
WATERCOURSE CROSSINGS ASSOCIATED WITH THE ACCESS ROAD UPGRADES TO THE AUTHORISED KLAWER WIND ENERGY FACILITY, WESTERN CAPE PROVINCE

CONSTRUCTION & OPERATION ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

Submitted as part of the Final Basic Assessment Report

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PROJECT DETAILS

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DEFINITIONS AND TERMINOLOGY

Alien species: A species that is not indigenous to the area or out of its natural distribution range.

Alternatives: Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.

Assessment: The process of collecting, organising, analysing, interpreting and communicating information which is relevant.

Biological diversity: The variables among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes they belong to.

Commence: The start of any physical activity, including site preparation and any other activity on site furtherance of a listed activity or specified activity, but does not include any activity required for the purposes of an investigation or feasibility study as long as such investigation or feasibility study does not constitute a listed activity or specified activity.

Cumulative impacts: Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

Direct impacts: Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.

'Do nothing' alternative: The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing' alternative also provides the baseline against which the impacts of other alternatives should be compared.

Drainage line: A drainage line is a lower category or order of watercourse that does not have a clearly defined bed or bank. It carries water only during or immediately after periods of heavy rainfall i.e. non-perennial and riparian vegetation may or may not be present.

Ecosystem: A dynamic system of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

Endangered species: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Endemic: An "endemic" is a species that grows in a particular area (is endemic to that region) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends on the geographical boundaries of the area in question and the area can be defined at different scales.

Environment: the surroundings within which humans exist and that are made up of:

- i. the land, water and atmosphere of the earth;
- ii. micro-organisms, plant and animal life;
- iii. any part or combination of (i) and (ii) and the interrelationships among and between them; and
- iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental Impact: An action or series of actions that have an effect on the environment.

Environmental impact assessment: Environmental Impact Assessment (EIA), as defined in the NEMA EIA Regulations and in relation to an application to which scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application.

Environmental management: Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental management programme: An operational plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its on-going maintenance after implementation.

Environmental assessment practitioner: An individual responsible for the planning, management and coordinating of environmental management plan or any other appropriate environmental instruments introduced by legislation.

Habitat: The place in which a species or ecological community occurs naturally.

Hazardous waste: Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment (Van der Linde and Feris, 2010;pg 185).

Indigenous: All biological organisms that occurred naturally within the study area prior to 1800

Indirect impacts: Indirect or induced changes that may occur as a result of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

Interested and Affected Party: Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups and the general public.

Perennial and non-perennial: Perennial systems contain flowing or standing water for all or a large proportion of any given year, while non-perennial systems are episodic or ephemeral and thus contain flows for short periods, such as a few hours or days in the case of drainage lines

Pollution: A change in the environment caused by substances (radio-active or other waves, noise, odours, dust or heat emitted from any activity, including the storage or treatment or waste or substances.

Rare species: Taxa with small world populations that are not at present Endangered or Vulnerable, but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. This category was termed Critically Rare by Hall and Veldhuis (1985) to distinguish it from the more generally used word "rare".

Red data species: Species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species, and/or in terms of the South African Red Data list. In terms of the South African Red Data list, species are

classified as being extinct, endangered, vulnerable, rare, indeterminate, insufficiently known or not threatened (see other definitions within this glossary).

Riparian: the area of land adjacent to a stream or river that is influenced by stream-induced or related processes. Riparian areas which are saturated or flooded for prolonged periods would be considered wetlands and could be described as riparian wetlands. However, some riparian areas are not wetlands (e.g. an area where alluvium is periodically deposited by a stream during floods but which is well drained).

Significant impact: An impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment.

Waste: is defined as (a) any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to this Act; or (b) any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister by notice in the Gazette, but any waste or portion of waste, referred to in paragraphs (a) and (b), ceases to be a waste— (i) once an application for its re-use, recycling or recovery has been approved or, after such approval, once it is, or has been re-used, recycled or recovered; (ii) where approval is not required, once a waste is, or has been re-used, recycled or recovered; (iii) where the Minister has, in terms of section 74, exempted any waste or a portion of waste generated by a particular process from the definition of waste; or (iv) where the Minister has, in the prescribed manner, excluded any waste stream or a portion of a waste stream from the definition of waste.

Wetland: land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which under normal circumstances supports or would support vegetation typically adapted to life in saturated soil (Water Act 36 of 1998); land where an excess of water is the dominant factor determining the nature of the soil development and the types of plants and animals living at the soil surface (Cowardin *et al.*, 1979).

Watercourse: as per the National Water Act means -

- (a) a river or spring;
- (b) a natural channel in which water flows regularly or intermittently;
- (c) a wetland, lake or dam into which, or from which, water flows; and
- (d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks

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PROJECT DETAILS

CHAPTER 1

Klawer Wind Power (Pty) Ltd received an environmental authorisation in terms of the National Environmental Management Act (NEMA) (Act 107 of 1998) for the Klawer Wind Energy Facility (WEF) on 27 September 2011 from the National Department of Environmental Affairs (DEA Ref: 12/12/20/1964). The project has undergone a number of Authorisation Amendments, with the last amendment resulting in the project's validity being extended to 26 September 2018, as well as changing the holder of the EA from Klawer Wind Power (Pty) Ltd to Vendiwell (Pty) Ltd (DEA Ref: 12/12/20/1964/AM3). The Project was awarded Preferred Bidder status under the Small Projects Independent Power Producer Procurement Programme (the "SPIPPPP") and it is intended to commence with construction Q2 of 2017.

The existing access roads to the Klawer Wind Energy Facility will be required to be upgraded to accommodate the construction vehicles associated with the facility. These activities could include the widening of the road by more than 4m and the upgrading of watercourse crossings (ephemeral drainage lines), including the use of concrete pipe culverts, and the infilling into and removal of material from the watercourse. These activities were not previously assessed or authorised as part of the proposed wind farm development. Therefore, Vendiwell (Pty) Ltd is applying to the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP), as Competent Authority for the project, for authorisation of the identified activities.

Number and date of relevant notice	Activity No (s) (in terms of the relevant notice)	Description of each listed activity as per the project description
GN R. 983, 4 December 2014	19 (i)	<p>The infilling or depositing of any material of more than 5 cubic meters into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles, or rock of more than 5 cubic meters from -</p> <p>(i) a watercourse</p> <p><i>Upgrades intended for the existing Public and Private access roads associated with the authorised Klawer WEF will require infilling and removal of material from the Groenkloof Gully.</i></p>
GN R. 985, 4 December 2014	18 (i) (aa)	<p>The widening of a road by more than 4 meters or the lengthening of a road by more than 1 kilometre</p> <p>(i) In all areas outside urban areas</p> <p>(aa) areas containing indigenous vegetation</p> <p><i>Both the Public and Private access roads are to be upgraded. This includes flattening and ardening, as well as resurfacing with G5 and/or</i></p>

Number and date of relevant notice	Activity No (s) (in terms of the relevant notice	Description of each listed activity as per the project description
		<i>G6 gravel. The roads are to be widened by more than 4m, and less than 6m. No lengthening will take place.</i>

All other activities associated with the construction of the wind energy facility, including construction within 32m of a watercourse, have been authorised as part of the wind energy facility.

Three proposed watercourse crossings are associated with the planned upgrades to the existing public and private farm access roads to the wind facility. The need for the project (watercourse crossings and access road upgrades) is based on the requirement to have appropriate infrastructure installed (roads and watercourse crossings) in order to facilitate the effective transport of the project components to the wind farm site during construction, and to optimise maintenance activities during operations.

