic travelling along the access roads may be higher. • Dust suppression measures should be implemented, such as wetting on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. All vehicles must be road worthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.
Residual impacts: No, provided losses are compensated for.

The presence of construction workers and construction-related activities on the site poses an increased risk of grass fires that could, in turn pose, a threat to livestock, crops, wildlife and farm infrastructure. The local landowners indicated that grass fires were a key risk given that the area is susceptible to grass fires during the winter months (May-October) and that the veld can take several years to recover to full productivity. Grass fires represent a key risk to livelihoods given the importance to livestock farming in the area. Grass fires also pose a risk to plantations.

Impact Phase: Construction

Nature: Potential loss of livestock and grazing and damage to farm infrastructure associated with increased incidence of grass fires

	Extent	**Duration**	**Magnitude**	**Reversibility**	**Probability**
Without Mitigation	Local	Short term	Moderate	Reversible with compensation	Probable
Score	2	2	3	3	3
With Mitigation	Local	Short term	Low	Reversible with compensation	Low Probability
Score	1	2	2	3	2
Significance		Medium (30)		Low (16)	
Status		Negative		Negative	
Can impact be mitigated?		Yes			

Impact Phase: Construction
Mitigation: • The proponent should become a member of the local firefighting association. • The proponent should enter into an agreement with the local farmers in the area whereby damages to farm property etc., during the construction phase will be compensated for. The agreement should be signed before the construction phase commences. • Contractor should ensure that open fires on the site for cooking or heating are not allowed except in designated areas. • Smoking on site should be confined to designated areas. • Contractor should ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high-risk dry, windy winter months. • Contractor should provide adequate fire-fighting equipment on-site. • Contractor should provide fire-fighting training to selected construction staff. • No construction staff, except for security staff, to be accommodated on site overnight. • As per the conditions of the Code of Conduct, in the advent of a fire being caused by construction workers and or construction activities, the appointed contractors should compensate farmers for damage caused to their farms.
Residual impacts: No, provided losses are compensated for.

The activities associated with the construction phase and establishment of the proposed project and associated infrastructure will result in the disturbance and loss of land available for crops and grazing. However, experience from other WEFs is that impact on farming operations can be effectively minimised and mitigated by careful planning in the final layout of the proposed WEF and associated components.

Based on the review of the proposed layout it appears that footprint impacts (long term and and/ or temporary) on productive farming areas are limited and associated with re relatively small number of wind turbines. The potential impacts on dryland cropping areas are associated with the turbines 4-7. The impacts associated with 4-7 are relatively marginal. Turbines 4 and 5 could be repositioned 150 m to east into veld to avoid impacts. The owner of Schiedam 274/2 (Randall) indicated that the location of turbine 17 was not acceptable. The option of locating the turbine in open veld to the west would mitigate the impact.

The owner of Schiedam 274/2 (Randall) also indicated that turbines 14, 15, 16 and 17 posed a potential risk to the operation of the landing strip on his property. Turbine 18 on the Sheepmoor WEF is located 2-3 km west of the airstrip. The owner has indicated that either the relevant Emvelo turbines or the single Sheepmoor turbine (18) would need to be relocated to avoid the impact on the airfield (Randall, pers. comm).

Mr Randall also proposed an alternative road off the Bankplaas gravel road, directly onto the southern site via Schiedam 274/2. This would avoid impacts on non-Emvelo properties. Mr Randall also proposed that the O&M site on 274/2 be moved closer to the Bankplaas Road.

The potential issues raised by affected landowners can be addressed by micro re-siting of the identified turbines in consultation with owners. Mitigation measures would involve locating the relevant turbines closer to field borders and avoiding access roads that cut across cropping areas where possible.

The impact on farmland associated with the construction phase can also be mitigated by minimising the footprint of the construction related activities and ensuring that disturbed areas are fully rehabilitated on completion of the construction phase. Recommended mitigation measures are outlined below. The timing / phasing on construction activities should where possible also be planned to avoid and or minimise disruption to farming operations. Affected landowners should be involved in planning of timing of construction activities.

The transmission grid alternatives (all four alternatives) all cross Meyer estate. The line would extend the existing Eskom corridor by 50 m to the north. The owner has indicated that he does not support the establishment of the transmission line over his property.

Impact Phase: Construction					
Nature: The activities associated with the construction phase, such as establishment of access roads and the construction camp, movement of heavy vehicles and preparation of foundations for the project etc. will damage farmlands and result in a loss of farmlands for grazing.					
	Extent	**Duration**	**Magnitude**	**Reversibility**	**Probability**
Without Mitigation	Local	Short term	Moderate	Reversible with compensation and rehabilitation	Highly Probable
Score	2	2	3	3	4
With Mitigation	Local	Short term	Low	Reversible with compensation and rehabilitation	Probable
Score	1	2	2	3	3
Significance		Medium (40)		Low (24)	
Status		Negative		Negative	
Can impact be mitigated?		Yes			

Mitigation:

The potential impacts associated with damage to, and loss of farmland can be effectively mitigated. The aspects that should be covered include:

- The proponent should, in consultation with the owner of Schiedam 274/2 investigate the opportunity to micro-site turbines 4, 5, 6, 7 and associated access roads, and the O&M site on Schiedam 274/2.

Impact Phase: Construction
• The proponent should, in consultation with the owner of Schiedam 274/2 discuss the impact on wind turbines on the landing strip on Schiedam 274/2. • An Environmental Control Officer (ECO) should be appointed to monitor the construction phase. • Existing internal roads should be used where possible. If new roads are required, these roads should be rehabilitated on completion of the construction phase. • The footprint associated with the construction related activities (access roads, construction camps, workshop etc.) should be minimised. • All areas disturbed by construction related activities, such as access roads on the site, construction camps etc., should be rehabilitated at the end of the construction phase. • The implementation of a rehabilitation programme should be included in the terms of reference for the contractor/s appointed. The specifications for the rehabilitation programme should be included in the EMPr. • The implementation of the Rehabilitation Programme should be monitored by the ECO.
Residual impacts: If damage to and or loss of productive land is not avoided and or minimised can impact on viability of farming operations and livelihoods.

10.8.2 OPERATIONAL PHASE

The following key social issues are of relevance to the operational phase:

Potential positive impacts

- The establishment of infrastructure to improve energy security and support renewable sector.
- Creation of employment opportunities.
- Benefits to the affected landowners.
- Benefits associated with the socio-economic contributions to community development.

Potential negative impacts

- Visual impacts and associated impacts on sense of place.
- Impact on property values.
- Impact on tourism.

Impact Phase: Operation

Nature: Development of infrastructure to improve energy security and support renewable sector

	Extent	**Duration**	**Magnitude**	**Reversibility**	**Probability**
Without Mitigation	Local, Regional and National	Long term	High	N/A	Highly Probable

Impact Phase: Operation					
Score	4	4	4		4
With Mitigation	Local, Regional and National	Long term	High	N/A	Definite
Score	4	4	4		5
Significance		Moderate (48)		High (60)	
Status		Negative		Positive	
Can impact be enhanced?		Yes			

Enhancement

- Implement a skills development and training programme aimed at maximizing the number of employment opportunities for local community members.
- Maximise opportunities for local content, procurement, and community shareholding.

Residual impacts: Overall reduction in CO2 emission, reduction in water consumption for energy generation, contribution to the development of the renewable energy sector in South Africa and benefit for economic development and investment.

Impact Phase: Operation

Nature: Creation of employment, skills development and business opportunities associated with the operational phase

	Extent	**Duration**	**Magnitude**	**Reversibility**	**Probability**
Without Mitigation	Local and Regional	Long term	Low	N/A	Low Probability
Score	1	4	2		2
With Enhancement	Local and Regional	Long term	Moderate	N/A	Highly Probable
Score	2	4	3		4
Significance		Low (14)		Medium (36)	
Status		Positive		Positive	
Can impact be mitigated?		Yes			

Impact Phase: Operation
Enhancement: • Where reasonable and practical, the proponent should implement a 'locals first' policy, especially for semi and low-skilled job categories. • Where feasible, efforts should be made to employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria. • Where feasible, training and skills development programmes for locals should be initiated as part of the operational phase. The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. Business • The proponent should liaise with the MM with regards the establishment of a database of local companies, specifically BBBEE companies, which qualify as potential service providers for the operational phase. Note that while preference to local employees and companies is recommended, it is recognised that a competitive tender process may not guarantee the employment of local labour for the operational phase.
Residual impacts: Creation of permanent employment and skills and development opportunities for members from the local community and creation of additional business and economic opportunities in the area.

Impact Phase: Operation					
Nature: The generation of additional income represents a significant benefit for the local affected farmer(s) and reduces the risks to their livelihoods posed by droughts and fluctuating market prices for sheep and farming inputs, such as feed etc. Security measures associated with the project will also benefit local landowners.					
	Extent	**Duration**	**Magnitude**	**Reversibility**	**Probability**
Without Mitigation	Local and Regional	Long term	Low	N/A	Probability
Score	1	4	2		3
With Enhancement	Local and Regional	Long term	Moderate	N/A	Definite
Score	2	4	3		5
Significance		Low (21)		Medium (45)	
Status		Positive		Positive	
Can impact be mitigated?		Yes			
Enhancement:					

Impact Phase: Operation

- The proponent should liaise with the local landowners and security companies and install CCTV cameras along key access roads in the study area.
- Implement agreements with affected landowners.

Residual impacts: Support for local agricultural sector and farming

Impact Phase: Operation

Nature: Benefits associated with support for local community's form SED contributions

	Extent	**Duration**	**Magnitude**	**Reversibility**	**Probability**
Without Mitigation	Regional	Long term	Moderate	N/A	High Probability
Score	3	4	3		4
With Enhancement	National	Long term	High	N/A	Definite
Score	4	4	4		5
Significance		Medium (40)		High (60)	
Status		Positive		Positive	
Reversibility		N/A			
Can impact be enhanced?		Yes			

Enhancement:

- The proponents should liaise with the MM to identify projects that can be supported by SED contributions.
- Clear criteria for identifying and funding community projects and initiatives in the area should be identified. The criteria should be aimed at maximising the benefits for the community as a whole and not individuals within the community.
- Strict financial management controls, including annual audits, should be instituted to manage the SED contributions.

Residual impacts: Promotion of social and economic development and improvement in the overall well-being of the community

Impact Phase: Operation					
Nature: Visual impact associated with the proposed facility and associated infrastructure and the potential impact on the areas rural sense of place.					
	Extent	**Duration**	**Magnitude**	**Reversibility**	**Probability**
Without Mitigation	Regional	Long term	High	Reversible with rehabilitation	Definite
Score	3	4	4	3	5
With Mitigation	Regional	Long term	Moderate	Reversible with rehabilitation	Highly Probable
Score	3	4	4	3	5
Significance		High (70)		Medium (56)	
Status		Negative		Negative	
Can impact be mitigated?		Yes, but opportunities are limited			
Mitigation: • The recommendations contained in the VIA should be implemented. • Install radar activated civil aviation light system.					
Residual impacts: Potential impact on current rural sense of place					

Impact Phase: Operation					
Nature: Visual impact associated with the proposed facility and associated potential impact on property values.					
	Extent	**Duration**	**Magnitude**	**Reversibility**	**Probability**
Without Mitigation	Local	Long term	Low	N/A	Low Probability
Score	2	4	2		2
With Mitigation	Local	Long term	Low	N/A	Low Probability

Impact Phase: Operation					
Score	1	4	2		2
Significance		Low (16)		Low (14)	
Status		Negative		Negative	
Can impact be mitigated?		Yes			

Mitigation:

- The recommendations contained in the VIA should be implemented.
- Install radar activated civil aviation light system.

Residual impacts: Potential impact on current rural sense of place and property values

Impact Phase: Operation					
Nature: Potential impact of the WEF on local tourism operations and activities					
	Extent	**Duration**	**Magnitude**	**Reversibility**	**Probability**
Without Mitigation	Local	Long term	Very Low	N/A	Low Probability
Score	2	4	1		2
With Mitigation	Local	Long term	Very Low	N/A	Low Probability
Score	2	4	1		2
Significance		Low (14)		Low (14)	
Status		Negative		Negative	
Can impact be mitigated?		Yes			

Mitigation:

- The recommendations contained in the VIA should be implemented.
- Install radar activated civil aviation light system.

Residual impacts: Potential impact on current rural sense of place and future tourism opportunities in the area.

10.8.3 DECOMMISSIONING PHASE

Typically, the major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income. This has implications for the households who are directly affected, the communities within which they live, and the relevant local authorities. However, in the case of the proposed facility the decommissioning phase is likely to involve the disassembly and replacement of the existing components with more modern technology. This is likely to take place in the 20 - 25 years post commissioning . The decommissioning phase is therefore likely to create additional construction type jobs, as opposed to the jobs losses typically associated with decommissioning. The number of people employed during the operational phase will be in the region of 20. Given the low number of people employed during the operational phase the decommissioning of the facility will not have a significant negative social impact on the local community. The potential impacts associated with the decommissioning phase can also be effectively managed with the implementation of a retrenchment and downscaling programme. The decommissioning phase will also create employment opportunities. This will represent a positive impact. These jobs will, however, be temporary.

Impact Phase: Decommissioning					
Nature: Social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income					
	Extent	**Duration**	**Magnitude**	**Reversibility**	**Probability**
Without Mitigation	Local	Short term	Moderate	Recoverable	Highly Probable
Score	1	2	3	3	4
With Mitigation	Local	Short term	Low	Recoverable	Probable
Score	1	2	2	3	3
Significance		Medium (36)		Moderate (24)	
Status		Negative		Negative	
Can impact be mitigated?		Yes			
Mitigation: • The proponent should ensure that retrenchment packages are provided for all staff retrenched when the WEF is decommissioned.					
Residual impacts: Loss of income and employment.					

10.9 HERITAGE, ARCHAEOLOGY AND PALAEONTOLOGY

10.9.1 CONSTRUCTION, OPERATION AND DECOMMISIONING

Impact Phase: Construction/ Operation/Decommissioning						
Potential impact description: Graves/Cemeteries Any construction activity near human graves has the possibility of disturbing the remains. There may be more subsurface graves with no demarcation.						
	Magnitude	Extent	Duration	Status	Probability	Reversibility
Without Mitigation	Low	Local	Short term	Negative	Low probability	Irreversible
Score	2	2	2		2	5
With Mitigation	Low	Local	Short term	Negative	Low probability	Irreversible
Score	2	2	2		2	5
Significance Calculation			Without Mitigation		With Mitigation	
S=(E+D+R+M)*P			Low (22)		Low (22)	
Can the impact be reversed?			N/A			
Will impact cause irreplaceable loss or resources?			There is no impact			
Can impact be avoided, managed or mitigated?			YES			
Mitigation measures to reduce residual risk or enhance opportunities: No graves nor cemeteries will be affected as no activity will occur near these sites						
Residual impact	high negative impact if no mitigation occur					

Impact Phase: Construction/ Operation/Decommissioning						
Potential impact description: 20th century settlements without graves Abandoned settlements with no visible structures are destroyed						
	Magnitude	Extent	Duration	Status	Probability	Reversibility
Without Mitigation	Low	Local	Short term	Neutral	Low probability	N/A
Score	2	2	2		2	
With Mitigation	Low	Local	Short team	Neutral	Low probability	N/A
Score	2	2	2		2	
Significance Calculation			Without Mitigation		With Mitigation	
S=(E+D+R+M)*P			Low (22)		Low (20)	

Can the impact be reversed?	N/A
Will impact cause irreplaceable loss or resources?	There is no impact.
Can impact be avoided, managed or mitigated?	YES
Mitigation measures to reduce residual risk or enhance opportunities: None of the recorded sites are to be destroyed.	
Residual impact	Yes, but acceptable as of low negative significance

Impact Phase: Construction/ Operation/Decommissioning						
Potential impact description: 20th century settlements with graves Abandoned settlements with graves and no visible structures are destroyed						
	Magnitude	Extent	Duration	Status	Probability	Reversibility
Score	2	2	2		2	
With Mitigation	Low	Local	Short Term	Negative	Low probability	N/A
Score	2	2	2		2	5
Score	2	2	2		2	
Significance Calculation			Without Mitigation		With Mitigation	
S=(E+D+R+M)*P			Low (22)		Low (22)	
Can the impact be reversed?			N/A			
Will impact cause irreplaceable loss or resources?			There is no impact.			
Can impact be avoided, managed or mitigated?			YES			
Mitigation measures to reduce residual risk or enhance opportunities: None of the recorded sites are to be destroyed.						
Residual impact	Yes, but acceptable as of low negative significance,					

Impact Phase: Construction/ Operation/Decommissioning						
Potential impact description: Late Iron Age settlements						
	Magnitude	Extent	Duration	Status	Probability	Reversibility
Without Mitigation	Low	Local	Short term	Positive	Low probability	Irreversible
Score	2	2	2		2	5
With Mitigation	Low	Local	Long term	positive	Low probability	Irreversible
Score	2	2	2		2	5
Significance Calculation		Without Mitigation		With Mitigation		
S=(E+D+R+M)*P		Low (22)		Low (22)		
Can the impact be reversed?		N/A				
Will impact cause irreplaceable loss or resources?		There is no Impact				
Can impact be avoided, managed or mitigated?		YES. Salvage excavations				
Mitigation measures to reduce residual risk or enhance opportunities: None of the recorded sites are to be destroyed						
Residual impact		Yes, but acceptable as of low positive significance				

Impact Phase: Construction/ Operation/Decommissioning						
Potential impact description: Ruins Ruins are protected by the NHA if they are older than 60 years in age. Loss of vernacular architecture Loss of historical middens						
	Magnitude	Extent	Duration	Status	Probability	Reversibility
Without Mitigation	Low	Local	Long term	positive	Low probability	Irreversible
Score	2	2	4		2	5
With Mitigation	Low	Local	Long term	positive	Low probability	Irreversible
Score	2	2	4		2	5
Significance Calculation		Without Mitigation		With Mitigation		
S=(E+D+R+M)*P		Low (22)		Low Impact (22)		
Can the impact be reversed?		N/A				
Will impact cause irreplaceable loss or resources?		There is no impact				

Can impact be avoided, managed or mitigated?	YES
Mitigation measures to reduce residual risk or enhance opportunities: • None of the recorded sites are to be destroyed.	
Residual impact	Yes, but acceptable as of medium negative significance

Impact Phase: Construction/ Operation/Decommissioning						
Potential impact description: isolated stone walled kraals Built structure to be damaged						
	Magnitude	Extent	Duration	Status	Probability	Reversibility
Without Mitigation	High	Local	Long Term	Negative	Low probability	Reversible
Score	2	2	4		2	5
With Mitigation	Low	Local	Long term	positive	Low probability	Irreversible
Score	2	2	4		2	5
Significance Calculation			Without Mitigation		With Mitigation	
S=(E+D+R+M)*P			Low (22)		Low (22)	
Can the impact be reversed?			N/A			
Will impact cause irreplaceable loss or resources?			There is no impact			
Can impact be avoided, managed or mitigated?			YES			
Mitigation measures to reduce residual risk or enhance opportunities: None of the recorded sites are to be destroyed.						
Residual impact			Yes, but acceptable as of low negative significance			

Impact Phase: Construction/ Operation/Decommissioning						
Potential impact description: Paeolontology Fossils could be disturbed						
	Magnitude	Extent	Duration	Status	Probability	Reversible
Without Mitigation	Low	Local	Long term	Negative	Low probability	Reversible
	2	2	4	-	2	1
With Mitigation	Low	Local	Long term	positive	Low probability	Reversible
	2	2	4	-	2	1
Significance Calculation			Without Mitigation		With Mitigation	
S=(E+D+R+M)*P			Low negative Impact (18)		Low positive Impact (18)	

Can the impact be reversed?	YES. Fossils could be reconstructed
Will impact cause irreplaceable loss or resources?	YES. Fossils could be reconstructed
Can impact be avoided, managed or mitigated?	YES. Chance Find Protocol
Mitigation measures to reduce residual risk or enhance opportunities: • Chance Find protocol.	
Residual impact	Yes, but acceptable as of low negative significance

10.9.2 CUMULATIVE PHASE

Impact Phase: Cumulative						
Potential impact description: Graves/Cemeteries Any construction activity near human graves has the possibility of disturbing the remains. There may be more subsurface graves with no demarcation.						
	Magnitude	Extent	Duration	Status	Probability	Reversible
Without Mitigation	Low	Local	Short Term	Neutral	Low probability	Irreversible
Score	2	2	2		2	5
With Mitigation	Low	Local	Short term	Neutral	Low probability	Irreversible
Score	2	2	2		2	5
Significance Calculation		Without Mitigation			With Mitigation	
S=(E+D+R+M)*P		Low positive Impact (22)			Low positive Impact (22)	
Can the impact be reversed?		No. they are a finite resource. reburial is not an option				
Will impact cause irreplaceable loss or resources?		Yes. they are a finite resource				
Can impact be avoided, managed or mitigated?		YES				
Mitigation measures to reduce residual risk or enhance opportunities: Cannot be affected. • 50m buffer from the edge. • 20m visible demarcation if within 100m						
Residual impact	high negative impact					

Impact Phase: Cumulative
Potential impact description: 20th century settlements without graves Detailed description of impact Abandoned settlements with no visible structures are destroyed

	Severity	Extent	Duration	Status	Probability	Reversibility
Without Mitigation	Low	Local	Short Term	Neutral	Low probability	Irreversible
Score	2	2	2		2	5
With Mitigation	Low	Local	Short term	Neutral	Low probability	Irreversible
Score	2	2	2		2	5

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	Low neutral Impact (22)	Low neutral Impact (22)
Can the impact be reversed?	No.	
Will impact cause irreplaceable loss or resources?	YES. No. They are a finite resource	
Can impact be avoided, managed or mitigated?	YES	
Mitigation measures to reduce residual risk or enhance opportunities: Once no graves are confirmed, then may be destroyed if the PPP has been approved.		
Residual impact	Yes, but acceptable as of low negative significance	

Impact Phase: Cumulative
Potential impact description: 20th century settlements with graves Abandoned settlements with graves and no visible structures are destroyed

	Magnitude	Extent	Duration	Status	Probability	Irreversible
Without Mitigation	High	Local	Long term	Negative	Low probability	Irreversible
Score	4	2	4	-	2	5
With Mitigation	Low	Local	Short term	Positive	Low probability	Irreversible
Score	2	2	2	-	2	5

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	Low positive Impact (22)	Low positive Impact (22)
Can the impact be reversed?	No. They are finite resource	
Will impact cause irreplaceable loss or resources?	YES. They are finite resource	
Can impact be avoided, managed or mitigated?	YES	
Mitigation measures to reduce residual risk or enhance opportunities:		

- Graves cannot be affected
- 50m buffer from the edge
- 20m visible demarcation if within 100m.

Residual impact	(for example: Yes, but acceptable as of low negative significance, or Yes, unacceptable high negative impact)

Impact Phase: Cumulative						
Potential impact description: Palaeontology Fossils could be disturbed						
	Magnitude	Extent	Duration	Status	Probability	Irreversible
Without Mitigation	Low	Local	Long term	Negative	Low probability	Reversible
Score	2	2	4		2	1
With Mitigation	Low	Local	Long term	positive	Low probability	Reversible
Score	2	2	4		2	1
Significance Calculation			Without Mitigation		With Mitigation	
S=(E+D+R+M)*P			Low negative Impact (18)		Low positive Impact (18)	
Can the impact be reversed?			YES. Fossils could be reconstructed			
Will impact cause irreplaceable loss or resources?			YES. Fossils could be reconstructed			
Can impact be avoided, managed or mitigated?			YES. Chance Find Protocol			
Mitigation measures to reduce residual risk or enhance opportunities: Chance Find protocol.						
Residual impact	Yes, but acceptable as of low negative significance					

Impact Phase: Cumulative						
Potential impact description: Late Iron Age settlements Detailed description of impact Archaeological site may be destroyed						
	Magnitude	Extent	Duration	Status	Probability	Irreversible
Without Mitigation	Moderate	Local	long term	Negative	Low probability	Irreversible
Score	3	2	2		2	5
With Mitigation	Low	Local	Long term	positive	Low probability	Irreversible
Score	2	2	2		2	5
Significance Calculation			Without Mitigation		With Mitigation	

S=(E+D+R+M)*P	Low	Low
Can the impact be reversed?	NO. Finite resource	
Will impact cause irreplaceable loss or resources?	YES. Finite resource	
Can impact be avoided, managed or mitigated?	YES. Salvage excavations	

Mitigation measures to reduce residual risk or enhance opportunities:
- Sites may be excavated
- PPP to ensure there are no claimants

Residual impact	(Yes, but acceptable as of low positive significance

Impact Phase: Cumulative

Potential impact description: Ruins
Ruins are protected by the NHA if they are older than 60 years in age.
Loss of vernacular architecture
Loss of historical middens

	Magnitude	Extent	Duration	Status	Probability	Significance Confidence
Without Mitigation	High	Local	Long term	Negative	Low probability	Irreversible
	4	2	4		2	5
With Mitigation	Low	Local	Long term	positive	Low probability	Irreversible
	2	2	4		2	5

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	Low	Low
Can the impact be reversed?	NO. It is a finite resource	
Will impact cause irreplaceable loss or resources?	YES. It is a finite resource	
Can impact be avoided, managed or mitigated?	YES	

Mitigation measures to reduce residual risk or enhance opportunities:
Should not be affected.
Middens may need to be sampled or excavated
Buildings need to be assessed by Built Environment specialist to determine architectural value
Will require mapping, photography if affected

Residual impact	Yes, but acceptable as of medium negative significance

Impact Phase: Cumulative

Potential impact description: isolated stone walled kraals
Built structure to be damaged

	Magnitude	Extent	Duration	Status	Probability	Significance Confidence
Without Mitigation	High	Local	Long term	Negative	Low probability	Reversible
Score	4	2	4		2	1
With Mitigation	Low	Local	Long term	positive	Low probability	Reversible
Score	2	2	4		2	1

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	Low	Low
Can the impact be reversed?	YES, Rebuild the structure elsewhere	
Will impact cause irreplaceable loss or resources?	YES. If is a finite resource	
Can impact be avoided, managed or mitigated?	YES	

Mitigation measures to reduce residual risk or enhance opportunities:
mapped and photographed
requires a permit

Residual impact	Yes, but acceptable as of low negative significance

Impact Phase: Cumulative

Potential impact description: farm buildings
Cultural landscape
Vernacular architecture
Historical buildings
Historical middens
Requires assessment by built environment specialist if to be damaged.

	Magnitude	Extent	Duration	Status	Probability	Significance Confidence
Without Mitigation	High	Local	Long term	Negative	Low probability	Reversible
Score	4	2	4		2	1
With Mitigation	Low	Local	Long term	positive	Low probability	Reversible
Score	2	2	4		2	1

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	Low	Low
Can the impact be reversed?	YES. Buildings could be rebuilt	

Will impact cause irreplaceable loss or resources?	YES. It is a finite resource
Can impact be avoided, managed or mitigated?	YES. Avoid the buildings and mitigate
Mitigation measures to reduce residual risk or enhance opportunities: • Should not be affected. • Middens may need to be sampled or excavated • Mapped and photographed • Requires assessment from Built Environment specialist • Will require a permit if to be damaged.	
Residual impact	Yes, acceptable low negative impact

Impact Phase: Cumulative						
Potential impact description: Palaeontology Fossils could be disturbed						
	Severity	Extent	Duration	Status	Probability	Significance Confidence
Without Mitigation	Low	Local	Long term	Negative	Low probability	Reversible
Score	2	2	4		2	1
With Mitigation	Low	Local	Long term	positive	Low probability	Reversible
Score	2	2	4		2	1
Significance Calculation			Without Mitigation		With Mitigation	
S=(E+D+R+M)*P			Low		Low	
Can the impact be reversed?			YES. Fossils could be reconstructed			
Will impact cause irreplaceable loss or resources?			YES. Fossils could be reconstructed			
Can impact be avoided, managed or mitigated?			YES. Chance Find Protocol			
Mitigation measures to reduce residual risk or enhance opportunities: Chance Find protocol.						
Residual impact	Yes, but acceptable as of low negative significance					

10.10 VISUAL/ LANDSCAPE AND FLICKER

The preparation/construction activities (earthworks and infrastructure development) will contrast with the existing agricultural and grass lands as soil is exposed to create service roads, trenches, erecting structures for the turbines, distribution lines and sub-stations etc. Once the turbines have been installed, they will also contrast, significantly, with the immediate landscape. The landscape impact (i.e. the change to the fabric and character of the landscape caused by the physical presence of the Project) is considered moderate particularly during the construction and operational phases. The combined effects of the changes described above, have a medium negative affect the overall character of the landscape, give the context of the sub-region.

VISUAL RECEPTORS

Visual receptors include people living in, visiting, or travelling through or adjacent to the study area and other local public roads (specifically the R65 road that connects Ermelo with Amsterdam to the east and the N2 which connects Ermelo with Piet Retief to the south-east).

The towns of Ermelo and Amsterdam and smaller settlements such as Sheepmoor and Lothar are within the study area. As the area is predominantly a farming community there are several farmsteads that fall within the study area. Activities and businesses that rely of the visual environment such as lodges, bed and breakfast establishments were not specifically observed in the study area although a game farm was noted on the eastern edge of the site.

SENSITIVE VIEWERS AND LOCATIONS

Although not all homesteads may be occupied fulltime, many of these will be in direct line of sight and within the 0-1km zone for the OHPL and a 0-5km zone for the turbines, where the magnitude of impact could be high. Other potential sensitive receptors include local towns and villages such as Ermelo, Sheepmoor, Lothair, Amsterdam and Camden, travellers on the main roads such as the N2, N11, R65 and secondary public roads, activities and institutions that rely on the aesthetic environment such as game farms, nature reserves, lodges, and B&B's.

TABLE 10-2 VISUAL RECEPTOR SENSITIVITIES

High Receptors at residential units across the study area. Primarily east and south of the project site and in the site as well as nature reserves, lodges, and B&B's	Moderate Locals travelling along the R65 and N2, and on the local connector roads that bisect the site	Low People working or travelling to work in the study area and related to the power production and transmission
Typical receptors -Visitors of tourist attractions and travelling along local routes, whose intention or interest may be focused on the landscape. -Communities where the development results in changes in the landscape setting or valued views enjoyed by the community. -Occupiers of residential properties with views affected by the development.	Typical receptors -People travelling through or past the affected landscape in cars or other transport routes.	Typical receptors Visitors and people working within the study area and travelling along local roads whose attention may be focused on their work or activity and who therefore may be potentially less susceptible to changes in the view.

VISIBILITY

The existing topography is gently rolling which does not assist significantly in limiting the views. Visibility of the structures, due to the tall and imposing scale of the turbines, would potentially be continuous and uninterrupted. Under optimal viewing conditions, up to 30km and beyond. It is considered that beyond 30 km views of the development, though still visible, are considered insignificant in the landscape due to the exponential diminishing effect of distance.

Activities associated with the Project will be visible to varying degrees and distances from the sensitive viewing areas described above and as indicated in Figure 6-20. During the construction phase, the Project's visibility will be influenced due to the preparatory activities, primarily earthworks and building works. During the operational phase, the visibility of the Project will be caused by the established wind turbines and associated infrastructure as well as the proposed new 132kV powerline (Preferred Alternative), which connect the Project site substation to the Camden B near the Camden power-station to the west of the site.

All Project components (WEF and OHPL) are planned within a landscape which has a low visual absorption capacity (grassland and along the ridgelines).

Although, due to the nature of land (topography, grassland vegetation, agriculture, timber, and settlements) immediately adjacent and in the general vicinity of the site, the landscape, although reasonably flat to undulating, provides a low visual absorption capacity (VAC). This is due to the substantial height of the turbines (maximum 250m to tip of rotor blade), the nature of the vegetation cover. The landscape is therefore not readily able to ‘absorb’ the visual change.

The visibility of the site, theoretically, extends (without taking the effect of vegetation screening into account) in a general northwest – southeast direction. Views to the south are intermittent with sections of the n2 exposed. The Sheepmoor community is exposed to the turbines due to the higher elevation of the turbines. The most intense views are those from the R65 where it runs east – west between the northern and southern portions. The site is most exposed along the N2 that runs east -west south of the site, where the OHPL cross the national road.

EFFECTS OF SHADOW FLICKER

The greatest impact is within the 2 km zone. There is little that topography and vegetation can help to mitigate this impact. This will have a high impact on the critical visual receptors such as the farmsteads and occupied buildings. There are farmsteads that will be directly impacted as well as some of the main roads that service the area such as the one that transects the study area which connects Ermelo with eMvelo (Amsterdam) via the R65 (refer to Figure 8 for the potentially affected farm/homesteads). These roads are within the zone of flicker influence. There are relatively few visual receptors, such as those that rely on the visual quality of the visual environment, such as game farms, national parks, lodges, and guesthouses, within the 2km zone of influence that will be affected.

The analysis of potential shadow flicker impacts from the development on the visual receptors indicates that the impacts are expected to be minor. It is not expected that the zone of influence will extend further that 2 km from any of the turbines. The impacts beyond 1 km will be very low intensity. Also, shadow flicker is not expected to be a significant environmental impact for any extended period.

FIGURE 10-3 VISIBILITY AND VIEWSHED EXPOSURE

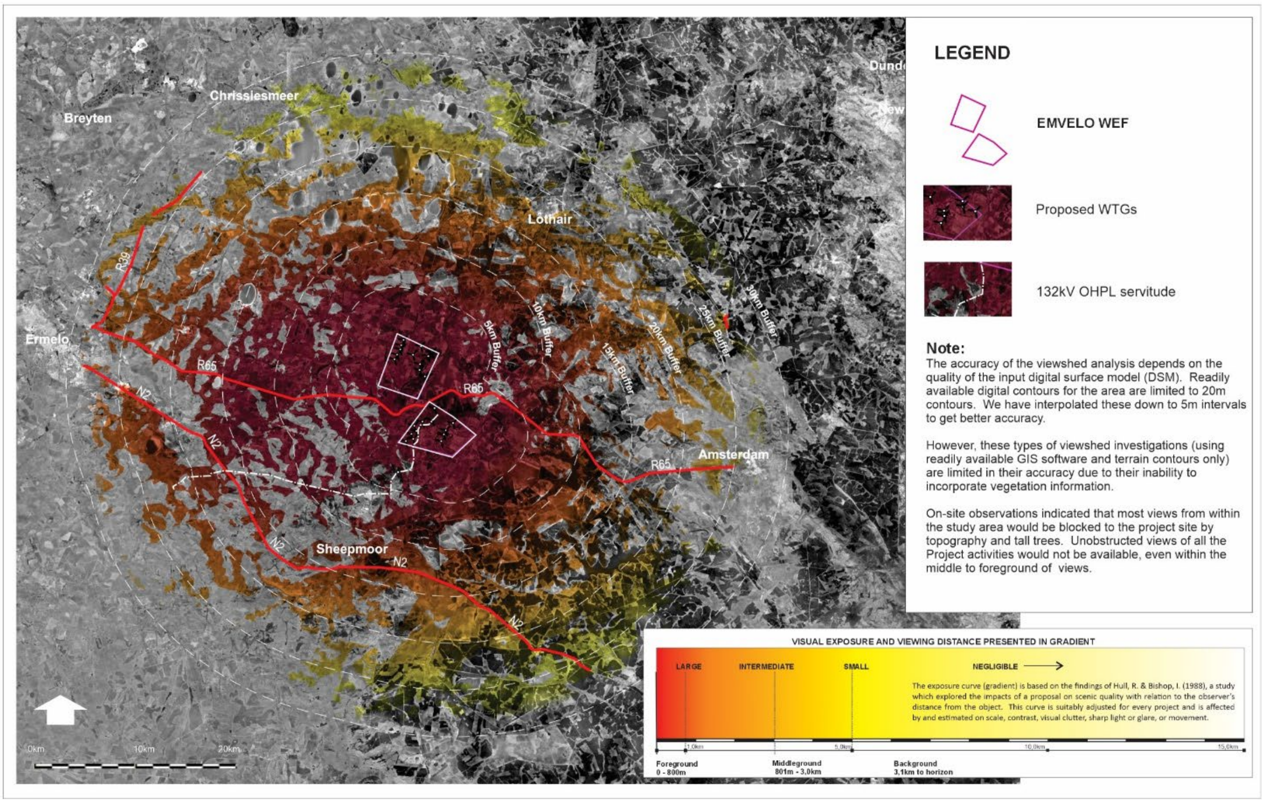
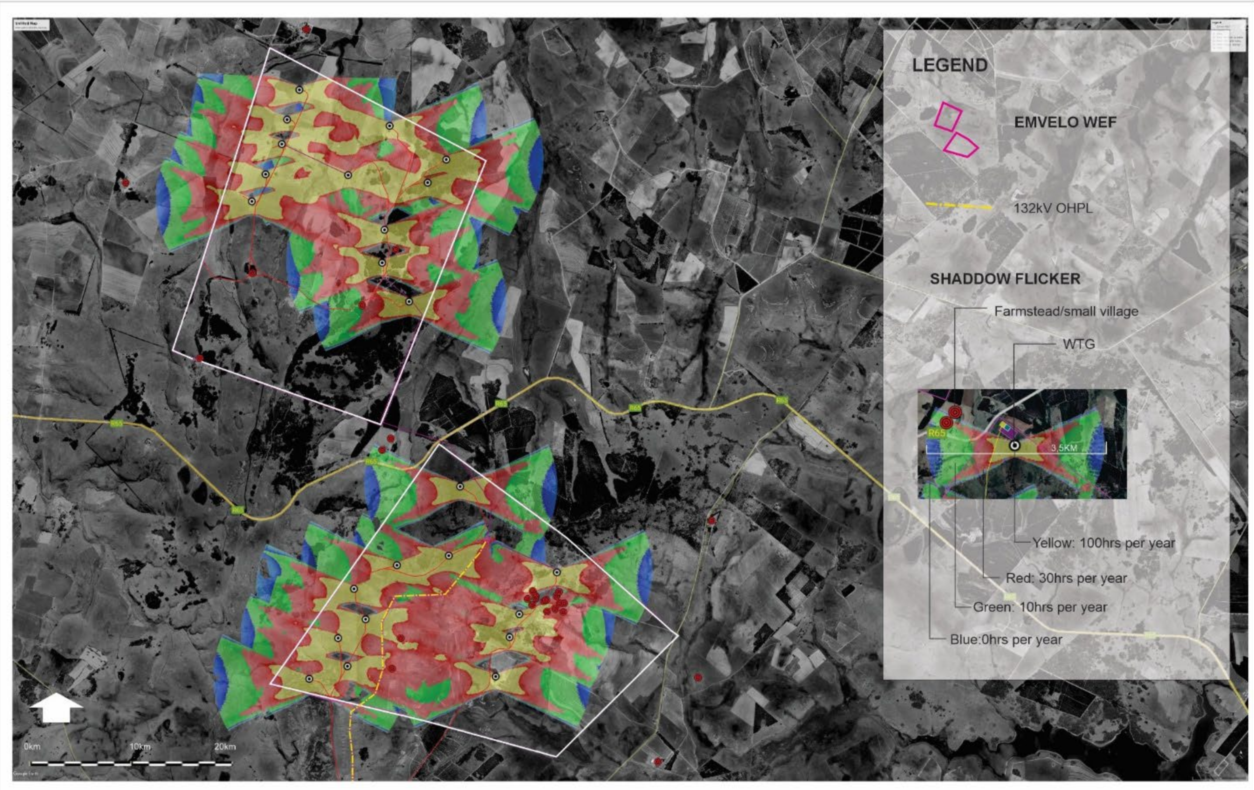


FIGURE 10-4 FLICKER ANALYSIS



VISUAL INTRUSION AND EXPOSURE

Project components will appear in moderately sensitive views from the local arterial and national roads with the potential for high visual intrusion for short sections of the R65 and from farmsteads to the north and west of the northern site and east of the southern site. Visual exposure and intrusion from the N2 would be moderate to low for the OHPL, for a short section of the road east of the Eskom Uitkoms substation.

For the remainder of the study area, visual intrusion is considered low to negligible, i.e. has a minimal to no effect on the visual quality and sense of place of the landscape and contrasts minimally with the patterns or cultural elements (mining infrastructure) that define the structure of the landscape.

EFFECTS OF NIGHT LIGHTING

I&APs consistently raise the impact of night lighting, specifically when they can be seen from tourist or residential sites and when the effect would continue for the Project's life. The negative effect of night lighting caused by the Project would be seen against a night sky already impacted by lights from surrounding urban areas such as Ermelo and Sheepmoor. Security lighting could, however, potentially be detrimental to people living in the immediate vicinity. The management measures should be implemented to limit light spillage beyond the Project's site boundaries.

Civil aviation requires installing a red hazard flashing navigation light on top of each turbine. These lights can be seen over extended distances of at least 40km, and when viewed against a dark sky, they become very visible. To minimise this visual intrusion, the use of AVWS (Audio Visual Warning System) technology should be investigated. AVWS is a radar-based obstacle avoidance system that activates obstruction lighting and audio signals only when an aircraft is near an obstruction on which an AVWS unit is mounted, such as a wind turbine. The obstruction lights and audio warnings are inactive when aircraft are not in proximity to the obstruction (BML 2013[16]).

10.10.1 CONSTRUCTION

10.10.1.1 WEF

Construction activities include the removal of vegetation, earthworks required to create building terraces for internal substations and preparation of the internal roads as well as excavations for the turbine structures foundations associated infrastructure and the clearing of vegetation for access roads. Construction activities would potentially negatively affect the landscape's visual quality and sense of place relative to its baseline. They would contrast with the patterns that define the structure of the landscape. The duration of the construction phase is approximately, twenty-four months.

Impact Phase: Construction
Nature of the impact: Visual Impact

[16] United States Department of the Interior. 2013. Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands. Bureau of Land Management. Cheyenne, Wyoming. 342 pp, First Edition 2013

Impact Phase: Construction						
Description of Impact: Change of the landscape characteristics and key views (visual intrusion and flicker effect) and change to the sense of place						
Impact Status: Negative						
	Extent	Duration	Reversibility	Magnitude	Probability	
Without Mitigation	Regional	Short Term	Irreversible	Moderate	High	
Score	3	2	5	3	4	
With Mitigation	Regional	Short Term	Irreversible	Moderate	High	
Score	3	2	5	3	4	
Significance Calculation	Without Mitigation			With Mitigation		
S=(E+D+R+M) *P	Moderate Negative Impact (52)			Moderate Negative Impact (52)		
Was public comment received?	Yes, and visual and aesthetic issues were not mentioned as a concern.					
Has public comment been included in mitigation measures?	Yes, however, generic sensitivities were considered as visual issues were not listed as a concern.					

Mitigation measures to reduce residual risk or enhance opportunities:

- Limit area of disturbance for turbine footprint, access roads and construction camp or sites
- Suppress dust during construction.
- Site turbines at least 2 km from any occupied homestead hospitality/tourism facility, where possible.
- Mitigation will already have been implemented by the placement of turbines according to distance from visual receptors. And the effect of shadow flicker.
- Limit area of disturbance for access roads, substations, and construction camp sites
- Locate construction camps and all related facilities such as stockpiles, lay-down areas, batching plants in areas already impacted such as existing farmyards or in unobtrusive locations away from the main visual receptors.
- Limit access tracks for construction and maintenance vehicles to existing roads where possible. Once established do not allow random access through the veld.
- Blend edges of road and platforms with surrounding landscape
- Rehabilitate exposed disturbed areas.
- Avoid vegetation stripping in straight lines but non-geometric shapes that blend with the landscape.
- Limit need for security lighting.
- Use non-reflective materials.
- Paint all other project infrastructure elements such as operational buildings, support poles etc. a dark colour.
- Avoid bright colour/patterns and logos.

Residual impact	Change of the landscape characteristics and key views (visual intrusion and flicker effect) and change to the sense of place

The impact on the visual environment during the construction phase is assessed to have a potential medium severity over a regional area (but extend beyond the site boundary to at least at 10,0km) and would occur over the short-term (less than five years) resulting in a moderate consequence. The probability of the unmitigated impact is high resulting in a predicted significance of impact as moderate. The implementation of mitigation measures would not significantly reduce the anticipated impact, which would remain moderate.

10.10.1.2 OHPL

Construction activities include the removal of vegetation, earthworks required for tower foundations and preparation for temporary access roads. Construction activities would potentially negatively affect the landscape's visual quality and sense of place relative to its baseline. They would contrast with the patterns that define the structure of the landscape. The construction is approximately twenty-four months.

Impact Phase: Construction					
Nature of the impact: Visual Impact					
Description of Impact: Change of the landscape characteristics and key views (visual intrusion and flicker effect) and change to the sense of place					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Regional	Short Term	Irreversible	Moderate	Probable
Score	3	2	5	3	3
With Mitigation	Regional	Short Term	Irreversible	Moderate	Probable
Score	3	2	5	3	3
Significance Calculation	Without Mitigation		With Mitigation		
S=(E+D+R+M)*P	Moderate Negative (39)		Moderate Negative Impact (39)		
Was public comment received?	Yes, and visual and aesthetic issues were not mentioned as a concern.				
Has public comment been included in mitigation measures?	Yes, however, generic sensitivities were considered as visual issues were not listed as a concern.				

- Limit area of disturbance for access roads, and construction camp sites
- Locate construction camps and all related facilities such as stockpiles, lay-down areas, batching plants in areas already impacted such as existing farmyards or in unobtrusive locations away from the main visual receptors.
- Limit access tracks for construction and maintenance vehicles to existing roads where possible. Once established do not allow random access through the veld
- Suppress dust during construction.
- Blend edges of road and platforms with surrounding landscape
- Rehabilitate exposed disturbed areas
- Avoid vegetation stripping in straight lines but rather non-geometric shapes that blend with the landscape
- Limit need for security lighting
- Use non-reflective materials
- Paint all other project infrastructure elements such as operational buildings, support poles etc. a dark colour
- Avoid bright colour/patterns and logos

Residual impact	Change of the landscape characteristics and key views (visual intrusion) and change to the sense of place.

The impact on the visual environment during the construction phase is assessed to have a potential medium severity over a regional (but extend beyond the site boundary to at least at 5,0km) and would occur over the short-term (less than five years) resulting in a moderate consequence. The probability of the unmitigated impact is high resulting in a predicted significance of impact as moderate. The implementation of mitigation measures would not significantly reduce the anticipated impact, which would remain moderate.

10.10.2 OPERATIONAL PHASE

10.10.2.1 WEF

Operational activities include the regular maintenance of the wind turbines, vegetation management under and around the structures and maintenance of all other infrastructural components. Security lighting, aviation hazard flashing lights, and other lighting associated with the movement of security vehicles at night. These activities along with the physical presence of the Project components day and night, constitute the visual impact.

Impact Phase: Operation					
Nature of the impact: Visual Impact					
Description of Impact: Change of the landscape characteristics and key views (visual intrusion and flicker effect) and change to the sense of place					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Regional	Long Term	Irreversible	High	Highly Probable
Score	3	4	5	4	4
With Mitigation	Regional	Long Term	Irreversible	Moderate	Probable
Score	3	4	5	3	3
Significance Calculation	Without Mitigation		With Mitigation		
S=(E+D+R+M)*P	High Negative Impact (64)		Moderate Negative Impact (45)		
Was public comment received?	Yes, and visual and aesthetic issues were not mentioned as a concern.				
Has public comment been included in mitigation measures?	Yes, however, generic sensitivities where considered as visual issues were not listed as a concern				
Mitigation measures to reduce residual risk or enhance opportunities: • Mitigation will already have been implemented by the placement of turbines according to distance from visual receptors. • Manage need for top of turbine red hazard lighting to only when a plane enters the affected airspace rather than be permanently lit. • Limit need for security lighting. • Use non-reflective materials. • Paint all other project infrastructure elements such as operational buildings, support poles etc. a dark colour.					

Impact Phase: Operation	
• Avoid bright colour/patterns and logos. • Maintain rehabilitated disturbed areas.	
Residual impact	Change of the landscape characteristics and key views (visual intrusion, shadow flicker and blinking aviation light effects) and change to the sense of place.

The worst-case impact on the visual environment during the operational phase is assessed to have a *high magnitude* over a *widespread area* and would occur over the *long-term* (anticipated to be longer than 10 years). The probability of the unmitigated impact is *high* resulting in a predicted significance of impact as HIGH. The significance of a high impact is that it could have an influence on the decision, and the impact would be unacceptable unless it is effectively mitigated. Mitigation measures are feasible (specifically with regards night lighting, the location of turbines to avoid flicker on affected residential locations and the lack of I&AP concern of the project) and can reduce the visual impact over time. The impact with mitigation is predicted to reduce slightly to that of MODERATE.

10.10.2.2 OHPL

Operational activities include the maintenance of the access roads and pylons, and vegetation management and maintenance under and around the transmission lines and other infrastructural components such as substations. These activities along with the physical presence of the Project components, constitute the visual impact.

Impact Phase: Operational					
Nature of the impact: Visual Impact					
Description of Impact: Change of the landscape characteristics and key views (visual intrusion and flicker effect) and change to the sense of place					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Regional	Long Term	Irreversible	Moderate	Probable
Score	3	4	5	3	3
With Mitigation	Regional	Long Term	Irreversible	Moderate	Probable
Score	3	4	5	3	3
Significance Calculation	Without Mitigation		With Mitigation		
S=(E+D+R+M)*P	Moderate Negative Impact (45)		Moderate Negative Impact (45)		
Was public comment received?	Yes, and visual and aesthetic issues were not mentioned as a concern.				
Has public comment been included in mitigation measures?	Yes, however, generic sensitivities where considered as visual issues were not listed as a concern				
Mitigation measures to reduce residual risk or enhance opportunities:					

Impact Phase: Operational	
Maintain rehabilitated disturbed areas	
Residual impact	Change of the landscape characteristics and key views (visual intrusion) and change to the sense of place

The worst-case impact on the visual environment during the operational phase is assessed to have a moderate *magnitude* over a *widespread area* and would occur over the *long-term* (anticipated to be longer than 10 years). The probability of the unmitigated impact is *moderate* resulting in a predicted significance of impact as <u>MODERATE.</u> The significance of a moderate impact is that it could have an influence on the decision, and the impact will not be avoided unless it is mitigated. Mitigation measures are feasible and can reduce the visual impact over time. The impact with mitigation is predicted to reduce slightly but would remain <u>MODERATE.</u>

10.10.3 DECOMMISIONING PHASE

10.10.3.1 WEF

Decommissioning and closure activities include the dismantling and removal of infrastructure and the rehabilitation of the site back to its current, mostly natural, state.

Impact Phase: Decommissioning					
Nature of the impact: Visual Impact					
Description of Impact: Change of the landscape characteristics and key views (visual intrusion and flicker effect) and change to the sense of place					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Regional	Short Term	Recoverable	Moderate	High
Score	3	2	3	3	4
With Mitigation	Regional	Short Term	Recoverable	Moderate	High
Score	3	2	3	3	4
Significance Calculation	Without Mitigation		With Mitigation		
S=(E+D+R+M)*P	Moderate Negative Impact (44)		Moderate Negative Impact (44)		
Was public comment received?	Yes, and visual and aesthetic issues were not mentioned as a concern.				
Has public comment been included in mitigation measures?	Yes, however, generic sensitivities where considered as visual issues were not listed as a concern				
Mitigation measures to reduce residual risk or enhance opportunities: • Remove all project components from site • Rip all compacted hard surfaces such as platforms, works areas, access, and service roads etc. and reshape to blend with the surrounding landscape • Rehabilitate/revegetate all disturbed areas to visually the original state by shaping and planting					

Impact Phase: Decommissioning	
Residual impact	*Minor but generally none (The rehabilitated areas might not be visually compatible with the existing surrounding vegetation).*

The impact on the visual environment during the decommissioning phase is assessed to have a *medium magnitude* over a *local area* and would occur over the *short-term* (less than five years) resulting in a *low consequence*. The probability of the unmitigated impact is *high* resulting in a predicted significance of impact as MEDIUM. The implementation of mitigation measures would reduce the anticipated impact, but it would remain MEDIUM.

10.10.3.2 OHPL

Decommissioning and closure activities include the dismantling and removal of infrastructure and the rehabilitation of the site back to its current, mostly natural, state.

Impact Phase: Decommissioning					
Nature of the impact: Visual Impact					
Description of Impact: Change of the landscape characteristics and key views (visual intrusion) and change to the sense of place					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Regional	Short Term	Recoverable	Moderate	Probable
Score	3	2	3	3	3
With Mitigation	Regional	Short Term	Recoverable	Moderate	Probable
Score	3	2	3	3	3
Significance Calculation	Without Mitigation		With Mitigation		
S=(E+D+R+M)*P	Moderate Negative Impact (33)		Moderate Negative Impact (33)		
Was public comment received?	Yes, and visual and aesthetic issues were not mentioned as a concern.				
Has public comment been included in mitigation measures?	Yes, however, generic sensitivities where considered as visual issues were not listed as a concern				
• Remove all project components from site • Rip all compacted hard surfaces such as platforms, words areas, access and service roads etc. and reshape to blend with the surrounding landscape • Rehabilitate/revegetate all disturbed areas to visually the original state by shaping and planting					
Residual impact	*Minor but generally none (The rehabilitated areas might not be visually compatible with the existing surrounding vegetation).*				

The impact on the visual environment during the decommissioning phase is assessed to have a *medium magnitude* over a *local area* and would occur over the *short-term* (less than five years) resulting in a *low consequence*. The probability of the unmitigated impact is *moderate* resulting in a predicted significance of impact as MEDIUM. The implementation of mitigation measures would reduce the anticipated impact, but it would remain MEDIUM.

10.11 TRAFFIC AND CONSTRUCTION

The trips generated at the Emvelo WEF 1 and WEF 2 will vary during the different phases of project implementation. Generally, Wind Energy Facilities generate traffic during three primary phases or categories, namely:

- Phase 1: Construction Traffic;
- Phase 2: Operation Traffic; and
- Phase 3: Decommission Traffic.

CONSTRUCTION PHASE

It was assumed that the skilled labour force will drive to site using cars while a portion (40%) of the semi-skilled group will drive cars and the remaining portion (60%) will use buses to site. The low skilled component of the labour force is expected to be transported to site by bus. The above means that 25% (skilled 100% + 40% semi-skilled) is anticipated to use cars to site and 75% (100% low-skilled + 60% semi-skilled) to be bussed to site. The number of vehicles using a vehicle occupancy factor of 1.2 and 60 for car and bus respectively is expected to be 42 cars and 3 buses during construction phase. For the purposes of this report, it was assumed that these vehicles will travel during the AM and PM Peak hours and were applied as such to the surrounding road network during the analysis.

OPERATION PHASE

The operational phase of the development is expected to generate approximately 10 vehicles per hour. About 3 of these vehicles are 2 heavy vehicles including 1 abnormal vehicle. Using a car equivalent factor of 4 for abnormal and 3 for normal trucks, the development will generate approximately 17 Passenger Car Units during the peak hours

DECOMMISSIONING PHASE

The decommissioning phase of the development is expected to generate approximately 57 vehicles per hour. About 12 of these vehicles are heavy vehicles including 2 abnormal vehicles. Using a car equivalent factor of 4 for abnormal and 3 for normal trucks, the development will generate approximately 89 Passenger Car Units during the peak hours and were used as such during the analysis.

10.11.1 CONSTRUCTION PHASE

The construction phase is expected to generate the highest number of vehicles over the construction period of approximately 2 years.

Impact Phase: Construction					
Nature of the impact: Increase in general peak hour traffic volumes					
Description of Impact: Increased traffic on the route and access points to site - Potential to be greater than what the existing road capacity of the local road network can handle in order to operate at an acceptable level of service. This impact relates to potential disruption of traffic flow on local, regional and national roads. The severity of the impacts will depend on the order of the road (current traffic volumes, how many lanes, lanes width, length, turns, etc.), the receiving environment and vicinity of land uses and towns. Additional traffic on the road network could result in changes to the operations of that road network, intersection capacity, such as increased congestion, delays, and accidents. Abnormal trucks will cause delays and queuing as they drive very slowly and are generally too long (length dimension) for a safe overtaking maneuver.					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Regional	Short Term	Recoverable	High	Highly Probable
Score	3	2	3	4	4
With Mitigation	Local	Short Term	Reversible	Very Low	Probable
Score	2	2	2	1	3
Significance Calculation	Without Mitigation		With Mitigation		
S=(E+D+R+M)*P	Moderate Negative Impact (48)		Low Negative Impact (21)		
Was public comment received?	NO				
Has public comment been included in mitigation measures?	NO				
Mitigation measures to reduce residual risk or enhance opportunities: • Implementation of the Traffic Management Plan and Road Safety Measures • Limit use of private cars • Schedule development traffic movements to not coincide with existing peaks where possible • Encourage use of public/staff transportation					
Residual impact	*Negative, moderate and temporary*				

Impact Phase: Construction
Nature of the impact: Increase in abnormal traffic volumes
Description of Impact: Additional heavy vehicles/E80's/Abnormal vehicles on the external road network- Potential to require additional road rehabilitation. The impact of abnormal loads on public roads is expected to cause journey time delays and traffic congestion due to low travelling speeds of heavy vehicles transporting abnormal loads. These often occupy two standard traffic lanes and can potentially lead to incidents when travelling on single carriageways with a single lane per direction and without traffic police escorts. Single carriageways in some areas might not be sufficient for the abnormal trucks to be able to turn with ease and that in turn will require the roads to be widened in some sections or intersections. The current roads in the area might not be built to withstand such abnormal loads as the area is dominated by farms and with that being said it means the roads are mostly low-grade roads.

Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	National	Short Term	Recoverable	High	Highly Probable
Score	4	2	3	4	4
With Mitigation	National	Short Term	Recoverable	Moderate	Probable
Score	4	2	3	3	3
Significance Calculation	Without Mitigation			With Mitigation	
S=(E+D+R+M)*P	Moderate Negative Impact (52)			Moderate Negative Impact (36)	
Was public comment received?	NO				
Has public comment been included in mitigation measures?	NO				

Mitigation measures to reduce residual risk or enhance opportunities:

- Implementation of the Traffic Management Plan and Road Safety Measures
- Compliance to permissible heavy vehicle dimensions, permissible axle mass load on vehicles (no overloading)
- Transportation scheduling to consider the time of day when the abnormal loads would be moved
- Other alternative modes of transportation (rail where feasible) should be considered

Residual impact	*Negative, moderate and temporary*

Impact Phase: Construction
Nature of the impact: Impact of dust along gravel site access roads
Description of Impact: Heavy vehicles are expected to cause dust along unpaved access roads to the site. This can affect the air quality and visibility for nearby residents and road users. Larger

Impact Phase: Construction					
vehicles generate more dust which can limit the ability of other vehicles to overtake due to poor visibility. The large amount of dust will cause respiratory issues for residents that stay in the nearby farms and also for construction workers who will be on site daily.					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Local	Immediate	Recoverable	High	Highly Probable
Score	2	1	3	4	4
With Mitigation	Local	Immediate	Recoverable	Moderate	Low Probability
Score	2	1	3	3	2
Significance Calculation	Without Mitigation		With Mitigation		
S=(E+D+R+M)*P	Moderate Negative Impact (40)		Low Negative Impact (18)		
Was public comment received?	NO				
Has public comment been included in mitigation measures?	NO				
Mitigation measures to reduce residual risk or enhance opportunities: *Dust control measures such as regular wet grading and wetting for dust suppression to minimize the negative impact*					

Residual impact	*Negative, moderate and temporary.*

Impact Phase: Construction					
Nature of the impact: Deterioration of surrounding road network					
Description of Impact: Heavy vehicle traffic during construction of the development is expected to cause additional wear and tear on the surrounding road network. Gravel access roads to the sites are also expected to sustain damage during the construction phase of the project. Abnormal loads can exert more pressure on road surfaces and infrastructure, leading to increased maintenance costs and reduced road network lifespan. Abnormal loads can also damage low lying bridges.					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Local	Short Term	Recoverable	Moderate	Highly Probable

Impact Phase: Construction					
Score	2	2	3	3	4
With Mitigation	Site	Immediate	Recoverable	Low	Low Probability
Score	1	1	3	2	2
Significance Calculation	Without Mitigation			With Mitigation	
S=(E+D+R+M)*P	Moderate Negative Impact (40)			Low Negative Impact (14)	
Was public comment received?	NO				
Has public comment been included in mitigation measures?	NO				

Mitigation measures to reduce residual risk or enhance opportunities:

- Limiting the number and frequency of heavy and overloaded vehicles where possible
- Undertaking regular maintenance, rehabilitation and upgrading substandard pavement conditions

Residual impact	*Negative, Moderate with long term effects on the pavement layers*

10.11.2 OPERATIONAL PHASE

The operational phase of the development is expected to generate the least number of vehicles over the project lifespan of approximately 25-30 years. Thus, the operational phase is expected to have comparatively minimal environmental impact as only the transport required will be associated with monitoring, operation, and maintenance.

Impact Phase: Operation					
Nature of the impact: Increase in general peak hour traffic volumes					
Description of Impact: Increased traffic on the route and access points to site - Potential to be greater than what the existing road capacity of the local road network can handle in order to operate at an acceptable level of service. This impact relates to potential disruption of traffic flow on local, regional and national roads. The severity of the impacts will depend on the order of the road (how many lanes, lanes width, length, turns, etc.), the receiving environment and vicinity of land uses and towns. Additional traffic on the road network could result in changes to the operations of that road network, intersection capacity, such as increased congestion, delays, and accidents. However, the operational phase is expected to generate very low traffic volumes during peak hours.					
Impact Status: Positive					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Site	Immediate	Reversible	Very Low	Low Probability

Impact Phase: Operation					
Score	1	1	1	1	2
With Mitigation	Site	Immediate	Reversible	Very Low	Low Probability
Score	1	1	1	1	2
Significance Calculation	Without Mitigation		With Mitigation		
S=(E+D+R+M)*P	Low Negative Impact (8)		Low Negative Impact (8)		
Was public comment received?	NO				
Has public comment been included in mitigation measures?	NO				

Mitigation measures to reduce residual risk or enhance opportunities:

- Implementation of the Traffic Management Plan and Road Safety Measures
- Limit use of private cars
- Schedule development traffic movements to not coincide with existing peaks where possible
- Encourage use of public/staff transportation

Residual impact	*Positive, Low impact on the existing traffic.*

Impact Phase: Operation

Nature of the impact: Increase in abnormal traffic volumes

Description of Impact: Additional heavy vehicles/E80's/Abnormal vehicles on the external road network- Potential to require additional road rehabilitation.

The impact of abnormal loads on public roads is expected to cause journey time delays and traffic congestion due to low travelling speeds of heavy vehicles transporting abnormal loads. These often occupy two standard traffic lanes and can potentially lead to incidents when travelling on single carriageways with a single lane per direction and without traffic police escorts.

The current roads in the area might not be built to withstand such abnormal loads as the area is dominated by farms and with that being said it means the roads are mostly low-grade roads. However, the operational phase is expected to generate very low heavy traffic volumes during periodic maintenance and repair events.

Impact Status: Positive

	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Regional	Immediate	Recoverable	Moderate	Probable
Score	2	1	3	3	3
With Mitigation	Regional	Immediate	Recoverable	Moderate	Low Probability
Score	2	1	3	3	2

Impact Phase: Operation		
Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	Low Negative Impact (27)	Low Negative Impact (18)
Was public comment received?	NO	
Has public comment been included in mitigation measures?	NO	

Mitigation measures to reduce residual risk or enhance opportunities:

- Implementation of the Traffic Management Plan and Road Safety Measures
- Compliance to permissible heavy vehicle dimensions, permissible axle mass load on vehicles (no overloading)
- Transportation scheduling to consider the time of day when the abnormal loads would be moved
- Other alternative modes of transportation (rail where feasible) should be considered

Residual impact	*Positive, Low because during operations they wont be a need for abnormal trucks.*

Impact Phase: Operation					
Nature of the impact: Impact of dust along gravel site access roads					
Description of Impact: Heavy vehicles are expected to cause dust along unpaved access roads to the site. This can affect the air quality and visibility for nearby residents and road users. Larger vehicles generate more dust which can limit the ability of other vehicles to overtake due to poor visibility.					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Site	Immediate	Recoverable	Low	Low Probability
Score	1	1	1	2	3
With Mitigation	Site	Immediate	Reversible	Very Low	Probable
Score	1	1	1	1	2
Significance Calculation	Without Mitigation		With Mitigation		
S=(E+D+R+M)*P	Low Negative Impact (15)		Low Negative Impact (8)		
Was public comment received?	NO				
Has public comment been included in mitigation measures?	NO				
Mitigation measures to reduce residual risk or enhance opportunities:					

Impact Phase: Operation
• Dust control measures such as regular wet grading and wetting for dust suppression to minimize the negative impact

Residual impact	*Negligible, dust will not be generated by abnormal loads as they won't be much abnormal loading during operations.*

Impact Phase: Operation						
Nature of the impact: Deterioration of surrounding road network						
Description of Impact: Heavy vehicle traffic during construction of the development is expected to cause additional wear and tear on the surrounding road network. Gravel access roads to the sites are also expected to sustain damage during the construction phase of the project. Abnormal loads can exert more pressure on road surfaces and infrastructure, leading to increased maintenance costs and reduced road network lifespan.						
Impact Status: Positive						
	Extent	Duration	Reversibility	Magnitude	Probability	
Without Mitigation	Site	Immediate	Reversible	Low	Low Probability	
Score	1	1	1	1	2	
With Mitigation	Site	Immediate	Reversible	Low	Low Probability	
Score	1	1	1	1	2	
Significance Calculation	Without Mitigation			With Mitigation		
S=(E+D+R+M)*P	Low Negative Impact (8)			Low Negative Impact (8)		
Was public comment received?	NO					
Has public comment been included in mitigation measures?	NO					
Mitigation measures to reduce residual risk or enhance opportunities: • Limiting the number and frequency of heavy and overloaded vehicles where possible • Undertaking regular maintenance, rehabilitation and upgrading substandard pavement conditions						

Residual impact	*Positive, roads will remain in better conditions post implementation of mitigation measures*

10.11.3 DECOMMISSIONING PHASE

It is expected that the decommissioning phase will have similar transport requirements in the construction phase. Thus, the decommissioning phases will generate the second highest traffic impact after construction as a result of the need to remove infrastructure and rehabilitate the site.

Impact Phase: Decommission					
Nature of the impact: Increase in general peak hour traffic volumes					
Description of Impact: Increased traffic on the route and access points to site - Potential to be greater than what the existing road capacity of the local road network can handle in order to operate at an acceptable level of service. This impact relates to potential disruption of traffic on local, regional and national roads. The severity of the impacts will depend on the order of the road (how many lanes, lanes width, length, turns, etc.), the receiving environment and vicinity of land uses and towns. Additional traffic on the road network could result in changes to the operations of that road network, intersection capacity, such as increased congestion, delays, and accidents.					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Regional	Medium Term	Recoverable	Moderate	Probable
Score	3	3	3	3	3
With Mitigation	Local	Short Term	Reversible	Low	Probable
Score	2	2	1	2	3
Significance Calculation	Without Mitigation		With Mitigation		
S=(E+D+R+M)*P	Moderate Negative Impact (36)		Low Negative Impact (21)		
Was public comment received?	NO				
Has public comment been included in mitigation measures?	NO				
Mitigation measures to reduce residual risk or enhance opportunities: *Implementation of the Traffic Management Plan and Road Safety Measures* *Limit use of private cars* *Schedule development traffic movements to not coincide with existing peaks where possible* *Encourage use of public/staff transportation*					
Residual impact	*Negative, moderate and temporary until decommissioning is completed.*				

Impact Phase: Decommission					
Nature of the impact: Increase in abnormal traffic volumes					
Description of Impact: Additional heavy vehicles/E80's/Abnormal vehicles on the external road network- Potential to require additional road rehabilitation. The impact of abnormal loads on public roads is expected to cause journey time delays and traffic congestion due to low travelling speeds of heavy vehicles transporting abnormal loads. These often occupy two standard traffic lanes and can potentially lead to incidents when travelling on single carriageways with a single lane per direction and without traffic police escorts.					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	National	Short Term	Recoverable	High	Highly Probable
Score	4	2	3	4	4
With Mitigation	National	Short Term	Recoverable	Moderate	Probable
Score	4	2	3	3	3
Significance Calculation	Without Mitigation		With Mitigation		
S=(E+D+R+M)*P	Moderate Negative Impact (52)		Moderate Negative Impact (36)		
Was public comment received?	NO				
Has public comment been included in mitigation measures?	NO				

Mitigation measures to reduce residual risk or enhance opportunities:
- Implementation of the Traffic Management Plan and Road Safety Measures
- Compliance to permissible heavy vehicle dimensions, permissible axle mass load on vehicles (no overloading)
- Transportation scheduling to consider the time of day when the abnormal loads would be moved
- Other alternative modes of transportation (rail where feasible) should be considered

Residual impact	*Negative, moderate and temporary with the option of using train to move other parts instead of trucks.*

Impact Phase: Decommission					
Nature of the impact: Impact of dust along gravel site access roads					
Description of Impact: Heavy vehicles are expected to cause dust along unpaved access roads to the site. This can affect the air quality and visibility for nearby residents and road users. Larger vehicles generate more dust which can limit the ability of other vehicles to overtake due to poor visibility.					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Local	Immediate	Recoverable	Moderate	Probable
Score	2	1	3	3	3
With Mitigation	Local	Immediate	Reversible	Low	Low Probability
Score	2	1	3	2	2
Significance Calculation	Without Mitigation		With Mitigation		
S=(E+D+R+M)*P	Low Negative Impact (27)		Low Negative Impact (16		
Was public comment received?	NO				
Has public comment been included in mitigation measures?	NO				

Mitigation measures to reduce residual risk or enhance opportunities:

- Dust control measures such as regular wet grading and wetting for dust suppression to minimize the negative impact

Residual impact	*Yes, Acceptable because a water truck will be on site daily making sure that the ground is wet.*

Impact Phase: Decommission					
Nature of the impact: Deterioration of surrounding road network					
Description of Impact: Heavy vehicle traffic during construction of the development is expected to cause additional wear and tear on the surrounding road network. Gravel access roads to the sites are also expected to sustain damage during the construction phase of the project. Abnormal loads can exert more pressure on road surfaces and infrastructure, leading to increased maintenance costs and reduced road network lifespan.					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Regional	Short Term	Recoverable	High	Probable
Score	3	2	3	4	3
With Mitigation	Local	Short Term	Reversible	Moderate	Low Probability
Score	2	2	3	3	2
Significance Calculation	Without Mitigation		With Mitigation		
S=(E+D+R+M)*P	Low Negative Impact (36)		Low Negative Impact (20)		
Was public comment received?	NO				
Has public comment been included in mitigation measures?	NO				
Mitigation measures to reduce residual risk or enhance opportunities: *Limiting the number and frequency of heavy and overloaded vehicles where possible* *Undertaking regular maintenance, rehabilitation and upgrading substandard pavement conditions*					
Residual impact	*Moderate, roads will be damaged by the heavy loads.*				

11. CUMULATIVE IMPACTS

11.1 SOIL AND AGRICULTURAL POTENTIAL

The cumulative impact of loss of future agricultural production potential is assessed as low. It will not have an unacceptable negative impact on the agricultural production capability of the area, and it is therefore recommended, from a cumulative agricultural impact perspective, that the development be approved.

Due to the fact that the assessed infrastructure contributes negligibly to a loss of agricultural land it cannot cause acceptable levels of change in terms of agricultural land loss to be exceeded. The cumulative impact of the power line and associated infrastructure can therefore confidently be assessed as being of very low significance and therefore as acceptable. It will not have an unacceptable negative impact on the agricultural production capability of the area, and it is therefore recommended, from a cumulative agricultural impact perspective, that the power line be approved.

11.2 NOISE

Impact Phase: Operational						
Potential impact description: *Numerous WTG operating simultaneously at Emvelo and Sheepmoor WEF* The projected cumulative noise levels, the potential change in ambient sound levels as well as the potential noise impact is defined per NSR. If the Sheepmoor WEF operate simultaneously with the Emvelo WEF, noise levels will increase at NSR58, 82 and 66, with a significant increase in noise level at NSR82.						
	Magnitude	Extent	Duration	Status	Probability	Reversibility
Without Mitigation	Very High	Local	short term	Negative	Highly probable	Reversible
Score	5	2	2		4	1
With Mitigation	Moderate	Local	short term	Negative	Possible	Reversible
Score	3	2	2		3	1

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	High Negative Impact	Low Negative Impact
Can the impact be reversed?	Impact is fully reversible once operational activities cease	
Will impact cause irreplaceable loss or resources?	Medium loss of resource (quiet environment away from busy roads).	
Can impact be avoided, managed or mitigated?	Potential operational impacts can be mitigated	

Impact Phase: Operational	
Mitigation measures to reduce residual risk or enhance opportunities: • Considering potential future night-time operational noise levels, the applicant can relocate certain NSR (such as NSR 52, 82, etc.) where operational noise levels will be high; • The applicant can reduce the number of WTG closer than 800m from the identified NSR; • The applicant can relocate WTG further from identified NSR where operational noise levels will be high (reducing the locations where construction activities may take place); • Discussions with NSR at locations where night-time projected noise levels will slightly exceed the recommended night- time noise limit (45 – 48 dBA). NSR should be informed about the potential issues associated with long-term exposure to high noise level. If acceptable to the NSR, the applicant could consider the acoustic treatment of the dwellings to ensure compliance with Table 1 of SANS 10103. Each dwelling must be treated on a case-to-case base, as this option is mainly available to housing structures of proper construction (concrete or brick, with a roof with a ceiling space); • Together with a combination of the mitigation measures raised in points 1, 2, 3 and 4; the applicant can add noise reducing additions to the blades of certain WTG (such as serrated trailing edges); • Together with a combination of the mitigation measures raised in points 1, 2, 3, 4 and 5; the applicant can design and implement a noise abatement plan that would reduce the noise emissions from the WTG during certain times or • conditions.	
Residual impact	There will be a residual impact stemming from operational activities, with the residual noise impact stopping once the WEF cease to operate.

11.3 FRESHWATER AND WETLANDS (AQUATICS)

Cumulative Impact: Cumulative impacts on the aquatic resources of the area					
Description of Cumulative Impact: The cumulative impact assessment considers the combined impact of the remaining and other renewable projects within a 30km radius, that are also in the development phase and the associated grid lines on the aquatic resources. The rating below is based on the premise that important or sensitive features will be avoided by the various projects, while the mitigations proposed will ensure that the form and or function of downstream areas remain intact.					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Mitigation	Local	Long Term	Irreversible	Medium	Probable
Score	2	4	5	2	3
With Mitigation	Site	Short Term	Recoverable	Low	Low Probability
Score	1	2	3	1	2
Significance Calculation	Without Mitigation			With Mitigation	
S=(E+D+R+M)*P	Moderate Negative Impact (39)			Low Negative Impact (14)	
Can Impacts be Enhanced?	No				
Enhancement: The project should share roads and infrastructure where possible to reduce the overall footprint and reduce stormwater and erosion and sedimentation related impacts					

Cumulative Impact: Cumulative impacts on the aquatic resources of the area	
The projects should collaborate with provincial roads authority to upgrade the main access routes and improve the crossings and stormwater controls	
Residual impact	Low

11.4 TERRESTRIAL BIODIVERSITY (FLORA AND FAUNA)

The proposed WEF is unlikely to have significant cumulative impacts, nor result in any unacceptable loss or risk to terrestrial biodiversity on the site or regionally, regardless of the other WEF projects proposed in the area, as the layout has been aligned with minimising impacts and avoiding key ecological processes. WEF facilities generally have a low-density footprint that can accommodate sensitivities, and the overall footprint area is small in comparison to the total coverage area. The current and future threats to the represented grassland vegetation units would be posed by large scale clearing of habitat, which is usually associated with Agriculture, Mining and Forestry as well as urban development and expansion.

Cumulative Impact: Cumulative loss of indigenous vegetation cover, in particular Endangered Eastern Highveld Grassland as a result of the activity					
Description of Cumulative Impact: Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint. The proposed footprint comprises an insignificant portion of the vegetation unit regionally and extensive areas of natural vegetation are present surrounding the site. Core habitat areas have been identified for avoidance during the preliminary sensitivity mapping and accommodated in the design. A single WTG (WTG 16) is situated within a small, degraded patch of the Endangered Highveld Grassland, with a further 5 WTGs (WTGs 15, 11, 10, 5 & 3) being marginal or on the edge where some loss of Grassland may occur. In addition, portions of road are aligned within remnant Highveld Grassland, but are mostly following existing roads. Assuming conservatively that each of the WTGs require clearing of 50 % of its footprint within natural Highveld Grassland and the total loss due to roads might be 10 Ha, a total loss of 12.5 Ha might be expected, although likely to be less. Since the entire remaining Highveld Grassland within the site is calculated at ~782.1 Ha, this loss represents only 1.6 % of the Highveld Grassland on the site and only 0.003 % of the entire remaining extent. The loss associated with this nominal footprint is thus negligible and not deemed to be significant and will not pose any risk to the conservation of the vegetation unit. Furthermore, the proposed recommended clearing of densely invaded areas of a 1:3 ratio (i.e. at least ~37.5 Ha) will more than adequately compensate for this loss. Furthermore, the management of the sites under an EMPr rather than just the status quo agriculture will provide management resources that will potentially benefit overall conservation significantly more than what the loss represents on the ground.					
Impact Status: Negative to Positive					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Enhancement	Site	Long-term	Recoverable	High	Definite
Score	1	4	3	3	5
With Enhancement	Site	Long-term	Recoverable	Low	Probable
Score	1	4	3	2	3
Significance Calculation	Without Enhancement		With Enhancement		
S=(E+D+R+M)*P	Moderate Negative Impact (55)		Moderate Positive Impact (30)		
Can Impacts be Enhanced?	YES				

Cumulative Impact: Cumulative loss of indigenous vegetation cover, in particular Endangered Eastern Highveld Grassland as a result of the activity	
Enhancement: Recommended clearing of alien invaded areas in a ratio of 1:3 for direct loss of natural grassland habitat (as a trade-off or offset), in conjunction with the mitigation measures below as well as post construction rehabilitation of the initial temporary disturbance footprint and implementation of a sound environmental management programme for the duration of the project lifespan can potentially and effectively result in a net positive impact. The loss of vegetation as a result of the loss of the expected project footprint (~18o Ha) is far outweighed by the potential improvement that can be achieved on the remaining habitat of the site (~7 000 Ha) through the positive management measures that can be implemented through the EMPr on farmland where there are currently no EMPr in place. Site layout to avoid more sensitive vegetation as far as technically viable. Most of the risks associated with this impact have been reduced through identification of risk areas during the initial assessment phases and careful layout design in response to the respective sensitivity. Site layout design has effectively reduced this impact to negligible levels with only a very small proportion of the footprint occurring in or near higher sensitivity areas. Very High Sensitivity or No-Go habitat has largely been avoided and reduced to an acceptable level. Mitigation measures and management actions are proposed to enhance areas of habitat as a trade-off in order to offset this nominal loss of elevated sensitivity areas. Blanket clearing of vegetation must be limited to the site and footprint. No blanket vegetation clearing outside of footprint to take place. Topsoil must be striped and stockpiled separately during site preparation and replaced on completion in areas where revegetation or rehabilitation will take place. Any site camps and laydown areas requiring clearing must be located within already disturbed areas and away from watercourses.	
Residual impact	*Residual risks include possible clearing of natural or near natural vegetation outside of the proposed footprint.*

11.5 FAUNA

Cumulative Impact: Name of impact

Description of Cumulative Impact:
Contributing to further habitat fragmentation, noise and visual disturbances, affecting animal behaviour and changes in their movement and distribution patterns across grassland landscapes. Habitat fragmentation, disrupting ecological corridors and altering ecosystems which can further fragment populations and isolate species; and further noise and visual disturbances, affecting animal behaviour and their habitat choice and use. Some animal species will actively avoid areas near turbines, leading to their further displacement or changes and limiting their movement and distribution patterns across grassland landscapes. Increased vehicle movement on access roads, increased human activities, could further compound these impacts. Consequences of such impacts can result in the loss of populations of faunal SCC; restrict movement of fauna through ecological corridors; and the fragmentation of sub-populations of faunal SCC across high sensitive grassland habitats.

Impact Status: Negative. Potentially Low positive impacts if enhancement measures, such as avoiding high sensitive areas, alien plant and Oribi management plans are successfully implemented.

	Extent	Duration	Reversibility	Magnitude	Probability
Without Enhancement	Regional	Long Term	Recoverable	High	Highly Probable
Score	3	4	3	4	4
With Enhancement	Local	Medium Term	Recoverable	High	Low Probability
Score	2	3	3	4	2

Cumulative Impact: Name of impact		
Significance Calculation	Without Enhancement	With Enhancement
S=(E+D+R+M)*P	Moderate (-) Impact (56)	Low (-) Impact (24)
Can Impacts be Enhanced?	YES/NO	

Enhancement:

- If high sensitive areas are to be impacted through cumulative impacts, then off-sets will be required.
- Implementation of an Oribi management plan for project area.
- Implementation of a grazing and fire management plans for the high sensitive areas.
- Ongoing eradication of alien invasive plants across the project area as part of an alien plant management plan.
- Vegetation management in accordance with the recommendations from the botanist.
- Modifications to any fencing to facilitate animal movement can include leaving a gap at reasonable intervals between the base of the fence and the ground of approx. 30 cm in height. This can occur across the full extent of the fence, or at regular intervals.
- Possible options to mitigate the addition of artificial light pollution in grassland habitats could include:

o Fixtures on lights to cover the light bulb and direct the light to where it is needed.
o Use timers and motion sensors
o An outdoor lighting plan should be developed that includes an overall reduction of nocturnal lighting.

Residual impact	*The noise and visual disturbances of turbines are an innate aspect of wind farms, and some noise and visual disturbances of turbines will always remain. This is likely true of other renewable energy projects; therefore, if other renewable energy projects are developed, the cumulative impacts of these residual impacts could potentially be large.*

11.6 AVIFAUNA

There are currently two approved Renewable Energy Facilities within 35 km of the Mulilo WEF Cluster based on the data using the REEA_OR_2024_Q3 (Figure 11-1).

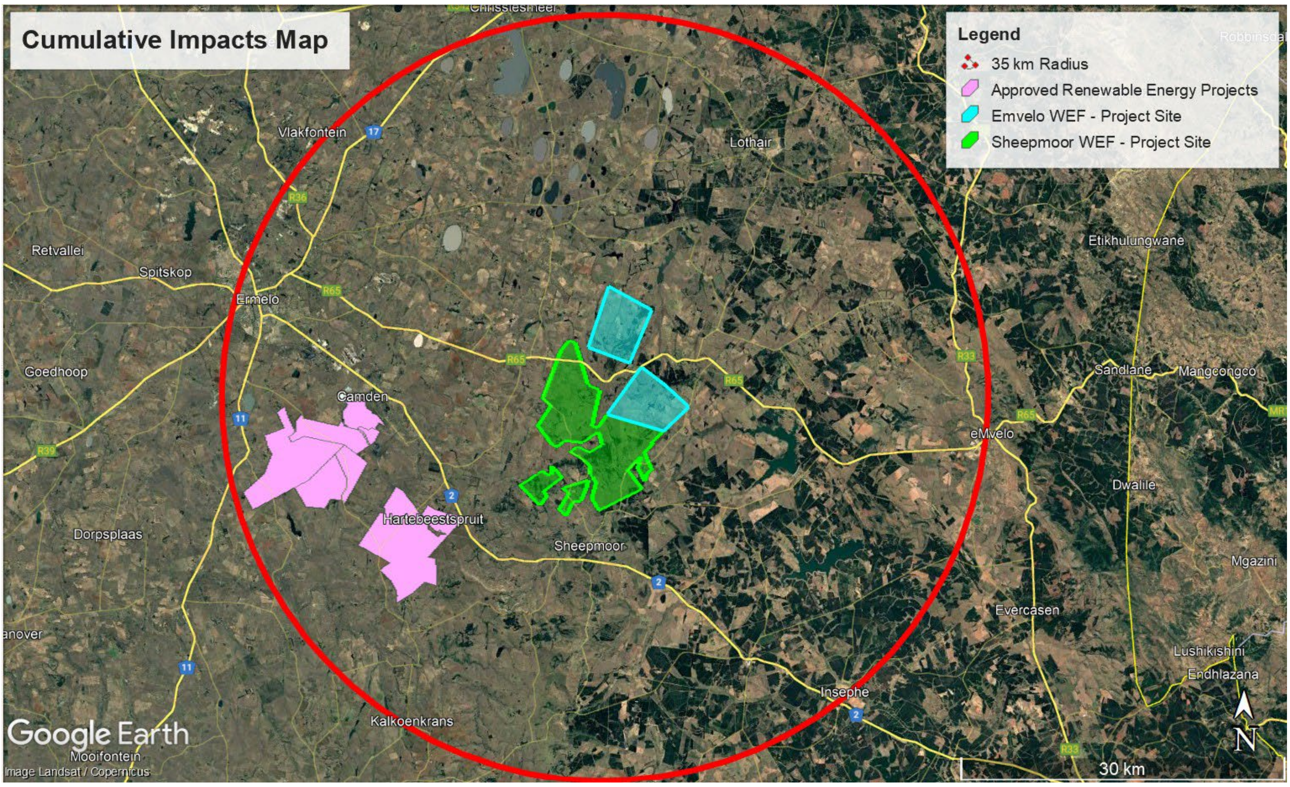
The maximum number of wind turbines which are currently proposed for the other wind farms which are located within a 35 km radius (i.e., Sheepmoor WEF, Camden I WEF and Camden II WEF) in similar habitat around the proposed Emvelo WEF is 152. None of these have been constructed to date, and each of the planned projects will still be subject to a bidding process where only the most competitive projects will obtain a power purchase agreement required for the project to proceed to construction. The Emvelo WEF will consist of 24 turbines, which brings the total number of potential turbines within the 35 km radius to 192. The 24 turbines of Emvelo WEF constitute 21% of the total number of planned turbines. As such, its contribution to the total number of turbines, and by implication the cumulative impact of all the planned turbines, is considered moderate to high.

The total land parcel area where renewable energy developments are planned, including the Emvelo WEF, amounts to approximately 268.3 km² (26,830 ha), which constitutes about 7% of the total area of similar habitat available to birds in the 35 km radius around the project. The cumulative impact of the planned wind energy projects at the time of writing is considered moderate as far as the creation of high-risk zones are concerned within the area contained in the 35 km radius.

The land parcel area of the proposed Emvelo WEF (46.5 km^2) amounts to about 19% of the total amount of land parcel area designated for renewable energy developments, but less than 2% of the total area available (3848 km2) in the 35 km radius. The contribution of the Emvelo WEF to the cumulative impact of all the renewable energy facilities is therefore moderate to low as far as potential displacement of priority species due to habitat transformation is concerned.

Figure 11-1 shows the location of all planned renewable energy projects within a 35km radius around the proposed Emvelo WEF. Refer to the impact table below for the cumulative impacts rating.

FIGURE 11-1 RENEWABLE ENERGY PROJECTS WITHIN A 35KM RADIUS OF THE PROPOSED EMVELO WEF.



