
CONSTRUCTION OF ROADS AND CABLING NEAR AND WITHIN WATERCOURSES (CROSSING OF WETLANDS) AS PART OF THE EXCELSIOR WIND ENERGY FACILITY NEAR SWELLENDAM, WESTERN CAPE

REVISION 1: ENVIRONMENTAL MANAGEMENT PROGRAMME

March 2017

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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.

Ambient sound level: The reading on an integrating impulse sound level meter taken at a measuring point in the absence of any alleged disturbing noise at the end of a total period of at least 10 minutes after such meter was put into operation.

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.

Commencement: 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 and can include both direct and indirect impacts.

Department: means the Department of Environmental Affairs.

Development footprint: in respect of land, means any evidence of its physical transformation as a result of the undertaking of any activity.

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.

Disturbing noise: A noise level that exceeds the ambient sound level measured continuously at the same measuring point by 7 dB or more.

'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.

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:

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

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

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 inspector: A person designated as an environmental management inspector in terms of section 31B or 31C on the National Environmental management Act 107 of 1998.

Environmental management plan: A 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.

Generator: The generator is what converts the turning motion of a wind turbine's blades into electricity.

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).

Heritage: That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act of 2000

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

Indirect impacts: Indirect or induced changes that may occur because 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 because 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 public.

Method statement: method statement is a written submission to the ECO and the Owner's Representative by the EPC Contractor in collaboration with his/her EO.

Natural properties of an ecosystem (*sensu* Convention on Wetlands): Defined in Handbook 1 as the "...physical, biological or chemical components, such as soil, water, plants, animals and nutrients, and the interactions between them". (Ramsar Convention Secretariat. 2004. Ramsar handbooks for the wise use of wetlands. 2nd Edition. Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (see <http://www.ramsar.org/>).

Perennial and non-perennial: Perennial systems contain flow or standing water for all or a large proportion of any given year, while non-perennial systems are episodic or ephemeral and thus contains 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.

Pre-construction: The period prior to the commencement of construction, which may include activities (e.g. geotechnical surveys) which do not require Environmental Authorisation.

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).

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: as defined in terms of the National Environmental Management: Waste Act, 2008 (Act 59 of 2008) (as amended) (NEM:WA) (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 of NEM:WA,; 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.

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

Wetland: Wetlands are defined in the National Water Act as '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 land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

» **Intermittent or seasonal wetlands:** are vleis or larger drainage lines where water tends to accumulate during the rainy season, and may persist for a week or longer, usually several months. In this case there is enough seasonal moisture accumulation to ensure that surface soils remain waterlogged for a longer period, hence also supporting specially adapted flora that will grow in (seasonally) saturated soils.

» **Perennial¹ wetlands:** are all dams, rivers and other water bodies that carry water permanently, and will only have severely reduced flows or water during periods of prolonged severe droughts.

Wind power: A measure of the energy available in the wind.

¹ Perennial: from Latin per, "through", annual, "year", lasting or active through the year or through many years, indefinitely.

ABBREVIATIONS AND ACRONYMS

DAFF	Department of Forestry and Fishery
DEA	National Department of Environmental Affairs
DME	Department of Minerals and Energy
DOT	Department of Transport
DWS	Department of Water and Sanitation
EA	Environmental Authorization
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EO	Environmental Officer
ECO	Environmental Control Officer
ER	Engineer's Representative
GIS	Geographical Information Systems
GG	Government Gazette
GN	Government Notice
GWh	Giga Watt Hour
Ha	Hectare
I&AP	Interested and Affected Party
km ²	Square kilometres
km/hr	Kilometres per hour
kV	Kilovolt
LUPO	Rezoning and Subdivision in terms of Land Use Planning Ordinance, Ordinance 15 of 1985
m ²	Square meters
m/s	Meters per second
MW	Mega Watt
NEMA	National Environmental Management Act (Act No 107 of 1998)
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act (Act No 25 of 1999)
NGOs	Non-Governmental Organisations
NIRP	National Integrated Resource Planning
NWA	National Water Act (Act No 36 of 1998)
SANBI	South African National Biodiversity Institute

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INTRODUCTION

CHAPTER 1

Amstilinx (RF) Proprietary Limited received an Environmental Authorisation (EA) for the construction of the Excelsior Wind Energy Facility near Swellendam in the Western Cape (DEA ref: 12/12/20/1798) on 27 September 2011. In addition, an Environmental Authorisation was received for the development of supporting infrastructure (primarily gravel roads and electrical cabling) which would be located in or within 32m of a watercourse. The project was selected as a Preferred Bidder project under the Fourth Round of the Department of Energy's (DOE) Renewable Energy Independent Power Producers Procurement Programme (REIPPP).

This Environmental Management Programme (EMPr) is an update of the EMPr submitted with the Basic Assessment for the project and includes the conditions of the Environmental Authorisation of August 2013 as well as recommendations from the specialist walk-through surveys undertaken for the project. Changes made have been underlined for ease of reference.

The EMPr has been developed on the basis of the findings of the BA, and must be implemented to protect sensitive on-site and off-site features through controlling preconstruction, construction, operation and decommissioning activities that could have a detrimental effect on the environment, and through avoiding or minimising potential impacts. This EMPr is a revision of the EMPr contained within the Basic Assessment Report for the project and has been updated in accordance with the requirements of Condition 12 of the Environmental Authorisation. This EMPr is applicable to all Amstilinx (RF) Proprietary Limited employees and contractors working on the pre-construction, construction, and operation and maintenance phases of the development of watercourse crossings within the Excelsior Wind Farm. The document will be adhered to and updated as relevant throughout the project life cycle. Any amendments must be approved by the Competent Authority (i.e. DEA) prior to implementation through the relevant process/es as required in terms of the relevant legislation, unless these are required to address an emergency situation.

PROJECT DETAILS

CHAPTER 2

BioTherm Energy (Pty) Ltd received an Environmental Authorisation (EA) for the construction of the Excelsior Wind Energy Facility near Swellendam in the Western Cape (DEA ref: 12/12/20/1798) (refer to Figure 2.1). The following infrastructure is authorised (refer to Appendix A):

- » Up to 13 wind turbines.
- » Foundations (16 x 16 x 2.5) depth to support the turbine towers.
- » Underground cables (where practical) between turbines.
- » Electrical transformers.
- » Gravel surfaced hard steering areas (40 x 20m) adjacent to each turbine.
- » Operations and maintenance building.
- » Wind monitoring mast.

A separate Basic Assessment process was undertaken for the development of infrastructure within or within 32m of a watercourse. Through this process, 29 crossings were authorised. In terms of the final layout for the wind energy facility, all areas earmarked for the development of roads and transmission lines fall outside wetland zones as well as associated buffers. One existing road, to be used as the main access road located within the northern portion of the study area, does cross wetland features. This road will not be upgraded for the purposes of the project and it is deemed possible that any impact on surrounding wetland features, can be largely reduced, if mitigation measures and recommendations as listed within the Wetlands Assessment report (dated January 2012) and this EMP are adhered to.

1.1. Conclusions and Recommendations of the Basic Assessment

The site is situated in an area mainly used for commercial agriculture (grazing and crop cultivation), causing large scale vegetation and habitat transformation. Structures in the area include gravel roads and infrastructure related to farming. In addition, it is notable that the wetland resources have generally been impacted upon by ploughing, impoundments (dams), existing gravel roads and the disposal of rocks cleared from adjacent areas for cultivation.

Given that existing activities in the study area have resulted in the wetlands being considered moderately to largely modified, and that mitigation actions have been identified that can either avoid impacts or reduce them to low significance, it was concluded that the proposed listed activities for the development of roads and cabling for this proposed wind energy facility should receive environmental

authorisation in terms of the 2010 EIA Regulations promulgated under the NEMA (Act No. 107 of 1998).

In order to avoid and/or manage the potential negative impacts, and enhance the benefits, the EMPr include all recommended mitigation actions, as well as additional management requirements. The EMPr is a dynamic document that should be updated regularly and provides clear and implementable measures for the construction and operational phases of the project. The recommendations in the EMPr must be adhered to by Excelsior Wind Energy Facility.

1.2. Final Layout

No new crossings will be constructed in terms of the current proposed layout. Roads will be designed to handle the weight of the heaviest piece of equipment, roughly 80-90 tonnes and will most likely be either compacted gravel or dirt. Turning radii have yet to be finalized, but need to be able to handle the turns of an approximately 50m long truck. All roads that will be used for the transport of wind turbine components will have a permanent width of approximately 4m, which serves as the road servitude, including cabling and drainage. The existing roads will be upgraded as far as possible.

The new cabling between the turbines will cover a total distance of approximately 5300m. Wherever possible, cabling will follow existing roads or proposed roads. The cabling will be 11-32kV and be buried approximately 2m underground, except possibly for river crossings where the cabling may be strung above ground to avoid being exposed by erosion (this depends on the geology of the river course).

During construction, tractors, loaders & backhoes (TLBs), cranes, cement mixers, rollers and other construction vehicles will be used on-site. Following construction, standard bakkies (1 ton pick-up vehicles) will be used on-site for general maintenance and operations.

