Khangela Emoyeni WEF - Ecological Walkdown Report

Murraysburg, Northern and Western Cape Provinces

November 2022

CLIENT

Prepared by:

The Biodiversity Company

Cell: +27 81 319 1225

info@thebiodiversitycompany.com

www.thebiodiversitycompany.com

Report Name	**Khangela Emoyeni WEF – Ecological Walkdown Report**
Reference	**Khangela WEF**
Submitted to	NALA ENVIRONMENTAL
Report Writer	**Leigh-Ann de Wet** 
	Ms Leigh-Ann de Wet is Pr. Nat. Sci. registered (400233/12) and has extensive experience in assessing terrestrial biodiversity. She obtained her MSc in Botany from Rhodes University and is currently a PhD candidate at the University of KwaZulu-Natal studying forest ecosystems in coastal KZN. She has over 12 years' experience conducting terrestrial biodiversity assessments (including both flora and fauna as well as specialist avifauna) throughout Southern Africa, West and Central Africa and Madagascar. She has experience in all 9 provinces of South Africa with a particular interest in KZN flora, and avifauna.
Report Writer	**Michael Ryan** 
	Michael Ryan is an Aquatic Ecologist and Hydrologist with 4 years of experience in baseline river assessments and aquatics and is SASS5 accredited as well as SACNASP registered (Cand. Sci. Nat 125128). Michael Ryan received his B.Sc Honours degree (Geography) from the University of Witwatersrand.
Writer / Reviewer	**Andrew Husted** 
	Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 12 years' experience in the environmental consulting field. Andrew has completed numerous wetland training courses, and is an accredited wetland practitioner, recognised by the DWS, and also the Mondi Wetlands programme as a competent wetland consultant.
Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

Table of Contents

1 Introduction 4
1.1 Project Description 4
1.2 Terms of Reference 5
1.3 Assumptions and Limitations 6
2 Approach 6
2.1 Spatial Data 6
2.2 Ecological Information 6
2.2.1 Terrestrial Ecology 6
2.3 Walkdown 8
2.4 Observations 19
2.5 Mitigation 19
2.6 Recommendations 24
2.7 Conclusion 24
3 References 25

List of Tables

Table 2-1 Listed plant species (Todd 2015) 7

Table 2-2 Summary Site specific comments and recommendations on the original turbines for Khangela Emoyeni WEF. 11

Table 2-3 Management objectives for the Khangela WEF 19

List of Figures

Figure 2-1 The original wind turbine locations as well as the associated roads for the Khangela WEF indicating turbines visited 9

Figure 2-2 The original SEI based SEI based on the walkdown for the Khangela WEF .. 10

Figure 2-3 The revised wind turbine locations based on the walkdown for the Khangela WEF indicating turbines visited. 17

Figure 2-4 Revised SEI based on the walkdown for the Khangela WEF 18

1 Introduction

The Biodiversity Company was commissioned to undertake the ecological walkdown for the Khangela Emoyeni Wind Energy Facility (WEF), located within the Northern and Western Cape provinces.

A requirement of the EA and the Environmental Management Programme report (EMPr) is the undertaking of an ecological walkdown for the approved turbines, roads and powerline footprint areas. The walkdown was undertaken from the 18th until the 24th of April 2022.

The purpose of the ecological walkdown was to locate and identify any sensitive ecological habitats, and also protected or threatened plant species and/or fauna of conservation concern within the development footprint areas. The presence of all listed and protected species is detailed herein, where applicable, and this information can be used to supplement the requirements of the necessary permit application that is required from the provincial authority, i.e. the Department of Agriculture, Environmental Affairs, Rural Development and Land Reform and Cape Nature before construction can commence. Spatial data was also provided for the walkdown which demarcated sensitivity areas which were also considered for the placement of infrastructure.

This report only presents the findings from the ecological walkdown, and should be considered in conjunction with other disciplines, specifically the bat findings. These disciplines will collectively provide the demarcation of ecological constraints for the larger area.

1.1 Project Description

Khangela Emoyeni Wind Farm (Pty) Ltd is proposing to establish the 147 MW Khangela Emoyeni Wind Energy Facility and associated infrastructure. The Environmental Authorisation (DFFE Ref: 14/12/16/3/3/2/687) for the proposed wind energy facility was granted on 06 September 2018 and amended on 30 March 2021 and the latest amendment on the 07 June 2022. The Khangela Emoyeni Wind Energy Facility and associated infrastructure is located near the town of Murraysburg in the Beaufort West Local Municipality and Ubuntu Local Municipality in the Western Cape and Northern Cape Provinces. The proposed wind energy facility is located within the Beaufort West Renewable Energy Development Zone (REDZ).

The project will include the following infrastructure as authorised:

- Up to 33 wind turbines with a hub height of up to 160m, blade length of 90m and rotor diameter of up to 180m;
- Hard standing area of up to 55m by 35m;
- Three temporary Laydown areas of up to 150m by 60m each;
- Temporary turbine laydown areas;
- Electrical cabling and on-site substation;
- Existing farm access tracks and watercourse crossings will be upgraded;
- Internal access roads;

- On-site office compound, including site offices, parking and an operation and maintenance facility including a control room;
- Anemometer masts;
- Security fencing; and
- CCTV monitoring towers.