Impact Phase: Cumulative						
Potential impact description: Cumulative Impacts on Birds						
	Extent	**Duration**	**Reversibility**	**Status**	**Magnitude**	**Probability**
Without Mitigation	National	Medium term	Reversible	Negative	High	Moderate
Score	4	3	1		4	3

Impact Phase: Cumulative						
With Mitigation	National	Medium term	Reversible	Negative	Moderate	Moderate
Score	4	3	1		3	3

Significance Calculation	**Without Mitigation**	**With Mitigation**
S=(E+D+R+M) *P	Moderate Negative Impact (36)	Moderate Negative Impact (33)
Can the impact be reversed?	Yes	
Will impact cause irreplaceable loss of resources?	No	
Can impact be avoided, managed, or mitigated?	Yes	

Mitigation measures to reduce residual risk or enhance opportunities:

- All mitigation measures listed in this report and recommended for other projects must be adhered to.
- The applicant and/or operational project company should proactively collaborate with other renewable energy operators in the area. Operational monitoring data must be shared with Birdlife SA.

Residual impact	A residual impact of medium negative significance is likely, as the cumulative impact is difficult to mitigate.

The are several existing HV lines in the 35 km radius around the proposed Grid Connection Project, of which about 300 km worth of OHL is contained in the 35 km radius (Figure 11-2). The sum of all the existing and planned HV lines in the 35 km radius amounts to an estimated 383 km, of which the proposed Emvelo WEF Grid Connection will constitute approximately 30 km, or about 8%. The contribution of the Emvelo WEF Grid Connection to the cumulative impact of all the grid connections and existing HV lines is medium. However, the combined contribution of all the grid connections to the cumulative impact of the HV lines in the 35 km radius, which is mainly collision mortality of priority species, is high. The cumulative collision impact of all the grid connections and existing HV lines in the 35 km radius is assessed to be high pre-mitigation and medium post-mitigation.

Impact Phase: Cumulative						
Potential impact description: Cumulative Impacts on Birds						
	Extent	**Duration**	**Intensity**	**Status**	**Magnitude**	**Probability**
Without Mitigation	National	Medium term	Reversible	Negative	High	Medium
Score	4	3	1		4	3
With Mitigation	National	Medium term	Reversible	Negative	Moderate	Medium
Score	4	3	1		4	3

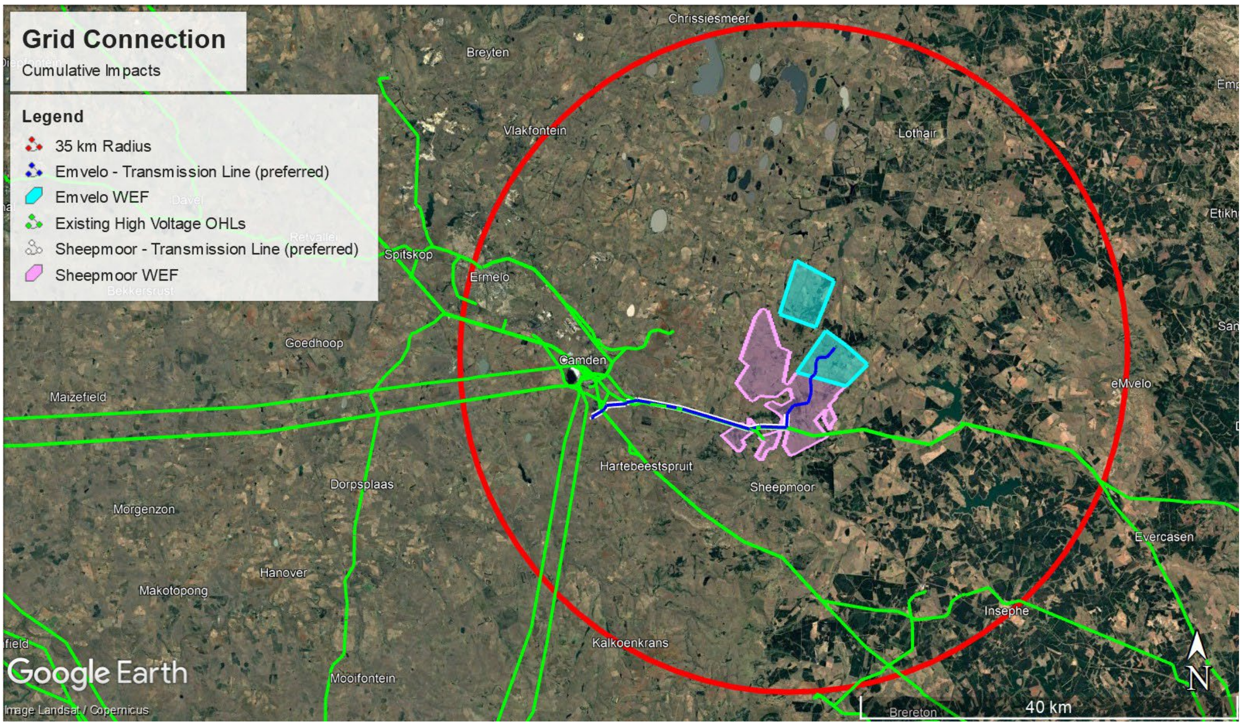
Significance Calculation	**Without Mitigation**	**With Mitigation**
S=(E+D+R+M) *P	Moderate Negative Impact (33)	Moderate Negative Impact (33)
Can the impact be reversed?	Yes	
Will impact cause irreplaceable loss of resources?	No	
Can impact be avoided, managed, or mitigated?	Yes	

Mitigation measures to reduce residual risk or enhance opportunities:

- All mitigation measures listed in this report and recommended for other projects must be adhered to.
- The applicant and/or operational project company should proactively collaborate with other renewable energy operators in the area. Operational monitoring data must be shared with Birdlife SA.

Residual impact	A residual impact of medium negative significance is likely, as the cumulative impact is difficult to mitigate.

FIGURE 11-2 PROPOSED RENEWABLE ENERGY PROJECTS WITHIN A 35 KM RADIUS AROUND THE PROPOSED EMVELO WEF.



11.7 BATS

Nature of the impact: CUMULATIVE IMPACTS					
Description of impact The total impacts resulting from the successive, incremental, and/or combined effects of the project when added to other existing, planned and/or reasonably anticipated future projects, as well as background pressures.					
	Extent (E)	**Duration (D)**	**Reversibility (R)**	**Magnitude (M)**	**Probability (P)**
Without Mitigation	3	4	3	4	5
With Mitigation	3	4	2	3	3
Significance Calculation	Without Mitigation			With Mitigation	
S=(E+D+R+M)*P	**High Negative Impact (70)**			**Moderate Negative Impact (36)**	
Was public comment received?	No				
Has public comment been included in mitigation measures?	No, no comments received				
Mitigation measures to reduce residual risk or enhance opportunities:					

Nature of the impact: CUMULATIVE IMPACTS	
The mitigation measures proposed in this report (buffering key habitats used by bats, use of appropriate lighting technology, blade feathering, and using smart curtailment and/or acoustic deterrents) should be applied to all future projects so that there is a collective management responsibility (IFC 2013).	
Residual impact	Curtailment and deterrents can successfully reduce bat fatality (Arnett 2011, Arnett et al. 2016, Weaver et al. 2020), but not completely. Through the application of fatality thresholds across all projects in the cumulative impact area, residual impacts should be minimized.

11.8 SOCIO-ECONOMIC

Local Services and Accommodation

The objective will be to source as many low and semi-skilled workers for the construction phase from the MM, specifically Ermelo. This will reduce the pressure on local services and accommodation in Ermelo. For a single WEF project ~ 200-250 workers may require accommodation. In the event of the construction phase for overlapping projects overlapping (2 or more), the total number of workers requiring accommodation would be between 500 and 600. The potential pressure on local services will depend on the number of locally based contractors and workers that are employed during the construction phase.

The potential impact should also be viewed within the context of the potential positive cumulative impacts for the local economy associated with the establishment of the proposed facility and associated renewable energy projects in the MM. These benefits will create opportunities for investment in the MM, including the opportunity to up-grade and expand existing services and the construction of new houses. Socio-economic development (SED) contributions also represent an important focus of the REIPPPP and is aimed at ensuring that the build programme secures sustainable value for the country and enables local communities to benefit directly from the investments attracted into the area. The proposed WEF is also required to contribute a percentage of projected revenues accrued over the 20-year period to SED. This will provide revenue that can be used by the MM to invest in up-grading local services where required. In should also be noted that it is the function of national, provincial, and local government to address the needs created by development and provide the required services. The additional demand for services and accommodation created by the establishment of development renewable energy projects should therefore be addressed in the Integrated Development Planning process undertaken by the MM.

Impact Phase: Operation					
Nature: The establishment of several renewable energy facilities and associated projects, such as the proposed WEF, in the MM has the potential to place pressure on local services, specifically medical, education and accommodation					
	Extent	Duration	Magnitude	Reversibility	Probability
Overall impact of the proposed project considered in isolation	Local	Short term	Low	N/A	Low Probability
Score	2	2	2		2
Cumulative impact of the project and other projects in the area	Local and regional	Medium term	Medium	N/A	Low Probability
Score	3	3	3		2
Significance		Low (12)		Low (18)	
Status		Negative		Negative	
Can impact be mitigated?		Yes			
Mitigation: 1. The proponent should liaise with the MM to address potential impacts on accommodation and local services.					

Local Economy

In addition to the potential negative impacts, the establishment of renewable energy facilities and associated infrastructure, including the proposed WEF, will also create several socio-economic opportunities for the MM. The positive cumulative opportunities include creation of employment, skills development and training opportunities, and downstream business opportunities.

The review of the REIPPPP (December 2021) indicates that to date (across BW1-4) a total contribution of R22.8 billion has been committed to SED initiatives. Assuming an even, annual revenue spread, the average contribution per year would be R1.1 billion. Of the total commitment, R18.5 billion is specifically allocated for local communities where the IPPs operate. With every new IPP on the grid, revenues and the respective SED contributions will increase. The potential cumulative benefits for the local and regional economy are therefore associated with both the construction and operational phase of renewable energy projects and associated infrastructure and extend over a period of 20-25 years. However, steps must be taken to maximise employment opportunities for members from the local communities in the area and support skills development and training programmes.

Impact Phase: Operation
Nature: Visual impacts associated with the establishment of more than one REF and the potential impact on the area's rural sense of place and character of the landscape.

Impact Phase: Operation					
	Extent	Duration	Magnitude	Reversibility	Probability
Overall impact of the proposed project considered in isolation	Regional	Long term	Low	N/A	Highly Probable
Score	3	4	2		4
Cumulative impact of the project and other projects in the area	National	Long term	High	N/A	Definite
Score	4	4	4		5
Significance		Medium (32)		High (60)	
Status (positive/negative)		Positive		Positive	
Can impacts be enhanced?		Yes			

Impact Phase: Operation					
Nature: No-development option would result in the lost opportunity for South Africa to improve energy security and assist to support with the development of clean, renewable energy					
	Extent	**Duration**	**Magnitude**	**Reversibility**	**Probability**
Without Mitigation17	Local-International	Long term	Medium	N/A	High Probability
Score	5	4	3		4
With Enhancement18	Local-International	Long term	Medium	N/A	High Probability
Score	5	4	3		4
Significance		Moderate (48)		Moderate (48)	
Status		Negative		Positive	

17 Assumes project is not developed

18 Assumes project is developed

Impact Phase: Operation	
Can impact be mitigated/enhanced?	Yes

Enhancement:

The proposed WEF should be developed, and the mitigation and enhancement measures identified in the SIA and other specialist studies should be implemented.

Residual impacts: Reduce carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change.

11.9 HERITAGE, ARCHAEOLOGY AND PALAEONTOLOGY

Impact Phase: Cumulative

Potential impact description: Graves/Cemeteries

- Any construction activity near human graves has the possibility of disturbing the remains.
- There may be more subsurface graves with no demarcation.

	Magnitude	**Extent**	**Duration**	**Status**	**Probability**	**Reversible**
Without Mitigation	High	Local	short term	Negative	Probable	Irreversible
Score	4	2	2	-	3	5
With Mitigation	Low	Local	Short term	Negative	Low probability	Irreversible
Score	2	2	2	-	2	5

Significance Calculation	**Without Mitigation**	**With Mitigation**
S=(E+D+R+M)*P	low negative Impact	Low negative Impact
Can the impact be reversed?	No. they are a finite resource. reburial is not an option	
Will impact cause irreplaceable loss or resources?	Yes. they are a finite resource	
Can impact be avoided, managed or mitigated?	YES	

Mitigation measures to reduce residual risk or enhance opportunities:

- Cannot be affected.
- 50m buffer from the edge.

- 20m visible demarcation if within 100m

Residual impact	high negative impact

Impact Phase: Cumulative

Potential impact description: 20^{th} century settlements without graves
Detailed description of impact
Abandoned settlements with no visible structures are destroyed

	Severity	**Extent**	**Duration**	**Status**	**Probability**	**Reversibility**
Without Mitigation	Low	Local	Short Term	Neutral	high probability	Irreversible
Score	2	2	2		4	5
With Mitigation	Low	Local	Short term	Neutral	Low probability	Irreversible
Score	2	2	2		2	5

Significance Calculation	**Without Mitigation**	**With Mitigation**
S=(E+D+R+M)*P	Low neutral Impact (22)	Low neutral Impact (22)
Can the impact be reversed?	No.	
Will impact cause irreplaceable loss or resources?	YES. No. They are a finite resource	
Can impact be avoided, managed or mitigated?	YES	

Mitigation measures to reduce residual risk or enhance opportunities:
- Once no graves are confirmed, then may be destroyed if the PPP has been approved …

Residual impact	Yes, but acceptable as of low negative significance

Impact Phase: Cumulative

Potential impact description: 20th century settlements with graves

Detailed description of impact

- Abandoned settlements with graves and no visible structures are destroyed

	Magnitude	**Extent**	**Duration**	**Status**	**Probability**	**Irreversible**
Without Mitigation	High	Local	short term	Negative	Highly probable	Irreversible
Score	4	2	2	-	4	5
With Mitigation	Low	Local	Short term	Positive	Low probability	Recoverable
Score	2	2	2	-	2	3

Significance Calculation	**Without Mitigation**	**With Mitigation**
S=(E+D+R+M)*P	Low negative Impact	Low positive Impact
Can the impact be reversed?	No. They are finite resource	
Will impact cause irreplaceable loss or resources?	YES. They are finite resource	
Can impact be avoided, managed or mitigated?	YES	

Mitigation measures to reduce residual risk or enhance opportunities:

- Graves cannot be affected
- 50m buffer from the edge
- 20m visible demarcation if within 100m…

Residual impact	*(for example: Yes, but acceptable as of low negative significance, or Yes, unacceptable high negative impact)*

Impact Phase: Cumulative						
Potential impact description: Palaeontology Fossils could be disturbed						
	Magnitude	Extent	Duration	Status	Probability	Irreversible
Without Mitigation	Low	Site	Long term	Negative	Low probability	Reversible
Score	2	1	4		2	1
With Mitigation	Low	Site	Long term	positive	Low probability	Reversible
Score	2	1	4		2	1
Significance Calculation		Without Mitigation			With Mitigation	
S=(E+D+R+M)*P		Low negative Impact (16)			Low positive Impact (16)	
Can the impact be reversed?		YES. Fossils could be reconstructed				
Will impact cause irreplaceable loss or resources?		YES. Fossils could be reconstructed				
Can impact be avoided, managed or mitigated?		YES. Chance Find Protocol				
Mitigation measures to reduce residual risk or enhance opportunities: • Chance Find protocol.						
Residual impact	Yes, but acceptable as of low negative significance					

Impact Phase: Cumulative						
Potential impact description: Ruins Ruins are protected by the NHA if they are older than 60 years in age. Loss of vernacular architecture Loss of historical middens						
	Magnitude	Extent	Duration	Status	Probability	Significance Confidence
Without Mitigation	High	Site	Long term	Negative	Highly probable	Irreversible
	4	1	4		4	5
With Mitigation	Low	Site	Long term	Negative	high probable	recoverable
	2	1	4		4	3
Significance Calculation		Without Mitigation			With Mitigation	
S=(E+D+R+M)*P		Low negative Impact			Low negative Impact	
Can the impact be reversed?		NO. It is a finite resource				
Will impact cause irreplaceable loss or resources?		YES. It is a finite resource				

Can impact be avoided, managed or mitigated?	YES

Mitigation measures to reduce residual risk or enhance opportunities:
- Should not be affected.
- Middens may need to be sampled or excavated
- Buildings need to be assessed by Built Environment specialist to determine architectural value
- Will require mapping, photography if affected

Residual impact	Yes, but acceptable as of medium negative significance

Impact Phase: Cumulative

Potential impact description: isolated stone walled kraals
Built structure to be damaged

	Magnitude	Extent	Duration	Status	Probability	Significance Confidence
Without Mitigation	High	Site	Long term	Negative	Highly probable	Reversible
Score	4	1	4		4	1
With Mitigation	Low	Site	Long term	negative	Highly probable	Reversible
Score	2	1	4		4	1

Significance Calculation	Without Mitigation	With Mitigation
S=(E+D+R+M)*P	Low negative Impact	Low negative Impact
Can the impact be reversed?	YES, Rebuild the structure elsewhere	
Will impact cause irreplaceable loss or resources?	YES. If is a finite resource	
Can impact be avoided, managed or mitigated?	YES	

Mitigation measures to reduce residual risk or enhance opportunities:
- mapped and photographed
- requires a permit

Residual impact	Yes, but acceptable as of low negative significance

Impact Phase: Cumulative						
Potential impact description: farm buildings Cultural landscape Vernacular architecture Historical buildings Historical middens Requires assessment by built environment specialist if to be damaged.						
	Magnitude	Extent	Duration	Status	Probability	Significance Confidence
Without Mitigation	low	Site	Long term	Negative	low probability	Reversible
Score	2	1	4		2	1
With Mitigation	Low	Site	Long term	positive	low probability	Reversible
Score	2	1	4		2	1
Significance Calculation			Without Mitigation		With Mitigation	
S=(E+D+R+M)*P			Low negative Impact (16)		low positive Impact (16)	
Can the impact be reversed?			YES. Buildings could be rebuilt			
Will impact cause irreplaceable loss or resources?			YES. It is a finite resource			
Can impact be avoided, managed or mitigated?			YES. Avoid the buildings and mitigate			
Mitigation measures to reduce residual risk or enhance opportunities: Should not be affected. Middens may need to be sampled or excavated Mapped and photographed Requires assessment from Built Environment specialist Will require a permit if to be damaged.						
Residual impact	Yes, acceptable low negative impact					

Impact Phase: Cumulative						
Potential impact description: Palaeontology Fossils could be disturbed						
	Severity	Extent	Duration	Status	Probability	Significance Confidence
Without Mitigation	Low	Site	Long term	Negative	Low probability	Reversible
Score	2	1	4		2	1
With Mitigation	Low	Site	Long term	positive	Low probability	Reversible
Score	2	1	4		2	1
Significance Calculation			Without Mitigation		With Mitigation	
S=(E+D+R+M)*P			low negative Impact		low positive Impact	

Can the impact be reversed?	YES. Fossils could be reconstructed
Will impact cause irreplaceable loss or resources?	YES. Fossils could be reconstructed
Can impact be avoided, managed or mitigated?	YES. Chance Find Protocol
Mitigation measures to reduce residual risk or enhance opportunities: Chance Find protocol.	
Residual impact	Yes, but acceptable as of low negative significance

11.10 VISUAL/ LANDSCAPE AND FLICKER

The cumulative impact of the Project is HIGH. The Emvelo WEF will be seen together with another proposed WEF's (Sheepmoor) that are planned. These, together with the proposed new transmission power lines running south and through the study area, as well as the existing Camdon power station and powerlines, contribute to the cumulative effect of power infrastructure in the sub-region.

The combined effect of proposed WEF project and the existing power infrastructure and associated infrastructure would cause a major change the nature, sense of study and character of the sub-region's landscape's baseline.

The significance of the cumulative impact of these projects on the visual environment during their operational phase is assessed to have a high magnitude and over the long-term. The probability of the unmitigated impact is high resulting in a predicted significance of impact as HIGH. The implementation of mitigation measures and that receptor sensitivity to the project is low could reduce the anticipated impact, to MODERATE.

Cumulative Impact: Visual and Sense of Place impact					
Description of Cumulative Impact: Change of the landscape characteristics and key views (visual intrusion and flicker effect) and change to the sense of place.					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Enhancement	Regional	Long term	Irreversible	High	Highly Probable
Score	4	4	5	4	4
With Enhancement	national	Long term	Irreversible	Moderate	Highly Probable
Score	4	4	5	3	4
Significance Calculation	Without Enhancement		With Enhancement		
S=(E+D+R+M)*P	High Negative Impact (64)		Moderate Negative Impact (60)		
Can Impacts be Enhanced?	No but can be managed at night by managing the red hazard lights on top of the turbines to be not continuous.				

Cumulative Impact: Visual and Sense of Place impact	
Enhancement: • Manage need for top of turbine red hazard lighting to only when a plane enters the affected airspace rather than be permanently lit. • Limit need for security lighting. • Use non-reflective materials. • Paint all other project infrastructure elements such as operational buildings, support poles etc. a dark colour. • Avoid bright colour/patterns and logos. • Maintain rehabilitated disturbed areas.	
Residual impact	*Yes, but it would be reduced once the turbines and associated infrastructure are removed and revert to the current cumulative infrastructure consisting of transmission lines, power station, etc.*

Impact Phase: Cumulative

Potential impact description: Late Iron Age settlements

Detailed description of impact

Archaeological site may be destroyed

	Magnitude	**Extent**	**Duration**	**Status**	**Probability**	**Irreversible**
Without Mitigation	Moderate	Local	long term	Negative	Highly probable	Irreversible
Score	3	2	2		4	5
With Mitigation	Low	Local	Long term	positive	Highly probable	Irreversible
Score	2	2	2		4	5

Significance Calculation	**Without Mitigation**	**With Mitigation**
S=(E+D+R+M)*P	Moderate negative Impact (48)	Moderate positive Impact (44)
Can the impact be reversed?	NO. Finite resource	
Will impact cause irreplaceable loss or resources?	YES. Finite resource	
Can impact be avoided, managed or mitigated?	YES. Salvage excavations	

Mitigation measures to reduce residual risk or enhance opportunities:

- Sites may be excavated
- PPP to ensure there are no claimants

Residual impact	(Yes, but acceptable as of low positive significance

FIGURE 11-3 CUMULATIVE EFFECT – MULILO WEF PROJECTS

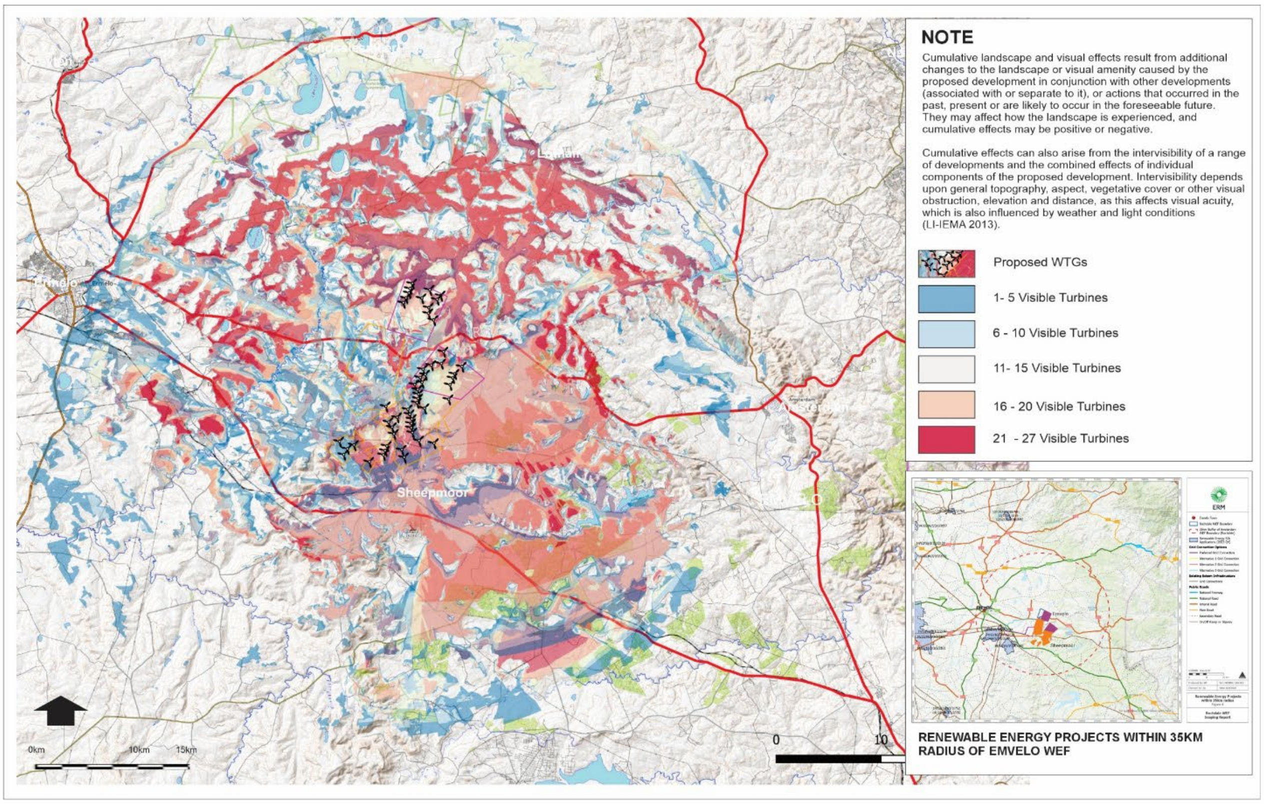


FIGURE 11-4 CUMULATIVE EFFECT VIEWSHED

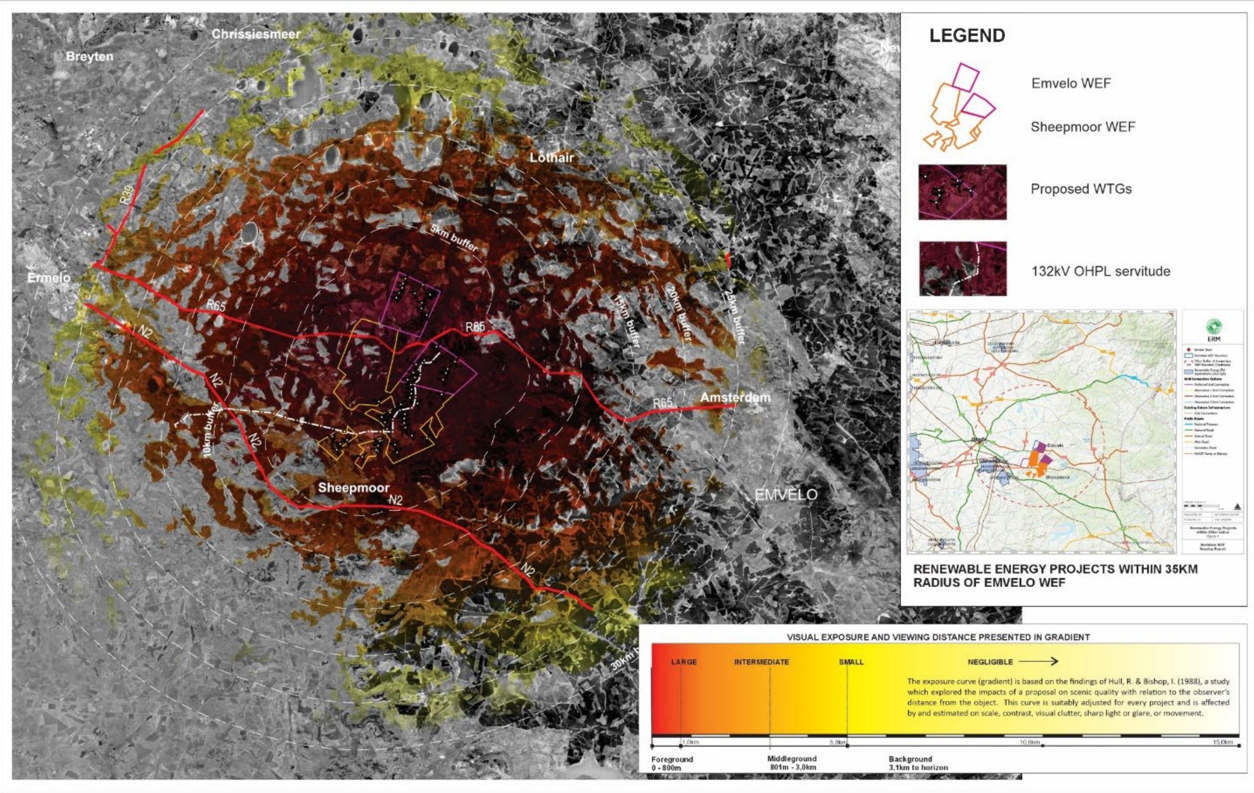
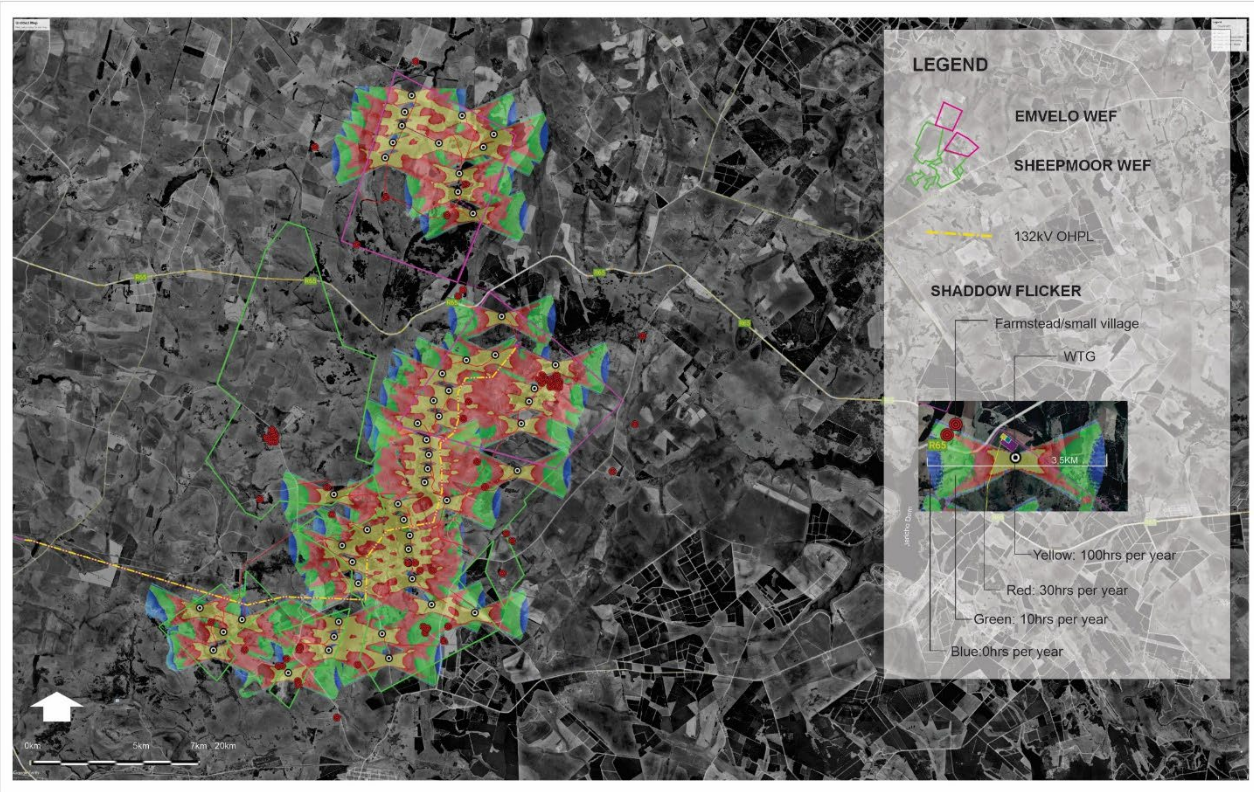


FIGURE 11-5 FLICKER ANALYSIS CUMULATIVE EFFECT



11.11 TRAFFIC AND CONSTRUCTION

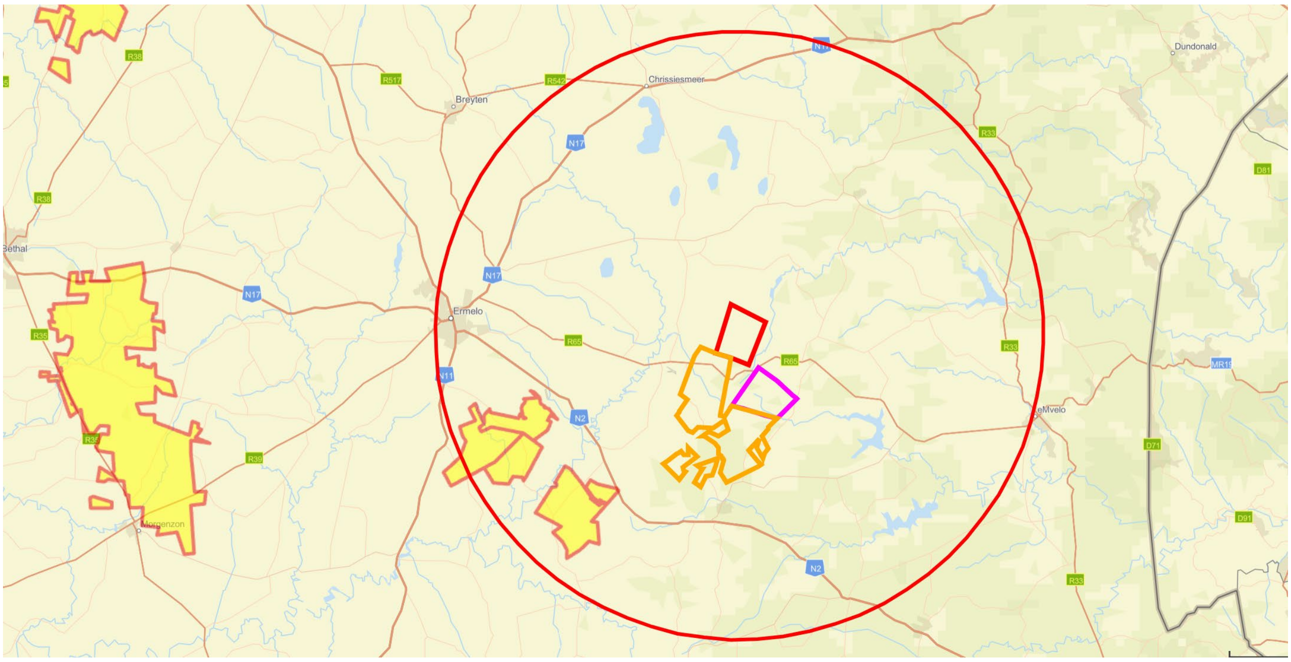
As per the NEMA EIA Reg GN R982 of 2014, in relation to an activity, cumulative impact means *"the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may be significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities".*

Table 11-1 and Figure 11-6 indicate wind and solar developments with an approved Environmental Authorisation or applications under consideration and proposed developments within 35 km of the proposed area. Cumulative impacts of these are assessed in the following subsections.

TABLE 11-1 WIND AND SOLAR DEVELOPMENTS WITH AN APPROVED ENVIRONMENTAL AUTHORISATION OR APPLICATION

Site No.	EIA Reference No	Classification	Status of Application
1	14/12/16/3/3/2/2134	Wind	Approved
2	14/12/16/3/3/2/2135	Wind	Approved
3	14/12/16/3/3/2/2136	Wind	Approved
4	14/12/16/3/3/2/2137	Wind	Approved
5 (Sheepmoor WEF 3)	N/A	Wind	Planned
6 (Sheepmoor WEF 2)	N/A	Wind	Planned
7 (Sheepmoor WEF 1)	N/A	Wind	Planned
8 (Emvelo WEF 1)	N/A	Wind	Planned
9 (Emvelo WEF 2)	N/A	Wind	Planned

FIGURE 11-6 WIND DEVELOPMENTS WITH AN APPROVED ENVIRONMENTAL AUTHORISATION WITHIN 35 KM OF THE PROPOSED EMVELO WEF



Cumulative Impact: Increase in general peak hour traffic volumes					
Description of Cumulative Impact: Increased traffic on the route and access points to site - Potential to be greater than what the existing road capacity of the local road network can handle in order to operate at an acceptable level of service. This impact relates to potential disruption of traffic on local, regional and national roads. The severity of the impacts will depend on the order of the road (how many lanes, lanes width, length, turns, etc.), the receiving environment and vicinity of land uses and towns. Additional traffic on the road network could result in changes to the operations of that road network, intersection capacity, such as increased congestion, delays, and accidents.					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Enhancement	Regional	Short Term	Recoverable	High	Highly Probable
Score	3	2	3	4	4
With Enhancement	Regional	Short Term	Recoverable	Moderate	Probable
Score	3	2	3	2	3
Significance Calculation	Without Enhancement		With Enhancement		
S=(E+D+R+M)*P	Moderate Negative Impact (48)		Low Negative Impact (30)		
Can Impacts be Enhanced?	YES				
Enhancement: Implementation of the Traffic Management Plan and Road Safety Measures Limit use of private cars Schedule development traffic movements to not coincide with existing peaks where possible Encourage use of public/staff transportation					

Cumulative Impact: Increase in general peak hour traffic volumes

Residual impact	*Moderate, but will be low if the mitigation measures are put in place.*

Cumulative Impact: Increase in abnormal traffic volumes

Description of Cumulative Impact: Additional heavy vehicles/E80's/Abnormal vehicles on the external road network- Potential to require additional road rehabilitation.
The impact of abnormal loads on public roads is expected to cause journey time delays and traffic congestion due to low travelling speeds of heavy vehicles transporting abnormal loads. These often occupy two standard traffic lanes and can potentially lead to incidents when travelling on single carriageways with a single lane per direction and without traffic police escorts.

Impact Status: Negative

	Extent	Duration	Reversibility	Magnitude	Probability
Without Enhancement	National	Short Term	Recoverable	High	Highly Probable
Score	4	2	3	4	5
With Enhancement	National	Short Term	Recoverable	Moderate	Probable
Score	4	2	3	3	4

Significance Calculation	Without Enhancement	With Enhancement
S=(E+D+R+M)*P	High Negative Impact (65)	Moderate Negative Impact (48)
Can Impacts be Enhanced?	YES	

Enhancement:
- Implementation of the Traffic Management Plan and Road Safety Measures
- Compliance to permissible heavy vehicle dimensions, permissible axle mass load on vehicles (no overloading)
- Transportation scheduling to consider the time of day when the abnormal loads would be moved
- Other alternative modes of transportation (rail where feasible) should be considered

Residual impact	*Moderate impact but will be low when the mitigation measures are implemented.*

Cumulative Impact: Deterioration of surrounding road network					
Description of Cumulative Impact: Heavy vehicle traffic during construction of the development is expected to cause additional wear and tear on the surrounding road network. Gravel access roads to the sites are also expected to sustain damage during the construction phase of the project. Abnormal loads can exert more pressure on road surfaces and infrastructure, leading to increased maintenance costs and reduced road network lifespan.					
Impact Status: Negative					
	Extent	Duration	Reversibility	Magnitude	Probability
Without Enhancement	Regional	short Term	Recoverable	High	Definite
Score	4	2	3	4	5
With Enhancement	Regional	Short Term	Recoverable	Moderate	Probable
Score	4	2	3	3	3
Significance Calculation	Without Enhancement		With Enhancement		
S=(E+D+R+M)*P	High Negative Impact (65)		Moderate Negative Impact (36)		
Can Impacts be Enhanced?	YES				
Enhancement: *Limiting the number and frequency of heavy and overloaded vehicles where possible* *Undertaking regular maintenance, rehabilitation and upgrading substandard pavement conditions*					

12. SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSIONS

12.1 SOIL AND AGRICULTURAL POTENTIAL

The overall conclusion of this assessment is that the proposed development offers a valuable opportunity for integrating renewable energy with agricultural production in a way that provides benefits to agriculture but leads to insignificant loss of future agricultural production potential.

The site is classified as ranging from low to very high agricultural sensitivity by the screening tool. This site sensitivity verification verifies those parts of the site that are indicated as cropland in this assessment as being of high agricultural sensitivity (or very high for irrigated cropland), and the rest of the site as being of medium agricultural sensitivity.

In general, the soils across more than half of the site have insufficient capability for viable crop production and those on the remaining proportion are suitable for viable cropping. Soil limitations that prevent crop production are predominantly the result of limited depth due to underlying bedrock, clay, or hardpan, or the result of poor drainage. The crop-suitable versus unsuitable soils have been identified over time through trial and error. All the deep, well-drained, suitable soils are generally cropped and uncropped soils that are used for grazing can fairly reliably be considered to have various limitations that make them unsuitable for crop production.

In general, the agricultural production potential of the site is high, and it is within an area that makes a significant contribution to food production in the country. Due to the favourable climate, crop yields are high on the suitable soils with average maize yields of around 7 tons per hectare according to the farmers on site.

An agricultural impact is a change to the future agricultural production potential of land. This is primarily caused by the exclusion of agriculture from the footprint of a development. In the case of wind farms, the amount of land excluded from agriculture is so small that the total extent of the loss of future agricultural production potential is insignificantly small, regardless of how much production potential the land has, and regardless of the duration of the impact. Furthermore, wind farms have both positive and negative effects on the production potential of land, and it is the net sum of these positive and negative effects that determines the extent of the change in future production potential. The positive effects are:

- increased financial security for farming
- improved security against stock theft and other crime
- an improved road network, with associated storm water handling system

Due to the facts that the proposed development will exclude agricultural production from only a very small area of land, and that its negative impact is offset by economic and other benefits to farming, the overall negative agricultural impact of the development (loss of future agricultural production potential) is assessed here as being of low significance and as acceptable.

Its acceptability is further substantiated by the following points:

1. The proposed development will also have the wider societal benefits of generating additional income and employment in the local economy.
2. In addition, the proposed development will contribute to the country's urgent need for energy generation, particularly renewable energy that has much lower environmental and agricultural impact than existing, coal powered energy generation.
3. All renewable energy development in South Africa decreases the need for coal power and thereby contributes to reducing the large agricultural impact that open cast coal mining has on highly productive agricultural land throughout the coal mining areas of the country. Furthermore, a reduction in coal power saves water resources and therefore potentially makes more water available for irrigated agriculture.

12.2 NOISE

This study considers the potential noise impact on the surrounding environment due to the construction, operational and future decommissioning activities associated with the Emvelo WEF. It makes use of conceptual scenarios to develop noise propagation models to estimate potential noise levels. It was determined that the potential noise impacts, without mitigation, would be:

- of a medium significance for the daytime construction of the access roads. Mitigation is recommended and measures are available that could reduce this significance to low;
- of a low significance for the daytime construction traffic passing NSR;
- of a medium significance (at one receptor) for the daytime construction activities (hard standing areas, excavation and concreting of foundations and the erecting of the WTG and other infrastructure) at the Emvelo WEF. Mitigation is recommended and measures are available that could reduce this significance to low;
- of a medium (at least seven locations) and high (at least one location) significance for the night-time construction activities (such as the pouring of concrete, erecting the WTG) at the Emvelo WEF. Mitigation is available to reduce the significance of the noise impact to low;
- of a medium significance for the daytime operational activities at the Emvelo WEF. Mitigation is available to reduce the significance of the noise impact to low;
- of a high significance for night-time operational activities (noises from wind turbines) at the Emvelo WEF when considering the worst-case PWL. Mitigation is available to reduce the significance of the noise impact to low; and
- of a low significance for the potential decommissioning activities.

There is a potential for a cumulative noise impact at one receptor.

The proposed layout (turbine placement) would only be acceptable with the selection of correct mitigation measures, which could include a combination of:

- Relocating a number of NSR where noise levels could exceed the recommended noise limits; and
- Reducing the noise emission levels (selecting a WTG with a lower sound PWL, using blade additions to reduce noise emission levels and potentially implementing a noise abatement plan during certain periods of time, wind speeds or meteorological conditions. Acoustic

treatment of residential dwellings should only be considered after other mitigation measures were considered.

The applicant could also change the layout (locating WTG further from NSR, or reducing the number of WTG within 1,000m from NSR) to mitigate the noise impact, though the applicant should re-evaluate the noise impact should:

- the layout be revised (as part of amendment process post EA) where any WTG, located within 2,500 m from a confirmed NSR, are moved closer to the NSR;
- the layout be revised (as part of amendment process post EA) where any new WTG are introduced within 2,500m from an NSR;
- the layout be revised (as part of amendment process post EA) where the number of WTG within 2,500m from an NSR are increased; and
- the applicant selects to use a WTG with a SPL higher than 114.0 dBA (re 1 pW).

The applicant should also develop and implement an environmental noise monitoring programme at selected NSR living within the 42 dBA noise contour.

It is proposed that the applicant recommend to landowners that:

- no new residential dwellings be developed within areas enveloped by the 42 dBA noise level contour, and
- structures located within the 45 dBA noise level contour should not be used for permanent residential purposed.

12.3 FRESHWATER AND WETLANDS (AQUATICS)

During this assessment, several sensitive aquatic habitats were observed and are shown in the maps provided in this report. Noteworthy areas, were then avoided by the required infrastructure, and include the main riverine and wetland systems, while the access roads could will make use of existing roads thus previously disturbed areas.

If this is carried out, then the specialist has no objection to the authorisation of the proposed activities assuming that all mitigations and buffer zones are implemented.

Mitigation should focus on these areas and include measures to halt erosion and rehabilitate habitat in the sections affected by the construction. Without the implementation of mitigation measures, the project has potential to cause a Moderate cumulative impact upon aquatic biodiversity. However, with the adoption of mitigation, the proposed project will have a Low impact upon aquatic biodiversity.

As the proposed activities have the potential to create erosion the following recommendations are reiterated:

- Vegetation clearing should occur in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment, and suitable dust and erosion control mitigation measures should be included in the generic EMPr, if not included already to mitigate.
- All construction materials including fuels and oil should be stored in demarcated areas that are contained within berms / bunds to avoid spread of any contamination / leaks. Washing and cleaning of equipment should also be done in berms or bunds, to trap any cement /

hazardous substances and prevent excessive soil erosion. Mechanical plant and bowsers must not be refuelled or serviced within or directly adjacent to any channel. It is therefore suggested that all construction camps, lay down areas, batching plants or areas and any stores should be located more than 50 m from any demarcated watercourses.

- It is also advised that an Environmental Control Officer (ECO), with a good understanding of the local flora be appointed during the construction phase. The ECO should be able to make clear recommendations with regards to the re-vegetation of the newly completed / disturbed areas along aquatic features, using selected species detailed in this report.
- All alien plant re-growth must be monitored and should these alien plants reoccur these plants should be re-eradicated. The scale of the operation does however not warrant the use of a Landscape Architect and / or Landscape Contractor.

It is further recommended from the project onset that all watercourse areas (inclusive of buffers) are included into any existing EMPr as reference, this to ensure a net benefit to the aquatic environment. This should from part of the suggested walk down as part of the final EMP preparation.

12.3.1 PERMIT REQUIREMENTS

Based on an assessment of the proposed activities and past engagement with DWS, the following WULs/ GA's could be required based on the following thresholds as listed in the following Government Notices, however ultimately the Department Water and Sanitation (DWS) will determine if a GA or full WULA will be required during the pre-application process (Phase 1):

	Water Use Activity	**Applicable to this development proposal**
S21(a)	Taking water from a water resource	Only water if water is abstracted from a local river or borehole
S21(b)	Storing water	If the total volume stored is greater than 40 000 m3 then a full Water Use License will be required. This is however unlikely due to the scale of the project and the need for such large volumes.
S21(c)	Impeding or diverting the flow of water in a watercourse	Yes – several new crossings of watercourses (i.e. activities within 500m of a wetland or 100m of a watercourse will be required. A GA process can potentially be followed if Risk Assessment Matrix indicates all impacts are LOW.
S21(d)	Engaging in a stream flow reduction activity	Not applicable
S21(e)	Engaging in a controlled activity	Not applicable
S21(f)	Discharging waste or water containing waste into a water	Not applicable

	Water Use Activity	Applicable to this development proposal
	resource through a pipe, canal, sewer or other conduit	
S21(g)	Disposing of waste in a manner which may detrimentally impact on a water resource	Not applicable – Only portable toilets will be required
S21(h)	Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process	Not applicable
S21(i)	Altering the bed, banks, course or characteristics of a watercourse	Yes – several new crossings of watercourses (i.e. activities within 500m of a wetland or 100m of a watercourse will be required. A GA process can potentially be followed if Risk Assessment Matrix indicates all impacts are LOW.
S21(j)	Removing, discharging or disposing of water found underground for the continuation of an activity or for the safety of persons	Not applicable
S21(k)	Using water for recreational purposes	Not applicable

12.4 TERRESTRIAL BIODIVERSITY (FLORA AND FAUNA)

The proposed Emvelo WEF site is comprised of several farm portions with a total area of approximately 7 020 Ha, of which the approximate total anticipated WEF footprint of 185 Ha will constitute 3.5 % of the farm area. The site is situated within a predominantly commercial farming area, generally comprising beef farming with dryland grazing and dryland pastures and crops including maize. Several coal mines are present in the broader landscape, as well as coal fired power stations. The area falls within a moderate to high summer rainfall area. Emvelo WEF is proposed to comprise 24 turbines with a maximum output capacity of up to 260 MW. The WEF will be located on ten (10) land parcels and will have an anticipated lifespan of 25 - 30 years. The final design which will be requested for approval in the EA, has been determined based on the outcome of the specialist studies undertaken for the EIA phase of the development. The proposed turbine footprints and associated facility infrastructure will cover an area of up to 185 ha after rehabilitation, depending on final layout design.

The proposed activity will require the clearing of more than 300 m^2 within a designated Critical Biodiversity Area and/or more than 1 Ha of indigenous vegetation and/or an activity in a watercourse in terms of EIA listing notices 1 and 3, hence as a minimum would trigger a Basic Assessment process. The project will also likely require clearing of more than 20 Ha of indigenous vegetation in terms of EIA listing notice 2, hence triggering a full Scoping and EIA process, as the site is not within any designated Renewable Energy Development Zone (REDZ). Additional listed activities that may pertain to the type of activity or other aspects that are not directly related to the terrestrial biodiversity features and risks have not been considered in depth.

Two vegetation units are primarily affected by the proposed project (Mucina & Rutherford, 2006). The site is located within Eastern Highveld Grassland (currently having an Endangered conservation status) and Wakkerstroom Montane Grassland (currently having a Least Concern conservation status). The Eastern Highveld Grassland tends to be associated with lower lying relatively flat areas, while the Wakkerstroom Montane Grassland is associated with higher elevation mountainous areas, particularly towards the central and south-east of the WEF cluster formed by a series of mountainous ridges as well as the eastern portions of the southern grid connection routes. Being situated on relatively flat areas with good soils and rainfall, the eastern highveld grassland has been subject to significant historical clearing for agricultural activities including pastures, fodder and crops.

One of the vegetation units (Eastern Highveld Grassland) present has an Endangered conservation status, being significantly transformed and highly fragmented regionally, as a result of historical agriculture, mining and rural/urban development, hence remnant intact vegetation patches will have an elevated sensitivity status. This unit generally occurs to the north and the east & west sides of the broader site. The other vegetation unit, comprising the central and southern parts of the site, has a Least Concern status and is not under threat now has high levels of transformation and fragmentation. In broad terms the Eastern Highveld Grassland is associated with flat plains having good soils, hence transformed for agriculture and forestry, whilst the Wakkerstroom Montane Grassland occurs on hill slopes and plateaus with poorer rocky soils. Irreplaceable and Optimal CBA areas are present as well as ESA local and landscape corridors that corresponds to the above remnant patches for Eastern Highveld Grassland as well as a representative portion of the Wakkerstroom Montane Grassland. Irreplaceable CBA areas should be avoided (No-Go), as per the applicable regional planning guidelines. Several rivers and wetlands surround the site or are present within the site boundary. Appropriate buffers to be considered, as per aquatic specialist assessment.

The Eastern Highveld Grassland vegetation unit has an Endangered status, indicating that more than 40% has been transformed and there will likely already be some loss or disruptions to ecological functioning which will be exacerbated by further loss. Further loss in remnant areas is not advisable as per the respective guidelines. All measures are taken to minimise this impact. Much of the indicated Eastern Highveld Grassland, comprising a portion of the historical coverage on the site in lower lying valleys, is already transformed as a result and/or comprised of secondary grassland due to historical cultivation. Wakkerstroom Montane Grassland in present in the southern and central area, having a Least Concern status and not under threat. As is evident from land-use coverages, the wider area is highly fragmented because of land-use, including agriculture, mining and urbanisation.

Intact vegetation on the site and surrounding sites is considered to be of conservation value, being generally designated either Irreplaceable or Optimal CBA with Other Natural Area (ONA) associated with transformed (cultivated) land, mostly associated with remnant Eastern Highveld Grassland, being designated Irreplaceable CBA. The degraded, secondary vegetation (old lands) and cultivated areas are generally not designated a CBA status but in some cases are designated ESA: local corridor or ESA: species specific. Specific reasons or sensitivities for these designations are not known at this stage but would require further investigation during the assessment phase to confirm current status and condition of designated areas. Land use guidelines indicates that Irreplaceable CBA sites must be avoided in terms of the mitigation hierarchy, however for Optimal CBA (referred to as Important and necessary in MBCP), the guidelines indicate that, although not desirable, if small-scale land-use change is unavoidable, it must be located and designed to be as biodiversity-sensitive as possible. Portions of the proposed grid connection corridors will also traverse some more extensive designated CBA: Irreplaceable areas. It is not anticipated that the actual footprint or loss within these areas will be significant due to the limited footprint of pylons as well as the corridors generally being near or within existing powerline corridors. ESA areas can accommodate loss, but ecological processes and connectivity must be given consideration.

Several perennial and non-perennial river, watercourses and wetland features occur within the site. These are addressed in more detail in the respective aquatic assessment reporting but are generally regarded as no-go areas as far as possibly in this assessment.

The site is also in proximity to several nature reserves and portions of the site are also designated as NPAES (National Protected Areas Expansion Strategy). Several Species of Conservation Concern are also potentially present that would require appropriate seasonal sampling. The specific type of development (Wind Energy Facility with grid connection and other associated infrastructure) tends to have a dispersed and relatively low footprint area in proportion to the overall project area, in comparison to for example an intensive project such as cultivation where larger areas require clearing. The activity will unlikely have any direct impact on any protected environment, other than where the grid connection will feed into the substation at the south-western end. Indirect and cumulative impacts may require further assessment relating to species and processes associated with protected areas in proximity to the site.

Transformed areas, primarily cultivated lands constitute 27.6 % and Montane Grassland 25.1 percent. Remnant intact Highveld Grassland only constitutes 16.8 % and 14.5 % comprises dense invaded thickets. The entire remining Highveld Grassland (782.1 Ha) on the site constitutes 0.002 % or the entire remaining extent of the vegetation unit (~380 000 Ha or 3 800 km2). Watercourses and wetlands have been delineated based on vegetation characteristics where they form distinct habitat. Being a terrestrial assessment, these might not include the smallest of aquatic features, which will be subject to the aquatic assessment protocols and outside the scope of this terrestrial biodiversity assessment. In terms of ecological processes, all watercourses, including these minor drainage lines, should still be avoided as far as possible, inclusive of buffers as per aquatic assessment. This landscape offers suitable habitat for a limited suite of animal species due to homogenous nature of the vegetation, although animals may have been displaced by to some extent in the grassland areas.

Vegetation is typical and representative of the vegetation unit. Exact composition and levels of disturbance are somewhat variable, dependant on various ecological factors, slope, aspect as well as historical and current land use and fire management practices. Due to having a low conservation status, the Montane Grassland would in principle provide a suitable footprint for the proposed activity, while intact Highveld grassland would provide less opportunity. The optimum approach is thus to limit loss of more sensitive habitat, and/or where unavoidable representative areas should be retained as ecological corridors.

Riverine areas should generally not be developed other than for crossings of linear features (access roads), including a 32 m watercourse buffer (or as per aquatic reporting). Where turbines may be in proximity to watercourses or wetlands or buffers, the laydown areas should be orientated away from rather than toward the watercourse (or buffer).

Critically Endangered flora species are likely not present, but Endangered species are known to occur in the vicinity and suitable habitat is present. It is likely that some sporadic clusters of species are present but will require specific footprint surveys during the final walkdown due the extent of the site. It is unlikely that the proposed WEF will pose any risk to Species of Conservation Concern as no substantial populations were found.

The final site visit was undertaken in mid-summer and proved to be a suitable season; however, the final site layout was not available at the time. All reasonable measures were taken to survey the range of habitat represented within the site; however, it is not feasible to sample 70 million square meter site with certainty. It is recommended that a final site walkdown be undertaken in order to inform the final layout design and inform micro0-siting of the footprints. Avoidance and Search and Rescue mitigation measures are deemed adequate to accommodate any small populations of Species of Conservation Concern that might not have been sampled and species that are Endangered or Critically Endangered are not deemed to be of significant concern. Most likely high-risk habitat, which includes remnant pockets of Highveld Grassland in good condition, wetlands and vleis, slopes and rocky outcrops on edges of plateaus have been identified and layout excludes these areas. Where suitable habitat is present (such as Montane Grassland in good condition) that is not excluded, is it deemed to be extensive to the extent that risks to any significant population will be low to negligible. The proposed development of the site for renewable energy provides a conservation opportunity, as it allows the farms to generate income without wide sale clearing of vegetation for agriculture with associated indirect impacts. This reduces the reliance of these farms on agriculture and high levels of utilisation. Furthermore, the development of a renewable facility will allow for the enhancement of any conservation opportunities that are identified during the ongoing construction and operational phases, for example protection of species of conservation concern and improvement of habitat, as outlines in the proposed trade off clearing of wattle thickets. These opportunities far outweigh any risks associated with loss of species of conservation concern, where measures will be in place to accommodate any specific issues during final layout design (walkdown) and construction (flora search and rescue). Wind Energy Facility projects pose a significantly different risk to terrestrial flora compared to other far more destructive development options including Mining, Agriculture (cultivation & high-density livestock), Forestry and Urban development, where extensive areas of habitat are cleared, and habitat is significantly fragmented. Wind Energy Facilities allow for very well-planned layout design and have specific measures at all stages of the development process to address ecological risks. Conservation objectives are highly compatible with Wind Energy development projects.

Specific faunal risks and mitigations are outlined in the respective faunal and avifaunal assessment reports. With including of the recommended buffers and mitigation measures overall risks to terrestrial biodiversity aspects are thus deemed to be low and within acceptable limits. Additional faunal species and risks as per separate faunal assessments, but buffers and measures are recommended to minimise these risks to acceptable levels within the terrestrial biodiversity context.

Extensive areas of impenetrable invasive tree thickets are present across the site, more extensive in the north. These are comprised of a range of primarily wattle species but also include some eucalyptus and pine. These infestations have a significant effect on natural vegetation and ecological processes. Site observations indicate that there are ongoing efforts to eradicate these infestations but is a slow process. Post removal burning of brushwood also has a negative impact on soil properties, which is not an idea approach for achieving a rehabilitation goal. Several less prominent exotic invasive and other weed species were noted within the site and surrounding area. Proliferation of weedy and exotic species often indicate disturbance especially during or after construction. During construction it is highly likely that species currently not on site could be introduced through the construction process.

Due to the elevated conservation status of Eastern Highveld Grassland, intact remnant pockets of vegetation would be deemed to have a high to very high sensitivity. Where intact patches overlap with designated CBA, they are generally designated very high and high for remining intact areas. Riparian vegetation is also categorised as very high sensitivity due to ecological value and irreplaceable habitat and should be considered No-Go. Natural and near natural Wakkerstroom Montane Grassland would be categorised as moderate sensitivity as it is not deemed irreplaceable. It should be avoided as much as possible and attention must be given to bioregional planning designations, but some loss will not pose a significant risk to the vegetation unit. Transformed habitat would be deemed to have a low sensitivity where no natural vegetation remains. The vegetation sensitivities indicated are based on a hierarchical approach, with high being the most sensitive and low being the least sensitive. The recommended approach will be to avoid higher sensitivity areas as far as is technically possible and prioritise moderate and lower sensitivity areas. The very high sensitivity riverine areas (and buffers) and irreplaceable Highveld Grassland should be avoided in terms of any footprints other than for minimal access road (including watercourse) crossings, which should also prioritise crossing watercourses where there is already disturbance (such as existing road crossings).

Potential No-Go areas would include all designated CBA (Irreplaceable) areas that are confirmed to be near natural or natural, as well as watercourses and wetlands, including any adjacent intact riparian vegetation and associated buffers (as per aquatic assessment). Any populations of Endangered or Critically Endangered species and/or important populations of r Vulnerable species, where relocation is not feasible, would also potentially be considered No-Go areas. No such areas were identified for flora (plant) species. In general, WEF footprints are limited in extend and are not likely to incur significant risks or losses.

A viable development footprint has been identified within the site. Most suitable areas to minimise biodiversity impacts would be transformed areas, including old lands and currently cultivated areas and degraded areas as well as Montane Grassland areas. As evident in the combined WTG sensitivity map, the optimised layout has largely accommodated the sensitivities and avoided as far as technically possible. Some residual crossings and turbines are within elevated sensitivity areas, but these are deemed to be acceptable and offset measures are prosed to accommodate this nominal loss. These nominal losses are unlikely to significantly compromise any ecological functioning nor conservation targets, as they constitute a very small proportion of both the site as well as the regional coverage or remaining extent of the vegetation. No turbines are situated within the watercourse buffers and the design mitigation strategy has eliminated several crossings from watercourses and buffers. Only necessary access road crossings, mostly along existing farm tracks remain, which are deemed acceptable.

A total of 14 or 24 WTGs are located within low sensitivity transformed habitat (cultivated and invaded). Of the remaining 10, 9 are located withi natural Montane Grassland (moderate sensitivity) and a single WTG (WTG 16) is situated within a small patch of degraded Highveld Grassland (Endangered, high sensitivity). This isolated patch of degraded highveld Grassland is surrounded by moderate to dense alien infestation and cultivated lands. Of those located in low sensitivity transformed or invaded habitat, 5 WTGs (WTGs 15, 11, 10, 5 & 3) are situated on edges or marginal to natural Highveld Grassland, where some loss of Highveld Grassland may occur, depending on final footprint configuration. The road network generally follows existing roads and tracks and invaded/cultivated areas as far as technically possible. Portions of roads are aligned within remnant Highveld Grassland but are mostly following existing roads. Assuming conservatively that each of the WTGs require clearing of 50 % of its footprint within natural Highveld Grassland and the total loss due to roads might be 10 Ha, a total loss of 12.5 Ha might be expected, although likely to be less. Since the entire remaining Highveld Grassland within the site is calculated at ~782.1 Ha, this loss represents only 1.6 % of the Highveld Grassland on the site and only 0.003 % of the entire remaining extent. The loss associated with this nominal footprint is thus negligible and not deemed to be significant and will not pose any risk to the conservation of the vegetation unit. Furthermore, the proposed recommended clearing of densely invaded areas of a 1:3 ratio (i.e. at least ~37.5 Ha) will more than adequately compensate for this loss. Furthermore, the management of the sites under an EMPr rather than just the status quo agriculture will provide management resources that will potentially benefit overall conservation significantly more than what the loss represents on the ground. The location of a single turbine in habitat that is categorised as high sensitivity is deemed acceptable as the specific patch is significantly degraded and isolated and has very limited, if any conservation potential.

Recommended clearing of alien invaded areas in a ratio of 1:3 for direct loss of natural grassland habitat (as a trade-off or offset), in conjunction with the mitigation measures below as well as post construction rehabilitation of the initial temporary disturbance footprint and implementation of a sound environmental management programme for the duration of the project lifespan can potentially and effectively result in a net positive impact. The loss of vegetation as a result of the loss of the expected project footprint (~185 Ha) is far outweighed by the potential improvement that can be achieved on the remaining habitat of the site (~7 000 Ha) through the positive management measures that can be implemented through the EMPr on farmland where there are currently no EMPr in place. With the implementation of the recommended mitigation measures as well as the layout design which has accommodated and avoided most of the important risk areas, all impacts are reduced to acceptable levels after mitigation. With the implementation of additional measures, such as clearing of dense alien wattle at a proposed ratio of 1:3, as well as implementation of an EMPr for the affected properties, it is expected that the overall terrestrial biodiversity impact in terms of loss of habitat can result in a net improvement of the site.

The proposed WEF is unlikely to have significant cumulative impacts, nor result in any unacceptable loss or risk to terrestrial biodiversity on the site or regionally, regardless of the other WEF projects proposed in the area, as the layout has been aligned with minimising impacts and avoiding key ecological processes. WEF facilities generally have a low-density footprint that can accommodate sensitivities, and the overall footprint area is small in comparison to the total coverage area. The current and future threats to the represented grassland vegetation units would be posed by large scale clearing of habitat, which is usually associated with Agriculture, Mining and Forestry as well as urban development and expansion.

As a gesture of sound environment management, a trade-off measure is recommended whereby alien vegetation clearing is undertaken at a 1:3 ratio for loss of natural Eastern Highveld Grassland and Wakkerstroom Montane Grassland that will result in a net improvement of total habitat across the site. Target areas should be identified during the final walkdown and calculated one the final design footprint is known. Suitable areas should be chosen in consultation with the landowner(s) in order to identify suitable areas that are not priority for future agriculture and where maximum ecological benefits can be attained. Recommended areas include the dense infestation on Emvelo in the vicinity of WTG2 8 – 12 as well as infested areas around WTG 14 around watercourses and on slopes and in the vicinity of WTGs 15 & 16. Preliminary calculations indicate an approximate area of 37.5 Ha for Eastern Highveld Grassland WTG and road loss and a further ~40 – 50 Ha for loss of Wakkerstroom Montane Grassland (road and WTG loss of natural grassland). Alternatively, the entire area (~80 - 90 Ha) can be allocated to clearing of dense alien infestation in Eastern Highveld Grassland. These areas must be selected in areas where future agriculture or cultivation is not proposed. In this instance the improved Highveld Grassland area will represent an area equivalent to ~11 % of the remaining Highveld Grassland on site, which is a significant conservation contribution that can be actively managed for the lifespan of the project.

12.5 FAUNA

The proposed wind farm development should not generate significant negative impacts on any of the faunal SCC flagged for this project once mitigation is followed. It is the specialists' opinion that the proposed development will have overall moderate negative impacts on faunal SCC, with some potential positive impacts, and therefore the proposed development can be approved in terms of the specific theme of this terrestrial animal species assessment: on the condition that all mitigation measures are implemented, including the avoidance of high sensitive areas, off-setting of high sensitive areas that are developed, and the implementation of an alien plant and Oribi management plans as stipulated here and in various other EMPrs (See Terrestrial Biodiversity and Botanical Impact Reports).

12.6 AVIFAUNA

WIND ENERGY FACILITY

It is imperative that the proposed 24-turbine layout be revised to avoid the recommended avifaunal no-go areas and turbine exclusion zones, including the rotor-swept areas. For detailed information on the exclusion areas, please refer to Section 6.5 below. The proposed Emvelo WEF is expected to have high and medium impacts on avifauna pre-mitigation, which must be addressed through appropriate mitigation measures to reduce the impact significance to an overall medium and low risk.

GRID CONNECTION COMPONENTS

The proposed Emvelo WEF Grid Connection will have a moderate impact significance on avifauna pre-mitigation which, in most instances, could be reduced to an overall low impact significance through the implementation of appropriate mitigation. From an avifaunal perspective, OHL Alternatives 1 and 2 are least preferred as they have the longest span and therefore pose a higher collision risk to birds. The Preferred OHL Alternative is preferred over OHL Alternative 3 as it avoids the 2.5 km No Disturbance Buffer around the Martial Eagle nest (coordinates provided on request).

In conclusion, the proposed WEF development and its associated electrical grid infrastructure is supported by this Specialist, provided that the implementation of mitigation measures as recommended in this report are strictly adhered to.

12.7 BATS

The first mitigation measure proposed to manage risk is to adhere to the no-go buffers which aim to spatially avoid impacts by buffering key habitat features used by bats. This measure is likely to be effective for most bat species recorded at the project, but additional mitigation measures are needed to avoid impacts to free-tailed bats, which forage high in the air, and to reduce residual impacts.

Turbine design can be effective, and it is recommended to maintain a minimum blade sweep of at least 30 m. However, free-tailed bats will still collide with turbine blades above this height and as such, the rotor diameter must be limited as much as practicable to minimize the space where collisions might occur. Additionally, blade feathering must be implemented to limit the rotation of turbine blades below the turbine cut-in speed when electricity is not being generated.

Mitigation measures to minimize residual impacts after the application of the above measures include smart curtailment and acoustic deterrents. As such, the project should consider the cost and feasibility of these measures. The residual impacts must be monitored using post-construction fatality monitoring for a minimum of two years (Aronson et al. 2020). Smart curtailment and/or acoustic deterrents must be used if this monitoring indicates that species fatality thresholds have been exceeded (MacEwan et al. 2018) to maintain the impacts to bats within acceptable limits of change and prevent declines in the impacted bat populations.

The overall impact to bats was assessed as moderate after the application of the mitigation measures proposed to avoid and minimize impacts to bats. However, on a species level, the project presents differential risk and impacts to bats must be managed adaptively during the operational phase, particularly for those species (e.g. Egyptian free-tailed bat and Cape serotine) for which high risk is predicted during some periods.

This adaptive management will be guided by the Environmental Management Programme for bats which must include the development of a Biodiversity Management Plan (BMP) to manage impacts to bats during the operation of the facility. The BMP for bats must be developed by a bat ecologist before the commencement of operation and must include the post-construction fatality monitoring plan design, fatality thresholds calculations and rationale (updated as required), and an adaptive management response plan that provides a timeous action pathway for mitigation, including roles and responsibilities, should fatality thresholds be exceeded. Provided these measures are adhered to, the project assessed can be approved.

12.8 SOCIO-ECONOMIC

The findings of the SIA study indicate that the proposed Emvelo WEF and associated components will create a number of social and socio-economic benefits, including creation of employment and business opportunities during both the construction and operational phase.

The findings of the SIA also indicate that the potential negative impacts associated with both the construction and operational phase are likely to be Low Negative with mitigation. The potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented.

RECOMMENDATIONS

- The proponent should, in consultation with the owner of Schiedam 274/2 investigate the opportunity to micro-site turbines 4, 5, 6, 7 and associated access roads, and the O&M site on Schiedam 274/2.
- The proponent should, in consultation with the owner of Schiedam 274/2 discuss the impact on wind turbines on the landing strip on Schiedam 274/2.
- Install radar activated civil aviation light system on wind turbines where technically feasible.

The establishment of the proposed Emvelo WEF and associated infrastructure is supported by the findings of the SIA.

12.9 HERITAGE, ARCHAEOLOGY AND PALAEONTOLOGY

A heritage survey was undertaken for the proposed Emvelo WEF. The desktop study noted sixty-three possible heritage sties. Most of these were farm labourers' settlements that could have graves Many of these sites occur in areas that will not be affected by the WEF and related infrastructure. The field survey recorded twelve heritage sites were recorded within the study area. Most of these sites will not be affected by the WEF. Those that are currently affected, can be mitigated by relocating the turbine.

The field survey also confirmed that most of the desktop settlements have human graves associated with them. A 50m sensitivity buffer should be placed around each of these for possible graves. Unfortunately, the black wattle has damaged most of these sites, while agricultural activity would have destroyed these sites.

One cemetery will be currently affected by the OHL. This section of the line will need to be moved west of the cemetery. Wind Turbine 21 is located on ROCH05. The turbine will need to be moved away from the site.

While the palaeontology is of very high sensitivity as it forms [part of the Vryheid formation, very few significant vertebrate fossils have been found in it. A Chance Find Protocol was initiated for the construction phase.

12.10 VISUAL/ LANDSCAPE AND FLICKER

The existing visual condition of the landscape that may be affected by the proposed Emvelo WEF and associated OHPL has been described. The study area's scenic quality has been rated high to low within the context of the sub-region. The Project site is in a moderate rated landscape type. Sensitive viewing areas and landscape types have been identified and mapped, indicating potential sensitivity to the Project, for users of the farmsteads, settlements, and towns and the R65 and the N2 roads.

Impacts on views are the highest when viewers are sensitive to change in the landscape, and the view is focused on and dominated by the change. The Project's visual impact will cause significant changes in the landscape that are noticeable to people viewing the Project.

Construction activities include the removal of vegetation, earthworks required to create building terraces for turbines and the preparation of the internal roads. Construction activities would negatively affect the landscape's visual quality and sense of place relative to its baseline. They would contrast with the patterns that define the structure of the immediate landscape and cause a significant change over a local to regional area, resulting in a moderate high change to key views. Mitigation measures are minimal with the greatest effect only at night.

Operational activities include the regular cleaning and maintenance, vegetation management under and around the turbines and powerline servitudes as well as maintenance of all other infrastructural components. Security lighting and other lighting associated with the movement of security vehicles at night. These activities along with the physical presence of the Project components day and night, constitute the visual impact.

Decommissioning and closure activities include the dismantling and removal of all infrastructure and the rehabilitation of the site back to its current, mostly natural, state.

SIGNIFICANCE OF VISUAL IMPACT

The significance of impact is based on the worst-case scenario and all project components taken together, i.e. WEF and OHPL.

CONSTRUCTION PHASE

The impact on the visual environment during the construction phase is assessed to have a potential medium severity over a regional area (but extend beyond the site boundary to at least at 10,0km) and would occur over the short-term (less than five years) resulting in a moderate consequence. The probability of the unmitigated impact is high resulting in a predicted significance of impact as MODERATE. The implementation of mitigation measures would not significantly reduce the anticipated impact, which would remain MODERATE

OPERATIONAL PHASE

The visual environment during the operational phase is assessed to have a high magnitude over a widespread area and would occur over the long-term (anticipated to be longer than 10 years). The probability of the unmitigated impact is high resulting in a predicted significance of impact as HIGH. The significance of a high impact is that it could have an influence on the decision, and the impact would be unacceptable unless it is effectively mitigated. Mitigation measures are feasible (specifically with regards night lighting, the location of turbines to avoid flicker on affected residential locations and the lack of I&AP concern of the project) and can reduce the visual impact over time. The impact with mitigation is predicted to reduce slightly to that of MODERATE.

DECOMMISSIONING PHASE

The impact on the visual environment during the decommissioning phase is assessed to have a medium magnitude over a local area and would occur over the short-term (less than five years) resulting in a low consequence. The probability of the unmitigated impact is high resulting in a predicted significance of impact as MODERATE. The implementation of mitigation measures would reduce the anticipated impact, but it would remain MODERATE.

CUMULATIVE EFFECTS

The significance of the cumulative impact of these projects on the visual environment during their operational phase is assessed to have a high magnitude and over the long-term. The probability of the unmitigated impact is high resulting in a predicted significance of impact as HIGH. The implementation of mitigation measures and that receptor sensitivity to the project is low could reduce the anticipated impact, to MODERATE.

It is the opinion of the Visual Specialist that the visual impacts associated with the proposed Project are of a nature, scale and duration that will require mitigation to slightly reduce the impact during the operational phase. It must also be noted that the I&APs did not consider visual and aesthetic concerns as an issue. The Visual Specialist believes that the impacts associated with the construction, operation and decommissioning phases can be mitigated from HIGH to MODERATE provided the recommended measures are effectively implemented in the short term and managed in the long term and that the site is effectively rehabilitated during decommissioning. **The project is deemed acceptable from a visual perspective.**

12.11 TRAFFIC AND TRANSPORTATION

Based on the information detailed in this report, the following conclusions are drawn:

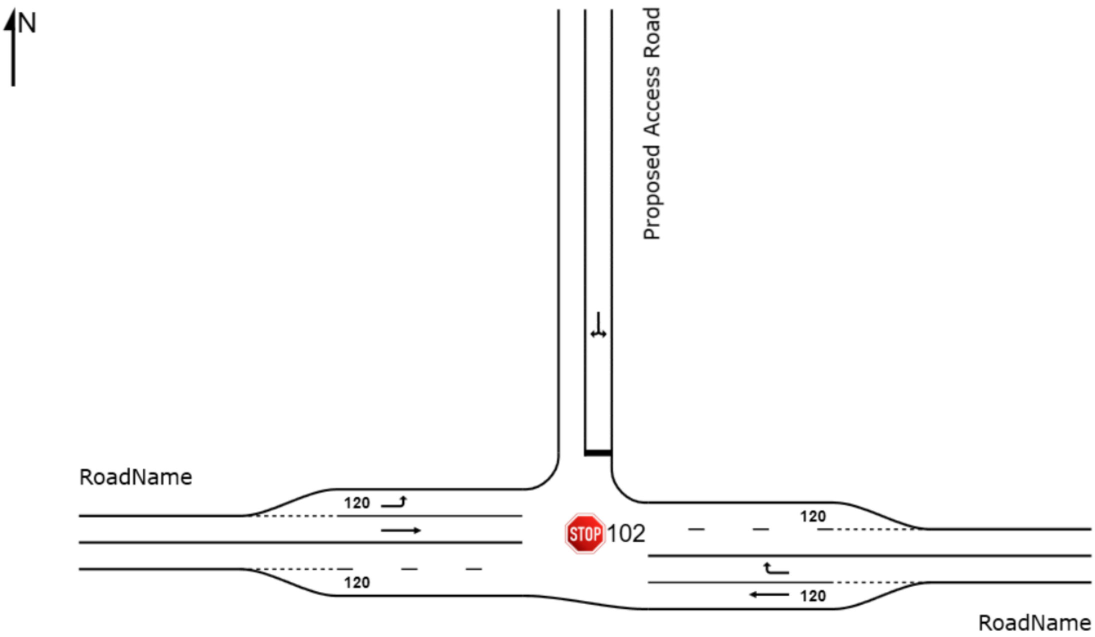
- **The proposed development and final layout can be supported from a traffic engineering point of view.**
- Given the findings of this report, it is recommended that the proposed development be considered favourably from a traffic engineering point of view as the intended construction will have no significant negative impact on the surrounding road network.

The following recommendations are made:

- A comprehensive route assessment of the entire transportation route to verify clearance, load bearing and sweeping radius distances is recommended.
- A comprehensive Traffic Management Plan (TMP) is recommended prior to the commencement of the construction phase and the operational phase based on the final development plan and construction schedule.
- The proposed Primary Site Access intersection R65 and D1264 is recommended as the main development access, based on the implementation of safety considerations and mitigation measures outlined in the report.

- It is recommended that the access point be priority controlled and widened to allow provision for acceleration lane and passing lane which will incorporate the turning characteristics of the expected abnormal vehicles. A standard upgrade is indicated below.

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



- Clearance permits will be required for the transport of the WT components. Full responsibility for the application of the permit and compliance with the permit conditions, lies with the carrier even if represented by an agent (Administrative Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads, Revision 4, May 2021, COTO-Committee of Transport Official).
- • It is recommended that applications for Abnormal Permits be lodged to the Department of Transport and Public Works, Eskom, and Telkom (where affected) at the time of construction. Full responsibility for the application of the permit and compliance with the permit conditions, lies with the carrier even if represented by an agent (Administrative Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads, Revision 4, May 2021, COTO-Committee of Transport Official)

13. IMPACT STATEMENT

The proposed Emvelo WEF has the potential to provide much needed renewable energy to the country's grid and play an important role in the Just energy Transition (JET) in Mpumalanga. The use of renewable energy to provide power to South Africa is supported at international, national, provincial and local level. Given South Africa's need for additional electricity generation and the need to decrease the country's dependency on coal-based power, renewable energy has been identified as a national priority, with wind energy identified as one of the readily available, technically viable and commercially cost-effective sources of renewable energy.

The impacts of the proposed development need to be viewed in the context of the country's energy mix and the negative externalities associated with the current dominant energy source of coal, often in areas of high potential soils, such as the Eastern Highveld, and the pollution that this form of energy generates. With this comparison in mind the impact of a wind energy facility is minimal compared to the damaging impacts of coal mining and coal-fired power generation. Indeed, wind energy is associated with positive externalities in the form of Economic Development benefits and the cheaper tariff at which it is bought. Therefore, in perspective, the impacts of the proposed facility can be motivated as necessary in decreasing the impacts in areas where agricultural potential plays a more significant role and in the role of externalities associated with power production.

The potential positive impacts associated with the proposed project is further recognised through the creation of jobs for the local community, and the positive contributions to the socio-economic development of the surrounding areas and local communities.

Should the proposed Emvelo WEF be developed, the actual physical footprint of the wind turbines and associated infrastructure will occupy a small area of land compared to the total project area. Livestock grazing and other agricultural activities can continue in parallel with the operation of the turbines. The project will have no significant impact in terms of loss of agricultural productivity. Should the mitigation measures identified by specialists and the recommendations of the EMPr be effectively implemented the negative impacts associated with the proposed project will be significantly reduced.

The negative impacts associated with the proposed Emvelo WEF are considered acceptable by the specialists, provided that all recommendations and mitigations are complied with and adhered to.

Taking into consideration the findings of the EIA process for the proposed development and the fact that recommended mitigation measures, which are feasible and implementable, have been used to inform the project design and preferred layout of the facility, it is the opinion of the EAP that the majority of negative impacts associated with the implementation of the proposed project have been mitigated to acceptable levels. While there are potential negative environmental impacts associated with the proposed development, the extent of the positive benefits associated with the implementation of the project in terms of renewable energy supply and positive local and regional economic impact are considered to outweigh the negative impacts. The EAP can therefore recommend the project for Enviornmantla Authoristation.

13.1 CONDITIONS TO BE INCLUDED IN THE ENVIRONMENTAL AUTHORIZATION

All specialist recommendations will be included in the EMPr. Any specialist conditions which must be considered during all phases of the development and / or not included in the EMPR, is provided below for the Department to consider should the development receive favourable Environmental Authorisation.

AGRICULTURAL

- A system of storm water management, which will prevent erosion on and downstream of the site, will be an inherent part of the engineering design on site. Any occurrences of erosion must be attended to immediately and the integrity of the erosion control system at that point must be amended to prevent further erosion from occurring there. As part of the system, the integrity of the existing contour bank systems of erosion control on croplands, where they occur on steeper slopes, must be kept intact.

Any excavations done during the construction phase, in areas that will be re-vegetated at the end of the construction phase, must separate the upper 40 cm of topsoil from the rest of the excavation spoils and store it in a separate stockpile. When the excavation is back-filled, the topsoil must be back-filled last, so that it is at the surface. Topsoil should only be stripped in areas that are excavated. Across the majority of the site, including construction lay down areas, it will be much more effective for rehabilitation, to retain the topsoil in place. If levelling requires significant cutting, topsoil should be temporarily stockpiled and then re-spread after cutting, so that there is a covering of topsoil over the entire cut surface.

- The agricultural protocol requires confirmation that all reasonable measures have been taken through micro-siting to minimize fragmentation and disturbance of agricultural activities. An aspect of wind farm layout that can cause unnecessary fragmentation of croplands is the location of turbine access roads within croplands. In this development, access roads have deliberately been laid out on existing roads and on the edges of croplands wherever possible, so that croplands are not unnecessarily fragmented.
- If linear infrastructure has been given exclusion from complying with certain requirements of the agricultural protocol because of its linear nature, the protocol requires confirmation that the land impacted by that linear infrastructure can be returned to the current state within two years of completion of the construction phase. The overhead power line is the only linear component of the project, to which this provision is applicable. It is hereby confirmed that the land under the overhead power line, where it is not occupied by other facility infrastructure, can be returned to the current state of agricultural production potential within two years of construction, with the obvious disclaimer that the pylons will continue to be present for the duration of the operational lifetime of the power line. The service and maintenance track underneath the power lines will also be present for the duration of the operational lifetime of the power line. However, no service and maintenance track needs to be kept within croplands because the cultivation ensures that the land remains accessible for maintenance without a track. The track therefore has no significant impact on agricultural potential underneath the lines.

NOISE

Construction Phase

Potential mitigation measures that could reduce the significance of construction noise impacts could include:

- The applicant should discuss the potential noise levels associated with road construction activities with NSR;
- The applicant can locate access roads further than 60 m from NSR.
- The applicant should add a component covering noise in the health and safety induction process. Employees and contractors should understand that noises could impact on the quality of living of people.
- Where possible, night-time construction activities closer than 1,000m from NSR should not be permitted;
- Considering potential future operational noise levels, the applicant can relocate certain NSR (such as NSR 64, 38, 65, 48, 41, 40, 47, 39, 43, 51, 50, 42, 56, 49, 46, 52, 44, 57, 53, 45, 58, 63, 54 and 55) where operational noise levels may also be high;
- The applicant can reduce the number of WTG closer than 800m from the identified NSR, or relocate WTG further from identified NSR where operational noise levels will be high (reducing the locations where construction activities may take place).

In addition, when construction activities are required closer than 1,000m from an NSR at night, the applicant should:

- Warning NSR of when construction activities may take place at night;
- Only allow construction activities at one WTG location (closer than 1,000m from an NSR). Simultaneous construction activities can take place at other WTG locations located further then 1,000m from an NSR; and
- minimise active equipment at night, planning the completion of noisiest activities (such a pile driving, rock breaking and excavation) during the daytime period.
- The following measures are also recommended for the applicant to discuss with the project contractor to implement in their environmental management programme:
- The potential noise levels associated with road construction activities must be discussed with the NSR staying within 120 m from any access roads, highlighting that the road construction / upgrading activities noises could be high at times but will be very temporary. It should be highlighted that construction traffic will be audible to clearly audible;
- If practical, road construction or upgrading activities (when working closer than 120 m from NSR) should ideally be planned for when NSR are not at home (children at school, adults at work or busy). Ideally work near NSR should be planned to take place between 08:00 and 14:00;
- Construction vehicles should reduce speeds to the minimum when passing NSR staying closer than 60 m from the road;
- NSR should be provided with the contact details of the environmental representative (Environmental Control Officer “ECO”) to register potential complaints about noise;
- Access roads passing within 120 m from NSR should ideally not be used at night by construction vehicles (trucks and heavy construction equipment).

- **Operation Phase**

Potential future construction and operational noise impacts must be addressed during the planning stage, as the costs implications will make the implementation of viable mitigation measures prohibitive. Measures that should be addressed during the planning stage include:

 - Considering potential future night-time operational noise levels, the applicant can relocate certain NSR (such as NSR 64, 38, 65, 48, 41, 40, 47, 39, 43, 51, 50, 42, 56, 49, 46, 52, 82, 44, 57, 53, 45, 58, 63, 54 and 55) where operational noise levels will be high;
 - The applicant can reduce the number of WTG closer than 800m from the identified NSR;
 - The applicant can relocate WTG further from identified NSR where operational noise levels will be high (reducing the locations where construction activities may take place);
 - Discussions with NSR at locations where night-time projected noise levels will slightly exceed the recommended night-time noise limit (45 – 48 dBA). NSR should be informed about the potential issues associated with long-term exposure to high noise level. If acceptable to the NSR, the applicant could consider the acoustic treatment of the dwellings to ensure compliance with Table 1 of SANS 10103. Each dwelling must be treated on a case-to-case base, as this option is mainly available to housing structures of proper construction (concrete or brick, with a roof with a ceiling space);
 - Together with a combination of the mitigation measures raised in points 1, 2, 3 and 4; the applicant can add noise reducing additions to the blades of certain WTG (such as serrated trailing edges);
 - Together with a combination of the mitigation measures raised in points 1, 2, 3, 4 and 5; the applicant can design and implement a noise abatement plan that would reduce the noise emissions from the WTG during certain times or conditions;
 - The potential mitigation measures should be modelled to ensure that the potential future operational noise levels will comply with the recommended and agreed noise limits; and
 - Once the mitigation measures above are selected and modelled, the applicant must design a noise monitoring program at representative NSR locations where the modelled worst-case noise rating levels exceed 42 dBA. This should include the measurement of ambient sound levels prior to the development of the WEF, followed by noise measurements once the WEF is operational to confirm that noise levels are less than 45 dBA.