At present, the private access roads to the wind facility is not structurally sound, and therefore cannot accommodate larger haulage vehicles traveling and carrying abnormal loads to the wind energy facility. Upgrading of the public road OP09636 will contribute to the objectives of the West Coast District Municipality. These Strategic Objectives were translated into direction for transport planning by reducing the need for fossil fuels, improving access to jobs by extending the catchment area of potential candidates, improving community wellbeing through integrated communities, and providing bulk public transport and NMT infrastructure to facilitate mobility and accessibility (WCDM IDP 2012-2016). Upgrading of the public access road will contribute directly to Objective 5 - Ensure a well-maintained road network.

The 'project' (watercourse crossings and access road upgrades) is proposed on the following four farm portions:

- » Portion 99 of Farm Birdfield 306
- » Portion 100 of Farm Birdfield 306
- » Remaining Extent of Farm 472
- » Remaining Extent of Portion 141 of Farm Annex Mielie Draai 384

PURPOSE & OBJECTIVES OF THE EMPR

CHAPTER 2

An Environmental Management Programme (EMPr) is defined as “an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented or mitigated, and that the positive benefits of the projects are enhanced”¹. The objective of this Environmental Management Plan is to provide consistent information and guidance for implementing the management and monitoring measures established in the permitting process and help achieve environmental policy goals. The purpose of an EMP is to help ensure compliance with recommendations and conditions specified through an EIA process, as well as to ensure continuous improvement of environmental performance, reducing negative impacts and enhancing positive effects during the construction and operation of the facility. An effective EMPr is concerned with both the immediate outcome as well as the long-term impacts of the project.

The EMPr provides specific environmental guidance for the construction and operation phases of a project, and is intended to manage and mitigate construction and operation activities so that unnecessary or preventable environmental impacts do not result. These impacts range from those incurred during start up (site clearing and site establishment) through those incurred during the construction activities themselves (erosion, noise, dust) to those incurred during site rehabilitation (soil stabilisation, re-vegetation) and operation. The EMPr also defines monitoring requirements in order to ensure that the specified objectives are met.

The EMPr has been developed as a set of environmental specifications, i.e. principles of environmental management for the proposed watercourse crossings associated with the public and private access road upgrades, which are appropriately contextualised to provide clear guidance in terms of the on-site implementation of these specifications (i.e. on-site contextualisation is provided through the inclusion of various monitoring and implementation tools).

The EMPr has the following objectives¹:

- » To outline mitigation measures and environmental specifications which are required to be implemented for the planning, construction, rehabilitation and operation phases of the project in order to minimise the extent of environmental impacts, and to manage environmental impacts associated with the watercourse crossings.

¹ Provincial Government Western Cape, Department of Environmental Affairs and Development Planning: *Guideline for Environmental Management Plans*, 2005

- » To ensure that the construction and operation phases do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential environmental benefits are enhanced.
- » To identify entities who will be responsible for the implementation of the measures and outline functions and responsibilities.
- » To propose mechanisms for monitoring compliance, and preventing long-term or permanent environmental degradation.
- » To facilitate appropriate and proactive responses to unforeseen events or changes in project implementation that were not considered in the EIA process.

This EMPr for construction activities has been compiled in accordance with the EIA Regulations of December 2014 and will be further developed in terms of specific requirements listed in any authorisations issued for the proposed project. This EMPr should be considered a dynamic document, requiring regular review and updating as new information becomes available in order for it to remain relevant to the requirements of the site and the environment.

The mitigation measures identified within the Environmental Impact Assessment process are systematically addressed in the EMP, ensuring the minimisation of adverse environmental impacts to an acceptable level.

2.1. Roles and Responsibilities

Vendiwell (Pty) Ltd must ensure that the implementation of the project complies with the requirements of any and all environmental authorisations and any other permits (once issued), and obligations emanating from other relevant environmental legislation. This obligation is partly met through the development of the EMPr, and the implementation of the EMPr through its integration into the contract documentation for activities associated with both construction and operation. Since this EMPr is part of the EIA process undertaken for the proposed watercourse crossings, it is important that this guideline document be read in conjunction with the draft Basic Assessment Report.

To achieve effective environmental management, it is important that Contractors are aware of their responsibilities in terms of the relevant environmental legislation and the contents of this EMPr. The Contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. The Contractors obligations in this regard include the following:

- » Ensuring that employees have a basic understanding of the key environmental features of the construction site and the surrounding environment.

- » Ensuring that a copy of the EMPr is readily available on-site and that all site staff is aware of the location and has access to the document. Employees must be familiar with the requirements of the EMPr and the environmental specifications as they apply to the construction of the facility.
- » Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended an appropriate Environmental Awareness Training course. The course must provide the site staff with an appreciation of the project's environmental requirements, the EMPr specifications, and how they are to be implemented.
- » Basic training in the identification of archaeological sites/objects, and protected or Red List flora and fauna that may be encountered on the site.
- » Awareness of any other environmental matters, which are deemed to be necessary by the ECO.

STRUCTURE OF THIS EMPR

CHAPTER 3

The first two chapters provide background to the EMPr and the proposed project or activity, and the relevant legislative context for the project. The chapters which follow consider the:

- » Pre-Construction Activities and,
- » Construction activities
- » Operation activities

These chapters set out the procedures necessary for the environmental management of the watercourse crossings associated with the public and private access road upgrades to the Klawer Wind Farm to achieve environmental compliance. For each aspect of the activity, an over-arching environmental **goal** is stated. In order to meet this goal, a number of **objectives** are listed. The management plan has been structured in table format in order to show the links between the goals for each phase and their associated objectives, activities/risk sources, mitigation actions monitoring requirements and performance indicators. A specific environmental management plan table has been established for each environmental objective. The information provided within the EMPr table for each objective is illustrated below:

OBJECTIVE: Description of the objective, which is necessary in order to meet the overall goals; these take into account the findings of the environmental impact assessment specialist studies.

Project component/s	List of project components affecting the objective
Potential Impact	Brief description of potential environmental impact if objective is not met
Activity/risk source	Description of activities which could impact on achieving objective
Mitigation: Target/Objective	Description of the target; include quantitative measures and/or dates of completion

Mitigation: Action/control	Responsibility	Timeframe
List specific action(s) required to meet the mitigation target/objective described above.	Who is responsible for the measures	Time periods for implementation of measures

Performance Indicator	Description of key indicator(s) that track progress/indicate the effectiveness of the management plan.
Monitoring	Mechanisms for monitoring compliance; the key monitoring actions required to check whether the objectives are being achieved, taking into consideration responsibility, frequency, methods and reporting

The objectives and EMPr tables are required to be reviewed and possibly modified whenever changes, such as the following, occur:

- » Planned activities change (i.e. in terms of the components of the facility).
- » Modification to or addition to environmental objectives and targets.
- » Additional or unforeseen environmental impacts are identified.
- » Relevant legal or other requirements are changed or introduced.
- » Significant progress has been made on achieving an objective or target such that it should be re-examined to determine if it is still relevant, should be modified, etc.

4.1. Project Team

This draft EMPr was compiled by:

EMPr Compilers	
Ashleigh Blackwell	Savannah Environmental
Jo-Anne Thomas	Savannah Environmental
Simon Todd	Simon Todd Consulting

The Savannah Environmental team has extensive knowledge and experience in environmental impact assessment and environmental management, having being involved in EIA processes over the past ten (10) years. They have managed and drafted environmental management plans for other wind and solar energy facility projects throughout South Africa. In addition, they have been involved in compliance monitoring of major construction projects in South Africa.