The following properties have been identified for the Khangela Emoyeni Wind Energy Facility and associated infrastructure:

- Portion 4 (a Portion of Portion 1) of Farm Driefontein No.26;
- Remainder of Farm Swavel Kranse No. 28;
- Portion 1 of Farm Houtkloof No. 29;
- Remainder of Portion 1 of Farm De Hoop No.30;
- Portion 2 of Farm De Hoop No.30;
- Portion 3 (a Portion of Portion 1) of the Farm De Hoop No.30;
- Portion 2 of Farm Swavel Kranse No.28;
- Portion 1 of Farm Klipplaat No.109;
- Potion 3 (a Portion of Portion 2) of Farm Klipplaat No. 109;
- Portion 4 (Portion of Portion 2) of Farm Klipplaat No.109;
- Portion 6 of Farm Klipplaat No. 109;
- Portion 7 of Farm Klipplaat No. 109;
- Remainder of Farm Klipplaat No.109; and
- Remainder of Portion 2 of Farm Klipplaat No.109.

Khangela Emoyeni Wind Farm (Pty) Ltd has commissioned Nala Environmental (Pty) Ltd to undertake the ground truthing and subsequent finalisation of the EMPrs in terms of NEMA EIA Regulations. As per the conditions of the Environmental Authorisations, independent specialist walkthrough's have been undertaken to inform the final layout and final Environmental Management Programme for the wind energy facility and associated infrastructure.

1.2 Terms of Reference

The Terms of Reference (ToR) for this assessment include the following:

- Review of existing information related to the development;
- Conduct an ecological walkdown for the planned footprint areas;
- Compilation of a report detailing the results of the walkdown:

- Detail and ecological constraints identified for the planned infrastructure;
- Present information on the presence of any species of conservation concern; and
- Provide information and recommendations for the micro-siting of relevant infrastructure.
- Provide information to adequately inform any contractors, environmental officers and personnel pertaining to the ecological significance for the area.

1.3 Assumptions and Limitations

The following assumptions and limitations should be noted for the assessment:

- The assessment area was based on the spatial file provided by the client and any alterations[1] to the development area subsequent to the site visit may affect the results;
- The field assessment was limited to accessible turbines due to time and weather constraints, where turbines and roads could not be reached, noted were made of similar habitat within the general WEF area;
- Only a single season survey was undertaken, thus no temporal variances have been considered; and
- All regional and site-specific environmental information are contained within the original (submitted) documents and were therefore not repeated within this document. This document focuses only on the very specific mandate and findings of the walkdown and its associated ecosystem evaluations.

2 Approach

2.1 Spatial Data

Turbine, road and powerline positions were supplied by the client. A 150 m corridor width (total width is 300 m) was considered for the road and powerline routes. A 200 m assessment buffer was assigned to turbine sites. These corridors were used as guidelines during the walkdown and ecosystem evaluation phase. GPS accuracy during the field surveys varied from 4 to 15 m. The findings for the turbine and road are discussed in the subsequent sections.

2.2 Ecological Information

2.2.1 Terrestrial Ecology

The ecological assessment completed for the proposed Umsinde Emoyeni WEF (Simon Todd, 2015) was considered for background information. List of plant species of conservation concern which are known to occur in the vicinity of the WEF as provided by Simon Todd (2015) is presented in

Table 2-1. Those in red are confirmed present in the immediate area, but not necessarily within the development footprint.

[1] A revised layout was provided in October 2022. The placement of infrastructure in relation to the designated ecological sensitivities has been updated for this report submission.

Table 2-1 Listed plant species (Todd 2015)

Family	Species	Threat status
Amaryllidaceae	***Boophone disticha***	**Dec**
Asphodelaceae	*Kniphofia ensifolia subsp. autumnalis*	EN
Geraniaceae	*Geranium ornithopodiodes*	EN
Geraniaceae	*Pelargonium sidoides*	Dec
Lamiaceae	***Salvia repens var. keiensis***	DDD

Of the flora species considered likely to occur in the area by Todd (2015), these were not recorded from the study area and are not considered a risk due to their widespread occurrence (Todd 2015). One additional species was found *Gethylis longistyla*, which is classified as rare.

Of the faunal study conducted by Todd in 2015, the most notable comment was that the drainage systems within the site do contain wide floodplains or alluvial terraces which are the known preferred habitat of the Riverine Rabbit (*Bunolagus monticularis),* but that these would be avoided due to their presence within drainage systems. Todd (2015) indicates that three listed species are likely to occur in the area, but that the effect of the WEF would be low considering the widespread distribution of the species as well as their mobility. These species are the Black-footed cat (*Felis nigripes),* which is listed as Vulnerable, the Leopard (*Pathera pardus*), which is listed as Near Threatened and the Honey Badger (*Mellivora capensis*), listed as Endangered (Todd 2015).

The author added that the Karoo Padloper (*Homopus boiulengeri*), a listed karoo endemic tortoise species may occur on site, as may the Plain Mountain Adder (*Bitis inornate*) a little-known species that occurs in the general area (Todd 2015). Todd (2015) indicates that reptiles are unlikely to be affected by wind turbines. Todd (2015) notes that tortoises (Angulate Tortoises, *Chersina angulata* with occasional observations of Karoo Tent Tortoises, *Psammobates tentorius tentorius*) may be negatively impacted by the development as they are vulnerable to collisions with motor vehicles and predation by avian predators. The author continued and said that attractive species such as Tent Tortoises are also vulnerable to collection for use as pets or trade, and the increased accessibility resulting from the new roads that will be constructed as part of the development would raise the risk for these species. Of the amphibians likely to occur on site only one is listed: the Giant Bullfrog (*Pyxicephalus adspersus*) which Todd (2015) considers unlikely to be found on site.