It is the intention to manage noise levels during the Planning Phase, however, it may still be necessary to implement a noise abatement plan. If noise monitoring indicates that the measures designed during the planning stage do not adequately mitigate noise levels to be within acceptable levels, the applicant should design and implement a NAP that will further reduce the noise emission levels during certain wind speeds, wind directions, time periods or meteorological conditions.

FRESHWATER AND WETLANDS

- Vegetation clearing should occur in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment, and suitable dust and erosion control mitigation measures should be included in the generic EMPr, if not included already to mitigate.
- All construction materials including fuels and oil should be stored in demarcated areas that are contained within berms / bunds to avoid spread of any contamination / leaks. Washing and cleaning of equipment should also be done in berms or bunds, to trap any cement / hazardous substances and prevent excessive soil erosion. Mechanical plant and bowsers must not be refuelled or serviced within or directly adjacent to any channel. It is therefore suggested that all construction camps, lay down areas, batching plants or areas and any stores should be located more than 50 m from any demarcated watercourses.
- It is also advised that an Environmental Control Officer (ECO), with a good understanding of the local flora be appointed during the construction phase. The ECO should be able to make clear recommendations with regards to the re-vegetation of the newly completed / disturbed areas along aquatic features, using selected species detailed in this report.
- All alien plant re-growth must be monitored and should these alien plants reoccur these plants should be re-eradicated. The scale of the operation does however not warrant the use of a Landscape Architect and / or Landscape Contractor.
- It is further recommended from the project onset that all watercourse areas (inclusive of buffers) are included into any existing EMPr as reference, this to ensure a net benefit to the aquatic environment. This should from part of the suggested walk down as part of the final EMP preparation.

FAUNA

From a faunal perspective, and specific to this development, several key management aspects to help reduce impacts and add biodiversity benefits are required:

- Off-set areas to be determined for any high faunal sensitive areas that are to be developed; these should form part of a long-term conservation programme and to be determine by an off-set specialist.
- An alien plant management plan that would involve the continued removal and monitoring of alien plant growth within the project sites, starting at the construction phase and continuing into the operational and decommissioning phases.
- Oribi management plan to be developed by a faunal specialist that could involve, amongst other aspects, identifying important Orbi habitat within the project areas, monitoring of Orbi numbers pre-construction, during construction, operational, and the decommissioning phases. Monitoring should ideally continue at least once a year at an appropriate time of year throughout the operation phase. In addition, populations should also be monitored for 1–3 years post- decommissioning. Other aspects could include establishing a local Oribi working group, linking in with the national Oribi Working Group (OWG) and with the Endangered Wildlife Trust (EWT) (see Patel et al., 2021; Shrader et al., 2016). An Oribi management plan would be a strong mitigation measure to reduce impacts on this highly threatened antelope species.

- In conjunction with the above two management plans and considering that the grassland system is a fire-driven ecosystem, a fire management plan should be implemented.
- Any high faunal sensitive grassland habitat, or off-set areas, should be incorporated as part of a long-term conservation strategy, such as a stewardship programme. This would ensure that at the end-of-life of the project, positive biodiversity measures that have been implemented do not suddenly come to an end.

Numerous detailed measures, often at the site-level for individual turbines, for inclusion into the EMPr during the different phases are listed in the Terrestrial Biodiversity and Botanical Impact reports; these are supported here and recommended for inclusion.

TERRESTRIAL BIODIVERSITY

Site Preparation and Vegetation Clearing Plan

The following flora relocation plan is recommended for inclusion in the EMP and Flora removal permit applications:

- A pre-commencement flora relocation is recommended as several TNCO protected species are present within the proposed footprint.
- A pre-commencement fauna relocation is recommended. Several burrowing faunal species are present and will allow for relocation of less mobile species, although most faunal species in proximity are likely to vacate the area once earth moving equipment commences clearing and construction, however some species may require manual relocation.
- Topsoil must be stripped and stockpiled for replacement after construction of the site. Additional measures should be implemented to stabilise eroded areas where necessary.

Rehabilitation and Landscaping Plan

- On completion of construction, the surface of any work areas, especially if compacted due to hauling and dumping operations shall be scarified to a depth of at least 200 mm and graded to an even surface condition and the previously stored topsoil will be returned to its original depth over the area.
- The disturbed areas can be seeded with suitable local grass seed mix, usually available from a local farmer co-op, if deemed to be required as vegetation is likely to re-establish without input, as is typical in Karoid areas. Species composition of such grass seed mixes is best determined by what local indigenous species are locally, cost effectively and readily available. A mix of several species is recommended rather than a single grass species.
- Excavations may not be used for the dumping of construction wastes.
- Waste (non-biodegradable refuse) will not be permitted to be deposited in the excavations and must be disposed of appropriately.

Alien Vegetation Management Plan

Alien species must be removed from the site as per the National Environmental Management: Biodiversity Act (No. 10 of 2004) requirements. A suitable weed management strategy must be implemented in the construction phase and carried through the operational phase. Weeds and alien species must be cleared by hand before the rehabilitation phase of the areas.

Recommended that the removal of alien plants are to be done according to the Working for Water Guidelines.

Maintenance Management Plan

Ongoing maintenance is likely to be required in the long-term, which could include re-excavation of portions of the site for maintenance/replacement of defective components and repairs where applicable, which may include road, turbine footprint and buried infrastructure maintenance and excavation or infill within watercourse crossings.

All measures of this report, including the EMPr should be adhered for any such maintenance requirements. Any excavated areas must be stabilised and rehabilitated as per the measures indicated in this report.

AVIFAUNA

- A 2.5 km No-Go zone around the identified Martial Eagle nest should be implemented and maintained to reduce the risk of collision mortality and displacement due to disturbance.
- All wetland No-Go areas as identified by the Aquatic Specialist should be buffered by an additional 110 m on either side to reduce the risk of turbine collisions and to prevent the disturbance of priority species breeding and roosting in these areas. Priority species in this category include African Fish Eagle, African Grass Owl, African Marsh Harrier, Black-winged Pratincole, Blue Crane, Grey Crowned Crane, Long-crested Eagle, Marsh Owl, Yellow-billed Stork, and sensitive Species Number 23 (as listed by the National Screening Tool).
- All drainage lines should be buffered by 210 m on either side to reduce the risk of turbine collisions
- Mitigation in the form of Bird Flight Diverters on the OHL is required. The entire length of the OHL should be fitted with Eskom approved Bird Flight Diverters. BFD design specification should conform to types of devices that will be visible at night e.g. LED type bird flight diverters.
- Martial Eagle nest – A 2.5 km no disturbance buffer zone must be implemented around the nest. No construction activity should take place in this zone from March to December, which is the breeding season for these eagles.

BATS

A Biodiversity Management Plan (BMP) for bats must be developed by a bat ecologist before operations which includes the post-construction fatality monitoring plan design, fatality thresholds calculations and rationale (updated as required), and an adaptive management response plan that provides a timeous action pathway for mitigation, including roles and responsibilities, should fatality thresholds be exceeded.

SOCIO-ECONOMIC

- The Proponent Should, In Consultation With The Owner Of Schiedam 274/2 Investigate The Opportunity To Micro-Site Turbines 4, 5, 6, 7 And Associated Access Roads, And The O&M Site On Schiedam 274/2.
- The Proponent Should, In Consultation With The Owner Of Schiedam 274/2 Discuss The Impact On Wind Turbines On The Landing Strip On Schiedam 274/2.

- Install Radar Activated Civil Aviation Light System On Wind Turbines Where Technically Feasible.

HERITAGE, ARCHAEOLOGY AND PALAEONTOLOGY

- Any activity within 50m of a heritage site that cannot be affected will require that site to be clearly demarcated before any construction activity occurs.
- All possible graves should be treated as graves until proven otherwise. Any activity within 50m of a grave will require that grave to be clearly demarcated before any construction activity occurs.

TRAFFIC AND TRANSPORTATION

- A comprehensive route assessment of the entire transportation route to verify clearance, load bearing and sweeping radius distances is recommended.
- A comprehensive Traffic Management Plan (TMP) is recommended prior to the commencement of the construction phase and the operational phase based on the final development plan and construction schedule.
- The proposed Primary Site Access intersection R65 and D1264 is recommended as the main development access, based on the implementation of safety considerations and mitigation measures outlined in the report.
- It is recommended that the access point be priority controlled and widened to allow provision for acceleration lane and passing lane which will incorporate the turning characteristics of the expected abnormal vehicles. A standard upgrade is indicated below.

14. CONCLUSION

Based on the finding of the specialist studies, the information contained in this environmental impact assessment report and the evolution of the site development plan, it is the opinion of the EAP that the proposed development can be authorised, provided the above listing mitigation measures as well as those contained in the Draft EMPr are adhered to by the applicant.

APPENDIX A EAP DECLARATION OF INDEPENDENCE AND CV

Stephanie Gopaul

Principal Consultant

Stephanie Gopaul is an Associate Partner based in Durban, South Africa. She holds a science degree in engineering and environmental geology and Masters in Environmental Management. Stephanie started her career at the eThekwini Municipality and thereafter, served at GCS (Pty) LTD as an Environmental Scientist before joining ERM. Stephanie has more than fifteen years of experience in the field of environmental management consulting and is registered with Environmental Assessment Practitioners Association of South Africa (EAPASA) as an Environmental Assessment Practitioner (EAP).

Her fields of expertise include environmental permitting, environmental auditing, due diligence, feasibility studies and environmental risk assessments. Additionally, Stephanie has experience in closure planning and costing.

Stephanie has managed projects for several public and private sector clients in the oil and gas (upstream and downstream), power utilities, renewable energy, industrial, mining and transport sectors. Her particular focus and area of expertise is in the African context where she has managed various large-scale, multi-disciplinary and complex projects for companies including TotalEnergies, Shell, Impact Africa, Shearwater, Chevron, ENI, ExxonMobil, Equinor, Sasol, Anglo suite, ENGIE, etc.

Experience: 15 years' experience in environmental permitting, environmental management and project management.

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Cell phone: +27 65 666 0066

Professional Affiliations & Registrations

- IAIA SA
- Environmental Assessment Practitioners Association of South Africa (EAPASA)

Fields of Competence

- ENVID
- Environmental Impact Assessments/ Basic Assessments,
- Environmental Management Programmes,
- Environmental Audits and Due Diligence,
- Compliance Audits;
- Waste Management Licenses,
- Integrated Water Use License Applications,
- Integrated Water and Waste Management Plans,
- Environmental legal assessments;
- Environmental compliance monitoring,
- Mining and prospecting right applications,
- Public / stakeholder consultation and participation,
- Mine closure and closure cost estimations.

Education

- Masters in Environmental Management, University of the Free State, South Africa, 2012
- BSc. Environmental and Engineering Geology, University of KwaZulu Natal, South Africa, 2005

Additional Education

- Water Quality Monitoring Short Course - GCS

- Environmental Impact Assessment Training– Metamorphosis Environmental Consultants;
- Intermediate/ Advanced Excel (ExecuTrain);
- Conflict resolution (Elsie Van Der Merwe)
- Project Management- University of the Free State;
- Hazardous Waste Course- IWMSA (Institute of Waste Management of Southern Africa)
- Environmental Managers as Leaders, Managers and Change Masters- University of the Free State;
- First Aid- Titan Medical; and
- Defensive Driving Course- MasterDrive.

Languages

- English, native speaker

Key Industry Sectors

- Diversified Energy
- Offshore
- Manufacturing
- Chemicals
- Mining

Key Projects

Oil & Gas/ Offshore/ Marine

- **ExxonMobil Rovuma LNG Midstream project, Mozambique, 2023**
  Project Manager and EAP
  ExxonMobil's Rovuma LNG Project in Mozambique was redesigned with ESG in mind – lowering emissions through engineering and technology selection, reducing security risks by offshoring operations, investing in biodiversity and local communities. ExxonMobil's efforts ceased due to local insurgency, COVID pandemic and Force Majoue in the country and they took the opportunity to redesign the plant, including an option for CCS, potential to significantly reduce emissions as well as reduce reliance on the workforce. The current scope and includes work includes:
  1. Environmental Design Basis for the Area 4 midstream plant.
  2. Review of the contractor's Waste Management Philosophy
  3. Review of the contractor's Noise Management Philosophy
  4. Review of the contractor's Environmental Design Basis
  5. Review of a contractor's Acorn's Gap Analysis of the Area 4 Project
  6. Regulatory review of the Combines Cycle Power Plant
  7. Early Authorities Engagement (including impact screening) as part of an imminent update to the EMP
  8. Compilation of a Permitting Action Tracker for the midstream and Upstream Components
  9. Updates to 16 contractors Environmental Management Plans & 10 Socio-economic Management Plans

- **GeoPartners EIR for a 3D Seismic Survey - Offshore Angoche Basin, Mozambique, 2023**
  EAI technical Lead/ Reviewer
  The Angoche 3D Seismic Survey Project was characterized as a Category A activity, subject to a

full EIA process (including EPDA and EIR) in accordance with the Mozambican Regulations.

- **Sasol Expert Responding Affidavit on Review Application for Offshore Exploration Project, Block ER236 of the East Coast of South Africa, 2022**
  Project Manager and EAP
  Various applicants lodged a review application in the High Court of South Africa, against the Environmental Authorisation held by ENI and Sasol for offshore exploration in Block ER236 of the East Coast of South Africa. Duties as a project manager and EAP included preparing an expert affidavit in response to the review and co-ordinating the inclusion of the opinions of marine fauna experts, oil and gas subject matter experts, an underwater noise modelling expert, and a climate change expert. This also included collaboration with the clients, client's attorneys and the expert legal council.

- **Shell and Impact Africa Expert Responding Affidavit on Review Application for Offshore Seismic Survey, Transkei and Algoa Blocks, 2022**
  Project Manager and EAP
  Various applicants lodged a review application in the High Court of South Africa, against the exploration right held by Impact Africa on the Transkei Algoa blocks. Duties as a project manager and EAP included preparing an expert affidavit in response to the review and co-ordinating the inclusion of the opinions of marine fauna experts, oil and gas subject matter experts, an underwater noise modelling expert, and a climate change expert. This also included collaboration with the clients and the client's attorneys.

- **TotalEnergies Post Oil-spill Audit, Angola, TotalEnergies E&P Angola S.A.- Sucursal EM (TEPA), 2022**
  Project Manager
  Stephanie was responsible for co-ordinating the auditing and management of specialists and an in-country team to conduct a post-spill environmental audit and advise the company on corrective actions to improve prevention and response systems and to address possible environmental contamination and also assess the impact on the environment/response management.

  Coega LNG Redflags Reporting, ENVID/ HAZID, Stakeholder Mapping and Permitting Roadmap, South Africa, TotalEnergies, 2021
  Project Manager
  Stephanie managed the team to support TotalEnergies carry out a Quantitative Risk Assessment (QRA) in order to inform a series of proposed exclusion zones for the TOTAL Coega LNG (Liquefied Natural Gas) concept which TOTAL has proposed to the South Africa Department of Mineral Resources and Energy

- **Coega LNG Exclusion Zone Quantified Risk Assessment, South Africa, TotalEnergies; 2021**
  Project Manager
  Duties as project manager included client liaison, authority engagement, team management and project co-ordination, to deliver four key outputs (Redflags Reporting, ENVID/ HAZID, Stakeholder Mapping and Permitting Roadmap) necessary to confirm TotalEnergies risk assessment, identify mitigation measures, map key stakeholders and understand their expectations.

- **EMP for Multi-Client 3 D Seismic Survey, Transkei Basin, South Africa, Shearwater, 2021**
  Project Manager
  As project manager, Stephanie led the team that supported Shearwater who with a Reconnaissance Permit for an area of 22,000km2 in the West Transkei region, offshore Port Elizabeth in South Africa. As part of this permit the requirement was to develop an EMP for managing potential environmental impacts that may result from the proposed operations and notify and consult with affected parties.

- **Closure Certificate for Tugela South Offshore Block, South Africa, Impact Africa, 2021**

Project Manager
Impact Africa was supported in their application for a closure certificate for a portion of the Tugela South offshore block.

- **ExxonMobil Exploration and Production South Africa Limited, 2020**
  Project Manager
  Project managed, reviewed reporting and supported compilation of the audit Transkei Algoa Exploration EMPr audit.

- **Environmental Compliance Audit of the ER236 Exploration Right for Eni South Africa B.V, South Africa, 2020**
  Project Manager
  Managed the environmental compliance audit for the ER236 Exploration Right.

- **Environmental Compliance Audit for the Tugela South Exploration Right EMPr, South Africa, ExxonMobil Exploration and Production South Africa Limited, 2020**
  Project Manager
  Project managed, reviewed reporting and supported compilation of the Tugela South Exploration EMPr audit.

- **Environmental Compliance Audit (Close Out) for Deepwater Durban Exploration Right EMPr, South Africa, ExxonMobil Exploration and Production South Africa Limited, 2020**
  Project Manager
  Project managed, reviewed reporting and supported compilation of the Deepwater South Exploration EMPr audit.

- **Environmental Impact Assessment Appeal, South Africa, ENI, 2019-2020**
  Project Manager
  Managing ERM submissions to an appeal against the Environmental Authorisation. The appeal decision upheld the Environmental Authorisation.

- **Biodiversity Management Plan, ENI Kenya, 2020**
  Project Manager
  Managed the development of a Biodiversity Management Plan (BMP) as part of ESMP for drilling of the Mlima-1 exploratory well in L11B Block in offshore Kenya. This also included stakeholder engagement.

- **NEMA EIA License Renewal, ENI Kenya, 2020**
  Project Manager
  Project managed the NEMA EIA license renewal for the Mlima-1 exploratory well in L11B Block in offshore Kenya.

- **Environmental Impact Assessment for Offshore Exploration Drilling, South Africa, ENI, 2019**
  Project Consultant
  Contributing to the drafting of a Scoping and EIA Report and the management of specialists for an exploration drilling project, offshore South Africa. Additional support on this project included addressing appeal comments in collaboration with the ENI team and their appointed legal consultants.

- **Gas to Power EIA, South Africa, ACED, 2021**
  Environmental Assessment Practitioner
  Stephanie was the Environmental Assessment Practitioner (EAP) for the EIA for this Gas to power facility, Saldanha Bay in the Western Cape, South Africa

- **East Algoa Exploration Right EMPr Environmental Compliance Audit, South Africa, Equinor (formerly Statoil), 2020**
  Project Manager
  Project managed, reviewed reporting and supported compilation of the East Algoa Exploration EMPr audit.

- **Environmental Compliance Audit for Transkei Algoa Exploration Right EMPr, South Africa,**
  Project Manager
  Project managed, reviewed reporting and supported compilation of the Transkei Algoa Exploration EMPr audit.

- **Kroonstad Terminal ECO Audit, Chevron, South Africa, 2015**
  Project Manager
  Responsibilities included co-ordinating the monthly ECO site visits, reviewing the monthly ECO compliance audits and overseeing the compilation and submission of the annual compliance report.

- **Alrode Terminal ECO Audit, Chevron, South Africa, 2015**
  Project Manager
  Responsibilities included co-ordinating the monthly ECO site visits, reviewing the monthly ECO compliance audits and overseeing the compilation and submission of the annual compliance report.

- **On-Land Early Power Project, Department of Energy, South Africa, 2016**
  Project Consultant
  Responsibilities include compilation of the application form, Scoping Reports, EIA and EMPs for this Gas to Power Project, located in Richards Bay, KwaZulu Natal.

- **Floating Power Plant Project, Department of Energy, South Africa, 2016**
  Project Consultant
  Responsibilities include compilation of the application form, Scoping Reports, EIA and EMPs for this Gas to Power Project, located in Richards Bay, KwaZulu Natal.

- **Terminal Screening/ Scoping and EIA, Globeleq, South Africa, 2016 - ongoing**
  Project Consultant
  Responsibilities include compilation of the application form, Scoping Reports, EIA and EMPs for this Gas to Power Project, located in Richards Bay, KwaZulu Natal.

- **IPP Floating Power Plant, Department of Energy, South Africa, 2016 - ongoing**
  Project Consultant
  Responsibilities include compilation of the application form, Scoping Reports, EIA and EMPs for this Gas to Power Project, located in the Port of Richards Bay, KwaZulu Natal.

- **On-Land Early Power Project, Department of Energy, South Africa, 2016**
  Project Consultant
  Responsibilities include compilation of the application form, Scoping Reports, EIA and EMPs for this Gas to Power Project, located in Richards Bay, KwaZulu Natal.

- **Floating Power Plant Project, Department of Energy, South Africa, 2016**
  Project Consultant
  Responsibilities include compilation of the application form, Scoping Reports, EIA and EMPs for this Gas to Power Project, located in Richards Bay, KwaZulu Natal.

- **Terminal Screening/ Scoping and EIA, Globeleq, South Africa, 2016**
  Project Consultant
  Responsibilities include compilation of the application form, Scoping Reports, EIA and EMPs for this Gas to Power Project, located in Richards Bay, KwaZulu Natal.

- **Alrode Depot Basic Assessment, Chevron, South Africa, 2015**
  Project Manager
  Responsibilities included co-ordinating the project, reviewing the reports and overseeing the compilation and submission of the reports.

- **Mageza Feasibility and Conceptual Remedial Design, Sasol Oil, South Africa, 2014**
  Project Manager
  Responsibilities included managing and compiling a feasibility assessment and conceptual remedial design for the Mageza Filling Station based on the concept and associated costs of using wetlands for the removal of contamination.

- **Shell Gess Programme, Shell, South Africa, 2013 - ongoing**
  Project Manager

Responsibilities included managing various (ERM has been awarded over 400 to date) Shell Gess projects including Remediation Orders, Section 24G Rectification Processes, Environmental Licensing, Environmental Audits and Waste Management Licenses in terms of specialists co-ordination, public consultation, client liaison, report compilation and all financial aspects. List of selected Projects include:

1. Basic Assessment for the Construction of the Aerodrome Service Station;
2. Decommissioning Basic Assessment for Shell infrastructure at the AEL Modderfontein Site;
3. Bayhead Road Compliance Motivation;
4. Breede Valley Decommissioning Basic Assessment and ECO Audits;
5. Davenport Service Station Compliance Audit;
6. Combined Transport Section 30 Application;
7. Five Star Service Station Compliance Audit;
8. Glebe Service Station Compliance Audit and ECO;
9. Key Delta Basic Assessment Process and ECO Audit;
10. Assegai Motors Environmental Audit and EMP;
11. Bailey and Maile EMP;
12. Mondi Basic Assessment Process and ECO Audit;
13. Montrose Service Station ECO Audit;
14. Ntokozweni EMP and ECO Audit;
15. Philani Valley EMP and ECO Audit;
16. Masakhane Basic Assessment Process and ECO Audit;
17. Beverly Service Station Basic Assessment Process;
18. Diepsloot Basic Assessment Process;
19. Alberton Water Use License;
20. Bargain Wholesalers EMP;
21. Quatro EMP;
22. Summit Road Basic Assessment Process;
23. Wilie Street Basic Assessment Process;
24. Cosmo City Basic Assessment Process;
25. Caledon Depot Basic Assessment;
26. Witbank WULA;
27. Mvoti Service Station WULA;
28. Umfula Motors Basic Assessment Process;
29. Update of Dom Pedro EMP;
30. De Beers Kleinsee Decommissioning Basic Assessment Process;
31. AEL Modderfontein Decommissioning Basic Assessment Process;
32. Three Sisters Screening;
33. Western Cape Sites Screening;
34. Project Black Rhino Screening and AEL;
35. Section 24G Screening Assessment.

Renewables

- **Rheboksfontein Wind Energy Project- Part 2 Amendment, South Africa, ENGIE, 2021**
  Environmental Assessment Practitioner
  Reviewed reporting and served as the Environmental Assessment Practitioner on the Part 2 Amendment for the Rheboksfontein Wind Energy Project, Western Cape, South Africa.

- **Project Rhynbow (Green Hydrogen)- Ongoing Permitting Support and Steering Committee, South Africa, 2022 Ongoing**
  Confidential Project
  Stephanie is a member of the steering committee for a consortium set up for a heavy-duty hydrogen mobility project in South Africa.

- **Permits and Consent Screening for a Green Hydrogen Project, South Africa, Confidential Client, 2022**
  Stephanie was the project manager and co-author of a permitting and consents report for a green hydrogen, production and storage facility in South Africa.

- **Social, Environmental, Economic Context Analysis (SEECA) study, South Africa, Enel Green Power, 2021**
  Project Consultant
  SEECA study for the Sonneblom and Serurubele Solar PV projects, Free State, South Africa.

- **Goldfields Solar PV EIA, South Africa, ENEL Greenpower, 2017- 2019**

Project Consultant
Gold Fields in collaboration with Enel Green Power proposed a 40MW Solar PV Plant at the South Deep Gold Mine near Westonaria, Gauteng. My project responsibilities included compilation of the financial provisioning for closure and drafting certain sections of the EIA.

Marine Telecoms

- **EIA for the METISS Subsea Cable System e Landed in KwaZulu-Natal, South Africa, ASN, 2018 to 2020**
  Project Consultant
  Supported the project by engaging with authorities on the EIA, amendment considerations, coastal lease negotiations and routing aspects. Supported in a short-term project management capacity towards the end of the project.

- **Environmental Impact Assessment (EIA) Reports for 2 Africa Subsea Cable System, ASN, 2021- ongoing**
  Project Consultant
  The project involves complex reporting, permit application, consultations and project management for subsea cable system for multiple countries in West Africa. Stephanie provides support to the team on various legal, procedural, financial and contractual aspects as and when needed.

Other Industry

- **Basic Assessment for the Dow PUSH Project, Dow Southern Africa (Pty) Ltd, 2019**
  Project Manager
  Conducted a Basic Assessment process and obtained and Environmental Authorisation for the Dow Polyurethanes Systems House (PUSH) Expansion Project, in terms of the National Environmental Management Act No. 107 of 1998, as amended (NEMA) and the Environmental Impact Assessment Regulations, 2014 as amended.

- **Project Caterpillar Audit, Arista Environmental Audit, 2018**
  Project Manager & Auditor
  Completed the following tasks:
  - Review of the formal and informal management systems, mechanisms, policies and procedures in place for the management of EHS issues at the Sites, including organization, objectives, targets, training, performance monitoring and auditing, and staffing, including use of contractors. Review of EHS capital expenditure (CapEx) plans.
  - Review of sustainability issues in the Supply Chain.
  - A review of integrated environmental permitting requirements, conditions and improvement programmes, as applicable.
  - A review of integrated environmental permitting requirements, conditions and improvement programmes, as applicable.
  - A review of emissions to air (both point-source and fugitive) from the site, focusing on demonstration of compliance with the permit and abatement measures required to achieve compliance with current or anticipated future permit/ license/ consent conditions.
  - A review of direct risks in relation to climate change regulation, such as emissions trading programmes and other climate change related regulations and taxes.
  - Review of wastewater sources, treatment and discharge (including storm water, process wastewater and domestic / sanitary wastewater) together with a demonstration of compliance with permit / consent conditions.
  - Review of processes for the handling and storage of liquid and solid hazardous raw materials, intermediates and products. Review of principal waste types (hazardous and non-hazardous, liquid and solid), storage, handling and disposal practices (current and former, on-site and off-site), and a review of waste documentation and permitting.

- **Environmental Compliance Audit, Leggett and Platt Inc., 2018**

Project Consultant
Conducted an environmental compliance assessment at the L&P Springs Stanger facility, which included an evaluation of the facility's compliance with the national and local environmental requirements and practices. Environmental topics reviewed included environmental permitting, air quality, waste materials management, water management (supply, storage release), wastewater management, storage tank systems, PCBs, asbestos; and ozone depleting substances.

- **Vopak Growth 4 Basic Assessment, Vopak terminal, South Africa, 2017**
  Project Manager
  Responsibilities included managing the project in terms of processes co-ordination, authority and public consultation, specialist's co-ordination, report compilation and financial aspects.

- **AFROX CIBE, AFROX, South Africa, 2013- 2014**
  Project Manager
  Responsibilities included managing the project in terms of coordinating specialists, holding public consultation, acting as client liaison, report compilation and managing all financial aspects.

Mining

- **Anglo IFC Gap Analysis and PS Training to Mines, South Africa and Botswana, Anglo American and De Beers, 2020**
  Project Manager
  The project involved a gap analysis of national and local legislation applicable to the South African and Botswana mines against the IFC Performance Standards. A workshop was held to facilitate an interactive learning on how to achieve compliance with IFC standards and what actions should be prioritised. Further to this, ERM led training sessions at each of the mines on IFC Performance Standards, the gaps identified and how to identify and close out any gaps.

- **Hillside/ Mozal Closure Reports Update, South32, South Africa/ Mozambique, 2020**
  Project Manager
  Responsibilities include project managing all the tasks associated with updating the risk assessments and closure plans for the South 32 sites Mozal (Mozambique) and Hillside (South Africa).

- **Swartberg Part 2 Amendment, South Africa, Black Mountain Mining, 2021**
  Environmental Assessment Practitioner
  Reviewed reporting and served as the Environmental Assessment Practitioner on the the Swartberg Mine Expansion Project, Northern Cape, South Africa.

- **Jwaneng Mine Cut 9 Feasibility, Debswana, 2018**
  Project Co-ordinator/ Manager
  Responsibilities included managing the project from a schedule and financial perspective. Additional tasks included updating the Mine Closure (including rehabilitation) Plan as well as the Closure Cost Valuation and associated report.

- **Polihali Reservoir and Associated Infrastructure, (Lesotho), Lesotho Highlands Development Agency, 2018**
  Assistant Project Manager
  Responsibilities include input into the Inception Report, co-ordination of specialists in terms of field visits and their reporting, compilation of the Environmental and Social Impact Assessment and Environmental Management Plan.

- **Venetia Mine Waste Management Licence, De Beers, 2015-2017**
  Project Manager
  Responsibilities included managing the Waste Management Licence in terms of specialists' co-ordination, public consultation, client liaison, report compilation and all financial aspects.

- **Voorspoed Mine Closure Social Impact Assessment, De Beers, 2017**
  Project Manager
  Responsibilities included managing the project from a schedule and financial perspective. Additional tasks included compiling the environmental baseline and impact assessment.

- **Hillside/ Mozal Closure Costing, South32, South Africa, 2020**
  Project Manager
  Responsibilities include project managing all the tasks associated with closure modelling for 2 South 32 sites, namely Mozal and Hillside.

- **Bakubung Platinum Mine Conceptual Closure Plan, Wesizwe Platinum Limited, 2015**
  Project Consultant
  Compiled the Closure Plan for the Bakubung Platinum Mine located on the Western Limb of the Bushveld Igneous Complex, north of Rustenburg in the North West Province of South Africa. This Closure Plan has been defined to meet South Africa's regulatory requirements for mine closure.

- **Teranga Mine Closure Plan (IFC), Teranga Gold Corporation, 2015**
  Project Consultant
  Compilation of sections of the Mine Closure Framework and Mine Closure Plan in English for the Sabodala Gold Mine and regional exploration located in Senagal. The final documents were translated to French and submitted to the Government of the Republic of Senegal.

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

Proposed Rochdale Wind Energy Facility and Auxiliary Infrastructure, near Ermelo, within the Msukaligwa Local Municipality, and Gert Sibande District Municipality, Mpumalanga Province

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1. ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP) INFORMATION

EAP Company Name:	Environmental Resource Management Southern Africa (Pty) Ltd			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	1	Percentage Procurement recognition	135%
EAP name:	Stephanie Gopaul			
EAP Qualifications:	• Masters in Environmental Management, University of the Free State, South Africa, 2012 • BSc. Environmental and Engineering Geology, University of KwaZulu Natal, South Africa, 2005			
Professional affiliation/registration:	Registered Environmental Assessment Practitioner: Number 2020/2202			
Physical address:	Regus, Floor -3, 18 The Boulevard, Westway Office Park, Westville, Durban			
Postal address:	Regus, Floor -3, 18 The Boulevard, Westway Office Park, Westville, Durban			
Postal code:	3629	Cell:	+27 (0)65 666 0066	
Telephone:	+27105963506	Fax:		
E-mail:	stephanie.gopaul@erm.com			

The appointed EAP must meet the requirements of Regulation 13 of GN R982 of 04 December 2014, as amended.

2. DECLARATION BY THE EAP

I, _______Stephanie Gopaul___________________________, declare that –

- I act as the independent environmental assessment practitioner in this application;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I will take into account, to the extent possible, the matters listed in Regulation 13 of the Regulations when preparing the application and any report relating to the application;
- I undertake to disclose to the applicant and the Competent Authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the Competent Authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the Competent Authority, unless access to that information is protected by law, in which case it will be indicated that such information exists and will be provided to the Competent Authority;
- I will perform all obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I am aware of what constitutes an offence in terms of Regulation 48 and that a person convicted of an offence in terms of Regulation 48(1) is liable to the penalties as contemplated in Section 49B of the Act.

Disclosure of Vested Interest (delete whichever is not applicable)

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;

- ~~I have a vested interest in the proposed activity proceeding, such vested interest being:~~

Signature of the Environmental Assessment Practitioner

Environmental Resource Management Southern Africa (Pty) Ltd

Name of Company:

05 March 2025

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, ______**Stephanie Gopaul**____________________________swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

____
Signature of the registered Environmental Assessment Practitioner

Environmental Resources Management
Name of Company

05 March 2025
Date

____
Signature of the Commissioner of Oaths

05 March 2025
Date

COMMISSIONER OF OATHS (RSA)
LEANNE GIBBONS CA (SA)
Membership No: 08194702
7 Short Road
Walmer
Port Elizabeth
6070

ERM

APPENDIX B ENVIRONMENTAL MANAGEMENT PROGRAMMES

Environmental Management Programme

Proposed Emvelo Wind Energy Facility and associated Infrastructure, Mpumalanga Province

PREPARED FOR

Emvelo Wind Energy Facility (Pty) Ltd

DATE
March 2025

REFERENCE
0684401

DOCUMENT DETAILS

DOCUMENT TITLE	Environmental Management Programme
DOCUMENT SUBTITLE	Proposed Emvelo Wind Energy Facility and associated Infrastructure, Mpumalanga Province
PROJECT NUMBER	0684401
Date	March 2025
Version	01
Author	Kgotatso Maarman, Victor Mutavhatsindi & Eduard Drost
Client name	Emvelo Wind Energy Facility (Pty) Ltd

DOCUMENT HISTORY

				ERM APPROVAL TO ISSUE		
VERSION	REVISION	AUTHOR	REVIEWED BY	NAME	DATE	COMMENTS
01	001	Kgotatso Maarman, Victor Mutavhatsindi & Eduard Drost	Stephen Burton	Stephanie Gopaul	06/03/2025	Draft for Client consideration

SIGNATURE PAGE

Environmental Management Programme

Proposed Emvelo Wind Energy Facility and associated Infrastructure, Mpumalanga Province

0684401

Stephanie Gopaul
Partner and Registered EAP

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South Africa
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ACRONYMS AND ABBREVIATIONS

Acronyms	Description
ABC	Activity Based Costing
BARESG	Bird and Renewable Energy Specialist Group
BBBEE	Broad-Based Black Economic Empowerment
CARA	Conservation of Agricultural Resources Act
CBAs	Critical Biodiversity Areas
CEC	Community Engagement Committee
CHSSP	Community Health, Safety, and Security Plan
CoC	Code of Conduct
CRM	Conservation Risk Management
CSI	Community Social Investment
CSR	Corporate Social Responsibility
DAERL	Department of Agriculture, Environmental Affairs, Rural Development, and Land Reform
DBA	A-weighted Decibels
DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning
DFFE	Department of Forestry, Fisheries, and the Environment
DMRE	Department of Mineral Resources and Energy
DRP	Decommissioning and Restoration Plan
DWAF	Department of Water Affairs and Forestry
EA	Environmental Authorization
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EoL	End-of-Life

Acronyms	Description
ERM	Environmental Resource Management
ESAP	Environmental and Social Action Plan
ESM	Environmental and Social Manager
ESO	Environmental Site Officer
GN	Government Notice
H&S	Health and Safety
Ha	Hectares
HV	High Voltage
I&APs	Interested and Affected Parties
IAPs	Invasive Alien Plants
IFC	International Finance Corporation
IPWIS	Integrated Pollutant and Waste Information System
LV	Low Voltage
MC	Monitoring Committee
MPRDA	Mineral and Petroleum Resources Development Act
MSDS	Material Safety Data Sheets
MW	Megawatts
MWe	Megawatts electrical
NEMWA	National Environmental Management: Waste Act
NEMA	National Environmental Management Act
NFA	National Forests Act
NSR	Noise Sensitive Receptor
NWMS	National Waste Management Strategy
O&M	Operation and Maintenance
OHS	Occupational Health and Safety
OHSA	Occupational Health and Safety Act
PD	Project Director
PIA	Paleontological Impact Assessment
PV	Photovoltaic
S&EIA	Scoping and Environmental Impact Assessment
SABAA	South African Bat Assessment Association
SABS	South African Bureau of Standards
SANS	South African National Standards
SCADA	Supervisory Control and Data Acquisition

Acronyms	Description
SCC	Species of Conservation Concern
SDOD	Shut Down on Demand
SEA	Strategic Environmental Assessment
SED	Socio-Economic Development
SEP	Stakeholder Engagement Plan
SWMP	Storm Water Management Plan
TMP	Traffic Management Plan
ToR	Terms of Reference
ULM	Urban Land Management
WEF	Wind Energy Facility
WTG	Wind Turbine Generator

Glossary of Terms

Construction Phase: The activities pertaining to the preparation for and the physical construction of the proposed development

Contractor: Persons/organisations contracted by the Developer to carry out parts of the work for the proposed project

Engineer / Project Director (PD): Person/organisation appointed by the Developer to oversee the work of all consultants, sub-developers, contractors, residents and visitors.

Environment: The environment is defined as the surroundings within which humans exist and that are made up of – the land, water and atmosphere of the earth; micro-organisms, plant and animal life; any part or combination of (i) and (ii) and the interrelationships among and between them; and the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental and Social Manager (ESM) also known as the Environmental Control Officer (ECO): Person/organisation appointed by the Developer who will provide direction to the Principal Agent concerning the activities within the Construction site. The ECO will also be responsible to liaise with the independent auditor who will conduct an environmental audit during the construction phase of the project according to the provisions of the Environmental Management Programme.

Independent Auditor: The person or entity who will conduct an environmental audit during the construction phase of the project according to the provisions of the Environmental Management Programme and Environmental Authorisation.

Environmental Management Programme (EMPr): The EMPr is a detailed plan for the implementation of the mitigation measures to minimise negative environmental impacts during the life-cycle of a project. The EMPr contributes to the preparation of the contract documentation by developing clauses to which the contractor must adhere for the protection of the environment. The EMPr specifies how the construction of the project is to be carried out and includes the actions required for the Post-Construction Phase to ensure that all the environmental impacts are managed for the duration of the project's life-cycle.

Therefore the EMPr will be a working document, which will be reviewed when necessary, or if required by the authorities. A revision will be done once the detailed design of the proposed development has been completed.

Operational Phase (Post Construction): The period following the Construction Phase, during which the proposed development will be operational.

Pre-Construction Phase: The period prior to commencement of the Construction Phase, during which various activities associated with the preparation for the Construction Phase: detailed final designs, micro siting, etc. will be undertaken.

Rehabilitation: Rehabilitation is defined as the return of a disturbed area to a state which approximates the state (where possible) which it was before disruption. Rehabilitation for the purposes of this specification is aimed at post-reinstatement revegetation of a disturbed area and the insurance of a stable land surface. Revegetation should aim to accelerate the natural succession processes so that the plant community develops in the desired way, i.e. promote rapid vegetation establishment.

Site Manager: The person, representing the Contractor, responsible for all the Contractor's activities on the site including supervision of the construction staff and activities associated with the Construction Phase.

Project Area: This refers to the authorised area for the proposed development to take place. Farm portions numbers are outline in the EMPr.

Local Community: People residing or present in the region and near the construction activities, including the owners and/or managers of land affected by construction, workers on the land, and people in nearby towns and villages.

Public: Any individual or group concerned with or affected by the Project and its consequences, including the local community, local, regional, and national authorities, investors, workforce, customers, consumers, environmental interest groups, and the general public.

Construction Area / Site: The land on which the Project is to be located. It includes the site, construction campsite, access roads and tracks, as well as any other area affected or disturbed by construction activities. The EMPr (particularly the specifications for rehabilitation) is relevant for all areas disturbed during construction.

Access Roads and Tracks: All newly established roads and tracks, and areas cleared or driven over to provide access to/from the construction areas, and for the transportation of the construction workforce, equipment and materials.

Environmental Impact: The effect of an activity on the environment, whether desirable or undesirable. Undesirable or negative environmental impacts will result in damage and/or pollution of, or detriment to the environment, or in danger to the public, whether immediate or delayed.

Environmental Incident: An unexpected or sudden occurrence related to the Project, including major emissions, spills, fires, explosions, floods or erosion leading to serious or potentially serious negative environmental impacts.

Fugitive Dust: Can be defined as natural and/or human-associated dust becoming airborne due to the forces of wind or human activity.

Fauna and Flora / Plants and Animals: Any individual or group of micro-organisms, plants or animals.

General Waste and Construction Rubble: It includes waste paper, board, cardboard, benign organic and domestic waste and uncontaminated construction debris such as used bricks, wood, waste concrete, unused subsoil and rubble from excavations or demolished structures.

Heritage Sites and Artefacts: Heritage sites and artefacts can be defined as any object or site of cultural, historical, archaeological or palaeontological significance found in or on the land. Historical objects are objects older than 50 years with architectural, historical, scientific, cultural, social, spiritual, linguistic, technological or aesthetic value. For example: buildings or parts thereof, graves or burial sites, milestones, numismatic objects (i.e. coins and beads), and military objects.

Archaeological objects include material remains resulting from human activity which are older than 100 years and which are in a state of disuse, such as tools, artefacts, human and hominoid remains and artificial features and structures.

Palaeontological objects include any fossilised remains of animals or plants.

Hazardous Substances: Substances which are potentially dangerous and may affect human and/or environmental health. This would be because of the substances' inherent chemical and physical composition, which could be toxic, poisonous, flammable, explosive, carcinogenic or radioactive. Hazardous waste includes, but is not limited to: human excrement, the by-products and wastes associated will the use of hazardous substances (i.e. used fuel, oil, lubricants and solvents), as well as items such as spent batteries, old oil filters, light bulbs, tyres, circuit boards, etc. which requires special collection and handling. When left abandoned, even substances such as scrap metal, wire, tins, broken glass and plastic could be harmful to people, wild and domestic animals. For example: plastic could be ingested by animals; people and animals could be injured by broken glass or metal objects; and animals could get trapped in drums, tins and bottles or get entangled in plastic or metal wiring. Even if buried, such objects may become exposed over time due to wind erosion, scavengers or future human activities. Because of the sensitive nature of the area, these substances are all regarded as 'hazardous waste' for the purposes of this EMPr.

Hydrological Features: Hydrological features include, but are not limited to:

- wetlands;
- open water;
- vegetated drainage channels;
- subterranean water;
- marine environments;
- estuarine environments.

Life Support Systems: Life support systems include, but are not limited to: an ecological system in which its outputs are vital for sustaining specialised habitats; an ecological system in which its outputs are vital for sustaining human life (e.g. water purification).

Mitigation: Environmental management measures designed to avoid, limit or remedy undesirable environmental impacts.

Monitoring: Structured observation, measurement and evaluation of environmental data over a period of time to assess the efficiency of environmental mitigation and rehabilitation measures.

Rehabilitation: Measures implemented to restore a damaged Environment.

Sensitive Sites: Environmentally sensitive sites include, but are not limited to:

- Areas with high conservation value due to the presence of important plant specimens, pristine habitats, high biodiversity, important water resources or heritage features and artefacts;
- Areas particularly prone to erosion once disturbed (i.e. steep slopes);
- Vulnerable areas with low potential for rehabilitation / slow rate of recovery (i.e. rock outcrops, steep slopes); and
- Areas in close proximity of sensitive receptors, such as farm homesteads, viewpoints or tourist stopovers.

Specialised habitats: Specialised habitats include, but are not limited to, areas which are:

- Priority breeding habitats;
- Refuge areas;
- Vital for species survival (important for, part, or all of its life cycle);
- Essential for species performance;
- Cryptic habitats, etc.

EXECUTIVE SUMMARY

Emvelo Wind Energy Facility (Pty) Ltd ('the Project Applicant') is applying for EA to construct and operate the up to 260 MW Emvelo Wind Energy Facility (WEF) (the proposed Emvelo WEF) and its associated auxiliary infrastructure, which is includes one on-site substation, with capacity of up to 132 kV, to facilitate the connection between the WEF and the electricity grid. As well as an up to 132 kV over-head powerline of approximately 30 km (300 m corridor), traversing 19 land parcels, be constructed to connect the proposed WEF to the new Camden B substation.

Environmental Resources Management Southern Africa (Pty) Ltd ('ERM') has been appointed to act as the independent Environmental Assessment Practitioner (EAP) to undertake the Scoping and Environmental Impact Assessment (S&EIA) process for Environmental Authorisation under Chapter 5 of the National Environmental Management Act, 1998 (Act 107 of 1998 - NEMA) as amended, for the Proposed Development.

One additional WEF, namely Sheepmoor is concurrently being considered in the surrounding properties and is assessed by way of separate impact assessment processes contained in the 2014 Environmental Impact Assessment (EIA) Regulations (GN No. R982, as amended) for listed activities contained in Listing Notices 1, 2 and 3 (GN R983, R984 and R985, as amended).

Site location and proposed development description

The proposed Emvelo WEF is located approximately 30 km east of the town of Ermelo within the Msukaligwa Local Municipality, and Gert Sibande District Municipality, Mpumalanga Province.

The proposed Emvelo WEF will consist of the components listed below. It is important to note at the outset that the exact specifications of the project components will be determined during the detailed engineering design phase prior to construction (subsequent to the issuing of an EA, should such an authorisation be granted), but that the information provided below is seen as the worst-case scenario.

- Up to 24 wind turbines, with a maximum hub height of up to 150 m and a rotor diameter of up to 220 m.
- Temporary laydown areas which will accommodate the crane platforms and hardstand laydown area.
- Cabling between the turbines, to be laid underground where practical and feasible.
- One on-site substation with capacity of up to 132 kV to facilitate the connection between the WEF and the electricity grid.
- 132 kV over-head powerline of approximately 30km (300 m corridor).
- Internal roads (existing roads will be upgraded wherever possible).
- A temporary site camp establishment and concrete batching.
- Operation and Maintenance (O&M) buildings.
- Total permanent development footprint of up to 185 ha after rehabilitation.

The project is expected to have a 30-year life span, but with possible refurbishment this could be extended if deemed feasible at the time.

1. INTRODUCTION

Emvelo Wind Energy Facility (Pty) Ltd ('the Project Applicant') is applying for EA to construct and operate the up to 260 MW Emvelo Wind Energy Facility (WEF) (the proposed Emvelo WEF) and its associated auxiliary infrastructure, which is includes one on-site substation, with capacity of up to 132 kV, to facilitate the connection between the WEF and the electricity grid. As well as an up to 132 kV over-head powerline of approximately 30 km (300 m corridor), traversing 19 land parcels, be constructed to connect the proposed WEF to the proposed new Camden B Substation.

The proposed development is located approximately 30 km east of Ermelo within the Msukaligwa Local Municipality, and Gert Sibande District Municipality.

The Project Applicant appointed Environmental Resources Management Southern Africa (Pty) Ltd (ERM), to act as the Environmental Assessment Practitioner (EAP) and to undertake the Scoping and Environmental Impact Assessment (S&EIA) process for EA; in line with Chapter 5 of the National Environmental Management Act, 1998 (Act 107 of 1998 – NEMA), and the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended). It must be noted that the DFFE have granted permission for the inclusion of the electrical infrastructure into a single application with the Wind Energy Facility, but two Environmental Authorisations (one for the WEF and one for the electrical infrastructure) will be issued if the application is successful.

This EMPr is prepared as part of the requirements of the EIA Regulations promulgated under the National Environmental Management Act, 1998 (NEMA, Act 107 of 1998), as amended. The EMPr outlines measures to be implemented in order to minimise adverse environmental degradation associated with the various phases of the development. It serves as a guide for the contractor and the construction workforce on their roles and responsibilities concerning environmental management on site, and it provides a framework for environmental monitoring throughout the life cycle of the development, i.e., from Design phase until after Decommissioning phase.

This document must be seen as dynamic and be updated when and if required, throughout the lifecycle of the project.

1.1 Details of the Developer and the Environmental Assessment Practitioner

Details of the Developer (Applicant)	
Project Applicant	Emvelo Wind Energy Facility (Pty) Ltd
Company Registration	2021/770255/07
Contact Person	Lloyd Barnes
Postal Address	21st Floor Portside 5 Buitengracht Street, Cape Town, 8001

Details of the Developer (Applicant)	
Telephone	+27 21 685 3240
Email	lloyd@mulilo.com
Environmental Assessment Practitioner	
EAP	Stephanie Gopaul
Organisation	Environnemental Resource Management (Pty) Ltd
Qualifications	• Masters in Environmental Management, University of the Free State, South Africa, 2012 • BSc. Environmental and Engineering Geology, University of KwaZulu Natal, South Africa, 2005
Physical address	Regus, Floor -3, 18 The Boulevard, Westway Office Park, Westville, Durban
Postal address	As above
Postal code	3629
Telephone	+27105963502
Email	stephanie.gopaul@erm.com / erm.arcusamsterdam@erm.com

1.2 Purpose and Aim of this Document

An EMPr for the proposed development is required in terms of the Appendix 4 (Table 1.1) of the National Environmental Management Act, 1998 (Act 107 of 1998), EIA Regulations of 2014 (GNR 326), as amended.

According to the Western Cape's Department of Environmental Affairs and Development Planning (DEA&DP) Guideline for Environmental Management Plans (Lochner 2005), the over-arching objectives of an EMPr is *(1) to ensure compliance with regulatory authority stipulations and guidelines, (2) to ensure sufficient allocation of resources on the project budget, (3) to verify environmental performance through information on impacts as they occur, (4) to respond to changes in project implementation not considered in the EIA, (5) to respond to unforeseen events and (6) to provide feedback for continual improvement in environmental performance.*

The aim of this EMPr is to achieve the above objectives by:

- Defining the environmental management objectives to be realised during the life of the project, in order to enhance benefits and minimise adverse environmental impacts;
- Describing detailed actions needed to achieve these objectives, and mechanisms that address changes in the project implementation, emergencies and unexpected events;
- Clarifying institutional structures, roles, communication and reporting processes;
- Describing the link between the EMPr and associated legislated requirements; and
- Describing requirements for record keeping, reporting, review and auditing.

The purpose of the EMPr is to:

- Encourage good management practices through planning and commitment to environmental issues;
- Define how the management of the environment is reported and performance evaluated;
- Provide rational and practical environmental guidelines to:
- Minimise disturbance of the natural environment;
- Prevent pollution of land, air and water;
- Protect indigenous flora and fauna;
- Prevent soil erosion and facilitate re-vegetation;
- Comply with all applicable laws, regulations, standards and guidelines for the protection of the environment;
- Adopt the best practicable means available to prevent or minimise adverse environmental impacts;
- Identify and mitigate against any potential impact on ecology;
- Describe all monitoring procedures required to identify impacts on the environment; and
- Train employees and contractors with regard to environmental obligations.

This EMPr will be updated to include inputs from interested and affected parties (I&APs) during the public review and comment period. Moreover, it should be considered critical that the EMPr be updated to include site-specific information and specifications as required throughout the life-cycle of the facility - this will ensure that project activities are planned and implemented taking into account a changing environment and sensitive environmental features.

TABLE 1.1 CONTENT OF THE EMPR IN TERMS OF THE NEMA AND APPENDIX 4 OF THE EIA REGULATIONS, 2014 (AS AMENDED)

Appendix 4 Requirements NEMA, 1998 (Act No. 107 of 1998)		EMPr Reference
(1) An EMPr must comply with section 24N of the Act and include-details of		
(a)	*the EAP who prepared the EMPr; and* *the expertise of the EAP to prepare an EMPr, including a curriculum vitae;*	*Section 1.1*
(b)	*A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;*	*Section 3*
(c)	*a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitives of the preferred site, indicating any areas that should be avoided, including buffers;*	*Figure 2*
(d)	*a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment processed for all phased of the development including-* *planning and design;* *pre-construction activities;* *construction activities;* *rehabilitation of the environment after construction and where applicable post closure; and*	*Section 4 - 27*

Appendix 4 Requirements NEMA, 1998 (Act No. 107 of 1998)		EMPr Reference
	where relevant, operation activities;	
(f)	*a description of proposed impact management actions, identifying the manner in which the impact management outcomes and contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to- avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;*	*Section 4 - 27*
	comply with any prescribed environmental management standards or practices;	
	comply with any applicable provisions of the Act regarding closure, whre applicable; and	
	comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;	
(g)	*the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);*	*Section 4 - 27*
(h)	*the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);*	*Section 4 - 27*
(i)	*an indication of the persons who will be responsible for the implementation of the impact management actions;*	*Section 4 - 27*
(j)	*the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;*	*Section 4 - 27*
(k)	*the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);*	*Section 4 - 27*
(l)	*a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;*	*Section 4 - 27*
(m)	*an environmental awareness plan describing the manner in which- the applicant intends to inform his or her employees of any environmental risk which may result from their work; and risks must be dealt with in order to avoid pollution or the degradation of the environment; and*	*Section 4 - 27*
(n)	*any specific information that be required by the competent authority.*	*Section 4 - 27*

2. THE PROPOSED EMVELO WEF PROJECT DISCRIPTION

2.1 Emvelo WEF Components

2.1.1 Wind turbine generators and hardstand areas

The proposed Emvelo WEF will comprise up to 24 turbines with a maximum combined output capacity of up to 260 MW with an anticipated lifespan of 30years.

The turbines will be three-bladed horizontal-axis design with a Wind Turbine Generator (WTG) hub height from ground level is anticipated to be up to 150 m, with a blade length and rotor diameter of up to 110 m and 220 m respectively. The height of the complete structure is approximately up to 260 m. The exact turbine model has not yet been selected and will be identified based on the wind resource distribution, technical, commercial and site-specific considerations. Update 1ha per WTG hardstand

2.1.2 Electrical cabling and on-site substation

It is proposed that an on-site substation with a capacity up to 132 kV with an up to 33 kV underground cables will be installed where technically feasible. As well as an up to 132 kV over-head powerline of approximately 30 km (300 m corridor). Due to the complexity related to the routing of the transmission line, it will not form a part of this application. The intention is for the internal project cabling to follow the road network to the on-site facility substation.

The on-site substation is expected to have a footprint of 2.5 ha. It will be used to facilitate the connection to the national grid. The turbines will be connected to the on-site substation using an underground cabling network with a capacity of up to 33kV.

2.1.3 laydown areas and site offices

Individual turbine temporary laydown areas including crane boom laydown areas of up to 45 ha, blade laydown areas and other potential temporary areas will be up to a maximum of 6 ha. The temporary warehouse and site camp establishment, as well as the concrete batching plants will have a footprint of up to 2 ha. As such, the footprint of the construction laydown area will be up to 185 ha in aerial permanent extent.

2.1.4 internal site Access roads

Permanent roads will be up to 15 m wide to be rehabilitated to up to 12 m, with a servitude of up to 15 m, which includes additional space required for cut and fill, side drains and other stormwater control measures. Furthermore, the servitude will be used as turning areas and vertical and horizontal turning radii to ensure safe delivery of the WTG components. Internal roads will provide access to each turbine, the on-site substation hub (which includes substation infrastructure and Balance of Plant area). All roads may have underground cables running next to them. The 15 m wide road servitude will be temporarily impacted during construction and rehabilitated to up to 12 m wide after construction.

2.2 Service Provision

2.2.1 Health and Safety

The IFC guidelines for Health and Safety are based on the Occupational Health and Safety Act (OHSA) of America and are subsequently aligned with South African legislation (OHS Act no 85 of 1993). It is understood that the project infrastructure and equipment will be designed to good industry standards to minimise risks personnel working at the proposed development site.

Emvelo (Pty) Ltd will institute a Health and Safety (H&S) Plan prior to construction, for all persons working at the proposed development site. The policy will need to evaluate the risks and impacts to the health and safety of the affected community during the design, construction and operation of the proposed development, and establish preventive measures to address them in a manner commensurate with the identified risks and impacts within this assessment. Such measures need to adhere to the precautionary principle for the prevention or avoidance of risks and impacts over minimization and reduction.

2.2.2 Water Requirements

Water will be sourced from either the Local Municipality, supplied from a contractor and trucked in, from existing boreholes located within the application site or from a new licensed borehole (if feasible) if none of these options are available. Note, however, that should municipal water supply not be confirmed, the Applicant will investigate other water sources considering any necessary and relevant legal requirements.

High water use is only anticipated during the first twelve months of the construction phase mainly for purposes of the turbine foundations, roads and dust suppression. Thereafter the water usage will decrease drastically. The anticipated water usage for the proposed development for the duration of the construction phase includes the following:

- Drinking;
- Ablution facilities;
- Access Road construction;
- Dust suppression;
- Fire-fighting reserve;
- Cleaning of facilities; and
- Construction of foundations for the WEF infrastructure, i.e., turbines and substation, etc.

The water use requirement during the operational phase will be primarily for human consumption and sanitation purposes.

2.2.3 Stormwater Management

Stormwater drainage systems will be constructed and kept separate from the sewerage effluent system on site to ensure that stormwater run-off from site is appropriately managed. Water from these systems is not likely to contain any chemicals or hazardous substances and will be released into the surrounding environment based on the natural drainage contours.

Wastewater and sludge will be managed by local authorities and service providers. All wastewater will be handled in accordance with the Guidelines for the Utilisation and Disposal of Wastewater Sludge Volumes 1 to 6 (Herselmann & Snyman, 2006).

A project specific stormwater management plan was produced and has been included in the EMPr (Section 17 of this report) for implementation.

2.2.4 Waste Management

During the construction phase, it is estimated that the Emvelo WEF would generate solid waste which includes (but is not limited to) packaging material, building rubble, discarded bricks, wood, concrete, plant debris and domestic waste. Solid waste will be collected and temporarily stockpiled within designated areas on site during construction, and thereafter removed and disposed of at a nearby registered waste disposal facility on a regular basis as per agreement with the local municipality. Where possible, recycling and re-use of materials will be encouraged.

During the operational phase, the WEF will typically produce minor quantities of general non-hazardous waste mainly resulting from the O&M and office areas. General waste will be collected and temporarily stockpiled in skips in a designated area on site and thereafter removed and disposed of at a nearby registered waste disposal facility (or registered landfill) on a regular basis as per agreement with the local municipality. Where possible, recycling and re-use of materials will be encouraged.

The development of the wind energy facility will include the construction and operation of facilities and infrastructure for the storage and handling of dangerous goods (combustible and flammable liquids, such as oils, lubricants, solvents associated with the facility, and facility substation) where such storage will occur inside containers with a combined capacity exceeding 80 cubic meters but not exceeding 500 cubic meters.

Any hazardous waste such as chemicals or contaminated soil as a result of spillages, which may be generated during the construction and operational phases, will be temporarily stockpiled within a designated area on site and thereafter removed off site by a suitable service provider for safe disposal at a registered hazardous waste disposal facility.

It must be noted that waste handling is not yet confirmed and is to be confirmed at a later stage through municipal or private channels. Similarly, the volumes of waste to be generated during construction and operation phases cannot be confirmed at this stage. This being said, the Project will adopt the 4R principle for solid waste management, which includes (in order or priority) to:

- Refuse single use plastics as much as possible;
- Reduce the use of non-recyclable products;
- Reuse solid wastes where possible to convert it into other useful products; and
- Recycle all wastes where possible.

2.2.5 Sewage

The WEF will require sewage services during the construction and operational phases. Low volumes of sewage or liquid effluent are estimated during both phases. Liquid effluent will be limited to the ablution facilities during the construction and operational phases. Portable sanitation facilities (i.e. Chemical toilets) will be used during the construction phase, which will be regularly serviced and emptied by a registered contractor on a regular basis.

The Applicant may consider a conservancy tank system which will be employed on site during the operational phase for which a registered company will be contracted to store and transport sewage from site to an appropriate municipal wastewater treatment facility.

2.2.6 Electricity for Construction Phase

Electricity on site will be from on-site diesel generators as well as sourced from the national grid distribution networks.

2.3 Summary of Project Information

WEF Technical Details

WEF Technical Details Components	Description/Dimensions - Emvelo
Maximum Generation Capacity	Up to 260MW
Type of technology	Onshore Wind
Number of Turbines	Up to 24
WTG Hub Height from ground level	Up to 150 m
Blade Length	Up to 110 m
Rotor Diameter	Up to 220 m
Structure height (Tip Height)	Up to 260 m
Structure orientation	Wind regime dependent
Area occupied by both permanent and construction laydown areas	Total permanent development footprint of up to 185 ha after rehabilitation
O&M building with parking area	Up to 1 ha
Site Access	Locality to be confirmed. Total width up to 15 m (12 m after rehabilitation) consisting of up to 3m width for underground 33 kV reticulation.
Area occupied by inverter transformer stations/substations	Up to 2.5 ha
Capacity of on-site substation	Up to 132 kV
Battery Energy Storage System footprint	Included in the project scope (specific footprint to be determined during the design phase)
Width of internal roads	Up to 15 m to be rehabilitated to up to 12 m.

WEF Technical Details Components	Description/Dimensions - Emvelo
Proximity to grid connection	Approximately 30 km
Internal Cabling	Cabling between the turbines, to be laid underground where technically practical.
Height of fencing	2.8 m

Proposed Emvelo WEF Site Boundary and Associated Infrastructure		
Aspect	**Longitude**	**Latitude**
WEF Site Boundary		
Reference Point 1	030° 18' 28.77" E	26° 30' 22.16" S
Reference Point 2	030° 20' 52.66" E	26° 31' 30.0" S
Reference Point 3	030° 19' 42.69" E	26° 34' 7.64" S
Reference Point 4	030° 17' 24.78" E	26° 33' 23.58" S
Reference Point 5	030° 20' 21.49" E	26° 34' 18.86" S
Reference Point 6	030° 21' 39.3" E	26° 37' 27.32" S
Reference Point 7	030° 23' 1.11" E	26° 36' 14.19" S
Reference Point 8	030° 18' 31.04" E	26° 36' 40.53" S
O&M Facilities		
Northeast Corner	030° 20' 48.37" E	26° 36' 43.14" S
Southeast Corner	030° 20' 47.59" E	26° 36' 45.55" S
Southwest Corner	030° 20' 41.77" E	26° 36' 43.79" S
Northwest Corner	030° 20' 42.7" E	26° 36' 41.28" S
Substations		
Southeast Corner	030° 20' 55.1" E	26° 35' 17.25" S
Southwest Corner	030° 20' 52.19" E	26° 35' 16.29" S
Northwest Corner	030° 20' 52.74" E	26° 35' 12.9" S
Northeast Corner	030° 20' 56.07" E	26° 35' 13.27" S
Tower Laydown Areas		
Northeast Corner	030° 18' 43.39" E	26° 31' 33.82" S

Proposed Emvelo WEF Site Boundary and Associated Infrastructure		
Southeast Corner	030° 18' 38.76" E	26° 31' 41.13" S
Southwest Corner	030° 18' 30.96" E	26° 31' 38.07" S
Northwest Corner	030° 18' 34.33" E	26° 31' 31.28" S

3. LEGAL FRAMEWORK

Any EA obtained from the DFFE or any other competent authority only applies to those specific listed activities for which the application was made. The applicable Listed Activities are presented in Table 3.1 below. This section of the EMPr will need to be updated to include the recommendations and requirements that are outlined in the EA, should this project be authorised by the DFFE.

TABLE 3.1 NEMA LISTED ACTIVITIES IN RELATION TO THE PROPOSED DEVELOPMENT

Activity No(s):	**Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended in 2017.**	**Describe the portion of the proposed project to which the applicable listed activity relates.**
Listing Notice 1 GN R 327 Activity 11	*The development of facilities or infrastructure for the transmission and distribution of electricity— (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.*	The facility will include the construction of one onsite substation and 132 kV overhead transmission powerline to facilitate the connection between the WEF and the national grid. The facility will be constructed across various farm portions outside urban areas.
Listing Notice 1 GN R 327 Activity 12	*The development of— (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;*	The facility will entail the construction of built infrastructure and structures (such as wind turbines, hardstands, offices, workshops, O&M buildings, ablution facilities, onsite substations, laydown areas and security enclosures etc.). The infrastructure and structures are expected to exceed a footprint of 100 m^2 and some may occur within small drainage features and 32 m of the watercourses.
Listing Notice 1 GN R 327 Activity 14	*The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic meters or more but not exceeding 500 cubic meters.*	Construction of the facility will require dangerous goods in the form of hydrocarbon fuels (e.g., diesel), paints and solvents, oils and greases. Sewage and waste streams will be generated by the WEF. During construction of the WEF, the combined capacity of dangerous goods on site will exceed 80 m^3. The proposed on-site substation is likely to require the use of transformer oils/other hazardous substances during the operational phase.
Listing Notice 1 GN R 327 Activity 19	*The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;*	The facility will entail the excavation, removal and moving of more than 10 m^3 of soil, sand, pebbles, or rock from nearby watercourses on site, mainly for the purpose of constructing access roads.
Listing Notice 1 GN R 327	*The development of a road—*	Roads with a reserve wider than 13.5 meters are proposed for the facility.

Activity No(s):	**Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended in 2017.**	**Describe the portion of the proposed project to which the applicable listed activity relates.**
Activity 24	*(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;*	As required by Eskom, a service and maintenance road of 8m wide is required to be constructed underneath the OHL, for construction and maintenance purposes.
Listing Notice 1 GN R 327 Activity 27	*The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for -* *the undertaking of a linear activity; or* *maintenance purposes undertaken in accordance with a maintenance management plan.*	The facility will entail the construction of infrastructure with a combined physical footprint of more than 1 ha that will require clearance of indigenous vegetation.
Listing Notice 1 GN R 327 Activity 28	*Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:* *(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.*	The facility will take place outside of an urban area and across several adjoining farm portions and will have an estimated total development footprint of more than 20 ha.
Listing Notice 1 GN R 327 Activity 48	*The expansion of* *(i) infrastructure or structures where the physical footprint is expanded by 100 square metre or more,* *Where such expansion occurs* *within a watercourse; and* *(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.*	The facility will require the upgrading of existing roads within the project area, as well as watercourse crossing upgrades, where such upgrades may take place within watercourses and within 32 m from the edge of these watercourses. The total footprint of the upgrades to be undertaken on the existing roads would be more than 100 m^2 within a watercourse, or within 32 m of a watercourse.
Listing Notice 1 GN R 327 Activity 56	*The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre-* *(ii) where no reserve exists, where the existing road is wider than 8 metres;*	Existing farm access roads will be widened or lengthened. These roads would currently have no road reserve and will be wider than 8 meters in some areas during construction phase of the development.
Listing Notice 2 GN R 325 Activity 1	*The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more*	The WEF will have a total generation capacity output of more than 20 MW. The facility is not situated within a REDZ or a strategic power corridor. A full S&EIA process will be undertaken.
Listing Notice 2 GN R 325 Activity 15	*The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for-* *the undertaking of a linear activity;*	The total development footprint of the facility is expected to be more than 20 ha. As a result, more than 20 ha of indigenous vegetation may be removed for the construction of the proposed projects.

Activity No(s):	**Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended in 2017.**	**Describe the portion of the proposed project to which the applicable listed activity relates.**
	maintenance purposes undertaken in accordance with a maintenance management plan.	
Listing Notice 3 GN R 324 Activity 4	*The development of a road wider than 4 metres with a reserve less than 13,5 metres.* *f. Mpumalanga* *i. Outside urban areas:* *(bb) National Protected Area Expansion Strategy Focus areas;* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;*	Roads with a reserve wider than 4 meters are proposed for the facility. As required by Eskom, a service and maintenance road of 8m wide is required to be constructed underneath the OHL, for construction and maintenance purposes.
Listing Notice 3 GN R 324 Activity 10	*The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres.* *f. Mpumalanga* *i. Outside urban areas:* *(bb) National Protected Area Expansion Strategy Focus areas;* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;*	Construction of the facility will require dangerous goods in the form of hydrocarbon fuels (e.g., diesel), paints and solvents, oils and greases. Sewage and waste streams will be generated by the WEF. During construction of the WEF, the combined capacity of dangerous goods on site will not exceed 80 m^3. The proposed on-site substation is likely to require the use of transformer oils/other hazardous substances during the operational phase.
Listing Notice 3 GN R324 Activity 12	*The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.* *f. Mpumalanga* *ii. Within critical biodiversity areas identified in bioregional plans;*	The facility will require the clearance of natural vegetation in excess of 300 m^2 in areas of natural vegetation. A portion of the respective facility is located within a Critical Biodiversity area in the Mpumalanga Province.
Listing Notice 3 GN R324 Activity 14	*The development of—* *(ii) infrastructure or structures with a physical footprint of 10 square metres or more;* *f. Mpumalanga* *i. Outside urban areas:* *(bb) National Protected Area Expansion Strategy Focus areas;* *(ff) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;*	The facility will likely entail the development of infrastructure with physical footprints of 10m^2 or more within a watercourse / surface water feature or within 32m from the edge of a watercourse / surface water feature. Although the layout will be designed to avoid the identified surface water features / watercourse as far as possible, some of the infrastructure / structures will likely need to traverse the identified surface water features / watercourses.

Activity No(s):	**Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended in 2017.**	**Describe the portion of the proposed project to which the applicable listed activity relates.**
		The construction of the infrastructure (MV caballing and roads) for the development will occur within Critical Biodiversity Areas (CBAs) located outside of urban areas.
Listing Notice 3 GN R324 Activity 18	*The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.* *f. Mpumalanga* *i. Outside urban areas:* *(bb) National Protected Area Expansion Strategy Focus areas;* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;*	Internal access roads will be required to access the wind turbines, as well as the respective substation. Existing roads will be used wherever possible. Internal access roads will thus likely be widened by more than 4 m or lengthened by more than 1 km. These roads will occur within the Mpumalanga Province, outside urban areas.
Listing Notice 3 GN R324 Activity 23	*The expansion of—* *infrastructure or structures where the physical footprint is expanded by 10 square metres or more;* *where such expansion occurs—* *(a) within a watercourse;* *(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;* *f. Mpumalanga* *i. Outside urban areas:* *(bb) National Protected Area Expansion Strategy Focus areas;* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;*	The facility will likely entail the development and expansion of roads by $10m^2$ or more within a surface water feature / watercourse or within 32 m from the edge of a surface water feature / watercourse. Although the layout will be designed to avoid the identified surface water features / watercourses as far as possible, some of the existing internal and access roads may likely need to traverse some of the identified surface water features / watercourses. The proposed developments occur within CBAs, and are located outside urban areas.

4. ENVIRONMENTAL MANAGEMENT PROGRAMME

This section forms the core of the EMPr and outlines the specific mitigation measures for those key impacts identified for the development of the Emvelo WEF.

4.1 Environmental Awareness and Compliance

The philosophy that has been used for the compilation of this management programme is derived from the principles of the NEMA, 1998 (Act No. 107 of 1998) which states that development must be socially, economically and environmentally sustainable. Sustainable development requires that:

- The disturbance of ecosystems and loss of biodiversity are avoided (minimised or remedied).
- Pollution and degradation of the environment are avoided or minimised and remedied.
- Waste is avoided or minimised and re-used or re-cycled where possible and otherwise disposed of in a responsible manner.
- A risk averse and cautious approach is applied.
- Negative impacts on the environment and on people's environmental rights be anticipated, and, prevented and where they cannot altogether be prevented, are minimised and remedied.

The Act makes provision that anyone who causes pollution or degradation of the environment is responsible for preventing impacts occurring, continuing or recurring and for the costs of repair of the environment.

4.1.1 Legally Binding Documents

Should favourable decision be received for the proposed development, a copy of the EA, the audit and compliance monitoring reports, and the approved EMPr, must be made available for inspection and copying during all phases of the development -

- At the site of the authorised activity;
- To anyone on request; and
- Where the holder of the EA has a website, on such publicly accessible website.

4.2 Roles And Responsibilities For Good Environmental Management

The developer, together with the appointed contractor, will be responsible for environmental management on site during all phases of (construction, operation and decommissioning) the development. Specific roles and responsibilities are highlighted below.

Environmental Manager - Developer Representative

- Review and approve final EMPr prior to authorisation by the DFFE.
- Review and approve any EMPr updates or amendments post approval of the EMPr.
- Ensure environmental requirements are integrated into the project plans, method statements and tender processes.
- Support the site environmental control officer (ECO) during the construction phase, to ensure implementation of the EMPr.

ENVIRONMENTAL MANAGEMENT PROGRAMME

- Follow up and close out all environmental incidents and non-conformances.
- Appoint a suitably qualified independent ECO during the construction phase.

Environmental Control Officer - Principal Contractor Representative

An independent ECO will work along-side the Environmental Site Officer (ESO) to conduct the required inspections of the construction activities and EMPr implementation throughout the construction phase. After each monthly inspection, the ECO will produce a monitoring report that will be submitted to Developer / Applicant, the DFFE, and any other person(s) if required. Relevant sections of the minutes of customary (monthly) site meetings will be attached to the monitoring report.

The ECO will be responsible for overseeing the implementation of the EMPr during the construction and operations phases, and for monitoring, reviewing and verifying compliance of the ESO and contractor with the EMPr, record-keeping and updating of the EMPr as and when necessary.

The ECO will:

- Be fully knowledgeable of the contents of the EMPr.
- Be fully knowledgeable of the contents of all relevant environmental legislation and ensure compliance with them.
- Communicate the contents of the EMPr to the contractor, all site staff, and the contractor and /or site manager are made aware of the contents of the EMPr, through presentations and discussions.
- Monitor compliance to the EMPr by regular and comprehensive inspection of the site and surrounding areas.
- Report on any incidents of non-compliance and ensure mitigation measure are implemented as soon as practical.

During construction, the ECO will be responsible for the following:

- Meeting on site with the Construction Manager and ESO prior to the commencement of construction activities to confirm the construction procedure and designated activity zones.
- Ensuring that daily / weekly (depending on the extent of construction activities, at any given time) monitoring of site activities take place by the ESO to ensure adherence to the specifications contained in the EMPr. The ESO should use a monitoring checklist that is to be prepared by an independent environmental assessment practitioner (EAP) at the start of the construction phase.
- Preparation of the monitoring report based on the site visits and feedback by the ESO.
- Conducting an environmental inspection on completion of the construction period and signing off the construction process with the Construction Manager and ESO.
- Ensuring that the ESO maintains an Incidents Register and Complaints Register on site.

During operation, the Environmental Control Officer will be responsible for:

- Overseeing the ESO during the implementation of the EMPr for the operation phase.

- Ensure that the necessary environmental monitoring takes place as specified in the EMPr.
- Update the EMPr and ensure that records are kept of all monitoring activities and results.
- Ensuring that the ESO maintains an Incidents Register and Complaints Register on site.

During decommissioning, the Environmental Control Officer will be responsible for:

- Overseeing the ESO during the implementation of the EMPr for the decommissioning phase.
- Conducting an environmental inspection on completion of decommissioning and "signing off" the site rehabilitation process.

Environmental Site Officer – Nominated Contractor Representative

The ECO must appoint a nominated representative of the contractor as the Environmental Site Officer (ESO). The independent ESO is required to be on site at all times and will conduct the required inspections of the construction activities and ensure implementation of the EMPr throughout the construction phase. After each inspection, the ESO is required to submit a completed monitoring checklist to the ECO.

The ESO will be responsible for ensuring the implementation of the EMPr during the construction and operations phases by the contractor and providing feedback to the ECO regarding the compliance of the contractor with the EMPr and any updates required to the EMPr as and when necessary.

The ESO will:

- Be fully knowledgeable with the contents of the EMPr.
- Be fully knowledgeable with the contents of all relevant environmental legislation and ensure compliance with them.
- Ensure that the contents of the EMPr are implemented by the contractor, all site staff.
- Ensure that compliance to the EMPr is monitored by regular and comprehensive inspection of the site and surrounding areas.
- Report on any incidents of non-compliance to the ECO and ensure mitigation measures are implemented as soon as practical.

Contractor

An independent contractor who will be responsible for the implementation of the EMPr in accordance with the requirements of the EA.

The Contractor will:

- Be fully knowledgeable of the contents of the EMPr.
- Communicate and develop understanding of the contents of the EMPr by all staff on site and other relevant staff.
- Report on any incidents of non-compliance to the ESO and ensure mitigation measures are implemented as soon as practical.

Environmental Auditor

The Developer must appoint an Independent Environmental Auditor. The independent Auditor is required to undertake routine site visits (at least every three months) to conduct the required inspections of the compliance with the EA and EMPr during the construction and post construction phase of the activities. After each inspection, the auditor is required to submit an environmental audit report to the DFFE.

The Auditor will:

- Be fully knowledgeable of the contents of the EMPr.
- Be fully knowledgeable of the contents of all relevant environmental legislation and monitoring compliance with them.
- Submit reports to the DFFE.

4.2.1 Frequency for Auditing of Compliance and Submission of Reports

The Auditor will arrange for inspections of the activities and EMPr implementation throughout the construction and post construction phase. After each inspection, the auditor will produce an environmental audit report that will be submitted to the client, DFFE, Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAERL), and any other stakeholder as required. The monitoring reports, recommended to be produced by the ECO must be appended to the audit reports for submission.

The frequency of auditing and submission of the environmental audit reports must be at least every three months, or what is deemed necessary in consultation with the ECO during times of heavy earth works and vegetation clearing and ensuring compliance with all aspects of the EA and EMPr.

4.3 Training and Induction of Employees

The ECO has a responsibility to ensure that all personnel involved in the project are aware of and are familiar with the environmental requirements for the project. The EMPr shall be part of the terms of reference (ToR) for all contractors, sub-contractors and suppliers. All Contractors have to give some assurance that they understand the EMPr and that they will undertake to comply with the conditions therein. All senior and supervisory staff members shall familiarise themselves with the full contents of the EMPr. They shall know and understand the specifications of the EMPr and be able to assist other staff members in matters relating to the EMPr.

The ECO and / or ESO must ensure that all staff working on site have an environmental induction. The presentation can include the following topics;

- What is meant by "Environment"?
- Why the environment needs to be protected and conserved.
- How construction activities can impact on the environment.
- What can be done to militate against such impacts?
- Awareness of emergency and spills response provisions.
- Social responsibility during construction e.g. being considerate to local residents.

A detailed environmental management and training program must be developed. The purpose of this is to ensure that all staff and workers understand what is required of them. The main components of the program can incorporate the following:

- Concept of sustainability and the reasons for good environmental management and practice.
- Potential environmental impacts.
- Mitigation measures.
- Establishing a chain of responsibility and decision making.
- Specific training requirements of certain staff, and the potential hazardous associated with the job.
- Methodologies to be used for field sampling.
- Training in the use of field equipment.
- Training in identification of non-compliance situations and procedures to be followed in such instances.
- Reporting requirements.
- Healthy and Safety.
- Fire management.
- HIV/AIDS.

4.4 Complaints Register and Environmental Incidents Book

Any complaints received from the community must be brought to the attention of the ECO / ESO, who will respond accordingly.

The following information will be recorded:

- Time, date and nature of the complaint;
- Response and investigation undertaken; and
- Actions taken and by whom.

All complaints received will be investigated and a response (even if pending further investigation) will be given to the complainant within 7 days.

All environmental incidents occurring on the site will be recorded. The following information will be provided:

- Time, date, location and nature of the incident; and
- Actions taken and by who.

4.5 Construction Environmental Monitoring

In order to facilitate communication between the Environmental Manager, the ECO (and the ESO), it is vital that a suitable chain of command is structured that will ensure that the ECO's recommendations have the full backing of the project team before being conveyed to the Contractor. In this way, penalties as a result of non-compliances with the EMPr may be justified as failure to comply with instruction from the highest authority.

4.6 Dealing with Non-Compliance with the EMPr

There may be difficulties encountered with carrying out the mitigation measures within the EMPr, this may result in non-compliance with the EMPr. It may be possible that the contractor and or the developer put in place procedures to motivate staff members to comply with the EMPr and to deal with non-compliance. The developer must make this known to the contractor at the earliest stage possible, even during the tender phase. When dealing with non-compliance, the following process is recommended to take place:

- A notice of transgression should be issued to the transgressor;
- It must be documented in a designated register; and
- It must be reported in a monthly report and made available to I&APs and DFFE upon request.

National government, provincial government, local authorities or committees appointed in terms of the conditions of this authorisation or any other public authority shall not be held responsible for any damages or losses suffered by the holder of the authorisation or his/her successor in title in any instance where construction or operation subsequent to construction be temporarily or permanently stopped for reasons of non-compliance by the holder of the authorisation with the conditions of authorisation as set out in this document or any other subsequent document emanating from these conditions of authorisation.

4.7 EMPr Amendments and Instructions

No EMPr amendments shall be allowed without the approval of the DFFE. Amendments may be possible, following discussions with the relevant ECO, who may propose EMPr amendments on behalf of the developer or issue EMPr instructions, corrective actions, remediation or rehabilitation. These correction actions must be completed within the specified timeframes.

5. OBJECTIVES AND GENERAL MITIGATION MEASURES- DESIGN PHASE / PRE–CONSTRUCTION PHASE

The objectives of the pre-construction phase are:

- To promote environmental awareness.
- To define roles and responsibilities for environmental management.
- To ensure suitable environmental training and induction to all contractors, sub-contractors and labourers.
- To ensure that all legal obligations and contractual conditions have been met prior to commencing of construction.
- To ensure that the facility design responds to the identified environmental constraints and opportunities.
- To implement effective communication methods and practices.

5.1 Mitigation Measures for Legal Compliance

- Appoint an independent ECO.
- Appoint an internal ESO to oversee day to day environmental activities.
- Staff should be educated as to the need to refrain from indiscriminate waste disposal and/or pollution of local soil and water resources and receive the necessary safety training.
- The contractor must ensure conditions described in the EA are adhered to.
- Confirm with ESO / ECO, suitable sites for the construction camps (equipment and batching etc.) and storage areas for materials. All construction equipment must be stored within this construction camp and all associated oil changes etc. (no servicing) must take place within this camp.
- Unskilled labourers should be drawn from the local market where possible.
- Environmental awareness training for site personnel, concerning the prevention of accidental spillage of hazardous chemicals and oil; pollution of water resources (both surface and groundwater), air pollution and litter control and identification of archaeological artefacts.
- The Contractor, together with the ESO shall ensure that the training and capabilities of the Contractor's site staff are adequate to carry out the designated tasks. Training developed by the Contractor and ESO must be approved by the ECO.
- Site personnel operating light, and heavy duty equipment (such as excavators, loaders, etc.) shall be adequately trained and sensitised to any potential hazards associated with their tasks.
- No operator shall be permitted to operate critical items of mechanical equipment without having been trained by the Contractor and certified competent by the Project Manager.
- Before construction begins, all areas to be developed must be clearly demarcated with fencing, by a qualified surveyor.
- No construction camps are allowed on site. No workers are allowed to stay overnight in the construction area.

- The developer is to compile and implement a grievance mechanism procedure for the public.
- The contractor to develop a Construction Site Traffic Management Plan – this will be in the form of a site layout, showing the flow of traffic during the construction phase taking into consideration existing land users.
- Once the final layout plan has been approved the appointed responsible engineers must produce an updated storm water management plan (SWMP) for the site, during the construction and operational phases of the project. An effective SWMP will include bunds and ditches, where it is required - that is at all points of disturbance where water accumulation might occur. The system must effectively collect and safely disseminate any run-off water from all hardened surfaces and it must prevent any potential down slope erosion.
- A health and safety plan must be drawn up to ensure worker safety.
- Develop a Project Layout and Access Plan to show the intended use of the area. The plan shall clearly indicate and/or describe the location and details of the final:
  - Servitudes.
  - Areas and routes to be cleared – including the size / width of the cleared areas.
  - The construction campsite and rest areas to be used during construction.
  - Waste disposal sites to be used during construction.
  - Sources of construction materials.
  - Power supply during construction.
  - Existing roads and tracks to be used as transportation routes, and routes to gain access to construction areas.
  - New tracks deemed necessary to provide access to construction activities.
  - Any informal residential structures found within the property.
  - Affected land use, 1:50 year floodlines.
  - Sensitive areas.

5.2 Site Establishment

The object of site establishment is to ensure that an appropriate site is selected for the construction camp/site office and that the site office is managed in an environmentally responsible manner with minimal impact on the environment.

The optimised site layout (including the location of construction camps and laydown areas) must be finalised through a micro-siting process, which will include a detailed site assessment of the final site layout by various specialists as stipulated in the EA and this draft EMPr.

5.2.1 Mitigation Measures

Before establishing the construction office areas, carefully plan the layout and develop a Construction Site Office Plan[1]. The Construction Site Office Plan shall provide a description of

[1] To form part of the Project Layout and Access Plan.

the site and shall show, on a reasonably scaled map, the intended use of the site. Indicate and/or describe the location, size / quantity / capacity and design of:

- Access routes.
- Ablution facilities (including details on the handling of sewage and wastewater).
- On-site waste management facilities (waste containers, etc.).
- Design of bunds and other structures for containment of hazardous substances.
- Fencing.
- Water storage and supply.
- Power supply (for cooking, space heating, lighting, etc.).
- Fire extinguishers, first aid kit and any other relevant safety equipment.
- Other structures and buildings (offices, storerooms, workshops, etc.).
- Other storage areas and stockpiles (i.e. topsoil, construction materials, equipment, etc.).
- Location of areas to be rehabilitated upon completion of the construction period, providing measures to be used for rehabilitation.

