Open Space Management Plan, Inyanda-Roodeplaat Wind Energy Facility, Eastern Cape, South Africa



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For

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LD Biodiversity Consulting

Biodiversity Assessments, Baseline surveys and Impact Assessments and Integrated Biodiversity Management Solutions.

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Appointment of Specialist

Leigh-Ann de Wet (LD Biodiversity Consulting) was commissioned by SRK to develop an open space management plan. This report thus serves as an addendum to the original Ecological Impact Assessment conducted by CES in 2014, and the Ecological Impact Assessment Update Report completed by LD Biodiversity Consulting in 2016.

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1 Introduction

1.1 Objective of this Plan

Developments that disturb natural landscapes introduce anthropogenic disturbance, which reduces the overall conservation value of the landscape. The Inyanda-Roodeplaat WEF is dedicated to finding a balance between development and the ecosystem, not only through its function as a renewable energy source, but also through providing well-managed conservation areas. As the WEF occurs within an area of high biodiversity and between several nature reserves, the aim of the Inyanda-Roodeplaat WEF is provide an accessible conservation corridor to allow for the maximum functionality of the surrounding ecosystem. Further, the project aims to follow RENFORUS – Renewable Energy Futures for UNESCO sites. The objectives of this plan are to:

- Maintain intact ecosystems within the site;
- Create a framework for the integrated management of the WEF and surrounding ecosystems;
- Manage the ecosystem in a natural or near-natural state; and
- Restore the ecosystem to a natural state where necessary.

This plan is designed to be used in conjunction with other management plans for the development and is also an adaptive management plan, which means that it should be consistently updated to include new relevant management tasks and priorities if and when they occur.

Currently there are three options for power line construction for connection to the national grid. This management plan can be applied as far as possible to the power line associated with the WEF, however, as soon as the power line design is finalized, the Open Space Management Plan should be updated.

This management plan must be reviewed and updated annually during the construction phase, and every 5 years during the operational phase.

1.2 Vegetation of the Inyanda-Roodeplaat WEF

Nine different vegetation types were described from the study area; these are summarized in Table 1.1, with an indication of the general vegetation shown in Figure 1-1. A vegetation map is shown in Figure 1-2. A detailed description of the vegetation of the site can be found in the Ecological Impact Assessment Report.



Table 1.1: Summary of the vegetation types mapped for the Inyanda-Roodeplaat WEF study area.

Vegetation	Brief description
type	
Thicket	Found on rocky outcrops within the fynbos, thicket comprises typical thicket species including <i>Euclea undulata, Pappea capensis, Brachylaena</i>
	<i>illicifolia</i> etc.
Proteaceous	Occurs on steep south and east facing slopes. Dominated sometimes
fynbos	almost exclusivelty of <i>Leucodendron salugnum</i> but other species may include <i>Protea munii</i> and <i>Metalasia muricata</i> . This fynbos type includes the Shale fynbos delineated by CES (Zide & Lubke 2014).
Grassy fynbos	On gentle to steep slopes with rocky outcrops containing thicket elements.
	Dominated by grass species including <i>Eragrostis curvula, Themeda triandra,</i> <i>Cymbopogon plurinodis</i> and <i>Tristcahya rehmanniii</i> . Other species include geophytes from the Irirdaceae family including <i>Bobartia orientalis</i> and
	Proteacea species including Protea mundii, Leucodendron salignum and Protea nerifolia.
Succulent	Succulent thicket occurs on flat areas to the east of the site and is
thicket	comprised of an almost completely succulent suite of species dominated
	by <i>Portulacaria afra</i> and other Crassulaceae and Mesembryanthemaceae species.
Karoo	Karroo is restricted to the very north of the site where it occurs on both
	sides of the road. A low succulent shrub interspersed with Euphorbia
	species characterizes it. This vegetation type is fairly degraded within the study site.
Degraded	Degraded thicket occurs near the main farmhouse and in areas that have
thicket	been grazed by livestock or have been used as agricultural land previously.
	The thicket is open and characterized by typical thicket species that exhibit
	a browsing growth-form (a clear-cut umbrella tree shape) and include
	Pappea capensis and Euclea undulala as dominant species. This vegetation
	type contains the majority of the alien invasive species recorded from the site.
Renosterveld	Renosterveld is restricted to a small section of the site and is clearly
	delineated by the presence of Renosterbos (<i>Elytropappus rhinoceratis</i>) where it occasionally forms a monoculture.
Acacia	The primary riparian vegetation type on the site has a road running
riparian	through it and as such, is degraded. The vegetation type is dominated by
thicket	Acacia karroo although in some areas species such as Salix mucronata,
	Schotia afra and Dondonea angustifolia are found.