Arcus Consultancy Services (2015) performed the avifauna assessment for the same development. This assessment was conducted over the periods of 1 year between October 2013 and October 2014. They recorded 181 species in and around the WEF site including 29 Priority species and 28 South African endemic or near endemic species. 13 Regional Red Data species were recorded which included three species listed as Endangered: Black Harrier (*Circus maurus*), Ludwig's Bustard (*Neotis ludwigii)* and Martial Eagle (*Polemaetus bellicosus*). The Vulnerable Verreaux's Eagle (*Aquila verreauxii*), including 21 active nests of this species was also recorded (arcus 2015).

2.3 Walkdown

The specialist ecologists traversed the planned footprint areas searching for ecologically sensitive habitats and any species of conservation concern within the corridor. Each accessible turbine position was visited on foot and evaluated according to the potential impact on the surrounding ecosystems. Each accessible road route between turbines was inspected and evaluated.

As much as possible of the roads and turbine layout was assessed on foot and by 4x4 vehicle. Tracks and waypoints are indicated in Figure 2-1. The site sensitivity (SEI) in relation to the original layout is presented in Figure 2-2. Findings are presented in Table 2-2. A refined layout that considered walkdown findings and also a sensitivity can be seen in Figure 2-3 and Figure 2-4 respectively

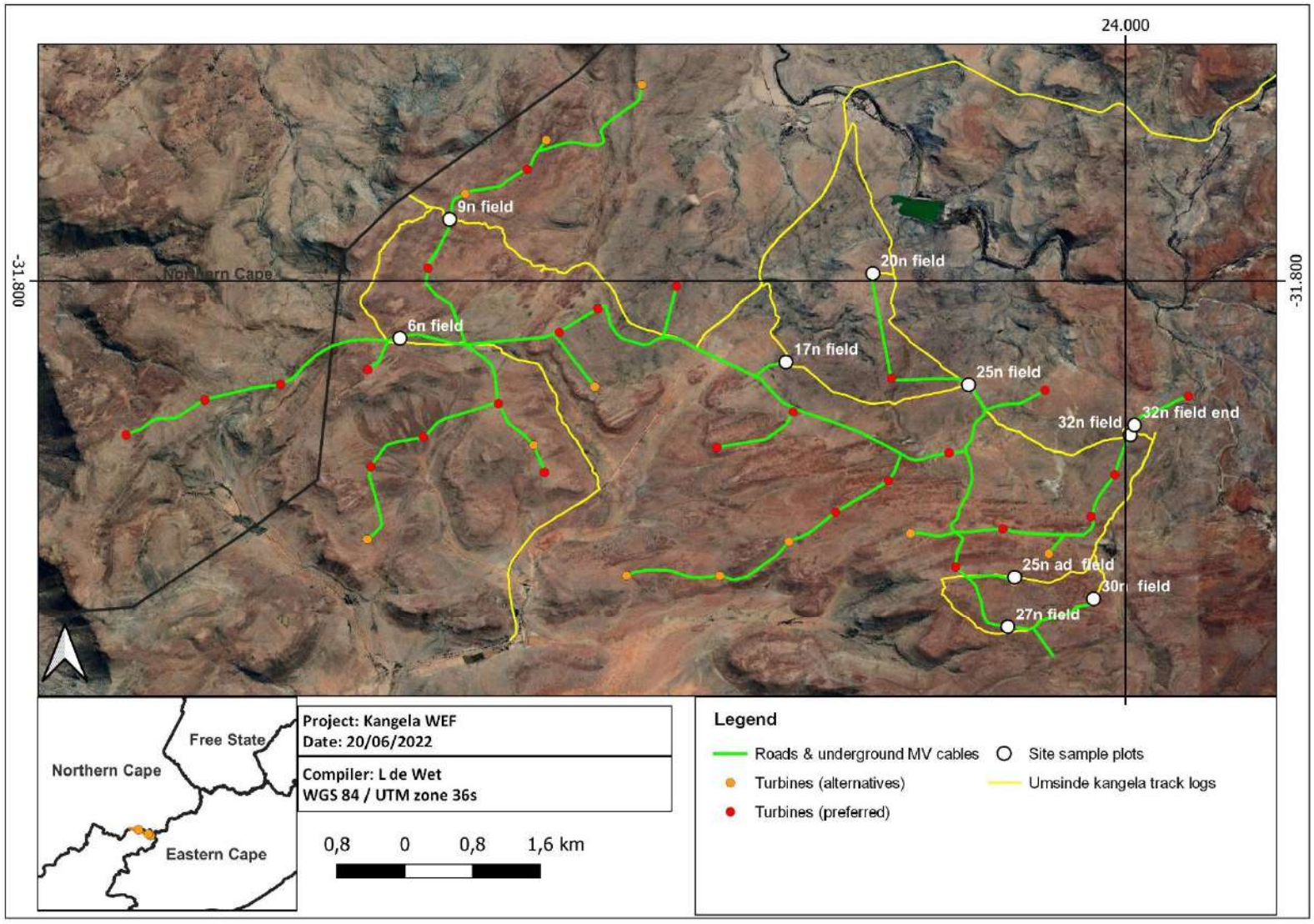

Figure 2-1 The original wind turbine locations as well as the associated roads for the Khangela WEF indicating turbines visited