The following requirements must be complied with:

- An area within the site must be demarcated for a construction site office, which will include storage area. This area must be fenced off.
- Site establishment shall take place in an orderly manner and all required amenities shall be installed at the lay down area before the main workforce move onto site.
- The construction camp shall have the necessary ablution facilities with chemical toilets at commencement of construction.
- During the pre-construction phase, the temporary construction camps and laydown areas must be located outside of the water courses (including the 45 m buffer).
- The Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed other than in supplied facilities.
- The Contractor shall supply waste collection bins and all solid waste collected shall be disposed of at a registered landfill.
- Potable water for use by on site workers must be made available on a daily basis at the site office and the working areas on site.
- A certificate of disposal shall be obtained by the Contractor and kept on file. Where a registered waste site is not available close to the construction site, the Contractor shall provide a method statement with regard to waste management.
- The disposal of waste shall be in accordance with all relevant legislation. Under no circumstances may solid waste be burnt or buried on site.
- Preconstruction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes topics such as no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, remaining within demarcated construction areas etc.
- Apply for all relevant permits for abnormal loads and route clearances with the relevant authorities prior to construction.

- Appoint a qualified specialist to conduct a detailed site-specific Transport Risk Assessment during the detailed design phase and prior to construction.
- Determine the pre-construction condition of the road immediately prior to construction by carrying out a condition assessment or from recent pavement management system condition assessments if available from the Provincial Authorities.
- Public notices regarding any planned abnormal load transports must be placed at the construction site to inform affected parties.
- Abnormal loads must conform with legal maximum dimensions, and vehicles carrying abnormal loads must display sufficient signage.
- Any roads damaged during the transportation of components, or from other construction vehicles must be rehabilitated and returned to pre-construction conditions.

5.3 Siting, Establishing and Management Materials

- Choice of location for storage areas must take into account prevailing winds, distances to water bodies, general onsite topography and water erosion potential of the soil. Impervious surfaces must be provided where necessary.
- Mitigation measures as provided in this draft EMPr must be adhered to during site establishment.
- Storage areas must be designated, demarcated and fenced.
- Storage areas must be secure so as to minimize the risk of crime. They must also be safe from access by children / animals etc.
- Fire prevention facilities must be present at all storage facilities.
- Proper storage facilities for the storage of oils, paints, grease, fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the temporary storage area(s).
- These pollution prevention measures for storage must include a bund wall high enough to contain at least 110% of any stored volume, and this must be sited away from drainage lines on site with the approval of the Engineer.
- Any water that collects in the bund must not be allowed to stand and must be removed immediately and the hydrocarbon digestion agent within must be replenished.
- All legal compliance requirements with respect to fuel storage and dispensing must be met.
- All fuel storage tanks (temporary or permanent) and associated facilities must be designed and installed in accordance with the relevant oil industry standards, SANS codes and other relevant requirements.
- Areas for storage of fuels and other flammable materials must comply with standard fire safety regulations2.
- Flammable fuel and gas must be separated from all welding workshops, assembly plants and loading bays where ignition of gas by an accidental spark may cause an explosion or fire.
- The tank must be erected at a safe distance from buildings, boundaries, welding sites and workshops and any other combustible or flammable materials.

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[2] https://www.nfast.co.za/gallery/fire%20extinguisher%20regulations.pdf

- Symbolic safety signs depicting "No Smoking", "No Naked Flames" and "Danger" are to be prominently displayed in and around the fuel storage area.
- The capacity of the tank must be clearly displayed and the product contained within the tank clearly identified.
- There must be adequate fire-fighting equipment at the fuel storage and dispensing area or areas.
- The storage tank must be removed on completion of the construction phase of the project.
- All such tanks to be designed and constructed in accordance with the national standard for storage tanks, i.e., ISO 16961:2015 and a recognised international standard code if required.
- The rated capacity of tanks must provide sufficient capacity to permit expansion of the product contained therein by the rise in temperature during storage.
- Only empty and externally clean tanks may be stored on the bare ground. All empty and externally dirty tanks must be sealed and stored in an area where the ground has been protected.
- Any electrical or petrol-driven pump must be equipped and positioned so as not to cause any danger of ignition of the product.
- If fuel is dispensed from 200 litre drums, the proper dispensing equipment must be used.
- The drum must not be tipped in order to dispense fuel. The dispensing mechanism of the fuel storage tank must be stored in a waterproof container when not in use.
- All waste fuel and chemical impregnated rags must be stored in leak-proof containers and disposed of at an approved hazardous waste site.
- The amounts of fuel and chemicals stored on site must be minimised.
- Storage sites must be provided with bunds to contain any spilled liquids and materials.
- These storage facilities (including any tanks) must be on an impermeable surface that is protected from the ingress of storm water from surrounding areas in order to ensure that accidental spillage does not pollute local soil or water resources.
- Clear signage must be placed at all storage areas containing hazardous substances / materials.
- Material Safety Data Sheets (MSDSs) shall be readily available on site for all chemicals and hazardous substances to be used on site. Where possible, the available MSDSs must additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or escapes.
- Storage areas containing hazardous substances / materials must be clearly signed.
- Staff dealing with these materials / substances must be aware of their potential impacts and follow the appropriate safety measures.
- Any hazardous waste handling on site must be undertaken by experienced staff. No mixing of hazardous and general waste should be permitted.
- A suitable Waste Disposal Contractor must be employed to remove waste oil. These wastes must only be disposed of at licensed landfill sites designed to handle hazardous wastes.
- The contractor must ensure that its staff is made aware of the health risks associated with any hazardous substances used and has been provided with the appropriate protective

clothing/equipment in case of spillages or accidents and have received the necessary training.

- All excess cement and concrete mixes are to be contained on the construction site prior to disposal off site.
- Any spillage, which may occur, shall be investigated and immediate action must be taken.

5.3.1 Site Clearance

- Vegetation clearance must preferably be phased as required to work in certain areas, rather than clearing of the entire site initially. If this is not practical and the entire site is cleared at the start of the contract, it is to be stabilized immediately to control dust. Wherever possible, vegetation shall be trimmed rather than cleared.
- Cleared vegetative material is not to be dumped anywhere other than an approved waste disposal site or an area as agreed to with the ECO.
- Wherever possible and where the material is suitable, the material must be chipped for later use as mulch in landscaped areas or for stabilization purposes or it must be dumped at a green waste recycling depot for compost production.
- Invasive alien plant species, which are removed from the site, are not to be chipped for mulch if they are in a seed bearing state. Such material is to be disposed of at a suitable waste disposal site. Wherever possible, suitable larger stumps must be made available to the local community as firewood.
- Plant material removed from the site is not to be burnt for disposal on site unless a burning permit has been obtained from the local authority.
- Sensitive ecosystems in the vicinity of the areas of construction must be demarcated (e.g. using danger tape or droppers) prior to any construction activities, so that these can be avoided.
- Removal of vegetation must be kept to a minimum, and cleared areas must be re-vegetated after clean-up. A detailed planting plan must be developed, in consultation with a landscaper and ecologist.
- Minimise the development footprint as far as possible and rehabilitate disturbed areas that are no longer required by the operational phase of the development
- Demarcate all areas to be cleared with construction tape or similar material. However, caution must be exercised to avoid using material that might entangle fauna.
- An alien control and monitoring program must be adhered to, to ensure that the site is cleared of alien plants (as listed under the Conservation of Agricultural Resources Act 43 of 1983 - as amended/updated) and kept free from alien plants for the duration of the construction phase.
- A low cover of vegetation must be left wherever possible within the construction footprint to bind the soil, prevent erosion and promote post-disturbance recovery of an indigenous ground cover.

5.3.2 Topsoil

Topsoil / top material shall be removed from all areas cleared of vegetation and retained for future landscaping use, where feasible. Top material must exclude litter, building rubble, alien plant material or any other waste.

All topsoil, and specifically any topsoil from areas which are likely to contain bulbs, must be stripped and stockpiled for re-use in rehabilitation. This will constitute at least a 300 mm layer.

Topsoil shall be stored in areas demarcated by the ECO and Engineer and in piles not higher than 2 m, and may not be removed from site, or used for any purpose other than in the rehabilitation of the site post-construction. The stockpiles shall not be compacted or disturbed, and shall be domed at the top to promote runoff. The period between the stockpiling of topsoil and its utilization shall be as short as possible, and ideally the topsoil must be transferred to its intended site of use immediately following site clearance and stockpiling. This would also avoid double handling.

Stockpiles that are to be stored for less than three months must be covered with shade-cloth or Geotech fabrics or similarly suitable material to prevent erosion. If stockpiles are to be stored for more than 3 months a protective vegetation layer must be established to cover topsoil stockpiles in order to protect them against erosion and desiccation. If possible, the stockpile must be kept moist in order to maintain the vitality of the vegetation. Vegetation may not consist of weeds, but must comprise of grass or ground covers.

5.4 Final Site Assessment by Specialists

Prior to the submission of the final layout plan to the DFFE for approval, the following specialists must visit the site to assist with micro-siting the final development layout:

- Aquatic specialist;
- Terrestrial Biodiversity specialist;
- Avifaunal specialist;
- Bat specialist; and
- Archaeological specialist.

Following the selection of turbine to be used for the project, the Developer must update the layout plan / site development plan, this together with the final management plans included in this EMPr must be submitted to the DFFE for approval.

Should any telephone communication lines require moving this will have to be facilitated and approved by Telkom separately and outside of the EIA process.

5.5 Potential Additional Permit Requirements

Activities planned during site preparation, construction and operation may require additional permits (ie. other than the EA). Emvelo and local regulations.

Additional permit requirements which may be required are described below.

5.5.1 Borrow Pits

A borrow pit refers to an open pit where material (soil, sand or gravel rock) is removed for use at another location. Emvelo (Pty) Ltd or their contractors may want to use borrow pits for certain earthworks operations, such as the construction of roads, embankments, bunds, berms, and other structures. Licensed borrow pits will be used to source material.

The establishment of borrow pits is regarded as a mining activity and is legislated in terms of the Mineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002) (MPRDA). A mining permit must be obtained from the Department of Mineral Resources and Energy (DMRE) prior to the establishment of borrow pits on the site.

5.5.2 Water Use License

The construction of the WEF and roads may result in water crossings. The developer must ensure that any necessary Water Use Licenses (or general authorizations) are applied for and approved, prior to the start of construction, if required.

There are licensing procedures that need to be followed for particular “water uses” under the National Water Act, 1998 (Act No. 36 of 1998). Water uses that may be of relevance to the development and associated road construction include the following:

- Taking of water from a water resource, including a water course, surface water, estuary or aquifer (i.e. borehole);
- Altering the bed, banks, course or characteristics of a water course; and/or
- Impeding or diverting of a flow in a water course.

5.5.3 Heritage, Archaeology and Palaeontology

Should any heritage resources, including evidence of graves and human burials, archaeological material and paleontological material be discovered during the execution of the activities above, all works must be stopped immediately and heritage authorities must be notified without delay.

5.5.4 Vegetation Search and Rescue

Under the National Forests Act, 1998 (Act No. 84 of 1998) (NFA), a license must be applied for from the DFFE for the removal or disturbance of any protected trees on the site, in terms of the List of Protected Tree Species promulgated under the NFA.

5.6 Method Statements

Prior to construction the developer must ensure that the contractor supply the following method statements:

- Vegetation clearing.
- Cement mixing.
- Hazardous waste management.
- Emergency preparedness and response.
- Hazardous spills clean up.
- Topsoil stockpiling management.
- Laydown area management.
- Hazardous materials management.

6. CONSTRUCTION PHASE MITIGATION MEASURES

The following sections form the core of the EMPr during the construction phase of the development. The major sources of potential impacts include, the turbine footprint construction, the construction of infrastructure, the construction of roads and bridges, and vehicle operation, and spillages.

The objectives of the construction phase are:

- To promote environmental awareness.
- To define roles and responsibilities for environmental management.
- To ensure that the contractor complies with all mitigation measures during the construction period.

6.1 Potential Construction Phase Impacts

The following impacts are likely to occur during the construction of the development. Specific mitigation measures for each impact are presented below.

- The accidental, negligent, or deliberate spillage or inappropriate disposal of hazardous substances could result in air, soil and water pollution and may affect the health and well-being of people, plants and animals.
- Loss of habitat containing protected species or Species of Special Concern.
- Loss of any critical corridors, important catchment areas and connected habitats that are linked to any Critical Biodiversity Areas or Ecological Support Areas.
- The potential spread of alien vegetation.
- Loss of riparian and or wetland habitat.
- Changes to the hydrological regime and increased potential for erosion.
- Changes to water quality.
- Removal of native vegetation
- Noise
- Dust generated
- Displacement of priority species due to disturbance associated with the construction of the wind turbines and associated infrastructure.
- Displacement of priority species due to habitat transformation associated with the construction of the wind turbines and associated infrastructure.
-

The following is not allowed on site:

- No poaching of any animals or harvesting of any flora;
- No construction camp, for workforce accommodation is allowed on site; contractors are to ensure suitable housing for staff outside of the proposed development footprint.
- No cooking or fires allowed on site; and
- No alcohol or drugs are allowed on site.

Error! Reference source not found. below presents a summary of the potential impacts as assessed by specialists for the construction phase of the WEF.

Recommended persons as provided in **Error! Reference source not found.** below should take responsibility for the implementation and monitoring to ensure that all operational mitigation measures outlined in this document, and all revisions thereof, are complied with.

TABLE 6.1 DESIGN AND CONSTRUCTION PHASE IMPACT MANAGEMENT & MONITORING

Construction Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Freshwater & Wetlands (Aquatics)								
Loss of habitat/vegetation containing SCC	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	Low
Loss of Critical Biodiversity Areas (CBAs)	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	Low
Spread of Alien Vegetation	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	Low
Changes to the hydrological regime and increase potential for erosion	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	Low
Loss of riparian habitat	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	Low
Changes to surface water quality	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	Low

Terrestrial Biodiversity								
Potential vegetation clearing	Without Mitigation	Site	Long term	Recoverable	Negative	Moderate	Definite	High
	With Mitigation	Site	Long term	Recoverable	Positive	Moderate	Probable	Low
Potential mortality of flora species	Without Mitigation	Local	Immediate	Recoverable	Negative	Low	Probable	Low
	With Mitigation	Local	Immediate	Recoverable	Negative	Low	Low Probability	Very Low
Potential mortality of faunal species	Without Mitigation	Local	Immediate	Recoverable	Negative	Low	Probable	Low
	With Mitigation	Local	Immediate	Recoverable	Negative	Low	Low Probability	Very Low
Invasion by exotic and alien invasive species	Without Mitigation	Local	Immediate	Recoverable	Negative	Low	Probable	Low
	With Mitigation	Local	Immediate	Recoverable	Positive	Low	Low Probability	Very Low
Potential altered flow regime	Without Mitigation	Local	Immediate	Recoverable	Negative	Low	Probable	Low
	With Mitigation	Local	Immediate	Recoverable	Negative	Low	Low Probability	Very Low
Reduced connectivity and restricted movement of fauna	Without Mitigation	Local	Immediate	Recoverable	Negative	Low	Probable	Low
	With Mitigation	Local	Immediate	Recoverable	Negative	Low	Low Probability	Very Low
Impact on Agricultural resources	Without Mitigation	Local	Long term	Recoverable	Negative	Low	Low Probability	Medium
	With Mitigation	Local	Long term	Reversible	Negative	Low	Low Probability	Medium

Faunal								
Loss of fauna SCC and potential loss of faunal habitat	Without Mitigation	Regional	Long-term	Recoverable	Negative	High	Definite	High
	With Mitigation	Regional	Medium Term	Recoverable	Negative	Moderate	High Probability	High
Avifauna								
Destruction of habitat and habitat transformation	Without Mitigation	Local	Long-term	Recoverable	Negative	Moderate	Low Probability	Medium
	With Mitigation	Site	Short-term	Recoverable	Negative	Moderate	Low Probability	Medium
Displacement of priority species due to disturbance	Without Mitigation	Local	Short-term	Recoverable	Negative	Moderate	Low Probability	Medium
	With Mitigation	Site	Short-term	Recoverable	Negative	Moderate	Low Probability	Medium
Bats								
Modification & disturbance of bat habitat (roosting, foraging, commuting)	Without Mitigation	Site	Short-term	Recoverable	Negative	Low	Probable	Low
	With Mitigation	Site	Short-term	Reversible	Negative	Low	Probable	Low
Archaeology, Paleontology and Heritage								
Graves/Cemeteries	Without Mitigation	Local	Permanent	Irreversible	Negative	High	Probable	High
	With Mitigation	Site	Short-term	Recoverable	Positive	Low	Low Probability	Low
20th century settlements without graves	Without Mitigation	Site	Short-term	Irreversible	Neutral	Low	Low Probability	Low
	With Mitigation	Site	Short-term	Irreversible	Neutral	Low	Low Probability	Low

20th century settlements with graves	Without Mitigation	Site	Long-term	Irreversible	Negative	Moderate	Highly Probable	High
	With Mitigation	Site	Short-term	Recoverable	Positive	Low	Low Probability	Low
Late Iron Age settlements	Without Mitigation	Site	Long-term	Irreversible	Negative	High	High Probability	Medium
	With Mitigation	Site	Long-term	Recoverable	Positive	Moderate	High Probability	Low
Ruins	Without Mitigation	Site	Long-term	Irreversible	Negative	High	High Probability	High
	With Mitigation	Site	Long-term	Recoverable	Positive	Moderate	High Probability	Low
Isolated stone walled kraals	Without Mitigation	Site	Long-term	Reversible	Negative	High	High Probability	High
	With Mitigation	Site	Long-term	Reversible	Positive	Moderate	High Probability	Low
Farm buildings	Without Mitigation	Site	Long-term	Reversible	Negative	High	High Probability	High
	With Mitigation	Site	Long-term	Reversible	Positive	Moderate	High Probability	Low
Paleontology	Without Mitigation	Site	Long-term	Reversible	Negative	Low	Low Probability	Low
	With Mitigation	Site	Long-term	Reversible	Positive	Low	Low Probability	Low
Visual								
WEF Change of the landscape characteristics and key views (visual	Without Mitigation	Regional	Short term	Irreversible	Negative	Moderate	Highly Probable	Medium

intrusion and flicker effect) and change to the sense of place	With Mitigation	Regional	Short term	Irreversible	Negative	Moderate	Highly Probable	Medium
OHPL Change of the landscape characteristics and key views (visual intrusion and flicker effect) and change to the sense of place	Without Mitigation	Regional	Short term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Regional	Short term	Irreversible	Negative	Moderate	Probable	Medium
Noise								
Construction noises from access road upgrading or construction activities	Without Mitigation	Local	Short-term	Reversible	Negative	Moderate	Highly Probable	Very High
	With Mitigation	Local	Short-term	Reversible	Negative	Low	Possible	Very High
Noises due to construction traffic passing NSR	Without Mitigation	Local	Short-term	Reversible	Negative	Low	Possible	Low
	With Mitigation	Local	Short-term	Reversible	Negative	Low	Possible	Low
Numerous simultaneous future daytime construction activities	Without Mitigation	Local	Short-term	Reversible	Negative	Moderate	Probable	High
	With Mitigation	Local	Short-term	Reversible	Negative	Low	Possible	Medium
Numerous simultaneous future night-time construction activities	Without Mitigation	Regional	Short-term	Reversible	Negative	High	Highly Probable	Very High
	With Mitigation	Regional	Short-term	Reversible	Negative	Low	Possible	Medium
Social								
Creation of employment and business opportunities	Without Mitigation	Regional	Short-term	N/A	Positive	Low	Probable	Medium
	With Mitigation	Regional	Short-term	N/A	Positive	Moderate	Highly Probable	Medium

Impact of construction workers on local communities	Without Mitigation	Regional	Short-term	Recoverable	Negative	Moderate	Probable	Medium
	With Mitigation	Regional	Short-term	Recoverable	Negative	Low	Low Probable	Low
Influx of job seekers	Without Mitigation	Regional	Short-term	Recoverable	Negative	Low	Probable	Very Low
	With Mitigation	Regional	Short-term	Recoverable	Negative	Low	Low Probable	Very Low
Safety risk, stock theft and damage to farm infrastructure associated with presence of construction workers	Without Mitigation	Local	Short-term	Recoverable	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short-term	Recoverable	Negative	Low	Low Probability	Low
Increased risk of grass fires	Without Mitigation	Local	Short-term	Reversible with compensation	Negative	Moderate	Probable	Moderate
	With Mitigation	Local	Short-term	Reversible with compensation	Negative	Low	Low Probability	Low
Nuisance impacts associated with construction related activities	Without Mitigation	Local	Short-term	Recoverable	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short-term	Recoverable	Negative	Low	Low Probability	Low
Loss of farmland	Without Mitigation	Local	Short-term	Reversible with compensation and rehabilitation	Negative	Moderate	Highly Probable	Medium
	With Mitigation	Local	Short-term	Reversible with compensation and rehabilitation	Negative	Low	Probable	Low
Traffic								

Increase in general peak hour traffic volumes	Without Mitigation	Regional	Short term	Recoverable	Negative	Moderate	Highly Probable	High
	With Mitigation	Local	Short term	Reversible	Negative	Low	Probable	Very Low
Additional heavy vehicles/E80's on the external road network-	Without Mitigation	National	Short term	Recoverable	Negative	Moderate	Highly Probable	High
	With Mitigation	National	Short term	Recoverable	Negative	Moderate	Probable	Medium
Impact of dust along gravel site access roads	Without Mitigation	Local	Immediate	Recoverable	Negative	Moderate	Highly Probable	High
	With Mitigation	Local	Immediate	Recoverable	Negative	Low	Low Probability	Medium
Deterioration of surrounding road network	Without Mitigation	Local	Short-term	Recoverable	Negative	Moderate	Highly Probable	Medium
	With Mitigation	Site	Immediate	Recoverable	Negative	Low	Low Probability	Low

TABLE 6.2 DESIGN AND CONSTRUCTION PHASE IMPACT MANAGEMENT

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
Impact on Critical Habitats and Biodiversity Corridors due to Construction		
• A stormwater management plan and Aquatic Rehabilitation and Monitoring plan must be developed, coupled to micro-siting of the final layout prior to construction. • Where large cut and fill areas are required, these must be stabilised and rehabilitated during the construction process, to minimise erosion and sedimentation. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, spreaders, etc). • Suitable stormwater management systems must be installed along roads and other areas and monitored during the first few months of use. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, spreaders, etc). • The aquatic systems have been mapped to a finer scale and have taken cognizance of any potential CBAs. As High / No-Go have been avoided by the major infrastructure such as turbines and buildings, the aquatic zones associated within the CBA / ESAs have also been avoided. Roads will need to traverse these areas, thus it is important to try and select existing areas with impacts / crossings where possible.	Site Engineer ECO / ESO	Design Phase Throughout Construction Phase
Impacts associated with the construction of Access Roads		
• Use existing roads or upgrade existing tracks rather than constructing entirely new roads wherever possible and has been included in the proposed layout. • Use the smallest possible working corridor. Outside the working corridor, all watercourses are to be considered no go areas. Where intrusion is required, the working corridor must be kept to a minimum and demarcated clearly before any construction commences. • Removal of vegetation must only be when essential for the continuation of the project. Do not allow any disturbance to the adjoining natural vegetation cover or soils. • Where required, all pipe culverts must be removed and replaced with suitable sized box culverts, where road levels are raised. Crossings that are installed below the natural ground level are to be constructed with an appropriate drop inlet structure on the	Site Engineer ECO / ESO Specialist	Design Phase Throughout Construction Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
upstream side to ensure that head cut erosion does not develop because of the gradient change from the natural ground level to the invert level of the culvert. • The channel profile, regardless of the current state of the river / water course, will be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist, with a preference for low level drifts where possible. • Water diversions must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse. Sandbags used in any diversion or for any other activity within a watercourse must be in a good condition, so that they do not burst and empty sediment into the watercourse. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns. Under no circumstance shall a new channel or drainage canals be excavated to divert water away from • construction activities. • Any fauna (frogs, snakes, etc.) that are found within the construction area must be moved to the closest point of similar habitat type outside of the areas to be impacted. • All disturbed areas beyond the construction site that are intentionally or accidentally disturbed during the construction phase must be rehabilitated.		
Spread of alien invasion species due to Construction of the Development		
• Alien vegetation management must be initiated at the beginning of the construction period and must extend into any remaining areas into the operation phase on the facility. • The revegetation of any temporary sites as well as any previously degraded areas must begin from the onset of the project, with the involvement of a botanist to assist with the revegetation specifications. • Regeneration of alien vegetation must be monitored once all areas have been cleared, forming part of a long-term alien vegetation management plan.	Site Engineer ECO / ESO	Design Phase Following clearing of vegetation Throughout Construction Phase
Changes to the hydrological regime and increase potential for erosion due to Construction of the Development		
• No stormwater discharged may be directed to delineated aquatic zones or the associated buffers.	Site Engineer ECO / ESO	Throughout Construction Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
• A stormwater management plan finalised prior to construction, detailing the structures and actions that must be installed to prevent the increase of surface water flows directly into any natural systems. • Effective stormwater management must include measures to slow, spread and deplete the energy of concentrated flows thorough effective stabilisation (gabions and Reno mattresses) and the re-vegetation of any disturbed areas		
Changes to the surface water quality characteristics due to Construction of the Development (A)		
• All liquid chemicals including fuels and oil must be stored in with secondary containment (bunds or containers or berms) that can contain a leak or spill. Such facilities must be inspected routinely and must have the suitable PPE and spill kits needed to contain likely worst-case scenario leak or spill in that facility, safely. • Washing and cleaning of equipment must be done in designated wash bays, where rinse water is contained in evaporation/sedimentation ponds (to capture oils, grease cement and sediment). • Mechanical plant and bowsers must not be refueled or serviced within 100m of a river channel or wetland. • All construction camps, lay down areas, wash bays, batching plants or areas and any stores should be beyond any demarcated water courses and their respective buffers. • Littering and contamination associated with construction activity must be avoided through effective construction camp management. • No stockpiling should take place within or near a water course. • All stockpiles must be protected and located in flat areas where run-off will be minimised and sediment recoverable. • ECO monitors the site on a daily basis to ensure plant is in working order (minimise leaks), spills are prevented and if they do occur, are quickly rectified.	Site Engineer ECO / ESO	Throughout Construction Phase
Potential impacts include erosion, poor vegetation cover and alien invasive and weed regeneration (Terr)		
• A suitable weed management strategy to be implemented in construction phase. • Alien trees and weeds must be removed from the site as per CARA/NEMBA requirements. • Suitable measures must be implemented in areas that are susceptible to erosion. Areas must be rehabilitated, and a suitable cover crop planted once construction is completed.	ECO	Completion of phased construction into operational phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
• Any topsoil stripped during site preparation must be replaced on completion in areas where rehabilitation is required. • If natural vegetation re-establishment does not occur, a suitable grass must be applied. • Stormwater discharge into watercourses to be protected against erosion.		for duration of aftercare period on completion of construction (2 years recommended)
Terrestrial Biodiversity Impacts relating to improper or inadequate waste management procedures.		
• Excavations may not be used for the dumping of construction wastes. • Waste (non-biodegradable refuse) will not be permitted to be deposited in the excavations and must be disposed of appropriately. • All waste to be collected in an appropriate manner and disposed of correctly at the respective waste disposal facilities.	ECO	Throughout Construction Phase
Potential impacts include faunal species mortalities, erosion and stormwater management.		
• Small mammals within the habitat on and around the affected area are generally mobile and likely to be transient to the area. They will most likely vacate the area once construction commences. As with all construction sites there is a latent risk that there will be some accidental mortalities. Specific measures are made to reduce this risk. The risk of species of Conservation Concern is low, and it is unlikely that there will be any impact to populations of such species because of the activity. • Reptiles such as lizards are less mobile compared to mammals, and some mortalities could arise. It is recommended that a faunal search and rescue be conducted before construction commences, although experience has shown that there could still be some mortalities as these species are mobile and may thus move onto site once construction is underway. A retile handler should be on call for such circumstances. • No animals are to be harmed or killed during the course of operations. • It is important that clearing activities are kept to the minimum and take place in a phased manner. This allows animal species to move into safe areas. • Workers are NOT allowed to collect or snare any faunal species. All fauna remain the property of the landowner and must not be disturbed, upset or used without their expressed consent.	ECO	Throughout Construction Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
Potential impacts include excessive loss of vegetation and species of conservation concern and habitat outside of footprint.		
• Blanket clearing of vegetation must be limited to the site footprint. No clearing outside of footprint to take place, without express approval of ECO and or indicated in approved layout plans. • Site must be clearly demarcated and pegged out before any bush clearing or construction commences. The cleared area should not exceed the required footprint including a reasonable working area. • Any site camps and laydown areas requiring clearing must be located within already disturbed areas away from watercourses. • Search and rescue operations for Species of Conservation Concern must be undertaken before the commencement of site clearing activities. • It is important that clearing activities are kept to the minimum and take place in a phased manner. This minimises wind and water erosion of the cleared areas. • Workers are NOT allowed to collect any flora. All flora remain the property of the landowner and must not be disturbed, upset or used without their expressed consent. • It is the responsibility of the Contractor to provide sufficient fuel for cooking and heated as needed by the staff. • No domestic animals are permitted on the sites. • Trees and shrubs that are directly affected by the operations may be felled or cleared but only by the expressed written permission of the ECO.	Site Engineer ECO	Throughout Construction Phase
Potential impacts include loss of topsoil due to incorrect storage during construction which will negatively affect rehabilitation, as well as erosion due to clearing and construction activities.		
• Topsoil shall be removed from all areas where physical disturbance of the surface will occur. • All available topsoil shall be removed after consultation with the botanist and/or ECO prior to commencement of any operations and sufficient topsoil must be stored for later use during decommissioning.	Site Engineer ECO	Throughout Construction Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
• The removed topsoil shall be stored on high ground within the site footprint outside the 1:100 flood level within demarcated areas. • Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of roads. • The stockpiled topsoil shall be protected from being blown away or being eroded. The application of a suitable grass seed/runner mix will facilitate this and reduce the minimise weeds if necessary. • A suitable weed management strategy to be implemented on topsoil stockpiles.		
Potential impacts include excessive dust during site clearing which may cause damage to vegetation. (Terr)		
• Blanket clearing of vegetation must be limited to the site footprint. No clearing outside of footprint to take place, without express approval of ECO and or indicated in approved layout plans. • Site must be clearly demarcated and pegged out before any bush clearing or construction commences. The cleared area should not exceed the required footprint including a reasonable working area. • If required, water spray vehicles should be used to control dust caused by strong winds during activities on the works. • No over-watering of the site or road surfaces. • Wind screens can be used to reduce wind and dust in open areas if required.	Site Engineer ECO / ESO	Throughout Construction Phase
Loss of fauna SCC and potential loss of faunal habitat		
• If possible, micro-siting of turbine and access roads pre-construction; even small adjustments in placement can help avoid ecologically sensitive areas. • If high sensitive areas are to be developed, then off-sets will be required. • Clearing of natural vegetation should be kept to a minimum where possible. • The smallest possible working corridor, particularly close to sensitive habitats, must be used. • A ~5 m buffer zone should also be considered for any development close to any high sensitive areas. • No construction vehicles are allowed within no-go areas.	Site Engineer ECO / ESO	Throughout Construction Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
• Limiting the number and speed of vehicle movements to, from, and within the project area. • All temporary/permanent security fences will need to be modified (e.g. maintaining a gap, at reasonable intervals, between the base of the fence and the ground of approx. 30 cm) to allow small and medium-sized animals to move freely through and to not act as a barrier to dispersal. • Any drainage/water run-off trenches required to be built alongside roads should be shallow and broad with low-angle sides (<30 degrees) so as not to trap fossorial invertebrates (e.g. dung beetles) and small vertebrates (e.g. moles, snakes, tortoises). • Alien invasive vegetation found on the project area should be removed by an alien plant clearing team during the construction phase; invasive alien plants are seen as a significant threat to faunal SCC. • Restoration and rehabilitation: Natural vegetation or biodiversity features impacted from construction-related activities that could not be completely avoided and/or minimised through re-vegetating of temporary-use and lay-down areas as soon as reasonably practicable after the construction phase. • Providing toolbox talks to onsite personnel to ensure that they are aware of the biodiversity mitigation measures for construction phase of the project. •		
Mortality due to 33 kv network		
• Overhead lines should be restricted to an absolute minimum and should only be allowed if underground cabling is unfeasible due technical (not financial) constraints. • Bird flight diverters should be installed on all 33 kV overhead lines on the full span length on the earthwire (according to Eskom guidelines - five metres apart). Light and dark colour devices must be alternated to provide contrast against both dark and light backgrounds, respectively. These devices must be installed as soon as the conductors are strung. Design specification should conform to types of devices that will be visible at night e.g. LED type bird flight diverters • bird-friendly pole designs must also be used to mitigate electrocutions on the grid connection infrastructure.	Contractor	Once-off
Habitat Transformation		

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
• No construction should take place in All Infrastructure Exclusion Zones as indicated in Section 6.5 of the avifaunal report. • No construction activities within 2.5 km of the Martial Eagle nest (coordinates on request) should take place in the period March to December, which is the breeding season for these eagles. • Removal of vegetation must be restricted to a minimum and must be rehabilitated to its former state where possible after construction. • Construction of new roads should only be considered if existing roads cannot be upgraded. • The recommendations of the terrestrial biodiversity including animal and plant species specialist studies must be strictly implemented, especially as far as limitation of the activity footprint is concerned to limit the impact of habitat transformation on priority species. • No construction should take place in all infrastructure exclusion zones as indicated in Section 6.5 of the avifaunal report. • Following construction, rehabilitation of all disturbed areas (e.g., temporary access tracks and laydown areas) must be undertaken. A habitat restoration plan is to be developed by a specialist and included within the EMPr.	Site Engineer ECO / ESO	Throughout Construction Phase
Displacement due to Disturbance		
• No construction should take place in All Infrastructure Exclusion Zones as indicated in Section 6.5 of the avifaunal report. • No construction activities within 2.5 km of the Martial Eagle nest (coordinates on request) should take place in the period March to December, which is the breeding season for these eagles. • Construction activity should be restricted to the immediate footprint of the infrastructure as far as possible. Access to the remainder of the area should be strictly controlled to prevent unnecessary disturbance of priority species. • Measures to control noise and dust should be applied according to current best practice in the industry. • No construction should take place in all infrastructure exclusion zones as indicated in Section 6.5 of this report unless existing roads are to be upgraded.	Site Engineer ECO / ESO	Throughout Construction Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
Displacement due to habitat transformation		
• Develop a Habitat Restoration Plan (HRP) and ensure that it is approved. • Monitor rehabilitation via site audits and site inspections to ensure compliance. Record and report any non-compliance. • Vehicle and pedestrian access to the site should be controlled and restricted to the facility footprint as much as possible to prevent unnecessary destruction of vegetation.	SHE Manager ECO / ESO Specialist	Throughout Construction Phase
Displacement due to disturbance due to construction phase activities		
A site-specific CEMPr must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere to the CEMPr and should apply good environmental practice during construction. The CEMPr must specifically include the following: • No off-road driving. • Maximum use of existing roads. • Measures to control noise and dust according to latest best practice. • Restricted access to the rest of the property. • Strict application of all recommendations in the botanical specialist report pertaining to the limitation and rehabilitation of the footprint.	ECO / ESO Contractor	Throughout Construction Phase
Modification & Disturbance Of Bat Habitat (Roosting, Foraging, Commuting) (Bats) Due To Construction Phase Activities		
• Limit potential for bats to roost in project infrastructure (e.g., buildings, turbines) by ensuring they are properly sealed such that bats cannot gain access. • No construction activities at night. • No placement of infrastructure (except roads) in no-go areas. • No blasting near rocky crevices. • No placement of pylons within 200 m of key habitat features specifically including buildings, dams/wetlands, and rivers/streams. The OHL itself is permitted to cross over No-Go Areas for practical routing reasons but pylon positions must avoid No-Go Areas where feasible. Therefore the maximum possible span should be implemented to avoid the sensitive area while ensuring the technical feasibility of the development.	Site Engineer ECO / ESO Specialist	During design and planning phase and throughout construction phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
• Minimize clearing of native vegetation • Minimize disturbance and destruction of rocky outcrops, native trees and buildings, and where this is required, these features should be examined for roosting bats. • Apply good construction abatement control practices to reduce emissions and pollutants (e.g., noise, erosion, waste) created during construction. • Rehabilitate all areas disturbed during construction (including aquatic habitat).		
Disruption of the cultural and paleontological landscape due to construction activities		

• A pre-construction archaeological walkdown survey of the final WEF layout is recommended.
• Any archaeological sites or material encountered during construction activities must be reported to the ECO by contractors, and HWC must be notified of HWC of any such discovery by the ECO so that the find can be assessed and arrangements made to mitigate it, if necessary.
• Keep the construction duration as short as possible and as much of the activity as possible out of the public view.
• In particular the infrastructure area(s) should be screened if possible, and noise and light pollution kept to a minimum
• The EAP and ECO must be informed of the very high palaeontological significance of the WEF area;
• The Fossil Chance Find Protocol contained in Volume II, which is designed to record all unexpected fossils associated with the geological formations on site must:
    ◦ be implemented during the construction WEF, and
    ◦ be included as part of the EMPr for this project.ewq
• If fossils are exposed during construction they should be rescued and a palaeontologist called to assess and collect a representative sample, unless HWC recommends an alternative approach; and
• Recommendations contained in the PIA must be approved by HWC for inclusion in the EMPr for the project.
	Site Engineer
	ECO / ESO
	Specialist
		Before and during construction

Visual impacts during construction phase activities		

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
• Limit area of disturbance for access roads, substations and construction camp sites • Limit access tracks for construction and maintenance vehicles to existing roads where possible. Once established do not allow random access through the veld • Suppress dust during construction. • Blend edges of road and platforms with surrounding landscape • Rehabilitate exposed disturbed areas • Avoid vegetation stripping in straight lines but rather non-geometric shapes that blend with the landscape • Limit need for security lighting • Use non-reflective materials • Paint ,where possible, all other project infrastructure elements such as operational buildings, support poles etc. a dark colour • Avoid bright colour/patterns and logos.	Site Engineer ECO / ESO	During construction
Noise impact during daytime the construction phase activities		
• Considering potential future operational noise levels, the applicant can relocate certain NSR (such as NSR42, 63 and 64, where noise levels may also be high during the operational phase); • The applicant should discuss the potential noise levels associated with road construction activities with NSR; • The applicant can locate access roads further than 60 m from NSR. • The applicant should discuss the project activities with NSR staying within 60 from the access roads. • The applicant should add a component covering noise in the health and safety induction process. Employees and contractors should understand that noises could impact on the quality of living of people.	Site Engineer ECO / ESO Contractor	Before and During the Construction phase
Noise impact during the nighttime construction phase activities		
• Where possible, night-time construction activities closer than 1,000m from NSR should not be permitted; • Plan construction schedule that such simultaneous activities are only required at one WTG location (WTG located within 1,000m from an NSR). Other simultaneous	Developer Contractor	Before and During the Construction phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
construction activities can continue, but should take place further than 1,000m from NSR. • Warning NSR of when construction activities may take place at night; • Minimise active equipment at night, planning the completion of noisiest activities (such a pile driving, rock breaking and excavation) during the daytime period; • Considering potential future operational noise levels, the applicant can relocate certain NSR (such as NSR 64, 38, 65, 48, 41, 40, 47, 39, 43, 51, 50, 42, 56, 49, 46, 52, 44, 57, 53, 45, 58, 63, 54 and 55) where operational noise levels may also be high; • The applicant can reduce the number of WTG closer than 800m from the identified NSR, or relocate WTG further from identified NSR where operational noise levels will be high (reducing the locations where construction activities may take place). • The applicant should add a component covering noise in the health and safety induction process. Employees and contractors should understand that noises could impact on the quality of living of people; • A combination of the mitigation highlighted in points 1, 2, 5 and 6.		
Ruins		
• Should not be affected. • Middens may need to be sampled or excavated • Buildings need to be assessed by Built Environment specialist to determine architectural value • Will require mapping, photography if affected	Site Engineer ECO / ESO	Throughout Operation Phase
Battlefields		
• The WEF works with landowners to remove the wattle. The wattle cannot be removed by bulldozers as this will affect the soil. Hand saws are to be used. • The area is maintained and kept clear of black wattle • Markers are placed on the landscape where people were shot or captured, and the location of the pompom gun through the battle. These markers need to be visible from a central high point.	ECO	Throughout Decommission Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
• A central high area is allocated where the map of the battle, and an explanation, is placed. This would be similar to the ordnance maps used by Smith (2004). • The area has a metal detector survey that concentrates on the main activity areas. These are: ○ Pompom locations and route with a 50m radius. ○ Capture of Lt Cook ○ Location where Maj. Vallentin and Gen. Opperman were killed ○ The picket line. ○ The general area of the actual battle. ○ Areas where Boer forces waited in the morning of the battle • All artefacts belong to the state, and will have the correct provenience and photos. They will be stored at the relevant institution.		
Farm buildings		
• Should not be affected. • Middens may need to be sampled or excavated • Mapped and photographed • Requires assessment from Built Environment specialist • Will require a permit if to be damaged.	ECO	Throughout Decommission Phase
Creation of employment and business opportunities (SIA)		
Employment • Where reasonable and practical, the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi- and low-skilled job categories. • Where feasible, efforts should be made to employ local contractors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria. • The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. **Business**	Contractor Developer	Once off during construction phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
• Where possible, the proponent should assist local BBBEE companies to complete and submit the required tender forms and associated information.		
Risk to local communities posed by construction workers		
• Prepare and implement Stakeholder Engagement Plan (SEP). • Prepare and implement Community Health, Safety and Security Plan (CHSSP) • SEP and CHSSP should include a Grievance Mechanism • Implement 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories. • Investigate option of establishing a Monitoring Forum (MF) • Develop Code of Conduct for construction workers and contractor. • Implement an HIV/AIDS awareness programme for construction workers • Provide transport for workers to and from the site daily. • Ensure all construction workers from outside the area are transported back to their place of residence within 2 days for their contract coming to an end. • No construction workers, except for security personnel, permitted to stay over-night on the site.	Applicant Contractors	Before and During the Construction phase
Nuisance impacts associated with construction activities (noise, dust, safety etc.)		
• Prepare and implement Community Health, Safety and Security Plan (CHSSP). • Establish Grievance Mechanism. • Develop Code of Conduct for construction workers and contractor. • Restrict movement of construction vehicles to agreed access road/s. • Repair damage to farm infrastructure, including damage to local gravel farm roads. • Plan movement of heavy vehicles to avoid impact on farming activities, such as planting and harvesting. • Implement dust suppression measures.	Contractor	Before and During the Construction phase
Risk of grass fires		

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
• No open fires on the site for cooking or heating except in designated areas. • Smoking on site to be confined to designated areas. • All construction related activities that pose a potential fire risk, such as welding, to be effectively managed and confined to areas where the risk of fires has been reduced. • Avoid working in high wind conditions. • Provide adequate fire-fighting equipment on-site. • Provide fire-fighting training to selected construction staff. • No construction staff to be accommodated on site overnight.	Contractor	During the Construction phase
Impact on farmland and farming activities		
• Liaise with affected landowners to discuss potential footprint related issues wind turbines 2, 3, 6, 8, 9, 14, 18, 21, 25, 26, 27, 28, 30, 33, 34, 38, 40, 43, 118 and 119 and associated access roads etc. • Establish Grievance Mechanism. • Plan movement of heavy vehicles to avoid impact on farming activities, such as planting and harvesting. • Preparate and implement Stakeholder Engagement Plan (SEP) prior to and during the construction phase. This should include informing affected landowners of type and timing of activities. • Implement dust suppression measures. • Maximise use of existing internal roads. • Minimise footprint associated with the construction related activities (access roads, construction camps, workshop etc.) • Rehabilitate areas disturbed by temporary construction related activities, such as access roads on the site, construction camps etc., at the end of the construction phase. • Appoint Environmental Control Officer (ECO) should be appointed to monitor construction phase and implementation of rehabilitation plan..	Developer ECO	During the Construction phase
Generate benefits for affected landowners		

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency and Timing of Monitoring
• Implement agreements with affected landowner. • Investigate opportunities to contribute to and improve security in the area.	Developer	During the Construction phase
Support local SED initiatives		
• Liaise with the MM to identify projects that can be supported by SED contributions. • Establish criteria for identifying and funding community projects. Criteria should be aimed at maximising the benefits for the community as a whole and not individuals within the community. • Develop and implement financial management controls, including annual audits, to manage the SED contributions.	Developer	Before and During the Construction phase
Visual impact on sense of place		
• Discuss relocating Turbine 2 with affected landowner. • Implement recommendations contained in the VIA. • Install radar activated civil aviation light system on wind turbines where technically feasible.	Developer	During the Construction phase

6.2 post construction

The following are the overarching post construction measures:

- Once construction has been completed on site and all excess material has been removed, the storage area shall be rehabilitated. If the area was badly damaged, re-seeding shall be done and fencing in of the area shall be considered if livestock/faunal species specific to the area may subsequently have access to such an area.
- Such areas shall be rehabilitated to their natural state. Any spilled concrete shall be removed and soil compacted during construction shall be ripped, levelled and re-vegetated.
- If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.
- Only designated areas must be used for storage of construction materials, soil stockpiles, machinery and other equipment.
- Specific areas must be designated for cement/concrete mixing/ batching plants. Sufficient drainage for these plants must be in place to ensure that soils do not become contaminated.
- The construction camp must be kept clear of litter at all times.
- Spillages within the construction camp need to be cleaned up immediately and disposed of in the hazardous skip bin for correct disposal.
- All remaining material including building rubble and waste are to be removed from the site.
- All disturbed areas must be managed to ensure efficient drainage.
- The area designated for the deposition of spoil material is to be levelled and shaped to ensure the efficient drainage of the site. Under no circumstances is general or hazardous waste to be disposed of at this site.

6.2.1 Infrastructure

The following are post construction infrastructure mitigation measures:

- Disassemble all temporary infrastructure units and remove components from the working areas and contractors' camp. This will include storage structures and containers, water storage container, power supply, workers accommodation, sewage systems.
- Drain all potable chemical toilets, being careful not to spill the contents. Transfer the waste to an appropriate disposal site.
- Drain all waste water and sewage associated with temporary ablution facilities and transfer the waste to an appropriate disposal site to be identified by the contractor.
- Disassemble all fencing around the camp and either sell, suction or donate to the local community or transfer the waste components to a disposal site or the contractor's base.
- Do not leave any components, waste or infrastructure units within the working area and camp unless specifically required for the operation and maintenance phases and as agreed with the ECO.

6.2.2 Contaminated Substrate and Pollution Control Structures

- Excavate all areas of contaminated substrate, transfer the contaminated substrate to an appropriate disposal site and treat the affected areas.
- Remove all plastic linings used for pollution control and transfer to an appropriate disposal site.
- Break up all concrete structures that have been created and remove concrete waste to an appropriate disposal site.

6.2.3 Waste

- Remove all remaining construction materials from the camp and working areas and either sell, auction, donate to the local community or transfer the waste components to a disposal site or a designated area in the contractor’s base.
- Remove all construction debris, litter and domestic waste from the camp and working areas and transfer to an appropriate disposal site.
- Remove all waste receptacles from the camp and working areas and either sell, auction, donate to the local community or transfer the waste components to a disposal site or the contractor’s base.

7. OPERATION PHASE MITIGATION MEASURES

Once the commissioning and construction of the WEF is complete, the project becomes operational. During the operation and maintenance of the WEF (including the normal operation of the turbine itself) a certain amount of disturbance is likely. An operational WEF will normally have various day to day activities occurring on site, such as (but not limited to) security control, routine maintenance, road clearing/cleaning, grass/bush cutting and clearing.

The objectives of the operation phase are:

- To promote environmental awareness.
- To define roles and responsibilities for environmental management.
- To ensure that the mitigation measures proposed for the operational phase of the WEF are implemented and conducted appropriately.
- To ensure that the recommended monitoring programmes are implemented accordingly.

The main impacts associated with the operation phase of the WEF relate to birds and bats. A bird and bat specialist must be appointed to undertake the operational phase monitoring as per the EA and according to the applicable bird and bat guidelines at the time of commercial operations.

If the destruction of natural vegetation is unavoidable, a habitat rehabilitation programme should be established before operation and following decommissioning. The programme must address the rehabilitation of the existing habitats as well as the rehabilitation of areas disturbed during construction and investigate the potential of rehabilitating previously transformed or degraded areas. This rehabilitation programme must be approved by the relevant government departments and the relevant permits must be obtained for the handling/transport/propagation of protected species.

7.1 Potential Operation Phase Impacts

Table 7.1 below provides a summary of the potential impacts of the operation of the WEF, as assessed by specialists.

Recommended persons as provided in Table 7.2 below should take responsibility for the implementation and monitoring to ensure that all operational mitigation measures outlined in this document, and all revisions thereof, are complied with.

TABLE 7.1 SUMMARY OF OPERATION PHASE POTENTIAL IMPACTS AND SIGNIFICANCE RATING

Operation Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Freshwater & Wetlands (Aquatics)								
Spread of Alien Vegetation	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	Low
Terrestrial Biodiversity								
Disturbances to ecological processes may occur as a result of the activity	Without Mitigation	Local	Immediate	Recoverable	Negative	Low	Probable	Low
	With Mitigation	Local	Immediate	Recoverable	Negative	Low	Low Probability	Very Low
Invasion by exotic and alien invasive species could occur as a result of construction	Without Mitigation	Local	Immediate	Recoverable	Negative	Low	Probable	Low
	With Mitigation	Local	Immediate	Recoverable	Negative	Low	Low Probability	Very Low
Faunal								
Loss of faunal species of conservation concern and potential loss of faunal habitat	Without Mitigation	Regional	Long term	Recoverable	Negative	High	Definite	High
	With Mitigation	Regional	Medium term	Recoverable	Negative	Moderate	High Probability	High
Avifauna								
Bird collision with turbine blades, habitat alteration and displacement	Without Mitigation	Local	Long term	Irreversible	Negative	High	Highly Probable	High
	With Mitigation	Local	Medium term	Recoverable	Negative	Moderate	Probable	High
Bird collision with overhead power lines	Without Mitigation	Regional	Long term	Irreversible	Negative	High	High Probability	High
	With Mitigation	Regional	Long term	Irreversible	Negative	Moderate	Low Probability	High
	Without Mitigation	Regional	Long term	Irreversible	Negative	Moderate	Probable	Medium

Operation Phase		**Extent**	**Duration**	**Reversibility**	**Status**	**Significance**	**Probability**	**Magnitude**
Mortality due to Electrocution (internal 33 kV cables)	With Mitigation	Regional	Long term	Irreversible	Negative	High	Low Probability	Medium
Mortality due to Collisions with Power Lines (132 kV)	Without Mitigation	Site	Long-term	Irreversible	Negative	High	Highly Probable	High
	With Mitigation	Site	Long-term	Irreversible	Negative	Moderate	Probable	High
Mortality due to Electrocutions (132kV OHL and/or Substation Yard)	Without Mitigation	Site	Long-term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Long-term	Irreversible	Negative	Low	Low Probability	Medium
Bats								
Direct collision or barotrauma	Without Mitigation	Regional	Long term	Irreversible	Negative	High	Highly probable	High
	With Mitigation	Regional	Long term	Recoverable	Negative	Moderate	Probable	Medium
Displacement of bats due to avoidance of wind turbines	Without Mitigation	Regional	Long-term	Recoverable	Negative	Moderate	Probable	Medium
	With Mitigation	Regional	Long-term	Reversible	Negative	Low	Low Probability	Low
Light pollution	Without Mitigation	Local	Long-term	Recoverable	Negative	Moderate	Highly probable	Medium
	With Mitigation	Local	Long-term	Reversible	Negative	Low	Probable	Low
Visual								
Change of the landscape characteristics and key views (visual intrusion and flicker effect) and change to the sense of place (Turbines)	Without Mitigation	Regional	Long term	Irreversible	Negative	High	Highly probable	High
	With Mitigation	Regional	Long term	Irreversible	Negative	Moderate	Probable	Medium
Change of the landscape characteristics and key	Without Mitigation	Regional	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Regional	Long term	Irreversible	Negative	Moderate	Probable	Medium

Operation Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
views (visual intrusion and flicker effect) and change to the sense of place (OHPL)								
Noise								
Daytime operation of WTG	Without Mitigation	Local	Long-term	Reversible	Negative	Moderate	Definite	Very High
	With Mitigation	Local	Long-term	Reversible	Negative	Low	Possible	Medium
Night-time operation of WTG	Without Mitigation	Regional	Long-term	Reversible	Negative	High	Definite	Very High
	With Mitigation	Regional	Long-term	Reversible	Negative	Low	Possible	Medium
Social								
Improve energy security and support renewable sector	Without Mitigation	National	Long-term	N/A	Negative	Moderate	Highly Probable	High
	With Mitigation	National	Long-term	N/A	Positive	High	Definite	High
Creation of employment and business opportunities	Without Mitigation	Regional	Long term	N/A	Positive	Low	Low Probability	Low
	With Mitigation	Regional	Long term	N/A	Positive	Moderate	Highly Probable	Medium
Generate income for affected landowners	Without Mitigation	Regional	Long term	N/A	Positive	Low	Probable	Low
	With Mitigation	Regional	Long term	N/A	Positive	Moderate	Definite	Medium
Benefits associated with the socio-economic development contributions	Without Mitigation	Regional	Long term	N/A	Positive	Moderate	Highly Probable	Medium
	With Mitigation	National	Long term	N/A	Positive	High	Definite	High
Visual impact and impact on sense of place	Without Mitigation	Regional	Long term	Reversible with rehabilitation	Negative	High	Definite	High
	With Mitigation	Regional	Long term	Reversible with rehabilitation	Negative	Moderate	Highly Probable	Medium

Operation Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Potential impact on property values	Without Mitigation	Local	Long term	N/A	Negative	Low	Low Probability	Low
	With Mitigation	Local	Long term	N/A	Negative	Low	Low Probability	Low
Potential impact on tourism	Without Mitigation	Local	Long term	N/A	Negative	Low	Low Probability	Very Low
	With Mitigation	Local	Long term	N/A	Negative	Low	Low Probability	Very Low
Traffic								
Increase in general peak hour traffic volumes	Without Mitigation	Site	Immediate	Reversible	Negative	Low	Low Probability	Very Low
	With Mitigation	Site	Immediate	Reversible	Negative	Low	Low Probability	Very Low
Increase in abnormal traffic volumes	Without Mitigation	Regional	Immediate	Recoverable	Negative	Low	Probable	Medium
	With Mitigation	Regional	Immediate	Recoverable	Negative	Low	Low Probability	Medium
Impact of dust along gravel site access roads	Without Mitigation	Site	Immediate	Recoverable	Negative	Low	Low Probability	Low
	With Mitigation	Site	Immediate	Reversible	Negative	Low	Probable	Very Low
Deterioration of surrounding road network	Without Mitigation	Site	Immediate	Reversible	Negative	Low	Low Probability	Low
	With Mitigation	Site	Immediate	Reversible	Negative	Low	Low Probability	Low

TABLE 7.2 OPERATION PHASE IMPACT MANAGEMENT

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
To minimise the impact of the access roads		
• Use existing roads or upgrade existing tracks rather than constructing entirely new roads wherever possible and has been included in the proposed layout. • Use the smallest possible working corridor. Outside the working corridor, all watercourses are to be considered no go areas. Where intrusion is required, the working corridor must be kept to a minimum and demarcated clearly, before any construction commences. • Removal of vegetation must only be when essential for the continuation of the project. Do not allow any disturbance to the adjoining natural vegetation cover or soils. • Where required, all pipe culverts must be removed and replaced with suitable sized box culverts, where road levels are raised. Crossings that are installed below the natural ground level are to be constructed with an appropriate drop inlet structure on the upstream side to ensure that head cut erosion does not develop as a result of the gradient change from the natural ground level to the invert level of the culvert. • The channel profile, regardless of the current state of the river / water course, will be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist, with a preference for low level drifts where possible. • Water diversions must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse. Sandbags used in any diversion or for any other activity within a watercourse must be in a good condition, so that they do not burst and empty sediment into the watercourse. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns. Under no circumstance shall a new channel or drainage canals be excavated to divert water away from construction activities. • Any fauna (frogs, snakes, etc.) that are found within the construction area must be moved to the closest point of similar habitat type outside of the areas to be impacted. • All disturbed areas beyond the construction site that are intentionally or accidentally disturbed during the construction phase must be rehabilitated.	Site Engineer ECO / ESO Developer Specialist	Throughout operation phase according to the Bat Management Plan (Section 23).

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
Potential impacts include erosion, poor vegetation cover and alien invasive and weed regeneration		
• A suitable weed management strategy to be implemented in construction phase. • Alien trees and weeds must be removed from the site as per CARA/NEMBA requirements on an ongoing basis during operational phase. • Suitable measures must be implemented in areas that are susceptible to erosion. Areas must be rehabilitated, and a suitable cover crop planted once construction is completed. • If natural vegetation re-establishment does not occur, a suitable grass must be applied. • Stormwater discharge into watercourses to be protected against erosion.	ECO	Duration of aftercare period on completion of construction (recommended 2 years)
Potential spread of alien vegetation		
• Alien vegetation management must be initiated at the beginning of the construction period and must extend into any remaining areas into the operation phase on the facility • The revegetation of any temporary sites as well as any previously degraded areas must begin from the onset of the project, with the involvement of a botanist to assist with the revegetation specifications • Regeneration of alien vegetation must be monitored once all areas have been cleared, forming part of a long-term alien vegetation management plan	ECO	Duration of aftercare period on completion of construction (recommended 2 years)
Loss of faunal species of conservation concern and potential loss of faunal habitat		
Mitigation measures to reduce residual risk or enhance opportunities: • If high sensitive areas are to be developed, then off-sets will be required. • Implementation of an Oribi management plan for project area. • Implementation of a grazing and fire management plan for the high sensitive areas. • Ongoing eradication of alien invasive plants across the project area as part of an alien plant management plan.	Operation Manager	Throughout Operation Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
• Vegetation management in accordance with the recommendations from the botanist. • Modifications to any fencing to facilitate animal movement can include leaving a gap at reasonable intervals between the base of the fence and the ground of approx. 30 cm in height. This can occur across the full extent of the fence, or at regular intervals. • Possible options to mitigate the negative impacts of artificial lights could include: ◦ Fixtures on lights to cover the light bulb and direct the light to where it is needed. ◦ Use timers and motion sensors ◦ An outdoor lighting plan should be developed that includes an overall reduction of nocturnal lighting. • Limiting the number and speed of vehicle movements within the project area to and from turbines. Speed bumps should be installed on internal roads and speed limits and animal crossing warning signs should be erected. • Providing toolbox talks to onsite personnel to ensure that they are aware of the biodiversity mitigation measures for the operational phase of the project.		
Mortality due to collisions with the wind turbines		
• No turbines (including the rotor swept area) should be located in turbine exclusion zones as indicated in Section 6.5 of this report. • Wind turbines (WTGs) located within the medium risk zones (as indicated in Section 6.5 of this report) must be subject to Shut Down on Demand (SDoD), either Observer SDoD or Automated SDoD, as well as proactive curtailment based on environmental and weather conditions conducive to bird flight activity. Analysis of Martial Eagle tracking data has revealed strong correlations between flight activity and variables such as time of day, wind speed, and temperature. These correlations will be further refined prior to the wind farm becoming operational, also see section 5.8.7.1 for more information. • Sensitive Species 23: All WTGs within the modelled medium risk zone (see Section 6.5) would need to implement dynamic, real-time nocturnal curtailment. • Habitat mapping and modelling for the species will need to be conducted every 7-14 days (semi-monthly) from spring onward, using the latest satellite imagery, supplemented with on-site weather station rainfall and soil moisture data. This near real-time, dynamic modelling will generate a **habitat suitability index** by integrating	Operation Manager	Throughout Operation Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
rainfall (water levels), wetland saturation, and vegetation state. Vegetation state will consider both structural components influenced by grazing and burning, as well as seasonal productivity measured through remotely sensed habitat suitability time-series analysis. Structural assessments will be conducted using drone-derived Digital Terrain Model (DTMs), while productivity trends will be monitored across the growing season to capture phenological and productivity changes. When the dynamic habitat suitability index indicates favourable habitat conditions during late spring-early summer, WTGs in the medium risk mitigation zone would need to be curtailed at night. • Live-bird monitoring and carcass searches should be implemented in the operational phase, as per the most recent edition of the Best Practice Guidelines at the time (Jenkins et al. 2015) to assess collision rates. • **All wind turbines** must have at least **one blade painted according to a CAA approved pattern** to reduce the risk of raptor collisions (Blade Patterning Guidelines 2024). See **Appendix 12 of Avifaunal report**. • If at any time estimated collision rates to be determined by Collision Risk Modelling during the EIA phase of the project indicate unacceptable mortality levels of priority species, i.e., if during operation it exceeds these mortality thresholds, additional measures will have to be considered as part of an adaptive management strategy.		
Mortality due to Collisions with Overhead Power Lines (internal 33 kV cables) (if any)		
• Bird flight diverters should be installed on all the overhead line sections for the full span directly associated with the proposed WEF according to the applicable Eskom standard at the time. • Design specification should conform to types of devices that will be visible at night e.g. LED type bird flight diverters.	Operation Manager	Throughout Operation Phase
Mortality due to Electrocution (internal 33 kV cables) (if any)		
• Underground cabling should be used as much as is practically possible. • If the use of overhead lines is unavoidable due to technical reasons, the Avifaunal Specialist must be consulted timeously to ensure that a bird-friendly pylon design is used, and that appropriate mitigation is implemented pro-actively for complicated pylon	Operation Manager	Throughout Operation Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
structures e.g., insulation of live components to prevent electrocutions on terminal structures and pole transformers. • Regular inspections of the overhead sections of the internal reticulation network must be conducted during the operational phase to look for carcasses, as per the most recent edition of the Best Practice Guidelines at the time (Jenkins et al. 2015).		
Bat fatality		
• No placement of turbines and infrastructure (apart from roads and the OHL) within no-go areas • Maintain a minimum blade sweep of 30 m to avoid impacts to lower flying bats such as clutter-edge species (e.g., Cape serotine, Natal long-fingered bat). • Minimize the rotor diameter • Feather blades to prevent free-wheeling below the turbine cut-in speed • Implement post-construction fatality monitoring and apply smart curtailment or deterrents if fatality thresholds are exceeded. •	Site Engineer ECO / ESO	Throughout Operation Phase
Displacement		
• Reduce turbine noise emissions by serration of the back edges of the blade, by using a low-noise blade airfoil design or with blade trailing-edge brushes (Bošnjaković et al. 2024; Ellerbrok et al. 2024).	Site Engineer ECO / ESO	Throughout Operation Phase
Light Pollution		
• No placement of substations and operational and maintenance buildings within no-go areas. • Avoid excessive lighting • Use of motion-sensor lighting, avoid sky-glow by using hoods and downward facing lighting, increase spacing between lighting units, and use low pressure sodium lights (Rydell 1992, Stone 2012)	Site Engineer ECO / ESO	Throughout Operation Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
Ruins		
• Should not be affected. • Middens may need to be sampled or excavated • Buildings need to be assessed by Built Environment specialist to determine architectural value • Will require mapping, photography if affected	Site Engineer ECO / ESO	Throughout Operation Phase
Battlefields		
• The WEF works with landowners to remove the wattle. The wattle cannot be removed by bulldozers as this will affect the soil. Hand saws are to be used. • The area is maintained and kept clear of black wattle • Markers are placed on the landscape where people were shot or captured, and the location of the pompom gun through the battle. These markers need to be visible from a central high point. • A central high area is allocated where the map of the battle, and an explanation, is placed. This would be similar to the ordnance maps used by Smith (2004). • The area has a metal detector survey that concentrates on the main activity areas. These are: • Pompom locations and route with a 50m radius. • Capture of Lt Cook • Location where Maj. Vallentin and Gen. Opperman were killed • The picket line. • The general area of the actual battle. • Areas where Boer forces waited in the morning of the battle • All artefacts belong to the state, and will have the correct provenience and photos. They will be stored at the relevant institution…	ECO	Throughout Decommission Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
Farm buildings		
• Should not be affected. • Middens may need to be sampled or excavated • Mapped and photographed • Requires assessment from Built Environment specialist • Will require a permit if to be damaged.	ECO	Throughout Decommission Phase
Visual intrusion and potential flicker effect by wind turbines and associated structures and infrastructure on visual receptors		
• Mitigation will already have been implemented by the placement of turbines according to distance from visual receptors. • Additional mitigation if still required: 1. Screening the affected receptor by, for example, applying blinds or shutters to the affected window; closing curtains during the period of the day when flicker could occur; planting a vegetation screen such as a row of trees between the receptor and the turbine or reconfiguring the building so that views from it are limited. 2. Consider compensation 3. Shutdown the turbine/s during the time of the day for those calendar days when flicker will occur. • Investigate the possibility to manage for the top of turbine red hazard lighting to only operate when a plane enters the affected airspace rather than be permanently lit • Limit need for security lighting • Mitigation will already have been implemented by the placement of turbines according to distance from landscape receptors • Limit need for security lighting. • Use non-reflective materialsPaint, where possible, all other project infrastructure elements such as operational buildings, support poles etc. a dark colour • Avoid bright colour/patterns and logos	Site Engineer ECO / ESO Specialist	Throughout Operation Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
Daytime operation of numerous WTG		
• Considering potential future night-time operational noise levels, the applicant can relocate certain NSR (such as NSR 64, 38, 65, 48, 41, 40, 47, 39, 43, 51, 50, 42, 56, 49, 46, 52, 44, 57, 53, 45, 58, 63, 54 and 55) where operational noise levels will be high; • The applicant can reduce the number of WTG closer than 800m from the identified NSR; • The applicant can relocate WTG further from identified NSR where operational noise levels will be high (reducing the locations where construction activities may take place); • Together with a combination of the mitigation measures raised in points 1, 2, and 3; the applicant can add noise reducing additions to the blades of certain WTG (such as serrated trailing edges); • Together with a combination of the mitigation measures raised in points 1, 2, 3, and 4; the applicant can design and implement a noise abatement plan that would reduce the noise emissions from the WTG during certain times or conditions.	Wind farm operator ECO / ESO Specialist	Throughout Operation Phase
Night-time operation of numerous WTG		
• Considering potential future night-time operational noise levels, the applicant can relocate certain NSR (such as NSR 64, 38, 65, 48, 41, 40, 47, 39, 43, 51, 50, 42, 56, 49, 46, 52, 44, 57, 53, 45, 58, 63, 54 and 55) where operational noise levels will be high; • The applicant can reduce the number of WTG closer than 800m from the identified NSR; • The applicant can relocate WTG further from identified NSR where operational noise levels will be high (reducing the locations where construction activities may take place); • Discussions with NSR at locations where night-time projected noise levels will slightly exceed the recommended night-time noise limit (45 – 48 dBA). NSR should be informed about the potential issues associated with long-term exposure to high noise level. If acceptable to the NSR, the applicant could consider the acoustic treatment of the dwellings to ensure compliance with Table 1 of SANS 10103. Each dwelling must be treated on a case-to-case base, as this option is mainly available to housing structures of proper construction (concrete or brick, with a roof with a ceiling space); • Together with a combination of the mitigation measures raised in points 1, 2, 3 and 4; the applicant can add noise reducing additions to the blades of certain WTG (such as serrated	Applicant Contractors	Throughout Operation Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
trTogether with a combination of the mitigation measures raised in points 1, 2, 3, 4 and 5; the applicant can design and implement a noise abatement plan that would reduce the noise emissions from the WTG during certain times or conditionsailing edges);		
Development of infrastructure to improve energy security and support renewable		
• Implement a skills development and training programme aimed at maximizing the number of employment opportunities for local community members. • Maximise opportunities for local content, procurement, and community shareholding.	Developer	Throughout Operation Phase
Nature: Visual impact associated with the proposed facility and associated potential impact on property values.		
• The recommendations contained in the VIA should be implemented. • Install radar activated civil aviation light system.	Developer	Throughout Operation Phase
Potential impact of the WEF on local tourism operations and activities		
• The recommendations contained in the VIA should be implemented. • Install radar activated civil aviation light system.	Developer	Throughout Operation Phase
Nature: Creation of employment, skills development and business opportunities associated with the operational phase		
Enhancement: • Where reasonable and practical, the proponent should implement a 'locals first' policy, especially for semi and low-skilled job categories.	Developer	Throughout Operation Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
• Where feasible, efforts should be made to employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria. • Where feasible, training and skills development programmes for locals should be initiated as part of the operational phase. The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. ***Business*** • The proponent should liaise with the MM with regards the establishment of a database of local companies, specifically BBBEE companies, which qualify as potential service providers for the operational phase.		
Generate benefits for affected landowners		
• The proponent should liaise with the local landowners and security companies and install CCTV cameras along key access roads in the study area. • Implement agreements with affected landowners.	Developer	Throughout operational phase
Support local SED initiatives		
• Liaise with the MM to identify projects that can be supported by SED contributions. • Establish criteria for identifying and funding community projects. Criteria should be aimed at maximising the benefits for the community as a whole and not individuals within the community. • Develop and implement financial management controls, including annual audits, to manage the SED contributions.	Developer	Throughout operational phase
Visual impact associated with the proposed facility and associated infrastructure and the potential impact on the areas rural sense of place.		
	Developer	Once off at outset of operational phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
• The developer should liaise with the owners of XXX to discuss location of wind turbine XXX and XX etc. • The recommendations contained in the VIA should be implemented. • Install radar activated civil aviation light system.		
Benefits associated with support for local community's form SED contributions		
• The proponents should liaise with the MM (Msukaligwa Municipality) to identify projects that can be supported by SED contributions. • Clear criteria for identifying and funding community projects and initiatives in the area should be identified. The criteria should be aimed at maximising the benefits for the community as a whole and not individuals within the community. • Strict financial management controls, including annual audits, should be instituted to manage the SED contributions.	Developer	Once off at outset of operational phase

8. CUMULATIVE PHASE

The cumulative impact assessment considers the combined impact of the remaining and other renewable projects within a 30 km radius, that are also in the development phase and the associated grid lines on the aquatic resources. The combination of the Emvelo and Sheepmoor WEFs, as well as other similar renewable energy projects, either existing or proposed, was considered to assess cumulative visual impacts within a 30 km radius of the proposed project. Developments considered during the assessment are named below:

8.1 Soil, Land Use and Agricultural Potential

Cumulative impact assessments determine the combined effects of a proposed development with past, present, and likely future activities on the environment. Key to this assessment is the concept of an "acceptable level of change." If a development’s impact does not exceed this threshold, its cumulative impact is considered insignificant.

This assessment specifically evaluates the potential agricultural impact of renewable energy projects within a 30 km radius, estimating a loss of approximately 276 hectares, which is only 0.1% of the total area and acceptable given the availability of low-potential agricultural land. All projects share similar impacts and can adopt uniform mitigation measures to prevent soil degradation.

Overall, the cumulative impact on future agricultural production potential is deemed low and acceptable. Therefore, approval of the development and its infrastructure is recommended due to its negligible effects on agricultural land.

8.2 Freshwater and Wetlands (Aquatics)

The cumulative impact assessment for aquatic biodiversity evaluates the combined effects of existing and planned renewable projects and their associated grid lines within a 30 km radius on local aquatic resources. It is based on the premise that sensitive aquatic features will be protected and that proposed mitigations will sustain the integrity of downstream areas. The impact status is categorized as negative, with a moderate negative impact score of 39 without mitigation, characterized by local, long-term, irreversible effects of medium magnitude and probable occurrence. With mitigation measures in place, the impact score decreases to 14, reflecting a low negative impact that is site-specific, short-term, recoverable, and of low probability. Suggested enhancements include sharing infrastructure to reduce the overall footprint and mitigate stormwater and erosion impacts, as well as collaborating with provincial authorities to upgrade access routes and improve stormwater management. Ultimately, the residual impact is assessed as low, indicating that the implementation of mitigation measures significantly reduces the severity of the potential impacts on aquatic biodiversity.

8.3 Terrestrial Biodiversity (Flora and Fauna)

The proposed WEF is unlikely to have significant cumulative impacts, nor result in any unacceptable loss or risk to terrestrial biodiversity on the site or regionally, regardless of the other WEF projects proposed in the area, as the layout has been aligned with minimising impacts and avoiding key ecological processes. WEF facilities generally have a low-density footprint that can accommodate sensitivities, and the overall footprint area is small in comparison to the total coverage area. The current and future threats to the represented grassland vegetation units would be posed by large scale clearing of habitat, which is usually associated with Agriculture, Mining and Forestry as well as urban development and expansion.

8.4 Fauna

Avoiding high sensitive grassland habitats, retaining ecological corridors, removing alien plants, monitoring Orbi populations, and implementing potential conservation programs could have an overall positive conservation impact for faunal SCC within the broader area of the WEF development. In this regard, a compromise between the loss of mostly degraded habitat with the conservation of areas of high grassland sensitivity and habitat for the Oribi should be considered as a positive component of this proposed development.

However, the current, and future developments in and around the Ermelo area, would need to be considered in the broader context of conservation strategies around the identification and establishment of a network of protected areas to help offset the cumulative negative impacts of renewable energy projects (and other developments) on faunal SCC, such as for highly threatened Oribi.

8.5 Avifauna

The assessment of the proposed Emvelo Wind Energy Facility (WEF) indicates that it will feature up to 24 wind turbines, contributing to a total of 192 potential turbines across several wind farms within a 35 km radius, including Sheepmoor and Camden facilities, all of which are yet to be constructed. The Emvelo WEF comprises 21% of this total, resulting in a moderate to high cumulative impact concerning the number of turbines. The total area allocated for renewable energy developments, including Emvelo WEF, covers approximately 268.3 km², equating to roughly 7% of the suitable habitat for birds in the same vicinity. Consequently, the cumulative impact concerning the creation of high-risk zones for birds is assessed as moderate. Emvelo WEF itself occupies 46.5 km², representing about 19% of the designated area for renewable energy projects but less than 2% of the total available habitat in the 35 km radius. Its contribution to potential displacement of priority species due to habitat transformation is therefore considered moderate to low. Cumulative impacts on birds, both without and with mitigation, are rated as medium negative significance, although they can be managed or mitigated. Key mitigation strategies include adhering to established measures, collaborating with other energy operators, and sharing operational monitoring data with Birdlife SA. A medium negative residual impact is anticipated, reflecting the challenges in effectively mitigating cumulative effects.

8.6 Heritage and Archaeology

The cumulative impacts on cultural heritage resources demonstrate a high sensitivity to construction activities. While many potential impacts can be mitigated through various strategies, there remains a persistent risk of irreparable loss to these finite resources, necessitating careful planning and adherence to mitigation measures to safeguard cultural heritage during development projects

8.7 Socio-Economic

The development of the Wind Energy Facility (WEF) alongside other wind energy projects in the region may lead to combined and sequential visibility impacts. Without mitigation measures, the significance of this effect is assessed as Medium Negative, and this rating remains the same even when mitigation strategies are applied. Additionally, the potential cumulative impact on local services and accommodation is contingent upon the coordination of construction timelines for various renewable energy projects in the area. With effective planning in place, this impact is rated as Low Negative when mitigation measures are adopted. Conversely, the significance of the cumulative impact on the local economy, particularly with enhancement efforts, is assessed as High Positive.

8.8 Visual / Landscape

The significance of the cumulative impact of these projects on the visual environment during their operational phase is assessed to have a high magnitude and over the long-term. The probability of the unmitigated impact is high resulting in a predicted significance of impact as high. The implementation of mitigation measures and that receptor sensitivity to the project is low could reduce the anticipated impact, to moderate.

8.9 Noise

The cumulative impact assessment for operational noise at the Emvelo and Sheepmoor Wind Energy Facilities (WEFs) indicates that the simultaneous operation of multiple wind turbines (WTGs) could significantly increase noise levels, particularly at noise-sensitive receptors (NSR) such as NSR58, NSR82, and NSR66, with NSR82 experiencing the most notable increase. Without mitigation, the projected noise impact is categorized as very high in severity, regional in extent, long-term in duration, and definite in probability, resulting in a high overall significance rating. However, these impacts are fully reversible once operational activities cease, with a medium loss of the quiet environment that typically characterizes the area away from busy roads.

To manage and reduce potential noise impacts, several mitigation measures are proposed. These include relocating WTGs to increase distance from certain NSR, reducing the number of turbines located closer than 800 meters from impacted residences, and engaging with residents to discuss projected nighttime noise levels that may slightly surpass recommended limits. Acoustic treatment of affected dwellings may also be considered, based on individual assessments. Additional measures could involve implementing noise-reducing features on turbine blades and designing a comprehensive noise abatement plan to strategically lower noise emissions during specific times or conditions. With these mitigations in place, the significance of noise impacts is anticipated to be reduced to moderate, although some residual impacts will remain until the facilities cease operations

8.10 Bats

The potential effects of the project on bat species, particularly focusing on those deemed to be at risk or vulnerable due to cumulative impacts from existing and planned renewable energy projects in the vicinity. The assessment identified three Valued Environmental Components (VECs) at risk from these cumulative impacts: the Cape serotine, the Natal long-fingered bat, and the Egyptian free-tailed bat. The assessment takes into account a temporal frame of 25 years, which aligns with the operational lifespan of a renewable energy facility, although impacts may extend beyond this period.

The geographical scope of the evaluation includes two Ecologically Appropriate Areas of Analysis (EAAA): a 150 km radius for the migratory Natal long-fingered bat and a smaller 35 km radius for the other two species, based on their foraging ranges. The CIA identifies various existing and planned wind energy projects within these areas, acknowledging renewable energy as the primary source of impact on these VECs, alongside other pressures such as habitat loss and disturbance. Predicted cumulative impacts from wind turbines include collisions leading to local extinctions, population fragmentation, and displacement from essential foraging and commuting areas. Without mitigation, the significance of these impacts is assessed as high; however, proposed mitigation measures, including habitat buffering, appropriate lighting, blade feathering, and the use of smart curtailment, are expected to reduce this to a moderate level. Residual impacts might still occur despite these measures, but proper management can safeguard against formidable declines in bat populations, aligning with established fatality thresholds aimed at mitigating population-level impacts across future developments.

8.11 Traffic and Transportation

The assessment of cumulative development impacts examines the combined effects of multiple renewable energy projects in the area, as outlined by the NEMA EIA Regulation GN R982 of 2014. This regulation defines cumulative impacts as the total effects of past, current, and reasonably foreseeable future activities, alongside their associated effects, which may appear insignificant on their own but become significant when considered collectively.

The evaluation includes various wind and solar developments within a 35 km radius of the proposed area, with several projects currently approved or in the application phase. Key potential cumulative impacts identified include increased general traffic volumes, abnormal heavy traffic, dust emissions from construction activities, and deterioration of the surrounding road network.

Increased general traffic during peak hours could exceed the existing road network's capacity, leading to congestion and delays. Without enhancements, this impact is rated as a moderate negative impact. However, with the implementation of a Traffic Management Plan and mitigation measures, the impact can be reduced to a low negative significance.

Similarly, the presence of abnormal heavy vehicles transporting materials can disrupt traffic flow and lead to road rehabilitation requirements. The significance of this impact is assessed as high negative without enhancement, which can be moderated to a moderate negative impact with proper traffic management and alternative transportation options.

Dust generated by heavy vehicles on unpaved access roads poses another concern, affecting air quality and visibility for nearby residents and road users. While this impact is categorized as moderate negative without enhancements, effective dust control measures can reduce the significance to low negative.

Lastly, the heavy vehicle traffic associated with construction activities is expected to cause wear and tear on the surrounding road network, leading to higher maintenance costs and reduced infrastructure lifespan. This impact is evaluated as moderate negative both with and without enhancement, though maintenance and limiting overloaded vehicles can mitigate its severity.

9. DECOMMISSIONING PHASE

The objectives of the decommission phase are:

To promote environmental awareness.

To define roles and responsibilities for environmental management.

To ensure that the mitigation measures proposed for the decommissioning phase of the WEF is implemented and conducted appropriately.

To ensure that the recommended management plans are implemented accordingly.

Prior to the decommissioning of the WEF, a decommissioning plan must be produced by the ECO. The plan must include details on the decommissioning and dismantling of the WEF, taking in consideration the potential environmental impact associated with it. Environmental monitoring plans must be produced to ensure no pollution occurs during this phase. The plan must include the steps that will be taken to rehabilitate the area after the WEF is dismantled, as well as recycling options of the equipment and structures. Recommendations for consideration for the decommissioning plan is provided below.

Decommissioning ultimately requires the removal of wind turbine infrastructure and includes the restoration of the site as closely as possible to its original state.

9.1 Decommissioning and Restoration Plan Recommendations

A Decommissioning and Restoration Plan (DRP) should be considered to ensure that habitat and ecosystem restoration is achievable once the Wind Farm has ceased operating.

According to the *Scottish Natural Heritage Commissioned Report: Research and Guidance on restoration and decommissioning of onshore wind farms*, a logical sequence for decommissioning planning and execution of construction activities were reviewed and some of what are suggested below:

- De-energising the site, usually involves initially high voltage (HV) disconnection in the event of re-energizing of the site followed by low voltage (LV) disconnection of the affected turbines.
- Handing over the site responsibility to an experienced Contractor and management of Operator access and site setup.
- Decommissioning of structures, likely to be the reverse of the installation procedure, such as:
    - Stripping out of turbine internals and removal of transformer;
    - Controlled dismantling of turbines (blades, nacelle, tower);
    - Removal of turbine base and backfilling void;
    - Removal of cables (whole or partial) and making good trenches (throughout);
    - Removal of crane pads (whole or partial) and backfilling/landscaping;
    - Removal of Sub-station and associated buildings (when applicable);
    - Removal of access tracks (whole or partial) and associated water crossings, passing areas etc. Working from end point towards exit point;
    - Reinstating watercourses and /or removing watercourse crossings;

- ◦ Final landscaping (seeding) and making good remaining borrow pits etc;
- ◦ Make good public road junctions, if required;
- ◦ Providing 'as-built' documentation including residual risks to Landowner and Planning Authority; and
- ◦ Monitoring and maintaining the site to achieve the end-use requirement.

9.1.1 Soil Conservation and Management

Completely removing wind turbine infrastructure is likely to require a rock-based backfill into the voids left behind. Decommissioning plans have proposed options that involve the removal of turbine materials to a depth of approximately 1 m below ground level followed by surface restoration of topsoil. This approach needs to be considered carefully as it may not always be ecologically feasible. Using large quantities of off-site rock or soil for backfill could have detrimental impacts especially if the backfill's chemical composition is significantly different from that found in the natural, baseline (receiving) soil environment of the site. A recommendation would be to avoid using large quantities of backfill that do not match the receiving environment's baseline soil profile.

Other direct and indirect impacts on soil properties that may occur during construction and decommissioning phases that should be avoided include:

- Sealing soil by covering it with impermeable materials that may alter the soil's chemical and biological properties and could have adverse impacts on drainage characteristics;
- Contaminating soil through accidental spillage / use of chemicals;
- Compacting soil with heavy machinery;
- Mixing topsoil with subsoil, resulting in reduced soil quality; and
- Indirect effects on water quality – increase in dissolved organic carbon and presence of suspended soils.

Before any decommissioning and restorative design work takes place, an in-depth assessment of the available soil on site, along with soil-forming resources from the restorative layers should be carried out. It is important to understand a site's soil characteristics and their influence on habitats so that communities that are re-established are likely to sustain themselves in the long run.

Agricultural restoration would need at least a thin layer of topsoil, while semi-natural environments often require low nutrient substrates and woodland restorative planting needs a minimum depth of 1 m of suitable material.

Imported soils should match the chemical and nutrient composition of the receiving soil profile and should be free of invasive and undesired seedlings / propagules. Using imported peat or soils may result in the need for resowing if the material does not contain a viable seed bank of local provenance. Reseeding techniques will inevitably be needed as materials that were side-casted during the initial construction phase will not contain enough viable seeds to regenerate the whole restoration area. Other soil-forming materials can be used in the absence of sufficient topsoil, peat, and appropriate seed bank levels as long as soils and/or soil substitutes are aligned with the site's target ecosystem.

9.1.2 Vegetation Restoration

The objective of habitat restoration is to minimize degradation of the ecological resource and promote the re-establishment of a functional ecosystem. Decommissioning plans that involve significant disturbance of habitats (complete removal of infrastructure) require a longer recovery period in environments less resilient to disturbance (peatlands or species-rich grasslands). Habitat restoration techniques must consider the ease that different habitats can be restored and the likely success of this restoration.

9.1.3 Options for End-of-life Infrastructure

Generally, the turbine would be dismantled at ground level and transported away from the site for recycling, reuse, or disposal. The decommissioning of the turbine structure should have a minimal environmental impact. Costs are driven by haulage and craneage charges.

Installed wind turbines consist of four sections: the rotor, nacelle, tower, and foundation. It is important to know what materials were used in the construction of the turbines as this will provide insight into best practices for appropriate disposal methods.

Materials commonly used in the construction of turbines are:

- Rotor – Blades, Blade hub, Nose cone, Resin, fiberglass, cast iron.
- Nacelle – Bed frame, Main shaft, Transformer, Generator, Gearbox, Nacelle cover, Steel, Silica, copper, steel, fiberglass, resin.
- Tower - Steel, Concrete (very uncommon).
- Foundation – Footing, Ferrule, Concrete, iron, steel.
- Other material to be decommissioned are discussed below.
- Transformer - There are limited recycling options, and is therefore recommended to be removed from site for disposal or be used by others. It would be a low cost to the decommissioning plan.
- Crane Pads can be retained, regraded and then covered. Original soils must be managed to be reused for restoration. Costs involved are Low to Medium. Recycling options would be to use on-site as backfilling voids.
- Tracks and roads can be left in situ if suitable and if not hindering on any other risks such as visual, hydrology. For reinstatement, original topsoil and appropriate seed layer must be used.
- Substations can be removed from site and materials can be separated and reused. Cables made from copper material can be recycled offsite.

Turbine foundations consist of reinforced concrete gravity structures or reinforced concrete bases supported on piles. The removal of a base will involve breaking apart the reinforced concrete. The concrete is recommended to be broken into smaller sections with steel cutting equipment, hydraulic breakers, excavators, and dump trucks for their removal. It is suggested that the removal of a concrete base could take a week if only the top layer of 1 meter is removed. Should reinforced concrete be processed on-site to remove steel (for recycling purposes) and create a granular or rubble concrete material, it can be used for further construction (tracks, hardstandings) if appropriate to the site. Processed or unprocessed reinforced concrete can be removed from site and be reused or recycled.