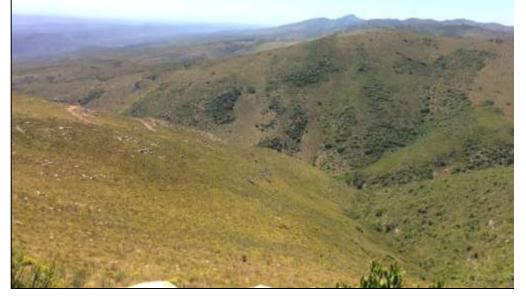


Figure 1-1: General vegetation on the upper slopes of the Inyanda-Roodeplaat WEF study site.



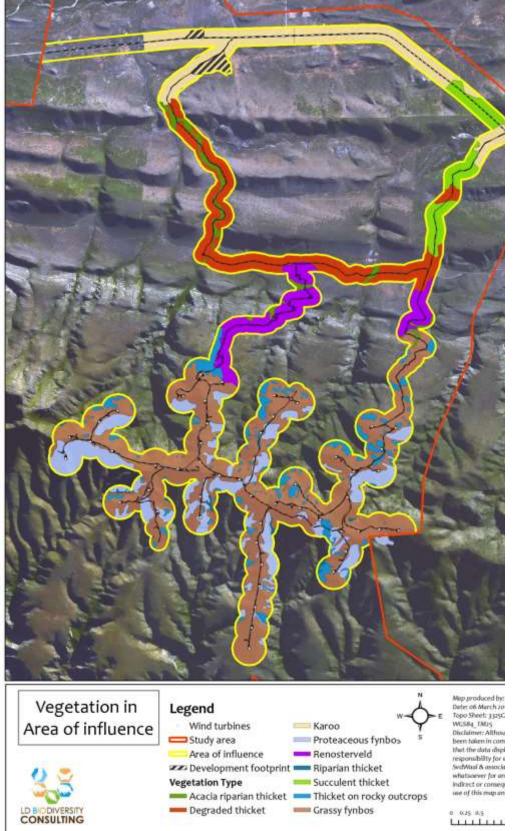


Figure 1-2: Vegetation map of the Inyanda-Roodeplaat WEF.



1.3 Vegetation of the Inyanda-Roodeplaat Power line options

All three power line options go through the same vegetation types, both in Mucina & Rutherford (2006) and STEP (Figure 1-3). These vegetation types are shown in Table 1.2. Of the different options, option 2 traverses the largest area of alluvial vegetation.

Table 1.2: Vegetation types of the three power line options (adapted from Zide and Lubke(2014).

Mucina & Rutherford	Description	STEP	Description
Sundays Thicket	Characterised by undulating plains and low mountains and foothills covered with tall dense thicket. The Sundays Thicket is composed of a mosaic of predominantly spinescent species that include trees, shrubs and succulents. It is classified as Least Threatened with a conservation target of 19%. 6% has been transformed by cultivation and urban development.	Sundays Spekboomveld Sundays Spekboom Thicket	This vegetation type is dominated by <i>Pappea</i> <i>capensis</i> and <i>Portulacaria</i> <i>afra</i> while <i>Euphorbia</i> <i>coerulescens</i> and <i>Crassula</i> <i>ovata</i> are abundant succulent plants that characterize this vegetation type. This spekboomveld is distinguished from adjacent noorsveld by the relatively high cover of <i>Portulacaria</i> <i>afra, Pappea capensis</i> and <i>Schotia afra</i> . This vegetation type is listed as Endangered. The tree component of this vegetation type is dominated by <i>Portulacaria afra</i> and <i>Pappea capensis</i> . Other common species include <i>Euphorbia ledienii</i> and <i>Rhigozum obovatum</i> . This vegetation type is listed as Vulnerable.