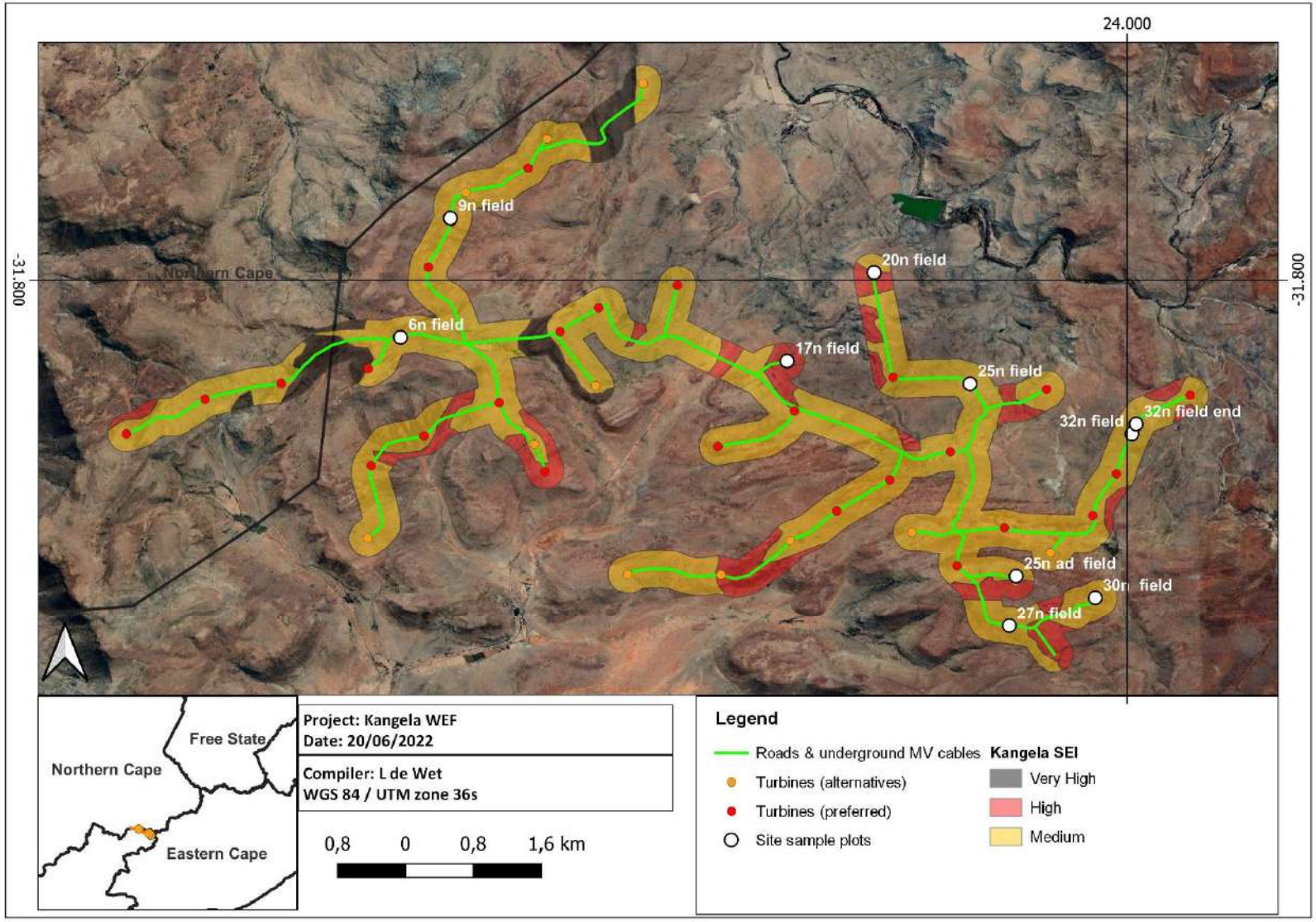

Figure 2-2 The original SEI based SEI based on the walkdown for the Khangela WEF

Table 2-2 Summary Site specific comments and recommendations on the original turbines for Khangela Emoyeni WEF.

Turbine	Comments and recommendations
9n	Findings: 9n is located adjacent to a rocky slope within a karoo scrub landscape. Soil is rocky in nature with the potential to support geophytic and other species protected by provincial legislation. The listed species *Monsonia crassucaulis* was found to occur here. These species are listed as Near Threatened and should be relocated if within the turbine footprint. Sensitivity: This particular species, as it is redlisted, make the position of this turbine a High SEI, within an area of Medium SEI. It can be moved slightly to avoid the SCC. Recommendations: The turbine can be moved to avoid the redlisted plants, or the plants can be moved (provided the necessary permits are acquired)  
6n	Findings: This turbine point is located in area of wash with deeper soils. It is degraded in this area. Sensitivity: The erosion risk maintains the sensitivity here as Medium. Recommendations: This turbine need not be relocated.

17n

Findings: This turbine is located in a good condition wash area of karroid scrub dominated by dwarf shrubs on comparatively deep soils.

Sensitivity: The presence of a small (2 individuals) population of *Hawaorthia semiviva* and miscellaneous geophytic species including *Ledebouria* species does not alter the rating of High for the SEI for this site.

Recommendations: In such instances, it is recommended that the turbine be relocated to an alternative in a medium SEI area. If this is not possible, then strict management measures should be put into place for the impacts associated with this turbine and the access road.

25n	Findings: This turbine is located in a largely transformed area as a result of livestock movement and grazing. Sensitivity: Sensitivity is Low. Recommendations: There are no ecological hindrances to placement of the turbine here. 
32n	Findings: This turbine is located in a good condition wash area of karroid scrub dominated by dwarf shrubs on comparatively deep soils. Sensitivity: The presence of *Aloe broomii*. And condition of the vegetation in general indicates that this should remain a Medium SEI. Aloes can be relocated provided the relevant permits are acquired. Recommendations: In such instances, it is recommended that all sensitive species including geophytic species be relocated to avoid them being lost as a direct result of construction. 