Amstilinx (RF) Proprietary Limited will attempt to source all materials from sources located as close as possible to the project (on site borrow pits or licensed borrow pits in close proximity to the site). Approximately 20 000m³ fill material and concrete, water (10 000 litres) will be used during construction phase. Approximately 50-100 jobs will be created during the construction phase of the roads. A construction yard will be erected on site. The construction phase is anticipated to be between 12-18 months.

PURPOSE AND OBJECTIVES OF THE EMPR

CHAPTER 3

An 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”². The objective of this EMPr 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 EMPr is to help 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 remediation (soil stabilisation, revegetation) and operation.

The EMPr has been developed as a set of environmental specifications (i.e. principles of environmental management for the construction of roads and cabling near and within watercourses (crossing of wetlands) and infilling thereof as part of the Excelsior Wind Energy Facility, 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 for assisted use of the EMPr by the project implementer as well as compliance monitors). The EMPr is separated into measures dealing with the various project phases.

The EMPr has the following objectives:

- » 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

² Provincial Government Western Cape, Department of Environmental Affairs and Development Planning: *Guideline for Environmental Management Plans*. 2005

impacts, and to manage environmental impacts associated with the construction of roads and cabling near watercourses.

- » 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 and frequency 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 was not considered in the BA process.

The mitigation measures identified within the BA process are systematically addressed in the EMPr, ensuring the minimisation of adverse environmental impacts to an acceptable level.

Amstilinx (RF) Proprietary Limited must ensure that the implementation of the project complies with the requirements of all Environmental Authorisations and permits, and obligations emanating from other relevant environmental legislation. This obligation is partly met through the development and the implementation of the EMPr through its integration into the contract documentation. It is important that this document be read in conjunction with the Final Basic Assessment Report (dated April 2013), as well as the Environmental Authorisation (dated August 2013). This will contextualise the EMPr and enable a thorough understanding of its role and purpose in the integrated environmental management process. This EMPr for construction and operation activities has been compiled in accordance with Section 24N and Appendix 4 of the 2014 EIA Regulations and will be further developed in terms of specific requirements listed in any authorisations issued for the proposed project.

This EMPr shall be binding on all the parties involved in the construction and operational phases of the project, and shall be enforceable at all levels of contract and operational management within the project. The document will be adhered to, updated as relevant throughout the project life cycle.

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 Contractor's 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 are aware of the location and have 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.
- » Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended an Environmental Awareness Training course. The course must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- » Providing basic training in the identification of archaeological sites/objects, and protected flora and fauna that may be encountered on the site.
- » Ensuring awareness of any other environmental matters, which are deemed necessary by the Environmental Control Officer (ECO).

The EMPr is a dynamic document, which must be updated when required. It is considered critical that this EMPr be updated to include site-specific information and specifications as required throughout the life-cycle of the facility. This will ensure that the project activities are planned and implemented in terms of Best Environmental Practice.

STRUCTURE OF THIS EMPr

CHAPTER 4

The first two chapters provide background to the EMPr and the proposed project. The chapters which follow consider the:

- » Planning and design activities
- » Construction activities; and
- » Operation activities
- » Decommissioning activities

These chapters set out the procedures necessary for Amstilinx (RF) Proprietary Limited to achieve environmental compliance. For each of the phases of implementation for the renewable energy facility project, an over-arching environmental **goal** is stated. In order to meet this goal, a number of **objectives** are listed. The management programme 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 programme 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, i.e.: <ul style="list-style-type: none"> » Access roads » Cabling » Power lines » Associated infrastructure
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 and/or layout of the facility).
- » Modification to or addition to environmental objectives and targets.
- » 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 EMPr was compiled by:

Name	Company
Tebogo Mapinga	Savannah Environmental
Jo-Anne Thomas	Savannah Environmental

The Savannah Environmental team have extensive knowledge and experience in environmental impact assessment and environmental management, having been involved in EIA processes for more than ten (10) years. They have managed and drafted Environmental Management Programmes for other power generation projects throughout South Africa, including numerous wind and solar energy facilities.

The EAPs from Savannah Environmental who are responsible for this project are:

- » Jo-Anne Thomas - a registered Professional Natural Scientist and holds a Master of Science degree. She has over 19 years of experience consulting in the environmental field. Her key focus is on strategic environmental assessment and advice; management and co-ordination of environmental projects, which

includes integration of environmental studies and environmental processes into larger engineering-based projects and ensuring compliance to legislation and guidelines; compliance reporting; the identification of environmental management solutions and mitigation/risk minimising measures; and strategy and guideline development. She is currently responsible for the project management of EIAs for several renewable energy projects across the country.

- » Tebogo Mapinga - is a Principal Environmental Consultant, holds a BSc degree with 10 years of experience in the environmental field in both public and private sectors. Her competencies lie in environmental impact assessments, compliance monitoring and public participation for small and large scale projects.

MANAGEMENT PLAN FOR THE PLANNING & DESIGN

CHAPTER 5

5.1 Goal for Planning and Design

Overall Goal for Planning and Design (Pre-construction): Undertake the planning and design phase for the construction of roads and cabling near and within watercourses (crossing of wetlands) as part of the Excelsior Wind Energy Facility in a way that:

- » Ensures that the design of the roads and cabling for the facility responds to the identified environmental constraints and opportunities which this was realised through the optimisation of the wind farm layout which was designed to avoid as far as possible all identified sensitive environmental areas.
- » Ensures that adequate regard has been taken of any landowner concerns and that these are appropriately addressed through design and planning (where appropriate).
- » Ensures that the best environmental options are selected for the project.
- » Enables the road and cabling construction activities for the Wind Facility to be undertaken without significant disruption to other land uses in the area.

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

5.2 Objectives

OBJECTIVE 1: To ensure that the design of the roads and cabling for the Wind Facility responds to the identified environmental constraints and opportunities

From the specialist investigations (i.e. Wetlands Assessment) undertaken for the BA for the construction of roads and cabling near and within watercourses (crossing of wetlands) and infilling thereof as part of the Excelsior Wind Energy Facility, areas of high sensitivity were identified. The site is situated in an area mainly used for commercial agriculture (grazing and crop cultivation), causing large scale vegetation and habitat transformation. Structures in the area include gravel roads and infrastructure related to farming. In addition, it is notable that the wetland resources have generally been impacted upon by ploughing, impoundments (dams), existing gravel roads and the disposal of rocks cleared from adjacent areas for cultivation.

The BA was conducted for supporting infrastructure (primarily roads and electrical cabling) between the wind turbines to enable the development of the Excelsior Wind Energy Facility. Given that some of this supporting infrastructure would be located in or within 32m of a watercourse, Environmental Authorisation is required in terms of NEMA (Act No. 107 of 1998).

There are four different natural vegetation types in the study area, although the two Shale Renosterveld types (Central and Eastern Ruens Shale Renosterveld) are superficially identical and are treated as one unit for purposes of the BA report. Ruens Silcrete Renosterveld occurs on the hilltops, and Cape Lowland Alluvial Vegetation occupies the drainage lines and wetlands. All four vegetation types on site are regarded as Critically Endangered in terms of the National Spatial Biodiversity Assessment (Rouget et al. 2004) and the National List of Threatened Ecosystems (DEA 2011).

All remaining natural areas on site may be regarded as special habitats – in that they are either sparsely vegetated areas of shale or silcrete, or wetlands. The former are likely to support various plant Species of Conservation Concern (SCC), although only one was recorded on site due to the site visit being undertaken outside the optimal flowering season. The following eight SCC are known to occur within 4km of the study area, in similar habitat (CREW GIS data), and are very likely to occur within the study area:

- » *Polhillia brevicalyx* (Critically Endangered)
- » *Aspalathus smithii* (Endangered)
- » *Erica venustiflora* ssp. *glandulosa* (Vulnerable)
- » *Acmadenia macropetala* (Vulnerable)
- » *Xiphotheca guthriei* (Vulnerable)
- » *Aspalathus incompta* (Near Threatened)
- » *Agathosma foetidissima* (Near Threatened)
- » *Peucedanum striatum* (Near Threatened; also seen on site)

It is considered very likely that more SCC are present within the study area. All such species can be expected to occur only within the identified High sensitivity areas. Alien invasive vegetation is not currently a major problem on the site.

The subject property is located within three quaternary catchments namely H60L, H70G and G50H and falls within the Southern Coast Belt ecoregion. According to the ecological importance classification for the three quaternary catchments, the systems in the area can be classified as sensitive to moderately sensitive in terms of ecological importance and sensitivity and, in their present state, can be considered to be Class C: moderately modified (G50H and H70G) and Class D: largely modified (H60L) streams based on the certainty of desktop methods (Kleynhans 1999).