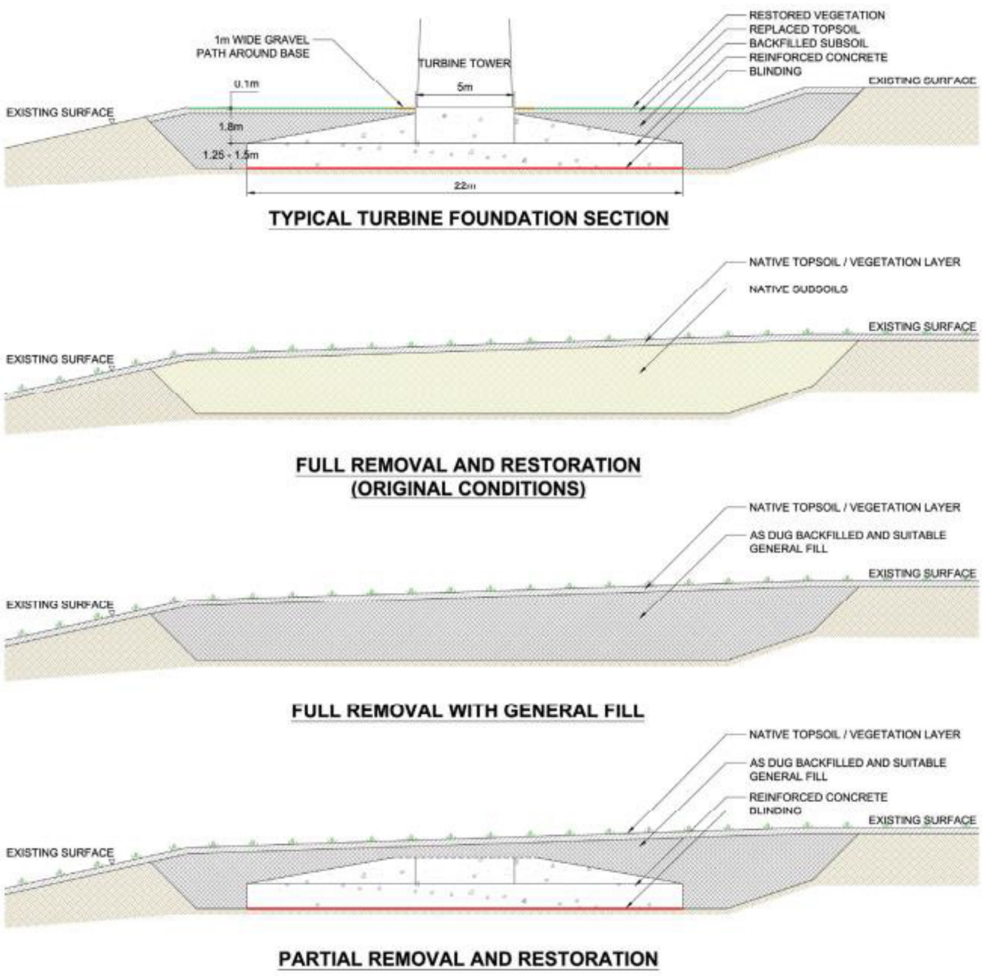
Alternatively, reinforced concrete can under normal circumstances remain *in situ* as an inert material. Concrete is inherently durable unless attacked by soils containing sulphates or low pH and other aggressive agents. The risk of rebar corrosion is low in buried concrete due to the low risk of carbonation and low levels of oxygen. Where ground conditions pose a chemical risk, it is likely that the concrete would have been designed to be resistant to acidic or alkaline conditions. Site-specific risks should be assessed in the DRP as the base has been *in situ* for 15 years.

Retaining the base *in situ* can be considered as there is a relatively low environmental risk associated with reinforced concrete. The noise, ground disturbance, and costs of excavating, processing, and transporting along with associated carbon emissions may create a larger environmental impact than leaving the base *in situ*.

Removing the concrete base without backfilling would leave a sizeable void that could pose a health and safety hazard or an unwanted feature in the visual landscape. The void would need to be filled with appropriate material as discussed in the soil conservation section.

Turbine bases supported on concrete piles are more difficult to remove. Leaving such piles *in situ* should not create an environmental hazard but it may be prone to oxidizing and staining or contamination. This is due to the depth of cover between concrete and reinforcement in the piles may be less than in gravity bases.

FIGURE 9.1 TURBINE FOUNDATION DECOMMISSIONING ALTERNATIVES



9.1.4 Reuse of Turbines

Ideally, sending off material to a landfill should be avoided or used as a last resort. There is the option of reusing wind turbine infrastructure where feasibly possible. For developing countries, buying second-hand wind turbines serve as an opportunity to gain experience with renewable energy and allow for profit from technology transfer with low capital expenditure. Wind turbines could be sold, or their materials (mainly comprised of steel, copper, and electronics) can be recycled or reused where possible.

Turbine blades are slightly more difficult to recycle as they're made primarily from fiberglass, a composite material. Cutting the blades into smaller, manageable sizes on site is achievable, but transporting the materials off-site is costly. There are limited recycling options for composite materials. Most recycling activities for composite materials are limited to down cycling (converting waste into products of lesser quality or reduced functionality.

9.2 Potential Decommissioning Phase Impacts

Table 9.1 below provides a summary of the potential impacts of the decommissioning of the WEF, as assessed by specialists.

Recommended persons as provided in Table 9.2 below should take responsibility for the implementation and monitoring to ensure that all decommissioning mitigation measures outlined in this document, and all revisions thereof, are complied with.

TABLE 9.1 SUMMARY OF DECOMMISSIONING PHASE IMPACTS

Decommission Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
Freshwater & Wetlands (Aquatics)								
Loss of habitat/vegetation containing SCC	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	Low
Loss of Critical Biodiversity Areas (CBAs)	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	Low
Changes to the hydrological regime and increase potential for erosion	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	Low
Loss of riparian habitat	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	Low
Changes to surface water quality	Without Mitigation	Local	Long term	Irreversible	Negative	Moderate	Probable	Medium
	With Mitigation	Site	Short term	Recoverable	Negative	Low	Low Probability	Low
Terrestrial Biodiversity								
No terrestrial biodiversity risks or impacts of significance are identified for the decommissioning phase.								
Faunal								
Noise and visual disturbances associated with the decommissioning (dismantling) of the	Without Mitigation	Local	Short term	Recoverable	Negative	Moderate	Probable	Moderate
	With Mitigation	Local	Short term	Recoverable	Negative	Low	Probable	Low

Decommission Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
wind turbines and associated infrastructure								
Avifaunal								
Displacement or disturbance associated with the decommissioning (dismantling) of the wind turbines and associated infrastructure	Without Mitigation	Local	Medium-term	Reversible	Negative	Moderate	Probable	High
	With Mitigation	Regional	Medium-term	Reversible	Negative	Moderate	Probable	High
Displacement due to disturbance associated with the decommissioning (dismantling) of the grid connection.	Without Mitigation	Local	Short-term	Reversible	Negative	Moderate	Low Probability	Medium
	With Mitigation	Site	Short-term	Reversible	Negative	Low	Low Probability	Low
Bats								
Disturbance of bats	Without Mitigation	Site	Short-term	Reversible	Negative	Low	Probable	Medium
	With Mitigation	Site	Short-term	Reversible	Negative	Low	Low Probability	Low
Visual								
Change of the landscape characteristics and key views (visual intrusion and flicker effect) and change to the sense of place (Turbines)	Without Mitigation	Regional	Short-term	Recoverable	Negative	Moderate	Highly Probable	Medium
	With Mitigation	Regional	Short-term	Recoverable	Negative	Moderate	Highly Probable	Medium
Change of the landscape	Without Mitigation	Regional	Short-term	Recoverable	Negative	Moderate	Highly Probable	Medium

Decommission Phase		Extent	Duration	Reversibility	Status	Significance	Probability	Magnitude
characteristics and key views (visual intrusion and flicker effect) and change to the sense of place (OHPL)	With Mitigation	Regional	Short-term	Recoverable	Negative	Moderate	Highly Probable	Medium
Noise								
Various decommissioning activities	Without Mitigation	Local	Short-term	Reversible	Negative	Low	Possible	Medium
	With Mitigation	Local	Short-term	Reversible	Negative	Low	Possible	Medium
Social								
Retrenchment including loss of jobs, and source of income	Without Mitigation	Local	Short term	Recoverable	Negative	Moderate	Highly Probable	Moderate
	With Mitigation	Local	Short term	Recoverable	Negative	Moderate	Probable	Low
Traffic								
Increase in general peak hour traffic volumes	Without Mitigation	Regional	Medium-term	Recoverable	Negative	Moderate	Probable	Medium
	With Mitigation	Local	Short-term	Reversible	Negative	Low	Probable	Low
Additional heavy vehicles/E80's on the external road network-	Without Mitigation	National	Short term	Recoverable	Negative	Moderate	Highly Probable	High
	With Mitigation	National	Short term	Recoverable	Negative	Moderate	Probable	Medium
Impact of dust along gravel site access roads	Without Mitigation	Local	Immediate	Recoverable	Negative	Low	Probable	Medium
	With Mitigation	Local	Immediate	Reversible	Negative	Low	Low Probability	Low
Deterioration of surrounding road network	Without Mitigation	Regional	Short-term	Recoverable	Negative	Low	Probable	High
	With Mitigation	Local	Short-term	Reversible	Negative	Low	Low Probability	Medium

TABLE 9.2 DECOMMISSIONING PHASE IMPACT MANAGEMENT

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
Loss of habitat containing protected species or Species of Special Concern		
The development of the stormwater management plan and Aquatic Rehabilitation and Monitoring plan, coupled to confirmation of the final layout prior to construction is made by the aquatic specialist. Where large cut and fill areas are required, these must be stabilised and rehabilitated during the construction process, to minimise erosion and sedimentation. Suitable stormwater management systems must be installed along roads and other areas and monitored during the first few months of use. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, spreaders, etc).	Site Engineer ECO / ESO	Throughout Decommission Phase
To minimise the impact of the access roads		
Use existing roads or upgrade existing tracks rather than constructing entirely new roads wherever possible and has been included in the proposed layout. Use the smallest possible working corridor. Outside the working corridor, all watercourses are to be considered no go areas. Where intrusion is required, the working corridor must be kept to a minimum and demarcated clearly before any construction commences. Removal of vegetation must only be when essential for the continuation of the project. Do not allow any disturbance to the adjoining natural vegetation cover or soils.	Site Engineer ECO / ESO	Throughout Decommission Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
Where required, all pipe culverts must be removed and replaced with suitable sized box culverts, where road levels are raised. Crossings that are installed below the natural ground level are to be constructed with an appropriate drop inlet structure on the upstream side to ensure that head cut erosion does not develop because of the gradient change from the natural ground level to the invert level of the culvert. The channel profile, regardless of the current state of the river / water course, will be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist, with a preference for low level drifts where possible. Water diversions must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse. Sandbags used in any diversion or for any other activity within a watercourse must be in a good condition, so that they do not burst and empty sediment into the watercourse. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns. Under no circumstance shall a new channel or drainage canals be excavated to divert water away from construction activities. Any fauna (frogs, snakes, etc.) that are found within the construction area must be moved to the closest point of similar habitat type outside of the areas to be impacted. All disturbed areas beyond the construction site that are intentionally or accidentally disturbed during the construction phase must be rehabilitated.		
Loss of CBAs or potential areas with conservation potential or linked to any important catchments and strategic water resource areas		
The aquatic systems have been mapped to a finer scale and have taken cognizance of any potential CBAs. As High / No-Go have been avoided by the major infrastructure such as turbines, the aquatic zones associated within the CBA / ESAs have also been avoided. Roads will need to traverse these areas, thus it is important to try and select	Site Engineer ECO / ESO	Throughout Decommission Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
existing areas with impacts / crossings where possible, coupled to the assumptions above The development of the stormwater management plan and Aquatic Rehabilitation and Monitoring plan, coupled to confirmation of the final layout prior to construction is made by the aquatic specialist. Where large cut and fill areas are required, these must be stabilised and rehabilitated during the construction process, to minimise erosion and sedimentation. Suitable stormwater management systems must be installed along roads and other areas and monitored during the first few months of use. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, spreaders, etc).		
Loss of riparian and or wetland habitat		
• The development of the stormwater management plan and Aquatic Rehabilitation and Monitoring plan, coupled to confirmation of the final layout prior to construction is made by the aquatic specialist. • Where large cut and fill areas are required these must be stabilised and rehabilitated during the construction process, to minimise erosion and sedimentation. • Suitable stormwater management systems must be installed along roads and other areas and monitored during the first few months of use. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, spreaders, etc).	Site Engineer ECO / ESO	Throughout Decommission Phase
Changes to the hydrological regime and increase potential for erosion		

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
No stormwater discharged may be directed to delineated aquatic zones or the associated buffers. A stormwater management plan finalised prior to construction, detailing the structures and actions that must be installed to prevent the increase of surface water flows directly into any natural systems. Effective stormwater management must include measures to slow, spread and deplete the energy of concentrated flows thorough effective stabilisation (gabions and Reno mattresses) and the re-vegetation of any disturbed areas	Site Engineer ECO / ESO	Throughout Decommission Phase
Changes to surface water quality characteristics		
All liquid chemicals including fuels and oil must be stored in with secondary containment (bunds or containers or berms) that can contain a leak or spill. Such facilities must be inspected routinely and must have the suitable PPE and spill kits needed to contain likely worst-case scenario leak or spill in that facility, safely. Washing and cleaning of equipment must be done in designated wash bays, where rinse water is contained in evaporation/sedimentation ponds (to capture oils, grease cement and sediment). Mechanical plant and bowsers must not be refueled or serviced within 100m of a river channel or wetland. All construction camps, lay down areas, wash bays, batching plants or areas and any stores should be beyond any demarcated water courses and their respective buffers. Littering and contamination associated with construction activity must be avoided through effective construction camp management. No stockpiling should take place within or near a water course. All stockpiles must be protected and located in flat areas where run-off will be minimised and sediment recoverable.	ECO	Throughout and after Decommission Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
ECO monitors the site on a daily basis to ensure plant is in working order (minimise leaks), spills are prevented and if they do occur, are quickly rectified.		
Social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income		
• The proponent should ensure that retrenchment packages are provided for all staff retrenched when the WEF is decommissioned.	Developer Contractor	Once
Displacement due to disturbance associated with the dismantling activities Turbines		
A site-specific EMPr must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere to the EMPr and should apply good environmental practice during construction. The EMPr must specifically include the following • No off-road driving. • Maximum use of existing roads. • Measures to control noise and dust according to latest best practice. • Restricted access to the rest of the property. • Strict application of all recommendations in the botanical specialist report pertaining to the limitation of the footprint.	ECO Contractor	Throughout Decommission Phase
Noise and visual disturbances associated with the decommissioning (dismantling) of the wind turbines and associated infrastructure		

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
• The smallest possible working corridor, particularly close to sensitive habitats, must be used. • A ~5 m buffer zone should also be considered for any decommissioning activities close to any high sensitive areas. • No construction vehicles are allowed within no-go areas. • Limiting the number and speed of vehicle movements to, from, and within the project area. • All temporary/permanent security fences will need to be modified (e.g. maintaining a gap, at reasonable intervals, between the base of the fence and the ground of approx. 30 cm) to allow small and medium-sized animals to move freely through and to not act as a barrier to dispersal. • Revegetation of disturbed areas (turbine placement areas, access roads, etc.) as they become available, using topsoil and indigenous plants from the site where possible. • Reinstatement of original vegetation, as far as feasible, after decommissioning. • Continuation of alien plant monitoring and clearing, Oribi monitoring programme, and ensuring any conservation areas are retained. • Providing toolbox talks to onsite personnel to ensure that they are aware of the biodiversity mitigation measures for decommissioning phase of the project.	ECO Contractor	Throughout Decommission Phase
Displacement due to disturbance grid connection		
A site-specific Decommissioning EMPr must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere to the EMPr and should apply good environmental practice during decommissioning. The EMPr must specifically include the following: • No off-road driving; • Maximum use of existing roads during the decommissioning phase and the construction of new roads should be kept to a minimum as far as practical; • Measures to control noise and dust according to latest best practice;	ECO Contractor	Throughout Decommission Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
• Restricted access to the rest of the property; • Strict application of all recommendations in the botanical specialist report pertaining to the limitation of the footprint.		
Disturbance of bats		
• No decommissioning activities at night. • Apply good abatement control practices to reduce emissions and pollutants (e.g., noise, erosion, waste) created during decommissioning activities. • Rehabilitate all areas disturbed during construction (including aquatic habitat).	ECO	Throughout Decommission Phase
Ruins		
• Should not be affected. • Middens may need to be sampled or excavated • Buildings need to be assessed by Built Environment specialist to determine architectural value • Will require mapping, photography if affected	ECO	Throughout Decommission Phase
20th century settlements with graves		
• Graves cannot be affected • 50m buffer from the edge • 20m visible demarcation if within 100m…	ECO	Throughout Decommission Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
Late Iron Age settlements		
• Sites may be excavated • PPP to ensure there are no claimants	ECO	Throughout Decommission Phase
Battlefields		

• The WEF works with landowners to remove the wattle. The wattle cannot be removed by bulldozers as this will affect the soil. Hand saws are to be used.
• The area is maintained and kept clear of black wattle
• Markers are placed on the landscape where people were shot or captured, and the location of the pompom gun through the battle. These markers need to be visible from a central high point.
• A central high area is allocated where the map of the battle, and an explanation, is placed. This would be similar to the ordnance maps used by Smith (2004).
• The area has a metal detector survey that concentrates on the main activity areas. These are:
  ○ Pompom locations and route with a 50m radius.
  ○ Capture of Lt Cook
  ○ Location where Maj. Vallentin and Gen. Opperman were killed
  ○ The picket line.
  ○ The general area of the actual battle.
  ○ Areas where Boer forces waited in the morning of the battle
 	
All artefacts belong to the state, and will have the correct provenience and photos. They will be stored at the relevant institution…
	ECO	Throughout Decommission Phase

Potential Impact and Management Actions	Responsibility for Implementation and Monitoring	Frequency of Monitoring
Farm buildings		
• Should not be affected. • Middens may need to be sampled or excavated • Mapped and photographed • Requires assessment from Built Environment specialist • Will require a permit if to be damaged.	ECO	Throughout Decommission Phase
Visual intrusion		
• Remove all project components from site • Rip all compacted hard surfaces such as platforms, words areas, access and service roads etc. and reshape to blend with the surrounding landscape • Rehabilitate/revegetate all disturbed areas to visually the original state by shaping and planting	Contractor	Once and then monitor growth succession. Redo where necessary
Visual intrusion by 132kV overhead transmission Powerline and its Associated Electrical Grid Infrastructure on visual and landscape receptors		
• Remove all project components from site • Rip all compacted hard surfaces and reshape to blend with the surrounding landscape • Rehabilitate/ revegetate all disturbed areas to visually the original state by shaping and planting	Contractor	Once

10. ALIEN INVASIVE MANAGEMENT PLAN

10.1 Purpose of the Alien Invasive Management Plan

The purpose of the Alien Invasive Management Plan is to provide a framework for the management of alien and invasive plant species during the construction and operation of the Emvelo WEF. The broad objectives of the plan include the following:

- Ensure alien plants do not become dominant in parts or the whole site through the control and management of alien and invasive species presence, dispersal & encroachment.
- Initiate and implement a monitoring and eradication programme for alien and invasive species.
- Promote the natural re-establishment and planting of indigenous species in order to retard erosion and alien plant invasion.

10.2 Problem Outline

Alien plants replace indigenous vegetation leading to severe loss of biodiversity and change in landscape function. Potential consequences include loss of biodiversity, loss of grazing resources, increased fire risk, increased erosion, loss of wetland function, impacts on drainage lines, increased water use etc.

In addition, the Conservation of Agricultural Resources Act (Act 43 of 1983), as amended in 2001, requires that land users clear *Declared Weeds* from their properties and prevent the spread of *Declared Invader Plants* on their properties.

Table 3 of CARA (the Conservation of Agricultural Resources Act) lists all declared weeds and invader plants. Alien plants are divided into 3 categories based on their risk as an invader.

- Category 1 - These plants must be removed and controlled by all land users. They may no longer be planted or propagated and all trade in these species is prohibited.
- Category 2 – These plants pose a threat to the environment but nevertheless have commercial value. These species are only allowed to occur in demarcated areas and a land user must obtain a water use licence as these plants consume large quantities of water.
- Category 3 – These plants have the potential of becoming invasive but are considered to have ornamental value. Existing plants do not have to be removed but no new plantings may occur and the plants may not be sold.

The following guide is a useful starting point for the identification of alien species: Bromilow, C. 2010. *Problem Plants and Alien Weeds of South Africa*. Briza, Pretoria.

10.3 Vulnerable Ecosystems and Habitats

Certain habitats and environments are more vulnerable to alien plant invasion and are likely to bear the brunt of alien plant invasion problems at the site. In addition, construction activities and changes in water distribution at the site following construction are also likely to increase and alter the vulnerability of the site to alien plant invasion.

Areas at the site which are likely to require specific attention include the following:

- Wetlands, drainage lines and other mesic areas.

- Cleared and disturbed areas such as road verges, crane pads and construction footprints etc.
- Construction camps and lay-down areas which are cleared or are active for an extended period.

10.3.1 Wetlands, drainage lines and other mesic areas

There are a relatively large number of drainage lines at the site as well as a number of artificial wetlands. Disturbance within these areas often results in alien plant invasion on account of the greater water and nutrient availability in this habitat. Although there are no turbines within such areas, numerous road crossings will be required. The disturbance footprint within such areas must be minimized and these areas must be checked for alien species more than the surrounding landscape.

10.3.2 Cleared and disturbed areas

Cleared and disturbed areas are clearly vulnerable to invasion on account of the lack of existing plant cover to resist invasion as well as the disturbance created during construction which promoted the germination and establishment of alien plant species.

10.3.3 Construction camps and laydown areas

Construction camps and lay down areas are either cleared of vegetation or prolonged activities in these areas result in negative impact on indigenous vegetation. In addition, repeated vehicle and human activity in these areas usually results in the import of alien plant seed on clothes, dirty vehicles or with construction machinery and materials.

10.4 General Clearing and Guidance Principles

Alien control programs are long-term management projects and must include a clearing plan which includes follow up actions for rehabilitation of the cleared area. Alien problems at the site must be identified during pre-construction surveys of the development footprint. This may occur simultaneously to other required reaches and surveys. The clearing plan must then form part of the pre-construction reporting requirements for the site.

The plan must include a map showing the alien density & indicating dominant alien species in each area.

- Lighter infested areas must be cleared first to prevent the build-up of seed banks.
- Pre-existing dense mature stands ideally must be left for last, as they probably won't increase in density or pose a greater threat than they are currently.
- Collective management and planning with neighbours may be required in the case of large woody invaders as seeds of aliens are easily dispersed across boundaries by wind or water courses.
- All clearing actions must be monitored and documented to keep track of which areas are due for follow-up clearing.

10.5 Clearing Methods

- Different species require different clearing methods such as manual, chemical or biological methods or a combination of both.

- However care must be taken that the clearing methods used do not encourage further invasion. As such, regardless of the methods used, disturbance to the soil must be kept to a minimum. Fire is not a natural phenomenon in the area and fire must not be used for alien control or vegetation management at the site.
- The best-practice clearing method for each species identified must be used. The preferred clearing methods for most alien species can be obtained from the DWAF Working for Water Website. http://www.dwaf.gov.za/wfw/Control/.

10.6 Use of Herbicide for Alien Control

Although it is usually preferable to use manual clearing methods where possible, such methods may create additional disturbance which stimulates alien invasion and may also be ineffective for many woody species which re-sprout. Where herbicides are to be used, the impact of the operation on the natural environment must be minimised by observing the following:

- Area contamination must be minimised by careful, accurate application with a minimum amount of herbicide to achieve good control.
- All care must be taken to prevent contamination of any water bodies. This includes due care in storage, application, cleaning equipment and disposal of containers, product and spray mixtures.
- Equipment must be washed where there is no danger of contaminating water sources and washings carefully disposed of in a suitable site.
- To avoid damage to indigenous or other desirable vegetation, products must be selected that will have the least effect on non-target vegetation.
- Coarse droplet nozzles must be fitted to avoid drift onto neighbouring vegetation.
- The appropriate health and safety procedures must also be followed regarding the storage, handling and disposal of herbicides.

For all herbicide applications, the following guidelines must be followed:

Working for Water: Policy on the Use of Herbicides for the Control of Alien Vegetation.

10.7 Construction Phase Activities

The following management actions are aimed at reducing soil disturbance during the construction phase of the development, as well as reducing the likelihood that alien species will be brought onto site or otherwise encouraged.

Construction Phase Action	Frequency
The ECO is to provide permission prior to any vegetation being cleared for development.	Daily
Clearing of vegetation must be undertaken as the work front progresses – mass clearing must not occur unless the cleared areas are to be surfaced or prepared immediately afterwards.	Weekly
Where cleared areas will be exposed for some time, these areas must be protected with packed brush, or appropriately battered with fascine work. Alternatively, jute (Soil Saver) may be pegged over the soil to stabilise it.	Weekly
Cleared areas that have become invaded can be sprayed with appropriate herbicides provided that these are such that break	Weekly

Construction Phase Action	Frequency
down on contact with the soil. Residual herbicides must not be used.	
Although organic matter is frequently used to encourage regrowth of vegetation on cleared areas, no foreign material for this purpose must be brought onto site. Brush from cleared areas must be used as much as possible. The use of manure or other soil amendments is likely to encourage invasion.	Weekly
Clearing of vegetation is not allowed within 32 m of any wetland, 80 m of any wooded area, within 1:100 year floodlines, in conservation servitude areas or on slopes steeper than 1:3, unless permission is granted by the ECO for specifically allowed construction activities in these areas	Weekly
Care must be taken to avoid the introduction of alien plant species to the site and surrounding areas. (Particular attention must be paid to imported material such as building sand or dirty earth-moving equipment.) Stockpiles must be checked regularly and any weeds emerging from material stockpiles must be removed.	Weekly
Alien vegetation regrowth on areas disturbed by construction must be controlled throughout the entire site during the construction period.	Monthly
The alien plant removal and control method guidelines must adhere to best-practice for the species involved. Such information can be obtained from the DWAF Working for Water website.	Monthly
Clearing activities must be contained within the affected zones and may not spill over into demarcated No Go areas.	Daily
Pesticides may not be used. Herbicides may be used to control listed alien weeds and invaders only.	Monthly
Wetlands and other sensitive areas must remain demarcated with appropriate fencing or hazard tape. These areas are no-go areas (this must be explained to all workers) that must be excluded from all development activities.	Daily

10.7.1 Monitoring Actions - Construction Phase

The following monitoring actions must be implemented during the construction phase of the development.

Monitoring Action	Indicator	Timeframe
Document alien species present at the site	List of alien species	Pre-construction
Document alien plant distribution	Alien plant distribution map within priority areas	3 Monthly
Document & record alien control measures implemented	Record of clearing activities	3 Monthly
Review & evaluation of control success rate	Decline in documented alien abundance over time	Biannually

10.8 Operational Phase Activities

The following management actions are aimed at reducing the abundance of alien species within the site and maintaining non-invaded areas clear of aliens.

Operational Phase Action	Frequency
Surveys for alien species must be conducted regularly. Every 6 months for the first two years after construction and annually thereafter. All aliens identified must be cleared.	Every 6 months for 2 years and annually thereafter
Where areas of natural vegetation have been disturbed by construction activities, revegetation with indigenous, locally occurring species must take place where the natural vegetation is slow to recover or where repeated invasion has taken place following disturbance.	Biannually, but revegetation must take place at the start of the rainy season
Areas of natural vegetation that need to be maintained or managed to reduce plant height or biomass, must be controlled using methods that leave the soil protected, such as using a weed-eater to mow above the soil level.	When necessary
No alien species must be cultivated on-site. If vegetation is required for esthetic purposes, then non-invasive, water-wise locally-occurring species must be used.	When necessary

10.8.1 Monitoring Actions - Operational Phase

The following monitoring actions must be implemented during the operation phase of the development.

Monitoring Action	Indicator	Timeframe
Document alien species distribution and abundance over time at the site	Alien plant distribution map	Biannually
Document alien plant control measures implemented & success rate achieved	Records of control measures and their success rate. A decline in alien distribution and cover over time at the site	Quarterly
Document rehabilitation measures implemented and success achieved in problem areas	Decline in vulnerable bare areas over time	Biannually

10.9 Decommissioning Phase Activities

The following management actions are aimed at preventing the invasion, by alien plant species, of the re-vegetated areas created during the decommissioning phase. Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to operation.

Decommissioning Phase Action	Frequency
All damaged areas shall be rehabilitated if the infrastructure is removed and the facility is decommissioned.	Once off
All natural areas must be rehabilitated with species indigenous to the area. Re-seed with locally-sourced seed of indigenous grass species that were recorded on site pre-construction.	Once off, with annual follow up re-vegetation where required

Decommissioning Phase Action	Frequency
Maintain alien plant monitoring and removal programme for 3 years after rehabilitation.	Biannually

10.9.1 Monitoring Actions - Decommissioning Phase

The following monitoring and evaluation actions must take place during the decommissioning phase of the development

Monitoring Action	Indicator	Timeframe
Monitor newly disturbed areas where infrastructure has been removed to detect and quantify any aliens that may become established for 3 years after decommissioning and rehabilitation	Alien plant surveys and distribution map	Biannually until such time as the natural vegetation has recovered sufficiently to resist invasion.
Monitor re-vegetated areas to detect and quantify any aliens that may become established for 3 years after decommissioning and rehabilitation	Alien plant surveys and distribution map	Biannually for 3 years
Document alien plant control measures implemented & success rate achieved	Records of control measures and their success rate. A decline in alien distribution and cover over time at the site	Annually for 3 years

11. PLANT RESCUE AND PROTECTION PLAN

The purpose of the plant rescue and protection plan is to implement avoidance and mitigation measures to reduce the impact of the development on listed and protected plant species and their habitats.

The objective of reusing plants on the project area is to prevent the loss of species either directly or through future extinction and minimising impacts of development on population dynamics of species of conservation concern.

Preserving the natural configuration of habitats as part of ecosystems, thus ensuring a diverse but stable hydrology, substrate and general environment for species to be able to become established and persist.

11.1 Effect of removing individual species of conservation concern

Species of conservation concern are declining either due to overexploitation or because their range of occupancy is limited and further infringed on by development. Most plant populations require a certain minimum number of individuals within a population or metapopulation to allow for sufficient genetic transfer between individuals. This prevents genetic erosion and hence weakening of the ability of individuals to persist in their environments. Similarly, where the distance between metapopulations is significantly increased due to fragmentation and the resultant loss of some populations, populations may suffer genetic decline due to restricted movement of pollen. Pollinators or other species that depend on a particular plant species for a specific microhabitat or food source may be equally affected because of the reduction of available resources. Therefore, the aim of plant rescue actions are always to maintain as many individuals of a plant population in as close proximity to the original habitat as possible to minimise loss of individuals and fragmentation of populations to prevent the creation of future extinction debts of the development.

11.2 Plant Rescue and Protection

Successful plant rescue can only be achieved if:

- Species can be removed from their original habitat with minimal damage to the plant, especially the roots.
- All plants removed are safely stored and treated according to their specific requirements prior to being transplanted again.
- They are relocated into a suitable habitat and protected from further damage and all disturbances to aid their re-establishment.
- Timing of planting activities is planned with the onset of the growing season.
- Steps are taken where necessary to aid the initial establishment of vegetation, including occasional watering.

11.3 Time of Planting

- All planting shall be carried out as far as is practicable during the period most likely to produce beneficial results (i.e. during the peak growing season), but as soon as possible after completion of a section of earthworks.

- Drainage line rehabilitation preparation must be done during autumn, and planting of appropriate species in these areas must commence during early spring after the first rains.

11.4 Plant Search and Rescue

Prior to construction, once all the areas where topsoil will be removed or areas will be transformed have been demarcated, the ECO and contractor will be responsible to remove all bulbous species from the topsoil, as well as succulents and small indigenous shrubs that can be transplanted. These are to be kept in a raised, protected position in a designated area until they can be replanted again as part of the rehabilitation process. Further details are listed in the Re-vegetation and Habitat rehabilitation Plan.

12. RE-VEGETATION AND HABITAT REHABILITATION PLAN

The Revegetation and Habitat Rehabilitation Plan addresses the need to mitigate all impacts leading to disturbed vegetation, loss of species and/or agricultural potential, disturbed soil surfaces, and generally bare soils prone to erosion and further degradation on the proposed development site. The plan overlaps to some degree with the Erosion Management Plan, and for successful rehabilitation, it is imperative that this plan is at all times used in conjunction with other EMPrs mentioned.

The objective of the plan is therefore to provide:

- Protocols for the removal, temporary storage and replanting of plant species of conservation concern Protocols for the rehabilitation of vegetative cover across the project area;
- Tools for planning the rehabilitation work and responding to unforeseen events Guidelines on implementation and post-implementation tasks Criteria for evaluating rehabilitation success; and
- A summary of items to be included in the rehabilitation budget to ensure that there is sufficient allocation of resources on the project budget so that the scale of EMPr-related activities is consistent with the significance of project impacts.

The objective of rehabilitation and revegetation of the development area is:

- Preventing the loss of species either directly or through future extinction and minimising impacts of development on population dynamics of species of conservation concern.
- Preserving the natural configuration of habitats as part of ecosystems, thus ensuring a diverse but stable hydrology, substrate and general environment for species to be able to become established and persist.
- Preserving or re-creating the structural integrity of natural plant communities. Actively aid the improvement of indigenous biodiversity according to a desirable end state according to a previously recorded reference state. This reference state, if healthy, will be dynamic and able to recover after occasional disturbances without returning to a degraded state.
- Improving the ecosystem function of natural landscapes and their associated vegetation.
- Successful rehabilitation can only be achieved with: »A long-term commitment »Practical, adaptive management »Viable goals of desired outcomes

Prior to vegetation rehabilitation, all stakeholders involved must be consulted to determine:

- What the rehabilitation is ultimately aiming for– rehabilitation of cropping/grazing lands or rehabilitation of indigenous vegetation, after soil erosion and storm water management is in place and IAPs have been cleared?
- A clear definition of incompatible and compatible vegetation on and in the immediate surroundings of the development must be defined and maintained as such. No tree or shrubs shall be allowed to grow to a height in excess of the horizontal distance of that tree or shrub from the nearest newly developed structure or to grow in such a manner as to endanger the development or its operation
- Who will take long-term ownership and hence responsibility for the rehabilitation and its subsequent monitoring and management? Continued monitoring of vegetation

establishment and composition, as well as erosion detection will have to be coupled with continued follow-up maintenance of rehabilitation and erosion control from commencement of activity up to the decommissioning phase.

- The ultimate objective for rehabilitation must focus on the stabilisation of soil erosion, retaining agricultural potential of transformed areas and /or the establishment of a dense and protective plant cover and the maintenance of habitats to enable vegetation to persist and flourish on rehabilitated areas indefinitely, ultimately relying only on environmental resources.

12.1 Map and Create Management Areas

The entire project area must be mapped and divided into management areas indicating:

- Current land cover
- Roads and residential
- Areas with IAPs, subdivided further in sparse or dense infestations where applicable
- Transformed areas
- Untransformed indigenous vegetation

For every one of the management areas, the project proponent, in consultation with the land users, will have to decide what intervention will be necessary, desirable, and feasible to enable the development of the project and long-term sustainable maintenance of infrastructure. Thus for every management area there must be an operational outline on:

- what will happen there
- what needs to be mitigated – including storm water- and erosion management
- which management units need priority intervention/mitigation
- how will this mitigation / intervention be done (method statements) including schedule of work
- realistic and desirable end states including list of species that must be established to initiate rehabilitation after initial revegetation
- approximate timeframes
- monitoring protocol to evaluate success or failures of interventions
- establish permanently marked transects and monitor with fixed-point photography who will be responsible for doing what how will different actions be integrated to achieve and maintain or improve the desirable end state of the environment of that management unit

Special attention will have to be given to drainage zones, as these not only have very active morphodynamics, but are also distributers of seeds – both indigenous and of IAPs. Thus clearing a downstream invasion of aliens to enable maintenance of the development will be futile if the upstream IAPs are not cleared or at least aggressively controlled.

12.2 Setting Realistic Rehabilitation Goals

Rehabilitation efforts typically aim at improving ecosystem function that consists of a series of processes, which can in the end be evaluated against a desired outcome or reference state of the vegetation and environment.

Attainable goals of rehabilitation on the project area must be possible and viable for at least the following:

- Stabilisation of soils
- Stabilisation of riparian areas
- Storm water reduction through management and wetland integrity
- Clearing of IAPs
  - The degree to which IAPs can be cleared from the project area needs to be determined according to desirability, available project funding, personnel and project requirements
- Restoring and/or rehabilitating vegetative cover on non-transformed areas to obtain an acceptable vegetation cover that can be maintained or persists on its own indefinitely.

12.3 Remove or Ameliorate the Cause of Degradation

This will include:

- Physical rehabilitation of topsoil where it has been removed.
- Topsoil on areas that have not been cultivated are considered as the upper 20 - 30 cm only. These contain the most important nutrients, micro flora and –fauna essential for nutrient cycling processes. Topsoils are also an important source of seeds.
- Subsoils and overburden substrata lack the above elements and will first have to be used for physical rehabilitation of landscapes as and where necessary, and then overlain with topsoils.
- Stabilisation of topsoils and prevention of erosion – refer to the Erosion management plan.
- Removal of all invasive vegetation – refer to the Alien Invasive Management Plan

Where it is desirable to use brush or logs of the cleared vegetation for soil stabilisation, such material must be free of regenerative material – e.g. seeds or root suckers.

12.4 Initial Revegetation

Immediately after clearing of vegetation, the soil surface must be inspected for signs of erosion and stabilised as soon as possible. After completion of construction, such erosion stabilisation must preferably be with a cover of vegetation. A dense initial grass or other perennial cover will be desirable. The appropriate seed mix must be determined in consultation with an ecologist familiar with the area. The aim of the first vegetation cover is to form a protective, relatively dense indigenous layer to slow runoff, increase moisture infiltration into the soil, and gradually change the soil nutrient status in order for it to be more favourable for other desirable indigenous vegetation to become established.

12.5 Natural seed banks and improvement of plant structural and compositional diversity

It is expected that soil seed banks of indigenous vegetation will be present to initiate initial vegetation cover, but may not be sufficient to establish an acceptable cover of desirable species. After deciding which indigenous species must be re-introduced, seed must be ideally collected from site or an environmentally-matched site nearby.

Seed collection may be done throughout the year as seed ripens, but can also be restricted to summer, when a large amount of the perennial seed should have ripened. Seeds must be stored in paper or canvas bags dusted with insecticide, and sown at the onset of the rainy season.

Alternatively, slower-growing perennials may be raised from seed or cuttings in a nursery and then transplanted once established. It will be beneficial to investigate if community members would be able to create and maintain such a nursery, or if there are nurseries in the area, that raise indigenous flora from the area.

The final vegetation cover must resemble the original (non-encroached) vegetation composition and structure as far as practicable possible or permissible within each management unit.

For drainage areas:

- First restore drainage line morphology following the guidelines of the Erosion Management Plan – without that ecological recovery cannot be initiated;
- Determine if natural seed sources may be present further upstream;
- If such upstream seed sources are still present, rehabilitation of riparian vegetation after soil erosion management will most likely occur naturally, PROVIDED that follow-up monitoring of the establishment of vegetation is carried out, and all invasive species eradicated as they emerge. This can only be achieved with a long-term commitment (> 5 years minimum); and
- Should no upstream seed resources be available, suitable species (as determined in consultation with an ecologist) must be sown or planted.

12.6 Monitoring and Follow-Up Action

Throughout the lifecycle of the development, regular monitoring and adaptive management must be in place to detect any new degradation of ecosystems affected by the development, and remedy these as soon as detected.

During the construction phase, the ECO and contractor will be responsible for initiating and maintaining a suitable monitoring system. Once the development is operational, the project proponent will have to identify a suitable entity that will be able to take over and maintain the monitoring cycle and initiate adaptive management as soon as it is required. Monitoring personnel must be adequately trained.

The following are the minimum criteria that must be monitored:

- Composition and density of replanted vegetation, distinguishing between species introduced for initial revegetation only and species that are part of the pre-determined desirable end state;
- Associated nature and stability of surface soils
    - It is recommended that permanent transects are marked and surveyed annually according to the LFA technique (Tongway and Hindley 2004), adapted to integrate both surface soil characteristics and the vegetation to be monitored
- Re-emergence of IAPs
    - If noted, remedial action must be taken immediately according to Working for Water specifications
- Nature and dynamics of riparian zones

  - Stability of riparian vegetation,
  - Any form of bank erosion, slumping or undercutting, and
  - Stability of channel form and width of streams – if this increases, it shows that vegetation on plains and/or riparian areas and upper drainage lines are not yet in a stable enough state to be fully functional in reducing excess runoff and the ecosystem overall is losing valuable resources.

12.7 Timeframes and Duration

- Rehabilitation will occur during construction, as areas for the re-application of topsoil and revegetation become available or where revegetation can be initiated after clearing of invasives or to stabilise erosion.
- The initial revegetation period post construction is estimated to be over a period of 6 (minimum) to 12 months (maximum), or a time period specified by the Horticultural Landscape Contractor, particularly if planting of trees and shrubs occurs.
- The rehabilitation phase (including post seeding maintenance) must be at least 12 months (depending on time of seeding and rainfall) to ensure establishment of an acceptable plant cover is achieved (excluding invasive plant species or weeds).
- If the plants have not established and the acceptable plant cover is not achieved within the specified maintenance period, maintenance of these areas shall continue until at acceptable plant cover is achieved (excluding alien plant species or weeds).
- Additional seeding or planting may be necessary to achieve acceptable plant cover. Hydroseeding may have to be considered as an option in this case.
- Any plants that die, during the maintenance period, shall be replaced by the Horticultural Landscape Contractor (at the Horticultural Landscape Contractor’s cost if it was due to insufficient maintenance).
- Succession of natural plant species must be encouraged
- Monitoring of rehabilitation success and follow-up adaptive management, together with clearing of emerging invasives shall be carried on until the decommissioning phase has been completed.

13. OPEN SPACE MANAGEMENT PLAN

The objective of open space management is to restore, enhance and rehabilitate open spaces, improve climate change adaptations through the minimisation of biodiversity loss, and mitigate against environmental degradation. Management actions consider open spaces and natural areas as well as community perceptions of these.

In the context of the proposed grid connections and substations the primary purpose of the open plan management plan is therefore to:

- Minimise visual impact on the character of the area; and
- Maintain biodiversity within the area to ensure that no long-term negative impacts occur on the local environment.

In order to maintain biodiversity, the Alien Invasive, Plant Rescue and Protection and Re-vegetation and Habitat Management Plans must be adhered to.

In addition, the following actions must be implemented by the Contractor and Project Company:

- Promote environmental awareness in all employees and sub-contractors and create an understanding of the environmental sensitivities of the project site;
- No waste, including organic matter may be disposed of anywhere on site, except in provided bins placed at convenient locations, especially during the construction period. Disciplinary actions must be taken against littering;
- Open spaces are to be kept free of alien plants and weeds;
- Indigenous plants may not be collected or removed from the site;
- Access to the facility must be strictly controlled;
- All visitors and contractors must be required to sign-in;
- Signage at the entrance must indicate that disturbance to fauna and flora is strictly prohibited.

The following activities must not be permitted by anyone except the landowner or his representatives:

- No fires within the site;
- No hunting, collecting or disturbance of fauna and flora, except where required for the safe operation of the facility and only by the Environmental Officer on duty and with the appropriate permits and landowner permission;
- No driving off of demarcated road; and
- No interfering with livestock.

13.1 Grazing Management

The development of the wind energy facility will not prevent the site from being used for its current land use, however it may reduce the grazing on site as the development footprint will be rezoned from agriculture to mixed-use development land. Parts of the farm are used for cultivation of planted pasture and small grain grazing – all used only for grazing. There is no small grain harvested on the farm. Grazing is compatible with biodiversity maintenance provided that it is implemented according to the basic principles of sustainable grazing management. While the majority of these are beyond the scope of the current plan, the following basic principles are recommended for implementation to:

- A grazing management plan for the development footprint should be developed in cooperation with Agricultural Extension services.
- The stocking rate applied should be within the recommended limits as identified by the Department of Agriculture.
- Livestock should be rotated through the different paddocks at the site in a manner which allows for the growth and recovery of the vegetation between grazing events.
- Precautions must be taken to ensure that the development of the site does not increase the risk of stock theft within the facility. These include access control as previously described, as well as security patrols.

14. TRAFFIC MANAGEMENT PLAN

The objective of the traffic management plan is the prevention of incidents from the use of vehicles and disturbance of local traffic on public roads during the construction, operation and decommissioning phases of the development. Traffic volumes are most likely to increase during the construction phase. Operations, maintenance and decommissioning phase traffic is expected to be insignificant, except where a major WEF component (i.e. replace damaged turbine blade) could be required.

The development must be accessible to passenger cars, buses, trucks and abnormal multi-vehicle combinations which will be delivering WT components. Access to the site needs to be safe and practical to minimise the risk of pedestrian and vehicle accidents through:

- The provision of adequate traffic control; and
- Clear visibility by ensuring sufficient stopping sight distances and sufficient markings and warnings signs.

The traffic management plan to be implemented during construction and decommissioning should consist of the following recommended mitigation measures:

- The arrival and departure of construction vehicles should be staggered during off- peak periods to have a distributed effect over low volume traffic periods.
- All vehicles with abnormal loads should have exemption permits as required by the National Road Traffic Act 93 of 1996.
- The Contractor and Site Safety Officer / ESO, during construction and decommissioning should ensure correct signage and safety precautions are in place for vehicles and pedestrians on-site and at the site access. These may include warning signs, construction vehicle signage and flagmen.
- Unpaved roads must be watered to lesson dust generation and routine maintenance on road surface to maintain condition.
- Vehicles transporting materials that can be blown away and cause dust must be securely covered and adhere to speed limits.
- Community participation/stakeholder involvement at every stage of the project is recommended to allow the community to be informed before the start of site activities.
- A comprehensive assessment of the entire route is recommended on award of the project.
- Prohibit WEF equipment and materials transportation at night, during the school December holiday period, on public holidays, during festivals or other special events.

Actions to be implemented by the Contractor and the Developer:

- Limit use of private cars by arranging mini bus transport service for workers;
- Monitor for overloading of vehicles;
- Use only well trained, suitably qualified and experienced drivers in possession of an appropriate and valid driver's license;
- All vehicles must be roadworthy and serviced regularly;
- Clear and visible signage must be placed on and around site, clearly demarcating safe entry and exit points;

- Require all drivers to abide by standard road and safety procedures on site;
- When travelling on public roads all speed limits and rules of the road must be adhered to; and
- Limit dust generation by applying dust suppressants and postponing dust generating activities during period of strong winds and enforcing a strict speed limit of 40 km/h on unpaved roads.

Monitoring actions to be conducted by the ECO / ESO:

- Maintain incidents/complaints register for community complaints;
- Monitor dust generation and implementation of management actions detailed above.

15. TRANSPORTATION MANAGEMENT PLAN

The section discusses traffic management techniques, vehicle requirements, and stakeholder collaboration for the construction and operation of wind energy facilities. Temporary signage, speed limits, road closures, diversions, and traffic signals are all addressed. Road authorities, municipalities, police, emergency services, communities, landowners, contractors, and suppliers are among the key stakeholders to be engaged.

15.1 Abnormal weights and dimension

15.1.1 Evaluation of Abnormal Weights and Dimensions

Transport requirements for the Wind Energy Facility project will require the use of abnormal load vehicles as stipulated in TRH 11, especially in the construction phase of the project for the delivery of construction materials and turbine components. Very little to no special transport will be required during the remainder of the development phases, as conventional transport will be used.

All wind turbine components are considered to be abnormal loads, either through length, weight, or height, usually comprising of 3 tower sections, 1 hub, 1 nacelle, and 3 blades. These require different truck and trailer combinations and configurations to be transported. These issues will be investigated at a later stage when the transporting contractor and the plant hire companies apply for the necessary permits from the permit-issuing authorities. The heaviest component of a wind turbine is the nacelle (approximately 67 to 85 tons, depending on the manufacturer and design of the unit). Combined with road-based transport, it has a total vehicle mass of approximately 130 tons (for the 85-ton unit). Route clearances and permits will be required for transporting the nacelle by road-based transport.

Blades are the longest component at 110 m and need to be transported on a specially imported extendible blade transport trailer or in a rigid container with rear steerable dollies. The blades can be transported individually, in pairs, or in threes, although different manufacturers have different methods of packaging and transporting the blades. Where required, existing public roads may need to be upgraded along the proposed equipment transport route to allow for the transportation and delivery of wind turbine components and other associated infrastructure components. The national roads on the potential national access routes are generally of high standard, and many of the structures have been assessed for load-bearing capacity and height clearance in the past. The turbine supplier or contractors selected for implementation would be responsible for the transportation of wind turbine components to the site. A complete transportation management plan should be undertaken prior to construction, should the project be awarded preferred bidder status.

15.1.2 Permit Requirements

In the transportation of loads, the following guidelines are available. According to TRH 11, the expected load dimensions are classified as abnormal loads and therefore, an exemption permit for each province where the load has to transit is required. Provision for the type of abnormal loads in this development is made in the National Road Transport Act (NRTA), and specifically in Section 81 of the NRTA, which reads as follows:

"Vehicle and load may be exempted from provisions of Act

An MEC may, subject to such conditions an upon payment of such fees or charges as he or she may determine, authorise in writing, either generally or specifically, the operation on a public road of a vehicle which does not comply with the provisions of this Act or the conveyance on a public road of passengers or any load otherwise that in accordance with the provisions of this Act."

When the movement of an abnormal load is considered to be in the country's economic and/or social interest, an exemption permit may be provided to allow a vehicle(s) conveying such an abnormal load to operate on a public road for a limited time. The essential principles that will guide this procedure are as follows:

- An exemption permit for an abnormal load will only be considered for an indivisible load, abnormal in dimension and/or mass, where there is no possibility of transporting the load in a legal manner;
- The risks to other users must be reduced to a level equivalent to what it would be without the presence of the abnormal vehicle on the road; and
- The conditions imposed must take the economic and/or social interest of the country and public at large into account.

15.1.3 Types of abnormalities

The Wind Energy Facility is anticipated to carry loads that are considered to be indivisible and can be abnormal either dimensionally, abnormal in mass, or abnormal both dimensionally and in mass. The following is the legally permissible maximum dimension or mass.

Length:

- Truck and Semi-Trailer (Tri-Axle). Overall length of combination (including load projections) -18.50m
- Superlink (6 m + 12 m trailers). Overall length of combination (no load projections) - 22.00m.

Width:

2.60 m

Height:

4.30 m measured from the ground. The height of a conventional trailer is 1.60 m from the ground to the trailer deck; therefore, the permissible height of the load is 2.70 m.

Weight:

- 13.50 m Tri-Axle 28 Ton
- 15.00 m Tri-Axle 30 Ton
- Superlink 34 Ton Gross (6.00 m–10/12 Ton & 12 m–24/22 Ton)

The Wind Energy Facility components are classified as abnormal loads and will necessitate an application to the Department of Transport and Public Works for a permit authorizing the conveyance of said load. With the required permits in place, the following escort vehicles (whether they are the client's own escort vehicles or provincial traffic officers) will be necessary to escort the transportation of abnormal loads. The anticipated escort vehicles are presented in **Error! Reference source not found.**.

It must be noted loads with a height of 4.70 m measured from the ground require 1 x Own Escort vehicle. For loads of 5.50 m + high, Telkom & Eskom Clearances are required for the lifting of overhead lines. Upon final selection of wind turbine models to be used, the exact amount of escort vehicles can be determined.

Table 16-1 Escort Vehicles

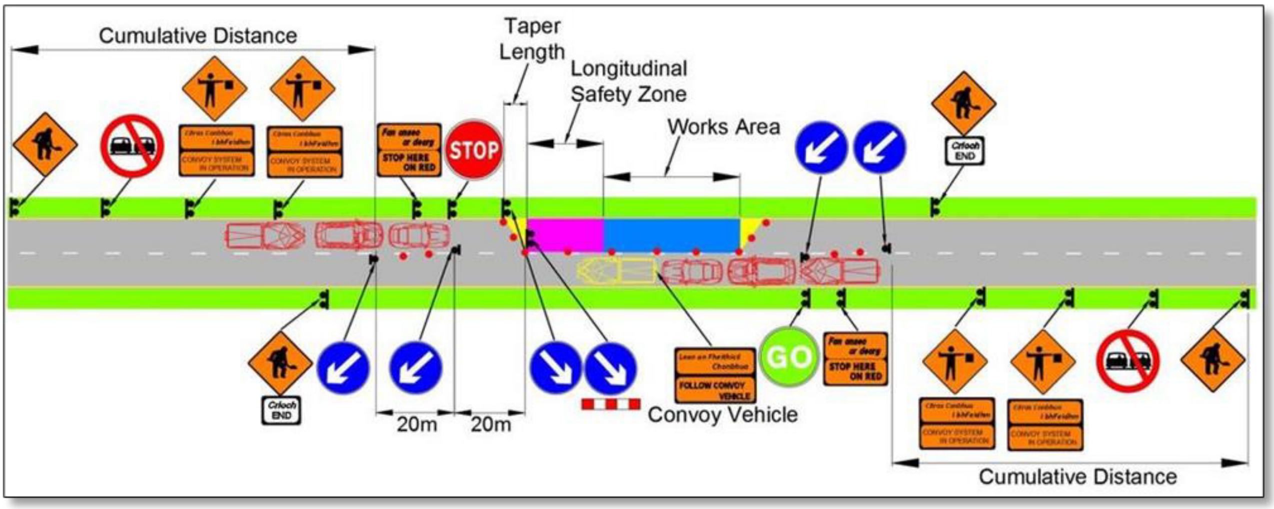
Component	Details	Escort Vehicles
Tower	Hub Height from ground level: Up to 150 m	3 Tower sections/WT ***2 x Provincial Traffic Escorts (subject to width of load)***
Rotor	Blade Length: Up to 110 m Hub	Blades/WT Connected to 1 Hub/WT ***2 x Provincial Traffic Escorts (subject to width of load)***

15.2 Impact on road users

There is potential for the transportation of components and construction materials to have an impact on the general traffic and local community. The presence of the heavy vehicles required during the construction and decommissioning phase may also cause noise and dust impacts which impact local residence located close to the Wind Energy Facility site. These impacts may be minimised by:

- Scheduling abnormal and heavy vehicle transport by proper distribution of arrivals and departure to avoid high numbers of vehicles arriving at once;
- Additional traffic management control measures at site accesses to limit impact, i.e., signage; and
- Traffic accommodation during any upgrades on access points, i.e., Stop-go system. An example of a Stop-go operation is presented in **Error! Reference source not found.**.

FIGURE 16-1 STOP-GO OPERATION (SOURCE: TEMPORARY TRAFFIC MANAGEMENT DESIGN GUIDANCE)



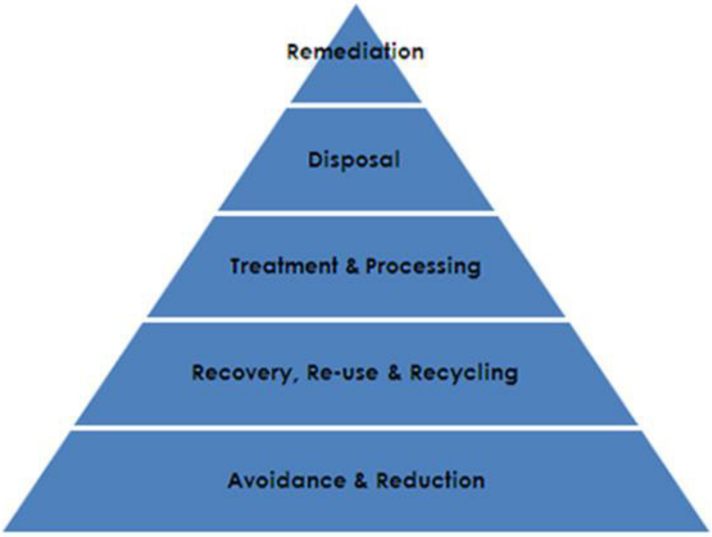
16. WASTE MANAGEMENT PLAN

A waste management plan (WMP) is important to ensure a safe and healthy environment and that sustainable waste management and procedures are followed throughout the lifecycle of the project. The DFFE promulgated the National Environmental Management: Waste Act 59 of 2008 (Waste Act) and in 2010 developed the National Waste Management Strategy (NWMS). The WMP provides recommended measures for the collection, temporary storage and safe disposal of the various waste streams associated with the project and includes recommendations for the recovery, re-use and recycling of waste. The purpose of this plan is therefore to ensure that effective procedures are implemented for the handling, storage, transportation, and disposal of waste generated from the project activities on site.

The National Waste Information Regulations published in GN No. R. 625 of 13 August 2012 must be adhered to in terms of any hazardous waste generated on the site. The Developer must apply for registration as a "hazardous waste generator" with the Department's Integrated Pollutant and Waste Information System ("IPWIS") (http://ipwis.pgwc.gov.za/ipwis3/public/login) should the need for hazardous waste disposal arise. The application can be completed within 30 days of the commencement of the waste generation activity.

The introduction of an internationally best-known practice in waste management, the Waste hierarchy (Figure 16.1 below) is one of the best mechanisms that came into effect with the promulgation of the waste act. The waste act promotes the exercising of the duty of care and the implementation of the waste hierarchy while protecting the environment.

FIGURE 16.1 WASTE HIERARCHY- NATIONAL WASTE MANAGEMENT STRATEGY 2010



(Source: https://www.dffe.gov.za/projectsprogrammes/workingonwaste)

16.1 Construction Phase Waste Management

A method statement to detail the specific (hazardous) waste management practices must be prepared by the Contractor prior to the commencement of activities.

General Waste Management

- Construction methods and materials must be carefully considered and implemented in view of waste reduction, re-use, and recycling opportunities.
- The ESO / ECO must conduct waste classification and rating in terms of SANS 10288 and Government Notice 634 published under the NEM: WA.
- The ESO / ECO must develop, implement and maintain a waste inventory reflecting all waste generated during construction for both general and hazardous waste.
- A dedicated waste area must be established on site for the storage of all waste streams before removal from site. The storage period must not trigger listed waste activities as per the NEMWA, GN 921 of November 2013.
- Waste collection bins and hazardous waste containers must be provided by the contractor and placed at strategic locations around the site for the storage of organic, recyclable and hazardous waste.
- Hazardous waste must be stored separate from other forms of waste to avoid contamination. The following items are hazardous: Batteries, Light bulbs (fluorescent, LED, Halide), Electronic waste, used oils, chemicals and chemical containers.
- The location of all temporary waste storage areas must aim to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage, and vermin control, while being reasonably placed in terms of centrality and accessibility on site. Where required, an additional temporary waste storage area must be designated, provided identical controls are exercised for these locations.
- Waste storage shall be in accordance with all Regulations and best-practice guidelines and under no circumstances must waste be burnt on site.

- All waste removed from site must be done by a registered / licensed subcontractor, who must supply information regarding how waste recycling / disposal will be achieved. The registered subcontractor must provide waste manifests for all removals at least once a month or for every disposal made, records of which must be kept on file at the site camp for the duration of the construction period.
- Waste must be stored in designated containers and not on the ground.
- Hazardous waste must be stored in a lockable container on an impermeable surface and bunded, should the need arise.
- Waste generated on site must be removed on a regular basis. This frequency must change during construction depending on waste volumes generated at different stages of the construction process, however removal must occur prior to the storage capacity being reached to avoid overflow of containers and poor waste storage.
- Waste must not be dumped, buried or burned on site.
- Reduce waste transportation and disposal costs by ensuring full loads of waste are transported instead of half loads.
- Setting up a reverse logistics system (products move from supplier to customer and vice-versa) would minimise waste and reduce disposal costs, i.e, suppliers deliver batteries and collect used batteries.

Waste Management Practices

- To achieve sustainable waste management, it is recommended a procurement policy be implemented that takes into account the waste that will be generated at the end of the construction phase. Sourcing local goods would reduce costs of transportation and carbon emissions. Purchasing and using environmentally safe cleaning and building materials as well as considering reusable/recyclable goods will help to achieve reduced waste.
- Once a waste inventory has been established, targets for the recovery of waste (minimisation, re-use, recycling) must be set.
- Recyclable materials must be identified as part of the site's waste management monitoring records.
- Waste manifests and waste acceptance approvals (i.e. receipts) from designated waste facilities must be kept on file at the site office, in order to record and prove continual compliance for future auditing.
- It is the responsibility of the ESO / ECO to ensure that each subcontractor implements their own waste recycling system, i.e. separate bins for food waste, plastics, paper, wood, glass cardboard, metals, etc. Such practises must be made contractually binding upon appointment of the subcontractors. Signage / colour coding must be used to differentiate disposal areas for the various waste streams (i.e. paper, cardboard, metals, food waste, glass etc.).
- Septic tanks and portable toilets must be maintained regularly and monitored by the ESO / ECO. Below ground storage of septic tanks must withstand the external forces of the surrounding environment. The area above the tank must be demarcated to prevent any vehicles or heavy machinery from moving around in the surrounding area.
- Hazardous waste must be stored within a bunded area constructed according to SABS requirements, and must ensure complete containment of the spilled material in the event

of a breach. As such, appropriate bunding material, design, capacity and type must be utilised to ensure that no contamination of the surrounding environment will occur despite a containment breach. The net capacity of a bunded compound in a storage facility must be at least 120% of the net capacity of the largest tank and must also take into consideration the capacity displaced by other tanks within the same bunded area and any foundations.

- Interconnected tanks must be treated as a single tank of equivalent total volume for the purposes of the bund design criteria.
- Inspections and maintenance of bunds must be undertaken regularly. Bunds must be inspected for leaks or cracks in the foundation and walls. If any leaks occur in the bund, these must be removed immediately.
- The position of all waste storage areas must be located so as to ensure minimal degradation to the environment. The main waste storage area must have a suitable stormwater system separating clean and contaminated stormwater.
- Bund systems must be designed to avoid dewatering of contaminated water, but to rather separate oil and hydrocarbons from water prior to dewatering.
- It is assumed that any rainwater collected inside the bund is contaminated and must be treated by oil / water separation (or similar method) prior to dewatering, or removed and stored as hazardous waste, and not released into the environment.
- Following rainfall event bunds must always be dewatered in order to maintain a sufficient storage capacity in the event of a breach.
- No mixing of hazardous and general waste is allowed.

The success of the Waste Management Plan is determined by measuring criteria such as waste volumes, cost recovery from recycling and cost of disposal. Recorded data can indicate the effect of training and education, or the need for education. It will provide trends and benchmarks for setting goals and standards and provide clear evidence of the success or otherwise of the plan.

- Documentation (waste manifest, certificate of issue or safe disposal) must be kept detailing the quantity, nature, and fate of any regulated waste for audit purposes.
- Waste management must form part of the monthly reporting requirements in terms of volumes generated, types, storage, and final disposal.
- Training and awareness regarding waste management shall be provided to all employees and contractors.

16.2 Operation Phase Waste Management

Operation phase activities will result in the production of limited amounts of general waste consisting mostly of cardboard, paper, plastic, tins, metals and a variety of synthetic compounds. Hazardous wastes (including grease, oils) will also be generated. All waste generated will be required to be temporarily stored at the facility in appropriate sealed containers prior to disposal at a permitted landfill site or other facilities.

Waste Management Practices

- The Operational Manager must develop, implement and maintain a waste inventory reflecting all waste generated during operation for both general and hazardous waste streams.
- Adequate waste collection bins at site must be supplied. Separate bins must be provided for general and hazardous waste.
- Recyclable waste must be removed from the waste stream and stored separately.
- All waste must be stored in appropriate temporary storage containers (separated between different operation wastes, and contaminated or wet waste).
- Waste storage shall be in accordance with all best-practice guidelines and under no circumstances can waste be burnt on site.
- Waste generated on site must be removed on a regular basis throughout the operation phase.
- Waste must be removed by a suitably qualified contractor and disposed at an appropriately licensed landfill site. Proof of appropriate disposal must be provided by the contractor and kept on site.
- Records must be kept of the volumes / mass of the different waste streams that are collected from the site throughout the life of the project. The appointed waste contractor is to provide monthly reports to the operator containing the following information:
  - Monthly volumes / mass of the different waste streams collected;
  - Monthly volumes / mass of the waste that is disposed of at a landfill site;
  - Monthly volumes / mass of the waste that is recycled; and
  - Data illustrating progress compared to previous months.

This report will aid in monitoring the progress and relevance of the waste management procedures that are in place. If it is found that the implemented procedures are not as effective as required, this WMP is to be reviewed and amended accordingly. This report must from part of the ESO’s reports to the ECO on a monthly basis.

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17. STORMWATER MANAGEMENT PLAN

The objective of the storm water management plan (SWMP) is to prevent increased soil erosion, to contain any contaminated run-off and to avoid water logging and pollution.

- The Erosion Management Plan (see below) must therefore be seen in conjunction with the SWMP. Actions are listed that will ensure that storm water is channelled in a controlled manner from roads and substations towards natural drainage lines, without impeded natural surface flows.
- Develop and implement a site-specific storm water management plan during the detailed design phase of the projects and prior to construction;
- In the detailed design phase of the project minimise any water crossings and utilise existing roads wherever possible;
- Enforce 32 m construction buffers of all rivers, streams and waterbodies;
- Should new roads be required to cross any banks or channels these must be secured with erosion protection (i.e. gabions etc);
- Monitor for erosion during the clearing of vegetation;
- Avoid hard-engineered surfaces (i.e. construct gravel roads and not asphalt roads wherever possible);
- Roads in steep areas must be equipped with side drainages and culverts that channel the run-off to natural drainage lines without gaining velocity and causing erosion;
- Construction camps and temporary ablution facilities must be located beyond the 1:100 year floodline;
- Stockpiles must be located on flat areas and protected from erosion;
- The substation site design must include side water outlets and an adequate slope to allow storm water run-off from the paved areas;
- Prevent surface run-off from areas of potential contamination.

Guidelines and Stormwater Management:

- Where buildings/ infrastructure occur on-site, the developer should ensure that all stormwater flow paths are protected against erosion. All inlets to piped systems must be fitted with a screen/grating to prevent debris and refuse from entering the stormwater system. Screens/ grating must be installed immediately after the installation of piped infrastructure. Buildings, earthworks, or any other infrastructure may obstruct or encroach on a watercourse inside or outside the site without approved plans. The approved plans must not compromise the SWMP or any other required Authority approvals.
- Designs must ensure that rainfall run-off from roofing, not subjected to increases in pollution, can be captured for re-use for on-site irrigation and non-potable water uses. Where storage for re-use and ground conditions permit, rainwater run-off should connect to detention areas to maximise groundwater recharge. Detention areas must be designed to attenuate run-off.
- Parking or paved areas should be structured to reduce stormwater runoff by allowing ponding or infiltration. Stormwater from these areas should be discharged and controlled as overland sheet flow or attenuation facilities.

- Designed roads must avoid concentration of flow along and off the road. Where flow concentration is unavoidable, incorporating the road into the major stormwater system must be considered.
- Subsurface disposal must be designed to ensure that slope instability, concentrated saturation or inundation does not occur.
- Channels may be constructed to convey stormwater directly to a natural watercourse where deemed necessary and unavoidable. The channels must be suitably lined to prevent erosion and provide maximum possible energy dissipation of the flow.
- Open trenches should not be unprotected for extended periods and should be progressively backfilled as construction proceeds. Excavated material to be used as a backfill must be placed close to the trench on the upstream side to avoid loose material from washing away.
- Materials to be stockpiled away from drainage paths and loose material such as stone, sand or gravel must be covered or kept damp to minimise dust. The stormwater systems should be free from materials that could harm the water systems' fauna, flora, and aquatic life.

18. EROSION MANAGEMENT PLAN

18.1 Purpose

The purpose of the erosion management plan is to implement avoidance and mitigation measures to reduce the erosion potential and the likely impact of erosion associated with the construction and operational phases of the proposed facility. As part of the management plan, measures to protect hydrological features from erosion damage are included.

18.2 Scope and Limitations

This plan is intended at introducing measures aimed at reducing the negative impacts of erosion on biodiversity as well as reducing the vulnerability of the site to erosion problems during the construction and operational phases of the development. The focus is on managing runoff and reducing the construction phase impact on ecologically sensitive areas. The plan does not cover engineering-side issues which are of relevance to soil management and erosion. Therefore issues such as the potential presence of heaving clays, compressible soils, perched water tables, dispersive soils and corrosive groundwater at the site are beyond the general scope of this study and are not directly dealt with. These issues would need to be addressed and their relevance assessed during detailed geotechnical investigation of the site.

18.3 Background

18.3.1 Types of Erosion

Erosion comes in several forms, some of which are not immediately obvious. The major types of erosion are briefly described below:

Raindrop impact

This is the erosion that occurs due to the "bomb blast" effect of raindrop impact. Soil particles can be blasted more than a meter into the air. Apart from loosening soil particles, the effect can also break soil aggregates apart and form a clay seal on the surface which resists infiltration and results in increased levels of runoff. This effect is most important when large areas of exposed soils are present. If the site is cleared, then this effect will play an important role as it results in the soil surface becoming sealed which reduces infiltration and increases runoff, leading to erosion.

Sheet Erosion

This is the removal of a shallow and uniform layer of soil from the surface. It is caused initially by raindrop splash and then by runoff. Sheet erosion is often difficult to see as no perceptible channels are formed. Accumulated sediment at the bottom of the slope is often the only indicator. This is likely to be an important erosion type at the site given the gently sloping nature of the site and the susceptible soils.

Rill Erosion

This is the removal of soil from the surface whereby small channels or rills up to 300 mm are formed. It is caused by runoff concentrating into depressions, wheel tracks etc.

Gully Erosion

This is the removal of soil from the surface and sub-surface caused by concentrated runoff eroding channels greater than 300mm deep. Gully erosion often begins as rill erosion.

Wind Erosion

Wind erosion results from soil particles being picked up, bounced or moved by the wind. Wind erosion is primarily a problem in arid areas and may affect sands soils as well as fine-textured soils. Vegetation cover is usually an effective barrier to wind erosion, but large soils losses or degradation can occur in disturbed areas or on croplands.

18.3.2 Promoting Factors

Rainfall characteristics

High-intensity, short-duration storm events have much greater erosion potential than low intensity, longer duration storm events with the same runoff volume. Intense storms produce larger raindrops, and are more likely to break up the soil and dislodge particles.

Soil erodibility

Soil erodibility is determined by the soils ability to resist detachment and transport due to rainfall, runoff and infiltration capacity. Well-structured soils with a high clay content are generally least erodible. Some clays are dispersible meaning that they break down when wet and become highly erodible. Silts and fine sands are highly erodible.

Length and Steepness of Slope

Steeper slopes cause runoff velocities to increase, resulting in increased erosion. As the slope length increases the opportunity for runoff to concentrate and achieve an erosive velocity increases.

Soil Surface Cover

Soil surface cover such as vegetation and mulch protect the soil surface from raindrop impact, reduce flow velocity, disperse flow, and promote infiltration and the deposition of sediment. This is a basic principle underlying many erosion control approaches which aim to modify the surface characteristics in order to reduce the flow velocity and reduce the potential for erosion. In this regard it is important to note that many of the practices which are used to enhance rehabilitation potential are also useful in reducing erosion potential.

18.3.3 Erosion and Sediment Control Principles

The goals of erosion and sediment control during and after construction at the site must be to:

- Protect the land surface from erosion;
- Intercept and safely direct run-on water from undisturbed upslope areas through the site without allowing it to cause erosion within the site or become contaminated with sediment.
- Progressively revegetate or stabilise disturbed areas.
- Prevent damage to hydrological features such as drainage lines or wetlands, either within or adjacent to the site.

These goals can be achieved by applying the following principles:

1. Integrate project design with site constraints.
2. Plan and integrate erosion and sediment control with construction activities.
3. Minimise the extent and duration of disturbance.
4. Control stormwater flows onto, through and from the site in stable drainage structures.
5. Use erosion controls to prevent on-site damage.
6. Use sediment controls to prevent off-site damage.
7. Control erosion and sediment at the source.
8. Stabilise disturbed areas promptly.
9. Inspect and maintain control measures.

18.3.4 On-Site Erosion Management

Exposed and unprotected soils are the main cause of erosion in most situations. Therefore, the erosion management plan and the revegetation and rehabilitation plan should be closely linked to one another and must not operate independently, but must rather be seen as complementary activities within the broader environmental management of the site and must therefore be managed together.

General factors to consider regarding erosion risk at the site includes the following:

- Soil loss will be greater during wet periods than dry periods. Intense rainfall events outside of the wet season, such as occasional unseasonal showers can also however cause significant soil loss. Therefore, precautions to prevent erosion must be present throughout the year.
- Soil loss is related to the length of time that soils are exposed prior to rehabilitation or stabilization. Therefore, the gap between construction activities and rehabilitation must be minimized. Allied to this the fact that topsoil does not store well and must preferably be used within a month or at most within 3 months to aid in the revegetation and rehabilitation of disturbed areas.
- Phased construction and progressive rehabilitation are important elements of the erosion control strategy.
- The extent of disturbance will influence the risk and consequences of erosion. Therefore, large areas must not be cleared at a time, especially in areas such as slopes where the risk of erosion is higher.

18.4 Concentration of flows into downstream areas

Road crossings over drainage lines, streams and wetlands can impact downstream wetland ecosystems. Crossings that result in narrowing of the downstream system can result in concentration of flows and channelisation downstream. This may result in a loss of wetland function, and result in the drying out and shrinkage of the wetland area. Erosion and increased vulnerability to invasion of drier banks by alien vegetation may occur.

- Culverts must be adequately spaced such that they do not result in shrinkage of downstream wetlands. Where roads cross minor drainage channels, a single culvert may be adequate, aligned with the downstream drainage line. Where more substantial wetland systems are intercepted by a road, sufficient culverts must be provided such that downstream shrinkage of wetland width does not occur. Moreover, culverts must be aligned, as far impossible, with existing, natural channels.

- All crossings of drainage systems must ensure that both surface and shallow subsurface flows can be accommodated where appropriate and that unnatural channelisation does not occur downstream.

18.5 Runoff Concentration

The increase in hardened surfaces associated with roads, and other infrastructure will lead to a significant increase in volume and velocity of flow generated from these areas during large rainfall events.

Runoff from road surfaces is usually channelled off of the road surface towards the downslope side of the road. On steep slopes, the volumes and velocity of runoff generated may result in erosion of the surrounding areas. Therefore, specific measures to curb the speed of runoff water is usually required in such areas, such as rock beds or even gabions. In addition, these areas must be monitored for at least a year after construction to ensure that erosion is not being initiated in the receiving areas. Once erosion on steep slopes has been initiated, it can be very difficult to arrest.

18.5.1 Diversion of Flows

Diversion of flows from natural drainage channels may occur when roads interrupt natural drainage lines, and water is forced to run in channels along the manipulated road edge to formalized crossing points. Even slight diversion from the natural drainage line can result in excessive downstream erosion, as the new channel cuts across the slope to reach the valley bottom. Should the access road to the site traverse any major drainage lines, the following principles must apply.

- Adequate culverts must be provided along the length of all roads to prevent diversion of flow from natural drainage lines.
- Culverts must be carefully located, such that outlet areas do in fact align with drainage lines.
- The downstream velocity of runoff must be managed, such that it does not result in downstream erosion – on steep slopes, where roads have been constructed on cut areas, allowance must be made for culverts to daylight sufficiently far down the slope that their velocities are managed and erosion does not occur.
- Where necessary, anti-erosion structures must be installed downstream of road drains – these may comprise appropriate planting, simple riprap or more formal gabion or other structures.
- Roads and their drainage system must be subject to regular monitoring and inspection, particularly during the wet season, so that areas where head cut erosion is observed can be addressed at an early stage.

18.6 Monitoring Requirements

18.6.1 Construction Phase

The following monitoring actions must be implemented during the construction phase of the development:

Monitoring Action	Indicator	Timeframe
Identify all river and drainage line crossings affected by the development	Map of sites of potential concern	Preconstruction
Monitor cleared areas for erosion problems	Record of monitoring site, problems encountered and remedial actions implemented	Monthly during the rainy season and following significant rainfall events otherwise
Monitor vegetation clearing activities near sensitive areas such as wetlands or drainage lines	Activity log of monitoring actions and any mitigation and avoidance measures implemented	Monthly during the rainy season and following significant rainfall events otherwise
Monitor revegetated and stabilised areas	Record of monitoring site, problems encountered and remedial actions implemented	Monthly during the rainy season and following significant rainfall events otherwise

18.6.2 Operational Phase

The following monitoring actions must be implemented during the operational phase of the development:

Monitoring Action	Indicator	Timeframe
Monitor for the development of new erosion problems across the site, with a focus on areas where water has been diverted or collected from upslope onto downslope areas	Map of erosion problem areas	Quarterly
Document erosion control measures implemented	Records of control measures and their success rate.	Quarterly
Document the extent of erosion at the site and the remedial actions implemented	Decline in erosion and vulnerable bare areas over time	Biannually

19. FUEL STORAGE MEASURES

19.1 Storage Tanks

The storage tanks will be within contained areas to prevent spills contaminating soil and water, and with a design to capture and contain a volume of spill of at least 110% of the volume of stored fuel. These containers can be built in concrete and painted with anti-corrosive paint. The floor of the container must be inclined to permit the collection of the spilled liquids.

The storage tanks must also have a cover protection on top, prepared for drainage and collection of runoff.

19.2 General Procedures

- Transport routes for the transport of fuel will be clearly indicated;
- Pollution control equipment (spill and leak cleaning kits) must be readily available;
- Ensure personnel training, including: measures to prevent fuel spills, to treat/clean fuel spills, how to react on spill of flammable liquids on clothing and in the inhalation of vapours, leaks simulations; fuel vapour recovery processes, etc. Keep records of all training;
- Maintain the premises and equipment in a clean and tidy state;
- Regularly clean outdoor areas with a broom;
- Wastewater from outside areas must be directed to the contaminated water drainage system, and not enter the storm water system;
- Used oils (waste oil) will be collected, re-used, stored and disposed of in line with disposal procedures for hazardous wastes;
- Ensure the proper management of other hazardous wastes (contaminated soils, used spilling kits, waste lube, etc.); and
- All hazardous waste should be collected by a licensed service provider and transported to a licensed disposal facility.

19.2.1 Filling Operations

- Isolate the area by cones and a rope;
- Prohibit refuelling operations during tank filling operations;
- Avoiding having people who are not involved in the operation within a 10 metre radius;
- Prohibit smoking and the use of mobile telephones or any other ignition sources during tank filling operations or vehicle refuelling, within a 3 metre radius;
- Use a tight-fill cap to completely seal off the connections between the tubing and the truck’s and station’s tanks;
- Engines must be turned off during refuelling;
- Prevent overflowing and spilling situations when the storage tanks are being filled (verify filling sensors and be aware of overflow alarms).

19.2.2 Preventing Accidents with fuel mixtures

Establish a procedure to deal with the potential occurrence of these situations, such as:

- The chemicals and reaction mechanisms associated with the substances mixed or blended must be well understood and documented
- Chemical and process hazards must be understood and addressed and the facilities must ensure that process equipment, controls, and procedures are designed, installed and maintained to safely operate the process
- All employees must understand the chemical and process hazards
- Facilities must establish a system for Standard Operating Procedures and ensure that they are understood and followed
- Display clear and informative messages for users of the station, as to how to deal with this situation;
- Prepare a procedure to suitably dispose of wastes recovered from the batches of fuel mixture.

19.2.3 Spill Kits

- Emergency spill kits of absorbent material (e.g. sand) must be provided and stored next to the higher risk sites, and must be easily-accessible, ideally outside, in order to allow an immediate response when a spill occurs. This will be clearly labelled and ready for use.
- Drums for the storage of contaminated material must be provided.
- An accurate drawing of the local drainage system shall be posted next to the spill kit.

19.2.4 Closure Phase

- During the closure phase, there may be loss of product into the soil, as a result of a deliberate or accidental release during closure and removal of tanks and tubing. In addition, this risk may arise outside of the facility site, if the tanks and/or tubing are not properly disposed of.
- In the closure phase, it is important to remove all tanks and pipes. A risk may arise if the tanks are left on site with residual products. As the integrity of the equipment will no longer be ensured or monitored.
- During closure, it must be ensured that facilities do not present a risk to the environment, health or safety. Measures must be taken to ensure that the closure does not result in an unacceptable risk, including:
  - Any and all waste products will be removed from the tanks. Care will be taken to ensure that no product is lost into the soil. Tank closure must be carried out safely, with the removal of explosive vapours, for example by filling the tanks with water or inert gases. All tanks will be safe prior to their removal from the ground. Similar methods will be employed prior to the removal of the pipes.
  - Water used in this process will be contaminated with residual product, and thus a water contamination risk may arise if the contaminated water is not disposed of in a way which is appropriate for hydrocarbon contamination. This would normally imply the removal to a suitable waste handling facility.
  - According to best environmental practices, the tanks, tubing and distributors will be disposed of. However, if the tanks remain in situ, it will be ensured that the procedure is safe. After making the tanks inert and safe, they will be filled in with sand, concrete, inert mud or hydrophobic foam.

- The tanks and associated tubing which are no longer considered appropriate or safe for fuel storage will not be used for storage of other hydrocarbons, without first ensuring their integrity.
- The oil/water separators will be removed for disposal, off the facility site. Otherwise they will be filled in a similar way to the tanks. Regardless of the fate of the oil/water separator, all liquid and mud waste will be removed (off the facility site) and all the inlets and outlets will be sealed.
- Whatever drainage system left behind will be modified to ensure that it does not serve as a path for pollutants to reach groundwater or other waters.
- If the deactivation is temporary, product can be left in the tanks. In this case, all monitoring procedures will be carried out as if the facility were in operation. If for any reason the monitoring cannot carry on, the tanks will be emptied and made inert.
- Personnel involved in the closure of a filling and fuel station will be aware and respect obligations with regards to waste disposal, in line with the best practices described above.

Environmental Aspect	Action or Measure
Prevent accidental spills from entering the stormwater drainage system	Provide cleaning equipment conceived specifically to deal with minor spills as may occur at the station. Place a clearly-identified spill kit in a visible location for each fuelling line.
	Develop a step-by-step guide to use of the spill kit.
	Develop an evacuation plan and/or response procedures for emergencies involving large fuel spills.
	Train the whole team in the emergency response procedures. Make sure that all staff knows where the emergency equipment is to be found and is acquainted with its maintenance.
	Label all of the stormwater drains on site in the proximity of the facilities as “Clean Water Only”.
	Inspect the fuel distribution area in order to confirm that rainwater drained or emptied from the roof doesn’t enter the areas marked out.
	Check whether the embankment around the fuel distribution area is in good condition and has the capacity to contain a fuel leak in the event of an emergency.
Minimise the risks of environmental contamination and from issues of workers’ health and safety	Provide training to the staff regarding the disposal of material contaminated with fuel, such as absorbent material from the spill kit, soaked in fuel.

	Ensure that the product safety cards for all fuels and oils are up-to-date and accessible at all times.
	Should any contamination be found on-site during the decommissioning phase of the existing / proposed facility, the Mpumalanga Province Pollution and Chemicals Management Directorate must be informed of such contamination, as required in terms of Part 8 of the National Environmental Management Waste Act, 2008 (Act No. 59 of 2008) ("NEM: WA").
	Should more than 100m^3 of general waste and/or or more than 80m^3 of hazardous waste be stored at the proposed WEF for a period exceeding 90 days, the applicant will need to register in terms of, and adhere to, the NEM: WA National Norms and Standards for the Storage of Waste promulgated in GN No. 926 of 29 November 2013.
Minimise the risks of fuel leaks as may result in pollution of the sub-soil and groundwater	Check if there is fuel, from a possible leak, in the spill containment sumps installed at the tank's discharge nozzle.
	Check if there is fuel, from a possible leak, in the all tanks containment sumps, installed on the manhole to the storage tanks. In the event of suspected leakage, report it immediately.
	Check if there is fuel or lube, from a possible leak in the containment sumps installed under the tanks.
Minimise the risks of fuel leaks as this may result in pollution of the sub-soil and groundwater	Check if there is fuel, from a possible leak, in the chambers of the containment sumps installed under the pumps
Minimise the risks of harmful emissions to the atmosphere and the loss of fuel	Check that lids, flanges and connections are closed.
	Confirm that the ventilation conduits are not blocked.
	Supervise the fuel deliveries.
Minimise the risks of water pollution	Carry out an Oil-Water Separator inspection to ensure effective treatment.
Integrity control	Adequate maintenance and calibration of the monitoring equipment

20. FIRE MANAGEMENT PLAN

The National Veld and Forest Fires Act (Act 101 of 1998) states that it is the landowner' and / or relevant contractors in the context of the WEFs' responsibility to ensure that the appropriate equipment as well as trained personnel are available to combat fires.

Although fires are not a regular occurrence at the site, fires may occasionally occur under the right circumstances. Ignition risk sources in the area include the following:

- Lightning strikes.
- Personnel within the facility.
- Infrastructure such as transmission lines.

A fire management plan in compliance with Veld Fire Management Act should be compiled by the main contractor prior to the commencement of construction.

20.1 Firebreaks

Extensive firebreaks are not recommended as a fire risk management strategy at the site. The site is very large compared to the extent of the infrastructure and the maintenance of firebreaks would impose a large management burden on the operation of the facility. In addition, the risk of fires is not distributed equally across the site and within many of the lowlands of the site, there is not sufficient biomass to carry fires and the risk of fires within these areas is very low. Rather targeted risk management must be implemented around vulnerable or sensitive elements of the facility such as substations or other high risk components. Within such areas, the extent over which management action needs to be applied is relatively limited and it is recommended that firebreaks are created by mowing and that burning to create firebreaks is not used as this in itself poses a risk of runaway fires. Where such firebreaks need to be built such as around substations, a strip of vegetation 5 - 10 m wide can be cleared manually and maintained relatively free of vegetation through manual clearing on an annual basis. However, if alien species colonise these areas, more regular clearing must be implemented.