	
	Findings: This turbine is located in a good condition wash area of karroid scrub dominated by dwarf shrubs on comparatively deep soils. Sensitivity: No SCC were recorded from this site. The potential for high erosion risk associated with construction means that this site is of Medium sensitivity. Recommendations: Proximity to High SEI areas should be monitored and the strict management measures put into place.
25n ad	
30n	

	Findings: This turbine is located in a particularly rocky area with some dolerite boulders present. Some geophytic species were recorded from this site, but overall it is somewhat degraded due to grazing of livestock. Sensitivity: The geophyte *Romulea tortuosa* was recorded from this site, but can be relocated. The sensitivity is maintained at a Medium SEI due to the degradation caused by grazing. Recommendations: SCC must be relocated once the relevant permits have been obtained. 
	
27n	Findings: This turbine is located in a moderate to poor condition wash area of karroid scrub dominated by dwarf shrubs on comparatively deep soils. Sensitivity: No SCC were recorded from this site. The potential for high erosion risk associated with construction means that this site is of Medium sensitivity. Recommendations: There are no ecological hindrances to placement of the turbine here.

	
12n ad	This turbine is located in an area with a Very High SEI and an alternative should be considered
3n	These turbines are located adjacent to areas of Very High SEI and care should be taken to avid these adjacent areas of high sensitivity wherever possible. Strict management measures should be put into place for such turbines and their associated impacts.
13n	
16n	
12n	These turbines are located in areas of High SEI and alternatives should ideally be chosen for these in areas of Medium SEI. Where this is not possible, then strict management measures must be put into place for the impacts associated with these turbines.
17n	
18n	
22n ad	
25n ad	
20n	

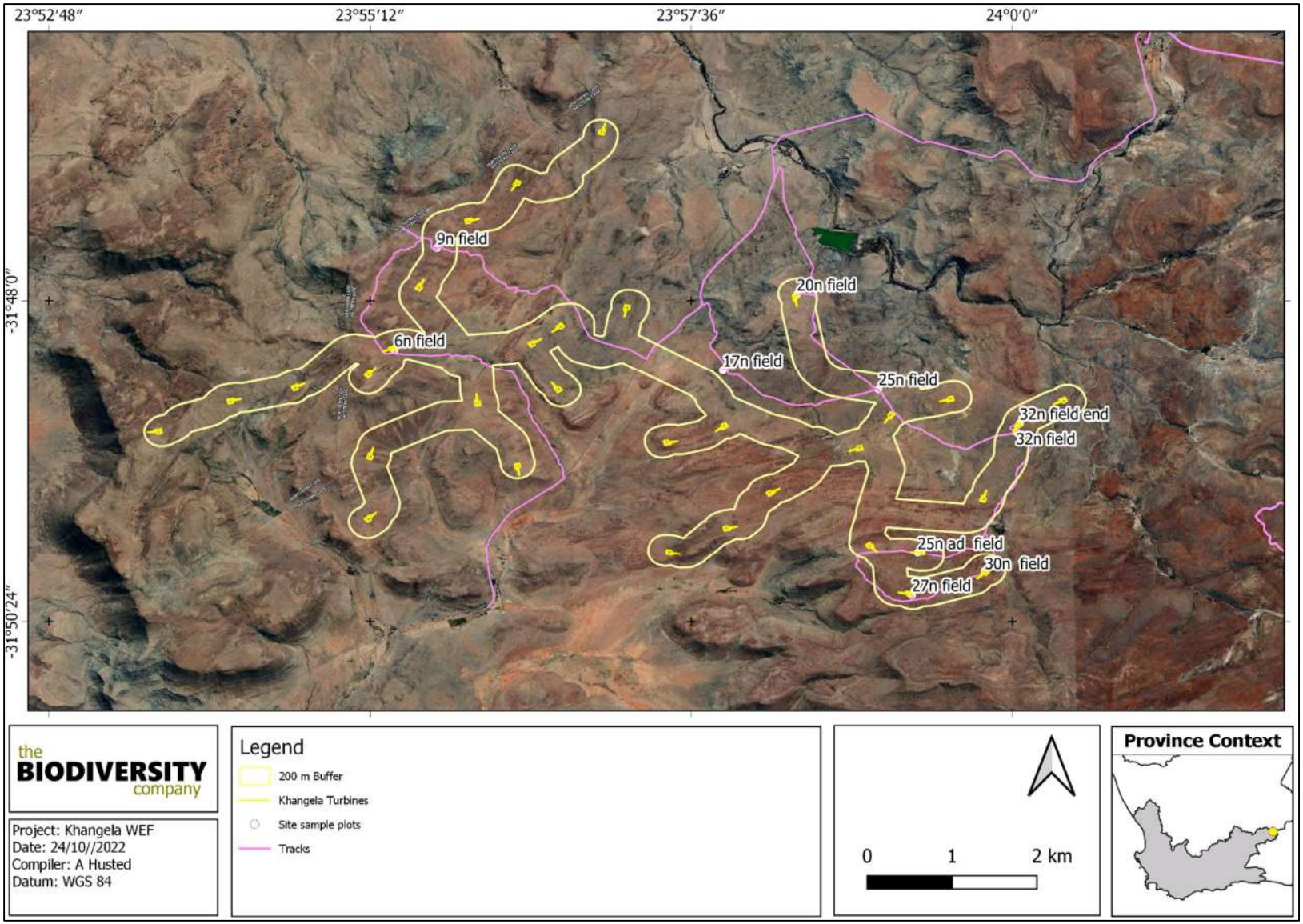

Figure 2-3 The revised wind turbine locations based on the walkdown for the Khangela WEF indicating turbines visited.