Mucina & Description STEP Description				
	Description	SIEP	Description	
Rutherford	The new old and nivering	Cura day sa	Sundava Dariamualdia	
Albany Alluvial	Thornveld and riverine	Sundays	Sundays Doringveld is	
Alluviai	thicket are the two major	Doringveld	characterised by a mosaic of	
	vegetation types that occur		thicket clumps and a Nama-	
	in this vegetation type. It is		karoo matrix. Thicket clumps	
	classified as Endangered with		often have low species	
	a conservation target of 31%.		diversity with species that	
	Only 6% has been statutorily		are typical of the Sundays	
	conserved.		Valley Thicket. Dominant	
			species in the Nama-karoo	
			matrix comprise of <i>Acacia</i>	
			karoo, Lycium sp. And	
			Cynodon dactylon and	
			include a suite of succulents,	
			some of which are rare	
			endemics such as <i>Haworthia</i>	
			<i>sordida</i> . This vegetation type	
			is listed as Vulnerable	
Sundays	The Sundays Noorsveld	Sundays	The domiant species of this	
Noorsveld	occurs along flat lowlands. It	Noorsveld	vegetation type is Euphorbia	
	is characterised by succulent		<i>coerulescens</i> . Presence of	
	thicket consisting of a mosaic		witgat trees (Boscia oleoides)	
	of Euphobia caerulescens		and wildegranaat (<i>Rhigozum</i>	
	and low karoo shrub		obovatum) is diagnostic.	
	vegetation (dominated by			
	Pentzia incana and Rhigozum		Spekboom (<i>Portulacaria</i>	
	obovayum). This vegetation		<i>afra),</i> only found in the	
	type is classified as Least		better-preserved veld, was	
	Threatened with a		never a dominant	
	conservation target of 19%.		component. Palatable	
	About 15% is statutorily		grasses (Cenchrus ciliata,	
	conserved in the Greater		Fingerhuthia africana and	
	Addo Elephant National Park		Panicum maximum) used to	
	and some 3% in private		be abundant, but are now	
	game ranches.		sparse.	
	Approximately 4% of this			
	vegetation type has been			
	transformed by cultivation.			



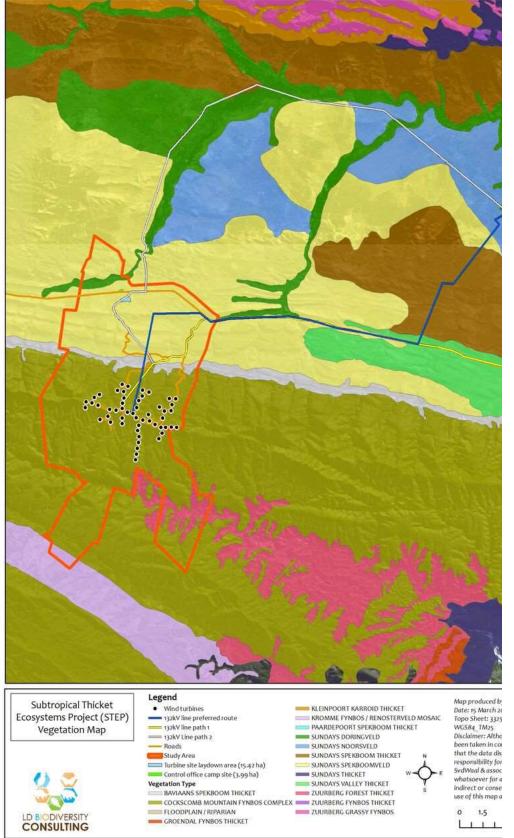


Figure 1-3: STEP vegetation map of the power line alternatives



2 Relation to other management plans

This Open Space Management Plan does not stand alone, and must be used as part of a suite of management plans including, but not limited to the following:

- Environmental Management Plan SRK (2016);
- Alien Vegetation Management Plan L. de Wet (2016);
- Plant Rescue and protection Plan L. de Wet (2016); and
- Rehabilitation Plan L. de Wet (2016).

In addition to these plans, background information can be obtained from the two Ecological Impact Assessment Reports (full references available in the reference list, Section 5):

- Zide, A and Lubke, R (2014). Inyanda-Roodeplaat Wind Energy Project Environmental Impact Assessment, Eastern Cape. Ecological Specialist Report.
- L. de Wet (2016). Ecological Impact Assessment Update, Roodeplaat Wind Energy Facility.

As the project aims to follow RENFORUS – Renewable Energy Futures for UNESCO sites, which will be run by a trust, RENFORUS processes will be followed. Details of this can be found at http://www.unesco.org/new/en/natural-sciences/special-themes/global-climate-change/related-info/projects/renforus/ and are integrated into this plan. RENFORUS is primarily a strategic objective but is included in the plan to demonstrate willingness of the proponent to adhere to conservation goals.

RENFORUS focuses on the increased use of renewable energy as a response to climate change: "Renewable sources of energy offer win-win solutions by increasing the access to energy while reducing environmental impacts and mitigating climate change". Box 2-1 provides further information provided by UNESCO on RENFORUS.



Box 2-1: Objectives and details of RENFORUS

"The objective of the RENFORUS initiative is to provide the international community with global climate change field observatory sites involving the sustainable use of environmentally sound renewable energy sources in UNESCO Sites (Biosphere reserves and World Heritage Sites). While addressing climate change mitigation, this initiative will also aim to demonstrate the benefit of harnessing the locally available renewable energy sources and their potential impacts on the environmental and ecological preservation of UNESCO sites."