21. AVIFAUNA MANAGEMENT AND MONITORING PLAN

Table 22.1 Management Plan for the Planning and Design Phase

Impact	Mitigation/Management Objectives and Outcomes	Mitigation/Management Actions	Monitoring		
			Methodology	***Frequency***	***Responsibility***
AVIFAUNA: MORTALITY DUE TO COLLISIONS WITH THE TURBINES					
Mortality of priority avifauna due to collisions with the wind turbines	Prevent mortality of priority avifauna	The results of the pre-construction monitoring must guide the layout of the turbines, especially as far as the identified no-turbine zones are concerned. No turbines must be constructed in the buffer zones which were identified based on the results of the pre-construction monitoring, with a specific view to limiting the risk of collisions to a variety of birds, including several Red Data species. No WEF infrastructure to be placed in All Infrastructure Exclusion Zones (No-Go Zones) as indicated in Section 6.5 of this report of the Avifaunal Specialist Report. No turbines (including the rotor swept area) should be located in the Turbine Exclusion Zones as indicated in Section 6.5 of this	1. Avoid All Infrastructure Exclusion Zones as indicated in Section 6.5 of this report of the Avifaunal Specialist Report. 2. No turbines (including the rotor swept area) should be located in the Turbine Exclusion Zones as indicated in Section 6.5 of this report of the Avifaunal Specialist Report. 3. Design the facility with 210m buffers	Once-off during the planning phase.	Project Developer

Impact	Mitigation/Management Objectives and Outcomes	Mitigation/Management Actions	Monitoring		
			Methodology	*Frequency*	*Responsibility*
		report of the Avifaunal Specialist Report.	around drainage lines, and 110m buffers around wetland no-go zones. 4. Implement the modelled no-turbine zone around the Martial Eagle nest.		
AVIFAUNA: MORTALITY DUE TO ELECTROCUTION ON 33 kV NETWORK					
Electrocution of raptors on the internal 33 kV poles	Prevent electrocutions	1. Overhead lines should be restricted to an absolute minimum and should only be allowed if underground cabling is unfeasible due technical (not financial) constraints. 2. Where the use of overhead lines is unavoidable due to technical reasons, the Avifaunal Specialist must be consulted to ensure that a bird friendly pylon design is used, and that appropriate mitigation is implemented pro-actively for complicated pole structures e.g. insulation of live components to prevent electrocutions on terminal structures and pole transformers.	1. Design the facility with underground cabling. 2. Consult with Avifaunal Specialist during the design phase of the overhead lines.	Once-off during the planning phase.	Project Developer

Table 22.2 Management Plan for the Construction Phase (Including pre- and post-construction activities)

Impact	Mitigation/Management Objectives and Outcomes	Mitigation/Management Actions	Monitoring		
			Methodology	*Frequency*	*Responsibility*
AVIFAUNA: DISPLACEMENT DUE TO DISTURBANCE					
The noise and movement associated with the construction activities at the development footprint will be a source of disturbance which would lead to the displacement of avifauna from the area	Prevent unnecessary displacement of priority avifauna by ensuring that contractors are aware of the requirements of the Construction Environmental Management Programme (CEMPr.)	A site-specific CEMPr must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere to the CEMPr and should apply good environmental practice during construction. The CEMPr must specifically include the following: 1. No off-road driving. 2. Maximum use of existing roads. 3. Measures to control noise and dust according to latest best practice. 4. Restricted access to the rest of the property. 5. Strict application of all recommendations in the botanical specialist report pertaining to the limitation and rehabilitation of the footprint.	1. Implementation o the CEMPr. Oversee activities to ensure that the CEMPr is implemented and enforced via site audits and inspections. Report and record any non-compliance. 2. Ensure that construction personnel are made aware of the impacts relating to off-road driving. 3. Construction access roads must be demarcated clearly. Undertake site inspections to verify.	1. On a daily basis 2. Weekly 3. Weekly 4. Weekly 5. Weekly	1. Contractor and ECO 2. Contractor and ECO 3. Contractor and ECO 4. Contractor and ECO 5. Contractor and ECO

Impact	Mitigation/Management Objectives and Outcomes	Mitigation/Management Actions	Monitoring		
			Methodology	*Frequency*	*Responsibility*
			4. Monitor the implementation of noise control mechanisms via site inspections and record and report non-compliance. 5. Ensure that the construction area is demarcated clearly and that construction personnel are made aware of these demarcations. Monitor via site inspections and report non-compliance.		
AVIFAUNA: DISPLACEMENT DUE TO HABITAT TRANSFORMATION					
Total or partial displacement of avifauna due to habitat transformation associated with the vegetation clearance and the presence of the wind turbines and associated infrastructure.	Prevent unnecessary displacement of avifauna by ensuring that the rehabilitation of transformed areas is implemented by an appropriately qualified rehabilitation specialist, according to the recommendations of the botanical specialist study.	1. Develop a Habitat Restoration Plan (HRP) and ensure that it is approved. 2. Monitor rehabilitation via site audits and site inspections to ensure compliance. Record and report any non-compliance. 3. Vehicle and pedestrian access to the site should be	1. Appointment of rehabilitation specialist to develop Habitat Restoration Plan (HRP). 2. Site inspections to	1. Once-off 2. Once a year	1. Operations Manager 2. SHE Manager 3. SHE Manager 4. Operations Manager

Impact	Mitigation/Management Objectives and Outcomes	Mitigation/Management Actions	Monitoring		
			Methodology	*Frequency*	*Responsibility*
		controlled and restricted to the facility footprint as much as possible to prevent unnecessary destruction of vegetation.	monitor progress of HRP.		

Table 22.3 Management Plan for the Planning and Design Phase Grid Connection

Impact	Mitigation/Management Objectives and Outcomes	Mitigation/Management Actions	Monitoring		
			Methodology	*Frequency*	*Responsibility*
None					

Table 22.4 Management Plan for the Construction Phase

Impact	Mitigation/Management Objectives and Outcomes	Mitigation/Management Actions	Monitoring		
			Methodology	*Frequency*	*Responsibility*
AVIFAUNA: DISPLACEMENT DUE TO DISTURBANCE					
The noise and movement associated with the construction activities at the development footprint will be a source of disturbance which would lead to the displacement of avifauna from the area	Prevent unnecessary displacement of avifauna by ensuring that contractors are aware of the requirements of the Construction Environmental Management Programme (CEMPr.)	A site-specific CEMPr must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere to the CEMPr and should apply good environmental practice during construction. The CEMPr must specifically include the following:	1. Implementation of the CEMPr. Oversee activities to ensure that the CEMPr is implemented and enforced via site audits and inspections. Report and record any non-compliance. 2. Ensure that construction personnel are made aware of the impacts relating to off-road driving. 3. Construction access roads must be demarcated clearly.	1. On a daily basis 2. Weekly 3. Weekly 4. Weekly 5. Weekly	1. Contractor and ECO 2. Contractor and ECO 3. Contractor and ECO 4. Contractor and ECO 5. Contractor and ECO

Impact	Mitigation/Management Objectives and Outcomes	Mitigation/Management Actions	Monitoring		
			Methodology	***Frequency***	***Responsibility***
		1. No off-road driving; 2. Maximum use of existing roads, where possible; 3. Measures to control noise and dust according to latest best practice; 4. Restricted access to the rest of the property; 5. Strict application of all recommendations in the botanical specialist report pertaining to the limitation of the footprint.	Undertake site inspections to verify. 4. Monitor the implementation of noise control mechanisms via site inspections and record and report non-compliance. 5. Ensure that the construction area is demarcated clearly and that construction personnel are made aware of these demarcations. Monitor via site inspections and report non-compliance.		
AVIFAUNA: MORTALITY DUE TO COLLISION WITH THE 132 kV OHL					
Mortality of avifauna due to collisions with the 132 kV OHL.	Reduction of avian collision mortality	The entire OHL to be marked with Eskom approved Bird Flight Diverters (BFDs). Design specification should conform to types of devices that will be visible at night e.g. LED type bird flight diverters.	1. Fit Eskom approved Bird Flight Diverters on the earthwire of the OHL.	1. Once-off	1. Contractor and ECO

Table 22.5 Management Plan for the Operational Phase

Impact	Mitigation/Management Objectives and Outcomes	Mitigation/Management Actions	Monitoring		
			Methodology	***Frequency***	***Responsibility***
AVIFAUNA: DISPLACEMENT DUE TO HABITAT TRANSFORMATION IN THE SUBSTATIONS					

Impact	Mitigation/Management Objectives and Outcomes	Mitigation/Management Actions	Monitoring		
			Methodology	*Frequency*	*Responsibility*
Total or partial displacement of avifauna due to habitat transformation associated with the vegetation clearance in the onsite substations.	Prevent unnecessary displacement of avifauna by ensuring that the rehabilitation of transformed areas is implemented where possible by an appropriately qualified rehabilitation specialist, according to the recommendations of the botanical specialist study.	1. Develop a Habitat Restoration Plan (HRP) and ensure that it is approved. 2. Monitor rehabilitation via site audits and site inspections to ensure compliance. Record and report any non-compliance.	1. Appointment of rehabilitation specialist to develop HRP. 2. Site inspections to monitor progress of HRP. 3. Adaptive management to ensure HRP goals are met.	1. Once-off 2. Once a year 3. As and when required	5. Facility Operator
AVIFAUNA: MORTALITY OF AVIFAUNA DUE TO COLLISION WITH THE 132 kV OHL					
Mortality of avifauna due to collisions with the 132 kV OHL.	Reduction of avian collision mortality	1. Monitor the collision mortality on the OHL. 2. Apply additional BFDs if collision hotspots are discovered.	1. Avifaunal specialist to conduct quarterly inspections of the OHL for a period of two years. 2. Apply additional BFDs if collision hotspots are discovered.	1. Quarterly 2. As and when required	1. Facility operator
AVIFAUNA: MORTALITY OF AVIFAUNA DUE TO ELECTROCUTION ON THE GRID INFRASTRUCTURE					
Mortality of avifauna due to electrocutions in the substations	Reduction of avian electrocution mortality	1. A Bird-friendly pylon design should be used. 2. Additional mitigation in the form of insulating sleeves on jumper cables present on strain poles and terminal poles is recommended. 3. Monitor the electrocution mortality in the substations. 4. Apply mitigation if any Species of Conservation Concern are electrocuted.	1. The construction of a single circuit powerline using the approved bird-friendly pole/tower design D-DT-7649 in accordance with the Distribution Technical Bulletin titled Refurbishment of 66/88kV line kite type frames with D-DT-7649 type top configuration - Reference Number 240-	1. Once-off 2. Weekly	1. Contractor 2. Facility operator

Impact	Mitigation/Management Objectives and Outcomes	Mitigation/Management Actions	Monitoring		
			Methodology	***Frequency***	***Responsibility***
			170000467 will eliminate the electrocution risk. The configuration of the insulators and the clearance distances between the live and earthed components on this structure can comfortably accommodate a perching vulture. However, if the OHL will be built on lattice structures, it is imperative that there is a minimum clearance of 1.8m between the jumper cables and/or insulators and the horizontal earthed component on the lattice structure. 2. Regular inspections of the substation yard		

Table 22.6 Management Plan for the Decommissioning Phase

Impact	Mitigation/Management Objectives and Outcomes	Mitigation/Management Actions	Monitoring		
			Methodology	***Frequency***	***Responsibility***
AVIFAUNA: DISPLACEMENT DUE TO DISTURBANCE					

Impact	Mitigation/Management Objectives and Outcomes	Mitigation/Management Actions	Monitoring		
			Methodology	*Frequency*	*Responsibility*
The noise and movement associated with the decommissioning activities will be a source of disturbance which would lead to the displacement of avifauna from the area	Prevent unnecessary displacement of avifauna by ensuring that contractors are aware of the requirements of the Decommissioning EMPr.	A site-specific Decommissioning EMPr (EMPr) must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere to the EMPr and should apply good environmental practice during decommissioning. The EMPr must specifically include the following: 1. No off-road driving; 2. Maximum use of existing roads during the decommissioning phase and the construction of new roads should be kept to a minimum as far as practical; 3. Measures to control noise and dust according to latest best practice; 4. Restricted access to the rest of the property; 5. Strict application of all recommendations in the botanical specialist report pertaining to the limitation of the footprint.	1. Implementation of the EMPr. Oversee activities to ensure that the EMPr is implemented and enforced via site audits and inspections. Report and record any non-compliance. 2. Ensure that decommissioning personnel are made aware of the impacts relating to off-road driving. 3. Access roads must be demarcated clearly. Undertake site inspections to verify. 4. Monitor the implementation of noise control mechanisms via site inspections and record and report non-compliance. 5. Ensure that the decommissioning area is demarcated clearly and that personnel are made aware of these demarcations. Monitor via site	1. On a daily basis 2. Weekly 3. Weekly 4. Weekly 5. Weekly	1. Contractor and ECO 2. Contractor and ECO 3. Contractor and ECO 4. Contractor and ECO 5. Contractor and ECO

Impact	Mitigation/Management Objectives and Outcomes	Mitigation/Management Actions	Monitoring		
			Methodology	***Frequency***	***Responsibility***
			inspections and report non-compliance.		

AVIFAUNA: MORTALITY DUE TO COLLISIONS WITH 33 KV NETOWORK					
Mortality of avifauna due to collisions with the 33 kV OHL.	Reduction of avian collision mortality	1. Overhead lines should be restricted to an absolute minimum and should only be allowed if underground cabling is unfeasible due technical (not financial) constraints. 2. Bird flight diverters should be installed on all 33 kV overhead lines on the full span length on the earthwire (according to Eskom guidelines - five metres apart). Light and dark colour devices must be alternated to provide contrast against both dark and light backgrounds, respectively. These devices must be installed as soon as the conductors are strung. Design specification should conform to types of devices that will be visible at night e.g. LED type bird flight diverters.	Fit Eskom approved Bird Flight Diverters on the earthwire at the demarcated sections of the OHL.	Once-off	Contractor

Table 22.7 Management Plan for the Operational Phase

Impact	Mitigation/Management Objectives and Outcomes	Mitigation/Management Actions	Monitoring		
			Methodology	***Frequency***	***Responsibility***
AVIFAUNA: MORTALITY DUE TO COLLISIONS WITH THE WIND TURBINES					

Impact	Mitigation/Management Objectives and Outcomes	Mitigation/Management Actions	Monitoring		
			Methodology	***Frequency***	***Responsibility***
Bird collisions with the wind turbines	Prevention of collision mortality on the wind turbines.	1. Wind turbines (WTGs) located within the medium risk zones (as indicated in Section 6.5 of this report) must be subject to Shut Down on Demand (SDoD), either Observer SDoD or Automated SDoD, as well as proactive curtailment based on environmental and weather conditions. Analysis of tracking data has revealed strong correlations between bird flight activity and variables such as time of day, wind speed, and temperature. These correlations will be further refined prior to the wind farm becoming operational. 2. Sensitive Species 23: All WTGs within the modelled medium risk zone (see Section 6.5) would need to implement dynamic, real-time nocturnal curtailment. a. Habitat mapping/modelling for the species will need to be conducted every two weeks (semi-monthly) from spring using the latest satellite imagery and supplemented with	1. Appoint Avifaunal Specialist to compile operational monitoring plan, including live bird monitoring and carcass searches. 2. Implement operational monitoring plan. 3. Design and implement mitigation measures if mortality thresholds are exceeded. 4. Compile quarterly and annual progress reports detailing the results of the operational monitoring and progress with any recommended mitigation measures.	1. Once-off 2. Yearly, for the operational lifetime of WEF.	1. Operations Manager 2. Operations Manager 3. Operations Manager 4. Operations Manager

Impact	Mitigation/Management Objectives and Outcomes	Mitigation/Management Actions	Monitoring		
			Methodology	*Frequency*	*Responsibility*
		on-site weather station rainfall data and soil moisture data. This modelling will generate a habitat suitability index, incorporating both rainfall (water levels) and vegetation state (grazing and burning). b. When the habitat suitability index indicates favourable habitat conditions during summer, WTGs in the medium risk mitigation zone would need to be curtailed at night 3. Formal live-bird monitoring and carcass searches should be implemented at the start of the operational phase, as per the most recent edition of the Best Practice Guidelines at the time (Jenkins *et al*. 2015) to assess collision rates. The exact time when operational monitoring should commence, will depend on the construction schedule, and should commence when the first turbines start operating. The Best Practice Guidelines require that, as an absolute			

Impact	Mitigation/Management Objectives and Outcomes	Mitigation/Management Actions	Monitoring		
			Methodology	*Frequency*	*Responsibility*
		minimum, operational monitoring should be undertaken for the first two (preferably three) years of operation, and then repeated again in year 5, and again every five years thereafter for the operational lifetime of the facility. 2. If estimated annual collision rates indicate unacceptable mortality levels of priority species, i.e. if it exceeds mortality thresholds as determined by the avifaunal specialist in consultation with BLSA and other avifaunal specialists, additional measures will have to be implemented which could include shut down on demand or other proven measures.			

Table 22.8 Management Plan for the Decommissioning Phase

Impact	Mitigation/Management Objectives and Outcomes	Mitigation/Management Actions	Monitoring		
			Methodology	***Frequency***	***Responsibility***
AVIFAUNA: DISPLACEMENT DUE TO DISTURBANCE ASSOCIATED WITH THE DISMANTLING ACTIVITIES					
The noise and movement associated with the de-commissioning activities at the WEF footprint will be a source of disturbance which would lead to the displacement of avifauna from the area	Prevent unnecessary displacement of avifauna by ensuring that contractors are aware of the requirements of the EMPr.	A site-specific EMPr must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere to the EMPr and should apply good environmental practice during construction. The EMPr must specifically include the following: 1. No off-road driving. 2. Maximum use of existing roads. 3. Measures to control noise and dust according to latest best practice. 4. Restricted access to the rest of the property. 5. Strict application of all recommendations in the botanical specialist report pertaining to the limitation of the footprint.	1. Implementation of the EMPr. Oversee activities to ensure that the EMPr is implemented and enforced via site audits and inspections. Report and record any non-compliance. 2. Ensure that construction personnel are made aware of the impacts relating to off-road driving. 3. Access roads must be demarcated clearly. Undertake site inspections to verify. 4. Monitor the implementation of noise control mechanisms via site inspections and record and report non-compliance.	1. On a daily basis 2. Weekly 3. Weekly 4. Weekly 5. Weekly	1. Contractor and ECO 2. Contractor and ECO 3. Contractor and ECO 4. Contractor and ECO 5. Contractor and ECO

Impact	Mitigation/Management Objectives and Outcomes	Mitigation/Management Actions	Monitoring		
			Methodology	***Frequency***	***Responsibility***
			5. Ensure that the footprint area is demarcated and that construction personnel are made aware of these demarcations. Monitor via site inspections and report non-compliance.		

22. BAT MANAGEMENT AND MONITORING PLAN

Project component/s	All project infrastructure
Potential Impact	Vegetation clearing for project infrastructure, as well as noise, dust and pollution generated during construction activities, will impact bats by removing habitat used for foraging and commuting, through disturbance, and displacement. Construction of WEF infrastructure could result in destruction and/or disturbance to bat roosts and inadvertently provide new roosting spaces for some bat species in risky locations.
Activity/risk source	All construction activities and associated activities (e.g., driving)
Mitigation: Target/Objective	1. Avoid potential for bats to roost in project infrastructure (e.g., buildings, and turbines) 2. Minimize disturbance to bats 3. Minimize habitat loss 4. Minimize displacement of bats

Mitigation	**Responsibility**	**Timeframe**

1. Ensure all project infrastructure (e.g., buildings, and turbines) is properly sealed such that bats cannot gain access. 2. No construction activities at night, apply good construction abatement control practices to reduce emissions and pollutants (e.g., noise, erosion, waste). 3. No placement of infrastructure (except roads and OHL) within No-Go areas. 4. Minimize clearing of native vegetation, minimize disturbance and destruction of farm buildings on site, minimize removal of native trees. Rehabilitate all areas disturbed during construction, (including aquatic habitat). 5. Reduce turbine noise emissions by serration of the back edges of the blade, by using a low-noise blade airfoil design or using blade trailing-edge brushes.	Project Developer Contractor	During design and planning phase and throughout construction phase

Performance Indicator	No bat roosts are destroyed No bats colonise new project infrastructure for roosting No infrastructure in No-Go areas (except roads and OHL) All areas disturbed during construction are rehabilitated
Monitoring	An appointed ECO must inspect all new project infrastructure, in conjunction with or via training from a bat ecologist, to ensure bats cannot gain access. ECO to ensure compliance with good construction abatement control practices. ECO must ensure no infrastructure is placed in No-Go areas (see Figure 3). If a bat roost is encountered during construction, the ECO must consult a bat ecologist to determine appropriate actions. ECO to ensure all disturbed areas are rehabilitated. ECO to ensure turbine blades have appropriate noise-reduction technology.

Project component/s	Wind turbines
Potential Impact	Bat mortality through collisions with wind turbine blades.

Activity/risk source	Operating Wind Turbines		
Mitigation: Target/Objective	1. Avoid bat fatalities through turbine layout design and turbine dimensions 2. Minimize bat fatalities using smart curtailment or deterrents during operation		
Mitigation		**Responsibility**	**Timeframe**
1. No placement of turbines in No-Go Areas (Figure 3). 2. Maintain a minimum blade sweep of 30 m to avoid impacts to lower flying bats such as clutter-edge species (e.g., Cape serotine, Natal long-fingered bat). 3. Minimize the rotor diameter 4. Feather blades to prevent free-wheeling below the turbine cut-in speed 5. Implement fatality monitoring throughout the operational phase 6. Apply smart curtailment or deterrents if fatality thresholds are exceeded. Annual fatality threshold per Least Concern species = 16 individuals. Annual fatality threshold per Species of Special Concern = 1 individual for each of [African Straw-coloured fruit bat, Wahlberg's Epauletted fruit bat, Percival's Short-eared Trident bat, Blasius's Horseshoe bat, Egyptian Rousette and Lessor Long-fingered bat].		Project Developer Operator	BMP developed prior to operation. BMP active throughout operation phase.
Performance Indicator	≤ 16 individuals per Least Concern species killed annually ≤ 1 individual per Species of Special Concern killed annually		
Monitoring	ECO must ensure no turbines are placed in No-Go areas, including the blade tips (Figure 3). ECO must ensure the dimensions of the final selected turbine adhere to requirements (A minimum blade sweep of 30 m). A Biodiversity Management Plan (BMP) for bats must be developed which includes the design of a post-construction fatality monitoring program (PCFM) for bats, and an adaptive management response plan that provides an escalating scale of mitigation should fatality thresholds be exceeded. ECO to ensure adherence to BMP and any mitigation measures implemented		

Project component/s	All project infrastructure		
Potential Impact	Construction of project infrastructure will increase ecological light pollution from artificial lighting associated with turbines, the substation and other operational and maintenance buildings. Light pollution can alter ecological dynamics (Horváth et al. 2009, Bará and C. Lima 2024). Lighting attracts and can cause direct mortality of insects, reducing the prey base for bats, especially bat species that are light-phobic. These species may also be displaced from previous foraging areas due to lighting. Other bat species forage around lights, attracted by higher numbers of insects. This may bring these species into the vicinity of the project and indirectly increase the risk of collision with wind turbines.		
Activity/risk source	Light sources from project infrastructure		
Mitigation: Target/Objective	1. Avoid light pollution 2. Minimize light pollution		
Mitigation		**Responsibility**	**Timeframe**
1. No placement of infrastructure within No-Go areas (Figure 3). 2. Use motion-sensor lighting, avoid sky-glow by using hoods and downward facing lighting, increase spacing between lighting units, and use low pressure sodium lights		Project Developer Operator	During design and planning phase and throughout operation phase.
Performance Indicator	Limited attraction of insects to light sources Limited foraging of bats around light sources Limited mortality at insects at light sources		
Monitoring	ECO must ensure no infrastructure is in No-Go areas (Figure 3). ECO must ensure motion-sensor lighting is used.		

	ECO must ensure all lighting fixtures have hoods and/or are downward facing, where appropriate, to prevent sky-glow. ECO must ensure minimum lighting is used and lighting is spaced to prevent excessive use of lighting. ECO must ensure low-pressure sodium lighting is used.

23. NOISE MANAGEMENT AND MONITORING PLAN

It is recommended that the project applicant:

1) The applicant should remodel the potential noise rating levels once the WTG and specifications are finalised;
2) If noise modelling of the final selected WTG (and final layout) indicates noise levels higher than 45 dBA at any NSR, the applicant must select appropriate mitigation measures to ensure outside night-time noise levels of 45 dBA, or compliance with Table 1 of SANS 10103 (in agreement with the different NSR);
3) re-evaluate the noise impact should the layout be revised (as part of amendment process post EA) where:
   a) any WTG, located within 2,500 m from a confirmed NSR, are moved closer to the NSR;
   b) any new WTG are introduced within 2,500m from an NSR;
   c) the number of WTG within 2,500m from an NSR are increased;
4) Re-evaluate the noise impact should the applicant make use of a WTG with a maximum PWL exceeding 114.0 dBA re 1 pW;
5) Ensure that equipment is well maintained and fitted with the correct and appropriate noise abatement measures. Engine bay covers over heavy equipment could be pre-fitted with sound absorbing material. Heavy equipment that fully encloses the engine bay should be considered, ensuring that the seam gap between the hood and vehicle body is minimised;
6) Include a component covering environmental noise in the Health and Safety Induction to sensitize all employees and contractors about the potential impact from noise, especially those employees and contractors that have to travel past receptors at night, or might be required to do work close (within 1,200m) to NSRs at night. This should include issues such as minimising the use of vehicle horns;
7) Investigates any reasonable and valid noise complaint if registered by a receptor staying within 2,500 m from the location where construction activities are taking place, or where an operational WTG are located. A complaint register, keeping a full record of the complaint, must be kept by the applicant; and
8) The applicant must plan and design a noise monitoring program at representative NSR locations where the modelled worst-case noise rating levels exceed 42 dBA. This should include the measurement of ambient sound levels prior to the development of the WEF, followed by noise measurements once the WEF is operational to confirm that noise levels are less than 45 dBA, or that noise levels within the dwelling complies with Table 1 of SANS 10103;
9) Where practicable, mobile equipment should be fitted with broadband (white-noise generators/alarms[3] [4]), rather than tonal reverse alarms.

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[3] White Noise Reverse Alarms: http://www.brigade-electronics.com/products.
[4] https://www.constructionnews.co.uk/home/white-noise-sounds-the-reversing-alarm/885410.article - White noise sounds the reversing alarm

23.1 Monitoring Plan

Environmental Noise Monitoring can be divided into two distinct categories, namely:

- Passive monitoring – the registering of any complaints (reasonable and valid from NSR living within 2,500m from any WTG of the Emvelo WEF) regarding noise; and
- Active monitoring – the measurement of noise levels at identified locations.

After the implementation of mitigation measures, noise levels could be higher than 42 dBA (more than 7 dBA of the night-time rating level of a rural noise district) and active noise monitoring is recommended and required.

In addition, passive monitoring also applies in the instance where a reasonable and valid noise complaint be registered, and the applicant/developer should investigate the noise complaint as per the guidelines in sub-section 12.1 and 12.2 of the Noise Impact Assessment EIA Report. These guidelines should be used as a rough guideline as site-specific conditions may require that the monitoring locations, frequency or procedure be adapted.

23.1.1 Measurement Localities and Frequency

Ambient sound levels could be measured at 4 – 5 representative locations before the development of the WEF (at the minimum), with the measurements repeated after the first year of operation. In addition, should there be a valid and reasonable noise complaint, once-off noise measurements must be conducted at the location of the person that registered a valid and reasonable noise complaint. The measurement location should consider the direct surroundings to ensure that other sound sources cannot influence the reading. These measurement locations can be reduced accordingly if the NSRs are relocated or the dwellings are no longer used for residential purposes.

23.1.2 Measurement Procedures

For active monitoring, it is recommended that ambient sound levels be measured at representative NSR where the worst-case noise levels could exceed 42 dBA (4 – 5 measurement locations should provide sufficient information about the compliance of the project to the noise limits) before the development of the WF, with the measurements repeated after the first year of operation. The procedures are described in the sub-section below.

In addition, should there be a valid and reasonable noise complaint, once-off noise measurements must be conducted at the location of the person that registered a valid and reasonable noise complaint. The measurement location should consider the direct surroundings to ensure that other sound sources cannot influence the reading.

Noise level measurements should be collected considering the requirements of SANS 10103:2008 (or an internationally recognised method such as ISO 1996, IEC 61400-11 or ETSU R97, considering the limitations of measuring the noise from WTG). It should be noted that the correct protocol should be selected to ensure quality data, with:

- SANS 10103 or ISO 1996 are recommended for use to measure noise levels due to construction activities (low wind conditions); and
- IEC 61400-11 or ETSU-R97 are recommended for use to measure operational noise levels (where increased winds may influence the measurements). Measurements done

in terms of SANS 10103 or ISO 1996 would report elevated noise levels due to wind-induced noises impacting on the measurement.

When a noise complaint is being investigated, measurements should be collected during a period or in conditions similar to when the receptor experienced the disturbing noise event.

23.2 ENVIRONMENTAL MANAGEMENT

Environmental Management Objectives are difficult to be defined for noise because ambient sound levels would slowly increase as developmental pressures increase in the area. This is due to increased traffic associated with increased development, human habitation, agriculture and even eco-tourism. While these increases in ambient sound levels may be low (and insignificant) it has the effect of cumulatively increasing the ambient sound levels over time.

The moment the WEF facility stops operation, ambient sound levels will drop to levels similar to the pre-WEF levels, or to new levels (typical of other areas with a similar developmental character) if other developments have occurred in the interim.

For the purpose of this report potential environmental management objectives would be:

- That the development (construction and operational phase) of the WEF project not result in noise levels exceeding 52 dBA (when measured over a period of at least 1 hour) during the day; and
- That the development (construction and operational phase) of the WEF project should not result in noise levels exceeding 45 dBA (when measured over a period of at least 1 hour) at night.

As noise levels will not exceed 52 dBA during both the construction and operational phases, Environmental Management is mainly focusing on the night-time period as summarized in:

- **Table 23**.1 for the planning phase (to ensure that noise levels are with the acceptable limits during the future operational phase:
- **Table 23**.2 for night-time activities during the construction phase; and
- **Table 23**.3 for the operational of the WTG.

TABLE 23.1 ENVIRONMENTAL MANAGEMENT FOR PLANNING PHASE

Objective: Future construction and operational noise levels should not change the existing ambient sound levels with more than 7 dBA from the existing levels, if the ambient sound levels are less than the IFC noise limits for residential use. If ambient sound levels exceed the IFC noise limits, the change in ambient sound levels should be less than 3 dBA.			
Project Components:	Future construction and operational activities of WTG of the Emvelo WEF		
Potential Impact:	Noise levels impacting on the quality of living of NSR		
Activity/Risk source	Future construction and operational activities		
Mitigation: Target	Daytime noise levels less than 52 dBA, night-time noise levels less than 45 dBA at locations used for residential purposes. If existing ambient sound levels exceed the IFC noise limits, the change in ambient sound levels should be less than 3 dBA.		
Mitigation: Action / Control		**Responsibility**	**Timeframe**

Applicant to re-evaluate the noise impact once the WTG specifications are finalized.	Applicant	Planning phase, before development of WEF
If noise levels, after the evaluation of the selected WTG are higher than 45 dBA, the applicant must design a noise abatement programme (or define appropriate mitigation measures) that will ensure that operational noise levels are less than 45 dBA at all verified NSR.	Applicant	Planning phase, before development of WEF
Applicant to re-evaluate the noise impact should the layout be revised (as part of an amendment process post EA) where any WTG, located within 2,500 m from a confirmed NSR, are moved closer to the NSR.	Applicant	Planning phase, before development of WEF
Applicant to re-evaluate the noise impact should the layout be revised (as part of an amendment process post EA) where any new WTG are introduced within 2,500 m from an NSR	Applicant	Planning phase, before development of WEF
Applicant to re-evaluate the noise impact should the layout be revised (as part of an amendment process post EA) where the number of WTG within 2,500 m from an NSR are increased	Applicant	Planning phase, before development of WEF
Applicant to re-evaluate the noise impact should the applicant make use of a wind turbine with a maximum PWL exceeding 108.4 dBA re 1 pW	Applicant	Planning phase, before development of WEF
Applicant to implement noise monitoring program to define the ambient sound levels at selected locations (NSR H-6) before the construction phase start.	Applicant	Planning phase, before development of WEF

Performance Indicator	Calculated daytime noise levels should be less than 52 dBA, with night-time noise levels being less than 45 dBA at structures used residential purposes
Monitoring	Potential measurements of ambient sound levels at representative NSR.

TABLE 23.2 ENVIRONMENTAL MANAGEMENT FOR NIGHT-TIME CONSTRUCTION ACTIVITIES

Objective: Construction activities should not result in daytime noise levels exceeding 52 dBA, nor night-time noise levels 45 dBA (at locations used for residential purposes). If existing ambient sound levels exceed the IFC noise limits, the change in ambient sound levels should be less than 3 dBA.		
Project Components:	Day- and night-time noise levels impacting on the quality of living of NSR	
Potential Impact:	Construction activities	
Activity/Risk source	Daytime noise levels less than 52 dBA at locations used for residential purposes Night-time noise levels less than 45 dBA at locations used for residential purposes If existing ambient sound levels already exceed the IFC noise limits, introduced noises should not change the ambient sound levels with more than 3 dBA (IFC requirement)	
Mitigation: Target	Daytime noise levels less than 52 dBA, night-time noise levels less than 45 dBA at locations used for residential purposes	
Mitigation: Action / Control	**Responsibility**	**Timeframe**

ECO to ensure that equipment is well maintained and fitted with the correct and appropriate noise abatement measures;	ECO	Ongoing during construction phase
ECO to include a component covering environmental noise in the Health and Safety Induction to sensitize all employees and contractors about the potential impact from noise;	ECO	Ongoing during construction phase
Complaints register kept on site, to register any noise complaints	Contractor	Ongoing during construction phase
ECO to notify NSR (and/or land owner(s)) before night-time construction activities are to take place within 1,200 m from an NSR (if the structures are used for residential activities during the proposed construction period).	ECO	Construction activities within 1,000 m from NSR
Performance Indicator	Daytime noise levels less than 52 dBA, night-time noise levels less than 45 dBA at locations used for residential purposes. If existing ambient sound levels exceed the IFC noise limits, the change in ambient sound levels should be less than 3 dBA.	
Monitoring	Inspection of equipment by ECO. Measurement of noise levels at dwellings of NSR after noise complaints.	

TABLE 23.3 ENVIRONMENTAL MANAGEMENT FOR NIGHT-TIME OPERATIONAL PERIOD

Objective: Operational activities should not result in daytime noise levels exceeding 52 dBA, nor night-time noise levels 45 dBA (at locations used for residential purposes). If existing ambient sound levels exceed the IFC noise limits, the change in ambient sound levels should be less than 3 dBA.		
Project Components:	Operation of WTG within 2,500 m from structure used for residential purposes	
Potential Impact:	Noises from WTG impacting on the quality of living of NSR	
Activity/Risk source	Operation of WTG	
Mitigation: Target	Daytime noise levels from operational activities less than 52 dBA at NSR Night-time noise levels from operational activities less than 45 dBA at NSR	
Mitigation: Action / Control	**Responsibility**	**Timeframe**
Applicant to conduct noise monitoring when a reasonable and valid noise complaint are received from an NSR living within 2,500m from a WTG of the project.	EO / Applicant	Within 2 months after a noise complaint is registered
Noise monitoring to confirm that noise levels associated with operating WTG are less than 45 dBA at all NSR.	EO	During the first year once the project is operational. Noise specialist to confirm need for future measurements.
Performance Indicator	Daytime noise levels from operating WTG less than 52 dBA, with night-time noise levels due to operating WTG being less than 45 dBA	

24. VISUAL MANAGEMENT AND MONITORING PLAN

In considering mitigating measures, three rules are considered - the measures should be feasible (economically), effective (how long will it take to implement and what provision is made for management/maintenance) and acceptable (within the framework of the existing landscape and land use policies for the area).

The following generic mitigation measures are suggested for the Project and should be included in the Environmental Management Plan Report (EMPr). The following general actions are recommended:

24.1 Planning and site development

- With the preparation of the land within the full extent of the Project site(s) onto which activities will take place, the minimum amount of existing vegetation and topsoil should be removed.
- Specifications with regards to the placement of construction camps (if required), as well as a site plan of the construction camp, indicating waste areas, storage areas and placement of ablution facilities, should be included in the EMPr. These areas should either be screened or positioned in areas where they would be less visible from the public road north of the Project site.
- When possible, construction activities should be limited to between 06:00 and 18:00 or in conjunction with the ECO and neighbours of the Project site.
- Adopt responsible construction practices that strictly contain the construction/establishment activities to demarcated areas.
- Building or waste material discarded should be undertaken at an authorised location, which should not be within any sensitive areas.

24.2 Earthworks and vegetation

- The mitigation measures during operation will need to focus on effective rehabilitation of the construction area. These specifications must be explicit and detailed and included in the contract documentation (Environmental Management Plan) so that the tasks can be costed and monitored for compliance and result.
- It is recommended that that a suitably qualified person, such as a landscape architect, is appointed to give attention to the concept and design of the aesthetic aspects of the project during the detailed design phase of the project prior to construction to integrate the design especially the shape of the cut and fill slopes with the surrounding landscape to ensure that the project blends in physically and aesthetically with the environment. The cut and fill slopes should not be steeper than 1:2.5 vertical to horizontal as this allows vegetation to establish more easily. This will also reduce erosion of the soil surface.
- Earthworks should be executed so that only the footprint and a small 'construction buffer zone' around the proposed activities are exposed. In all other areas, the naturally occurring vegetation should be retained.

- All cut and fill slopes (if any) and areas affected by construction work should be progressively top soiled and re-vegetated as soon as possible.
- Disturbed soil must be exposed for the minimum time possible once cleared of vegetation to avoid prolonged exposure to wind and water erosion and to minimise dust generation.

24.3 Structures and associated infrastructure

- Paint all structures with colours that reflect and compliment the colours of the surrounding landscape avoid shiny materials.
- The colour of the components of the project components will make a difference to the visual fit of the project into the landscape and setting.
- Subdued and complimentary natural shades and tints blend easily into a landscape setting.
- Vivid primary or bright or reflective colours or surfaces will accentuate the visual presence of the development and should be avoided.

24.4 Good housekeeping

- "Housekeeping" procedures should be developed for the Project to ensure that the project site and lands adjacent to it are kept clean of debris, garbage, graffiti, fugitive trash, or waste generated on-site; procedures should extend to control of "track out" of dirt on vehicles leaving the active construction site and controlling sediment in stormwater runoff.
- During construction, temporary fences surrounding the material storage yards and laydown areas should be covered with 'shack' cloth (khaki coloured) or shade cloth.
- Operating facilities should be actively maintained during operation.

24.5 Lighting

- As night lighting during both construction and operation is one of the more objectionable forms of visual impact, it is important that selective and sensitive location and design of the lighting requirements for the construction camp and the sub-stations are developed. For instance, reduce the height from which floodlights are fixed and identify zones of high and low lighting requirements with the focus of the lights being inward, rather than outward.
- Light pollution is the result of bad lighting design, which allows artificial light to shine outward and upward into the sky, where it is not wanted, instead of focusing the light downward, where it is needed. Ill designed lighting washes out the darkness of the night sky and radically alters the light levels in rural areas where light sources shine as 'beacons' against the dark sky and are not wanted.
- Of all the pollutions faced, light pollution is the most easily remedied. Simple changes in lighting design and installation yield immediate changes in the amount of light spilled into the atmosphere. The

following are measures that must be considered in the lighting design of the Project, particularly at the management and service platforms.

- Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the site i.e. lights are to be aimed away from adjacent roads and residential areas.
- Minimize the number of light fixtures to the bare minimum, including security lighting.
- Avoid high pole top security lighting along the periphery of the site and at the substations , and use only lights activated on illegal entry to the site.
- It is a requirement by Civil Aviation that a red hazard flashing navigation light be installed on top of each turbine. To minimise this visual intrusion, the use of AVWS (Audio Visual Warning System) technology should be investigated.

24.6 Shadow Flicker

- Avoid locating any of the turbines within 2km of a residence to limit the effect of shadow flicker.

Table 25.1: Emvelo WEF Environmental Mitigation Monitoring Measures

Impact/Aspect	**Mitigation/Management Actions**	***Responsibility***	***Methodology***	**Mitigation/Management Objectives and Outcomes**	***Frequency***
Planning and Design					
Visual intrusion and potential flicker effect by wind turbines and associated structures and infrastructure on visual receptors	• Site turbines at least 2 km from any occupied homestead or hospitality/tourism facility, where possible to limit effect of shadow flicker.	Client	Determine location of sensitive viewers	Avoid impact on sensitive viewers	once

Impact/Aspect	**Mitigation/Management Actions**	***Responsibility***	***Methodology***	**Mitigation/Management Objectives and Outcomes**	***Frequency***
	(This has already been done during the Scoping phase)				
Visual intrusion by wind turbines and associated structures and infrastructure on visual and landscape receptors	• Site turbines at least 2 km from any occupied homestead hospitality/tourism facility, where possible. • Locate construction camps and all related facilities such as stockpiles, lay-down areas, batching plants in areas already impacted such as existing farmyards or in unobtrusive locations away from the main visual receptors (These has already been done during the Scoping phase)	Client Client	Determine location of sensitive landscape receptors such as rivers, hills, ridges, natural areas, pans, nature reserves, cultural sites and structures	Avoid impact on landscape receptors	Once Once
Visual intrusion by Access Road, Substations and Associated structures and infrastructure on visual and landscape receptors	• Locate construction camps and all related facilities such as stockpiles, lay-down areas, batching plants in areas already impacted such as existing farmyards or in unobtrusive locations away from the main visual and landscape receptors	Client	Determine location of sensitive viewers and landscape receptors	Avoid impact on sensitive viewers and landscape receptors	once

Impact/Aspect	**Mitigation/Management Actions**	***Responsibility***	***Methodology***	**Mitigation/Management Objectives and Outcomes**	***Frequency***
Construction					
Visual intrusion by wind turbines and associated structures and infrastructure on visual and landscape receptors	• Limit area of disturbance for access roads, substations and construction camp sites • Limit access tracks for construction and maintenance vehicles to existing roads where possible. Once established do not allow random access through the veld • Suppress dust during construction. Blend edges of road and platforms with surrounding landscape Rehabilitate exposed disturbed areas • Avoid vegetation stripping in straight lines but rather non-geometric shapes that blend with the landscape • Limit need for security lighting Use non-reflective materials • Paint ,where possible, all other project infrastructure elements such as operational buildings, support poles etc. a dark colour • Avoid bright colour/patterns and logos	Client/Contractor Client/contractor Contractor/ Client/Contractor	Prepare a site layout plan for construction	To limit visual intrusion of turbine installation	Once Continuously Regularly/Daily Once

Impact/Aspect	**Mitigation/Management Actions**	***Responsibility***	***Methodology***	**Mitigation/Management Objectives and Outcomes**	***Frequency***
		Client/Contractor Client/Contractor Client			Once Once Once
Visual intrusion by Access Road, Substations and Associated structures and infrastructure on visual and landscape receptors	• Limit area of disturbance for footprint, access roads and construction camp or sites • Suppress dust during construction • Limit area of disturbance for access roads, substations and construction camp sites • Limit access tracks for construction and maintenance vehicles to existing roads where possible. Once	Client/Contractor Contractor Client/Contractor	Prepare a site layout plan for construction	To limit visual intrusion of infrastructure	Once Regularly /daily Once

Impact/Aspect	**Mitigation/Management Actions**	***Responsibility***	***Methodology***	**Mitigation/Management Objectives and Outcomes**	***Frequency***
	established do not allow random access through the veld Suppress dust during construction. ● Blend edges of road and platforms with surrounding landscape Rehabilitate exposed disturbed areas ● Avoid vegetation stripping in straight lines but rather non-geometric shapes that blend with the landscape ● Limit need for security lighting Use non-reflective materials ● Paint, where possible, all other project infrastructure elements such as operational buildings, support poles etc. a dark colour ● Avoid bright colour/patterns and logos	Client/Contractor Client/Contractor Client/Contractor Client/Contractor Client Client/Contractor			Once Once Once Once Once Once

Impact/Aspect	**Mitigation/Management Actions**	***Responsibility***	***Methodology***	**Mitigation/Management Objectives and Outcomes**	***Frequency***
		Client			Once
Operation					
Visual intrusion and potential flicker effect by wind turbines and associated structures and infrastructure on visual receptors	• Mitigation will already have been implemented by the placement of turbines according to distance from visual receptors. Additional mitigation if still required: • Screening the affected receptor by, for example, applying blinds or shutters to the affected window; closing curtains during the period of the day when flicker could occur; planting a vegetation screen such as a row of trees between the receptor and the turbine or reconfiguring the building so that views from it are limited. • Consider compensation	Client Client	Site turbines 2 km from visual receptors. This has already been done	To limit the effect of shadow flicker on the visual receptors	Done Once

Impact/Aspect	**Mitigation/Management Actions**	***Responsibility***	***Methodology***	**Mitigation/Management Objectives and Outcomes**	***Frequency***
	• Shutdown the turbine/s during the time of the day for those calendar days when flicker will occur. ● Investigate the possibility to manage for the top of turbine red hazard lighting to only operate when a plane enters the affected airspace rather than be permanently lit ● Limit need for security lighting	Client Client Client Client			Once As and when required during affected times during the year Once Once
Visual intrusion by wind turbines and	● Mitigation will already have been implemented by the placement of	Client	Done	To limit the visual impact on the landscape receptors	Done

Impact/Aspect	**Mitigation/Management Actions**	***Responsibility***	***Methodology***	**Mitigation/Management Objectives and Outcomes**	***Frequency***
associated structures and infrastructure on landscape receptors	turbines according to distance from landscape receptors • Limit need for security lighting. • Use non-reflective materials • Paint, where possible, all other project infrastructure elements such as operational buildings, support poles etc. a dark colour • Avoid bright colour/patterns and logos		Use unobtrusive security lighting Select matt colours Select darker tones of colours		
Decommissioning					
Visual intrusion and potential flicker effect by wind turbines and associated structures	• Remove all project components from site • Rip all compacted hard surfaces such	Contractor	Disassemble and or demolish component Use a ripper or	To re-instate the area to approximately the original state	Once

Impact/Aspect	**Mitigation/Management Actions**	***Responsibility***	***Methodology***	**Mitigation/Management Objectives and Outcomes**	***Frequency***
and infrastructure on visual receptors Visual intrusion by wind turbines and associated structures and infrastructure on visual and landscape receptors Visual intrusion by Access Road, Substations and Associated structures and infrastructure on visual and landscape receptors	as platforms, words areas, access and service roads etc. and reshape to blend with the surrounding landscape • Rehabilitate/revegetate all disturbed areas to visually the original state by shaping and planting	Contractor Contractor	by hand and loosen all compacted material Fertilise ripped areas, add organic matter where necessary and hydroseed with indigenous plant seed		Once Once and then monitor growth succession. Redo where necessary
Cumulative					
The introduction of a WEF into a landscape that is devoid of any such similar structures	Locate the WEF in areas where there is already existing industrial infrastructure such as other powerlines, roads, rail and industry	Client	During the planning stage (already done) locate the proposed WEF as close to existing large-scale infrastructure	Concentrating infrastructure minimises the visual cumulative impact	Once

Table 25-2: Emvelo OHPL Environmental Mitigation Monitoring Measures

Impact/Aspect	Mitigation/Management Actions	*Responsibility*	*Methodology*	Mitigation/Management Objectives and Outcomes	*Frequency*
Planning and Design					
Visual intrusion by 132kV overhead transmission Powerline and its Associated Electrical Grid Infrastructure on visual and landscape receptors	Limit transmission alignment to the planned corridor	Client	Select the optimal routing	Minimise area of impact	Once
Construction					
Visual intrusion by 132kV overhead transmission Powerline and its Associated Electrical Grid Infrastructure on visual and landscape receptors	• Limit area of disturbance for access roads pylon placement. sites • Suppress dust during construction • Limit area of disturbance for access roads. • Locate stockpiles, in areas already impacted such as existing farmyards or in unobtrusive locations away from the main visual receptors. • Limit access tracks for construction and maintenance vehicles	Client/Contractor Contractor Client/Contractor Client/Contractor			

Impact/Aspect	**Mitigation/Management Actions**	***Responsibility***	***Methodology***	**Mitigation/Management Objectives and Outcomes**	***Frequency***
	to existing roads where possible. Once established do not allow random access through the veld Suppress dust during construction. • Blend edges of road and platforms with surrounding landscape • Avoid vegetation stripping in straight lines but rather non-geometric shapes that blend with the landscape • Limit need for security lighting • Use non-reflective materials • Paint , where possible, all other project infrastructure elements such as operational buildings, support poles etc. a dark colour • Avoid bright colour/patterns and logos	Contractor Contractor Client/Contractor Client	Break up straight edges where possible Use unobtrusive security lighting		

Impact/Aspect	Mitigation/Management Actions	*Responsibility*	*Methodology*	Mitigation/Management Objectives and Outcomes	*Frequency*
		Client Client Client	Select matt colours Select darker tones of colours Use mono-tone colours		
Operation					
Visual intrusion by Access Road, Substations and Associated structures and infrastructure on visual and landscape receptors	• Maintain rehabilitated disturbed areas	Contractor	Remove invasive species and general weeds. Cut back vegetation where overgrown. Revegetate where rehabilitation has not taken	To avoid unnecessary landscape degeneration and rehabilitation	Weekly basis
Decommissioning					
Visual intrusion by 132kV overhead	• Remove all project components from site • Rip all compacted hard surfaces and	Contractor	Disassemble and or	To re-instate the area to approximately the original state	Once

Impact/Aspect	**Mitigation/Management Actions**	***Responsibility***	***Methodology***	**Mitigation/Management Objectives and Outcomes**	***Frequency***
transmission Powerline and its Associated Electrical Grid Infrastructure on visual and landscape receptors	reshape to blend with the surrounding landscape ● Rehabilitate/ revegetate all disturbed areas to visually the original state by shaping and planting		demolish component Use a ripper or by hand and loosen all compacted material Fertilise ripped areas, add organic matter where necessary and hydroseed with indigenous plant seed		Once Once and then monitor growth succession. Redo where necessary
Cumulative					
The introduction of a powerline into a landscape where similar structures already exist	Locate the powerlines in areas where there is already existing industrial infrastructure such as other powerlines, roads, rail and industry	Client	During the planning stage (already done) locate the prosed lines as close to existing large-scale infrastructure	Concentrating infrastructure minimises the visual cumulative impact	Once

25. HERITAGE MANAGEMENT PLAN

Any activity within 50m of a heritage site that cannot be affected will require that site to be clearly demarcated before any construction activity occurs. Demarcation: Demarcation is a physical high visibility demarcation that occurs 20m from the edge of the site. Normally demarcations is 5m from the edge; however since there will be heavy equipment involved, this needs to be increased to lessen possible impacts. Demarcation needs to occur before construction activity begins and they type of demarcti0n should be part of the site Safety, Health, Environment and Quality (SHEQ) course. This needs to be the standard approach to all sites with variation allowed in a few cases.

Many of the settlements from the desktop no longer exist as they have been abandoned, overgrown by black wattle thickets and/or are now part of the agricultural fields. Where graves are known to the landowners, they tend to be buffered and omitted from farming activity. All of the old settlements that were recorded had graves associated with them. One could assume that those settlements that no longer exist, or were not accessible, could have graves. These graves will not be marked, as the cairns would be disturbed. All settlements from the desktop study should thus be treated has being sensitive for potential graves. Those that will be affected could re-assessed after the area has been cleared of wattle and/or the vegetation has been thinned out at the end of winter or burnt.

All possible graves should be treated as graves until proven otherwise. Any activity within 50m of a grave will require that grave to be clearly demarcated before any construction activity occurs.

Isolated stone kraals may be removed/demolished after they have been mapped and photographed. Any stone walled feature that is to be damaged will require a permit from the

Ruins and old farmhouses should preferably not be damaged and will require an assessment by a Built Environment specialist. They would also require a permit of they are to be (partially) damaged. Old farmhouses will have historical middens associated with them. These middens would need to be excavated/sampled if exposed.

While the paleontology is of very high sensitivity as it forms [part of the Vryheid formation, very few significant vertebrate fossils have been found in it. A Chance Find Protocol was initiated for the construction phase.

Only ROCH05 will be currently affected by a wind turbine. The OHL is too close to EMVE06 and will need to be moved. The access road needs to be moved westwards so as not to affect the cemetery.

26. SOCIAL MONITORING PLAN

Impact	Mitigation / Enhancement Action	Responsibility	Mitigation / Enhancement Objective	Frequency
Employment and Business Opportunities	**Employment** • Where reasonable and practical, the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi- and low-skilled job categories. • Where feasible, efforts should be made to employ local contractors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria. • The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. **Business** • Where possible, the proponent should assist local BBBEE companies to complete and submit the required tender forms and associated information.	Developer	Enhance local employment and business opportunities	Once off during construction phase
Risk to local communities posed by construction workers	• Prepare and implement Stakeholder Engagement Plan (SEP). • Prepare and implement Community Health, Safety and Security Plan (CHSSP) • SEP and CHSSP should include a Grievance Mechanism • Implement 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories. • Investigate option of establishing a Monitoring Forum (MF) • Develop Code of Conduct for construction workers and contractor. • Implement an HIV/AIDS awareness programme for construction workers • Provide transport for workers to and from the site daily. • Ensure all construction workers from outside the area are transported back to their place of residence within 2 days for their contract coming to an end. • No construction workers, except for security personnel, permitted to stay over-night on the site.	Developer and appointed contractor	Reduce risk posed by construction workers to local communities	Prior to and throughout construction phase
Safety and security risks posed by construction workers to local landowners	**Mitigation:** • Prepare and implement Community Health, Safety and Security Plan (CHSSP). • Investigate option of establishing a Monitoring Forum (MF)	Contractor appointed by developer	Avoid and or minimise safety and security risks posed by construction workers on	Prior to and throughout construction phase

Impact	Mitigation / Enhancement Action	Responsibility	Mitigation / Enhancement Objective	Frequency
	• Establish Grievance Mechanism. • Develop Code of Conduct for construction workers and contractor. • Manage and monitor movement of construction workers on and off the site. • Avoid the establishment of a public link between the Transvalia Road and N11. • Install security cameras at strategic locations and key access points. • Ensure all farm gates are closed after use. • Provide transport for low and semi-skilled workers to and from the site. • Establish code of conduct for workers and Inform construction workers of site rules, including consequences of stock theft and trespassing on adjacent farms. • No construction workers, except for security personnel, permitted to stay over-night on the site.		local landowners	
Nuisance impacts associated with construction activities (noise, dust, safety etc.)	• Prepare and implement Community Health, Safety and Security Plan (CHSSP). • Establish Grievance Mechanism. • Develop Code of Conduct for construction workers and contractor. • Restrict movement of construction vehicles to agreed access road/s. • Repair damage to farm infrastructure, including damage to local gravel farm roads. • Plan movement of heavy vehicles to avoid impact on farming activities, such as planting and harvesting. • Implement dust suppression measures.	Contractor appointed by developer	Avoid and or minimise nuisance impacts to local landowners associated with construction related activities	Prior to and throughout construction phase
Risk of grass fires	**Mitigation:** • No open fires on the site for cooking or heating except in designated areas. • Smoking on site to be confined to designated areas. • All construction related activities that pose a potential fire risk, such as welding, to be effectively managed and confined to areas where the risk of fires has been reduced. • Avoid working in high wind conditions. • Provide adequate fire-fighting equipment on-site • Provide fire-fighting training to selected construction staff. • No construction staff to be accommodated on site overnight.	Contractor appointed by developer	Avoid and or minimise risk of grass fires developing and spreading	Throughout construction phase

Impact	Mitigation / Enhancement Action	Responsibility	Mitigation / Enhancement Objective	Frequency
Impact on farmland and farming activities	• Liaise with affected landowners to discuss potential footprint related issues wind turbines 2, 3, 6, 8, 9, 14, 18, 21, 25, 26, 27, 28, 30, 33, 34, 38, 40, 43, 118 and 119 and associated access roads etc. • Establish Grievance Mechanism. • Plan movement of heavy vehicles to avoid impact on farming activities, such as planting and harvesting. • Preparate and implement Stakeholder Engagement Plan (SEP) prior to and during the construction phase. This should include informing affected landowners of type and timing of activities. • Implement dust suppression measures. • Maximise use of existing internal roads. • Minimise footprint associated with the construction related activities (access roads, construction camps, workshop etc.) • Rehabilitate areas disturbed by temporary construction related activities, such as access roads on the site, construction camps etc., at the end of the construction phase. • Appoint Environmental Control Officer (ECO) should be appointed to monitor construction phase and implementation of rehabilitation plan.	Developer and contractor appointed by developer	Avoid and or minimise impact on farmland and farming activities	Throughout construction phase
Employment and Business Opportunities	Employment • Implement skills development and training program. • Where reasonable and practical, appoint members from the local community and local contractors. • Promote gender equality and the employment of women wherever possible. **Business** • Where possible, appoint local BBBEE companies to provide services.	Developer	Enhance local employment and business opportunities	Throughout operational phase
Generate benefits for affected landowners	• Implement agreements with affected landowner. • Investigate opportunities to contribute to and improve security in the area.	Developer	Compensate landowners for use of land	Throughout operational phase
Support local SED initiatives	• Liaise with the MM to identify projects that can be supported by SED contributions. • Establish criteria for identifying and funding community projects. Criteria should be aimed at maximising the benefits for the	Developer	Enhance SED opportunities	Throughout operational phase

Impact	Mitigation / Enhancement Action	Responsibility	Mitigation / Enhancement Objective	Frequency
	community as a whole and not individuals within the community. • Develop and implement financial management controls, including annual audits, to manage the SED contributions.			
Visual impact on sense of place	• Discuss relocating Turbine 2 with affected landowner. • Implement recommendations contained in the VIA. • Install radar activated civil aviation light system on wind turbines where technically feasible.	Developer	Reduce visual impact on sense of place	Once off at outset of operational phase

27. Faunal Management Plan

From a faunal perspective, and specific to this development, several key management aspects to help reduce impacts and add biodiversity benefits are required:

- Off-set areas to be determined for any high faunal sensitive areas that are to be developed; these should form part of a long-term conservation programme and to be determine by an off-set specialist.
- An alien plant management plan that would involve the continued removal and monitoring of alien plant growth within the project sites, starting at the construction phase and continuing into the operational and decommissioning phases.
- Oribi management plan to be developed by a faunal specialist that could involve, amongst other aspects, identifying important Orbi habitat within the project areas, monitoring of Orbi numbers pre-construction, during construction, operational, and the decommissioning phases. Monitoring should ideally continue at least once a year at an appropriate time of year throughout the operation phase. In addition, populations should also be monitored for 1–3 years post- decommissioning. Other aspects could include establishing a local Oribi working group, linking in with the national Oribi Working Group (OWG) and with the Endangered Wildlife Trust (EWT) (see Patel et al., 2021; Shrader et al., 2016). An Oribi management plan would be a strong mitigation measure to reduce impacts on this highly threatened antelope species.
- In conjunction with the above two management plans and considering that the grassland system is a fire-driven ecosystem, a fire management plan should be implemented.
- Any high faunal sensitive grassland habitat, or off-set areas, should be incorporated as part of a long-term conservation strategy, such as a stewardship programme. This would ensure that at the end-of-life of the project, positive biodiversity measures that have been implemented do not suddenly come to an end.

Numerous detailed measures, often at the site-level for individual turbines, for inclusion into the EMPr during the different phases are listed in the Terrestrial Biodiversity and Botanical Impact reports; these are supported here and recommended for inclusion.

28. CONCLUSION

In terms of the National Environmental Management Act 107 of 1998, as amended, everyone is required to take reasonable measures to ensure that they do not pollute the environment. Reasonable measures include informing and educating employees about the environmental risks of their work and training them to operate in an environmentally acceptable manner.

Although all foreseeable actions and potential mitigation measures and management actions are contained in this document, the EMPr should be seen as a day-to-day management document. The EMPr thus sets out the environmental and social standards, which would be required to minimise the negative impacts and maximise the positive benefits of the Emvelo WEF. The EMPr could thus change daily, and if managed correctly lead to successful construction and operational phases of the development.

Furthermore, in terms of the 'Act', the cost to repair any environmental damage shall be borne by the person responsible for the damage. It is therefore imperative that the management plan is successfully implemented, as a failure to comply could have legal implications. The environmental impacts on the site will not be significant if the construction management is well implemented, and a set of operational guidelines are developed by the long-term site management body.

APPENDIX A GENERIC EMPR FOR SUBSTATION INFRASTRUCTURE

APPENDIX CONTENTS LIST

GENERIC ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr) FOR THE DEVELOPMENT AND EXPANSION OF SUBSTATION INFRASTRUCTURE FOR THE TRANSMISSION AND DISTRIBUTION OF ELECTRICITY

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

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INTRODUCTION

1. Background

The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) requires that an environmental management programme (EMPr) be submitted where an environmental impact assessment (EIA) has been identified as the environmental instrument to be utilised as the basis for a decision on an application for environmental authorisation (EA). The content of an EMPr must either contain the information set out in Appendix 4 of the Environmental Impact Assessment Regulations, 2014, as amended (EIA Regulations) or must be a generic EMPr relevant to an application as identified and gazetted by the Minister in a government notice. Once the Minister has identified, through a government notice that a generic EMPr is relevant to an application for EA, that generic EMPr must be applied by all parties involved in the EA process, including but not limited to the applicant and the competent authority (CA).

2. Purpose

This document constitutes a generic EMPr relevant to applications for the development or expansion of substation infrastructure for the transmission and distribution of electricity, and all listed and specified activities necessary for the realisation of such infrastructure.

3. Objective

The objective of this generic EMPr is to prescribe and pre-approve generally accepted impact management outcomes and impact management actions, which can commonly and repeatedly be used for the avoidance, management and mitigation of impacts and risks associated with the development or expansion of substation infrastructure for the transmission and distribution of electricity. The use of a generic EMPr is intended to reduce the need to prepare and review individual EMPrs for applications of a similar nature.

4. Scope

The scope of this generic EMPr applies to the development or expansion of substation infrastructure for the transmission and distribution of electricity requiring EA in terms of NEMA. This generic EMPr applies to activities requiring EA, mainly activity 11 and 47 of the Environmental Impact Assessment Regulations Listing Notice 1 of 2014, as amended, and activity 9 of the Environmental Impact Assessment Regulations Listing Notice 2 of 2014, as amended, and all associated listed or specified activities necessary for the realization of such infrastructure.

5. Structure of this document

This document is structured in three parts with an Appendix as indicated in the table below:

Part	Section	Heading	Content
A		Provides general guidance and information and is **not legally binding**	Definitions, acronyms, roles & responsibilities and documentation and reporting.
B	1	Pre-approved generic EMPr template	Contains generally accepted impact management outcomes and impact management actions required for the avoidance, management and mitigation of impacts and risks associated with the development or expansion of substation infrastructure for the transmission and distribution of electricity, which are presented in the form of a template that has been pre- approved. The template in this section is to be completed by the contractor, with each completed page signed and dated by the holder of the EA prior to commencement of the activity. Where an impact management outcome is not relevant, the words "not applicable" can be inserted in the template under the "responsible persons" column. Once completed and signed, the template represents the EMPr for the activity approved by the CA and is legally binding. The template **is not required** to be submitted to the CA as once the generic EMPr is gazetted for implementation, it has been approved by the CA. To allow interested and affected parties access to the pre-approved EMPr template for consideration through the decision-making process, the EAP on behalf of the applicant /proponent must make the hard copy of this EMPr available at a public location and where the applicant has a website, the EMPr should also be made available on such publicly accessible website.
	2	Site specific information	Contains preliminary infrastructure layout and a declaration that the applicant/holder of the EA

Part	Section	Heading	Content
			will comply with the pre-approved generic EMPr template contained in Part B: Section 1, and understands that the impact management outcomes and impact management actions are **legally binding**. The preliminary infrastructure layout must be finalized to inform the final EMPr that is to be submitted with the basic assessment report (BAR) or environmental impact assessment report (EIAR), ensuring that all impact management outcomes and impact management actions have been either pre-approved or approved in terms of Part C. This section **must be** submitted to the CA together with the final BAR or EIAR. The information submitted to the CA will be considered to be incomplete should a signed copy of Part B: section 2 not be submitted. Once approved, this Section forms part of the EMPr for the development and is legally binding.
C		Site specific sensitivities/ attributes	If any specific environmental sensitivities/ attributes are present on the site which require site specific impact management outcomes and impact management actions, not included in the pre-approved generic EMPr, to manage impacts, these specific impact management outcomes and impact management actions must be included in this section. These specific environmental attributes must be referenced spatially and impact management outcomes and impact management actions must be provided. These specific impact management outcomes and impact management actions must be presented in the format of the pre- approved EMPr template (Part B: section 1) This section will not be required should the site contain no specific environmental sensitivities or attributes. However, if Part C is applicable to the site, it **is required** to be submitted together with the BAR or EIAR, for consideration of, and decision on, the application for EA. The information in this section must be prepared by an EAP and must contain his/her name and expertise including a curriculum vitae. Once

Part	Section	Heading	Content
			approved, Part C forms part of the EMPr for the site and is legally binding. This section applies only **to additional** impact management outcomes and impact management actions that are necessary for the avoidance, management and mitigation of impacts and risks associated with the specific development or expansion and which are not already included in <u>Part B: section 1</u>.
Appendix 1			Contains the method statements to be prepared prior to commencement of the activity. The method statements are **not required** to be submitted to the competent authority.

6. Completion of part B: section 1: the pre-approved generic EMPr template

The template is to be completed prior to commencement of the activity, by providing the following information for each environmental impact management action:

- For implementation
  - a 'responsible person',
  - a method for implementation,
  - a timeframe for implementation
- For monitoring
  - a responsible person
  - frequency
  - evidence of compliance.

The completed template must be signed and dated by the holder of the EA prior to commencement of the activity. The method statements prepared and agreed to by the holder of the EA must be appended to the template as <u>Appendix 1</u>. Each method statement must be signed and dated on each page by the holder of the EA. This template once signed and dated is legally binding. The holder of the EA will remain responsible for its implementation.

7. Amendments of the impact management outcomes and impact management actions

Once the activity has commenced, a holder of an EA may make amendments to the impact management outcomes and impact management actions in the following manner:

- Amendment of the impact management outcomes: in line with the process contemplated in Regulation 37 of the EIA Regulations; and
- Amendment of the impact management actions: in line with the process contemplated in Regulation 36 of the EIA Regulations.

8. Documents to be submitted as part of part B: section 2 site specific information and declaration

Part B: Section 2 has three distinct sub-sections. The first and third sub-sections are in a template format. Sub-section two requires a map to be produced.

Sub-section 1 contains the project name, the applicant's name and contact details, the site information, which includes coordinates of the property or farm in which the proposed substation infrastructure is proposed as well as the 21-digit Surveyor General code of each cadastral land parcel and, where available, the farm name.

Sub-section 2 is to be prepared by an EAP and must contain his/her name and expertise including a curriculum vitae. This sub-section must include a map of the site sensitivity overlaid with the preliminary infrastructure layout using the national web based environmental screening tool, when available for compulsory use at: https://screening.environment.gov.za/screeningtool. The sensitivity map shall identify the nature of each sensitive feature e.g. threatened plant species, archaeological site, etc. Sensitivity maps shall identify features both within the planned working area and any known sensitive features and within 50 m from the development footprint.

Sub-section 3 is the declaration that the applicant (s)/proponent (s) or holder of the EA in the case of a change of ownership must complete which confirms that the applicant/EA holder will comply with the pre-approved 'generic EMPr' template in Section 1 and understands that the impact management outcomes and impact management actions are legally binding.

(a) Amendments to Part B: Section 2 – site specific information and declaration

Should the EA be transferred, Part B: Section 2 must be completed by the new applicant/proponent and submitted with the application for an amendment of the EA in terms of regulations 29 or 31 of the EIA Regulations, whichever applies. The information submitted as part of such an application for an amendment to an EA will be considered to be incomplete should a signed copy of Part B: Section 2 not be submitted. Once approved, Part B: Section 2 forms part of the EMPr for the development and the EMPr becomes legally binding to the new EA holder.

PART A – GENERAL INFORMATION

1. DEFINITIONS

In this EMPr any word or expression to which a meaning has been assigned in the NEMA or EIA Regulations has that meaning, and unless the context requires otherwise –

"clearing" means the clearing and removal of vegetation, whether partially or in whole, including trees and shrubs, as specified;

"construction camp" is the area designated for key construction infrastructure and services, including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management;

"contractor" - The Contractor has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract, are in line with the Environmental Management Programme and that Method Statements are implemented as described.

"**hazardous substance**" is a substance governed by the Hazardous Substances Act, 1973 (Act No. 15 of 1973) as well as the Hazardous Chemical and Substances Regulations, 1995;

"method statement" means a written submission by the Contractor to the Project Manager in response to this EMPr or a request by the Project Manager and ECO. The method statement must set out the equipment, materials, labour and method(s) the Contractor proposes using to carry out an activity identified by the Project Manager when requesting the Method Statement. This must be done in such detail that the Project Manager and ECO is able to assess whether the Contractor's proposal is in accordance with this specification and/or will produce results in accordance with this specification;

The method statement must cover as a minimum applicable details with regard to:

(i) Construction procedures;
(ii) Plant, materials and equipment to be used;
(iii) Transporting the equipment to and from site;
(iv) How the plant/ material/ equipment will be moved while on site;
(v) How and where the plant/ material/ equipment will be stored;
(vi) The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
(vii) Timing and location of activities;
(viii) Compliance/ non-compliance; and
(ix) Any other information deemed necessary by the Project Manager.

"slope" means the inclination of a surface expressed as one unit of rise or fall for so many horizontal units;

"solid waste" means all solid waste, including construction debris, hazardous waste, excess cement/ concrete, wrapping materials, timber, cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers);

"spoil" means excavated material which is unsuitable for use as material in the construction works or is material which is surplus to the requirements of the construction works;

"topsoil" means a varying depth (up to 300 mm) of the soil profile irrespective of the fertility, appearance, structure, agricultural potential, fertility and composition of the soil;

"works" means the works to be executed in terms of the Contract

2. ACRONYMS and ABBREVIATIONS

CA	Competent Authority
cEO	Contractors Environmental Officer
dEO	Developer Environmental Officer
DPM	Developer Project Manager
DSS	Developer Site Supervisor
EAR	Environmental Audit Report
ECA	Environmental Conservation Act No. 73 of 1989
ECO	Environmental Control Officer
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
ERAP	Emergency Response Action Plan
EMPr	Environmental Management Programme Report
EAP	Environmental Assessment Practitioner
FPA	Fire Protection Agency
HCS	Hazardous chemical Substance
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act ,2004 (Act No. 10 of 2004)
NEMWA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
MSDS	Material Safety Data Sheet
RI&AP's	Registered Interested and affected parties

3. ROLES AND RESPONSIBILITIES FOR ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr) IMPLEMENTATION

The effective implementation of this generic EMPr is dependent on established and clear roles, responsibilities and reporting lines within an institutional framework. This section of the EMPr gives guidance to the various environmental roles and reporting lines, however, project specific requirements will ultimately determine the need for the appointment of specific person(s) to undertake specific roles and or responsibilities. As such, it must be noted that in the event that no specific person, for example, an environmental control officer (ECO) is appointed, the holder of the EA remains responsible for ensuring that the duties indicated in this document for action by the ECO are undertaken.

Table 1: *Guide to roles and responsibilities for implementation of an EMPr*

Responsible Person(s)	Role and Responsibilities
Developer's Project Manager (DPM)	<u>Role</u> The Project Developer is accountable for ensuring compliance with the EMPr and any conditions of approval from the competent authority (CA). Where required, an environmental control officer (ECO) must be contracted by the Project Developer to objectively monitor the implementation of the EMPr according to relevant environmental legislation, and the conditions of the environmental authorisation (EA). The Project Developer is further responsible for providing and giving mandate to enable the ECO to perform responsibilities, and he must ensure that the ECO is integrated as part of the project team while remaining independent. <u>Responsibilities</u> - Be fully conversant with the conditions of the EA; - Ensure that all stipulations within the EMPr are communicated and adhered to by the Developer and its Contractor(s); - Issuing of site instructions to the Contractor for corrective actions required; - Monitor the implementation of the EMPr throughout the project by means of site inspections and meetings. Overall management of the project and EMPr implementation; and - Ensure that periodic environmental performance audits are undertaken on the project implementation.

Responsible Person(s)	Role and Responsibilities
Developer Site Supervisor (DSS)	<u>Role</u> The DSS reports directly to the DPM, oversees site works, liaises with the contractor(s) and the ECO. The DSS is responsible for the day to day implementation of the EMPr and for ensuring the compliance of all contractors with the conditions and requirements stipulated in the EMPr. <u>Responsibilities</u> - Ensure that all contractors identify a contractor's Environmental Officer (cEO); - Must be fully conversant with the conditions of the EA. Oversees site works, liaison with Contractor, DPM and ECO; - Must ensure that all landowners have the relevant contact details of the site staff, ECO and cEO; - Issuing of site instructions to the Contractor for corrective actions required; - Will issue all non-compliances to contractors; and - Ratify the Monthly Environmental Report.
Environmental Control Officer (ECO)	<u>Role</u> The ECO should have appropriate training and experience in the implementation of environmental management specifications. The primary role of the ECO is to act as an independent quality controller and monitoring agent regarding all environmental concerns and associated environmental impacts. In this respect, the ECO is to conduct periodic site inspections, attend regular site meetings, pre-empt problems and suggest mitigation and be available to advise on incidental issues that arise. The ECO is also required to conduct compliance audits, verifying the monitoring reports submitted by the cEO. The ECO provides feedback to the DSS and Project Manager regarding all environmental matters. The Contractor, cEO and dEO are answerable to the Environmental Control Officer for non-compliance with the Performance Specifications as set out in the EA and EMPr. The ECO provides feedback to the DSS and Project Manager, who in turn reports back to the Contractor and potential and Registered Interested &Affected Parties' (RI&AP's), as required. Issues of non-compliance raised by the ECO must be taken up by the Project Manager, and resolved with the Contractor as per the conditions of his contract. Decisions regarding environmental procedures, specifications and requirements which have a cost implication (i.e. those that are deemed to be a variation, not allowed for in the

Responsible Person(s)	Role and Responsibilities
	Performance Specification) must be endorsed by the Project Manager. The ECO must also, as specified by the EA, report to the relevant CA as and when required. <u>Responsibilities</u> The responsibilities of the ECO will include the following: - Be aware of the findings and conclusions of all EA related to the development; - Be familiar with the recommendations and mitigation measures of this EMPr; - Be conversant with relevant environmental legislation, policies and procedures, and ensure compliance with them; - Undertake regular and comprehensive site inspections / audits of the construction site according to the generic EMPr and applicable licenses in order to monitor compliance as required; - Educate the construction team about the management measures contained in the EMPr and environmental licenses; - Compilation and administration of an environmental monitoring plan to ensure that the environmental management measures are implemented and are effective; - Monitoring the performance of the Contractors and ensuring compliance with the EMPr and associated Method Statements; - In consultation with the Developer Site Supervisor order the removal of person(s) and/or equipment which are in contravention of the specifications of the EMPr and/or environmental licenses; - Liaison between the DPM, Contractors, authorities and other lead stakeholders on all environmental concerns; - Compile a regular environmental audit report highlighting any non-compliance issues as well as satisfactory or exceptional compliance with the EMPr; - Validating the regular site inspection reports, which are to be prepared by the contractor Environmental Officer (cEO); - Checking the cEO's record of environmental incidents (spills, impacts, legal transgressions etc.) as well as corrective and preventive actions taken; - Checking the cEO's public complaints register in which all complaints are recorded, as well as action taken;

Responsible Person(s)	Role and Responsibilities
	- Assisting in the resolution of conflicts; - Facilitate training for all personnel on the site – this may range from carrying out the training, to reviewing the training programmes of the Contractor; - In case of non-compliances, the ECO must first communicate this to the Senior Site Supervisor, who has the power to ensure this matter is addressed. Should no action or insufficient action be taken, the ECO may report this matter to the authorities as non-compliance; - Maintenance, update and review of the EMPr; - Communication of all modifications to the EMPr to the relevant stakeholders.
developer Environmental Officer (dEO)	<u>Role</u> The dEOs will report to the Project Manager and are responsible for implementation of the EMPr, environmental monitoring and reporting, providing environmental input to the Project Manager and Contractor's Manager, liaising with contractors and the landowners as well as a range of environmental coordination responsibilities. <u>Responsibilities</u> - Be fully conversant with the EMPr; - Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures; - Ensure that all stipulations within the EMPr are communicated and adhered to by the Employees, Contractor(s) - Confine the development site to the demarcated area; - Conduct environmental internal audits with regards to EMPr and authorisation compliance (on cEO); - Assist the contractors in addressing environmental challenges on site; - Assist in incident management: - Reporting environmental incidents to developer and ensuring that corrective action is taken, and lessons learnt shared; - Assist the contractor in investigating environmental incidents and compile investigation reports; - Follow-up on pre-warnings, defects, non-conformance reports; - Measure and communicate environmental performance to the Contractor;

Responsible Person(s)	Role and Responsibilities
	- Conduct environmental awareness training on site together with ECO and cEO; - Ensure that the necessary legal permits and / or licenses are in place and up to date; - Acting as Developer's Environmental Representative on site and work together with the ECO and contractor;
Contractor	<u>Role</u> The Contractor appoints the cEO and has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract are in line with the EMPr and that Method Statements are implemented as described. External contractors must ensure compliance with this EMPr while performing the onsite activities as per their contract with the Project Developer. The contractors are required, where specified, to provide Method Statements setting out in detail how the impact management actions contained in the EMPr will be implemented during the development or expansion of substation infrastructure for the transmission and distribution of electricity activities. <u>Responsibilities</u> - project delivery and quality control for the development services as per appointment; - employ a suitably qualified person to monitor and report to the Project Developer's appointed person on the daily activities on-site during the construction period; - ensure that safe, environmentally acceptable working methods and practices are implemented and that equipment is properly operated and maintained, to facilitate proper access and enable any operation to be carried out safely; - attend on site meeting(s) prior to the commencement of activities to confirm the procedure and designated activity zones; - ensure that contractors' staff repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained in EMPr, to the satisfaction of the ECO.
contractor Environmental Officer (cEO)	<u>Role</u> Each Contractor affected by the EMPr should appoint a cEO, who is responsible for the on-site implementation of the EMPr (or relevant sections of the EMPr). The Contractor's representative can be the site agent; site engineer; a dedicated environmental officer; or an independent consultant. The Contractor must ensure that the Contractor's Representative is suitably qualified to perform the necessary tasks and is

Responsible Person(s)	Role and Responsibilities
	appointed at a level such that she/he can interact effectively with other site Contractors, labourers, the Environmental Control Officer and the public. As a minimum the cEO shall meet the following criteria: <u>Responsibilities</u> - Be on site throughout the duration of the project and be dedicated to the project; - Ensure all their staff are aware of the environmental requirements, conditions and constraints with respect to all of their activities on site; - Implementing the environmental conditions, guidelines and requirements as stipulated within the EA, EMPr and Method Statements; - Attend the Environmental Site Meeting; - Undertaking corrective actions where non-compliances are registered within the stipulated timeframes; - Report back formally on the completion of corrective actions; - Assist the ECO in maintaining all the site documentation; - Prepare the site inspection reports and corrective action reports for submission to the ECO; - Assist the ECO with the preparing of the monthly report; and - Where more than one Contractor is undertaking work on site, each company appointed as a Contractor will appoint a cEO representing that company.

4. ENVIRONMENTAL DOCUMENTATION REPORTING AND COMPLIANCE

To ensure accountable and demonstrated implementation of the EMPr, a number of reporting systems, documentation controls and compliance mechanisms must be in place for all substation infrastructure projects as a minimum requirement.

4.1 Document control/Filing system

The holder of the EA is solely responsible for the upkeep and management of the EMPr file. As a minimum, all documentation detailed below will be stored in the EMPr file. A hard copy of all documentation shall be filed, while an electronic copy may be kept where relevant. A duplicate file will be maintained in the office of the DSS (where applicable). This duplicate file must remain current and up-to-date. The filing system must be updated and relevant documents added as required. The EMPr file must be made available at all times on request by the CA or other relevant authorities. The EMPr file will form part of any environmental audits undertaken as prescribed in the EIA Regulations.

4.2 Documentation to be available

At the outset of the project the following preliminary list of documents shall be placed in the filing system and be accessible at all times:

- Full copy of the signed EA from the CA in terms of NEMA, granting approval for the development or expansion;
- Copy of the generic and site specific EMPr as well as any amendments thereof;
- Copy of declaration of implementing generic EMPr and subsequent approval of site specific EMPr and amendments thereof;
- All method statements;
- Completed environmental checklists;
- Minutes and attendance register of environmental site meetings;
- An up-to-date environmental incident log;
- A copy of all instructions or directives issued;
- A copy of all corrective actions signed off. The corrective actions must be filed in such a way that a clear reference is made to the non-compliance record;
- Complaints register.

4.3 Weekly Environmental Checklist

The ECOs are required to complete a Weekly Environmental Checklist, the format of which is to be agreed prior to commencement of the activity. The ECOs are required to sign and date the checklist, retain a copy in the EMPr file and submit a copy of the completed checklist to the DSS on a weekly basis.

The checklists will form the basis for the Monthly Environmental Reports. Copies of all completed checklists will be attached as Annexures to the Environmental Audit Report as required in terms of the EIA Regulations.

4.4 Environmental site meetings

Minutes of the environmental site meetings shall be kept. The minutes must include an attendance register and will be attached to the Monthly Report that is distributed to attendees. Each set of minutes must clearly record "Matters for Attention" that will be reviewed at the next meeting.

4.5 Required Method Statements

The method statement will be done in such detail that the ECOs are enabled to assess whether the contractor's proposal is in accordance with the EMPr.

The method statement must cover applicable details with regard to:

- development procedures;
- materials and equipment to be used;
- getting the equipment to and from site;
- how the equipment/ material will be moved while on site;
- how and where material will be stored;
- the containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
- timing and location of activities;
- compliance/ non-compliance with the EMPr; and
- any other information deemed necessary by the ECOs.

Unless indicated otherwise by the Project Manager, the Contractor shall provide the following method statements to the Project Manager no less than 14 days prior to the commencement date of the activity:

- Site establishment – Camps, Lay-down or storage areas, satellite camps, infrastructure;
- Batch plants;
- Workshop or plant servicing;
- Handling, transport and storage of Hazardous Chemical Substance's;
- Vegetation management – Protected, clearing, aliens, felling;
- Access management – Roads, gates, crossings etc.;
- Fire plan;
- Waste management – transport, storage, segregation, classification, disposal (all waste streams);
- Social interaction – complaints management, compensation claims, access to properties etc.;
- Water – use (source, abstraction and disposal), access and all related information, crossings and mitigation;
- Emergency preparedness – Spills, training, other environmental emergencies;
- Dust and noise management methodologies;
- Fauna interaction and risk management – only if the risk was identified – wildlife interaction especially on game farms; and
- Heritage and palaeontology management.

The ECOs shall monitor and ensure that the contractors perform in accordance with these method statements. Completed and agreed method statements between the holder of the EA and the contractor shall be captured in Appendix 1.

4.6 Environmental Incident Log (Diary)

The ECOs are required to maintain an up-to-date and current Environmental Incident Log (environmental diary). The Environmental Incident Log is a means to record all environmental incidents and/or all non-compliance notice would not be issued. An environmental incident is defined as:

- Any deviation from the listed impact management actions (listed in this EMPr) that may be addressed immediately by the ECOs. (For example a contractor's staff member littering or a drip tray that has not been emptied);
- Any environmental impact resulting from an action or activity by a contractor in contravention of the environmental stipulations and guidelines listed in the EMPr which as a single event would have a minor impact but which if cumulative and continuous would have a significant effect (for example no toilet paper available in the ablutions for an afternoon); and
- General environmental information such as road kills or injured wildlife.

The ECOs are to record all environmental incidents in the Environmental Incident Log. All incidents regardless of severity must be reported to the Developer. The Log is to be kept in the EMPr file and at a minimum the following will be recorded for each environmental incident:

- The date and time of the incident;
- Description of the incident;
- The name of the Contractor responsible;
- The incident must be listed as significant or minor;
- If the incident is listed as significant, a non-compliance notice must be issued, and recorded in the log;
- Remedial or corrective action taken to mitigate the incident; and
- Record of repeat minor offences by the same contractor or staff member.

The Environmental Incident Log will be captured in the EAR.

4.7 Non-compliance

A non-compliance notice will be issued to the responsible contractor by the ECOs via the DSS or Project Manager. The non-compliance notice will be issued in writing; a copy filed in the EMPr file and will at a minimum include the following:

- Time and date of the non-compliance;
- Name of the contractor responsible;
- Nature and description of the non-compliance;
- Recommended / required corrective action; and
- Date by which the corrective action to be completed.
- The contractors shall act immediately when a notice of non-compliance is received and correct whatever is the cause for the issuing of the notice. Complaints received regarding activities on the development site pertaining to the environment shall be

recorded in a dedicated register and the response noted with the date and action taken. The ECO should be made aware of any complaints. Any non-compliance with the agreed procedures of the EMPr is a transgression of the various statutes and laws that define the manner by which the environment is managed. Failure to redress the cause shall be reported to the relevant CA for them to deal with the transgression, as it deems fit. The contractor is deemed not to have complied with the EMPr if, inter alia, There is a deviation from the environmental conditions, impact management outcomes and impact management actions activities, as approved in generic and site specific EMPr as relevant as set out in the EMPr, which deviation has, or may cause, an environmental impact.

4.8 Corrective action records

For each non-compliance notice issued, a documented corrective action must be recorded. On receiving a non-compliance notice from the DSS, the contractor's cEO will ensure that the corrective actions required take place within the stipulated timeframe. On completion of the corrective action the cEO is to issue a Corrective Action Report in writing to the ECOs. If satisfied that the corrective action has been completed, the ECOs are to sign-off on the Corrective Action Report, and attach the report to the non-compliance notice in the EMPr file. A corrective action is considered complete once the report has signed off by the ECOs.

4.9 Photographic record

A digital photographic record will be kept. The photographic record will be used to show before, during and post rehabilitation evidence of the project as well used in cases of damages claims if they arise. Each image must be dated and a brief description note attached.

The Contractor shall:

1. Allow the ECOs access to take photographs of all areas, activities and actions.

The ECOs shall keep an electronic database of photographic records which will include:

1. Pictures of all areas designated as work areas, camp areas, development sites and storage areas taken before these areas are set up;
2. All bunding and fencing;
3. Road conditions and road verges;
4. Condition of all farm fences;
5. Topsoil storage areas;
6. All areas to be cordoned off during construction;
7. Waste management sites;
8. Ablution facilities (inside and out);
9. Any non-conformances deemed to be "significant";
10. All completed corrective actions for non-compliances;
11. All required signage;
12. Photographic recordings of incidents;
13. All areas before, during and post rehabilitation; and
14. Include relevant photographs in the Final Environmental Audit Report.

4.10 Complaints register

The ECOs shall keep a current and up-to-date complaints register. The complaints register is to be a record of all complaints received from communities, stakeholders and individuals. The Complaints Record shall:

1. Record the name and contact details of the complainant;
2. Record the time and date of the complaint;
3. Contain a detailed description of the complaint;
4. Where relevant and appropriate, contain photographic evidence of the complaint or damage (ECOs to take relevant photographs); and
5. Contain a copy of the ECOs written response to each complaint received and keep a record of any further correspondence with the complainant. The ECO's written response will include a description of any corrective action to be taken and must be signed by the Contractor, ECO and affected party. Where a damage claim is issued by the complainant, the ECOs shall respond as described in (**section 4.11**) below.

4.11 Claims for damages

In the event that a Claim for Damages is submitted by a community, landowner or individual, the ECOs shall:

1. Record the full detail of the complaint as described in (**section 4.10**) above;
2. The DPM will evaluate the claim and associated damage and submit the evaluation to the Senior Site Representative for approval;
3. Following consideration by the DPM, the claim is to be resolved and settled immediately, or the reason for not accepting the claim communicated in writing to the claimant. Should the claimant not accept this, the ECO shall, in writing report the incident to the Developer's negotiator and legal department; and
4. A formal record of the response by the ECOs to the claimant as well as the rectification of the method of making payments not amount will be recorded in the EMPr file.

4.12 Interactions with affected parties

Open, transparent and good relations with affected landowners, communities and regional staff are an essential aspect to the successful management and mitigation of environmental impacts.

The ECOs shall:

1. Ensure that all queries, complaints and claims are dealt within an agreed timeframe;
2. Ensure that any or all agreements are documented, signed by all parties and a record of the agreement kept in the EMPr file;
3. Ensure that a complaints telephone numbers are made available to all landowners and affected parties; and
4. Ensure that contact with affected parties is courteous at all times;

4.13 Environmental audits

Internal environmental audits of the activity and implementation of the EMPr must be undertaken. The findings and outcomes included in the EMPr file and submitted to the CA at intervals as indicated in the EA.