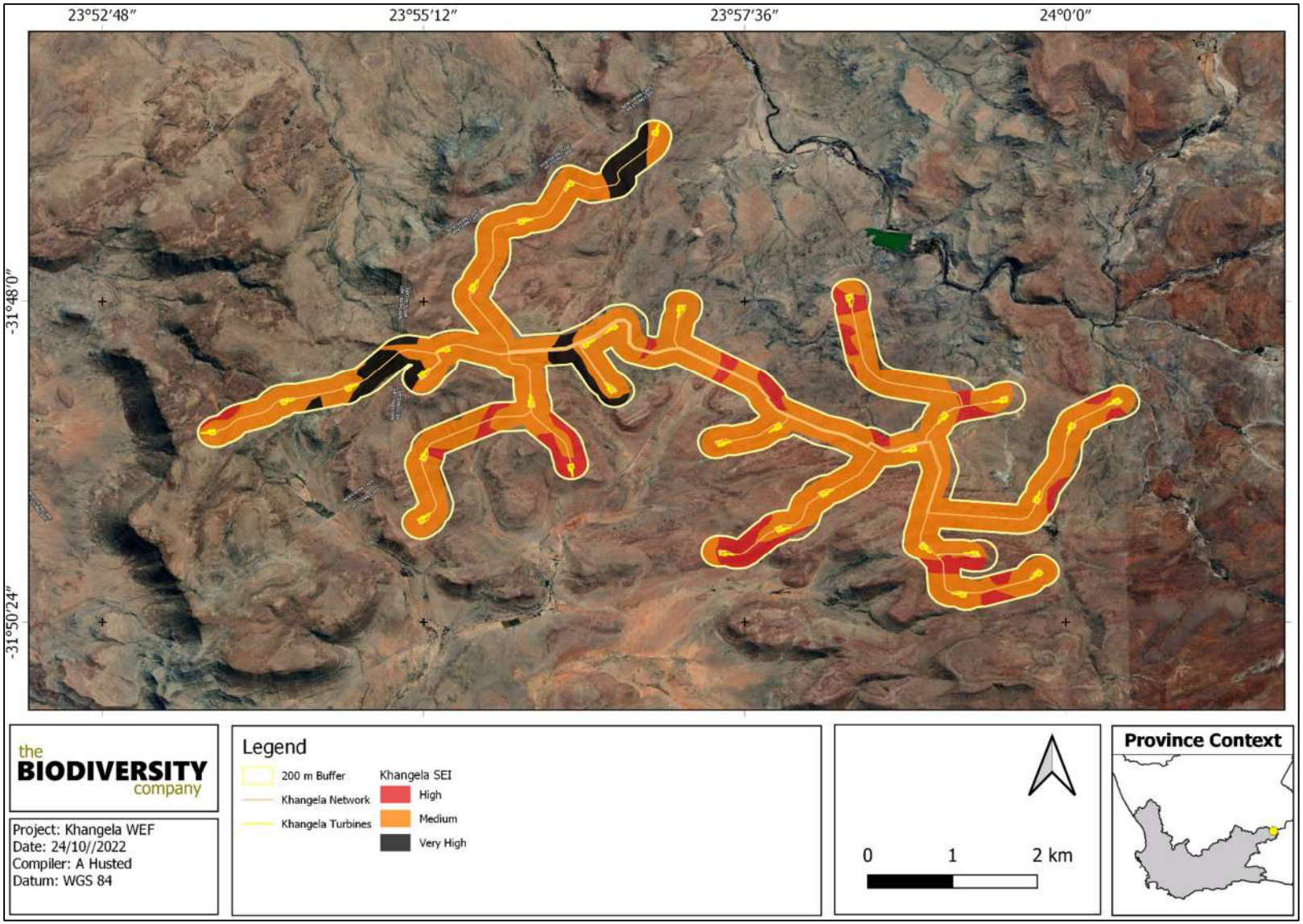

Figure 2-4 Revised SEI based on the walkdown for the Khangela WEF

2.4 Observations

The following are observations made in the general area during the walkdown, these are discussed below due to the nature of the occurrence of these fauna and flora being ubiquitous throughout the area:

- All Very High SEI areas have been avoided in the final layout (October 2022), except for limited roads (with associated cables) and part of the foundation/ hardstand of turbine 4. This is considered acceptable, subject to implementation of the recommended mitigation measures;

- Access routes and development areas (other than turbine) are in varying sensitivities, include the Very High SEI proximal to turbine 19 which will require access. Measures have been prescribed to mitigate these impacts;

- Geophytes were particularly abundant within the rocky areas. It is important to note that these growth forms, and some succulents, are protected under the Western Cape and Northern Cape Legislation (WC Nature-Conservation-Ordinance-19-of-1974 and NC Nature Conservation Act No., 9 of 2009) and include. All species of Amaryllidaceae; All Iridaceae; All species of Mesembryanthemaceae (including those species now in the Aizoaceae) and All *Orchids* (Orchidaceae). No protected trees, listed in term of the National Forests Act, were observed; and

- Verrox's Tent Tortoise (*Psammobates tentorius veroxii)* is expected to occur throughout the area and thus special awareness and protection of this species is necessary.

2.5 Mitigation

The aim of the management outcomes is to present the mitigations in such a way that the can be incorporated into the existing Environmental Management Programme (EMPr), allowing for more successful implementation and auditing of the mitigations and monitoring guidelines.