MANAGEMENT PLAN FOR PRE-CONSTRUCTION

CHAPTER 4

Overall Goal: undertake pre-construction activities (planning and design phase) in a way that:

- » Ensures that the design of the watercourse crossings responds to the identified environmental constraints and opportunities.
- » Ensures that pre-construction activities are undertaken in accordance with all relevant legislative requirements.
- » Ensures that adequate regard has been taken of any landowner and community concerns and that these are appropriately addressed through design and planning (where appropriate).
- » Enables the construction activities to be undertaken without significant disruption to other land uses and activities in the area.

In order to meet this goal, the following objectives have been identified, together with necessary actions and monitoring requirements.

5.1. Objectives

OBJECTIVE 1: To ensure that the planning and design of the road upgrades, including the watercourse crossings respond to the identified environmental constraints and opportunities

Project component/s	<ul style="list-style-type: none"> » Watercourse crossing, i.e. culverts » Access Road Upgrade
Potential Impact	<ul style="list-style-type: none"> » Design fails to respond optimally to the environmental consideration
Activities/risk sources	<ul style="list-style-type: none"> » Construction of watercourse crossings » Construction of the watercourse crossing » Upgrade of the access roads
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure that the design of the watercourse crossings responds to the identified environmental constraints and opportunities. » To ensure selection of best environmental option for design of infrastructure. » To undertake pre-construction activities in accordance with all relevant legislative requirements. As far as possible, the Developer and Contractor should ensure that where sensitive vegetation is present along portions of the access roads, the upgrade footprint should be kept to a absolute minimum.

Mitigation: Action/control	Responsibility	Timeframe
Plan and conduct pre-construction activities in an environmentally acceptable manner	Project Company and Contractor	Design phase
Crossings must be designed to be the most practical and technically feasible, and must take into accounts all aspects of the surrounding landscape		
The watercourse crossings should be designed such that they do not trap any run-off, thereby creating inundated areas, but allow for free flowing systems	Contractor	Design phase
A detailed geotechnical investigation is required for the design phase.	Contractor	Design phase
Undertake a preconstruction walk-through of the affected intact vegetation areas along the road to identify species of concern that can be translocated. A permit must be obtained for removal or cutting of any protected plants found on site prior to the commencement of construction.	Project Company	Design phase
Obtain a permit as required in terms of the National Water Act from DWS to impact on any water resource.	Project Company	Design phase
Compile a comprehensive storm water management plan as part of the final design of the project for implementation during construction and operation.	Contractor	Design phase

Performance Indicator	<ul style="list-style-type: none"> » Design meets objectives and does not degrade the environment and respond to the mitigation measures and recommendations in the Basic Assessment report. » Ecosystem fragmentation is kept to a minimum.
Monitoring	<ul style="list-style-type: none"> » Ensure that the design implemented meets the objectives and mitigation measures in the Basic Assessment report through review of the design by the Project Manager and Environmental Specialist prior to the commencement of construction.

OBJECTIVE 2: To ensure effective communication mechanisms

On-going communication with affected and surrounding landowners is important to maintain during the construction and operational phases of the activity. Any issues and concerns raised should be addressed as far as possible in as short a timeframe as possible.

Project component/s	<ul style="list-style-type: none"> » Access roads » watercourse crossing
Potential Impact	<ul style="list-style-type: none"> » Impacts on affected and surrounding landowners and land uses

Activity/risk source	<ul style="list-style-type: none"> » Activities associated with construction of watercourse crossings » Activities associated with the access road upgrades
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Effective communication with affected and surrounding landowners » Addressing of any issues and concerns raised as far as possible in as short a timeframe as possible

Mitigation: Action/control	Responsibility	Timeframe
Compile and implement a grievance mechanism procedure for the public (as outlined in Appendix A) to be implemented during both the construction and operational phases of the facility. This procedure should include details of the contact person who will be receiving issues raised by interested and affected parties, and the process that will be followed to address issues. This procedure should be in line with the South African Labour Law.	Project Company and Contractor	Pre-construction
Liaison with landowners is to be undertaken prior to the commencement of construction. This is to be in accordance with the EIA regulations of 2014	Contractor	Pre-construction

Performance Indicator	<ul style="list-style-type: none"> » Effective communication procedures in place.
Monitoring	<ul style="list-style-type: none"> » An incident reporting system should be used to record non-conformances to the EMPr. » Public complaints register must be developed and maintained.

MANAGEMENT PLAN FOR CONSTRUCTION

CHAPTER 5

Overall Goal: Undertake the construction phase in a way that:

- » Ensures that construction activities are properly managed in respect of environmental aspects and impacts.
- » Enables construction activities to be undertaken without significant disruption to other land uses and activities in the area, in particular concerning farming practices and effects on local residents.
- » Minimises the impact on any remaining indigenous natural vegetation and habitats of ecological value.
- » Minimises the impact on heritage site should they be uncovered.

5.1. Institutional Arrangements: Roles and Responsibilities for Construction

As the Proponent, Vendiwell (Pty) Ltd must ensure that the implementation of the project activities (i.e. road upgrades and watercourse crossings) comply with the requirements of any and all environmental authorisations and permits, and obligations emanating from other relevant environmental legislation. While the proponent has a duty of care in this regard, the Contractor will be held directly responsible for all of these permits. This obligation is partly met through the development of the EMPr, and the implementation of the EMPr through its integration into the contract documentation. Vendiwell (Pty) Ltd will retain various key roles and responsibilities during construction. These are outlined within the EMPr compiled for the Klawer Wind Farm and are also applicable for the access road upgrades and watercourse crossings.

5.2. Objectives

In order to meet this goal, the following objectives have been identified, together with the necessary actions and monitoring requirements.

OBJECTIVE 1: Soil erosion control, water quality management

The natural soil on the site needs to be preserved as far as possible in order to minimise impacts on the environment. Soil degradation including erosion (by wind and water) and subsequent deposition elsewhere is of a concern in areas underlain by fine grained soil which can be mobilised when disturbed, even on relatively low slope gradients (accelerated erosion). Degradation of the natural soil profile due to project earthworks will affect soil forming processes and associated ecosystems. A set of strictly adhered to

mitigation measures are required to be implemented in order to effectively limit the impact on the environment as outline below.

Project component/s	<ul style="list-style-type: none"> » watercourse crossing » Access Roads (Public and Private)
Potential Impact	<ul style="list-style-type: none"> » Erosion and soil loss into watercourse » Disturbance of watercourse » Sedimentation of watercourse area » A loss of indigenous vegetation cover along portions of the access road to be upgraded and in watercourse area
Activities/risk sources	<ul style="list-style-type: none"> » Vegetation clearance along access road portions to be widened » Excavation, stockpiling and compaction of soil » Mobile construction equipment movement on site » Drainage line road crossings » Roadside drainage ditches
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise erosion of soil from site during construction » To minimise deposition of soil into drainage lines » To minimise damage to aquatic system by erosion or deposition » To minimise damage to soil and aquatic system by construction activity » No accelerated overland flow related surface erosion as a result of a loss of vegetation cover » No reduction in the surface area of drainage lines as a result of the establishment of infrastructure » Minimal loss of vegetation cover due to construction related activities » Increase the flow rate and ease at which water passes through sections of the drainage line which is currently in a poor condition