The following summary was extracted from the Wetlands Assessment:

- » Based on the presence of surface water the wetlands within the subject property were divided into two groups, namely non-perennial and perennial valley bottom wetlands.
- » Both wetland groups calculated an intermediate importance in terms of wetland service and function provision within the subject property, with the highest scores calculated for assimilation of phosphates, nitrates and toxicants.
- » The perennial wetland group calculated a present ecological state score of 2.9 falling within Class C moderately modified; and the non-perennial group calculated a score of 2 falling within Class D largely modified.
- » The Ecological Management Class (EMC) deemed appropriate to enhance and maintain current ecology as well as functionality is class C (moderately modified) for the perennial wetlands and class D (largely modified) for non-perennial wetlands.
- » No RAMSAR wetlands are located within or close to the subject property.
- » No cluster wetlands selected as Freshwater Ecosystem Priority Areas (FEPAs) are located within the subject property.
- » The applicable FEPA water management area (WMA) map does not show any riverine resources within the subject property which are of significance in terms of fish conservation.
- » According to FEPA, two non-perennial river features and one perennial river feature are located within the subject property. Neither the non-perennial nor the perennial features are classified as free flowing or flag ship rivers.
- » After wetlands were delineated and boundaries verified, each wetland group was assigned a buffer to minimize any impact the proposed activities could have on wetland systems. All wetland features within the subject property were allocated 32m buffers.
- » Wetland crossings were considered to have different sensitivities due to the varying nature of the crossings. Wetland crossing sensitivity was determined by considering whether the crossing will be made by a new or existing road, whether the crossing will pass through a wetland or through a wetland buffer, and whether any sensitive vegetation is present at the crossing.
- » Crossings passing through 32m buffers were considered of low sensitivity with the exception of crossings made through wetland buffers and sensitive vegetation which were considered of a moderately low sensitivity. Crossings passing through wetlands and those crossing through wetlands and sensitive vegetation were considered of high sensitivity.
- » No extending of existing roads is envisioned as part of the proposed development; therefore the impact assessment was done with focus on possible upgrade of existing roads or bridges only as well as construction of underground cables.
- » No new crossings are envisioned as part of the proposed development.

The proposed development is highly likely to result in loss of wetland habitat and structure, impact on hydrological function as well as function and service provision during the construction as well as operational phase of the development. From the results of the impact assessment it was observed that 22 major impact categories were applicable to the proposed development. The impacts are likely to have a medium to low significance (before mitigation). Careful consideration was afforded to the development of mitigation measures that could result in all predicted impacts in wetlands being reduced to low significance, and, in some instances, actions are recommended that could potentially result in the impact being avoided all together.

An Archaeological study was conducted for the EIA for the Excelsior Wind Energy Facility. This study found that the proposed Excelsior Wind Energy Facility will have a very low impact on the archaeological heritage, and as a result no archaeological mitigation is required. Indications are that the study area is not a sensitive archaeological landscape. The affected environment has been dramatically transformed by agricultural activities over more than two centuries. There is the possibility of encountering archaeological remains during excavation for the turbine platforms and underground cables, but this is likely to be very low. No fatal flaws have been identified, and the project is deemed to be viable from an archaeological perspective.

A Palaeontological study was conducted for the EIA for the Excelsior Wind Energy Facility. It was concluded that the proposed wind farm development will have a very low impact on the very limited local fossil heritage, whether in the construction phase or later. No further specialist mitigation of palaeontological heritage for this project is recommended besides the action recommended below.

Project component/s	<ul style="list-style-type: none"> » Access roads; » Cabling; and » Associated infrastructure.
Potential Impact	<ul style="list-style-type: none"> » Design fails to respond optimally to the identified environmental considerations.
Activities/risk sources	<ul style="list-style-type: none"> » Positioning of access roads and cabling; » Alignment of power line; and » Associated infrastructure.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure that the design of the roads and cabling for the Wind Facility responds to the identified environmental constraints and opportunities.

Mitigation: Action/control	Responsibility	Timeframe
Consider design level mitigation measures recommended by the specialists, especially with respect to visual aesthetics, noise, flora,	Engineering Design Consultant / turbine supplier	Tender design, design review stage

Mitigation: Action/control	Responsibility	Timeframe
ecology, avifauna, and heritage sites, as detailed within the BA report and relevant appendices.	Proponent	
As far as possible, access roads and cable trenches which could potentially impact on sensitive areas should be shifted in order to avoid these areas of high sensitivity (i.e. best practice is impact avoidance). Where this is not possible, alternative mitigation measures as detailed in this report must be implemented.	Engineering Design Consultant Proponent	Tender design, design review stage
A walk-through survey of final infrastructure positions for the wind energy facility and associated infrastructure (including the access roads and power line) should be undertaken by a specialist ecologist and heritage specialist prior to the commencement of construction. The EMPr for construction must be updated to include site-specific information and specifications resulting from the final walk-through surveys. This EMPr must be submitted to DEA for approval prior to the commencement of construction.	Specialists	Final design phase (already completed)
Should the layout change significantly during the final design, the new layout must be submitted to the Department and it is recommended that the new layout be remodelled/reviewed in terms of the potential environmental impacts by an independent acoustics specialist.	Proponent	Design phase
The access roads is likely to have an impact on landscape connectivity for fauna, especially slow moving species such as tortoises. Roads should be as narrow as possible and as short as possible. A natural surface such as gravel would be preferable to a tarred or concrete road to reduce the loss of landscape connectivity.	Proponent	Design phase, construction
Implement a stormwater management plan for hard/compacted surfaces (e.g. substation footprints) as part of the final design of the project.	Proponent	Design phase
Undertake pre-construction heritage survey of the power line alignment to determine if	Relevant specialists	Design stage - once layout is finalised

Mitigation: Action/control	Responsibility	Timeframe
any adjustments are necessary to mitigate impacts on heritage resources.		(already completed)
It is possible that in situ archaeological sites/remains, and human remains may be uncovered during construction.	Relevant specialists Proponent Contractor	Design phase
Make use of existing roads where possible. Where no road infrastructure exists, new roads should be placed within existing disturbed areas or environmental conditions must be taken into account to ensure the minimum amount of damage is caused to natural habitats.	Relevant specialists The Proponent Contractor	Design phase
The terms of this EMPr and the Environmental Authorisation must be included in all tender documentation and Contractors contracts.	Proponent	Tender process

Performance Indicator	<ul style="list-style-type: none"> » Design meets objectives and does not degrade the environment; and » Design and layouts respond to the mitigation measures and recommendations in the BA report.
Monitoring	<ul style="list-style-type: none"> » Ensure that the design implemented meets the objectives and mitigation measures in the BA report through review of the design by the Project Manager and Environmental Control Officer (ECO) 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 of roads and cabling and infilling thereof, and operational phases of the Wind Farm. 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 and cabling; » Wind energy facility; » Power line; and » Associated infrastructure.
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 road and cabling construction; » Activities associated with wind energy facility construction; and » Activities associated with wind energy facility operation.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Effective communication with affected and surrounding landowners; and

» Addressing of any issues and concerns raised as far as possible in as short a timeframe as possible.

Mitigation: Action/control	Responsibility	Timeframe
Fourteen (14) days written notice must be given to DEA that the activity will commence. Commencement for the purposes of this condition includes site preparation. The notice must include a date on which it is anticipated that the activity will commence.	Proponent	Pre-Construction
Compile a Project Specific Grievance Mechanism Procedure for the public 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.	Proponent	Pre-construction (construction procedure) Pre-operation (operation procedure)
Develop and implement a grievance mechanism for the construction, operational and closure phases of the project for all employees, contractors, subcontractors and site personnel. This procedure should be in line with the South African Labour Law.	Proponent	Pre-construction (construction procedure) Pre-operation (operation procedure)
Liaison with land owners must be undertaken in order to provide sufficient time for them to plan agricultural activities.	Proponent	Pre-construction

Performance Indicator	» Effective communication procedures in place.
Monitoring	» An incident reporting system should be used to record non-conformances to the EMPr.

MANAGEMENT PLAN FOR CONSTRUCTION

CHAPTER 6

6.1. Overall Goal for Construction

Overall Goal for Construction: Undertake the construction phase of roads and cabling near and within watercourses (crossing of wetlands) and infilling thereof as part of the Excelsior Wind Energy Project in a way that:

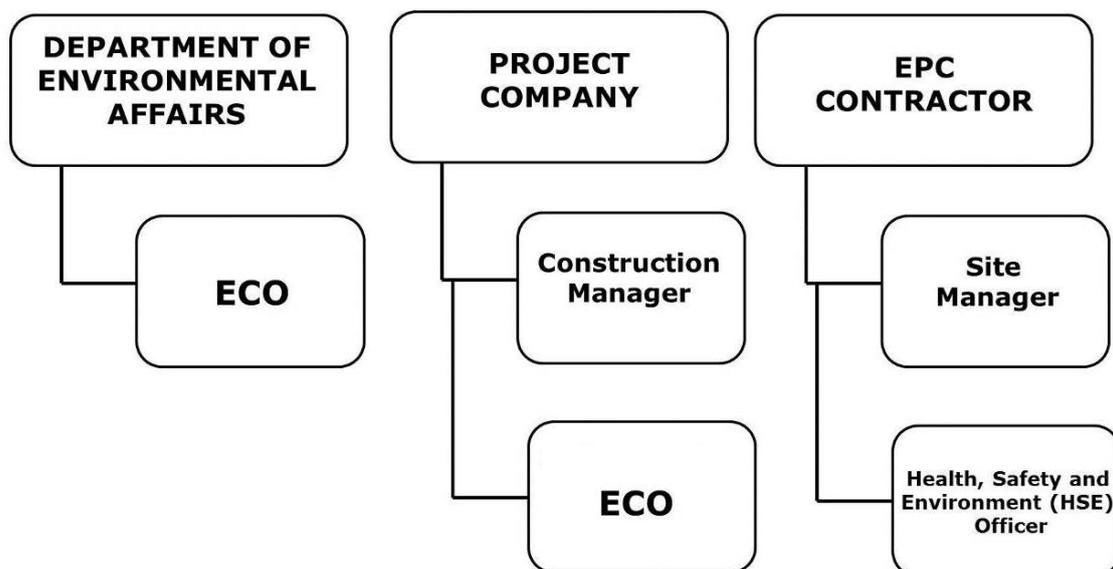
- » Ensures that construction activities are properly managed in respect of environmental aspects and impacts;
- » Enables the road and cabling construction activities for the Wind Energy Facility to be undertaken without significant disruption to other land uses in the area;
- » Minimises the loss of wetland habitat and ecological structure;
- » Minimises the alteration of wetland zonation and hydrological function; and
- » Minimises the loss of wetland ecological and socio-cultural services.