Table 2-3 Management objectives for the Khangela WEF

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Management outcome: Vegetation and Habitats				
Drainage lines must be avoided for turbine placement and a no-go buffer of 30 m must be applied around them. Limited access road crossings are acceptable subject to mitigation prescribed by the aquatic specialist. The aquatic ecology walkdown report must be consulted,	Life of operation	Project manager, Environmental Officer	Development footprint	Ongoing
Areas of indigenous vegetation, even secondary communities outside of the direct turbine footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible It is recommended that areas to be developed be specifically demarcated so that during the	Life of operation	Project manager, Environmental Officer	Areas of indigenous vegetation	Ongoing

construction phase, only the demarcated areas be impacted upon. All temporary disturbance footprints to be rehabilitated and landscaped after installation is complete. Rehabilitation of the disturbed areas existing in the project area must be made a priority. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are endemic to this vegetation type.				
A qualified environmental control officer must be on site when construction begins. In situations where the threatened and protected plants must be removed, the proponent may only do so after the required permission/permits have been obtained in accordance with national and provincial legislation. In the abovementioned situation the development of a search, rescue and recovery program is suggested for the protection of these species.	Construction/Operational Phase	Environmental Officer & Design Engineer	Roads and paths used	Ongoing
Existing access routes, especially roads must be made use of. The development areas and access roads should be specifically demarcated so that during the construction phase, only the demarcated areas may be impacted upon	Construction/Operational Phase	Environmental Officer & Design Engineer	Roads and paths used	Ongoing
All laydown, chemical toilets etc. should be restricted to the identified and demarcated laydown/site camp areas. All materials not required during the operational phase must be removed from the project area once the construction phase has been concluded. No storage of vehicles or equipment will be allowed outside of the designated project areas.	Construction/Operational Phase	Environmental Officer & Design Engineer	Laydown areas	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood and wind events. This will also reduce the likelihood of encroachment by alien invasive plant species. Livestock should be kept out of areas that have been recently re-planted until these areas are well established. .	Operational phase	Environmental Officer & Contractor	Assess the state of rehabilitation and encroachment of alien vegetation	Quarterly for up to two years after the closure
A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No servicing of equipment on site unless necessary. All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers for off-site disposal. Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them leaking and entering the environment. Construction activities and vehicles could cause spillages of lubricants, fuels and waste material potentially negatively affecting the functioning of the ecosystem. All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is	Life of operation	Environmental Officer & Contractor	Spill events, Vehicles dripping.	Ongoing

to take place off-site where possible, or within in specifically demarcated areas on-site.				
It should be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.	Life of operation	Project manager, Environmental Officer	Any instances	Ongoing
A fire management plan needs to be complied and implemented to restrict the impact fire might have on the surrounding areas.	Life of operation	Environmental Officer & Contractor	Fire Management	During Phase
Any individual of the protected plants that are present needs a relocation or destruction permit in order for any individual that may be removed or destroyed due to the development. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program. Turbine infrastructure, development areas and routes where protected plants cannot be avoided, these plants many being geophytes or small succulents should be removed from the soil and relocated/ re-planted in similar habitats where they should be able to resprout and flourish again. All protected and red-data plants should be relocated, and as many other geophytic species as possible.	Life of operation	Project manager, Environmental Officer	Protected Tree/Plant species	Ongoing
For the threatened species that may not be destroyed, it is recommended that professional service providers that deal with plant search and rescue be used to remove such plants and use them either for later rehabilitation work other conservation projects.	Planning Phase, Pre-Construction	Project manager, Environmental Officer & Contractor	Fire Management	During Phase
Management outcome: Fauna				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
A qualified environmental control officer must be on site when construction begins. In situations where the threatened and protected fauna must be removed, the proponent may only do so after the required permission/permits have been obtained in accordance with national and provincial legislation. In the abovementioned situation the development of a search, rescue and recovery program is suggested for the protection of these species.	Construction Phase	Environmental Officer, Contractor	Presence of any floral or faunal species.	During phase
The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments, • Signs must be put up to enforce this	Construction/Operational Phase	Project manager, Environmental Officer	Infringement into these areas	Ongoing
The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on fauna.	Construction	Project manager, Environmental Officer & Design Engineer	Construction/Closure Phase	Ongoing
Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to amphibian species and nocturnal mammals	Construction/Operational Phase	Environmental Officer	Noise levels	Ongoing

No trapping, killing, or poisoning of any wildlife is to be allowed • Signs must be put up to enforce this;	Life of operation	Environmental Officer	Evidence of trapping etc	Ongoing
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings, dust and erosion is limited, this is especially true due to the presence of the Verrox's Tent Tortoise's. The speed limits on-site should be restricted to maximum 30 km/h.	Life of operation	Health and Safety Officer	Compliance to the training.	Ongoing
• Driving on access roads at night should be limited as far as possible to reduce or prevent wildlife road mortalities which occur more frequently during this period.	Life of operation	Project manager, Environmental Officer & Design Engineer	Activities should take place during the day in the case.	Ongoing
Any holes/deep excavations must be dug and planted in a progressive manner and should not be left open overnight; • Should the holes overnight they must be fenced or covered temporarily to ensure no small fauna species fall in; or inspected each morning and any trapped fauna released by a suitably experienced individual.	Planning and Construction	Environmental Officer & Contractor, Engineer	Presence of trapped animals and open holes	Ongoing
Ensure that cables and connections are insulated successfully to reduce electrocution risk.	Life of project	Environmental Officer & Contractor, Engineer	Presence of electrocuted fauna	Ongoing