Mitigation: Action/control	Responsibility	Timeframe
Identify and demarcate construction areas for general construction work and restrict construction activity to these areas. Prevent unnecessary destructive activity within construction areas (prevent over-excavations and double handling ²)	Contractor	Before and during construction
Stockpile topsoil for re-use in rehabilitation phase. Maintain stockpile shape and protect from erosion. All stockpiles must be positioned at least 50 m away from wetlands and drainage lines. Limit the height of stockpiles as far as possible in order to reduce compaction.	Contractor	During site establishment and any activity related to earthworks as well as the duration of construction
Disturbance of vegetation and topsoil must be kept to a practical minimum.	Contractor	Duration of contract
Stockpile areas should be located outside of identified sensitive areas and more than 50m from drainage lines.	Contractor	Duration of Construction

² The term double handling refers to moving excavated material multiple times

Mitigation: Action/control	Responsibility	Timeframe
Rehabilitate disturbance areas as soon as construction in an area is completed.	Contractor	For the project, Lifecycle
Control depth of excavations and stability of cut faces/sidewalls.	Contractor	maintenance over duration of contract
Vegetation clearing should be kept to a minimum at the crossings and vegetation immediately up- and downstream of the crossing sites should be left intact as this binds the soil and also slows water flow, thereby minimising erosion risk.	Contractor	For the project, Lifecycle
Control storm water and runoff water through the implementation of a storm water management plan for the site.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » Limited soil erosion around site » Limited increased siltation in drainage lines Limited soil degradation
Monitoring	<ul style="list-style-type: none"> » Regular inspections of the site by SHE Officer and ECO » Inspections of sediment control devices by SHE Officer and ECO » Regular inspections of surroundings, including drainage lines by SHE Officer and ECO » Immediate reporting of ineffective sediment control systems by SHE Officer and ECO » An incident reporting system must record non-conformances. » Public complaints register must be developed and maintained on site.

OBJECTIVE 2: Limit Damage to watercourse and sensitive drainage

Construction of the proposed infrastructure will impact upon non-perennial drainage lines only (the Groenkloof Gully). Where impacts are unavoidable, mitigation measures are required to minimise impacts on these systems. The proposed activity is deemed to have a limited potential impact (negative) on the aquatic environment, especially considering the highly impacted nature of the aquatic resources on site due to transformation and disturbance from human and agricultural activities.

Project component/s	» watercourse crossing, i.e. access roads and culverts
Potential Impact	» Damage to watercourse area by any means that will result in hydrological changes (includes erosion, siltation, dust, direct removal of soil of vegetation, dumping of material).
Activity/risk source	» Construction of watercourse crossing

Mitigation:	Minimise damage to watercourse areas where crossing will be built.
Target/Objective	Increase the flow rate and ease at which water passes through sections of the drainage line which is currently in a poor condition

Mitigation: Action/control	Responsibility	Timeframe
Rehabilitate any disturbed areas as soon as possible once construction is completed in an area.	Contractor	Construction
Control storm water and runoff water through the implementation of a storm water management plan for the site.	Contractor	Construction
The natural flow direction of the channel should not be changed as this can lead to bank destabilisation and erosion damage	Contractor	Construction
Immediately downstream of the installed crossing there should be flow dampening structures in the bed such as rock gabions to ensure that the faster flow coming off the drift does not initiate erosion in the disturbed area downstream of the crossing.	Contractor	Construction
Any alien plant species establishing near the crossings should be strictly controlled and removed.	Contractor	Construction

Performance Indicator	» No impacts on water quality, water quantity, natural status of watercourse.
Monitoring	<ul style="list-style-type: none"> » Habitat loss in watercourse should be monitored before and after construction. » The presence and development of erosion features downstream of any construction must be monitored. » An incident reporting system must be used to record non-conformances to the EMPr. » Public complaints register must be developed and maintained on site. » Each crossing should be monitored for the entire project lifecycle to ensure that the banks of the drainage line have remained stable and any erosion in the bed or bank can be addressed if required.

OBJECTIVE 3: Minimisation of the Development Footprint

In order to minimise impacts on flora, fauna and ecological processes, the development footprint should be limited.

Project component/s	<ul style="list-style-type: none"> » watercourse crossing » Access Roads (Public and Private)
Potential Impact	» Impacts on natural vegetation and habitats

	<ul style="list-style-type: none"> » Impacts on soil » Loss of topsoil
Activity/risk source	<ul style="list-style-type: none"> » Site preparation and earthworks » Construction of watercourse crossings and access road upgrades » Stockpiling of topsoil, subsoil and spoil material
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise footprints of disturbance of vegetation/habitats on-site and in surrounding areas » Remove and store all topsoil on areas that are to be excavated; and use this topsoil in subsequent rehabilitation of disturbed areas. » Spoil material to be minimised.

Mitigation: Action/control	Responsibility	Timeframe
Construction activities must be restricted to demarcated areas so that impact on flora and fauna is restricted.	Contractor	Contractor Site establishment & duration of contract
Rehabilitate any disturbed areas immediately after construction in that area is complete in order to stabilise landscapes.	Contractor	Construction
Vegetation clearing should be kept to a minimum, especially along the final 1.3km towards the junction with the entrance to the wind farm site.	Contractor	Construction
Soil disturbance should be kept to a minimum and erosion controlled. There should be diversion structures present to prevent water from running down the road on slopes, as well as rock packs or similar in areas likely to receive large amounts of runoff from the road	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » Zero disturbance outside of designated work areas » Minimise loss of topsoil » Minimise clearing of existing natural vegetation
Monitoring	<ul style="list-style-type: none"> » Observation of vegetation clearing and soil management activities by SHE officer throughout the construction phase. » An incident reporting system must be used to record non-conformances to the EMP.

OBJECTIVE 4: Protection of Indigenous Vegetation and Control of Alien Invasive Plants

Impacts on vegetation at the construction stage are expected to be mainly as a result of direct permanent loss of vegetation in development footprint areas. There are a number of different alien plant species that could become established on site. The potential therefore exists for extensive and diverse invasion of the site. The habitats most likely

to be affected are the watercourses, and vegetation of the Doringriver Quartzite Karoo vegetation. Although there are several species of concern in the area, the affected area is disturbed and there would not be a direct impact on any species of concern.

Project component/s	<ul style="list-style-type: none"> » watercourse crossing » Access Roads (Public and Private)
Potential Impact	<ul style="list-style-type: none"> » Loss of vegetation and sensitive vegetation » Spread of alien species
Activity/risk source	<ul style="list-style-type: none"> » Site preparation and earthworks » Construction-related traffic » Dumping or damage by construction equipment outside of demarcated construction areas
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To retain natural vegetation as far as possible » To minimise footprints of disturbance of vegetation/habitats on-site » Limit alien plants within project development footprint (WEF, Water crossings and road upgrades) » Limit loss of species of conservation concern

Mitigation: Action/control	Responsibility	Timeframe
Vegetation clearing should be kept to a minimum, especially along the final 1.3km towards the junction with the entrance to the wind farm site.	Contractor	Construction
Unnecessary impacts on surrounding natural vegetation must be avoided, e.g. driving around in the veld. The construction impacts must be contained to the footprint of the infrastructure.	Contractor	Construction
Vegetation immediately up- and down-stream of the crossing sites should be left intact as this binds the soil and also slows water flow, thereby minimising erosion risk.	Contractor	Maintenance over duration of contract
<ul style="list-style-type: none"> » Avoid creating conditions in which alien plants may become established: Keep disturbance of indigenous vegetation to a minimum » Rehabilitate disturbed areas as quickly as possible once construction is complete in an area » Do not import soil from areas with alien plants 	Contractor	Construction
Establish an ongoing monitoring programme to detect and quantify any alien species that may become established and identify the problem species (as per Conservation of Agricultural Resources Act, Act 43 of 1983) and the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).	Contractor	Construction
Immediately control any alien plants that become established using registered control methods.	Contractor	Construction
Soil disturbance should be kept to a minimum and erosion controlled. There should be diversion structures present to prevent water from running down the road on slopes, as	Contractor	Construction

well as rock packs or similar in areas likely to receive large amounts of runoff from the road.		
A site rehabilitation programme should be compiled and implemented.	Contractor	Construction and the duration of the contact