The ECOs must prepare a monthly EAR. The report will be tabled as the key point on the agenda of the Environmental Site Meeting. The Report is submitted for acceptance at the meeting and the final report will be circulated to the Project Manager and filed in the EMPr file. At a frequency determined by the EA, the ECOs shall submit the monthly reports to the CA. At a minimum the monthly report is to cover the following:

- Weekly Environmental Checklists;
- Deviations and non-compliances with the checklists;
- Non-compliances issued;
- Completed and reported corrective actions;
- Environmental Monitoring;
- General environmental findings and actions; and
- Minutes of the Bi-monthly Environmental Site Meetings.

4.14 Final environmental audits

On final completion of the rehabilitation and/or requirements of the EA a final EAR is to be prepared and submitted to the CA. The EAR must comply with Appendix 7 of the EIA Regulations.

PART B: SECTION 1: Pre-approved generic EMPr template

5. IMPACT MANAGEMENT OUTCOMES AND IMPACT MANAGEMENT ACTIONS

This section provides a pre-approved generic EMPr template with aspects that are common to the development of substation infrastructure for the transmission and distribution of electricity. There is a list of aspects identified for the development or expansion of substation infrastructure for the transmission and distribution of electricity, and for each aspect a set of prescribed impact management outcomes and associated impact management actions have been identified. Holders of EAs are responsible to ensure the implementation of these outcomes and actions for all projects as a minimum requirement, in order to mitigate the impact of such aspects identified for the development or expansion of substation infrastructure for the transmission and distribution of electricity.

The template provided below is to be completed by providing the information under each heading for each environmental impact management action.

The completed template must be signed and dated on each page by both the contractor and the holder of the EA prior to commencement of the activity. The method statements prepared and agreed to by the holder of the EA must be appended to the template as Appendix 1. Each method statement must also be duly signed and dated on each page by the contactor and the holder of the EA. This template, once signed and dated, is legally binding. The holder of the EA will remain responsible for its implementation.

5.1 *Environmental awareness training*

Impact management outcome: All onsite staff are aware and understands the individual responsibilities in terms of this EMPr.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All staff must receive environmental awareness training prior to commencement of the activities; – The Contractor must allow for sufficient sessions to train all personnel with no more than 20 personnel attending each course; – Refresher environmental awareness training is available as and when required; – All staff are aware of the conditions and controls linked to the EA and within the EMPr and made aware of their individual roles and responsibilities in achieving compliance with the EA and EMPr; – The Contractor must erect and maintain information posters at key locations on site, and the posters must include the following information as a minimum: a) Safety notifications; and b) No littering. – Environmental awareness training must include as a minimum the following: a) Description of significant environmental impacts, actual or potential, related to their work activities;	**ECO and cEO**	**Environmental Induction training; Toolbox talks; other pertinent training aids**	**Initially prior to construction commencing ECO to induct Construction Management and cEO, and thereafter repeated for all new employees and yearly. Toolbox talks to be presented weekly**	**ECO**	**Monthly**	**Signed induction and toolbox talk, or training registers**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
b) Mitigation measures to be implemented when carrying out specific activities; c) Emergency preparedness and response procedures; d) Emergency procedures; e) Procedures to be followed when working near or within sensitive areas; f) Wastewater management procedures; g) Water usage and conservation; h) Solid waste management procedures; i) Sanitation procedures; j) Fire prevention; and k) Disease prevention. – A record of all environmental awareness training courses undertaken as part of the EMPr must be available; – Educate workers on the dangers of open and/or unattended fires; – A staff attendance register of all staff to have received environmental awareness training must be available. – Course material must be available and presented in appropriate languages that all staff can understand.						

5.2 Site Establishment development

Impact management outcome: Impacts on the environment are minimised during site establishment and the development footprint are kept to demarcated development area.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– A method statement must be provided by the contractor prior to any onsite activity that includes the layout of the construction camp in the form of a plan showing the location of key infrastructure and services (where applicable), including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous materials storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management; – Location of camps must be within approved area to ensure that the site does not impact on sensitive areas identified in the environmental assessment or site walk through; – Sites must be located where possible on previously disturbed areas; – The camp must be fenced in accordance with ***Section 5.5: Fencing and gate installation***; and – The use of existing accommodation for contractor staff, where possible, is encouraged.	**Contractor**	**Method Statement compilation and communication of Method Statements to employees. Use of EIA and Specialist Studies to locate site camps**	**Prior to construction**	**ECO**	**Monthly**	**Signed Method Statements; signed proof of communication register; Liaison with ECO regarding site camp placement**

5.3 Access restricted areas

Impact management outcome: Access to restricted areas prevented.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identification of access restricted areas is to be informed by the environmental assessment, site walk through and any additional areas identified during development; – Erect, demarcate and maintain a temporary barrier with clear signage around the perimeter of any access restricted area, colour coding could be used if appropriate; and – Unauthorised access and development related activity inside access restricted areas is prohibited.	**Contractor**	**Use of EIA/BA and Specialist Studies to locate sensitive areas and 'no-go' areas**	**Prior to construction in new areas**	**ECO**	**Monthly**	**Contractor compliance with sensitive areas and 'no-go' areas identified in EIA/BA and Specialist Studies**

5.4 Access roads

Impact management outcome: Minimise impact to the environment through the planned and restricted movement of vehicles on site.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance

– An access agreement must be formalised and signed by the DPM, Contractor and landowner before commencing with the activities; – All private roads used for access to the servitude must be maintained and upon completion of the works, be left in at least the original condition – All contractors must be made aware of all these access routes. – Any access route deviation from that in the written agreement must be closed and re-vegetated immediately, at the contractor's expense; – Maximum use of both existing servitudes and existing roads must be made to minimize further disturbance through the development of new roads; – In circumstances where private roads must be used, the condition of the said roads must be recorded in accordance with ***section 4.9: photographic record***; prior to use and the condition thereof agreed by the landowner, the DPM, and the contractor; – Access roads in flattish areas must follow fence lines and tree belts to avoid fragmentation of vegetated areas or croplands – Access roads must only be developed on a pre-planned and approved roads.	**Contractor**	**Implementation of mitigation measures**	**Ongoing.**	**ECO**	**Monthly**	**Signed access agreements and maintenance of access roads**

5.5 Fencing and Gate installation

Impact management outcome: Minimise impact to the environment and ensure safe and controlled access to the site through the erection of fencing and gates where required.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Use existing gates provided to gain access to all parts of the area authorised for development, where possible; – Existing and new gates to be recorded and documented in accordance with **section *4.9: photographic record***; – All gates must be fitted with locks and be kept locked at all times during the development phase, unless otherwise agreed with the landowner; – At points where the line crosses a fence in which there is no suitable gate within the extent of the line servitude, on the instruction of the DPM, a gate must be installed at the approval of the landowner; – Care must be taken that the gates must be so erected that there is a gap of no more than 100 mm between the bottom of the gate and the ground; – Where gates are installed in jackal proof fencing, a suitable reinforced concrete sill must be provided beneath the gate; – Original tension must be maintained in the fence wires; – All gates installed in electrified fencing must be re-electrified; – All demarcation fencing and barriers must be maintained in good working order for the duration of the development activities;	**Contractor and Applicant**	**Implementation of the mitigation measures**	**Ongoing.**	**ECO**	**Monthly**	**Site observation; public complaints register**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Fencing must be erected around the camp, batching plants, hazardous storage areas, and all designated access restricted areas, where applicable; – Any temporary fencing to restrict the movement of life-stock must only be erected with the permission of the land owner. – All fencing must be developed of high quality material bearing the SABS mark; – The use of razor wire as fencing must be avoided; – Fenced areas with gate access must remain locked after hours, during weekends and on holidays if staff is away from site. Site security will be required at all times; – On completion of the development phase all temporary fences are to be removed; – The contractor must ensure that all fence uprights are appropriately removed, ensuring that no uprights are cut at ground level but rather removed completely.						

5.6 *Water Supply Management*

Impact management outcome: Undertake responsible water usage.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All abstraction points or bore holes must be registered with the DWS and suitable water meters installed to ensure that the abstracted volumes are measured on a daily basis; – The Contractor must ensure the following: a. The vehicle abstracting water from a river does not enter or cross it and does not operate from within the river; b. No damage occurs to the river bed or banks and that the abstraction of water does not entail stream diversion activities; and c. All reasonable measures to limit pollution or sedimentation of the downstream watercourse are implemented. – Ensure water conservation is being practiced by: a. Minimising water use during cleaning of equipment; b. Undertaking regular audits of water systems; and c. Including a discussion on water usage and conservation during environmental awareness training. d. The use of grey water is encouraged.	**Contractor and Applicant**	**Application to DWS where applicable. Implementation of mitigation measures**	**Construction**	**ECO**	**Monthly**	**Proof of water source used; submission of above proof to DWS**

5.7 Storm and waste water management

Impact management outcome: Impacts to the environment caused by storm water and wastewater discharges during construction are avoided.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Runoff from the cement/ concrete batching areas must be strictly controlled, and contaminated water must be collected, stored and either treated or disposed of off-site, at a location approved by the project manager; – All spillage of oil onto concrete surfaces must be controlled by the use of an approved absorbent material and the used absorbent material disposed of at an appropriate waste disposal facility; – Natural storm water runoff not contaminated during the development and clean water can be discharged directly to watercourses and water bodies, subject to the Project Manager's approval and support by the ECO; – Water that has been contaminated with suspended solids, such as soils and silt, may be released into watercourses or water bodies only once all suspended solids have been removed from the water by settling out these solids in settlement ponds. The release of settled water back into the environment must be subject to the Project Manager's approval and support by the ECO.	**Contractor**	**Employ methods to prevent water pollution**	**Construction**	**ECO**	**Weekly**	**Inspection of areas where construction takes place near watercourses**

5.8 Solid and hazardous waste management

Impact management outcome: Wastes are appropriately stored, handled and safely disposed of at a recognised waste facility**.**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All measures regarding waste management must be undertaken using an integrated waste management approach; – Sufficient, covered waste collection bins (scavenger and weatherproof) must be provided; – A suitably positioned and clearly demarcated waste collection site must be identified and provided; – The waste collection site must be maintained in a clean and orderly manner; – Waste must be segregated into separate bins and clearly marked for each waste type for recycling and safe disposal; – Staff must be trained in waste segregation; – Bins must be emptied regularly; – General waste produced onsite must be disposed of at registered waste disposal sites/ recycling company; – Hazardous waste must be disposed of at a registered waste disposal site; – Certificates of safe disposal for general, hazardous and recycled waste must be maintained.	**Contractor**	**Following good waste management practices outlined in approved method statement**	**Construction**	**ECO**	**Weekly**	**Waste safe disposal slips; Service Level Agreements**

5.9 Protection of watercourses and estuaries

Impact management outcome: Pollution and contamination of the watercourse environment and or estuary erosion are prevented.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All watercourses must be protected from direct or indirect spills of pollutants such as solid waste, sewage, cement, oils, fuels, chemicals, aggregate tailings, wash and contaminated water or organic material resulting from the Contractor's activities; – In the event of a spill, prompt action must be taken to clear the polluted or affected areas; – Where possible, no development equipment must traverse any seasonal or permanent wetland – No return flow into the estuaries must be allowed and no disturbance of the Estuarine functional Zone should occur; – Development of permanent watercourse or estuary crossing must only be undertaken where no alternative access to tower position is available; – There must not be any impact on the long term morphological dynamics of watercourses or estuaries; – Existing crossing points must be favored over the creation of new crossings (including temporary access) – When working in or near any watercourse or estuary, the following environmental controls and consideration must be taken: a) Water levels during the period of construction;	**Contractor**	**Method statements; Stormwater Management Plan**	**Construction**	**ECO**	**Weekly**	**Method Statement compliance**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
No altering of the bed, banks, course or characteristics of a watercourse b) During the execution of the works, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented e.g. including ensuring that construction equipment is well maintained; c) Where earthwork is being undertaken in close proximity to any watercourse, slopes must be stabilised using suitable materials, i.e. sandbags or geotextile fabric, to prevent sand and rock from entering the channel; and d) Appropriate rehabilitation and re-vegetation measures for the watercourse banks must be implemented timeously. In this regard, the banks should be appropriately and incrementally stabilised as soon as development allows.						

5.10 Vegetation clearing

Impact management outcome: Vegetation clearing is restricted to the authorised development footprint of the proposed infrastructure.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
General: – Indigenous vegetation which does not interfere with the development must be left undisturbed; – Protected or endangered species may occur on or near the development site. Special care should be taken not to damage such species; – Search, rescue and replanting of all protected and endangered species likely to be damaged during project development must be identified by the relevant specialist and completed prior to any development or clearing; – Permits for removal must be obtained from the relevant CA prior to the cutting or clearing of the affected species, and they must be filed; – The Environmental Audit Report must confirm that all identified species have been rescued and replanted and that the location of replanting is compliant with conditions of approvals; – Trees felled due to construction must be documented and form part of the Environmental Audit Report; – Rivers and watercourses must be kept clear of felled trees, vegetation cuttings and debris;	**Contractor and Applicant**	**Specialist recommendations; Method statement; Search and Rescue Plan; Alien vegetation removal Plan (approved plans and strategies used by Eskom), site awareness**	**Pre-Construction and Construction and Operation**	**ECO**	**Pre-Construction and weekly during construction**	**Compliance to method statements and Search and Rescue Plan; Alien vegetation removal Plan. Approved plans and strategies used by Eskom.**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Only a registered pest control operator may apply herbicides on a commercial basis and commercial application must be carried out under the supervision of a registered pest control operator, supervision of a registered pest control operator or is appropriately trained; – A daily register must be kept of all relevant details of herbicide usage; – No herbicides must be used in estuaries; – All protected species and sensitive vegetation not removed must be clearly marked and such areas fenced off in accordance to ***Section 5.3: Access restricted areas***. Alien invasive vegetation must be removed and disposed of at a licensed waste management facility.						

5.11 Protection of fauna

Impact management outcome: Disturbance to fauna is minimised.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– No interference with livestock must occur without the landowner's written consent and with the landowner or a person representing the landowner being present;	**Contractor**	**Method statement and adherence to**	**Construction**	**ECO**	**Weekly**	**Public complaints register;**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The breeding sites of raptors and other wild birds species must be taken into consideration during the planning of the development programme; – Breeding sites must be kept intact and disturbance to breeding birds must be avoided. Special care must be taken where nestlings or fledglings are present; – Special recommendations of the avian specialist must be adhered to at all times to prevent unnecessary disturbance of birds; – No poaching must be tolerated under any circumstances. All animal dens in close proximity to the works areas must be marked as Access restricted areas; – No deliberate or intentional killing of fauna is allowed; – In areas where snakes are abundant, snake deterrents to be deployed on the pylons to prevent snakes climbing up, being electrocuted and causing power outages; and – No Threatened or Protected species (ToPs) and/or protected fauna as listed according NEMBA (Act No. 10 of 2004) and relevant provincial ordinances may be removed and/or relocated without appropriate authorisations/permits.		**exclusion/no-go zones; site awareness**				**adherence to exclusion/no-go zones and method statements**

5.12 Protection of heritage resources

Impact management outcome: Impact to heritage resources is minimised.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identify, demarcate and prevent impact to all known sensitive heritage features on site in accordance with the No- Go procedure in ***Section 5.3: Access restricted areas***; – Carry out general monitoring of excavations for potential fossils, artefacts and material of heritage importance; – All work must cease immediately, if any human remains and/or other archaeological, palaeontological and historical material are uncovered. Such material, if exposed, must be reported to the nearest museum, archaeologist/ palaeontologist (or the South African Police Services), so that a systematic and professional investigation can be undertaken. Sufficient time must be allowed to remove/collect such material before development recommences.	**Contractor**	**Method Statement; Heritage management plan**	**Pre-construction and construction**	**ECO**	**Weekly and daily for zones highlighted by Heritage Specialist where potsherds were found**	**Monitoring of construction areas, adherence to management plan if change finds found.**

5.13 Safety of the public

Impact management outcome: All precautions are taken to minimise the risk of injury, harm or complaints.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identify fire hazards, demarcate and restrict public access to these areas as well as notify the local authority of any potential threats e.g. large brush stockpiles, fuels etc.; – All unattended open excavations must be adequately fenced or demarcated; – Adequate protective measures must be implemented to prevent unauthorised access to and climbing of partly constructed towers and protective scaffolding; – Ensure structures vulnerable to high winds are secured; – Maintain an incidents and complaints register in which all incidents or complaints involving the public are logged.	**Contractor**	**Landowner agreements; Method Statement**	**Construction**	**ECO**	**Weekly**	**Site works barricaded, safe working site maintained, public complaints register.**

5.14 Sanitation

Impact management outcome: Clean and well maintained toilet facilities are available to all staff in an effort to minimise the risk of disease and impact to the environment.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Mobile chemical toilets are installed onsite if no other ablution facilities are available; – The use of ablution facilities and or mobile toilets must be used at all times and no indiscriminate use of the veld for the purposes of ablutions must be permitted under any circumstances; – Where mobile chemical toilets are required, the following must be ensured: a) Toilets are located no closer than 100 m to any watercourse or water body; b) Toilets are secured to the ground to prevent them from toppling due to wind or any other cause; c) No spillage occurs when the toilets are cleaned or emptied and the contents are managed in accordance with the EMPr; d) Toilets have an external closing mechanism and are closed and secured from the outside when not in use to prevent toilet paper from being blown out; e) Toilets are emptied before long weekends and workers holidays, and must be locked after working hours; f) Toilets are serviced regularly and the ECO must inspect toilets to ensure compliance to health standards; – A copy of the waste disposal certificates must be maintained.	**Contractor**	**Service level agreement with Service provider; Method statement; site awareness**	**Construction**	**ECO**	**Weekly**	**Service level agreement with service provider, proof of safe disposal of waste**

5.15 Prevention of disease

Impact Management outcome: All necessary precautions linked to the spread of disease are taken.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Undertake environmentally-friendly pest control in the camp area; – Ensure that the workforce is sensitised to the effects of sexually transmitted diseases, especially HIV AIDS; – The Contractor must ensure that information posters on AIDS are displayed in the Contractor Camp area; – Information and education relating to sexually transmitted diseases to be made available to both construction workers and local community, where applicable; – Free condoms must be made available to all staff on site at central points; – Medical support must be made available; – Provide access to Voluntary HIV Testing and Counselling Services.	**Contractor**	**Method statement, awareness training**	**Construction**	**ECO**	**Monthly**	**Method statement, proof of awareness training**

5.16 Emergency procedures

Impact management outcome: Emergency procedures are in place to enable a rapid and effective response to all types of environmental emergencies.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Compile an Emergency Response Action Plan (ERAP) prior to the commencement of the proposed project; – The Emergency Plan must deal with accidents, potential spillages and fires in line with relevant legislation; – All staff must be made aware of emergency procedures as part of environmental awareness training; – The relevant local authority must be made aware of a fire as soon as it starts; – In the event of emergency necessary mitigation measures to contain the spill or leak must be implemented (see ***Hazardous Substances section 5.17***).	**Contractor**	**Environmental Emergency Response Action Plan**	**Construction**	**ECO**	**Monthly**	**Adherence /compliance to ERAP**

5.17 Hazardous substances

Impact management outcome: Safe storage, handling, use and disposal of hazardous substances.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The use and storage of hazardous substances to be minimised and non-hazardous and non-toxic alternatives substituted where possible; – All hazardous substances must be stored in suitable containers as defined in the Method Statement; – Containers must be clearly marked to indicate contents, quantities and safety requirements; – All storage areas must be bunded. The bunded area must be of sufficient capacity to contain a spill / leak from the stored containers; – Bunded areas to be suitably lined with a SABS approved liner; – An Alphabetical Hazardous Chemical Substance (HCS) control sheet must be drawn up and kept up to date on a continuous basis; – All hazardous chemicals that will be used on site must have Material Safety Data Sheets (MSDS); – All employees working with HCS must be trained in the safe use of the substance and according to the safety data sheet; – Employees handling hazardous substances / materials must be aware of the potential impacts and follow appropriate safety measures. Appropriate personal protective equipment must be made available;	**Contractor**	**Method Statement, OHS requirements; adequate and responsible use and storage of Hazardous Substances, Hazardous Substances storage register**	**Construction**	**ECO**	**Weekly**	**Hazardous Substance Storage Register, MSDS, Method Statement**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The Contractor must ensure that diesel and other liquid fuel, oil and hydraulic fluid is stored in appropriate storage tanks or in bowsers; – The tanks/ bowsers must be situated on a smooth impermeable surface (concrete) with a permanent bund. The impermeable lining must extend to the crest of the bund and the volume inside the bund must be 110% of the total capacity of all the storage tanks/ bowsers; – The floor of the bund must be sloped, draining to an oil separator; – Provision must be made for refueling at the storage area by protecting the soil with an impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained; – All empty externally dirty drums must be stored on a drip tray or within a bunded area; – No unauthorised access into the hazardous substances storage areas must be permitted; – No smoking must be allowed within the vicinity of the hazardous storage areas; – Adequate fire-fighting equipment must be made available at all hazardous storage areas; – Where refueling away from the dedicated refueling station is required, a mobile refueling unit must be used. Appropriate ground protection such as drip trays must be used;						

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– An appropriately sized spill kit kept onsite relevant to the scale of the activity/s involving the use of hazardous substance must be available at all times; – The responsible operator must have the required training to make use of the spill kit in emergency situations; – An appropriate number of spill kits must be available and must be located in all areas where activities are being undertaken; – In the event of a spill, contaminated soil must be collected in containers and stored in a central location and disposed of according to the National Environmental Management: Waste Act 59 of 2008. Refer to ***Section 5.7*** for procedures concerning ***storm and waste water management*** and ***5.8*** for ***solid and hazardous waste management.***						

5.18 Workshop, equipment maintenance and storage

Impact management outcome: Soil, surface water and groundwater contamination is minimised.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Where possible and practical all maintenance of vehicles and equipment must take place in the workshop area; – During servicing of vehicles or equipment, especially where emergency repairs are effected outside the workshop area, a suitable drip tray must be used to prevent spills onto the soil. The relevant local authority must be made aware of a fire as soon as it starts; – Leaking equipment must be repaired immediately or be removed from site to facilitate repair; – Workshop areas must be monitored for oil and fuel spills; – Appropriately sized spill kit kept onsite relevant to the scale of the activity taking place must be available; – The workshop area must have a bunded concrete slab that is sloped to facilitate runoff into a collection sump or suitable oil / water separator where maintenance work on vehicles and equipment can be performed; – Water drainage from the workshop must be contained and managed in accordance Section ***5.7: Storm and waste water management***.	**Contractor**	**Method Statement, OHS requirements; Hazardous Substances storage register, vehicle daily checklist, vehicle service register**	**Construction**	**ECO**	**Weekly**	**Method Statement, Hazardous Substances storage register, vehicle daily checklist, vehicle service register**

5.19 Batching plants

Impact management outcome: Minimise spillages and contamination of soil, surface water and groundwater**.**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Concrete mixing must be carried out on an impermeable surface; – Batching plants areas must be fitted with a containment facility for the collection of cement laden water. – Dirty water from the batching plant must be contained to prevent soil and groundwater contamination – Bagged cement must be stored in an appropriate facility and at least 10 m away from any water courses, gullies and drains; – A washout facility must be provided for washing of concrete associated equipment. Water used for washing must be restricted; – Hardened concrete from the washout facility or concrete mixer can either be reused or disposed of at an appropriate licenced disposal facility; – Empty cement bags must be secured with adequate binding material if these will be temporarily stored on site; – Sand and aggregates containing cement must be kept damp to prevent the generation of dust (Refer to ***Section 5.20: Dust emissions***) – Any excess sand, stone and cement must be removed or reused from site on completion of construction period and disposed at a registered disposal facility;	**Contractor**	**Method Statement**	**Construction**	**ECO**	**Weekly**	**Compliance to mitigation and method statement**

– Temporary fencing must be erected around batching plants in accordance with Section ***5.5: Fencing and gate installation***.						

5.20 Dust emissions

Impact management outcome: Dust prevention measures are applied to minimise the generation of dust.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Take all reasonable measures to minimise the generation of dust as a result of project development activities to the satisfaction of the ECO; – Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces must be re-vegetated or stabilised as soon as is practically possible; – Excavation, handling and transport of erodible materials must be avoided under high wind conditions or when a visible dust plume is present; – During high wind conditions, the ECO must evaluate the situation and make recommendations as to whether dust- damping measures are adequate, or whether working will cease altogether until the wind speed drops to an acceptable level; – Where possible, soil stockpiles must be located in sheltered areas where they are not exposed to the erosive effects of the wind;	**Contractor**	**Method Statement, Vehicle Speed limit, dust suppression**	**Construction**	**ECO**	**Monthly**	**Site observations, dust suppression register**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Where erosion of stockpiles becomes a problem, erosion control measures must be implemented at the discretion of the ECO; – Vehicle speeds must not exceed 40 km/h along dust roads or 20 km/h when traversing unconsolidated and non-vegetated areas; – Straw stabilisation must be applied at a rate of one bale/10 m² and harrowed into the top 100 mm of top material, for all completed earthworks; – For significant areas of excavation or exposed ground, dust suppression measures must be used to minimise the spread of dust.						

5.21 Blasting

Impact management outcome: Impact to the environment is minimised through a safe blasting practice.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Any blasting activity must be conducted by a suitably licensed blasting contractor; and	**Contractor**	**Relevant legislation and regulation**	**Construction**	**ECO**	**Monthly**	**Public complaints register; proof of**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Notification of surrounding landowners, emergency services site personnel of blasting activity 24 hours prior to such activity taking place on Site.						**registration of blasting contractor.**

5.22 Noise

Impact Management outcome: Prevent unnecessary noise to the environment by ensuring that noise from development activity is mitigated.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The Contractor must keep noise level within acceptable limits, Restrict the use of sound amplification equipment for communication and emergency only; – All vehicles and machinery must be fitted with appropriate silencing technology and must be properly maintained; – Any complaints received by the Contractor regarding noise must be recorded and communicated. Where possible or applicable, provide transport to and from the site on a daily basis for construction workers; – Develop a Code of Conduct for the construction phase in terms of behaviour of construction staff. Operating hours as determined by the environmental authorisation are adhered	**Contractor**	**Restriction of site hours to working hours Monday to Friday**	**Construction**	**ECO**	**Monthly**	**Public Complaints Register**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
to during the development phase. Where not defined, it must be ensured that development activities must still meet the impact management outcome related to noise management.						

5.23 Fire prevention

Impact management outcome: Prevention of uncontrollable fires.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Designate smoking areas where the fire hazard could be regarded as insignificant; – Firefighting equipment must be available on all vehicles located on site; – The local Fire Protection Agency (FPA) must be informed of construction activities; – Contact numbers for the FPA and emergency services must be communicated in environmental awareness training and displayed at a central location on site; – Two-way swop of contact details between ECO and FPA.	**Contractor**	**Emergency Response Action Plan; Method Statement**	**Construction**	**ECO**	**Monthly**	**Public complaints register; compliance to ERAP**

5.24 Stockpiling and stockpile areas

Impact management outcome: Reduce erosion and sedimentation as a result of stockpiling.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All material that is excavated during the project development phase (either during piling (if required) or earthworks) must be stored appropriately on site in order to minimise impacts to watercourses, watercourses and water bodies; – All stockpiled material must be maintained and kept clear of weeds and alien vegetation growth by undertaking regular weeding and control methods; – Topsoil stockpiles must not exceed 2 m in height; – During periods of strong winds and heavy rain, the stockpiles must be covered with appropriate material (e.g. cloth, tarpaulin etc.); – Where possible, sandbags (or similar) must be placed at the bases of the stockpiled material in order to prevent erosion of the material.	**Contractor**	**Method Statement**	**Construction**	**ECO**	**Monthly**	**Method Statement and site observations**

5.25 Civil works

Impact management outcome: Impact to the environment minimised during civil works to create the substation terrace.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Where terracing is required, topsoil must be collected and retained for the purpose of re-use later to rehabilitate disturbed areas not covered by yard stone; – Areas to be rehabilitated include terrace embankments and areas outside the high voltage yards; – Where required, all sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled; – These areas can be stabilised using design structures or vegetation as specified in the design to prevent erosion of embankments. The contract design specifications must be adhered to and implemented strictly; – Rehabilitation of the disturbed areas must be managed in accordance with ***Section 5.35: Landscaping and rehabilitation***; – All excess spoil generated during terracing activities must be disposed of in an appropriate manner and at a recognised landfill site; and – Spoil can however be used for landscaping purposes and must be covered with a layer of 150 mm topsoil for rehabilitation purposes.	**Contractor**	**Method Statement**	**Construction**	**ECO**	**Monthly**	**Site observation**

5.26 *Excavation of foundation, cable trenching and drainage systems*

Impact management outcome: No environmental degradation occurs as a result of excavation of foundation, cable trenching and drainage systems.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All excess spoil generated during foundation excavation must be disposed of in an appropriate manner and at a licensed landfill site, if not used for backfilling purposes; – Spoil can however be used for landscaping purposes and must be covered with a layer of 150 mm topsoil for rehabilitation purposes; – Management of equipment for excavation purposes must be undertaken in accordance with ***Section 5.18: Workshop, equipment maintenance and storage***; and – Hazardous substances spills from equipment must be managed in accordance with ***Section 5.17: Hazardous substances***.	**Contractor**	**Method Statement and Engineering Drawings**	**Construction**	**ECO**	**Weekly**	**Adherence to method statements**

5.27 Installation of foundations, cable trenching and drainage systems

Impact management outcome: No environmental degradation occurs during the installation of foundation, cable trenching and drainage system.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Batching of cement to be undertaken in accordance with **Section *5.19: Batching plants***; and – Residual solid waste must be disposed of in accordance with ***Section 5.8: Solid waste and hazardous management***.	**Contractor**	**Method Statement**	**Construction**	**Contractor and ECO**	**Weekly**	**Method Statement and site observations**

5.28 Installation of equipment (circuit breakers, current Transformers, Isolators, Insulators, surge arresters, voltage transformers, earth switches)

Impact management outcome: No environmental degradation occurs as a result of installation of equipment.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Management of dust must be conducted in accordance with Section ***5. 20: Dust emissions***; – Management of equipment used for installation must be conducted in accordance with Section ***5.18: Workshop, equipment maintenance and storage***; – Management hazardous substances and any associated spills must be conducted in accordance with Section ***5.17: Hazardous substances***; and	**Contractor**	**Method Statement**	**Construction**	**ECO**	**Weekly**	**Method Statement and site observation**

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Residual solid waste must be recycled or disposed of in accordance with ***Section 5.8: Solid waste and hazardous management***.						

5.29 Steelwork Assembly and Erection

Impact management outcome: No environmental degradation occurs as a result of steelwork assembly and erection.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– During assembly, care must be taken to ensure that no wasted/unused materials are left on site e.g. bolts and nuts – Emergency repairs due to breakages of equipment must be managed in accordance with ***Section 5. 18: Workshop, equipment maintenance and storage*** and ***Section 5.16: Emergency procedures***.	**Contractor**	**Method Statement**	**Construction**	**ECO**	**Weekly**	**Site Observations**

5.30 Cabling and Stringing

Impact management outcome: No environmental degradation occurs as a result of stringing.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Residual solid waste (off cuts etc.) shall be recycled or disposed of in accordance with **Section 6.8: *Solid waste and hazardous Management***; – Management of equipment used for installation shall be conducted in accordance with **Section 5.18: *Workshop, equipment maintenance and storage***; – Management hazardous substances and any associated spills shall be conducted in accordance with ***Section 5.17: Hazardous substances***.	**Contractor**	**Method Statement, adherence to exclusion zones**	**Construction**	**ECO**	**Weekly**	**Site observations**

5.31 *Testing and Commissioning (all equipment testing, earthing system, system integration)*

Impact management outcome: No environmental degradation occurs as a result of Testing and Commissioning.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Residual solid waste must be recycled or disposed of in accordance with ***Section 5.8: Solid waste and hazardous management***.	**Contractor**	**Method Statement**	**Construction**	**ECO**	**Weekly**	**Site observation**

5.32 *Socio-economic*

Impact management outcome: enhanced socio-economic development.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Develop and implement communication strategies to facilitate public participation; – Develop and implement a collaborative and constructive approach to conflict resolution as part of the external stakeholder engagement process; – Sustain continuous communication and liaison with neighboring owners and residents	**Contractor**	**Landowner Agreements; Issues and Complaints Register**	**Construction**	**ECO**	**Monthly**	**Landowner Agreement; Issues and Complaints Register**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Create work and training opportunities for local stakeholders; and – Where feasible, no workers, with the exception of security personnel, must be permitted to stay over-night on the site. This would reduce the risk to local farmers.						

5.33 Temporary closure of site

Impact management outcome: Minimise the risk of environmental impact during periods of site closure greater than five days.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Bunds must be emptied (where applicable) and need to be undertaken in accordance with the impact management actions included in ***sections 5.17: Hazardous substances and 5.18: Workshop, equipment maintenance and storage***; – Hazardous storage areas must be well ventilated; – Fire extinguishers must be serviced and accessible. Service records to be filed and audited at last service; – Emergency and contact details displayed must be displayed; – Security personnel must be briefed and have the facilities to contact or be contacted by relevant management and emergency personnel;	**Contractor**	**Method statement**	**Construction – when applicable**	**ECO**	**Monthly – when applicabl e**	**Method statement** **ECO reports**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Night hazards such as reflectors, lighting, traffic signage etc. must have been checked; – Fire hazards identified and the local authority must have been notified of any potential threats e.g. large brush stockpiles, fuels etc.; – Structures vulnerable to high winds must be secured; – Wind and dust mitigation must be implemented; – Cement and materials stores must have been secured; – Toilets must have been emptied and secured; – Refuse bins must have been emptied and secured; – Drip trays must have been emptied and secured.						

5.34 Dismantling of old equipment

Impact management outcome: Impact to the environment to be minimised during the dismantling, storage and disposal of old equipment commissioning.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All old equipment removed during the project must be stored in such a way as to prevent pollution of the environment; – Oil containing equipment must be stored to prevent leaking or be stored on drip trays;	**Contractor**	**Method statement**	**Construction and decommissioning**	**ECO**	**Monthly – when applicabl e**	**Site observation**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All scrap steel must be stacked neatly and any disused and broken insulators must be stored in containers; – Once material has been scrapped and the contract has been placed for removal, the disposal Contractor must ensure that any equipment containing pollution causing substances is dismantled and transported in such a way as to prevent spillage and pollution of the environment; – The Contractor must also be equipped to contain and clean up any pollution causing spills; and – Disposal of unusable material must be at a licensed waste disposal site.						

5.35 Landscaping and rehabilitation

Impact management outcome: Areas disturbed during the development phase are returned to a state that approximates the original condition.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All areas disturbed by construction activities must be subject to landscaping and rehabilitation; All spoil and waste must be disposed of to a registered waste site;	**Contractor**	**Method Statements; erosion protection; alien eradication plan**	**Concurrent with Construction**	**ECO**	**Monthly**	**Adequately revegetate d work areas; no erosion or**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All slopes must be assessed for contouring, and to contour only when the need is identified in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983 – All slopes must be assessed for terracing, and to terrace only when the need is identified in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983; – Berms that have been created must have a slope of 1:4 and be replanted with indigenous species and grasses that approximates the original condition; – Where new access roads have crossed cultivated farmlands, that lands must be rehabilitated by ripping which must be agreed to by the holder of the EA and the landowners; – Rehabilitation of access roads outside of farmland; – Indigenous species must be used for with species and/grasses to where it compliments or approximates the original condition; – Stockpiled topsoil must be used for rehabilitation (refer to ***Section 5.24: Stockpiling and stockpiled areas***); – Stockpiled topsoil must be evenly spread so as to facilitate seeding and minimise loss of soil due to erosion; – Before placing topsoil, all visible weeds from the placement area and from the topsoil must be removed; – Subsoil must be ripped before topsoil is placed; – The rehabilitation must be timed so that rehabilitation can take place at the optimal time for vegetation establishment;						**invasive plant species**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Where impacted through construction related activity, all sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled; – Sloped areas stabilised using design structures or vegetation as specified in the design to prevent erosion of embankments. The contract design specifications must be adhered to and implemented strictly; – Spoil can be used for backfilling or landscaping as long as it is covered by a minimum of 150 mm of topsoil. – Where required, re-vegetation including hydro-seeding can be enhanced using a vegetation seed mixture as described below. A mixture of seed can be used provided the mixture is carefully selected to ensure the following: a) Annual and perennial plants are chosen; b) Pioneer species are included; c) Species chosen must be indigenous to the area with the seeds used coming from the area; d) Root systems must have a binding effect on the soil; e) The final product must not cause an ecological imbalance in the area						

6 ACCESS TO THE GENERIC EMPr

Once completed and signed, to allow the public access to the generic EMPr, the holder of the EA must make the EMPr available to the public in accordance with the requirements of Regulation 26(h) of the EIA Regulations.

PART B: SECTION 2

7 SITE SPECIFIC INFORMATION AND DECLARATION

6.1 Sub-section 1: contact details and description of the project

6.1.1 Details of the applicant: Emvelo Wind Energy Facility (PTY) LTD

Name of applicant: **Mulilo Energy Holdings (PTY) LTD**

Tel No: **(+27) 21 685 3240**

Fax No: **N/A**

Postal Address: **Portside, 5 Buitengracht Street, Cape Town, Western Cape, 8001**

Physical Address: **Same as above**

6.1.2 Details and expertise of the EAP:

Name of applicant: **Environmental Resource Management Southern Africa (Pty) Ltd**

Tel No: **+27105963502**

Fax No: **N/A**

E-mail address: stephanie.gopaul@erm.com / erm.arcusamsterdam@erm.com

Expertise of the EAP (Curriculum Vitae included): Masters in Environmental Management, University of the Free State, South Africa, 2012 BSc. Environmental and Engineering Geology, University of KwaZulu Natal, South Africa, 2005

6.1.3 Project name:

Mulilo Amsterdam Emvelo Wind Energy Facility and associated infrastructure , including a Grid Connection located in the Msukaligwa Local Municipality, and Gert Sibande District Municipality, Mpumalanga Province

6.1.4 Description of the project:

Mulilo Amsterdam Emvelo Wind Energy Facility (Pty) Ltd proposes the establishment of a Wind Energy facility (WEF), including associated infrastructure and a grid connection ('the WEF and associated infrastructure'), near the town of Ermelo, in the Mpumalanga Province. The WEF and associated infrastructure are situated approximately 30 km east of Ermelo.

The WEF will comprise 24 wind turbines and will have a contracted capacity of up to 260 MW. The WEF and associated infrastructure will connect to the future planned collector / switching station and an up to 132 kV powerline of approximately 30 km to connect to the ESKOM Uitkoms Substation. A separate environmental process is being undertaken to assess the collector / switching station and its connection to the national grid.

The WEF is located the Msukaligwa Local Municipality and Gert Sibande District Municipality, Mpumalange Province.

The project is planned as part of a larger cluster, which includes one additional WEF facility (Sheepmoor WEF Facility) up to 260 MW. An assessment area of approximately 185 ha is being assessed as part of this S&EIA process and the infrastructure associated with the facility includes:

- **Up to 24 wind turbines, with a maximum hub height of up to 150 m and a rotor diameter of up to 220 m;**
- **Temporary laydown areas which will accommodate the crane platforms and hardstand laydown area;**

- Cabling between the turbines, to be laid underground where practical and feasible;
- One on-site substation with capacity of up to 132 kV to facilitate the connection between the WEF and the electricity grid;
- 132 kV over-head powerline of approximately 30 km (300 m corridor);
- Internal roads (existing roads will be upgraded wherever possible);
- A temporary site camp establishment and concrete batching;
- Operation and Maintenance (O&M) buildings; and
- Total permanent development footprint of up to 185 ha after rehabilitation.

6.1.5 Project location:

Proposed Emvelo WEF Site Boundary and Associated Infrastructure		
Aspect	**Longitude**	**Latitude**
WEF Site Boundary		
Reference Point 1	030° 18' 28.77" E	26° 30' 22.16" S
Reference Point 2	030° 20' 52.66" E	26° 31' 30.0" S
Reference Point 3	030° 19' 42.69" E	26° 34' 7.64" S
Reference Point 4	030° 17' 24.78" E	26° 33' 23.58" S
Reference Point 5	030° 20' 21.49" E	26° 34' 18.86" S
Reference Point 6	030° 21' 39.3" E	26° 37' 27.32" S
Reference Point 7	030° 23' 1.11" E	26° 36' 14.19" S
Reference Point 8	030° 18' 31.04" E	26° 36' 40.53" S
O&M Facilities		
Northeast Corner	030° 20' 48.37" E	26° 36' 43.14" S
Southeast Corner	030° 20' 47.59" E	26° 36' 45.55" S
Southwest Corner	030° 20' 41.77" E	26° 36' 43.79" S
Northwest Corner	030° 20' 42.7" E	26° 36' 41.28" S
Substations		
Southeast Corner	030° 20' 55.1" E	26° 35' 17.25" S
Southwest Corner	030° 20' 52.19" E	26° 35' 16.29" S
Northwest Corner	030° 20' 52.74" E	26° 35' 12.9" S
Northeast Corner	030° 20' 56.07" E	26° 35' 13.27" S

Proposed Emvelo WEF Site Boundary and Associated Infrastructure		
Tower Laydown Areas		
Northeast Corner	030° 18' 43.39" E	26° 31' 33.82" S
Southeast Corner	030° 18' 38.76" E	26° 31' 41.13" S
Southwest Corner	030° 18' 30.96" E	26° 31' 38.07" S
Northwest Corner	030° 18' 34.33" E	26° 31' 31.28" S

7.16 Preliminary technical specification of the overhead transmission and distribution:

WEF Technical Details Components	Description/Dimensions - Emvelo
Maximum Generation Capacity	Up to 260MW
Type of technology	Onshore Wind
Number of Turbines	Up to 24
WTG Hub Height from ground level	Up to 150 m
Blade Length	Up to 110 m
Rotor Diameter	Up to 220 m
Structure height (Tip Height)	Up to 260 m
Structure orientation	Wind regime dependent
Area occupied by both permanent and construction laydown areas	Total permanent development footprint of up to 185 ha after rehabilitation
O&M building with parking area	Up to 1 ha
Site Access	Locality to be confirmed. Total width up to 15 m (12 m after rehabilitation) consisting of up to 3m width for underground 33 kV reticulation.
Area occupied by inverter transformer stations/substations	Up to 2.5 ha
Capacity of on-site substation	Up to 132 kV
Battery Energy Storage System footprint	Included in the project scope (specific footprint to be determined during the design phase)
Width of internal roads	Up to 15 m to be rehabilitated to up to 12 m.
Proximity to grid connection	Approximately 30 km

WEF Technical Details Components	Description/Dimensions - Emvelo
Internal Cabling	Cabling between the turbines, to be laid underground where technically practical.
Height of fencing	2.8 m

6.2 Sub-section 2: Development footprint site map

This sub-section must include a map of the site sensitivity overlaid with the preliminary infrastructure layout. The sensitivity map must be prepared from the national web based environmental screening tool, when available for compulsory use at: https://screening.environment.gov.za/screeningtool. The sensitivity map shall identify the nature of each sensitive feature e.g. raptor nest, threatened plant species, archaeological site, etc. Sensitivity maps shall identify features both within the planned working area and any known sensitive features in the surrounding landscape. The overhead transmission and distribution profile shall be illustrated at an appropriate resolution to enable fine scale interrogation. It is recommended that <20 km of overhead transmission and distribution length is illustrated per page in A3 landscape format. Where considered appropriate, photographs of sensitive features in the context of tower positions shall be used.

Figure 0-1 Site Development Plan

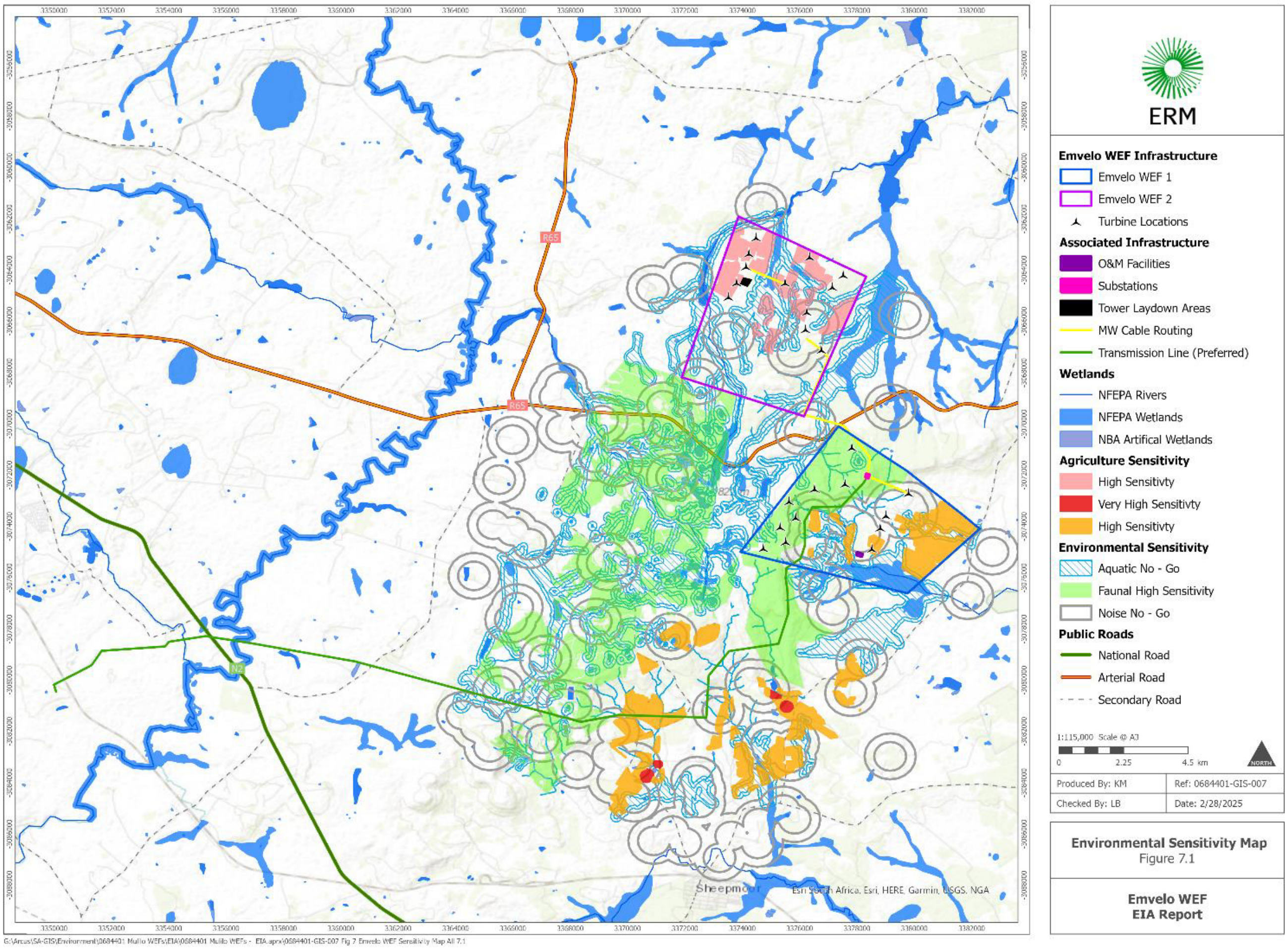


Figure 0-2 Environmental Sensitivity Overlay

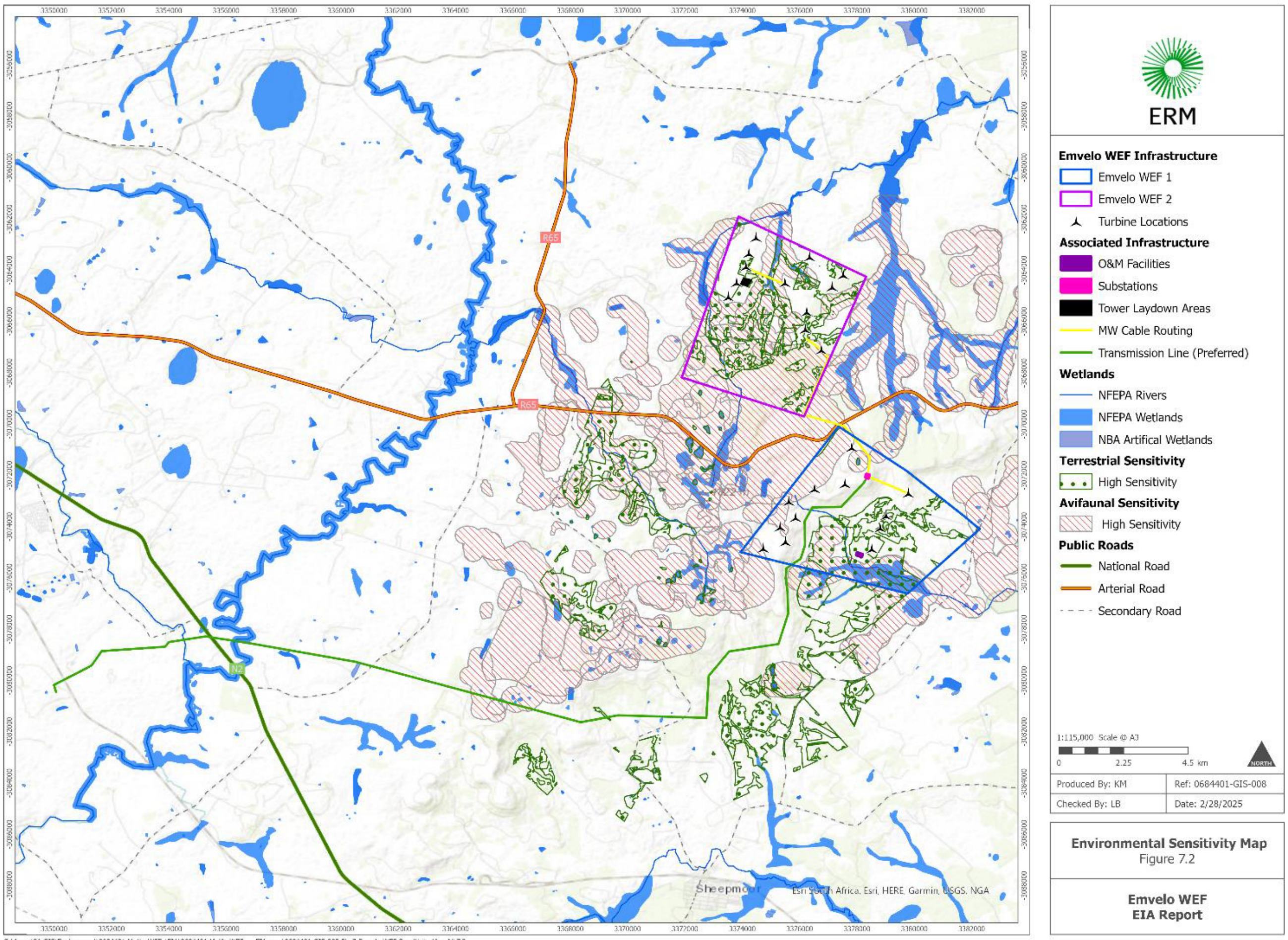
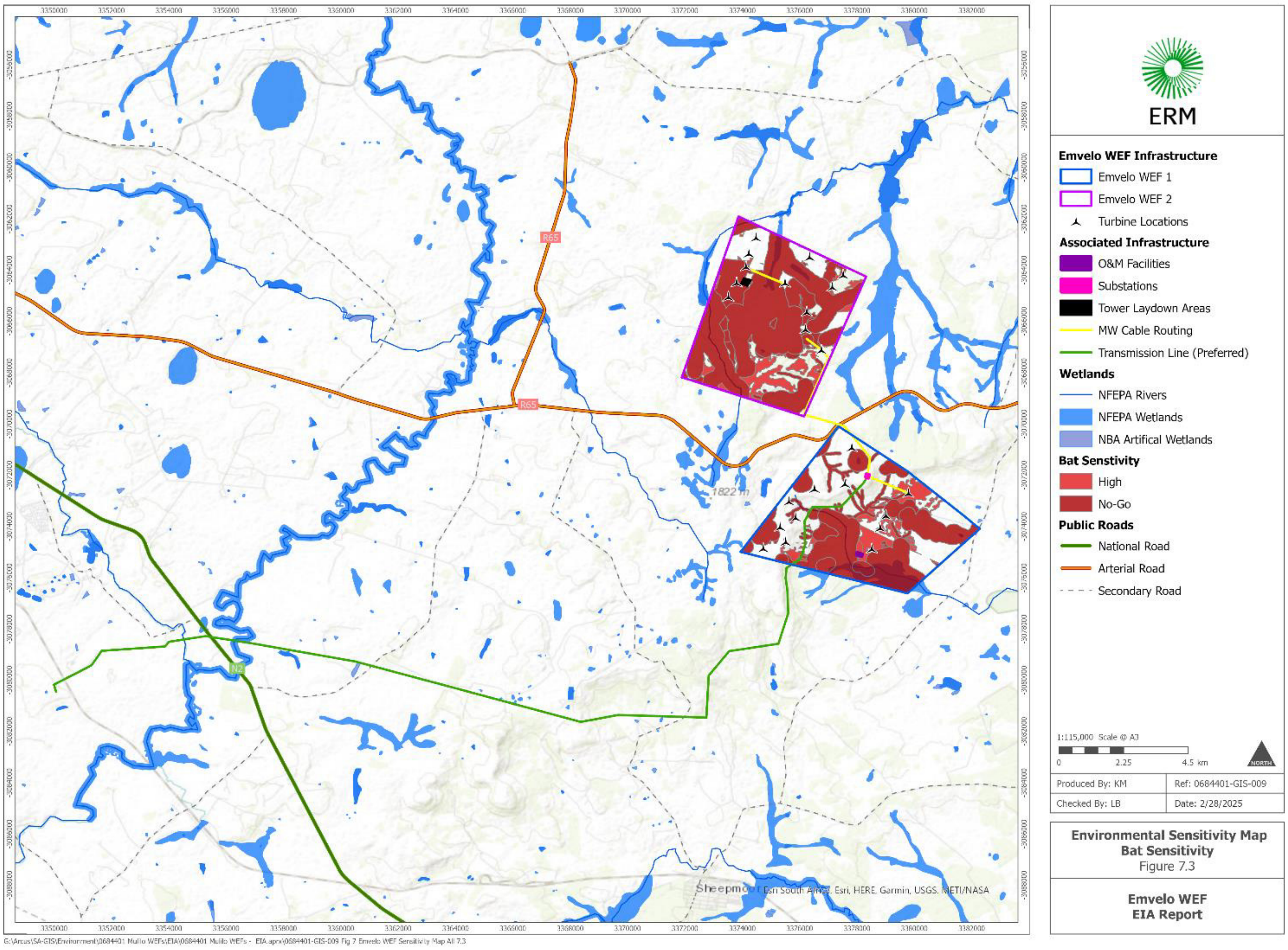


Figure 0-3 Bat Sensitivity Overlay



6.3 Sub-section 3: Declaration

The proponent/applicant or holder of the EA affirms that he/she will abide and comply with the prescribed impact management outcomes and impact management actions as stipulated in part B: section 1 of the generic EMPr and have the understanding that the impact management outcomes and impact management actions are legally binding. The proponent/applicant or holder of the EA affirms that he/she will provide written notice to the CA 14 days prior to the date on which the activity will commence of commencement of construction to facilitate compliance inspections.

Signature Proponent/applicant/ holder of EA   Date:

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6.4 Sub-section 4: amendments to site specific information (Part B; section 2)

Should the EA be transferred to a new holder, Part B: Section 2 must be completed by the new holder and submitted with the application for an amendment of the EA in terms of Regulations 29 or 31 of the EIA Regulations, whichever applies. The information submitted for an amendment to an environmental authorisation will be considered to be incomplete should a signed copy of Part B: Section 2 not be submitted. Once approved, Part B: Section 2 forms part of the EMPr for the development and the EMPr becomes legally binding to the new EA holder.

PART C

7 SITE SPECIFIC ENVIRONMENTAL ATTRIBUTES

If any specific environmental sensitivities/attributes are present on the site which require more specific impact management outcomes and impact management actions, not included in the pre-approved generic EMPr template, to manage impacts, those impact management outcomes and actions must be included in this section. These specific management controls must be referenced spatially, and must include impact management outcomes and impact management actions. The management controls including impact management outcomes and impact management actions must be presented in the format of the pre-approved generic EMPr template. This applies only to additional impact management outcomes and impact management actions that are necessary.

If Part C is applicable to the development as authorised in the EA, it is required to be submitted to the CA together with the BAR or EIAR, for consideration of, and decision on, the application for EA. The information in this section must be prepared by an EAP and the name and expertise of the EAP, including the curriculum vitae are to be included. Once approved, Part C forms part of the EMPr for the site and is legally binding.

This section will **not be required** should the site contain no specific environmental sensitivities or attributes.

The following specialist studies were undertaken as part of this project:

- Avifauna Impact Assessment (incl. pre-construction monitoring);
- Biodiversity Impact Assessment;
- Soil and Agricultural Impact Assessment;
- Heritage Impact Assessment (including Palaeontology, Archaeology & Cultural Landscape);
- Social Impact Assessment;
- Transportation Impact Assessment; and
- Visual Impact Assessment;
- Bat Impact Assessment;
- Environmental Noise Impact Assessment;
- Aquatic Assessment.
- Faunal Assessment

The specific mitigation measures provide by the Specialists through the Impact Assessment process are included below.

Pre-construction walk-through of the approved development footprint will be conducted to ensure that sensitive habitats and species are avoided where possible.

Specific Mitigations and Recommendations included in EAIr:

Soil, Land use and Agricultural Potential

Generic mitigation measures that are effective in preventing soil degradation are all inherent in the engineering of such a project and/or are standard, best-practice for construction sites.

- A system of storm water management, which will prevent erosion on and downstream of the site, will be an inherent part of the engineering design on site. Any occurrences of erosion must be attended to immediately and the integrity of the erosion control system at that point must be amended to prevent further erosion from occurring there. As part of the system, the integrity of the existing contour bank systems of erosion control on croplands, where they occur on steeper slopes, must be kept intact.
- Any excavations done during the construction phase, in areas that will be re-vegetated at the end of the construction phase, must separate the upper 40 cm of topsoil from the rest of the excavation spoils and store it in a separate stockpile. When the excavation is back-filled, the topsoil must be back-filled last, so that it is at the surface. Topsoil should only be stripped in areas that are excavated. Across the majority of the site, including construction lay down areas, it will be much more effective for rehabilitation, to retain the topsoil in place. If levelling requires significant cutting, topsoil should be temporarily stockpiled and then re-spread after cutting, so that there is a covering of topsoil over the entire cut surface.

Avifauna

It is imperative that the proposed 24-turbine layout be revised to avoid the recommended avifaunal no-go areas and turbine exclusion zones, including the rotor-swept areas. The proposed Emvelo WEF is expected to have high and medium impacts on avifauna pre-mitigation, which must be addressed through appropriate mitigation measures to reduce the impact significance to an overall medium and low risk.

The proposed Emvelo WEF Grid Connection will have a moderate impact significance on avifauna pre-mitigation which, in most instances, could be reduced to an overall low impact significance through the implementation of appropriate mitigation. From an avifaunal perspective, OHL Alternatives 1 and 2 are least preferred as they have the longest span and therefore pose a higher collision risk to birds. The Preferred OHL Alternative is preferred over OHL Alternative 3 as it avoids the 2.5 km No Disturbance Buffer around the Martial Eagle nest (coordinates provided on request).

In conclusion, the proposed WEF development and its associated electrical grid infrastructure is supported by this Specialist, provided that the implementation of mitigation measures as recommended in this report are strictly adhered to.

Freshwater and Wetlands (Aquatics)

During this assessment, several sensitive aquatic habitats were observed and are shown in the maps provided in this report. Noteworthy areas, were then avoided by the required infrastructure, and include the main riverine and wetland systems, while the access roads could will make use of existing roads thus previously disturbed areas.

If this is carried out, then the specialist has no objection to the authorisation of the proposed activities assuming that all mitigations and buffer zones are implemented.

Mitigation should focus on these areas and include measures to halt erosion and rehabilitate habitat in the sections affected by the construction. Without the implementation of mitigation measures, the project has potential to cause a Moderate cumulative impact upon aquatic biodiversity. However, with the adoption of mitigation, the proposed project will have a Low impact upon aquatic biodiversity.

As the proposed activities have the potential to create erosion the following recommendations are reiterated:

- Vegetation clearing should occur in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment, and suitable dust and erosion control mitigation measures should be included in the generic EMPr, if not included already to mitigate.
- All construction materials including fuels and oil should be stored in demarcated areas that are contained within berms / bunds to avoid spread of any contamination / leaks. Washing and cleaning of equipment should also be done in berms or bunds, to trap any cement / hazardous substances and prevent excessive soil erosion. Mechanical plant and bowsers must not be refuelled or serviced within or directly adjacent to any channel. It is therefore suggested that all construction camps, lay down areas, batching plants or areas and any stores should be located more than 50 m from any demarcated watercourses.
- It is also advised that an Environmental Control Officer (ECO), with a good understanding of the local flora be appointed during the construction phase. The ECO should be able to make clear recommendations with regards to the re-vegetation of the newly completed / disturbed areas along aquatic features, using selected species detailed in this report.
- All alien plant re-growth must be monitored and should these alien plants reoccur these plants should be re-eradicated. The scale of the operation does however not warrant the use of a Landscape Architect and / or Landscape Contractor.

It is further recommended from the project onset that all watercourse areas (inclusive of buffers) are included into any existing EMPr as reference, this to ensure a net benefit to the aquatic environment. This should from part of the suggested walk down as part of the final EMP preparation.

Bats

The EIA report assessed impacts to bats that could occur because of the construction, operation and decommission of the Emvelo WEF and grid connection. The assessment was based on 16 months of baseline data on bat activity recorded at the project. Based on these data, the key issue for the WEF will be managing collision impacts to Cape serotine and Egyptian free-tailed bat, and cumulative impacts.

The first mitigation measure proposed to manage risk is to adhere to the no-go buffers which aim to spatially avoid impacts by buffering key habitat features used by bats. This measure is likely to be effective for most bat species recorded at the project, but additional mitigation measures are needed to avoid impacts to free-tailed bats, which forage high in the air, and to reduce residual impacts.

Turbine design can be effective, and it is recommended to maintain a minimum blade sweep of at least 30 m. However, free-tailed bats will still collide with turbine blades above this height and as such, the rotor diameter must be limited as much as practicable to minimize the space where collisions might occur. Additionally, blade feathering must be implemented to limit the rotation of turbine blades below the turbine cut-in speed when electricity is not being generated.

Mitigation measures to minimize residual impacts after the application of the above measures include smart curtailment and acoustic deterrents. As such, the project should consider the cost and feasibility of these measures. The residual impacts must be monitored using post-construction fatality monitoring for a minimum of two years (Aronson et al. 2020). Smart curtailment and/or acoustic deterrents must be used if this monitoring indicates that species fatality thresholds have been exceeded (MacEwan et al. 2018) to maintain the impacts to bats within acceptable limits of change and prevent declines in the impacted bat populations.

The overall impact to bats was assessed as moderate after the application of the mitigation measures proposed to avoid and minimize impacts to bats. However, on a species level, the project presents differential risk and impacts to bats must be managed adaptively during the operational phase, particularly for those species (e.g. Egyptian free-tailed bat and Cape serotine) for which high risk is predicted during some periods.

This adaptive management will be guided by the Environmental Management Programme for bats which must include the development of a Biodiversity Management Plan (BMP) to manage impacts to bats during the operation of the facility. The BMP for bats must be developed by a bat ecologist before the commencement of operation and must include the post-construction fatality monitoring plan design, fatality thresholds calculations and rationale (updated as required), and an adaptive management response plan that provides a timeous action pathway for mitigation, including roles and responsibilities, should fatality thresholds be exceeded. Provided these measures are adhered to, the project assessed can be approved.

Socio-economic

The findings of the SIA study indicate that the proposed Emvelo WEF and associated components will create a number of social and socio-economic benefits, including creation of employment and business opportunities during both the construction and operational phase.

The findings of the SIA also indicate that the potential negative impacts associated with both the construction and operational phase are likely to be **Low Negative** with mitigation. The potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented.

Recommendations

- The proponent should, in consultation with the owner of Schiedam 274/2 investigate the opportunity to micro-site turbines 4, 5, 6, 7 and associated access roads, and the O&M site on Schiedam 274/2.
- The proponent should, in consultation with the owner of Schiedam 274/2 discuss the impact on wind turbines on the landing strip on Schiedam 274/2.
- Install radar activated civil aviation light system on wind turbines where technically feasible.

Statement and reasoned opinion

The establishment of the proposed Emvelo WEF and associated infrastructure is supported by the findings of the SIA.

Noise

The proposed WTG layout (WTG placement) would only be acceptable with the selection of correct mitigation measures, which could include a combination of:

- Relocating a number of NSR where noise levels could exceed the recommended noise limits (NSR as highlighted in **Appendix E**); and
- Reducing the noise emission levels (selecting a WTG with a lower sound PWL, using blade additions to reduce noise emission levels and potentially implementing a noise abatement plan during certain periods of time, wind speeds or

meteorological conditions. Acoustic treatment of residential dwellings should only be considered after other mitigation measures were considered.

The applicant could also change the layout (locating WTG further from NSR, or reducing the number of WTG within 1,000m from NSR) to mitigate the noise impact, though the applicant should re-evaluate the noise impact should:

- the layout be revised (as part of amendment process post Environmental Authorization [EA]) where any WTG, located within 2,500 m from a confirmed NSR, are moved closer to the NSR;
- the layout be revised (as part of amendment process post EA) where any new WTG are introduced within 2,500m from an NSR;
- the layout be revised (as part of amendment process post EA) where the number of WTG within 2,500m from an NSR are increased; and
- the applicant selects to use a WTG with a SPL higher than 109.0 dBA (re 1 pW).

The applicant should also develop and implement an environmental noise monitoring programme at selected NSR living within the 42 dBA noise contour.

Terrestrial Biodiversity

- A pre-commencement flora relocation is recommended as several TNCO protected species are present within the proposed footprint.
- A pre-commencement fauna relocation is recommended. Several burrowing faunal species are present and will allow for relocation of less mobile species, although most faunal species in proximity are likely to vacate the area once earth moving equipment commences clearing and construction, however some species may require manual relocation.
- Topsoil must be stripped and stockpiled for replacement after construction of the site. Additional measures should be implemented to stabilise eroded areas where necessary.
- On completion of construction, the surface of any work areas, especially if compacted due to hauling and dumping operations shall be scarified to a depth of at least 200 mm and graded to an even surface condition and the previously stored topsoil will be returned to its original depth over the area.
- The disturbed areas can be seeded with suitable local grass seed mix, usually available from a local farmer co-op, if deemed to be required as vegetation is likely to re-establish without input, as is typical in Karoid areas. Species composition of such grass seed mixes is best determined by what local indigenous species are locally, cost effectively and readily available. A mix of several species is recommended rather than a single grass species.
- Excavations may not be used for the dumping of construction wastes.
- Waste (non-biodegradable refuse) will not be permitted to be deposited in the excavations and must be disposed of appropriately.
- Alien species must be removed from the site as per the National Environmental Management: Biodiversity Act (No. 10 of 2004) requirements. A suitable weed management strategy must be implemented in the construction phase and carried through the operational phase. Weeds and alien species *must* be cleared by hand before the rehabilitation phase of the areas. Recommended that the removal of alien plants are to be

done according to the Working for Water Guidelines.

- Ongoing maintenance is likely to be required in the long-term, which could include re-excavation of portions of the site for maintenance/replacement of defective components and repairs where applicable, which may include road, turbine footprint and buried infrastructure maintenance and excavation or infill within watercourse crossings.

Heritage, Archaeology and Paleontology

- A heritage survey was undertaken for the proposed Emvelo WEF.The desktop study noted sixty-three possible heritage sties. Most of these were farm labourers' settlements that could have graves Many of these sites occur in areas that will not be affected by the WEF and related infrastructure. The field survey recorded twelve heritage sites were recorded within the study area. Most of these sites will not be affected by the WEF. Those that are currently affected, can be mitigated by relocating the turbine.
- The field survey also confirmed that most of the desktop settlements have human graves associated with them. A 50m sensitivity buffer should be placed around each of these for possible graves. Unfortunately, the black wattle has damaged most of these sites, while agricultural activity would have destroyed these sites.
- One cemetery will be currently affected by the OHL. This section of the line will need to be moved west of the cemetery. Wind Turbine 21 is located on ROCH05. The turbine will need to be moved away from the site.
- While the palaeontology is of very high sensitivity as it forms part of the Vryheid formation, very few significant vertebrate fossils have been found in it. A Chance Find Protocol was initiated for the construction phase.

Traffic

Based on the information detailed in this report, the following conclusions are drawn:

The proposed development and final layout can be supported from a traffic engineering point of view.

Given the findings of this report, it is recommended that the proposed development be considered favourably from a traffic engineering point of view as the intended construction will have no significant negative impact on the surrounding road network.

The following recommendations are made:

A comprehensive route assessment of the entire transportation route to verify clearance, load bearing and sweeping radius distances is recommended.

A comprehensive Traffic Management Plan (TMP) is recommended prior to the commencement of the construction phase and the operational phase based on the final development plan and construction schedule.

The proposed Primary Site Access intersection R65 and D1264 is recommended as the main development access, based on the implementation of safety considerations and mitigation measures outlined in the report.

It is recommended that the access point be priority controlled and widened to allow provision for acceleration lane and passing lane which will incorporate the turning characteristics of the expected abnormal vehicles.

Clearance permits will be required for the transport of the WT components. Full responsibility for the application of the permit and compliance with the permit conditions, lies with the carrier even if represented by an agent (Administrative Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads, Revision 4, May 2021, COTO-Committee of Transport Official).

It is recommended that applications for Abnormal Permits be lodged to the Department of Transport and Public Works, Eskom, and Telkom (where affected) at the time of construction. Full responsibility for the application of the permit and compliance with the permit conditions, lies with the carrier even if represented by an agent (Administrative Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads, Revision 4, May 2021, COTO-Committee of Transport Official)

Visual and Landscape

It is the opinion of Graham A Young Landscape Architect (GYLA) that the visual impacts associated with the proposed Project are of a nature, scale and duration that will require mitigation to slightly reduce the impact during the operational phase. It must also be noted that the I&APs did not consider visual and aesthetic concerns as an issue. GYLA believes that the impacts associated with the construction, operation and decommissioning phases can be mitigated from HIGH to MODERATE provided the recommended measures are effectively implemented in the short term and managed in the long term and that the site is effectively rehabilitated during decommissioning. The project is deemed acceptable from a visual perspective.

Faunal

From a faunal perspective, and specific to this development, several key management aspects to help reduce impacts and add biodiversity benefits are required:

• Off-set areas to be determined for any high faunal sensitive areas that are to be developed; these should form part of a long-term conservation programme and to be determine by an off-set specialist.

• An alien plant management plan that would involve the continued removal and monitoring of alien plant growth within the project sites, starting at the construction phase and continuing into the operational and decommissioning phases.

• Oribi management plan to be developed by a faunal specialist that could involve, amongst other aspects, identifying important Orbi habitat within the project areas, monitoring of Orbi numbers pre-construction, during construction, operational, and the decommissioning phases. Monitoring should ideally continue at least once a year at an appropriate time of year throughout the operation phase. In addition, populations should also be monitored for 1–3 years post-decommissioning. Other aspects could include establishing a local Oribi working group, linking in with the national Oribi Working Group (OWG) and with the Endangered Wildlife Trust (EWT) (see

Patel et al., 2021; Shrader et al., 2016). An Oribi management plan would be a strong mitigation measure to reduce impacts on this highly threatened antelope species.

- In conjunction with the above two management plans and considering that the grassland system is a fire-driven ecosystem, a fire management plan should be implemented.
- Any high faunal sensitive grassland habitat, or off-set areas, should be incorporated as part of a long-term conservation strategy, such as a stewardship programme. This would ensure that at the end-of-life of the project, positive biodiversity measures that have been implemented do not suddenly come to an end.

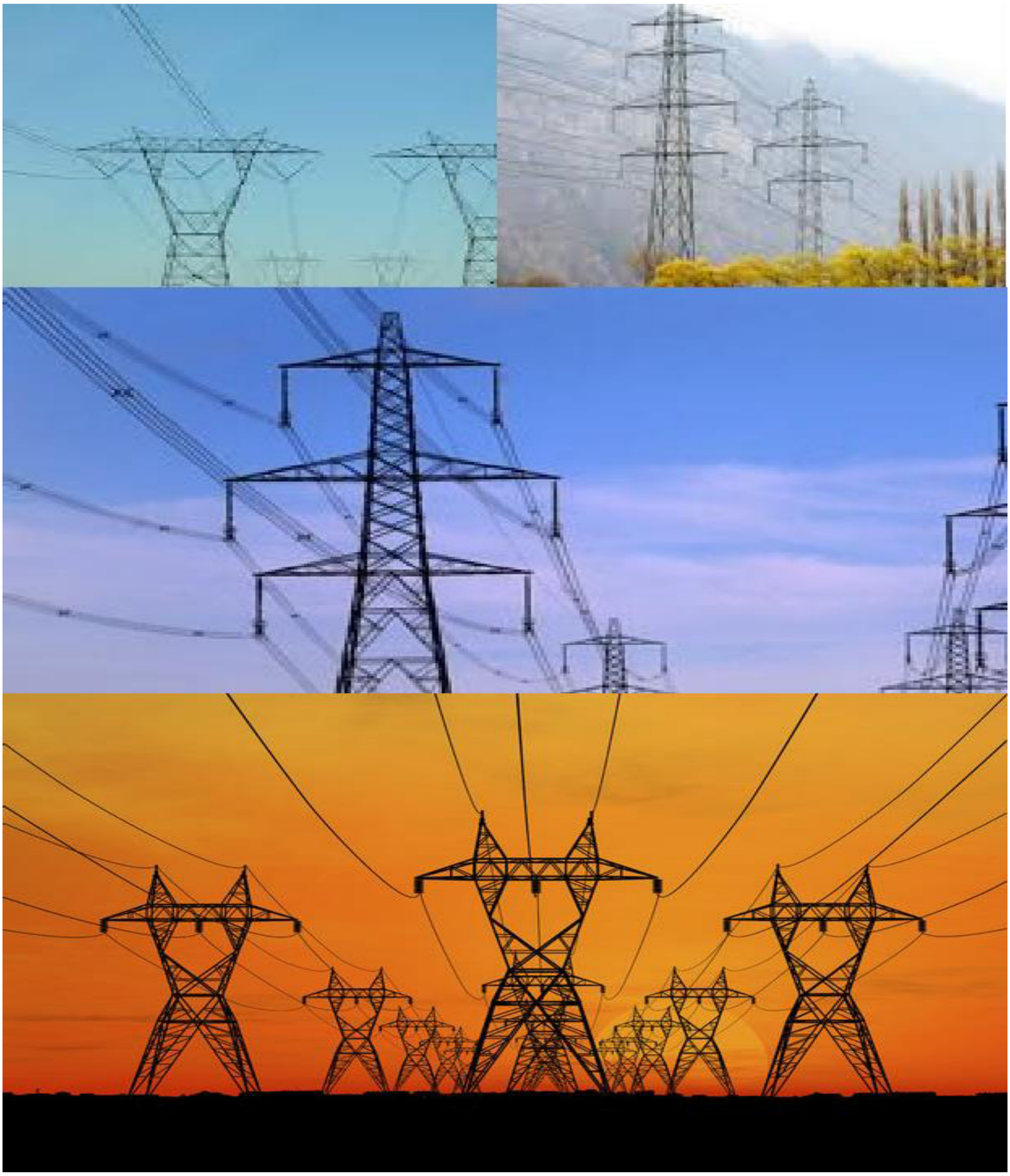
Numerous detailed measures, often at the site-level for individual turbines, for inclusion into the EMPr during the different phases are listed in the Terrestrial Biodiversity and Botanical Impact reports; these are supported here and recommended for inclusion.

APPENDIX 1: METHOD STATEMENTS

To be prepared by the contractor prior to commencement of the activity. The method statements are **not required** to be submitted to the CA.

APPENDIX 1

GENERIC ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr) FOR THE DEVELOPMENT AND EXPANSION FOR OVERHEAD ELECTRICITY TRANSMISSION AND DISTRIBUTION INFRASTRUCTURE



environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

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INTRODUCTION

1. Background

The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) requires that an environmental management programme (EMPr) be submitted where an environmental impact assessment (EIA) has been identified as the environmental instrument to be utilised as the basis for a decision on an application for environmental authorisation (EA). The content of an EMPr must either contain the information set out in Appendix 4 of the Environmental Impact Assessment Regulations, 2014, as amended, (EIA Regulations) or must be a generic EMPr relevant to an application as identified and gazetted by the Minister in a government notice. Once the Minister has identified, through a government notice, that a generic EMPr is relevant to an application for EA, that generic EMPr must be applied by all parties involved in the EA process, including, but not limited to, the applicant and the competent authority (CA).

2. Purpose

This document constitutes a generic EMPr relevant to applications for the development or expansion of overhead electricity transmission and distribution infrastructure, and all listed and specified activities necessary for the realisation of such infrastructure.

3. Objective

The objective of this generic EMPr is to prescribe and pre-approve generally accepted impact management outcomes and impact management actions, which can commonly and repeatedly be used for the avoidance, management and mitigation of impacts and risks associated with the development or expansion of overhead electricity transmission and distribution infrastructure. The use of a generic EMPr is intended to reduce the need to prepare and review individual EMPrs for applications of a similar nature.

4. Scope

The scope of this generic EMPr applies to the development or expansion of overhead electricity transmission and distribution infrastructure requiring EA in terms of NEMA, i.e. with a capacity of 33 kilovolts or more. This generic EMPr applies to activities requiring EA, mainly activity 11 and 47 of the Environmental Impact Assessment Regulations Listing Notice 1 of 2014, as amended, and activity 9 of the Environmental Impact Assessment Regulations Listing Notice 2 of 2014, as amended, and all associated listed or specified activities necessary for the realisation of such infrastructure.

5. Structure of this document

This document is structured in three parts with an Appendix as indicated in the table below:

Part	Section	Heading	Content
A		Provides general guidance and information and is **not legally binding**	Definitions, acronyms, roles & responsibilities and documentation and reporting.
B	1	Pre-approved generic EMPr template	Contains generally accepted impact management outcomes and impact management actions required for the avoidance, management and mitigation of impacts and risks associated with the development or expansion of overhead electricity transmission and distribution infrastructure, which are presented in the form of a template that has been pre-approved. The template in this section is to be completed by the contractor, with each completed page signed and dated by the holder of the EA prior to commencement of the activity. Where an impact management outcome is not relevant, the words "not applicable" can be inserted in the template under the "responsible persons" column. Once completed and signed, the template represents the EMPr for the activity approved by the CA and is legally binding. The template **is not required** to be submitted to the CA as once the generic EMPr is gazetted for implementation, it has been approved by the CA. To allow interested and affected parties access to the pre-approved EMPr template for consideration through the decision-making process, the EAP on behalf of the applicant /proponent must make the hard copy of this EMPr available at a public location and where the applicant has a website, the EMPr should also be made available on such publicly accessible website.
	2	Site specific information	Contains preliminary infrastructure layout and a declaration that the applicant/holder of the EA will comply with the pre-approved generic EMPr

Part	Section	Heading	Content
			template contained in Part B: Section 1, and understands that the impact management outcomes and impact management actions are **legally binding**. The preliminary infrastructure layout must be finalized to inform the final EMPr that is to be submitted with the basic assessment report (BAR) or environmental impact assessment report (EIAR), ensuring that all impact management outcomes and actions have been either pre-approved or approved in terms of Part C. This section **must be** submitted to the CA together with the final BAR or EIAR. The information submitted to the CA will be considered to be incomplete should a signed copy of Part B: section 2 not be submitted. Once approved, this Section forms part of the EMPr for the development and is legally binding.
C		Site specific sensitivities/ attributes	If any specific environmental sensitivities/ attributes are present on the site which require site specific impact management outcomes and impact management actions, not included in the pre-approved generic EMPr, to manage impacts, these specific impact management outcomes and impact management actions must be included in this section. These specific environmental attributes must be referenced spatially and impact management outcomes and impact management actions must be provided. These specific impact management outcomes and impact management actions must be presented in the format of the pre-approved EMPr template (Part B: section 1) This section will not be required should the site contain no specific environmental sensitivities or attributes. However, if Part C is applicable to the site, it **is required** to be submitted together with the BAR or EIAR, for consideration of, and decision on, the application for EA. The information in this section must be prepared by an EAP, and must contain his/her name and expertise including a curriculum vitae. Once approved, Part C forms part of the EMPr for the site and is legally binding.

Part	Section	Heading	Content
			This section applies only **to additional** impact management outcomes and impact management actions that are necessary for the avoidance, management and mitigation of impacts and risks associated with the specific development or expansion and which are not already included in Part B: section 1.
Appendix 1			Contains the method statements to be prepared prior to commencement of the activity. The method statements are **not required** to be submitted to the competent authority.

6. Completion of part B: section 1: the pre-approved generic EMPr template

The template is to be completed prior to commencement of the activity, by providing the following information for each environmental impact management action:

- For implementation
  - a 'responsible person',
  - a method for implementation,
  - a timeframe for implementation
- For monitoring
  - a responsible person
  - frequency
  - evidence of compliance.

The completed template must be signed and dated by the holder of the EA prior to commencement of the activity. The method statements prepared and agreed to by the holder of the EA must be appended to the template as Appendix 1. Each method statement must be signed and dated on each page by the holder of the EA. This template, once signed and dated, is legally binding. The holder of the EA will remain responsible for its implementation.

7. Amendments of the impact management outcomes and impact management actions

Once the activity has commenced, a holder of an EA may make amendments to the impact management outcomes and impact management actions in the following manner:

- Amendment of the impact management outcomes: in line with the process contemplated in regulation 37 of the EIA Regulations; and
- Amendment of the impact management actions: in line with the process contemplated in regulation 36 of the EIA Regulations.

8. Documents to be submitted as part of part B: section 2 site specific information and declaration

Part B: Section 2 has three distinct sub-sections. The first and third sub-sections are in a template format. Sub-section two requires a map to be produced.

Sub-section 1 contains the project name, the applicant's name and contact details, the site information, which includes coordinates of the corridor in which the proposed overhead electricity transmission and distribution infrastructure is proposed as well as the 21-digit Surveyor General code of each cadastral land parcel and, where available, the farm name.

Sub-section 2 is to be prepared by an EAP and must contain his/her name and expertise including a curriculum vitae. This sub-section must include a map of the site sensitivity overlaid with the preliminary infrastructure layout using the national web based environmental screening tool, when available for compulsory use at: https://screening.environment.gov.za/screeningtool. The sensitivity map shall identify the nature of each sensitive feature e.g. raptor nest, threatened plant species, archaeological site, etc. Sensitivity maps must identify features both within the planned working area and any known sensitive features in the surrounding landscape within 50m from the development footprint. The overhead transmission and distribution profile must be illustrated at an appropriate resolution to enable fine scale interrogation. It is recommended that <20 km of overhead transmission and distribution length is illustrated per page in A3 landscape format. Where considered appropriate, photographs of sensitive features in the context of tower positions must be used.

Sub-section 3 is the declaration that the applicant/proponent or holder of the EA in the case of a change of ownership must complete, which confirms that the applicant/EA holder will comply with the pre-approved generic EMPr template in Section 1 and understands that the impact management outcomes and actions are legally binding.

(a) Amendments to Part B: Section 2 – site specific information and declaration

Should the EA be transferred, Part B: Section 2 must be completed by the new applicant/proponent and submitted with the application for an amendment of the EA in terms of Regulations 29 or 31 of the EIA Regulations, whichever applies. The information submitted as part of such an application for an amendment to an EA will be considered to be incomplete should a signed copy of Part B: Section 2 not be submitted. Once approved, Part B: Section 2 forms part of the EMPr for the development and the EMPr becomes legally binding to the new EA holder.

PART A – GENERAL INFORMATION

1. DEFINITIONS

In this EMPr any word or expression to which a meaning has been assigned in the NEMA or EIA Regulations has that meaning, and unless the context requires otherwise –

"clearing" means the clearing and removal of vegetation, whether partially or in whole, including trees and shrubs, as specified;

"construction camp" is the area designated for key construction infrastructure and services, including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management;

"contractor" - The Contractor has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract, are in line with the Environmental Management Programme and that Method Statements are implemented as described.

"hazardous substance" is a substance governed by the Hazardous Substances Act, 1973 (Act No. 15 of 1973) as well as the Hazardous Chemical and Substances Regulations, 1995;

"method statement" means a written submission by the Contractor to the Project Manager in response to this EMPr or a request by the Project Manager and ECO. The method statement must set out the equipment, materials, labour and method(s) the Contractor proposes using to carry out an activity identified by the Project Manager when requesting the Method Statement. This must be done in such detail that the Project Manager and ECO is able to assess whether the Contractor's proposal is in accordance with this specification and/or will produce results in accordance with this specification;

The method statement must cover applicable details with regard to:

(i) Construction procedures;
(ii) Plant, materials and equipment to be used;
(iii) Transporting the equipment to and from site;
(iv) How the plant/ material/ equipment will be moved while on site;
(v) How and where the plant/ material/ equipment will be stored;
(vi) The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
(vii) Timing and location of activities;
(viii) Compliance/ non-compliance; and
(ix) Any other information deemed necessary by the Project Manager.

"slope" means the inclination of a surface expressed as one unit of rise or fall for so many horizontal units;

“solid waste” means all solid waste, including construction debris, hazardous waste, excess cement/ concrete, wrapping materials, timber, cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers);

“spoil” means excavated material which is unsuitable for use as material in the construction works or is material which is surplus to the requirements of the construction works;

“topsoil” means a varying depth (up to 300 mm) of the soil profile irrespective of the fertility, appearance, structure, agricultural potential, fertility and composition of the soil; and

“works” means the works to be executed in terms of the Contract

2. ACRONYMS and ABBREVIATIONS

CA	Competent Authority
cEO	Contractors Environmental Officer
dEO	Developer Environmental Officer
DPM	Developer Project Manager
DSS	Developer Site Supervisor
EAR	Environmental Audit Report
ECA	Environmental Conservation Act No. 73 of 1989
ECO	Environmental Control Officer
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
ERAP	Emergency Response Action Plan
EMPr	Environmental Management Programme Report
EAP	Environmental Assessment Practitioner
FPA	Fire Protection Agency
HCS	Hazardous chemical Substance
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act ,2004 (Act No. 10 of 2004)
NEMWA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
MSDS	Material Safety Data Sheet
RI&AP’s	Registered interested and affected parties

3. ROLES AND RESPONSIBILITIES FOR ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr) IMPLEMENTATION

The effective implementation of this generic EMPr is dependent on established and clear roles, responsibilities and reporting lines within an institutional framework. This section of the EMPr gives guidance to the various environmental roles and reporting lines, however, project specific requirements will ultimately determine the need for the appointment of specific person(s) to undertake specific roles and or responsibilities. As such, it must be noted that in the event that no specific person, for example, an environmental control officer (ECO) is appointed, the holder of the EA remains responsible for ensuring that the duties indicated in this document for action by the ECO are undertaken.