6.2. Institutional Arrangements: Roles and Responsibilities for the Construction Phase of the roads and cabling for the Wind Energy Facility and supporting infrastructure

As the Proponent, Amstilinx (RF) Proprietary Limited must ensure that the implementation of the proposed project complies with the requirements of all environmental authorisations and permits, and obligations emanating from other relevant environmental legislation. This obligation is partly met through the development of this EMPr, and the implementation through integration into the contract documentation.

OBJECTIVE 1: To establish clear reporting, communication and responsibilities in relation to environmental incidents.

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Technical Director/Manager; Site Manager; Internal Environmental Officer, Safety and Health Representative; Independent Environmental Control Officer (ECO) and Contractor for the construction phase of this project are as detailed below. Formal responsibilities are necessary to ensure that key procedures are executed. The figure below provides an organogram indicating the organisational structure for the implementation of the EMPr.



Construction Manager will:

- » Ensure all specifications and legal constraints specifically with regards to the environment are highlighted to the Contractor(s) so that they are aware of these.
- » Ensure that Amstilinx (RF) Proprietary Limited and its Contractor(s) are made aware of all stipulations within the EMPr.
- » Ensure that the EMPr is correctly implemented throughout the project by means of site inspections and meetings. This will be documented as part of the site meeting minutes through input from the independent ECO.
- » Be fully conversant with the EIA for the project, the EMPr, the conditions of the Environmental Authorisation, and all relevant environmental legislation.
- » Be fully knowledgeable with the contents of all relevant licences and permits.

Site Manager (EPC Contractor's on-site Representative) will:

- » Be fully knowledgeable with the contents of the EIA and risk management.
- » Be fully knowledgeable with the contents and conditions of the Environmental Authorisation.
- » Be fully knowledgeable with the contents of the EMPr.
- » Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance with these.
- » Have overall responsibility of the EMPr and its implementation.
- » Conduct audits to ensure compliance to the EMPr.
- » Ensure there is communication with the Technical Director, the ECO, the Internal Environmental Officer and relevant discipline engineers on matters concerning the environment.

- » Be fully knowledgeable with the contents of all relevant licences and permits.
- » Ensure that no actions are taken which will harm or may indirectly cause harm to the environment, and take steps to prevent pollution on the site.
- » Confine activities to the demarcated construction site.

An independent **Environmental Control Officer (ECO)** must be appointed by the project proponent prior to the commencement of any authorised activities and will be responsible for monitoring, reviewing and verifying compliance by the EPC Contractor with the environmental specifications of the EMPr and the conditions of the Environmental Authorisation. Accordingly, the ECO will:

- » Be fully knowledgeable with the contents with the EIA.
- » Be fully knowledgeable with the contents with the conditions of the Environmental Authorisation.
- » Be fully knowledgeable with the contents with the EMPr.
- » Be fully knowledgeable of all the licences and permits issued to the site.
- » Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance with them.
- » Ensure that the contents of this document are communicated to the Contractor site staff and that the Site Manager and Contractor are constantly made aware of the contents through discussion.
- » Ensure that the compliance of the EMPr, EA and the legislation is monitored through regular and comprehensive inspection of the site and surrounding areas.
- » Monitoring and verification must be implemented to ensure that environmental impacts are kept to a minimum, as far as possible.
- » Ensure that the Site Manager has input into the review and acceptance of construction methods and method statements.
- » Keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.
- » Ensure that the compilation of progress reports for submission to the Technical Director, with input from the Site Manager, takes place on a regular basis, including a final post-construction audit.
- » Ensure that there is communication with the Site Manager regarding the monitoring of the site.
- » Submit independent reports to the DEA and other regulating authorities regarding compliance with the requirements of the EMPr, EA and other environmental permits.

As a general mitigation strategy, the Environmental Control Officer (ECO) should be present for the site preparation and initial clearing activities to ensure the correct demarcation of no-go areas, facilitate environmental induction with construction staff and supervise any flora relocation and faunal rescue activities that may need to

take place during the site clearing (i.e. during site establishment, and excavation of foundations). Thereafter weekly site compliance inspections would probably be sufficient. However, in the absence of the ECO there should be a designated owner's environmental officer present to deal with any environmental issues that may arise such as fuel or oil spills. The ECO shall remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site handed over for operation.

Contractors and Service Providers: 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 will appoint an Internal Environmental Officer whom will be responsible for informing contractor 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 Internal Environmental Officer and Contractor's obligations in this regard include the following:

- » Must be fully knowledgeable on all environmental features of the construction site and the surrounding environment.
- » Be fully knowledgeable with the contents of the conditions of the Environmental Authorisation.
- » Be fully knowledgeable with the contents of the EMPr.
- » Be fully knowledgeable of all the licences and permits issued to the site as well as their associated conditions.
- » Ensure a copy of the Environmental Authorisation and EMPr must be easily accessible to all on-site staff members.
- » Ensure contractor employees are familiar with the requirements of this EMPr and the environmental specifications as they apply to the construction of the proposed facility.
- » Ensure that prior to commencing any site works, all contractor employees and sub-contractors must have attended an environmental awareness included in the induction training which must provide staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- » Ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor.
- » Manage the day-to-day on-site implementation of this EMPr, and for the compilation of regular (usually weekly) Monitoring Reports.
- » Keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken, including those of the Independent ECO.
- » Staff will be informed of environmental issues as deemed necessary by the Independent ECO.

All contractors (including sub-contractors and staff) and service providers are ultimately responsible for:

- » Ensuring adherence to the environmental management specifications.
- » Ensuring that Method Statements are submitted to the Site Manager (and ECO) for approval before any work is undertaken.
- » Any lack of adherence to the above will be considered as non-compliance to the specifications of the EMPr.
- » Ensuring that any instructions issued by the Site Manager on the advice of the ECO are adhered to.
- » Ensuring that a report is tabled at each site meeting, which will document all incidents that have occurred during the period before the site meeting.
- » Ensuring that a register is kept in the site office, which lists all transgressions issued by the ECO.
- » Ensuring that a register of all public complaints is maintained.
- » Ensuring that all employees, including those of sub-contractors receive training before the commencement of construction in order that they can constructively contribute towards the successful implementation of the EMPr (i.e. ensure their staff are appropriately trained as to the environmental obligations).

Contractor's Safety, Health and Environment Representative: The Contractor's Safety, Health and Environment (SHE) Representative, employed by the Contractor, is responsible for managing the day-to-day on-site implementation of this EMPr, and for the compilation of regular (usually weekly) Monitoring Reports. In addition, the SHE must act as liaison and advisor on all environmental and related issues and ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor.

The Contractor's Safety, Health and Environment Representative should:

- » Be well versed in environmental matters.
- » Understand the relevant environmental legislation and processes.
- » Understand the hierarchy of Environmental Compliance Reporting, and the implications of Non-Compliance.
- » Know the background of the project and understand the implementation programme.
- » Be able to resolve conflicts and make recommendations on site in terms of the requirements of this Specification.
- » Keep accurate and detailed records of all EMPr-related activities on site.

6.3. Objectives

In order to meet the goal outlined in Section 5.1, the following objectives have been identified, together with necessary actions and monitoring requirements.

OBJECTIVE 1: To manage scarring and dust resulting from vegetation clearing for roads and cabling near and within watercourses (crossing of wetlands) and infilling thereof.

During the construction phase, particulate emissions are anticipated from excavation and vegetation clearing for roads and cabling, etc., as well as vehicle entrained dust from the movement of vehicles on the main and internal access roads. As a result, scarring of the landscape may take place during vegetation clearing.

Project component/s	» Construction and establishment activities e.g. vegetation clearing for road and cabling near wetland crossings and wetland buffer areas.
Potential Impact	» Dust and particulates from vehicle movement to and on-site, road construction activities, road maintenance activities and vegetation clearing for roads and cabling; and » Scarred landscapes due to the clearing of vegetation.
Activities/risk sources	» Clearing of vegetation and topsoil; » Scraping / grading for roads; » Transport of materials, equipment and components on internal access roads; » Re-entrainment of deposited dust by vehicle movements; » Wind erosion from topsoil and spoil stockpiles and unsealed roads and surfaces; and » Rehabilitation programme not adhered to which leads to visual scarring.