Performance Indicator	<ul style="list-style-type: none"> » Zero disturbance outside of designated work areas. » Minimised clearing of existing/natural vegetation. » Loss of natural vegetation only within designated footprint of infrastructure. » No significant fragmentation of untransformed areas of natural vegetation. » No alien infestation within project control area
Monitoring	<ul style="list-style-type: none"> » Observation of vegetation clearing activities by SHE Officer throughout the construction phase. » Monitoring of alien plant establishment within the project development footprint (wind energy facility, Water crossings and road upgrades) on an on-going basis. » An incident reporting system must be used to record non conformances to the EMPr. » The road should be monitored for 1 year after construction to ensure that the disturbed areas along the sides of the road have stabilised and the road is not eroding or causing hydrological impacts.

OBJECTIVE 5: Minimise the impacts on fauna

Faunal species are indirectly affected by the overall loss of habitat as a result of construction and operation activities. Construction activities would result in a negative direct impact on fauna such as reptiles, amphibians and mammals present in the drainage areas or along the portions of the access road to be upgraded. Construction phase disturbance will be transient, but some limited habitat loss would be long term.

Project component/s	<ul style="list-style-type: none"> » watercourse crossing » Access Roads (Public and Private)
Potential Impact	<ul style="list-style-type: none"> » Loss or displacement of fauna » Vegetation clearance and associated impacts on faunal habitats. » Traffic movement to and from site
Activity/risk source	<ul style="list-style-type: none"> » Site preparation and earthworks. » Construction-related traffic. » Earthwork and excavations for culverts. » Vegetation clearance
Mitigation:	<ul style="list-style-type: none"> » To minimise footprints of habitat destruction

Target/Objective	» To minimise disturbance to (and death of) resident and visitor faunal species
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Mitigation: Action/control	Responsibility	Timeframe
Areas to be cleared must be clearly marked in the field to eliminate unnecessary clearing/disturbance.	Contractor	Pre-Construction
The extent of clearing and disturbance to the native vegetation must be kept to a minimum so that impact on fauna and their habitats is restricted.	Contractor	Duration of contract
All construction vehicles should adhere to a low speed limit (40km/h for cars and 30km/h for trucks) to avoid collisions with susceptible species such as snakes and tortoises.	Contractor	Construction
The intentional harming or killing of animals will be prohibited through on-site supervision and worksite rules.	Contractor	Construction
Implement a faunal removal plan/ rescue plan with designated/ trained personnel and contact numbers. Any animals found must be removed by a suitably qualified person in a safe manner, unharmed, and placed in an area where the animal will be comfortable.	Contractor	Duration of contract
No fires should be allowed within the site.	Contractor	Construction
No fuelwood collection should be allowed on-site.	Contractor	Construction
All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » No disturbance to areas outside of the project development footprint (WEF, Water crossings and road upgrades) » Minimised clearing of existing/natural vegetation and habitats for fauna » Limited impacts on faunal species (i.e. noted/recorded fatalities)
Monitoring	<ul style="list-style-type: none"> » Observation of vegetation clearing activities by The SHE Officer or contractor's EO throughout construction phase. » Supervision of all clearing and earthworks. » Recording faunal fatalities to monitor success of relocation efforts. » An incident reporting system will be used to record non-conformances to the EMPr

OBJECTIVE 6: Ensure Appropriate Traffic Management

Construction activities may result in impacts on road users, especially along the public

access road. Appropriate traffic management measures must be implemented to ensure the safety of road users.

Project component/s	<ul style="list-style-type: none"> » watercourse crossing » Access Roads (Public and Private)
Potential Impact	<ul style="list-style-type: none"> » Impact on traffic movement » Impact on road user safety
Activity/risk source	<ul style="list-style-type: none"> » Construction activities associated with widening of the access roads » Construction activities associated with watercourse crossings
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Minimise impact on traffic movements. » To ensure safety of road users

Mitigation: Action/control	Responsibility	Timeframe
Signage must be established at appropriate points warning of turning traffic and the construction site, identifying speed limits, travel restrictions, and other standard traffic control information. All signage to be in accordance with prescribed standards and must be appropriately maintained for the duration of the construction period.	Contractor	Duration of contract
All vehicles of the contractor travelling on public roads must adhere to the specified speed limits and all drivers must be in possession of an appropriate valid driver's license.	Transport Contractor	Duration of contract
All construction vehicles should adhere to a low speed limit (40km/h for cars and 30km/h for trucks) to avoid collisions with susceptible species such as snakes and tortoises.	Contractor	Construction
A designated access route to the construction areas should be used at all times, no vehicles are permitted to stray from the approved access route.	Transport Contractor	Duration of contract

Performance Indicator	<ul style="list-style-type: none"> » Local residents and road users are aware of vehicle movements and schedules » No reports from property owners regarding problems with construction activities and workforce
Monitoring	<ul style="list-style-type: none"> » Developer must monitor indicators listed above to ensure that they have been implemented. » A complaints register must be maintained, in which any complaints from residents/the community will be logged, and thereafter complaints will be investigated and, where appropriate, acted upon. » An incident reporting system must be used to record nonconformances to the EMPr

Monitoring	<ul style="list-style-type: none"> » Observation of vegetation clearing activities by The SHE Officer or contractor's EO throughout construction phase. » Supervision of all clearing and earthworks. » Recording faunal fatalities to monitor success of relocation efforts. » An incident reporting system will be used to record non-conformances to the EMPr
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OBJECTIVE 7: Appropriate handling of potential waste generated at the site

The construction phase of the proposed project may produce a small amount of domestic waste (litter) and other general solid waste including rubble. Since haulage vehicles and machinery will be petrol and diesel operated, trace amount of hydrocarbons may be leaked during the construction activities.