Table 1: *Guide to roles and responsibilities for implementation of an EMPr*

Responsible Person (s)	Role and Responsibilities
Developer's Project Manager (DPM)	<u>Role</u> The Project Developer is accountable for ensuring compliance with the EMPr and any conditions of approval from the competent authority (CA). Where required, an environmental control officer (ECO) must be contracted by the Project Developer to objectively monitor the implementation of the EMPr according to relevant environmental legislation, and the conditions of the environmental authorisation (EA). The Project Developer is further responsible for providing and giving mandate to enable the ECO to perform responsibilities, and he must ensure that the ECO is integrated as part of the project team while remaining independent. <u>Responsibilities</u> - Be fully conversant with the conditions of the EA; - Ensure that all stipulations within the EMPr are communicated and adhered to by the Developer and its Contractor(s); - Issuing of site instructions to the Contractor for corrective actions required; - Monitor the implementation of the EMPr throughout the project by means of site inspections and meetings. Overall management of the project and EMPr implementation; and - Ensure that periodic environmental performance audits are undertaken on the project implementation.
Developer Site Supervisor (DSS)	<u>Role</u> The DSS reports directly to the DPM, oversees site works, liaises with the contractor(s) and the ECO. The DSS

Responsible Person (s)	Role and Responsibilities
	is responsible for the day to day implementation of the EMPr and for ensuring the compliance of all contractors with the conditions and requirements stipulated in the EMPr. Responsibilities - Ensure that all contractors identify a contractor's Environmental Officer (cEO); - Must be fully conversant with the conditions of the EA. Oversees site works, liaison with Contractor, DPM and ECO; - Must ensure that all landowners have the relevant contact details of the site staff, ECO and cEO; - Issuing of site instructions to the Contractor for corrective actions required; - Will issue all non-compliances to contractors; and - Ratify the Monthly Environmental Report.
Environmental Control Officer (ECO)	Role The ECO should have appropriate training and experience in the implementation of environmental management specifications. The primary role of the ECO is to act as an independent quality controller and monitoring agent regarding all environmental concerns and associated environmental impacts. In this respect, the ECO is to conduct periodic site inspections, attend regular site meetings, pre-empt problems and suggest mitigation and be available to advise on incidental issues that arise. The ECO is also required to conduct compliance audits, verifying the monitoring reports submitted by the cEO. The ECO provides feedback to the DSS and Project Manager regarding all environmental matters. The Contractor, cEO and dEO are answerable to the Environmental Control Officer for non- compliance with the Performance Specifications as set out in the EA and EMPr. The ECO provides feedback to the DSS and Project Manager, who in turn reports back to the Contractor and potential and Registered Interested &Affected Parties' (RI&AP's), as required. Issues of non- compliance raised by the ECO must be taken up by the Project Manager, and resolved with the Contractor as per the conditions of his contract. Decisions regarding environmental procedures, specifications and requirements which have a cost implication (i.e. those that are deemed to be a variation, not allowed for in the Performance Specification) must be endorsed by the Project Manager. The ECO must also, as specified by the EA, report to the relevant CA as and when required. Responsibilities

Responsible Person (s)	Role and Responsibilities
	The responsibilities of the ECO will include the following: - Be aware of the findings and conclusions of all EA related to the development; - Be familiar with the recommendations and mitigation measures of this EMPr; - Be conversant with relevant environmental legislation, policies and procedures, and ensure compliance with them; - Undertake regular and comprehensive site inspections / audits of the construction site according to the generic EMPr and applicable licenses in order to monitor compliance as required; - Educate the construction team about the management measures contained in the EMPr and environmental licenses; - Compilation and administration of an environmental monitoring plan to ensure that the environmental management measures are implemented and are effective; - Monitoring the performance of the Contractors and ensuring compliance with the EMPr and associated Method Statements; - In consultation with the Developer Site Supervisor order the removal of person(s) and/or equipment which are in contravention of the specifications of the EMPr and/or environmental licenses; - Liaison between the DPM, Contractors, authorities and other lead stakeholders on all environmental concerns; - Compile a regular environmental audit report highlighting any non-compliance issues as well as satisfactory or exceptional compliance with the EMPr; - Validating the regular site inspection reports, which are to be prepared by the contractor Environmental Officer (cEO); - Checking the cEO's record of environmental incidents (spills, impacts, legal transgressions etc) as well as corrective and preventive actions taken; - Checking the cEO's public complaints register in which all complaints are recorded, as well as action taken; - Assisting in the resolution of conflicts; - Facilitate training for all personnel on the site – this may range from carrying out the training, to reviewing the training programmes of the Contractor; - In case of non-compliances, the ECO must first communicate this to the Senior Site Supervisor, who has the power to ensure this matter is addressed. Should no action or insufficient action be taken, the ECO may report this matter to the authorities as non-compliance; - Maintenance, update and review of the EMPr; - Communication of all modifications to the EMPr to the relevant stakeholders.
developer Environmental Officer	Role

Responsible Person (s)	Role and Responsibilities
(dEO)	The dEOs will report to the Project Manager and are responsible for implementation of the EMPr, environmental monitoring and reporting, providing environmental input to the Project Manager and Contractor's Manager, liaising with contractors and the landowners as well as a range of environmental coordination responsibilities. <u>Responsibilities</u> - Be fully conversant with the EMPr; - Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures; - Ensure that all stipulations within the EMPr are communicated and adhered to by the Employees, Contractor(s) ; - Confine the development site to the demarcated area; - Conduct environmental internal audits with regards to EMPr and authorisation compliance (on cEO); - Assist the contractors in addressing environmental challenges on site; - Assist in incident management: - Reporting environmental incidents to developer and ensuring that corrective action is taken, and lessons learnt shared; - Assist the contractor in investigating environmental incidents and compile investigation reports; - Follow-up on pre-warnings, defects, non-conformance reports; - Measure and communicate environmental performance to the Contractor; - Conduct environmental awareness training on site together with ECO and cEO; - Ensure that the necessary legal permits and / or licenses are in place and up to date; - Acting as Developer's Environmental Representative on site and work together with the ECO and contractor;
Contractor	<u>Role</u> The Contractor appoints the cEO and has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract are in line with the EMPr and that Method Statements are implemented as described. External contractors must ensure compliance with this EMPr while performing the onsite activities as per their contract with the Project Developer. The contractors are required, where

Responsible Person (s)	Role and Responsibilities
	specified, to provide Method Statements setting out in detail how the impact management actions contained in the EMPr will be implemented during the development or expansion for overhead electricity transmission and distribution infrastructure activities. <u>Responsibilities</u> - project delivery and quality control for the development services as per appointment; - employ a suitably qualified person to monitor and report to the Project Developer's appointed person on the daily activities on-site during the construction period; - ensure that safe, environmentally acceptable working methods and practices are implemented and that equipment is properly operated and maintained, to facilitate proper access and enable any operation to be carried out safely; - attend on site meeting(s) prior to the commencement of activities to confirm the procedure and designated activity zones; - ensure that contractors' staff repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained in EMPr, to the satisfaction of the ECO.
contractor Environmental Officer (cEO)	<u>Role</u> Each Contractor affected by the EMPr should appoint a cEO, who is responsible for the on-site implementation of the EMPr (or relevant sections of the EMPr). The Contractor's representative can be the site agent; site engineer; a dedicated environmental officer; or an independent consultant. The Contractor must ensure that the Contractor's Representative is suitably qualified to perform the necessary tasks and is appointed at a level such that she/he can interact effectively with other site Contractors, labourers, the Environmental Control Officer and the public. As a minimum the cEO shall meet the following criteria: <u>Responsibilities</u> - Be on site throughout the duration of the project and be dedicated to the project; - Ensure all their staff are aware of the environmental requirements, conditions and constraints with respect to all of their activities on site; - Implementing the environmental conditions, guidelines and requirements as stipulated within the EA,

Responsible Person (s)	Role and Responsibilities
	EMPr and Method Statements; - Attend the Environmental Site Meeting; - Undertaking corrective actions where non-compliances are registered within the stipulated timeframes; - Report back formally on the completion of corrective actions; - Assist the ECO in maintaining all the site documentation; - Prepare the site inspection reports and corrective action reports for submission to the ECO; - Assist the ECO with the preparing of the monthly report; and - Where more than one Contractor is undertaking work on site, each company appointed as a Contractor will appoint a cEO representing that company.

4. ENVIRONMENTAL DOCUMENTATION REPORTING AND COMPLIANCE

To ensure accountable and demonstrated implementation of the EMPr, a number of reporting systems, documentation controls and compliance mechanisms must be in place for all overhead electricity transmission and distribution infrastructure projects as a minimum requirement.

4.1 Document control/Filing system

The holder of the EA is solely responsible for the upkeep and management of the EMPr file. At a minimum, all documentation detailed below will be stored in the EMPr file. A hard copy of all documentation shall be filed, while an electronic copy may be kept where relevant. A duplicate file will be maintained in the office of the DSS (where applicable). This duplicate file must remain current and up-to-date. The filing system must be updated and relevant documents added as required. The EMPr file must be made available at all times on request by the CA or other relevant authorities. The EMPr file will form part of any environmental audits undertaken as prescribed in the EIA Regulations.

4.2 Documentation to be available

At the outset of the project the following preliminary list of documents shall be placed in the filing system and be accessible at all times:

- Full copy of the signed EA from the CA in terms of NEMA, granting approval for the development or expansion;
- Copy of the generic and site specific EMPr as well as any amendments thereof;
- Copy of declaration of implementing generic EMPr and subsequent approval of site specific EMPr and amendments thereof;
- All method statements;
- Completed environmental checklists;
- Minutes and attendance register of environmental site meetings;
- An up-to-date environmental incident log;
- A copy of all instructions or directives issued;
- A copy of all corrective actions signed off. The corrective actions must be filed in such a way that a clear reference is made to the non-compliance record;
- Complaints register.

4.3 Weekly Environmental Checklist

The ECOs are required to complete a Weekly Environmental Checklist, the format of which is to be agreed prior to commencement of the activity. The ECOs are required to sign and date the checklist, retain a copy in the EMPr file and submit a copy of the completed checklist to the DSS on a weekly basis.

The checklists will form the basis for the Monthly Environmental Reports. Copies of all completed checklists will be attached as Annexures to the Environmental Audit Report as required in terms of the EIA Regulations.

4.4 Environmental site meetings

Minutes of the environmental site meetings shall be kept. The minutes must include an attendance register and will be attached to the Monthly Report that is distributed to attendees. Each set of minutes must clearly record "Matters for Attention" that will be reviewed at the next meeting.

4.5 Required Method Statements

The method statement will be done in such detail that the ECOs are enabled to assess whether the contractor's proposal is in accordance with the EMPr.

The method statement must cover applicable details with regard to:

- development procedures;
- materials and equipment to be used;
- getting the equipment to and from site;
- how the equipment/ material will be moved while on site;
- how and where material will be stored;
- the containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
- timing and location of activities;
- compliance/ non-compliance with the EMPr; and
- any other information deemed necessary by the ECOs.

Unless indicated otherwise by the Project Manager, the Contractor shall provide the following method statements to the Project Manager no less than 14 days prior to the commencement date of the activity:

- Site establishment – Camps, Lay-down or storage areas, satellite camps, infrastructure;
- Batch plants;
- Workshop or plant servicing;
- Handling, transport and storage of Hazardous Chemical Substance's;
- Vegetation management – Protected, clearing, aliens, felling;
- Access management – Roads, gates, crossings etc.;
- Fire plan;
- Waste management – transport, storage, segregation, classification, disposal (all waste streams);
- Social interaction – complaints management, compensation claims, access to properties etc.;
- Water – use (source, abstraction and disposal), access and all related information, crossings and mitigation;
- Emergency preparedness – Spills, training, other environmental emergencies;
- Dust and noise management methodologies;
- Fauna interaction and risk management – only if the risk was identified – wildlife interaction especially on game farms; and
- Heritage and palaeontology management.

The ECOs shall monitor and ensure that the contractors perform in accordance with these method statements. Completed and agreed method statements between the holder of the EA and the contractor shall be captured in Appendix 1.

4.6 Environmental Incident Log (Diary)

The ECOs are required to maintain an up-to-date and current Environmental Incident Log (environmental diary). The Environmental Incident Log is a means to record all environmental incidents and/or all non-compliance notice would not be issued. An environmental incident is defined as:

- Any deviation from the listed impact management actions (listed in this EMPr) that may be addressed immediately by the ECOs. (For example a contractor's staff member littering or a drip tray that has not been emptied);
- Any environmental impact resulting from an action or activity by a contractor in contravention of the environmental stipulations and guidelines listed in the EMPr which as a single event would have a minor impact but which if cumulative and continuous would have a significant effect (for example no toilet paper available in the ablutions for an afternoon); and
- General environmental information such as road kills or injured wildlife.

The ECOs are to record all environmental incidents in the Environmental Incident Log. All incidents regardless of severity must be reported to the Developer. The Log is to be kept in the EMPr file and at a minimum the following will be recorded for each environmental incident:

- The date and time of the incident;
- Description of the incident;
- The name of the Contractor responsible;
- The incident must be listed as significant or minor;
- If the incident is listed as significant, a non-compliance notice must be issued, and recorded in the log;
- Remedial or corrective action taken to mitigate the incident; and
- Record of repeat minor offences by the same contractor or staff member.

The Environmental Incident Log will be captured in the EAR.

4.7 Non-compliance

A non-compliance notice will be issued to the responsible contractor by the ECOs via the DSS or Project Manager. The non-compliance notice will be issued in writing; a copy filed in the EMPr file and will at a minimum include the following:

- Time and date of the non-compliance;
- Name of the contractor responsible;
- Nature and description of the non-compliance;
- Recommended / required corrective action; and
- Date by which the corrective action to be completed.
- The contractors shall act immediately when a notice of non-compliance is received and correct whatever is the cause for the issuing of the notice. Complaints

received regarding activities on the development site pertaining to the environment shall be recorded in a dedicated register and the response noted with the date and action taken. The ECO should be made aware of any complaints. Any non-compliance with the agreed procedures of the EMPr is a transgression of the various statutes and laws that define the manner by which the environment is managed. Failure to redress the cause shall be reported to the relevant CA for them to deal with the transgression, as it deems fit. The contractor is deemed not to have complied with the EMPr if, inter alia, There is a deviation from the environmental conditions, impact management outcomes and impact management actions , as approved in generic and site specific EMPr as relevant as set out in the EMPr, which deviation has, or may cause, an environmental impact.

4.8 Corrective action records

For each non-compliance notice issued, a documented corrective action must be recorded. On receiving a non-compliance notice from the DSS, the contractor's cEO will ensure that the corrective actions required take place within the stipulated timeframe. On completion of the corrective action the cEO is to issue a Corrective Action Report in writing to the ECOs. If satisfied that the corrective action has been completed, the ECOs are to sign-off on the Corrective Action Report, and attach the report to the non-compliance notice in the EMPr file. A corrective action is considered complete once the report has signed off by the ECOs.

4.9 Photographic record

A digital photographic record will be kept. The photographic record will be used to show before, during and post rehabilitation evidence of the project as well used in cases of damages claims if they arise. Each image must be dated and a brief description note attached.

The Contractor shall:

1. Allow the ECOs access to take photographs of all areas, activities and actions.

The ECOs shall keep an electronic database of photographic records which will include:

1. Pictures of all areas designated as work areas, camp areas, development sites and storage areas taken before these areas are set up;
2. All bunding and fencing;
3. Road conditions and road verges;
4. Condition of all farm fences;
5. Topsoil storage areas;
6. All areas to be cordoned off during construction;
7. Waste management sites;
8. Ablution facilities (inside and out);
9. Any non-conformances deemed to be "significant";
10. All completed corrective actions for non-compliances;
11. All required signage;
12. Photographic recordings of incidents;
13. All areas before, during and post rehabilitation; and
14. Include relevant photographs in the Final Environmental Audit Report.

4.10 Complaints register

The ECOs shall keep a current and up-to-date complaints register. The complaints register is to be a record of all complaints received from communities, stakeholders and individuals. The Complaints Record shall:

1. Record the name and contact details of the complainant;
2. Record the time and date of the complaint;
3. Contain a detailed description of the complaint;
4. Where relevant and appropriate, contain photographic evidence of the complaint or damage (ECOs to take relevant photographs); and
5. Contain a copy of the ECOs written response to each complaint received and keep a record of any further correspondence with the complainant. The ECO's written response will include a description of any corrective action to be taken and must be signed by the Contractor, ECO and affected party. Where a damage claim is issued by the complainant, the ECOs shall respond as described in (**section 4.11**) below.

4.11 Claims for damages

In the event that a Claim for Damages is submitted by a community, landowner or individual, the ECOs shall:

1. Record the full detail of the complaint as described in (**section 4.10**) above;
2. The DPM will evaluate the claim and associated damage and submit the evaluation to the Senior Site Representative for approval;
3. Following consideration by the DPM, the claim is to be resolved and settled immediately, or the reason for not accepting the claim communicated in writing to the claimant. Should the claimant not accept this, the ECO shall, in writing report the incident to the Developer's negotiator and legal department; and
4. A formal record of the response by the ECOs to the claimant as well as the rectification of the method of making payments not amount will be recorded in the EMPr file.

4.12 Interactions with affected parties

Open, transparent and good relations with affected landowners, communities and regional staff are an essential aspect to the successful management and mitigation of environmental impacts.

The ECOs shall:

1. Ensure that all queries, complaints and claims are dealt within an agreed timeframe;
2. Ensure that any or all agreements are documented, signed by all parties and a record of the agreement kept in the EMPr file;
3. Ensure that a complaints telephone numbers are made available to all landowners and affected parties; and
4. Ensure that contact with affected parties is courteous at all times;

4.13 Environmental audits

Internal environmental audits of the activity and implementation of the EMPr must be undertaken. The findings and outcomes must be included in the EMPr file and be submitted to the CA at intervals as indicated in the EA.

An Environmental Audit Report must be prepared monthly. The report will be tabled as the key point on the agenda of the Environmental Site Meeting. The Report is submitted for acceptance at the meeting and the final report will be circulated to the Project Manager and filed in the EMPr file. At a frequency determined by the EA, the ECOs shall submit the monthly reports to the CA. At a minimum the monthly report is to cover the following:

- Weekly Environmental Checklists;
- Deviations and non-compliances with the checklists;
- Non-compliances issued;
- Completed and reported corrective actions;
- Environmental Monitoring;
- General environmental findings and actions; and
- Minutes of the Bi-monthly Environmental Site Meetings.

4.14 Final environmental audits

On final completion of the rehabilitation and/or requirements of the EA a final EAR is to be prepared and submitted to the CA. The EAR must comply with Appendix 7 of the EIA Regulations.

PART B: SECTION 1: Pre-approved generic EMPr template

5. IMPACT MANAGEMENT OUTCOMES AND IMPACT MANAGEMENT ACTIONS

This section provides a pre-approved generic EMPr template with aspects that are common to the development of overhead electricity transmission and distribution infrastructure. There is a list of aspects identified for the development or expansion of overhead electricity transmission and distribution infrastructure, and for each aspect a set of prescribed impact management outcomes and associated impact management actions have been identified. Holders of EAs are responsible to ensure the implementation of these outcomes and actions for all projects as a minimum requirement, in order to mitigate the impact of such aspects identified for the development or expansion of overhead electricity transmission and distribution infrastructure.

The template provided below is to be completed by providing the information under each heading for each environmental impact management action.

The completed template must be signed and dated on each page by both the contractor and the holder of the EA prior to commencement of the activity. The method statements prepared and agreed to by the holder of the EA must be appended to the template as Appendix 1. Each method statement must also be duly signed and dated on each page by the contactor and the holder of the EA. This template, once signed and dated, is legally binding. The holder of the EA will remain responsible for its implementation.

5.1 Environmental awareness training

Impact management outcome: All onsite staff are aware and understands the individual responsibilities in terms of this EMPr.						
act Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All staff must receive environmental awareness training prior to commencement of the activities; – The Contractor must allow for sufficient sessions to train all personnel with no more than 20 personnel attending each course; – Refresher environmental awareness training is available as and when required; – All staff are aware of the conditions and controls linked to the EA and within the EMPr and made aware of their individual roles and responsibilities in achieving compliance with the EA and EMPr; – The Contractor must erect and maintain information posters at key locations on site, and the posters must include the following information as a minimum: a) Safety notifications; and b) No littering. – Environmental awareness training must include as a minimum the following: a) Description of significant environmental impacts, actual or potential, related to their work activities; b) Mitigation measures to be implemented when carrying out specific activities; c) Emergency preparedness and response						

procedures; d) Emergency procedures; e) Procedures to be followed when working near or within sensitive areas; f) Wastewater management procedures; g) Water usage and conservation; h) Solid waste management procedures; i) Sanitation procedures; j) Fire prevention; and k) Disease prevention. – A record of all environmental awareness training courses undertaken as part of the EMPr must be available; – Educate workers on the dangers of open and/or unattended fires; – A staff attendance register of all staff to have received environmental awareness training must be available. – Course material must be available and presented in appropriate languages that all staff can understand.						

5.2 Site Establishment development

Impact management outcome: Impacts on the environment are minimised during site establishment and the development footprint are kept to demarcated development area.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– A method statement must be provided by the contractor prior to any onsite activity that includes the layout of the construction camp in the form of a plan showing the location of key infrastructure and services (where applicable), including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous materials storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management; – Location of camps must be within approved area to ensure that the site does not impact on sensitive areas identified in the environmental assessment or site walk through; – Sites must be located where possible on previously disturbed areas; – The camp must be fenced in accordance with ***Section 5.5: Fencing and gate installation***; and – The use of existing accommodation for contractor staff, where possible, is encouraged.						

5.3 Access restricted areas

Impact management outcome: Access to restricted areas prevented.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identification of access restricted areas is to be informed by the environmental assessment, site walk through and any additional areas identified during development; – Erect, demarcate and maintain a temporary barrier with clear signage around the perimeter of any access restricted area, colour coding could be used if appropriate; and – Unauthorised access and development related activity inside access restricted areas is prohibited.						

5.4 Access roads

Impact management outcome: Minimise impact to the environment through the planned and restricted movement of vehicles on site.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Access to the servitude and tower positions must be negotiated with the relevant landowner and must fall within the assessed and authorised area; – An access agreement must be formalised and signed by the DPM, Contractor and landowner before commencing with the activities;						

– The access roads to tower positions must be signposted after access has been negotiated and before the commencement of the activities; – All private roads used for access to the servitude must be maintained and upon completion of the works, be left in at least the original condition – All contractors must be made aware of all these access routes. – Any access route deviation from that in the written agreement must be closed and re-vegetated immediately, at the contractor's expense; – Maximum use of both existing servitudes and existing roads must be made to minimize further disturbance through the development of new roads; – In circumstances where private roads must be used, the condition of the said roads must be recorded in accordance with ***section 4.9: photographic record***; prior to use and the condition thereof agreed by the landowner, the DPM, and the contractor; – Access roads in flattish areas must follow fence lines and tree belts to avoid fragmentation of vegetated areas or croplands – Access roads must only be developed on pre-planned and approved roads.						

5.5 Fencing and Gate installation

Impact management outcome: Minimise impact to the environment and ensure safe and controlled access to the site through the erection of fencing and gates where required.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Use existing gates provided to gain access to all parts of the area authorised for development, where possible; – Existing and new gates to be recorded and documented in accordance with ***section 4.9: photographic record***; – All gates must be fitted with locks and be kept locked at all times during the development phase, unless otherwise agreed with the landowner; – At points where the line crosses a fence in which there is no suitable gate within the extent of the line servitude, on the instruction of the DPM, a gate must be installed at the approval of the landowner; – Care must be taken that the gates must be so erected that there is a gap of no more than 100 mm between the bottom of the gate and the ground; – Where gates are installed in jackal proof fencing, a suitable reinforced concrete sill must be provided beneath the gate; – Original tension must be maintained in the fence wires; – All gates installed in electrified fencing must be re-electrified; – All demarcation fencing and barriers must be maintained in good working order for the duration of overhead transmission and distribution electricity infrastructure development activities; – Fencing must be erected around the camp, batching plants, hazardous storage areas, and all designated access						

restricted areas, where appropriate and would not cause harm to the sensitive flora; – Any temporary fencing to restrict the movement of life-stock must only be erected with the permission of the land owner. – All fencing must be developed of high quality material bearing the SABS mark; – The use of razor wire as fencing must be avoided; – Fenced areas with gate access must remain locked after hours, during weekends and on holidays if staff is away from site. Site security will be required at all times; – On completion of the development phase all temporary fences are to be removed; – The contractor must ensure that all fence uprights are appropriately removed, ensuring that no uprights are cut at ground level but rather removed completely.						

5.6 Water Supply Management

Impact management outcome: Undertake responsible water usage**.**						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All abstraction points or bore holes must be registered with the DWS and suitable water meters installed to ensure that the abstracted volumes are measured on a daily basis; – The Contractor must ensure the following: a. The vehicle abstracting water from a river does not enter						

or cross it and does not operate from within the river; b. No damage occurs to the river bed or banks and that the abstraction of water does not entail stream diversion activities; and c. All reasonable measures to limit pollution or sedimentation of the downstream watercourse are implemented. – Ensure water conservation is being practiced by: a. Minimising water use during cleaning of equipment; b. Undertaking regular audits of water systems; and c. Including a discussion on water usage and conservation during environmental awareness training. d. The use of grey water is encouraged.						

5.7 Storm and waste water management

Impact management outcome: Impacts to the environment caused by storm water and wastewater discharges during construction are avoided.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Runoff from the cement/ concrete batching areas must be strictly controlled, and contaminated water must be collected, stored and either treated or disposed of off-site, at a location approved by the project manager; – All spillage of oil onto concrete surfaces must be controlled by the use of an approved absorbent material and the used absorbent material disposed of at an appropriate waste disposal facility; – Natural storm water runoff not contaminated during the						

development and clean water can be discharged directly to watercourses and water bodies, subject to the Project Manager's approval and support by the ECO; – Water that has been contaminated with suspended solids, such as soils and silt, may be released into watercourses or water bodies only once all suspended solids have been removed from the water by settling out these solids in settlement ponds. The release of settled water back into the environment must be subject to the Project Manager's approval and support by the ECO.						

5.8 Solid and hazardous waste management

Impact management outcome: Waste is appropriately stored, handled and safely disposed of at a recognised waste facility.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All measures regarding waste management must be undertaken using an integrated waste management approach; – Sufficient, covered waste collection bins (scavenger and weatherproof) must be provided; – A suitably positioned and clearly demarcated waste collection site must be identified and provided; – The waste collection site must be maintained in a clean and orderly manner;						

– Waste must be segregated into separate bins and clearly marked for each waste type for recycling and safe disposal; – Staff must be trained in waste segregation; – Bins must be emptied regularly; – General waste produced onsite must be disposed of at registered waste disposal sites/ recycling company; – Hazardous waste must be disposed of at a registered waste disposal site; – Certificates of safe disposal for general, hazardous and recycled waste must be maintained.						

5.9 Protection of watercourses and estuaries

Impact management outcome: Pollution and contamination of the watercourse environment and or estuary erosion are prevented.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All watercourses must be protected from direct or indirect spills of pollutants such as solid waste, sewage, cement, oils, fuels, chemicals, aggregate tailings, wash and contaminated water or organic material resulting from the Contractor's activities; – In the event of a spill, prompt action must be taken to clear the polluted or affected areas; – Where possible, no development equipment must traverse any seasonal or permanent wetland – No return flow into the estuaries must be allowed and no disturbance of the Estuarine Functional Zone should occur;						

– Development of permanent watercourse or estuary crossing must only be undertaken where no alternative access to tower position is available; – There must not be any impact on the long term morphological dynamics of watercourses or estuaries; – Existing crossing points must be favored over the creation of new crossings (including temporary access) – When working in or near any watercourse or estuary, the following environmental controls and consideration must be taken: a) Water levels during the period of construction; No altering of the bed, banks, course or characteristics of a watercourse b) During the execution of the works, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented e.g. including ensuring that construction equipment is well maintained; c) Where earthwork is being undertaken in close proximity to any watercourse, slopes must be stabilised using suitable materials, i.e. sandbags or geotextile fabric, to prevent sand and rock from entering the channel; and d) Appropriate rehabilitation and re-vegetation measures for the watercourse banks must be implemented timeously. In this regard, the banks should be appropriately and incrementally stabilised as soon as development allows.						

5.10 Vegetation clearing

Impact management outcome: Vegetation clearing is restricted to the authorised development footprint of the proposed infrastructure.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
General: – Indigenous vegetation which does not interfere with the development must be left undisturbed; – Protected or endangered species may occur on or near the development site. Special care should be taken not to damage such species; – Search, rescue and replanting of all protected and endangered species likely to be damaged during project development must be identified by the relevant specialist and completed prior to any development or clearing; – Permits for removal must be obtained from the Department of Agriculture, Forestry and Fisheries prior to the cutting or clearing of the affected species, and they must be filed; – The Environmental Audit Report must confirm that all identified species have been rescued and replanted and that the location of replanting is compliant with conditions of approvals; – Trees felled due to construction must be documented and form part of the Environmental Audit Report; – Rivers and watercourses must be kept clear of felled trees, vegetation cuttings and debris; – Only a registered pest control operator may apply herbicides on a commercial basis and commercial application must be carried out under the supervision of a registered pest control operator, supervision of a registered						

pest control operator or is appropriately trained; – A daily register must be kept of all relevant details of herbicide usage; – No herbicides must be used in estuaries; – All protected species and sensitive vegetation not removed must be clearly marked and such areas fenced off in accordance to ***Section 5.3: Access restricted areas***. **Servitude:** – Vegetation that does not grow high enough to cause interference with overhead transmission and distribution infrastructures, or cause a fire hazard to any plantation, must not be cut or trimmed unless it is growing in the road access area, and then only at the discretion of the Project Manager; – Where clearing for access purposes is essential, the maximum width to be cleared within the servitude must be in accordance to distance as agreed between the land owner and the EA holder – Alien invasive vegetation must be removed according to a plan (in line with relevant municipal and provincial procedures, guidelines and recommendations) and disposed of at a recognised waste disposal facility; – Vegetation must be trimmed where it is likely to intrude on the minimum vegetation clearance distance (MVCD) or will intrude on this distance before the next scheduled clearance. MVCD is determined from SANS 10280; – Debris resulting from clearing and pruning must be disposed of at a recognised waste disposal facility, unless the landowners wish to retain the cut vegetation; – In the case of the development of new overhead transmission and distribution infrastructures, a one metre "trace-line" must be cut through the vegetation for stringing						

purposes only and no vehicle access must be cleared along the "trace-line". Alternative methods of stringing which limit impact to the environment must always be considered.						

5.11 Protection of fauna

Impact management outcome: Minimise disturbance to fauna.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– No interference with livestock must occur without the landowner's written consent and with the landowner or a person representing the landowner being present; – The breeding sites of raptors and other wild birds species must be taken into consideration during the planning of the development programme; – Breeding sites must be kept intact and disturbance to breeding birds must be avoided. Special care must be taken where nestlings or fledglings are present; – Nesting sites on existing parallel lines must documented; – Special recommendations of the avian specialist must be adhered to at all times to prevent unnecessary disturbance of birds; – Bird guards and diverters must be installed on the new line as per the recommendations of the specialist; – No poaching must be tolerated under any circumstances. All animal dens in close proximity to the works areas must be marked as Access restricted areas; – No deliberate or intentional killing of fauna is allowed;						

– In areas where snakes are abundant, snake deterrents to be deployed on the pylons to prevent snakes climbing up, being electrocuted and causing power outages; and – No Threatened or Protected species (ToPs) and/or protected fauna as listed according NEMBA (Act No. 10 of 2004) and relevant provincial ordinances may be removed and/or relocated without appropriate authorisations/permits.						

5.12 Protection of heritage resources

Impact management outcome: Minimise impact to heritage resources.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identify, demarcate and prevent impact to all known sensitive heritage features on site in accordance with the No-Go procedure in ***Section 5.3: Access restricted areas***; – Carry out general monitoring of excavations for potential fossils, artefacts and material of heritage importance; – All work must cease immediately, if any human remains and/or other archaeological, palaeontological and historical material are uncovered. Such material, if exposed, must be reported to the nearest museum, archaeologist/ palaeontologist (or the South African Police Services), so that a systematic and professional investigation can be undertaken. Sufficient time must be allowed to						

remove/collect such material before development recommences.						

5.13 Safety of the public

Impact management outcome: All precautions are taken to minimise the risk of injury, harm or complaints.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identify fire hazards, demarcate and restrict public access to these areas as well as notify the local authority of any potential threats e.g. large brush stockpiles, fuels etc.; – All unattended open excavations must be adequately fenced or demarcated; – Adequate protective measures must be implemented to prevent unauthorised access to and climbing of partly constructed towers and protective scaffolding; – Ensure structures vulnerable to high winds are secured; – Maintain an incidents and complaints register in which all incidents or complaints involving the public are logged.						

5.14 Sanitation

Impact management outcome: Clean and well maintained toilet facilities are available to all staff in an effort to minimise the risk of disease and impact to the environment.		
Impact Management Actions	**Implementation**	**Monitoring**

	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Mobile chemical toilets are installed onsite if no other ablution facilities are available; – The use of ablution facilities and or mobile toilets must be used at all times and no indiscriminate use of the veld for the purposes of ablutions must be permitted under any circumstances; – Where mobile chemical toilets are required, the following must be ensured: a) Toilets are located no closer than 100 m to any watercourse or water body; b) Toilets are secured to the ground to prevent them from toppling due to wind or any other cause; c) No spillage occurs when the toilets are cleaned or emptied and the contents are managed in accordance with the EMPr; d) Toilets have an external closing mechanism and are closed and secured from the outside when not in use to prevent toilet paper from being blown out; e) Toilets are emptied before long weekends and workers holidays, and must be locked after working hours; f) Toilets are serviced regularly and the ECO must inspect toilets to ensure compliance to health standards; – A copy of the waste disposal certificates must be maintained.						

5.15 Prevention of disease

Impact Management outcome: All necessary precautions linked to the spread of disease are taken.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Undertake environmentally-friendly pest control in the camp area; – Ensure that the workforce is sensitised to the effects of sexually transmitted diseases, especially HIV AIDS; – The Contractor must ensure that information posters on AIDS are displayed in the Contractor Camp area; – Information and education relating to sexually transmitted diseases to be made available to both construction workers and local community, where applicable; – Free condoms must be made available to all staff on site at central points; – Medical support must be made available; – Provide access to Voluntary HIV Testing and Counselling Services.						

5.16 Emergency procedures

Impact management outcome: Emergency procedures are in place to enable a rapid and effective response to all types of environmental emergencies.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Compile an Emergency Response Action Plan (ERAP) prior to the commencement of the proposed project; – The Emergency Plan must deal with accidents, potential spillages and fires in line with relevant legislation; – All staff must be made aware of emergency procedures as part of environmental awareness training; – The relevant local authority must be made aware of a fire as soon as it starts; – In the event of emergency necessary mitigation measures to contain the spill or leak must be implemented (see ***Hazardous Substances section 5.17***).						

5.17 Hazardous substances

Impact management outcome: Safe storage, handling, use and disposal of hazardous substances.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The use and storage of hazardous substances to be minimised and non-hazardous and non-toxic alternatives						

substituted where possible; – All hazardous substances must be stored in suitable containers as defined in the Method Statement; – Containers must be clearly marked to indicate contents, quantities and safety requirements; – All storage areas must be bunded. The bunded area must be of sufficient capacity to contain a spill / leak from the stored containers; – Bunded areas to be suitably lined with a SABS approved liner; – An Alphabetical Hazardous Chemical Substance (HCS) control sheet must be drawn up and kept up to date on a continuous basis; – All hazardous chemicals that will be used on site must have Material Safety Data Sheets (MSDS); – All employees working with HCS must be trained in the safe use of the substance and according to the safety data sheet; – Employees handling hazardous substances / materials must be aware of the potential impacts and follow appropriate safety measures. Appropriate personal protective equipment must be made available; – The Contractor must ensure that diesel and other liquid fuel, oil and hydraulic fluid is stored in appropriate storage tanks or in bowsers; – The tanks/ bowsers must be situated on a smooth impermeable surface (concrete) with a permanent bund. The impermeable lining must extend to the crest of the bund and the volume inside the bund must be 130% of the total capacity of all the storage tanks/ bowsers (110% statutory requirement plus an allowance for rainfall);						

– The floor of the bund must be sloped, draining to an oil separator; – Provision must be made for refueling at the storage area by protecting the soil with an impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained; – All empty externally dirty drums must be stored on a drip tray or within a bunded area; – No unauthorised access into the hazardous substances storage areas must be permitted; – No smoking must be allowed within the vicinity of the hazardous storage areas; – Adequate fire-fighting equipment must be made available at all hazardous storage areas; – Where refueling away from the dedicated refueling station is required, a mobile refueling unit must be used. Appropriate ground protection such as drip trays must be used; – An appropriately sized spill kit kept onsite relevant to the scale of the activity/s involving the use of hazardous substance must be available at all times; – The responsible operator must have the required training to make use of the spill kit in emergency situations; – An appropriate number of spill kits must be available and must be located in all areas where activities are being undertaken; – In the event of a spill, contaminated soil must be collected in containers and stored in a central location and disposed of according to the National Environmental Management: Waste Act 59 of 2008. Refer to ***Section 5.7*** for procedures concerning ***storm and waste water management*** and ***5.8*** for ***solid and hazardous waste management.***						

5.18 Workshop, equipment maintenance and storage

Impact management outcome: Soil, surface water and groundwater contamination is minimised.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Where possible and practical all maintenance of vehicles and equipment must take place in the workshop area; – During servicing of vehicles or equipment, especially where emergency repairs are effected outside the workshop area, a suitable drip tray must be used to prevent spills onto the soil. The relevant local authority must be made aware of a fire as soon as it starts; – Leaking equipment must be repaired immediately or be removed from site to facilitate repair; – Workshop areas must be monitored for oil and fuel spills; – Appropriately sized spill kit kept onsite relevant to the scale of the activity taking place must be available; – The workshop area must have a bunded concrete slab that is sloped to facilitate runoff into a collection sump or suitable oil / water separator where maintenance work on vehicles and equipment can be performed; – Water drainage from the workshop must be contained and managed in accordance ***Section 5.7: storm and waste water management***.						

5.19 Batching plants

Impact management outcome: Minimise spillages and contamination of soil, surface water and groundwater**.**						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Concrete mixing must be carried out on an impermeable surface; – Batching plants areas must be fitted with a containment facility for the collection of cement laden water. – Dirty water from the batching plant must be contained to prevent soil and groundwater contamination – Bagged cement must be stored in an appropriate facility and at least 10 m away from any water courses, gullies and drains; – A washout facility must be provided for washing of concrete associated equipment. Water used for washing must be restricted; – Hardened concrete from the washout facility or concrete mixer can either be reused or disposed of at an appropriate licenced disposal facility; – Empty cement bags must be secured with adequate binding material if these will be temporarily stored on site; – Sand and aggregates containing cement must be kept damp to prevent the generation of dust (Refer to ***Section 5.20: Dust emissions***)						

– Any excess sand, stone and cement must be removed or reused from site on completion of construction period and disposed at a registered disposal facility; – Temporary fencing must be erected around batching plants in accordance with ***Section 5.5: Fencing and gate installation***.						

5.20 Dust emissions

Impact management outcome: Dust prevention measures are applied to minimise the generation of dust.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Take all reasonable measures to minimise the generation of dust as a result of project development activities to the satisfaction of the ECO; – Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces must be re-vegetated or stabilised as soon as is practically possible; – Excavation, handling and transport of erodible materials must be avoided under high wind conditions or when a visible dust plume is present; – During high wind conditions, the ECO must evaluate the situation and make recommendations as to whether dust-damping measures are adequate, or whether working will cease altogether until the wind speed drops to an						

acceptable level; – Where possible, soil stockpiles must be located in sheltered areas where they are not exposed to the erosive effects of the wind; – Where erosion of stockpiles becomes a problem, erosion control measures must be implemented at the discretion of the ECO; – Vehicle speeds must not exceed 40 km/h along dust roads or 20 km/h when traversing unconsolidated and non- vegetated areas; – Straw stabilisation must be applied at a rate of one bale/10 m² and harrowed into the top 100 mm of top material, for all completed earthworks; – For significant areas of excavation or exposed ground, dust suppression measures must be used to minimise the spread of dust.						

5.21 Blasting

Impact management outcome: Impact to the environment is minimised through a safe blasting practice.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Any blasting activity must be conducted by a suitably licensed blasting contractor; and – Notification of surrounding landowners, emergency services site personnel of blasting activity 24 hours prior to such						

activity taking place on Site.						

5.22 Noise

Impact Management outcome: Unnecessary noise is prevented by ensuring that noise from construction activities is mitigated.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The Contractor must keep noise level within acceptable limits, Restrict the use of sound amplification equipment for communication and emergency only; – All vehicles and machinery must be fitted with appropriate silencing technology and must be properly maintained; – Any complaints received by the Contractor regarding noise must be recorded and communicated. Where possible or applicable, provide transport to and from the site on a daily basis for construction workers; – Develop a Code of Conduct for the construction phase in terms of behaviour of construction staff.Operating hours as determined by the environmental authorisation are adhered to during the development phase. Where not defined, it must be ensured that development activities must still meet the impact management outcome related to noise management.						

5.23 Fire prevention

Impact management outcome: Prevention of uncontrollable fires.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Designate smoking areas where the fire hazard could be regarded as insignificant; – Firefighting equipment must be available on all vehicles located on site; – The local Fire Protection Agency (FPA) must be informed of construction activities; – Contact numbers for the FPA and emergency services must be communicated in environmental awareness training and displayed at a central location on site; – Two way swop of contact details between ECO and FPA.						

5.24 Stockpiling and stockpile areas

Impact management outcome: Erosion and sedimentation as a result of stockpiling are reduced.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All material that is excavated during the project development phase (either during piling (if required) or earthworks) must be stored appropriately on site in order to minimise impacts to watercourses, watercourses and water bodies; – All stockpiled material must be maintained and kept clear of weeds and alien vegetation growth by undertaking regular weeding and control methods; – Topsoil stockpiles must not exceed 2 m in height; – During periods of strong winds and heavy rain, the stockpiles must be covered with appropriate material (e.g. cloth, tarpaulin etc.); – Where possible, sandbags (or similar) must be placed at the bases of the stockpiled material in order to prevent erosion of the material.						

5.25 Finalising tower positions

Impact management outcome: No environmental degradation occurs as a result of the survey and pegging operations.

Impact Management Actions	Implementation			Monitoring		
	Responsible	Method of	Timeframe for	Responsible	Frequency	Evidence of

	person	implementation	implementation	person		compliance
– No vegetation clearing must occur during survey and pegging operations; – No new access roads must be developed to facilitate access for survey and pegging purposes; – Project manager, botanical specialist and contractor to agree on final tower positions based on survey within assessed and approved areas; – The surveyor is to demarcate (peg) access roads/tracks in consultation with ECO. No deviations will be allowed without the prior written consent from the ECO.						

5.26 Excavation and Installation of foundations

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
Impact management outcome: No environmental degradation occurs as a result of excavation or installation of foundations.						
– All excess spoil generated during foundation excavation must be disposed of in an appropriate manner and at a recognised disposal site, if not used for backfilling purposes; – Spoil can however be used for landscaping purposes and must be covered with a layer of 150 mm topsoil for rehabilitation purposes; – Management of equipment for excavation purposes must be undertaken in accordance with ***Section 5.18: Workshop equipment maintenance and storage***; and – Hazardous substances spills from equipment must be						

managed in accordance with ***Section 5.17: Hazardous substances***. – Batching of cement to be undertaken in accordance with **Section 5.19 : *Batching plants***; – Residual cement must be disposed of in accordance with **Section 5.8: *Solid and hazardous waste management***.						

5.27 Assembly and erecting towers

Impact management outcome: No environmental degradation occurs as a result of assembly and erecting of towers.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Prior to erection, assembled towers and tower sections must be stored on elevated surface (suggest wooden blocks) to minimise damage to the underlying vegetation; – In sensitive areas, tower assembly must take place off-site or away from sensitive positions; – The crane used for tower assembly must be operated in a manner which minimises impact to the environment; – The number of crane trips to each site must be minimised; – Wheeled cranes must be utilised in preference to tracked cranes; – Consideration must be given to erecting towers by helicopter or by hand where it is warranted to limit the extent						

of environmental impact; – Access to tower positions to be undertaken in accordance with access requirements in specified in Section 8.4: Access Roads; – Vegetation clearance to be undertaken in accordance with general vegetation clearance requirements specified in Section 8.10: Vegetation clearing; – No levelling at tower sites must be permitted unless approved by the Development Project Manager or Developer Site Supervisor; – Topsoil must be removed separately from subsoil material and stored for later use during rehabilitation of such tower sites; – Topsoil must be stored in heaps not higher than 1m to prevent destruction of the seed bank within the topsoil; – Excavated slopes must be no greater that 1:3, but where this is unavoidable, appropriate measures must be undertaken to stabilise the slopes; – Fly rock from blasting activity must be minimised and any pieces greater than 150 mm falling beyond the Working Area, must be collected and removed; – Only existing disturbed areas are utilised as spoil areas; – Drainage is provided to control groundwater exit gradient with the spill areas such that migration of fines is kept to a minimum; – Surface water runoff is appropriately channeled through or around spoil areas; – During backfilling operations, care must be taken not to dump the topsoil at the bottom of the foundation and then put spoil on top of that; – The surface of the spoil is appropriately rehabilitated in						

accordance with the requirements specified in Section 5.29: Landscaping and rehabilitation; – The retained topsoil must be spread evenly over areas to be rehabilitated and suitably compacted to effect re-vegetation of such areas to prevent erosion as soon as construction activities on the site is complete. Spreading of topsoil must not be undertaken at the beginning of the dry season.						

5.28 Stringing

Impact management outcome: No environmental degradation occurs as a result of stringing.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Where possible, previously disturbed areas must be used for the siting of winch and tensioner stations. In all other instances, the siting of the winch and tensioner must avoid Access restricted areas and other sensitive areas; – The winch and tensioner station must be equipped with drip trays in order to contain any fuel, hydraulic fuel or oil spills and leaks; – Refueling of the winch and tensioner stations must be undertaken in accordance with Section 5.17: Hazardous substances;						

– In the case of the development of overhead transmission and distribution infrastructure, a one metre “trace-line” may be cut through the vegetation for stringing purposes only and no vehicle access must be cleared along ”trace-lines”. Vegetation clearing must be undertaken by hand, using chainsaws and hand held implements, with vegetation being cut off at ground level. No tracked or wheeled mechanised equipment must be used; – Alternative methods of stringing which limit impact to the environment must always be considered e.g. by hand or by using a helicopter; – Where the stringing operation crosses a public or private road or railway line, the necessary scaffolding/ protection measures must be installed to facilitate access. If, for any reason, such access has to be closed for any period(s) during development, the persons affected must be given reasonable notice, in writing; – No services (electrical distribution lines, telephone lines, roads, railways lines, pipelines fences etc.) must be damaged because of stringing operations. Where disruption to services is unavoidable, persons affected must be given reasonable notice, in writing; – Where stringing operations cross cultivated land, damage to crops is restricted to the minimum required to conduct stringing operations, and reasonable notice (10 work days minimum), in writing, must be provided to the landowner; – Necessary scaffolding protection measures must be installed to prevent damage to the structures supporting certain high value agricultural areas such as vineyards, orchards, nurseries.						

5.29 Socio-economic

Impact management outcome: Socio-economic development is enhanced.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Develop and implement communication strategies to facilitate public participation; – Develop and implement a collaborative and constructive approach to conflict resolution as part of the external stakeholder engagement process; – Sustain continuous communication and liaison with neighboring owners and residents – Create work and training opportunities for local stakeholders; and – Where feasible, no workers, with the exception of security personnel, must be permitted to stay over-night on the site. This would reduce the risk to local farmers.						

5.30 Temporary closure of site

Impact management outcome: Minimise the risk of environmental impact during periods of site closure greater than five days.		
Impact Management Actions	**Implementation**	**Monitoring**

	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Bunds must be emptied (where applicable) and need to be undertaken in accordance with the impact management actions included in ***sections 5.17: management of hazardous substances*** and ***5.18 workshop, equipment maintenance and storage***; – Hazardous storage areas must be well ventilated; – Fire extinguishers must be serviced and accessible. Service records to be filed and audited at last service; – Emergency and contact details displayed must be displayed; – Security personnel must be briefed and have the facilities to contact or be contacted by relevant management and emergency personnel; – Night hazards such as reflectors, lighting, traffic signage etc. must have been checked; – Fire hazards identified and the local authority must have been notified of any potential threats e.g. large brush stockpiles, fuels etc.; – Structures vulnerable to high winds must be secured; – Wind and dust mitigation must be implemented; – Cement and materials stores must have been secured; – Toilets must have been emptied and secured; – Refuse bins must have been emptied and secured; – Drip trays must have been emptied and secured.						

5.31 Landscaping and rehabilitation

Impact management outcome: Areas disturbed during the development phase are returned to a state that approximates the original condition.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All areas disturbed by construction activities must be subject to landscaping and rehabilitation; All spoil and waste must be disposed to a registered waste site and certificates of disposal provided; – All slopes must be assessed for contouring, and to contour only when the need is identified in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983 – All slopes must be assessed for terracing, and to terrace only when the need is identified in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983; – Berms that have been created must have a slope of 1:4 and be replanted with indigenous species and grasses that approximates the original condition; – Where new access roads have crossed cultivated farmlands, that lands must be rehabilitated by ripping which must be agreed to by the holder of the EA and the landowners; – Rehabilitation of tower sites and access roads outside of farmland; – Indigenous species must be used for with species and/grasses to where it compliments or approximates the original condition; – Stockpiled topsoil must be used for rehabilitation (refer to						

Section ***5.24: Stockpiling and stockpiled areas***); – Stockpiled topsoil must be evenly spread so as to facilitate seeding and minimise loss of soil due to erosion; – Before placing topsoil, all visible weeds from the placement area and from the topsoil must be removed; – Subsoil must be ripped before topsoil is placed; – The rehabilitation must be timed so that rehabilitation can take place at the optimal time for vegetation establishment; – Where impacted through construction related activity, all sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled ; – Sloped areas stabilised using design structures or vegetation as specified in the design to prevent erosion of embankments. The contract design specifications must be adhered to and implemented strictly; – Spoil can be used for backfilling or landscaping as long as it is covered by a minimum of 150 mm of topsoil. – Where required, re-vegetation including hydro-seeding can be enhanced using a vegetation seed mixture as described below. A mixture of seed can be used provided the mixture is carefully selected to ensure the following: a) Annual and perennial plants are chosen; b) Pioneer species are included; c) Species chosen must be indigenous to the area with the seeds used coming from the area; d) Root systems must have a binding effect on the soil; e) The final product must not cause an ecological imbalance in the area						

6 ACCESS TO THE GENERIC EMPr

Once completed and signed, to allow the public access to the generic EMPr, the holder of the EA must make the EMPr available to the public in accordance with the requirements of regulation 26(h) of the EIA Regulations.

PART B: SECTION 2

7 SITE SPECIFIC INFORMATION AND DECLARATION

7.1 Sub-section 1: contact details and description of the project

7.1.1 Details of the applicant: Emvelo Wind Energy Facility (PTY) LTD

Name of applicant: **Mulilo Energy Holdings (PTY) LTD**

Tel No: **(+27) 21 685 3240**

Fax No: **N/A**

Postal Address: **Portside, 5 Buitengracht Street, Cape Town, Western Cape, 8001**

Physical Address: **Same as above**

7.1.2 Details and expertise of the EAP:

Name of applicant: **Environmental Resource Management Southern Africa (Pty) Ltd**

Tel No: **+27105963502**

Fax No: **N/A**

E-mail address: stephanie.gopaul@erm.com / erm.arcusamsterdam@erm.com

Expertise of the EAP (Curriculum Vitae included): Masters in Environmental Management, University of the Free State, South Africa, 2012 BSc. Environmental and Engineering Geology, University of KwaZulu Natal, South Africa, 2005

7.1.3 Project name:

Mulilo Amsterdam Emvelo Wind Energy Facility and associated infrastructure , including a Grid Connection located in the Msukaligwa Local Municipality, and Gert Sibande District Municipality, Mpumalanga Province

7.1.4 Description of the project:

Mulilo Amsterdam Emvelo Wind Energy Facility (Pty) Ltd proposes the establishment of a Wind Energy facility (WEF), including associated infrastructure and a grid connection ('the WEF and associated infrastructure'), near the town of Ermelo, in the Mpumalanga Province. The WEF and associated infrastructure are situated approximately 30 km east of Ermelo.

The WEF will comprise 24 wind turbines and will have a contracted capacity of up to 260 MW. The WEF and associated infrastructure will connect to the future planned collector / switching station and an up to 132 kV powerline of approximately 30 km to connect to the ESKOM Uitkoms Substation. A separate environmental process is being undertaken to assess the collector / switching station and its connection to the national grid.

The WEF is located the Msukaligwa Local Municipality and Gert Sibande District Municipality, Mpumalange Province.

The project is planned as part of a larger cluster, which includes one additional WEF facility (Sheepmoor WEF Facility) up to 260 MW. An assessment area of approximately 185 ha is being assessed as part of this S&EIA process and the infrastructure associated with the facility includes:

- **Up to 24 wind turbines, with a maximum hub height of up to 150 m and a rotor diameter of up to 220 m;**

- Temporary laydown areas which will accommodate the crane platforms and hardstand laydown area;
- Cabling between the turbines, to be laid underground where practical and feasible;
- One on-site substation with capacity of up to 132 kV to facilitate the connection between the WEF and the electricity grid;
- 132 kV over-head powerline of approximately 30 km (300 m corridor);
- Internal roads (existing roads will be upgraded wherever possible);
- A temporary site camp establishment and concrete batching;
- Operation and Maintenance (O&M) buildings; and
- Total permanent development footprint of up to 185 ha after rehabilitation.

7.1.5 Project location:

Proposed Emvelo WEF Site Boundary and Associated Infrastructure		
Aspect	**Longitude**	**Latitude**
WEF Site Boundary		
Reference Point 1	030° 18' 28.77" E	26° 30' 22.16" S
Reference Point 2	030° 20' 52.66" E	26° 31' 30.0" S
Reference Point 3	030° 19' 42.69" E	26° 34' 7.64" S
Reference Point 4	030° 17' 24.78" E	26° 33' 23.58" S
Reference Point 5	030° 20' 21.49" E	26° 34' 18.86" S
Reference Point 6	030° 21' 39.3" E	26° 37' 27.32" S
Reference Point 7	030° 23' 1.11" E	26° 36' 14.19" S
Reference Point 8	030° 18' 31.04" E	26° 36' 40.53" S
O&M Facilities		
Northeast Corner	030° 20' 48.37" E	26° 36' 43.14" S
Southeast Corner	030° 20' 47.59" E	26° 36' 45.55" S
Southwest Corner	030° 20' 41.77" E	26° 36' 43.79" S
Northwest Corner	030° 20' 42.7" E	26° 36' 41.28" S
Substations		
Southeast Corner	030° 20' 55.1" E	26° 35' 17.25" S
Southwest Corner	030° 20' 52.19" E	26° 35' 16.29" S
Northwest Corner	030° 20' 52.74" E	26° 35' 12.9" S

Proposed Emvelo WEF Site Boundary and Associated Infrastructure		
Northeast Corner	030° 20' 56.07" E	26° 35' 13.27" S
Tower Laydown Areas		
Northeast Corner	030° 18' 43.39" E	26° 31' 33.82" S
Southeast Corner	030° 18' 38.76" E	26° 31' 41.13" S
Southwest Corner	030° 18' 30.96" E	26° 31' 38.07" S
Northwest Corner	030° 18' 34.33" E	26° 31' 31.28" S

7.16 Preliminary technical specification of the overhead transmission and distribution:

WEF Technical Details Components	Description/Dimensions - Emvelo
Maximum Generation Capacity	Up to 260MW
Type of technology	Onshore Wind
Number of Turbines	Up to 24
WTG Hub Height from ground level	Up to 150 m
Blade Length	Up to 110 m
Rotor Diameter	Up to 220 m
Structure height (Tip Height)	Up to 260 m
Structure orientation	Wind regime dependent
Area occupied by both permanent and construction laydown areas	Total permanent development footprint of up to 185 ha after rehabilitation
O&M building with parking area	Up to 1 ha
Site Access	Locality to be confirmed. Total width up to 15 m (12 m after rehabilitation) consisting of up to 3m width for underground 33 kV reticulation.
Area occupied by inverter transformer stations/substations	Up to 2.5 ha
Capacity of on-site substation	Up to 132 kV
Battery Energy Storage System footprint	Included in the project scope (specific footprint to be determined during the design phase)
Width of internal roads	Up to 15 m to be rehabilitated to up to 12 m.

WEF Technical Details Components	Description/Dimensions - Emvelo
Proximity to grid connection	Approximately 30 km
Internal Cabling	Cabling between the turbines, to be laid underground where technically practical.
Height of fencing	2.8 m

7.2 Sub-section 2: Development footprint site map

This sub-section must include a map of the site sensitivity overlaid with the preliminary infrastructure layout. The sensitivity map must be prepared from the national web based environmental screening tool, when available for compulsory use at: https://screening.environment.gov.za/screeningtool. The sensitivity map shall identify the nature of each sensitive feature e.g. raptor nest, threatened plant species, archaeological site, etc. Sensitivity maps shall identify features both within the planned working area and any known sensitive features in the surrounding landscape. The overhead transmission and distribution profile shall be illustrated at an appropriate resolution to enable fine scale interrogation. It is recommended that <20 km of overhead transmission and distribution length is illustrated per page in A3 landscape format. Where considered appropriate, photographs of sensitive features in the context of tower positions shall be used.

Figure 7-1 Site Development Plan

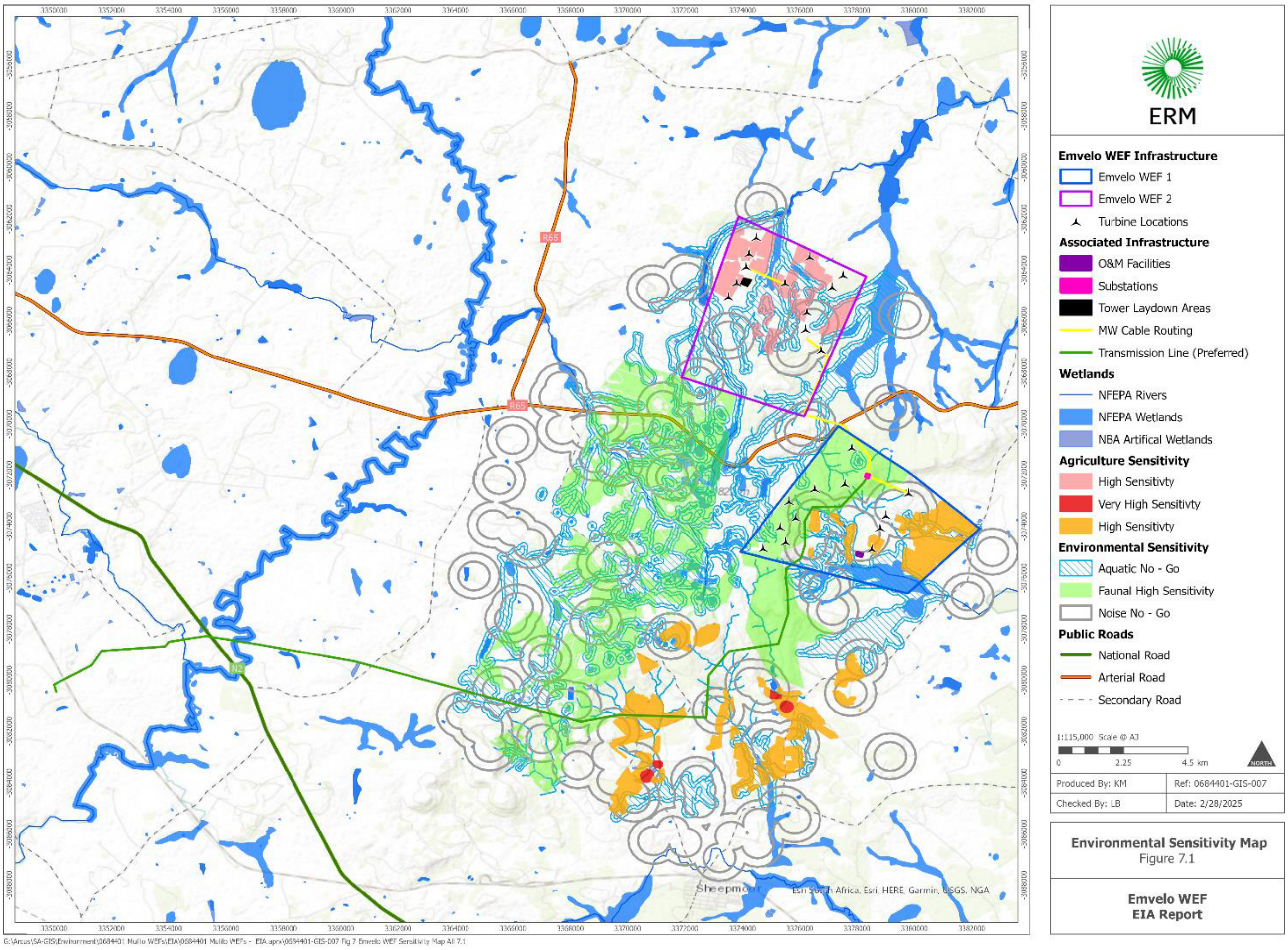


Figure 7-2 Environmental Sensitivity Overlay

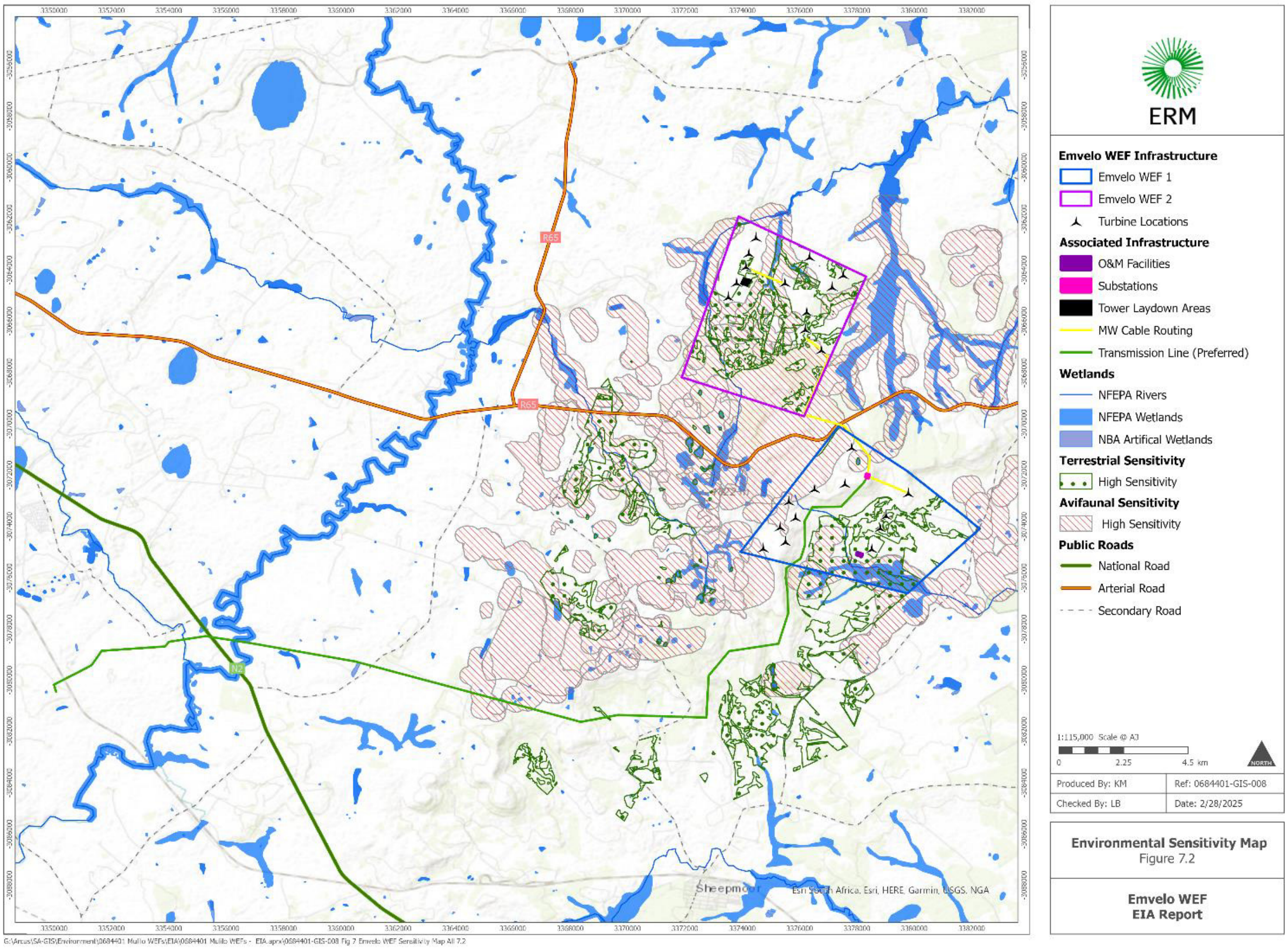
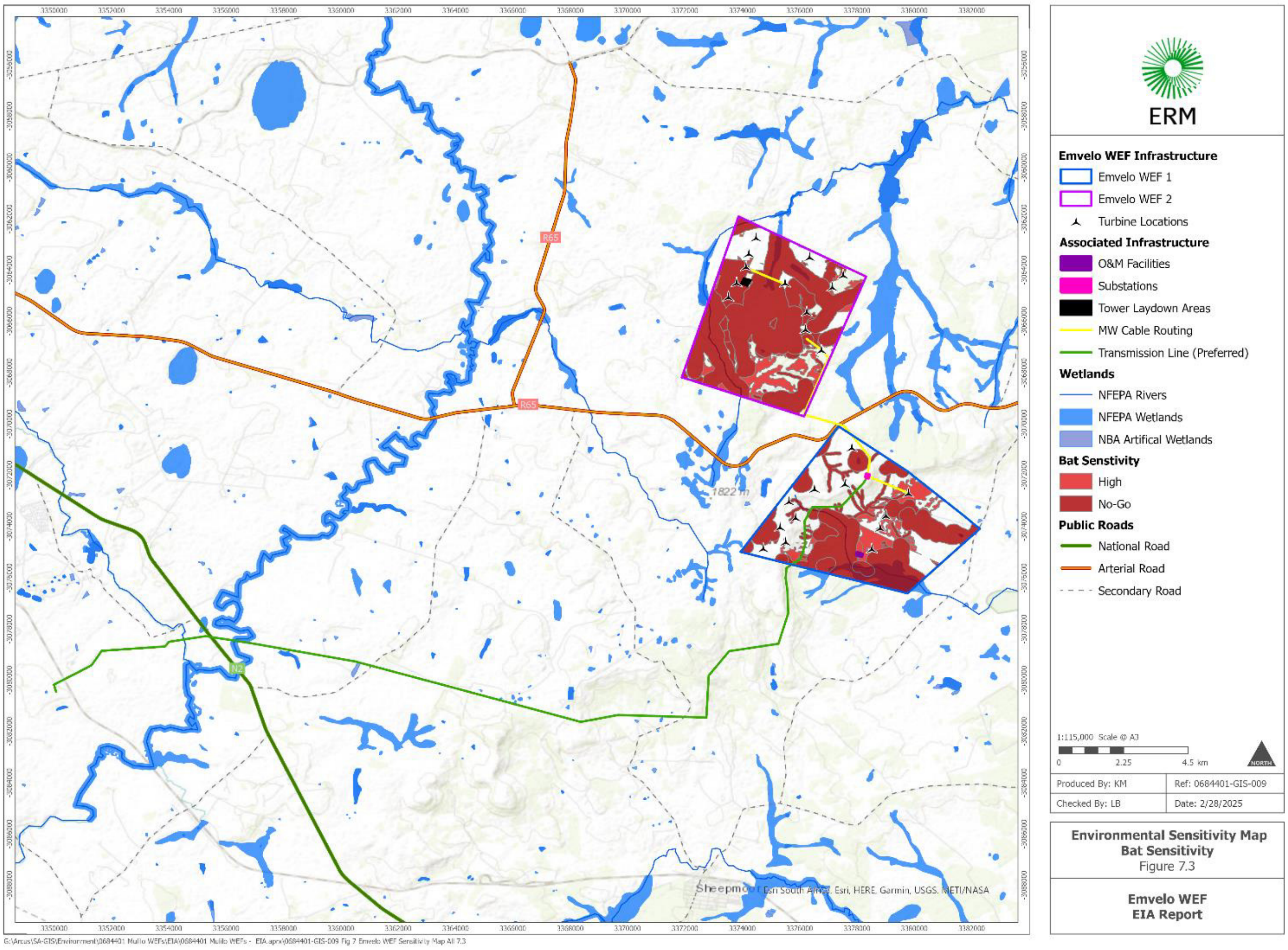


Figure 7-3 Bat Sensitivity Overlay



7.3 Sub-section 3: Declaration

The proponent/applicant or holder of the EA affirms that he/she will abide and comply with the prescribed impact management outcomes and impact management actions as stipulated in part B: section 1 of the generic EMPr and have the understanding that the impact management outcomes and impact management actions are legally binding. The proponent/applicant or holder of the EA affirms that he/she will provide written notice to the CA 14 days prior to the date on which the activity will commence of commencement of construction to facilitate compliance inspections.

Signature Proponent/applicant/ holder of EA Date:

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7.4 Sub-section 4: amendments to site specific information (Part B; section 2)

Should the EA be transferred to a new holder, Part B: Section 2 must be completed by the new holder and submitted with the application for an amendment of the EA in terms of Regulations 29 or 31 of the EIA Regulations, whichever applies. The information submitted for an amendment to an environmental authorisation will be considered to be incomplete should a signed copy of Part B: Section 2 not be submitted. Once approved, Part B: Section 2 forms part of the EMPr for the development and the EMPr becomes legally binding to the new EA holder.

PART C

8 SITE SPECIFIC ENVIRONMENTAL ATTRIBUTES

If any specific environmental sensitivities/attributes are present on the site which require more specific impact management outcomes and impact management actions, not included in the pre-approved generic EMPr template, to manage impacts, those impact management outcomes and actions must be included in this section. These specific management controls must be referenced spatially, and must include impact management outcomes and impact management actions. The management controls including impact management outcomes and impact management actions must be presented in the format of the pre-approved generic EMPr template. This applies only to additional impact management outcomes and impact management actions that are necessary.

If Part C is applicable to the development as authorised in the EA, it is required to be submitted to the CA together with the BAR or EIAR, for consideration of, and decision on, the application for EA. The information in this section must be prepared by an EAP and the name and expertise of the EAP, including the curriculum vitae are to be included. Once approved, Part C forms part of the EMPr for the site and is legally binding.

This section will **not be required** should the site contain no specific environmental sensitivities or attributes.

The following specialist studies were undertaken as part of this project:

- Avifauna Impact Assessment (incl. pre-construction monitoring);
- Biodiversity Impact Assessment;
- Soil and Agricultural Impact Assessment;
- Heritage Impact Assessment (including Palaeontology, Archaeology & Cultural Landscape);
- Social Impact Assessment;
- Transportation Impact Assessment; and
- Visual Impact Assessment;
- Bat Impact Assessment;
- Environmental Noise Impact Assessment;
- Aquatic Assessment.
- Faunal Assessment

The specific mitigation measures provide by the Specialists through the Impact Assessment process are included below.

Pre-construction walk-through of the approved development footprint will be conducted to ensure that sensitive habitats and species are avoided where possible.

Specific Mitigations and Recommendations included in EAIr:

Soil, Land use and Agricultural Potential

Generic mitigation measures that are effective in preventing soil degradation are all inherent in the engineering of such a project and/or are standard, best-practice for construction sites.

- A system of storm water management, which will prevent erosion on and downstream of the site, will be an inherent part of the engineering design on site. Any occurrences of erosion must be attended to immediately and the integrity of the erosion control system at that point must be amended to prevent further erosion from occurring there. As part of the system, the integrity of the existing contour bank systems of erosion control on croplands, where they occur on steeper slopes, must be kept intact.
- Any excavations done during the construction phase, in areas that will be re-vegetated at the end of the construction phase, must separate the upper 40 cm of topsoil from the rest of the excavation spoils and store it in a separate stockpile. When the excavation is back-filled, the topsoil must be back-filled last, so that it is at the surface. Topsoil should only be stripped in areas that are excavated. Across the majority of the site, including construction lay down areas, it will be much more effective for rehabilitation, to retain the topsoil in place. If levelling requires significant cutting, topsoil should be temporarily stockpiled and then re-spread after cutting, so that there is a covering of topsoil over the entire cut surface.

Avifauna

It is imperative that the proposed 24-turbine layout be revised to avoid the recommended avifaunal no-go areas and turbine exclusion zones, including the rotor-swept areas. The proposed Emvelo WEF is expected to have high and medium impacts on avifauna pre-mitigation, which must be addressed through appropriate mitigation measures to reduce the impact significance to an overall medium and low risk.

The proposed Emvelo WEF Grid Connection will have a moderate impact significance on avifauna pre-mitigation which, in most instances, could be reduced to an overall low impact significance through the implementation of appropriate mitigation. From an avifaunal perspective, OHL Alternatives 1 and 2 are least preferred as they have the longest span and therefore pose a higher collision risk to birds. The Preferred OHL Alternative is preferred over OHL Alternative 3 as it avoids the 2.5 km No Disturbance Buffer around the Martial Eagle nest (coordinates provided on request).

In conclusion, the proposed WEF development and its associated electrical grid infrastructure is supported by this Specialist, provided that the implementation of mitigation measures as recommended in this report are strictly adhered to.

Freshwater and Wetlands (Aquatics)

During this assessment, several sensitive aquatic habitats were observed and are shown in the maps provided in this report. Noteworthy areas, were then avoided by the required infrastructure, and include the main riverine and wetland systems, while the access roads could will make use of existing roads thus previously disturbed areas.

If this is carried out, then the specialist has no objection to the authorisation of the proposed activities assuming that all mitigations and buffer zones are implemented.

Mitigation should focus on these areas and include measures to halt erosion and rehabilitate habitat in the sections affected by the construction. Without the implementation of mitigation measures, the project has potential to cause a Moderate cumulative impact upon aquatic biodiversity. However, with the adoption of

mitigation, the proposed project will have a Low impact upon aquatic biodiversity.
As the proposed activities have the potential to create erosion the following recommendations are reiterated:

- Vegetation clearing should occur in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment, and suitable dust and erosion control mitigation measures should be included in the generic EMPr, if not included already to mitigate.
- All construction materials including fuels and oil should be stored in demarcated areas that are contained within berms / bunds to avoid spread of any contamination / leaks. Washing and cleaning of equipment should also be done in berms or bunds, to trap any cement / hazardous substances and prevent excessive soil erosion. Mechanical plant and bowsers must not be refuelled or serviced within or directly adjacent to any channel. It is therefore suggested that all construction camps, lay down areas, batching plants or areas and any stores should be located more than 50 m from any demarcated watercourses.
- It is also advised that an Environmental Control Officer (ECO), with a good understanding of the local flora be appointed during the construction phase. The ECO should be able to make clear recommendations with regards to the re-vegetation of the newly completed / disturbed areas along aquatic features, using selected species detailed in this report.
- All alien plant re-growth must be monitored and should these alien plants reoccur these plants should be re-eradicated. The scale of the operation does however not warrant the use of a Landscape Architect and / or Landscape Contractor.

It is further recommended from the project onset that all watercourse areas (inclusive of buffers) are included into any existing EMPr as reference, this to ensure a net benefit to the aquatic environment. This should from part of the suggested walk down as part of the final EMP preparation.

Bats

The EIA report assessed impacts to bats that could occur because of the construction, operation and decommission of the Emvelo WEF and grid connection. The assessment was based on 16 months of baseline data on bat activity recorded at the project. Based on these data, the key issue for the WEF will be managing collision impacts to Cape serotine and Egyptian free-tailed bat, and cumulative impacts.

The first mitigation measure proposed to manage risk is to adhere to the no-go buffers which aim to spatially avoid impacts by buffering key habitat features used by bats. This measure is likely to be effective for most bat species recorded at the project, but additional mitigation measures are needed to avoid impacts to free-tailed bats, which forage high in the air, and to reduce residual impacts.

Turbine design can be effective, and it is recommended to maintain a minimum blade sweep of at least 30 m. However, free-tailed bats will still collide with turbine blades above this height and as such, the rotor diameter must be limited as much as practicable to minimize the space where collisions might occur. Additionally, blade feathering must be implemented to limit the rotation of turbine blades below the turbine cut-in speed when electricity is not being generated.

Mitigation measures to minimize residual impacts after the application of the above measures include smart curtailment and acoustic deterrents. As such, the project should consider the cost and feasibility of these measures. The residual impacts must be monitored using post-construction fatality monitoring for a minimum of two years (Aronson et al. 2020). Smart curtailment and/or acoustic deterrents must be used if this monitoring indicates that species fatality thresholds have been exceeded (MacEwan et al. 2018) to maintain the impacts to bats within acceptable limits of change and prevent declines in the impacted bat populations.

The overall impact to bats was assessed as moderate after the application of the mitigation measures proposed to avoid and minimize impacts to bats. However, on a species level, the project presents differential risk and impacts to bats must be managed adaptively during the operational phase, particularly for those species (e.g. Egyptian free-tailed bat and Cape serotine) for which high risk is predicted during some periods.

This adaptive management will be guided by the Environmental Management Programme for bats which must include the development of a Biodiversity Management Plan (BMP) to manage impacts to bats during the operation of the facility. The BMP for bats must be developed by a bat ecologist before the commencement of operation and must include the post-construction fatality monitoring plan design, fatality thresholds calculations and rationale (updated as required), and an adaptive management response plan that provides a timeous action pathway for mitigation, including roles and responsibilities, should fatality thresholds be exceeded. Provided these measures are adhered to, the project assessed can be approved.

Socio-economic

The findings of the SIA study indicate that the proposed Emvelo WEF and associated components will create a number of social and socio-economic benefits, including creation of employment and business opportunities during both the construction and operational phase.

The findings of the SIA also indicate that the potential negative impacts associated with both the construction and operational phase are likely to be **Low Negative** with mitigation. The potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented.

Recommendations

- The proponent should, in consultation with the owner of Schiedam 274/2 investigate the opportunity to micro-site turbines 4, 5, 6, 7 and associated access roads, and the O&M site on Schiedam 274/2.
- The proponent should, in consultation with the owner of Schiedam 274/2 discuss the impact on wind turbines on the landing strip on Schiedam 274/2.
- Install radar activated civil aviation light system on wind turbines where technically feasible.

Statement and reasoned opinion

The establishment of the proposed Emvelo WEF and associated infrastructure is supported by the findings of the SIA.

Noise

The proposed WTG layout (WTG placement) would only be acceptable with the selection of correct mitigation measures, which could include a combination of:

- Relocating a number of NSR where noise levels could exceed the recommended noise limits (NSR as highlighted in **Appendix E**); and
- Reducing the noise emission levels (selecting a WTG with a lower sound PWL, using blade additions to reduce noise emission levels and potentially implementing a noise abatement plan during certain periods of time, wind speeds or meteorological conditions. Acoustic treatment of residential dwellings should only be considered after other mitigation measures were considered.

The applicant could also change the layout (locating WTG further from NSR, or reducing the number of WTG within 1,000m from NSR) to mitigate the noise impact, though the applicant should re-evaluate the noise impact should:

- the layout be revised (as part of amendment process post Environmental Authorization [EA]) where any WTG, located within 2,500 m from a confirmed NSR, are moved closer to the NSR;
- the layout be revised (as part of amendment process post EA) where any new WTG are introduced within 2,500m from an NSR;

- the layout be revised (as part of amendment process post EA) where the number of WTG within 2,500m from an NSR are increased; and
- the applicant selects to use a WTG with a SPL higher than 109.0 dBA (re 1 pW).

The applicant should also develop and implement an environmental noise monitoring programme at selected NSR living within the 42 dBA noise contour.

Terrestrial Biodiversity

- A pre-commencement flora relocation is recommended as several TNCO protected species are present within the proposed footprint.
- A pre-commencement fauna relocation is recommended. Several burrowing faunal species are present and will allow for relocation of less mobile species, although most faunal species in proximity are likely to vacate the area once earth moving equipment commences clearing and construction, however some species may require manual relocation.
- Topsoil must be stripped and stockpiled for replacement after construction of the site. Additional measures should be implemented to stabilise eroded areas where necessary.
- On completion of construction, the surface of any work areas, especially if compacted due to hauling and dumping operations shall be scarified to a depth of at least 200 mm and graded to an even surface condition and the previously stored topsoil will be returned to its original depth over the area.
- The disturbed areas can be seeded with suitable local grass seed mix, usually available from a local farmer co-op, if deemed to be required as vegetation is likely to re-establish without input, as is typical in Karoid areas. Species composition of such grass seed mixes is best determined by what local indigenous species are locally, cost effectively and readily available. A mix of several species is recommended rather than a single grass species.
- Excavations may not be used for the dumping of construction wastes.
- Waste (non-biodegradable refuse) will not be permitted to be deposited in the excavations and must be disposed of appropriately.
- Alien species must be removed from the site as per the National Environmental Management: Biodiversity Act (No. 10 of 2004) requirements. A suitable weed management strategy must be implemented in the construction phase and carried through the operational phase. Weeds and alien species *must* be cleared by hand before the rehabilitation phase of the areas. Recommended that the removal of alien plants are to be done according to the Working for Water Guidelines.
- Ongoing maintenance is likely to be required in the long-term, which could include re-excavation of portions of the site for maintenance/replacement of defective components and repairs where applicable, which may include road, turbine footprint and buried infrastructure maintenance and excavation or infill within watercourse crossings.

Heritage, Archaeology and Paleontology

- A heritage survey was undertaken for the proposed Emvelo WEF.The desktop study noted sixty-three possible heritage sties. Most of these were farm labourers' settlements that could have graves Many of these sites occur in areas that will not be affected by the WEF and related infrastructure. The field survey recorded twelve heritage sites were recorded within the study area. Most of these sites will not be affected by the WEF. Those that are currently affected, can be mitigated by relocating the turbine.
- The field survey also confirmed that most of the desktop settlements have human graves associated with them. A 50m sensitivity buffer should be placed around each of these for possible graves. Unfortunately, the black wattle has damaged most of these sites, while agricultural activity would have destroyed these sites.

- One cemetery will be currently affected by the OHL. This section of the line will need to be moved west of the cemetery. Wind Turbine 21 is located on ROCH05. The turbine will need to be moved away from the site.
- While the palaeontology is of very high sensitivity as it forms part of the Vryheid formation, very few significant vertebrate fossils have been found in it. A Chance Find Protocol was initiated for the construction phase.

Traffic

Based on the information detailed in this report, the following conclusions are drawn:

The proposed development and final layout can be supported from a traffic engineering point of view.

Given the findings of this report, it is recommended that the proposed development be considered favourably from a traffic engineering point of view as the intended construction will have no significant negative impact on the surrounding road network.

The following recommendations are made:

A comprehensive route assessment of the entire transportation route to verify clearance, load bearing and sweeping radius distances is recommended.

A comprehensive Traffic Management Plan (TMP) is recommended prior to the commencement of the construction phase and the operational phase based on the final development plan and construction schedule.

The proposed Primary Site Access intersection R65 and D1264 is recommended as the main development access, based on the implementation of safety considerations and mitigation measures outlined in the report.

It is recommended that the access point be priority controlled and widened to allow provision for acceleration lane and passing lane which will incorporate the turning characteristics of the expected abnormal vehicles.

Clearance permits will be required for the transport of the WT components. Full responsibility for the application of the permit and compliance with the permit conditions, lies with the carrier even if represented by an agent (Administrative Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads, Revision 4, May 2021, COTO-Committee of Transport Official).

It is recommended that applications for Abnormal Permits be lodged to the Department of Transport and Public Works, Eskom, and Telkom (where affected) at the time of construction. Full responsibility for the application of the permit and compliance with the permit conditions, lies with the carrier even if represented by an agent (Administrative Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads, Revision 4, May 2021, COTO-Committee of Transport Official)

Visual and Landscape

It is the opinion of Graham A Young Landscape Architect (GYLA) that the visual impacts associated with the proposed Project are of a nature, scale and duration that will require mitigation to slightly reduce the impact during the operational phase. It must also be noted that the I&APs did not consider visual and aesthetic concerns as an issue. GYLA believes that the impacts associated with the construction, operation and decommissioning phases can be mitigated from HIGH to MODERATE provided the recommended measures are effectively implemented in the short term and managed in the long term and that the site is effectively rehabilitated during decommissioning. The project is deemed acceptable from a visual perspective.

Faunal

From a faunal perspective, and specific to this development, several key management aspects to help reduce impacts and add biodiversity benefits are required:

- Off-set areas to be determined for any high faunal sensitive areas that are to be developed; these should form part of a long-term conservation programme and to be determine by an off-set specialist.
- An alien plant management plan that would involve the continued removal and monitoring of alien plant growth within the project sites, starting at the construction phase and continuing into the operational and decommissioning phases.
- Oribi management plan to be developed by a faunal specialist that could involve, amongst other aspects, identifying important Orbi habitat within the project areas, monitoring of Orbi numbers pre-construction, during construction, operational, and the decommissioning phases. Monitoring should ideally continue at least once a year at an appropriate time of year throughout the operation phase. In addition, populations should also be monitored for 1–3 years post- decommissioning. Other aspects could include establishing a local Oribi working group, linking in with the national Oribi Working Group (OWG) and with the Endangered Wildlife Trust (EWT) (see Patel et al., 2021; Shrader et al., 2016). An Oribi management plan would be a strong mitigation measure to reduce impacts on this highly threatened antelope species.
- In conjunction with the above two management plans and considering that the grassland system is a fire-driven ecosystem, a fire management plan should be implemented.
- Any high faunal sensitive grassland habitat, or off-set areas, should be incorporated as part of a long-term conservation strategy, such as a stewardship programme. This would ensure that at the end-of-life of the project, positive biodiversity measures that have been implemented do not suddenly come to an end.

Numerous detailed measures, often at the site-level for individual turbines, for inclusion into the EMPr during the different phases are listed in the Terrestrial Biodiversity and Botanical Impact reports; these are supported here and recommended for inclusion.

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APPENDIX 1: METHOD STATEMENTS

To be prepared by the contractor prior to commencement of the activity. The method statements are **not required** to be submitted to the CA.

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