"Biosphere reserves are sites established by countries and recognized under UNESCO's Man and the Biosphere (MAB) Programme to promote sustainable development based on local community efforts and sound science. By definition, they are ideal for testing and demonstrating innovative approaches to sustainable development from local to international scale."

"Among other factors, the energy system plays a key role in providing the resident communities and the whole existing infrastructure with basic energy services in UNESCO Sites. Thus, the wide use and application of local renewable energy sources will help to reduce the damage caused to the ecosystem by energy production, while contributing to the sustainable development of local communities through access to energy services."

(UNESCO, 2016)



3 Conservation and conservation planning

3.1 The Inyanda-Roodeplaat WEF

In de Wet (2016), a sensitivity assessment for the Inyanda-Roodeplaat site was conducted based on several planning tools available for the region. This assessment is reproduced here to provide context and indicate the need for an open space management plan. Several conservation assessments have been completed for the area and include the conservation importance of the site as a whole. Table 3.2 describes the factors taken into consideration for each of the 10 criteria for the sensitivity assessment. Sensitivity rating is necessarily subjective, and takes into consideration the experience and knowledge of the specialist applying the scale. CES (Zide & Lubke 2014) have described the conservation and planning tools available for the area in detail. These maps are reproduced here to aid elucidation of the sensitivity assessment and are presented in Figure 3-1 to Figure 3-4. A map of the sensitive areas shown in Figure 3-5.

The Baviaanskloof Mega-reserve CBA map was mostly taken into account as the vegetation mapping for this area is of the finest scale of all the assessments consulted. This assessment describes three CBAs, the recommendations for which are described in Table 3.1. Of the development, a small portion of existing road falls in CBA 1 and CBA 2, with the majority of the development falling into CBA 3 and the rest into CBA 2. The CBAs provide guidance for future land use, and efforts should be made to adhere as far as practicable to the recommended land use for each CBA, regardless of previous land use.

СВА	Description	Development Guidance
CBA1a	100% irreplaceable habitats; restricted RDB plant species; all remaining Critically Endangered habitats; selected river reaches	Natural Landscapes – Maintain biodiversity in as natural a state as possible. Manage for no biodiversity loss. Land use = conservation.
CBA1b	Best design site (meeting balance of patter targets); RDB plant species; restricted animal habitats	
CBA2	All remaining Endangered habitats; all remaining forest and wetland habitats; remaining coastal corridor; river reaches supporting selected river reaches; landscape linkages	Near Natural Landscapes – maintain biodiversity in a near natural state with minimal loss of ecosystem integrity. No transformation on natural habitat should be permitted. Land use = game farming, Conservation, Limited livestock

Table 3.1: Baviaanskloof Mega-reserve CBAs



СВА	Description	Development Guidance
CBA3	Sub-quaternary catchments od selected river reaches, Key Biodiversity Support Area, Important Natural Area	Functional Landscapes – Manage for sustainable development, keeping natural habitat intact in wetlands (including buffers) and riparian zones. Environmental authorizations should support ecosystem integrity. Land use = Conservation, Game farming, livestock, limited dryland crops, limited irrigated crops, limited dairy, limited timber, limited settlement.

Table 3.2: Factors taken into consideration for the sensitivity assessment

Crit	eria	Factors considered	Data sets analysed
1	Topography	As slopes, especially steep rocky slopes can form refugia for SSC, these are important. Slopes also provide a variety of habitats that may be used by a number of different species.	 Google earth imagery Contours Site inspection
2	Vegetation – Extent or habitat type in the region	The extent of the vegetation in the region determines whether it is rare, which increases conservation value or widespread, which decreases conservation value.	 Baviaanskloof Megareserve Mucina & Rutherford (2006) STEP SKEP CES vegetation map LD Biodiversity Vegetation map
3	Conservation status of fauna/flora or habitats	The conservation status of the vegetation and faunal habitats is important. For example none of the vegetation type may be conserved, or most of it may be.	 Baviaanskloof Megareserve Mucina & Rutherford (2006) STEP SKEP NPAES Protected areas
4	Species of Special Concern – Presence and number	The number of SSC will help to determine the sensitivity of the site. Large numbers of SSC raise the sensitivity rating.	 CES species list PNCO Protected trees NEMBA National Red List International Red List CITES