Mitigation: Action/control	Responsibility	Timeframe
Roads must be maintained in a manner that will ensure that dust from road or vehicle sources is not visibly excessive. Ensure that damage to roads is repaired on completion of construction phase.	Contractor	Site establishment; duration of construction
Appropriate dust suppressant must be applied on all exposed areas and stockpiles as required to minimise/control airborne dust. Cognisance must be taken of water scarcity in the area and every effort must be made to employ successful alternatives.	Contractor	Duration of contract
Speed of construction vehicles must be restricted, as defined by the Site Manager and ECO.	Contractor	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
Disturbed areas must be re-vegetated as soon as practicable once construction is completed in an area.	Contractor	At completion of construction phase
If monitoring results or complaints indicate inadequate performance against the criteria indicated, then the source of the problem must be identified, and existing procedures or equipment modified to ensure the problem is rectified.	Contractor	Duration of contract
Restrict road widths, cabling trench widths, and associated temporary work areas. In so doing, as much vegetation as possible will be retained resulting in minimised scarring. To measure quantities, alternatives should be provided with areas of disturbance tabled.	Proponent	Monitoring during design phase and on approval of plans

Performance Indicator	<ul style="list-style-type: none"> » No complaints from affected residents or community regarding dust or vehicle emissions; » Dust suppression measures on roads implemented for all heavy vehicles that require such measures during the construction phase commences; » Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed; » Rehabilitated disturbed natural and cultivated areas; and » Roads and other infrastructure planned and designed to minimise disturbance to natural areas.
Monitoring	<ul style="list-style-type: none"> » Monitoring must be undertaken to ensure emissions are not exceeding the prescribed levels via the following methods: <ul style="list-style-type: none"> * Visual daily inspections of dust generation by construction activities throughout the construction phase. * Immediate reporting by personnel of any potential or actual issues with nuisance dust or emissions to the Project Manager. * A complaints register must be maintained, in which any complaints from residents/the community will be logged. Complaints will be investigated and, where appropriate, acted upon. * An incident reporting system must be used to record non-conformances to the EMPr.

OBJECTIVE 2: Minimise visibility of roads and related infrastructure.

Supporting infrastructure (primarily gravel roads and electrical cabling) will be required between the wind turbines to enable the development of the wind energy facility.

Project component/s	» Supporting infrastructure (i.e. gravel roads, electrical cabling, control room, etc).
Potential Impact	» Visual impact of general planning and design activities, and the potential scarring of the landscape due to vegetation clearing.
Activity/risk source	» Colour and material of roads not according to specifications; and » The viewing of the above mentioned by observers on or near the site.
Mitigation: Target/Objective	» Minimal visual intrusion by planning and design activities and intact vegetation cover outside of immediate works areas; and » Visibility of roads and related infrastructure minimised.

Mitigation: Action/control	Responsibility	Timeframe
Plan the placement of lay-down areas, temporary construction camps and control rooms in order to minimise vegetation clearing.	Proponent, Contractor	Planning and design phase
Ensure that all infrastructure and the site and general surrounds are maintained in a neat and appealing way.	Proponent, Contractor	Duration of contract
Rehabilitate all disturbed areas, construction areas, road servitudes and cut and fill slopes to acceptable visual standards.	Proponent, Contractor	Construction
Colour and material selection during design phase to fit in with surroundings. The colour of imported road and/or paving material to be dark grey or brown, not light grey or white. During the design phase and in the construction tender documentation, the specification of materials should make allowance for these darker coloured materials. White stone (e.g. crushed sandstone and quartzite) is to be avoided as far as possible as this material will be very visible when placed in this landscape.	Proponent, Contractor	Monitored during construction (delivery of material to site) to ensure compliance; monitoring during operational phase as ongoing maintenance.

Performance Indicator	» Vegetation cover on and in the vicinity of the site is intact with no evidence of degradation or erosion; and » Visibility of roads and related infrastructure minimised.
Monitoring	» Monitoring of vegetation clearing during planning & design, and construction; » Monitoring of rehabilitated areas post construction; and » ECO to monitor all mitigation measures.

OBJECTIVE 3: Minimise the risk to the farm and to the wind farm.

Uncontrolled, unplanned fires will not serve their desired purpose and may serve to place the vegetation in the study area and the people on at risk of veldt fires.

Project component/s	» Construction and establishment activities associated with the wind energy facility and associated infrastructure near wetland crossings and wetland buffer areas.
Potential Impact	» Veldt fires can pose a personal safety risk to the wind farm, local farmers and communities, and their homes, livestock and farm infrastructure, such as gates and fences.
Activities/risk sources	» Flammable, toxic or carcinogenic materials used on site during construction and operation cause a fire; and » Leaking of oil causing fire.
Mitigation: Target/Objective	» To avoid and or minimise the potential risk of veldt fires on farms, the wind farm, local communities and their livelihoods.

Mitigation: Action/control	Responsibility	Timeframe
All construction activities to be preceded with comprehensive full risk assessments and safe work procedures for each task as required by the Occupational Health and Safety Act (OHSA). Risk assessments will include the identification and handling of hazardous materials as required by the Hazardous Substance regulations of the same Act.	Proponent, Contractor	Duration of construction
The contractor to implement adequate fire safety measures to prevent fires from occurring. This includes the provision of adequate fire-fighting equipment onsite and fire-fighting training to selected construction staff.	Contractor	Duration of construction
Ensure that all the oil systems are fully enclosed, circulating systems which are designed to have no fluid to come in contact with the atmosphere. The daily maintenance routines provide for the identification and correction of any potential oil leaks.	Contractor	Duration of construction
Compensate farmers / community members at full market related replacement cost for any losses, such as livestock, damage to infrastructure etc, for losses associated with fires resulting from negligence or non-compliance.	Contractor	As required
Road borders should be regularly maintained to ensure that vegetation remains short and that they therefore serve as an effective firebreak.	Contractor	As required

OBJECTIVE 4: Minimise loss of wetland habitat and ecological structure during construction.

Minimise loss of wetland habitat and ecological structure from the construction of the roads and associated cabling to the turbine sites, for the perennial and non-perennial wetlands on site and including the 32m buffer area established around each wetland.

Project component/s	» Construction of the roads and associated cabling to the turbine sites.
Potential Impact	<ul style="list-style-type: none"> » Construction will inevitably alter the landscape and influence the drainage processes on the site. This in turn, will influence the drainage and status of the wetland areas; » Exposure of the site to alien and invasive vegetation; and » Erosion of the soil surface due to surface vegetation being removed, causing exposed soil conditions where rainfall and high winds can cause mechanical erosion. This surface soil can wash into the stormwater channel and riparian areas if adequate precautions are not taken. This build-up may result in blockage and flooding.
Activity/risk source	<ul style="list-style-type: none"> » Construction of roads (either new roads or upgrading of existing roads) and installation of power cables is not managed responsibly and in accordance with the management actions in the EMPr; » Construction activities encroaching into demarcated wetlands and sensitive zones, including the 32m buffer area established around each wetland; » Construction vehicles driving through wetland areas; and » Waste management not implemented on site (i.e. run-off from work areas enters wetland areas).
Mitigation: Target/Objective	» Loss of wetland habitat and ecological structure minimised during construction.

Mitigation: Action/control	Responsibility	Timeframe
Where cables need to cross perennial valley bottom wetlands the cables should either span over the wetland with associated buffer zone or directional drilling can be used. However drilling should start/stop outside the wetland boundary.	Contractor	Construction
The relevant approvals must be obtained from the Department of Water and Sanitation (DWS) for any activities within wetland areas and their associated buffers. In this regard special mention is made of Water Use Licences (WUL) in terms of section 21 (c) and (i) of the National Water Act (NWA).	Proponent	Prior to construction