Project component/s	<ul style="list-style-type: none"> » Watercourse crossings, i.e. access roads and culverts » Diesel machinery and haulage vehicles
Potential Impact	<ul style="list-style-type: none"> » The release of small amounts of diesel and petrol hydrocarbons from leaking vehicles and machinery » Litter or contamination of the site or water through poor waste management practices
Activity/risk source	<ul style="list-style-type: none"> » Vehicles associated with site preparation and earthworks » Packaging and other construction wastes » Hydrocarbon leakage from vehicles and machinery » Spoil material from excavation, earthworks and site preparation
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons » To ensure that the maintenance of machinery on-site does not cause pollution of the environment or harm to persons » To comply with waste management legislation » To minimise production of waste » To ensure appropriate waste storage and disposal » To avoid environmental harm from waste disposal

Mitigation: Action/control	Responsibility	Timeframe
Storage areas, should any be necessary, must be located more than 50 m away from the watercourse.	Contractor	Before and during construction
The storage of flammable and combustible liquids such as oils, should any exist, must be in designated areas which are appropriately bunded, and stored in compliance with MSDS files, as defined by the SHE Representative.	Contractor	Duration of contract

Any spills must receive the necessary clean-up action. If required, bioremediation kits are to be kept on-site and used to remediate any spills that may occur.	Contractor	Duration of contract
Any storage and disposal permits/approvals which may be required will be obtained, and the conditions attached to such permits and approvals must be complied with.	Contractor	Duration of contract
Routine servicing and maintenance of vehicles is not to take place on-site (except for emergency situations or large cranes which cannot be moved off-site). If repairs of vehicles must take place on site, an appropriate drip tray must be used to contain any fuel or oils.	Contractor	Duration of contract
All cleared vegetation and construction material waste will be placed in demarcated disposal areas on site	Contractor	Duration of contract
Construction contractor must provide specific detailed waste management plans to deal with all waste streams.	Contractor	Duration of contract
Specific areas must be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste (wood and metal scrap) and contaminated waste. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage and vermin control.	Contractor	Duration of contract
Where possible, construction and general wastes on-site must be reused or recycled. Bins and skips must be available on-site for collection, separation and storage of waste streams (such as wood, metals, general refuse etc.).	Contractor	Duration of contract
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Contractor	Duration of contract
Waste and surplus dangerous goods must be kept to a minimum and must be transported by approved waste transporters to sites designated for their disposal.	Contractor	Duration of contract
Documentation (waste manifest) must be maintained detailing the quantity, nature and fate of any hazardous waste.	Contractor	Duration of contract
Hazardous and non-hazardous waste must be separated at source. Separate waste collection bins must be provided for this purpose. These bins must be clearly marked and appropriately covered.	Contractors	Erection: Prior to construction and Maintenance: for the duration of the contract within a particular area
All solid waste collected must be disposed of at a registered waste disposal site. A certificate of disposal must be obtained and kept on file. The disposal of waste must be in accordance with all relevant legislation. Under no circumstances may solid waste be burnt or buried on	Contractors	Erection: Prior to construction and Maintenance: for the duration of the contract

site.		within a particular area
Construction equipment (haulage vehicles and machinery) must be refuelled within designated refuelling locations, or where remote refuelling is required, appropriate drip trays must be utilised	Contractor	Duration of contract
Construction machinery must be stored in an appropriately sealed area.	Contractor	Duration of contract
Although no concrete batching is to take place at the water crossings, any spilled cement or concrete must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site.	Contractor	Duration of contract
In the event of a major spill or leak of contaminants, the relevant administering authority must be immediately notified as per the notification of emergencies/incidents.	Contractor	Duration of contract
Any contaminated/polluted soil removed from the site must be disposed of at a licensed hazardous waste disposal facility.	Contractor	Duration of contract
Upon the completion of construction, the area must be cleared of potentially polluting materials.	Contractor	Completion of construction

Performance Indicator	<ul style="list-style-type: none"> » No water or soil contamination by chemical spills » No complaints received regarding waste on site or indiscriminate dumping » Internal site audits ensuring that waste segregation, recycling and reuse is occurring appropriately » Provision of all appropriate waste manifests for all waste streams
Monitoring	<ul style="list-style-type: none"> » Observation and supervision of handling practices and vehicle maintenance throughout construction phase » A complaints register must be maintained, in which any complaints from the community will be logged. Complaints must be investigated and, if appropriate, acted upon. » Observation and supervision of waste management practices throughout construction phase. » Waste collection to be monitored on a regular basis. » Waste documentation completed. » An incident reporting system must be used to record non conformances to the EMPr. » An appointed SHE Officer must monitor indicators listed above to ensure that they have been met for the construction phase. » Public complaints register must be developed and maintained on site.

OBJECTIVE 8: Management of dust and emissions to air

The movement of haulage vehicles on the public and private access roads during construction of the crossings and upgrading of the access roads will result in dust emissions. Limited gaseous or particulate emissions are anticipated from exhaust emissions from diesel-operated equipment on-site and heavy duty haulage vehicles that will access site.

Project component/s	<ul style="list-style-type: none"> » Vehicles carrying project components (culverts) » Watercourse Crossings » Road Upgrades
Potential Impact	<ul style="list-style-type: none"> » Dust and particulates from exposed areas and vehicle movement onsite. » Release of minor amounts of air pollutants (for example NO₂, CO and SO₂) from haulage vehicles and on-site operation equipment » Potential impact on site personnel and other land users within 1km radius of the site
Activity/risk source	<ul style="list-style-type: none"> » Fugitive dust from areas cleared of vegetation and due to vehicle movement on site » Atmospheric exhaust emissions
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure emissions from all vehicles are minimised, where possible, for the duration of the construction phase » To ensure appropriate management of exposed areas and gravel road surfaces to minimise dust emissions » To minimise nuisance to the community from dust emissions and to comply with workplace health and safety requirements for the duration of the operation phase

Mitigation: Action/control	Responsibility	Timeframe
Appropriate dust suppression measures must be implemented at all exposed areas and along gravel roads utilised in order to minimise dust pollution during windy and dry weather conditions	Contractor	Throughout Construction
Speed restriction (40km/h for cars and 30km/h for trucks) must be implemented for all vehicles and machinery within the site boundaries.	Contractor	Throughout Construction
Vehicles must be maintained in a road-worthy condition at all times.	Contractor	Duration of the contract
Regular maintenance of machinery must be undertaken to ensure they are in condition at all times.	Contractor	Throughout Construction

Performance Indicator	<ul style="list-style-type: none"> » No complaints from affected residents or community regarding dust or vehicle emissions from construction activities. » Dust suppression measures implemented for all heavy vehicles that require such measures. » Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed.
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Monitoring	<p>Monitoring must be undertaken by the contractor to ensure emissions are not exceeding the prescribed levels via the following methods:</p> <ul style="list-style-type: none"> » Visual weekly inspections of dust generated by activities throughout the operation phase. » Immediate reporting by personnel of any potential or actual issues with nuisance dust or emissions to the contractor. » A complaints register must be maintained, in which any complaints from residents/the community will be logged. Complaints must be investigated and, where appropriate, acted upon. » An incident reporting system must be used to record non-conformances to the EMPr.
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OBJECTIVE 9: Protection of Heritage Resources

The main cause of impacts to archaeological sites is physical disturbance of the material itself and its context. The heritage and scientific potential of an archaeological site is highly dependent on its geological and spatial context. This means that even though, for example a deep excavation may expose archaeological artefacts, the artefacts are relatively meaningless once removed from the area in which they were found. Largescale excavations for foundations will damage archaeological sites, as will road construction activities.