			CONSULTING	
Crit	eria	Factors considered	Data sets analysed	
6	Habitat fragmentation leading to loss of viable populations Biodiversity contribution	This aspect of the sensitivity rating scale is based on the level of fragmentation of the vegetation type. Fragmentation includes development, disturbance and other anthropogenic effects. Each of the different vegetation communities found within the site may form habitat for large numbers of species or smaller numbers of species. The large the	 Baviaanskloof Megareserve Mucina and Rutherford (2006) Google earth imagery CES species list 	
7	Visibility of the site or landscape from other vantage points	number of species (diversity) the higher the sensitivity of the site. Some areas are highly visible, such as those on the top of high ridges, while others are not visible. Visibility increases the sensitivity	 Contours Google earth imagery Site inspection 	
8	Erosion potential or instability of the region	of the site. Erosion potential is an aspect of how the natural environment will respond to disturbance. A low erosion potential indicates a robust site that will be able to buffer disturbance, particularly from clearing. Sites with high erosion potential (low robustness) are more sensitive than those with low erosion potential (high robustness).	Site inspection	
9	Rehabilitation potential of the area or region	Rehabilitation potential is also a sensitivity indicator. Areas that are easy to rehabilitate back to the natural state are less sensitive than areas that are not easy to rehabilitate. It should be noted that restoration – or the rehabilitation of a site back to a completely natural state – is not often successful.	 Site inspection Vegetation classification CES species list 	
10	Disturbance due to human habitation or other influences (Alien invasive species)	The greater the amount of disturbance, the less sensitive a site is. Disturbance results in the invasion of alien species and the loss of SSC.	Site inspectionGoogle earth imagery	