Mitigation: Action/control	Responsibility	Timeframe
Permit only essential construction personnel within 32m of the wetland habitat.	Contractor	Construction
Keep all demarcated sensitive zones outside of the construction area off limits during the construction phase of the development.	Contractor	Construction
Do not leave soil surfaces open to erosion for lengthy time periods.	Contractor	Construction
Time construction as far as possible so that construction takes place outside the rainy seasons, thus reducing opportunities for erosion from rainfall events.	Contractor	Construction
Strictly manage edge effects of activities, including erosion and alien/weed control in wetland areas as well as their associated buffer zones.	Contractor	Construction and operation
Plan construction to avoid any impact on the drainage of the site and wetland functionality and implement a sound stormwater management plan.	Proponent and contractor	Construction
Limit the footprint area of the construction activity to what is absolutely essential in order to minimise environmental damage.	Contractor	Construction
Do not allow vehicles to indiscriminately drive through wetland zones and ensure that all access paths are marked and all other areas are marked as out of bounds.	Contractor and EO	Construction and operation (during maintenance)
Prevent run-off from work areas entering wetland habitats.	Contractor	Construction
Implement waste management as contemplated in the EMPr in order to prevent construction related waste from entering the wetland environment.	Contractor	Construction
Service and re-fuel construction vehicles in a designated area or off site.	Contractor	Construction
Provide appropriate sanitation facilities for the duration of the proposed development and remove all waste to an appropriate facility. These facilities must be located outside of the wetland features and associated buffers and must be regularly serviced.	Contractor	Construction
Any required bridge upgrades should allow for migration of faunal species.	Contractor	Construction
Ensure that bridge structures which may be upgraded do not alter stream flow patterns. Particular mention is made of the use of a battery of pipe wetland crossing structure to ensure that wetland wetting patterns are maintained and that movement of wetland faunal taxa is afforded.	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
All waste, with special mention of waste rock and spoils and remaining building material should be removed from the site on completion of the project.	Contractor	Construction
Dig trenches for cables at non-perennial wetland crossing points by hand in order to minimise any additional disturbance of wetland soils and habitats as well as compacting of soil.	Contractor	Construction
Wherever possible, develop wetland crossings at 90 degree angles to the wetland feature to reduce the extent of the wetland area disturbed.	Contractor	Construction
Ensure that no alteration of the wetland bed material or river bed profile occurs or that the longitudinal and cross sectional profile of the wetland occurs in order to prevent erosion, ponding and sedimentation.	Contractor	Construction
Rip and aerate all compacted soils in order to allow for plant establishment and growth.	Contractor	Construction
Removal of all overburden from wetland zones after construction.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » Extent of wetlands prior to construction, during construction and operational phases (aerial images / mapping); and » For each alien species: number of plants and aerial cover of plants within project area and immediate surroundings.
Monitoring	<ul style="list-style-type: none"> » Establishment of a Monitoring Plan of the area by Environmental Control Officer prior to construction and ongoing throughout the construction period; and » Ensure construction phase contractors adhere to all listed mitigation measures.

OBJECTIVE 5: Avoid alteration of wetland zonation and hydrological function during construction.

The Biodiversity GIS database (www.bgis.sanbi.org), with special mention of the Freshwater Ecosystem Priority Areas (FEPAs), were consulted with regards to wetland features close to or within the subject property that may be of ecological importance. Although all available resources given by the BGIS were taken into consideration in the Wetlands Assessment (dated January 2012) only the aspects applicable to the subject property and surroundings were discussed in the report. It should be noted that all areas earmarked for the development of roads and transmission lines fall outside wetland zones as well as associated buffers. One

existing road, to be used as the main access road located within the northern portion of the study area, does cross wetland features, however this road will not be upgraded for the purposes of the project and it is deemed possible that any impact on surrounding wetland features, can be largely reduced, if mitigation measures and recommendations as listed within the Wetlands Assessment report (dated January 2012) and EMPr are adhered to.

The majority of the wetlands within the subject property are regarded natural with isolated artificial wetlands scattered throughout the area and are considered slope (seep) wetlands and bench (flat) wetlands with one valley bottom wetland located within the north east portion of the subject property.

The function and service provision was calculated for each group of wetlands according to characteristics discussed in the section 4.3 (Wetland System Characterisation) of the Wetlands Assessment (dated January 2012). The average score for each group assessed are presented in the table below.

Wetland function and service provision for the subject property

Ecosystem Service	Perennial	Non-perennial
Flood attenuation	1.9	2
Streamflow regulation	1.3	0.8
Sediment trapping	1.8	2
Phosphate assimilation	2	2.1
Nitrate assimilation	2	1.5
Toxicant assimilation	2.1	2
Erosion control	2.2	2
Biodiversity maintenance	1.5	1
Carbon storage	1.3	0.6
Water supply	1.3	0.5
Harvestable resources	1	0.2
Cultural value	0	0
Cultivated foods	0.8	0.8
Tourism and recreation	1.7	1.7
Education and research	1	1
SUM	21.9	18.2
AVERAGE SCORE	1.6	1.3

Both wetland types calculated an intermediate importance in terms of wetland service and function provision within the subject property. Several aspects calculated the same scores for the two groups, mainly due to surface water being the only difference between the two groups and agricultural related activities within surrounding areas considered a significant impact on both perennial and non-perennial wetland features.

As a result of agriculture, all wetland features are bordered by crop cultivation areas leading to a runoff of agriculturally related chemicals such as fertilisers into wetland zones. The wetlands are therefore expected to play an important role with regards to assimilation of phosphates, nitrates and toxicants. Erosion control and sediment trapping also calculated relatively high scores due to the agricultural activities resulting in altered run off patterns as well as an overall increase in sediment from surrounding areas.

The scores were however increased due to the presence of avifaunal species of concern within downstream as well as surrounding areas increasing the overall importance of the wetland features with regards to overall biodiversity as well as tourism and recreation. Furthermore, the subject property is not located within a rural area, significantly decreasing the degree of service and function provision of wetland features in terms of wetland crop cultivation, harvestable resources and cultural value.

Overall function and service provision scores for the two groups are not considered very high. However, the subject property is located within a FEPA upstream water management area therefore all impacts that could occur due to the proposed development should be effectively mitigated in order to minimise downstream impact and overall decline in wetland Present Ecological Status (PES).

Project component/s	» Construction of the access roads and associated cabling to the turbine sites near wetland crossings and wetland buffer areas.
Potential Impact	<ul style="list-style-type: none"> » With disturbance of the soils associated with the project, there is a risk of sedimentation of the wetland systems being crossed which in turn could lead to an alteration of the vegetation characteristics of the system; » The proposed development area is located upstream of a FEPA management area. The wetland and non-perennial systems in these areas are often of increased importance in supporting taxa associated with wetland and riparian areas of increased conservation importance; » Faunal species with an affinity for riverine systems such as certain avifaunal species may migrate along linear non perennial riverine features and wetlands for foraging and breeding purposes. Although the proposed development will not encroach onto wetland features there is still a possibility of impact on migrational corridors due to development related activities; » The vegetation within the region where the proposed development is to take place is regarded endangered with the majority of the natural vegetation removed for agricultural related activities. Therefore any further impact on vegetation within wetlands or surrounding areas of conservation importance for endemic species

	<p>will be of increased significance;</p> <ul style="list-style-type: none"> » Impacts due to canalisation and erosion can be significant and has the potential to affect the hydrological functioning and biodiversity of wetland systems. Disturbances caused by vegetation clearing and soil disturbance are the key activities which could lead to this impact; » Alien vegetation encroachment is a significant problem in areas where past disturbance has occurred. If left unattended seeds may be dispersed to wetland features, especially during the rainy season, impacting beyond the activity area; and » Destruction of the wetland areas may lead to a loss of ecological service provision in terms of nutrient trapping and biodiversity maintenance. However, the probability of the impact occurring is regarded low due to no wetland areas earmarked for proposed development.
Activity/risk source	<ul style="list-style-type: none"> » Disturbances caused by vegetation clearing and soil disturbances during construction activities near the wetland features; » Encroachment of development related activities into wetland zones; » Construction activities impact on wetland areas such as dumping of waste and construction material; and » Run-off from work areas enter wetlands.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Wetland zonation and hydrological function are not altered.

Mitigation: Action/control	Responsibility	Timeframe
Where cables need to cross perennial valley bottom wetlands the cables should either span over the wetland with associated buffer zone or directional drilling can be used. However drilling should start/stop outside the wetland boundary.	Contractor	Duration of construction
Prevent run-off from work areas entering wetland habitats.	Contractor	Duration of construction
Do not allow dumping of waste material within wetland zones at any stage of the development.	Proponent and contractor	Duration of project (i.e. until decommissioning)
Do not allow temporary storage of building material within wetland areas.	Contractor	Duration of construction
Any upgrades of bridge structures should ensure no alteration of stream flow patterns take place and that movement of wetland faunal taxa is afforded.	Contractor	Duration of construction
Ensure that no alteration of the wetland bed material or river bed profile occurs or that the longitudinal and cross sectional profile of the wetland occurs in order to	Contractor	Duration of construction

Mitigation: Action/control	Responsibility	Timeframe
prevent erosion, ponding and sedimentation.		
All waste, with special mention of waste rock and spoils and remaining building material should be removed from the site on completion of the project.	Contractor	Duration of construction
Within all areas earmarked for cable development which fall next to roads within buffer zones, the trench for the cable should be developed up gradient of the road to prevent further encroachment into the wetland areas.	Contractor	Duration of construction

Performance Indicator	<ul style="list-style-type: none"> » Extent of wetlands prior to construction, during construction and operational phases (aerial images /mapping); and » Adjustments to final layout to avoid highly sensitive areas.
Monitoring	<ul style="list-style-type: none"> » Establishment of a Monitoring Plan of the area prior to construction and ongoing throughout the construction period; » Ensure construction phase contractors adhere to all listed mitigation measures.

OBJECTIVE 5: Prevent loss of wetland ecological and socio-cultural services during construction of roads and cabling.

During the service and function assessment of the Wetland Assessment (dated January 2012) it became clear that the wetland systems could potentially be important for assimilation of chemicals used during agriculture. Therefore, destruction of the wetland areas may lead to a loss of ecological service provision in terms of nutrient trapping and biodiversity maintenance. However, the probability of the impact occurring is regarded low due to no wetland areas earmarked for proposed development.