Project component/s	<ul style="list-style-type: none"> » Watercourse Crossings » Road Upgrades
Potential Impact	» Heritage objects or artefacts found on site are inappropriately managed or destroyed
Activity/risk source	<ul style="list-style-type: none"> » Site preparation and earthworks » Foundations or plant equipment installation » Mobile construction equipment movement on site
Mitigation: Target/Objective	» To ensure that any heritage objects found on site are treated appropriately and in accordance with the relevant legislation

Mitigation: Action/control	Responsibility	Timeframe
Areas required to be cleared during construction must be clearly marked in the field to avoid unnecessary disturbance of adjacent areas (which will not be surveyed in detail by a heritage specialist).	Contractor in consultation with Heritage Specialist	Pre-Construction
Contractors must be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites. All staff should also be familiarised with procedures for dealing with heritage objects/sites.	Contractor in consultation with Heritage Specialist	Duration of contract, especially during excavations

Despite falling outside of the site area, the Hottentotskop must be avoided during construction activities. The SHE Officer should be made aware of the presence of archaeological resources there so that their safeguarding during construction can be ensured. The presence of a grave to the north of the wind energy facility development area should be demarcated as a NO-GO area. The easily recognisable quartz scatters present near the Koppies must be avoided during the period of construction, so as to prevent any destruction of the sites.	Contractor in consultation with Heritage Specialist	Pre-Construction
Familiarise all staff and contractors with procedures for dealing with heritage objects/sites.	Heritage Specialist	Pre-Construction
Project employees and any contract staff must maintain, at all times, a high level of awareness of the possibility of discovering heritage sites.	Contractor	Duration of the contract
If a heritage object is found, work in that area must be stopped immediately, and appropriate specialists brought in to assess to site, notify the administering authority (SAHRA) of the item/site, and undertake due/required processes.	Contractor in consultation with Heritage Specialist	Duration of the contract
In the event that fossils resources are discovered during excavations, immediately stop excavation in the vicinity of the potential material. Mark (flag) the position and also spoil that may contain fossils. Inform the site foreman and the SHE Officer. SHE Officer to inform the developer; the developer contacts the standby archaeologist and/or palaeontologist. SHE Officer to describe the occurrence and provide images by email.	Contractor, SHE Officer	Construction
Should any heritage remains be exposed during excavations, these must be immediately reported to the Provincial Heritage Resource Authority of the Western Cape, in terms of the national Heritage Resources Act (Act No. 25 of 1999). Heritage remains uncovered or disturbed during earthworks may not be disturbed further until the necessary guidance and approval have been obtained from the relevant Heritage Authority.	Contractor	Duration of the contract

Performance Indicator	<ul style="list-style-type: none"> » No disturbance outside of designated work areas » All heritage items located are dealt with as per the legislative guidelines
Monitoring	<ul style="list-style-type: none"> » Observation of excavation activities by SHE Officer throughout construction phase. » Supervision of all clearing and earthworks during construction phase by the contractor. » Due care taken during earthworks and disturbance of land by all staff and any heritage objects found reported. » Appropriate permits obtained from SAHRA prior to the disturbance or

- destruction of heritage sites (if required).
- » An incident reporting system will be used to record non-conformances to the EMPr.
- » Heritage Western Cape must be notified should any historical resources be uncovered or disturbed

5.3. Detailing Method Statements

OBJECTIVE 10: Ensure all construction activities are undertaken with the appropriate level of environmental awareness to minimise environmental risk

The environmental specifications are required to be underpinned by a series of Method Statements, within which the Contractors and Service Providers are required to outline how any identified environmental risks will practically be mitigated and managed for the duration of the contract, and how specifications within this EMPr will be met. That is, the Contractor will be required to describe how specified requirements will be achieved through the submission of written Method Statements to the Site Manager and ECO.

A Method Statement is defined as "a written submission by the Contractor in response to the environmental specification or a request by the Site Manager, setting out the plant, materials, labour and method the Contractor proposes using to conduct an activity, in such detail that the Site Manager is able to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications". The Method Statement must cover applicable details with regard to:

- » Details of the responsible person/s
- » Construction 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 Specifications, and
- » Any other information deemed necessary by the Site Manager.

Method Statements must be compiled for all activities which affect any aspect of the environment and should be applied consistently to all activities. The Contractor may not commence the activity covered by the Method Statement until it has been submitted to

the Site Manager for review, except in the case of emergency activities and then only with the consent of the Site Manager. Review of the Method Statement will not absolve the Contractor from their obligations or responsibilities in terms of their contract.

Failure to submit a method statement may result in suspension of the activity concerned until such time as a method statement has been submitted and reviewed. The ECO should monitor the construction activities to ensure that these are undertaken in accordance with the approved Method Statement.

5.4. Awareness and Competence

OBJECTIVE 11: To ensure all construction personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm

To achieve effective environmental management, it is important that Contractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMPr. The Contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. The Contractors obligations in this regard include the following:

- » Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment.
- » Ensuring that a copy of the EMPr is readily available on-site and that all site staff is aware of the location and has access to the document.
- » Employees will be familiar with the requirements of the EMPr and the environmental specifications as they apply to the construction of the facility.
- » Employees must undergo training for the operation and maintenance activities associated with a wind energy facility and have a basic knowledge of the potential environmental impacts that could occur and how they can be minimised and mitigated.
- » Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended an Environmental Awareness Training course.
- » The course should be sufficient to provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- » Awareness of any other environmental matters, which are deemed to be necessary by the ECO.
- » Ensuring that employee information posters, outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) are erected at prominent locations throughout the site.

- » Ensure that construction workers have received basic training in environmental management, including the storage and handling of hazardous substances, minimisation of disturbance to sensitive areas, management of waste, and prevention of water pollution.
- » Records must be kept of those that have completed the relevant training.
- » Training should be done either in a written or verbal format but must be in an appropriate format for the receiving audience.
- » Refresher sessions must be held to ensure the contractor staffs is aware of its environmental obligations as practically possible.

Therefore, prior to the commencement of construction activities on site and before any person commences with work on site thereafter, adequate environmental awareness and responsibility are to be appropriately presented to all staff present onsite, clearly describing their obligations towards environmental controls and methodologies in terms of this EMPr. This training and awareness will be achieved in the following ways:

5.4.1. Environmental Awareness Training

Environmental Awareness Training must take the form of an on-site talk and demonstration by the SHE Officer before the commencement of site establishment and construction on site. The education/awareness programme should be aimed at all levels of management and construction workers within the contractor team. Included in the training programme should be any protected resources found on site and consequences of non-compliance with the relevant authorities. A record of attendance of this training must be maintained by the SHE Officer on site.

6.4.2. Induction Training

Environmental induction training must be presented to all persons who are to work on the site – be it for short or long durations; Contractor’s or Engineer’s staff; administrative or site staff; sub-contractors or visitors to site.

This induction training should include discussing the developer’s environmental policy and values, the function of the EMPr and Contract Specifications and the importance and reasons for compliance to these. The induction training must highlight overall do’s and don’ts on site and clarify the repercussions of not complying with these. The non-conformance reporting system must be explained during the induction as well. Opportunity for questions and clarifications must form part of this training. A record of attendance of this training must be maintained by the SHE Officer on site.

6.4.3. Toolbox Talks

Toolbox talks should be held on a scheduled and regular basis (at least twice a month) where foremen, environmental and safety representatives of different components of

the Works and sub-consultants hold talks relating to environmental practices and safety awareness on site. These talks should also include discussions on possible common incidents occurring on site and the prevention of reoccurrence thereof. Records of attendance and the awareness talk subject must be kept on file.

6.5. Monitoring Programme

OBJECTIVE 12: To monitor the performance of the control strategies employed against environmental objectives and standards

A monitoring programme should be in place not only to ensure conformance with the EMPr, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPr that are, or could result in significant environmental impacts for which corrective action is required. The period and frequency of monitoring will most likely be stipulated by the Environmental Authorisation, or should remain in line with the requirements of the Regulations. Where this is not clearly dictated, Vendiwel (Pty) Ltd will determine and stipulate the period and frequency of monitoring required in consultation with relevant stakeholders and authorities. The Contractor Project Manager of the Project Company will work with the site manager of the Contractor will ensure that the monitoring is conducted and reported.