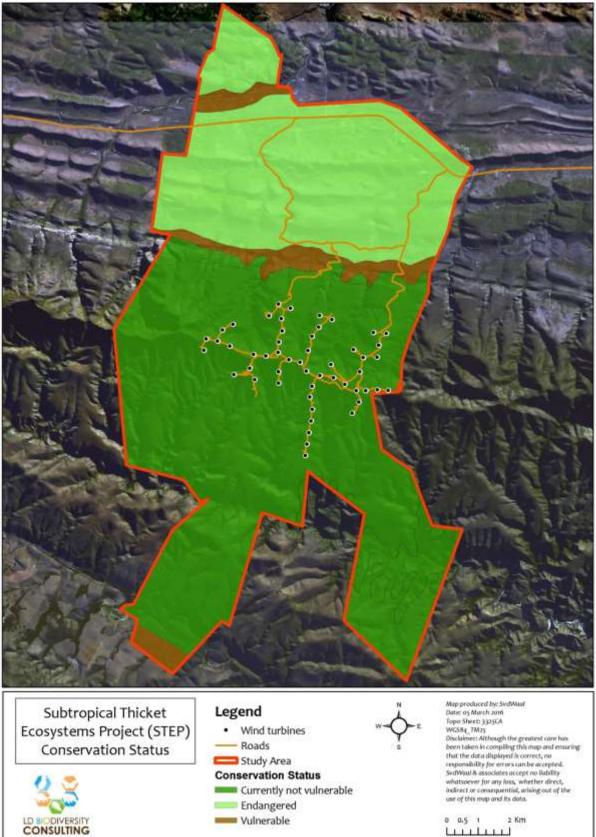


Figure 3-1: STEP Conservation Status



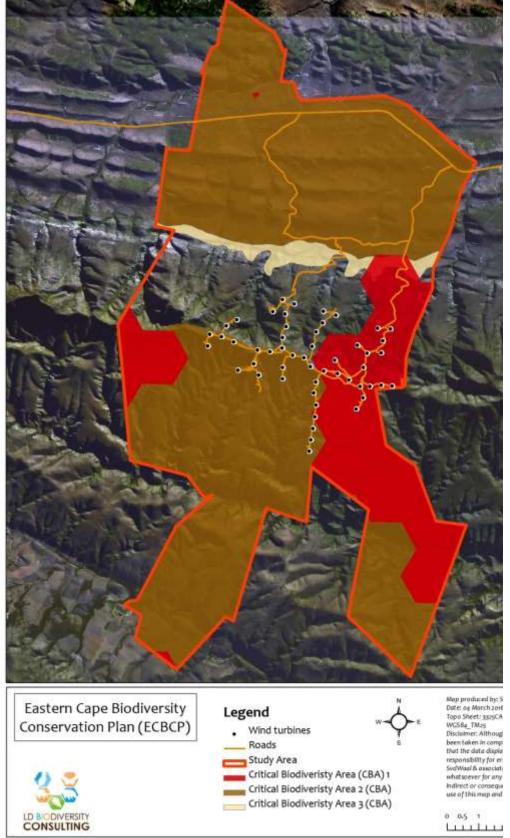


Figure 3-2: ECBCP Critical Biodiversity Areas



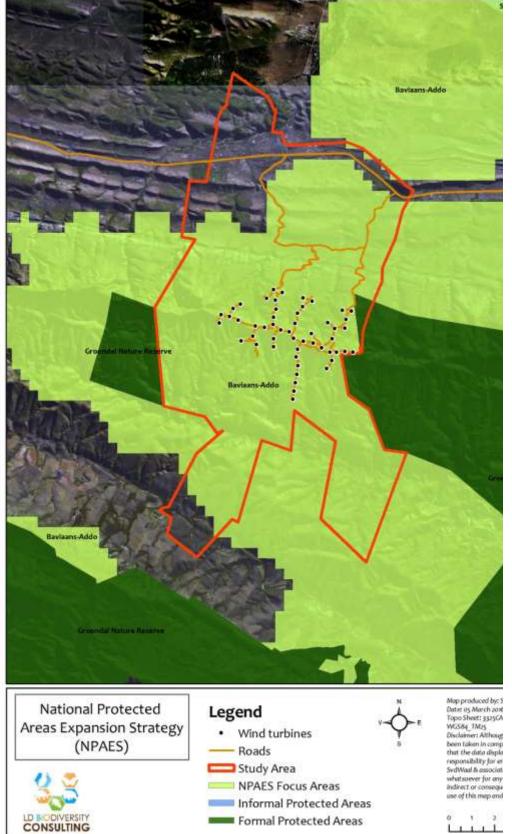


Figure 3-3: National Protected Areas Expansion Strategy



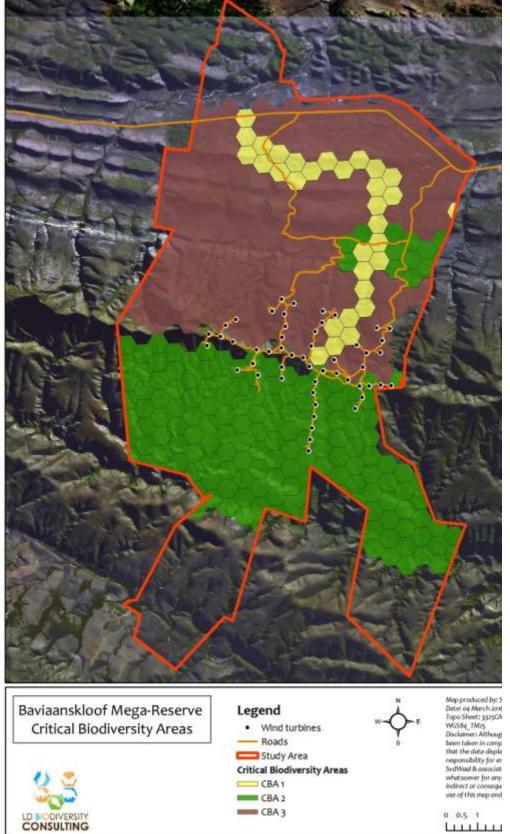


Figure 3-4: Baviaanskloof Mega-reserve Critical Biodiversity Areas



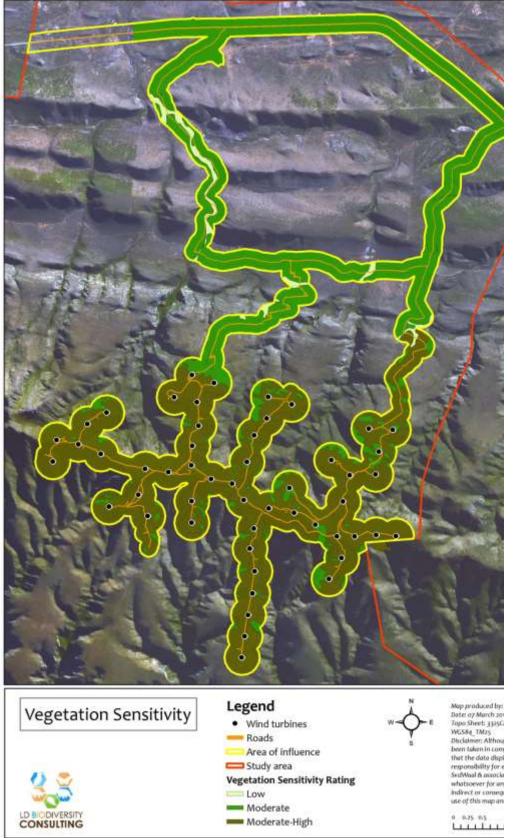


Figure 3-5: Sensitivity map of the Area of Influence within the Inyanda-Roodeplaat WEF



3.2 Power line alternatives

STEP, the finest scale conservation-planning tool that covers the entire power line footprint reflects that each of the options traverse areas considered Critically Endangered, Endangered and Vulnerable, with small portions of the preferred option and Option 1 traversing areas that are Currently Not Vulnerable. These areas are shown in Figure 3-6. These conservation statuses are described in full in Zide and Lubke (2014) however, a brief table is included here in Table 3.3. These sensitivity ratings in addition to other factors, have been used to determine the overall sensitivity for each of the routes, this assessment can be seen in Table 3.4.