Project component/s	» Construction of the access roads and associated cabling to the turbine sites near wetland crossings and wetland buffer areas.
Potential Impact	» Destruction of the wetland areas may lead to a loss of ecological service provision in terms of nutrient trapping and biodiversity maintenance.
Activity/risk source	<ul style="list-style-type: none"> » Drilling within wetland boundary; » Construction areas encroach into demarcated sensitive areas; and » Proliferation of alien vegetation in impacted areas.
Mitigation: Target/Objective	» Wetland ecological and socio-cultural services maintained during construction.

Mitigation: Action/control	Responsibility	Timeframe
Where cables need to cross perennial valley bottom wetlands the cables should either span over the	Contractor	Duration of construction

Mitigation: Action/control	Responsibility	Timeframe
wetland with associated buffer zone or directional drilling can be used. However drilling should start/stop outside the wetland boundary.		
Keep all demarcated sensitive zones outside of the construction area off limits during the construction phase of the development.	Contractor	Duration of construction
Limit the footprint area of the construction activity to what is absolutely essential in order to minimise environmental damage.	Contractor	Duration of construction
Do not allow dumping of waste material within wetland or associated buffer zones at any stage of the development.	Contractor	Duration of construction
Prevent run-off from work areas entering wetland habitats.	Contractor	Duration of construction
Ongoing alien and invader control within impacted areas. Special attention should be paid with the eradication methods chosen so as not to increase impact on the wetland features.	Contractor	Duration of construction
Minimise impediments to surface flows as well as baseflows, as far as possible, to ensure that recharge of wetland areas in the vicinity of the development is afforded.	Contractor	Duration of construction
Prevent erosion and sedimentation of water resources.	Contractor	Duration of construction

Performance Indicator	<ul style="list-style-type: none"> » Extent of wetlands prior to construction, during construction and operational phases (aerial images /mapping); and » Adjustments to final layout to avoid highly sensitive areas.
Monitoring	<ul style="list-style-type: none"> » Establishment of a Monitoring Plan of the area by Environmental Control Officer prior to construction and ongoing throughout the construction period; » Annual audit of project area and immediate surroundings by Wetland specialist (or EO if so qualified); and » Ensure construction phase contractors adhere to all listed mitigation measures.

OBJECTIVE 6: Avoid any project impact on heritage (palaeontological, archaeological and historical features).

The main cause of impacts to palaeontological, archaeological and fossil material during construction activities is physical disturbance of the material itself and its context. The heritage and scientific potential of a palaeontological or archaeological site is highly dependent on its geological and spatial context. This means that even

though, for example a deep excavation may expose palaeontological or archaeological artefacts, the artefacts are relatively meaningless once removed from the area in which they were found. Excavations and trenching for cabling will damage palaeontological and archaeological sites, as will road construction activities.

A Palaeontological study was conducted for the BA for the Excelsior Wind Energy Facility. It was concluded that the proposed wind farm development will have a very low impact on the very limited local fossil heritage, whether in the construction phase or later. No further specialist mitigation of palaeontological heritage for this project is recommended besides the actions recommended below. Should substantial fossil remains be exposed during development, the responsible ECO should alert Heritage Western Cape so that appropriate mitigation measures may be considered. Mitigation in the form of fossil recording and collection will have a positive impact on our appreciation of local fossil heritage.

An Archaeological study was conducted for the BA for the Excelsior Wind Energy Facility. This study found that the proposed Excelsior Wind Energy Facility will have a very low impact on the archaeological heritage, and as a result no archaeological mitigation is required. Indications are that the study area is not a sensitive archaeological landscape. The affected environment has been dramatically transformed by agricultural activities over more than two centuries. There is the possibility of encountering archaeological remains during excavation for the turbine platforms and underground cables, but this is likely to be very low. No fatal flaws have been identified, and the project is deemed to be viable from an archaeological perspective.

Project component/s	» Construction and establishment activities associated with the wind energy facility and associated infrastructure near wetland crossings and wetland buffer areas.
Potential Impact	» Damage to palaeontological, archaeological and historical features; and » Irreplaceable loss of the archaeological heritage and fossil material.
Activities/risk sources	» Excavation for the turbine platforms and underground cables.
Mitigation: Target/Objective	» To ensure that any palaeontological and archaeological objects that are found on the site are treated appropriately and in accordance with the relevant legislation.

Mitigation: Action/control	Responsibility	Timeframe
If a heritage object is found any activities in that area must be stopped immediately, and appropriate specialists must be brought in to assess the site	Proponent/ Contractor/ Appointed	Duration of construction (especially

Mitigation: Action/control	Responsibility	Timeframe
<p>(photographs and GPS points must be recorded), the HWC must be notified of the item/site, and must undertake due/required processes. Where required the necessary and relevant permits must be obtained.</p> <p>The contact person at HWC (at time of preparing this EMPr) is: Shiceka Zwelibanzi Heritage Western Cape, Protea Assurance Building, Green Market Square, Cape Town, 8000 Tel: 0214839736 Email: Zwelibanzi.shiceka@westerncape.gov.za</p>	<p>professional archaeologist/s in consultation with palaeontology Specialist</p>	<p>during excavation and trenching)</p>
<p>EO to be present on site during major excavation and trenching. If at any stage during the construction phase any semblance of a fossil were to be observed, it would be vital to recover the fossil and report the occurrence to a heritage specialist, HWC and/or SAHRA so that appropriate mitigation measures may be considered.</p>	<p>Proponent/ Contractor/ Appointed professional archaeologist/s in consultation with palaeontology Specialist</p>	<p>Duration of construction (especially during excavation and trenching)</p>
<p>EO to provide training for contractors and sub-contractors on site to assist them in identifying potential features of palaeontological value.</p>	<p>EO</p>	<p>Prior to and during construction</p>

<p>Performance Indicator</p>	<ul style="list-style-type: none"> » Zero disturbance outside of designated work areas; » All heritage/fossil material located are dealt with as per the legislative guidelines; » A record is kept of all instances of accidental disturbance of heritage/fossil material, as well as post construction review of impacts on landscape context; » Compliance with the recommendations in the Palaeontological and Archaeological study; and » Site visit, assessment report and recommendations to SAHRA in terms of archaeology and palaeontology.
<p>Monitoring</p>	<ul style="list-style-type: none"> » Supervision of clearing, excavation and trenching by ECO throughout construction phase.

OBJECTIVE 7: Prevent soil and groundwater contamination.

The construction phase of the roads and cabling for the Wind Energy Facility will involve the storage and handling of a variety of chemicals including fuel, oils and lubricants and grease, as well as cement water.

Project component/s	» Storage and handling of chemicals.
Potential Impact	<ul style="list-style-type: none"> » Release of contaminated water from contact with spilled chemicals; » Generation of contaminated wastes from used chemical containers; » Inefficient use of resources resulting in excessive waste generation; » Pollution of the surrounding environment through inappropriate waste management practices; » Contamination of the site or water through poor waste management practices; and » Pollution of groundwater and soil resources.
Activities/risk sources	<ul style="list-style-type: none"> » Power line construction activities; » Machinery, chemicals and human waste – soil pollutants; » Rainfall – surface runoff of contaminated soil; » Packaging and other construction wastes; » Hydrocarbon use and storage; » Contamination of soil (change in pH) and risk of damage to vegetation and/or fauna through spillage of concrete; and » 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 storage and maintenance of machinery (i.e. used oil) on-site does not cause soil or groundwater contamination; » To comply with waste management guidelines developed by contractor; and » Prevent spillage of cement, sand and stone into soil and vegetation beyond the defined area for concrete mixing and batching.

Mitigation: Action/control	Responsibility	Timeframe
Construction equipment is checked daily (by Contractor) to ensure that no fuel spillage takes place from construction vehicles or machinery, and monitored weekly by the EO.	Contractor and EO	Duration of construction