The aim of the monitoring and auditing process would be to routinely monitor the implementation of the specified environmental specifications, in order to:

- » Monitor and audit compliance with the prescriptive and procedural terms of the environmental specifications
- » Ensure adequate and appropriate interventions to address non-compliance
- » Ensure adequate and appropriate interventions to address environmental degradation
- » Provide a mechanism for the lodging and resolution of public complaints
- » Ensure appropriate and adequate record keeping related to environmental compliance
- » Determine the effectiveness of the environmental specifications and recommend the requisite changes and updates based on audit outcomes, in order to enhance the efficacy of environmental management on site
- » Aid communication and feedback to authorities and stakeholders.

6.5.1. Non-Conformance Reports

All supervisory staff and the ECO must be provided the means to be able to submit non-conformance reports to the Site Manager. Non-conformance reports will describe, in detail, the cause, nature and effects of any environmental non-conformance by the Contractor. Records of penalties imposed may be required by the relevant authority within 48 (forty eight) hours.

The non-conformance report will be updated on completion of the corrective measures indicated on the finding sheet. The report must indicate that the remediation measures have been implemented timeously and that the non-conformance can be closed-out to the satisfaction of the Site Manager and ECO.

6.5.2. Monitoring Reports

A monitoring report must be compiled by the ECO on a monthly basis and must be submitted to DEA for their records as deemed practical or with the Final Audit Report. This report should include details of the activities undertaken in the reporting period, any non-conformances or incidents recorded, corrective action required, and details of those non-conformances or incidents which have been closed out.

6.5.3. Final Audit Report

A final environmental audit report must be compiled by an independent auditor and be submitted to DEA upon completion of the construction and rehabilitation activities (within 30 days of completion of the construction phase (i.e. within 30 days of site handover) and within 30 days of completion of rehabilitation activities). This report must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the environmental authorisation conditions (once issued) and the requirements of the EMPr.

MANAGEMENT PLAN FOR REHABILITATION OF DISTURBED AREAS

CHAPTER 6

Overall Goal for the Rehabilitation of Disturbed Areas: Undertake the rehabilitation measures in a way that:

- » Ensures rehabilitation of disturbed areas following the execution of the works, such that residual environmental impacts are remediated or curtailed

In order to meet this goal, the following objective, actions and monitoring requirements are relevant:

OBJECTIVE 1: To ensure rehabilitation of disturbed areas

Areas requiring rehabilitation will include all areas disturbed during the construction phase and that are not required for regular maintenance operations.

Project component/s	<ul style="list-style-type: none"> » watercourse crossing » Access Road Upgrades
Potential Impact	<ul style="list-style-type: none"> » Environmental integrity of site undermined resulting in erosion, compromised land capability and the requirement for on-going management intervention
Activity/risk source	<ul style="list-style-type: none"> » Disturbed areas/footprints
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure and encourage site rehabilitation of disturbed areas » To ensure that the site is appropriately rehabilitated following the execution of the works, such that residual environmental impacts (including erosion) are remediated or curtailed

Mitigation: Action/control	Responsibility	Timeframe
All temporary facilities, equipment and waste materials must be removed from site and appropriately disposed of.	Contractor	Post-construction
Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion.	Contractor	Post-construction
Disturbed areas must be rehabilitated/re-vegetated with appropriate natural vegetation and/or local seed mix where possible.	Contractor in consultation with rehabilitation specialist	Following completion of construction activities in an

Mitigation: Action/control	Responsibility	Timeframe
		area
Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved.	Contractor and Project Company in consultation with rehabilitation specialist	Post-rehabilitation
On-going alien plant monitoring and removal should be undertaken on all areas of natural vegetation on an annual basis.	Contractor and Project Company in consultation with rehabilitation specialist	Post-rehabilitation
The road should be monitored for the duration of the contract following construction to ensure that the disturbed areas along the sides of the road have stabilised and the road is not eroding or causing hydrological impacts.	Contractor and Project Company in consultation with rehabilitation specialist	Post-rehabilitation
Vegetation occurring outside of the road reserve will be rehabilitated if impacted on by the development.	Contractor and Project Company in consultation with rehabilitation specialist	Rehabilitation and Post-rehabilitation

Performance Indicator	<ul style="list-style-type: none"> » All areas of the site cleared of equipment and temporary facilities » Topsoil replaced on all areas and stabilised » Disturbed areas rehabilitated and acceptable plant cover achieved on rehabilitated sites » Closed site free of erosion and alien invasive plants
Monitoring	<ul style="list-style-type: none"> » On-going inspection of rehabilitated areas in order to determine effectiveness of rehabilitation measures implemented » On-going alien plant monitoring and removal should be undertaken on an annual basis » An incident reporting system must be used to record non-conformances to the EMPr.

MANAGEMENT PLAN FOR OPERATION

CHAPTER 7

Overall Goal: To ensure that the operation and maintenance of the access roads and watercourse crossings do not have unforeseen impacts on the environment and to ensure that all impacts are monitored and the necessary corrective action taken in all cases. In order to address this goal, it is necessary to operate the infrastructure in a way that:

- » Ensures that operation and maintenance activities are properly managed in respect of environmental aspects and impacts.
- » Enables the operation and maintenance activities to be undertaken without significant disruption to other land uses in the area, in particular with regard to farming practices and effects on local residents.

An environmental manager must be appointed during operation whose duty it will be to ensure the implementation of the operational EMPr

7.1. Objectives

OBJECTIVE 1: Minimise Soil Degradation and Erosion

Areas requiring rehabilitation will include all areas disturbed during the construction phase and that are not required for regular maintenance operations.

Project component/s	<ul style="list-style-type: none"> » watercourse crossing » Access Road Upgrades
Potential Impact	<ul style="list-style-type: none"> » Soil degradation and erosion. » Increased deposition of soil into drainage systems. » Increased run-off over the site
Activity/risk source	<ul style="list-style-type: none"> » Poor rehabilitation and/or revegetation of cleared areas. » Rainfall - water erosion of disturbed areas. » Wind or water erosion of disturbed areas. » Concentrated discharge of water.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Ensure rehabilitation of disturbed areas is maintained. » Minimise soil erosion and deposition of soil into drainage lines. » Ensure continued stability of embankments/excavations

Mitigation: Action/control	Responsibility	Timeframe
Implement stormwater management and erosion control plan, as well as a rehabilitation plan	Developer	Operation
The culvert crossings should not trap any run-off, thereby creating inundated areas, but allow for free	Developer	Operation

Mitigation: Action/control	Responsibility	Timeframe
flowing systems		
Erosion control measures installed on both roads during construction should be maintained for the duration of the operation phase.	Developer and Roads Authority	Operation

Performance Indicator	<ul style="list-style-type: none"> » Minimal levels of soil erosion around site. » Minimal levels of increased siltation in drainage lines
Monitoring	<ul style="list-style-type: none"> » Inspections of site on a bi-annual basis.

MANAGEMENT PLAN FOR DECOMMISSIONING

CHAPTER 8

The watercourse crossings would only be decommissioned in the event that the infrastructure is no longer required. The project is expected to have a life span of more than 30 years. At the time where decommissioning would be applicable, all activities would need to comply with the legislation relevant at the time. Should the activity ever cease or become redundant, the applicant shall undertake the required actions as prescribed by legislation at the time and comply with all relevant legal requirements administered at any relevant and competent authority at that time.

FINALISATION OF THE EMPR

CHAPTER 9

The EMPr is a dynamic document, which must be updated when required. It is considered critical that this Final EMPr be updated to include site-specific information and specification. This will ensure that the construction activities are planned and implemented taking sensitive environmental features into account as far as possible.