Classification	Conservation priority	Brief Description	General rule
Critically Endangered	I – highest priority	Ecosystems whose original extent has been so reduced that they are under threat of collapse or disappearance. Included here are special ecosystems such as wetlands and natural forests	This Class I land can NOT withstand loss of natural area through disturbance or development. Any further impacts on these areas must be avoided. Only biodiversity friendly activities must be permitted.
Endangered	11	Ecosystems whose original extent has been severely reduced, and whose health, functioning and existence is endangered	This land can withstand minimal loss of natural area through disturbance or development
Vulnerable	111	Ecosystems which cover much of their original extent but where further disturbance or destruction could harm their health and functioning	This land can withstand limited loss of area through disturbance or development
Currently not Vulnerable	IV	Ecosystems which cover most of their original extent and which are mostly intact, healthy and functioning	Depending on other factors, this land can withstand loss of natural area through disturbance or development

Table 3.3: STEP conservation priorities (Pierce, 2003)

Table 3.4: Sensitivity assessment for each power line route



Power line option	STEP conservation status	Area traversing through Critically Endangered areas	Area traversing green fields areas	Overall comparative sensitivity of the route (1 being the most sensitive, 3 being the least)
Preferred option	Traverses Critically Endangered, Endangered and Vulnerable areas, with a small area of Currently Not vulnerable.	The smallest area of Critically Endangered habitat will be traversed by this option.	None, this option is located next to existing roads and fence lines.	3
Option 1	Traverses Critically Endangered, Endangered and Vulnerable areas.	The largest area of Critically Endangered habitat is traversed by this option.	None, this option is located next to existing roads and fence lines.	2
Option 2	Traverses Critically Endangered, Endangered and Vulnerable areas, with a small area of Currently Not vulnerable.	Critically Endangered habitat will be traversed by this option, less than Option 1 but more than the preferred option.	Yes, this option traverses areas without existing fence lines and roads for a section.	1



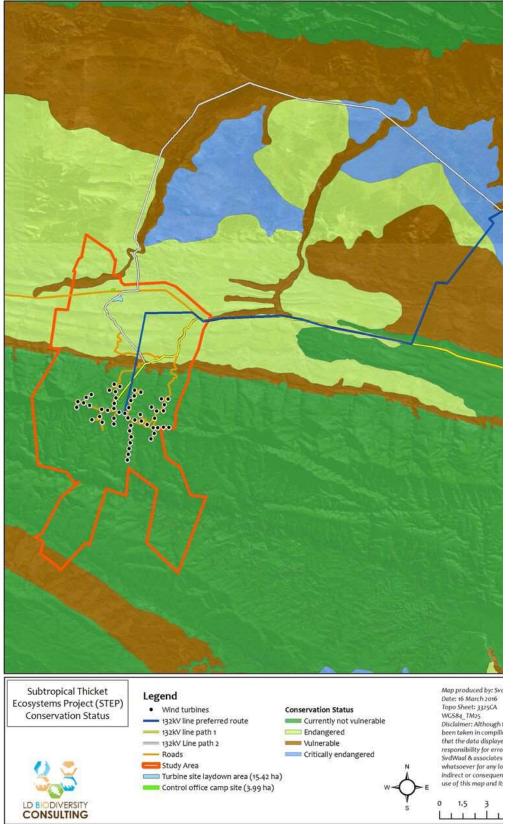


Figure 3-6: STEP Conservation status map indicating the areas traversed by the power line options associated with the Inyanda-Roodeplaat WEF.



4 Management Plan

The site comprises three spatial zones:

- The footprint of the study area
- The Area of Influence, which is the area most likely to receive the majority of the impacts of the development and
- The Study Area, comprising the farms containing the development.

Both the Area of Influence and the Study area need to be need to be managed as part of the Open Space Management Plan.

Considering the presence of several reserves in the area, including Groendal Nature reserve and the Baviaanskloof World Heritage Site, care should be taken to align the Open Space Management Plan with their management plans (should these be available) to ensure continuity. RENFORUS, a UNESCO project, provides several objectives for the project as a whole, Box 4-1 provides a summary of those that are applicable to a specific project – in this case the Roodeplaat WEF:

Box 4-1: Management measures of RENFORUS

- Facilitate knowledge exchange, policy development and joint action for a rapid transition to renewable energy.
- Reduction of environmental and ecological degradation produced by the use of conventional energy sources through the use of renewable energy sources.
- Empowerment of local communities through renewable energy development and capacity building.
- Effective use of the World Network of Biosphere Reserves as demonstration sites for the potential of renewable energies.
- Involvement of local and regional authorities voluntarily committing to increasing energy efficiency and the use of renewable energy sources.