Management outcome: Alien species				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Compilation of and implementation of an alien vegetation management plan for the 300 meter grid corridor.	Life of operation	Project manager, Environmental Officer & Contractor	Assess presence and encroachment of alien vegetation	As per existing EMPR
The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprint of the roads must be kept to prescribed widths.	Construction/Operational Phase	Project manager, Environmental Officer & Contractor	Footprint Area	Life of operation
Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site	Life of operation	Environmental Officer & Health and Safety Officer	Presence of waste	Life of operation

Management outcome: Dust				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes wetting of exposed soft soil surfaces, or use of other dust suppression measures. • No non environmentally friendly suppressants may be used as this	Life of operation	Contractor	Dustfall	Dust monitoring program.

could result in pollution of water sources				
Management outcome: Waste management				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Waste management must be a priority and all waste must be collected and stored effectively.	Life of operation	Environmental Officer & Contractor	Waste Removal	Weekly
Litter, spills, fuels, chemicals and human waste in and around the project area must be contained. All waste must be disposed at licenced facilities.	Construction/Closure Phase	Environmental Officer & Health and Safety Officer	Presence of Waste	Daily
Sufficient toilets must be provided for on-site workers, as per the Occupational Health and Safety Act . Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area.	Life of operation	Environmental Officer & Health and Safety Officer	Number of toilets per staff member. Waste levels	Daily
The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility	Life of operation	Environmental Officer & Health and Safety Officer	Availability of bins and the collection of the waste.	Ongoing
Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement with regard to waste management. Under no circumstances may domestic waste be burned on site	Life of operation	Environmental Officer, Contractor & Health and Safety Officer	Collection/handling of the waste.	Ongoing
Refuse bins will be emptied and secured to allow for the disposal of waste in these bins. Temporary storage of domestic waste shall be in covered waste skips or other suitable containers. Maximum domestic waste storage period will be 10 days.	Life of operation	Environmental Officer, Contractor & Health and Safety Officer	Management of bins and collection of waste	Ongoing, every 10 days
Management outcome: Environmental awareness training				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area to inform contractors and site staff of the presence of Red / Orange List species, their identification, conservation status and importance, biology, habitat requirements and management requirements the Environmental Authorisation and within the EMPr. The avoidance and protection of the very high sensitivity areas must be included into a site induction. Contractors and employees must all undergo the induction and made aware of the "no-go" to be avoided.	Life of operation	Health and Safety Officer	Compliance to the training.	Ongoing
Management outcome: Erosion				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Speed limits of 30 km/h must be put in place on-site to reduce erosion. • Reducing the dust generated by the listed activities above, especially	Life of operation	Project manager, Environmental Officer	Water Runoff from road surfaces	Ongoing

the earth moving machinery, through wetting the soil surface (or other dust suppression measures) and putting up signs to enforce speed limit as well as speed bumps built to force slow speeds where needed; • Signs must be put up to enforce this.				
Where possible, existing access routes and walking paths must be made use of.	Life of operation	Project manager, Environmental Officer	Routes used within the area	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events and strong winds.	Life of operation	Project manager, Environmental Officer	Re-establishment of indigenous vegetation	Progressively
A stormwater management plan must be compiled and implemented.	Life of operation	Project manager, Environmental Officer	Management plan	Before construction phase: Ongoing

2.6 Recommendations

Recommendations have been provided for the footprint areas that will have notable impacts on the local habitats and / or species of conservation concern. The following recommendations are in addition to what has been provided for the footprint areas:

- The revised layout (October 2022) has successfully achieved avoidance of the Very High SEI habitats, except for part of the foundation/ hardstand of turbine 4. The number of turbines positioned in High SEI has also been reduced with the layout revision. Based on this the revised layout is considered to be acceptable for development;
- All mitigation measures prescribed by Simon Todd (2015) remain applicable for the development and must be adhered to;
- All mitigation measures prescribed by Arcus (2015) remain applicable for the development and must be adhered to;
- Rocky outcrops must be avoided as much as possible. Avoid fragmenting rocky habitats; and
- To the extent possible within construction timelines, the floral search and rescue operation must be undertaken before the end of February for the summer flowering species, and during August for the winter flowering species.

2.7 Conclusion

The current layout (October 2022) is acceptable for terrestrial biodiversity provided all mitigation measures described and referred to herein are adhered to, a Rehabilitation Plan is developed and relevant permits obtained prior to the removal of any protected species that may be damaged or destroyed by the development.

3 References

Arcus Consultancy Services (2015). Avifauna Specialist Report. Umsinde Emoyeni Wind Energy Facility Phase 1 & 2 Western Cape & Northern Cape.

Dosskey, M.G. 2000. How much can USDA riparian buffers reduce agricultural nonpoint source pollution? In P.J. Wigington and R.L. Beschta, Riparian Ecology and Management in Multi-Land Use Watersheds. American Water Resources Association.

Elmore, W. and Beschta, R.L., 1987. Riparian areas: perceptions in management. Rangelands Archives, 9(6), pp.260-265.

Ezemvelo, K.Z.N., Wildlife IEM 2013 Guideline: Biodiversity Impact Assessment in KwaZulu-Natal.

Macfarlane, D.M., Bredin, I.P., Adams, J.B., Zungu, M.M., Bate, G.C. and Dickens, C.W.S. 2014. Preliminary guideline for the determination of buffer zones for rivers, wetlands and estuaries. Final Consolidated Report. WRC Report No TT 610/14, Water Research Commission, Pretoria.

Simon Todd consulting (2015). Ecological Impact Assessment Report: Proposed Umsinde Emoyeni Wind Energy Facility Western Cape and Northern Cape. Prepared for Arcus Consultancy Services.