(UNESCO, 2016)

The management plan follows; these tables are designed to be freestanding (with reference to the maps) and to be utilized in the field by the responsible parties.

This plan must be reviewed and adapted once a year during the construction phase and every 5 years during operation of the development.



1: Construc	tion Phase		
Number	Task	Responsible Party	Frequency
1.1	Development should be kept within the footprint and not extend into any areas outside of the footprint design, areas outside the footprint will be managed as part of the Open Space Management Plan.	Contractor	Daily
1.1	Open space areas should be maintained as corridors with no barriers (such as fences, and roads) unless part of the project design. All superfluous fences should be removed.	Contractor	Once prior to construction for the full site, then a monthly check on the Footprint and Area of Influence of the site.
1.2	Management of weeds and alien invasive plants must be done continuously.	Alien invasive plant specialist	As outlined in the Alien Vegetation Management Plan
1.3	Bins should be provided for waste generated by workers and disposed of in a waste dump. Any additional waste should not be dumped in open space areas but disposed of in an appropriate waste facility.	Contractor	Weekly
1.4	A plant search and rescue must be conducted to ensure maximum survival of all conservation important species.	Botanical expert	As outlined in the Plant Rescue and Protection Plan
1.5	Vegetation cleared for construction must not be dumped in intact vegetation, even temporarily.	Contractor	Daily
1.6	No collection of indigenous plants should be allowed on site except for the relevant experts	Gate control	Daily
1.7	All employees must complete a course in environmental awareness of the site, including the necessity to stay within the footprint of the site to limit disturbance, and prohibited activities.	Contractor	Preconstruction
1.8	Prohibited activities include: 1.8.1) Hunting	Contractor	These rules must be clearly indicated to all people on site, and the ECO can monitor



		CONSULTING	
	1.8.2) Fires		activities when required.
	1.8.3) Litter		
	1.8.4) Collection of plants, including medicinal plants except		
	when required with the relevant permits and overseen by the		
	ECO		
	1.8.5) No driving off-road		
	1.8.6) No interfering with fauna, including indigenous animals		
	and livestock		
	1.8.7) No use of natural water resources (washing, swimming		
	or washing of clothes)		
	1.8.8) No graffiti or other markings on natural features such		
	as rocks.		
1.9	Access to the Inyanda-Roodeplaat WEF must be strictly	Contractor	Daily
	controlled, with all contractors and visitors required to sign		
	in.		
1.10	The entrance should include signage indicating no flora or	Contractor	Preconstruction
	fauna is to be disturbed.		
1.11	All construction activities are to be confined within the	Contractor	Daily
	footprint of the site.		
2: Operatio	nal Phase		
Number	Task	Responsible Party	Frequency
2.1	Open space areas should be maintained as corridors with no	Contractor	The site should be checked for barriers
	barriers (such as fences, and roads) unless part of the project		every 5 years, or farmers consulted to
	design.		ensure no additional fences or roads have
			been constructed.
2.2	Management of weeds and alien invasive plants must be	Alien invasive	As outlined in the Alien Vegetation
	done continuously.	plant specialist	Management Plan
2.3	Rehabilitation of areas cleared in the construction phase and	Rehabilitation	As outlined in the Rehabilitation Plan
	not required in the operational phase is essential.	specialist	



		CONSULTING	
2.4	No collection of indigenous plants should be allowed on site except for the relevant experts	Contractor	Daily
2.5	Access to the Inyanda-Roodeplaat WEF must be strictly controlled, during the operational phase gates should be locked if they cannot be manned.	Contractor	Daily
2.6	 Prohibited activities include: 1.8.1) Hunting 1.8.2) Fires 1.8.3) Litter 1.8.4) Collection of plants, including medicinal plants except when required with the relevant permits and overseen by the ECO 1.8.5) No driving off-road 1.8.6) No interfering with fauna, including indigenous animals and livestock 1.8.7) No use of natural water resources (washing, swimming or washing of clothes) 1.8.8) No graffiti or other markings on natural features such as rocks. 		These rules must be clearly indicated to all people on site, and the ECO can monitor activities when required.



5 References

L. de Wet (2016). Ecological Impact Assessment Update, Roodeplaat Wind Energy Facility, Eastern Cape, South Africa. LD Biodiversity Consulting upon appointment by SRK.

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