Mitigation: Action/control	Responsibility	Timeframe
Cement water, spilled fuel, oil and grease will be collected and soil contaminated by these substances will be removed from the site. The Contractor will dispose of the cement water at a licensed municipal wastewater treatment works and the soil contaminated by the aforesaid substances will be disposed of at a licensed hazardous waste disposal facility.	Contractor	Duration of construction
Certificates of safe disposal shall be kept and produced when requested by officials of the competent authority during compliance inspections.	Contractor (EO)	Duration of construction
Portable bioremediation kit (to remedy chemical spills) is to be held on site and used as required.	Contractor	Duration of construction
Bunded containment to be provided below and around any fuel storage containers.	Contractor	Duration of construction
Concrete mixing area (if any) should be in a designated area. If any concrete mixing takes place on site, this is to be done on board or plastic sheeting, which is to be removed from the site once concreting is completed; or in areas to be covered by further construction.	Contractor	Duration of construction
Sand, stone and cement are stored in demarcated areas, and are covered or sealed to prevent wind erosion and resultant deposition of dust on the surrounding indigenous vegetation.	Contractor	Duration of construction
Any excess sand, stone and cement must be removed from the site and disposed of at a licensed landfill site.	Contractor	Duration of construction
Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures.	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
Soil contaminated/ polluted because of a major spill must be removed from the site and disposed of at a licensed hazardous waste disposal facility, disposal slips for which must be submitted to the ECO. Soils contaminated/	Contractor	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
polluted through minor spills can be treated on site provided they are contained and have not penetrated the soil surface.		
Routine servicing and maintenance of vehicles must not take place on-site outside of designated areas (except for emergencies 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
Any storage and disposal permits/approvals which may be required must be obtained, and the conditions attached to such permits and approvals will be complied with.	Contractor	Duration of contract
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations.	Contractor	Duration of contract
Hazardous substances must not be stored where there could be accidental leakage into surface or subterranean water.	Contractor	Duration of contract
Hazardous and flammable substances must be stored and used in compliance to the applicable regulations and safety instructions. Furthermore, no chemicals must be stored nor may any vehicle maintenance occur within 350m of the temporal zone of wetlands or a drainage line with or without an extensive floodplain.	Contractor	Duration of contract
Conservancy tank (completely sealed) systems should be utilised at site camps to capture all sewage and grey water. These tanks must be routinely emptied by licensed contractors and disposed of at licensed Waste Water Treatment Works. Disposal slips for each disposal episode must be submitted to the ECO.	Contractor	Pre-construction/ Duration of contract
An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems.	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 chemical spills outside of designated storage areas; and » No water or soil contamination by spills.
Monitoring	<ul style="list-style-type: none"> » Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase; and » An incident reporting system will be used to record any spillages or possible contamination.

OBJECTIVE 8: Effectively manage the civil contractors and sub-contractors

In order to minimise impacts on the surrounding environment, contractors and sub-contractors must be required to adopt a certain Code of Conduct and commit to restricting construction activities to areas within the development footprint. Contractors and their sub-contractors must be familiar with the conditions of the Environmental Authorisation, the BA Report, and this EMPr, as well as the requirements of all relevant environmental legislation.

Project component/s	<ul style="list-style-type: none"> » Construction of the access roads and associated cabling to the turbine sites near wetland crossings and wetland buffer areas.
Potential Impact	<ul style="list-style-type: none"> » Pollution/contamination of the environment; and » Disturbance to the environment.
Activities/risk sources	<ul style="list-style-type: none"> » Contractors and sub-contractors are not aware of the requirements of the EMPr, leading to unnecessary impacts on the surrounding environment.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment.

Mitigation: Action/control	Responsibility	Timeframe
The terms of this EMPr and the conditions in the environmental authorisation (from DEA) will be included in all tender documentation and contractors and sub-contractors contracts.	Proponent	During compilation of tender documents (prior to issue of tender).
Contractors and sub-contractors will use the chemical toilet situated in a designated area of the site; no personal hygiene (e.g. washing) will be permitted outside the designated area.	Contractors and sub-contractors	Duration of construction
Cooking will take place in a designated area shown on the site map and no firewood or kindling may be gathered from the site or surrounds.	Contractors and sub-contractors	Duration of construction
All litter will be deposited in a clearly marked,	Contractors and sub-	Duration of

Mitigation: Action/control	Responsibility	Timeframe
closed, animal-proof disposal bin in the construction area; particular attention needs to be paid to food waste.	contractors	construction
No one may disturb or pick plants outside the demarcated construction area.	Contractors and sub-contractors	Duration of construction
No one may disturb animals on the site (no trapping, shooting etc.).	Contractors and sub-contractors	Duration of construction
Animals disturbed during construction activities should not be harmed but should be allowed to move off to an undisturbed area of the site or be relocated by an appropriately qualified person.	Contractors and sub-contractors	Duration of construction
Feral dogs and cats should not be fed or encouraged to visit the site.	Contractors, sub-contractors	Duration of construction
An ECO must be permanently on site throughout the road construction, cable laying, and turbine foundation excavation periods.	Proponent	Duration of construction
Contractors must use chemical toilets/ablution facilities situated at designated areas of the site; no ablution will be permitted outside the designated area. These facilities must be regularly cleaned, sanitised, emptied and serviced by the appropriate contractors. Sewage must be disposed of at an approved & permitted wastewater treatment site and may under no circumstances be dumped in the bush or buried. Disposal certificates for each disposal episode are to be submitted to the ECO.	Contractor (and sub-contractor/s)	Duration of contract
Contractors appointed by Amstilinx (RF) Proprietary Limited must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms.	Contractor (and sub-contractor/s)	Construction
On completion of the construction phase all construction workers must return to their place of origin within two days of their contract ending.	Contractor (and sub-contractor/s)	Construction

Performance Indicator	<ul style="list-style-type: none"> » Compliance with specified conditions of Environmental Authorisation, BA report and EMPr; » No complaints regarding contractor behaviour or habits; » Code of Conduct implemented before commencement of construction phase; and » Briefing session with construction workers held at outset of construction phase.
Monitoring	<ul style="list-style-type: none"> » Observation and supervision of Contractor practices throughout

	<p>construction phase;</p> <ul style="list-style-type: none"> » A complaints register must be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon; » An incident reporting system will be used to record non-conformances to the EMP; and » EO to monitor mitigation; and » Check compliance with specified conditions on a weekly or bi-weekly basis, using a report card.
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OBJECTIVE 9: Minimise the Visual impacts.

The duration of the construction phase of the facility is dependent on the number of turbines being constructed. During the construction period, there will be a noticeable increase in heavy vehicles utilising the roads to the development site that may cause, at the very least, a visual nuisance to other road users and landowners in the area.

In this environment, dust from construction work and scarring from vegetation clearing for road and turbine related infrastructure (e.g. power line excavation) are also likely to represent a significant visual impact.

Project component/s	<ul style="list-style-type: none"> » Construction of the access roads and associated cabling to the turbine sites near wetland crossings and wetland buffer areas.
Potential Impact	<ul style="list-style-type: none"> » Visual impact of general construction activities and the potential scarring of the landscape due to vegetation clearing.
Activity/risk source	<ul style="list-style-type: none"> » Demarcated construction areas not adhered to; » Dust suppression measures not adequate to minimise visual impact of construction equipment; » Construction site office located in a visually obtrusive site; » Roads and excavations placed along highly visible locations (e.g. ridgelines); » Erosion measures not put in place, leading to unsightly erosion scars; and » The viewing of the above mentioned by observers on or near the site.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Construction areas demarcated and restricted areas adhered to; » Visual impact of construction equipment minimised; » Visual impact of construction offices minimised; » Visibility of roads and related infrastructure minimised by siting the roads and excavations along contours, rehabilitating road verges with indigenous vegetation and using dark grey or brown stone for roads as opposed to white gravel; and

» Erosion scars, especially on ridgelines and slopes prevented through provision of formal erosion management for roads.

Mitigation: Action/control	Responsibility	Timeframe
Clearly demarcate construction areas to minimize disturbance. The construction tender documentation should specify that access roads, power line trenches, overhead line routes, on site substations, control rooms and construction areas are to be demarcated by use of posts at regular intervals (20m).	Proponent, Contractor	Prior to commencement of construction and during construction
Dust suppression measures to be put in place (e.g. dustex, watering soil/gravel areas, speed limits) if dust impacts exceed South African air quality standards. The construction tender documentation should specify that dust caused by construction should be minimised through the use of compounds such as 'dustex' or through watering gravel roads.	Proponent, Contractor	Duration of construction
<p>Locate construction site office in a visually discreet area away from the R319. The construction tender documentation should specify that the establishment of a suitable construction and maintenance site should avoid clearing of vegetated or cultivated areas.</p> <p>The proposed site should be approved by the Construction Manager prior to establishment to ensure that disturbance of areas are not required. Ongoing monitoring during the construction and maintenance phases, monthly checks should be made to ensure that further disturbance is minimised.</p>	Proponent, Contractor	Get approval during planning and design phase
Siting of roads and excavations along contours (which will result in less cut and fill and visual scarring), and off ridgelines which are visually exposed/ highly visible landforms. This specification must also be incorporated in the design phase of the project.	Proponent, Contractor	Duration of construction
Rehabilitate the road verges with species approved by an ecologist to reduce the visual impact of the roads. Colour and material of roads must be either of dark grey or brown stone to blend in with the landscape, as opposed to white gravel which will be visually intrusive.	Proponent, Contractor	Duration of construction, maintenance and operation

Mitigation: Action/control	Responsibility	Timeframe
Design the on-site control rooms, storage rooms or substation to be in keeping with the local architectural vernacular (e.g. simple white farm buildings with a dark roof) or to blend into the landscape (e.g. dark grey or brown). The area immediately surrounding these structures should be vegetated to increase the visual screening of such structures.	Proponent, Contractor	Construction
Provision of formal erosion management for roads (e.g. stormwater gullies) to prevent erosion scars, especially on ridgelines and slopes. This specification must also be incorporated in the design phase of the project.	Proponent, Contractor	Planning and design, duration of construction

Performance Indicator	» Vegetation cover on and in the vicinity of the site is intact with no evidence of degradation or erosion.
Monitoring	<ul style="list-style-type: none"> » Monitoring of vegetation clearing during construction; » Monitoring of rehabilitated areas post construction; and » EO to monitor all mitigation measures.

OBJECTIVE 10: Minimise the project impact on flora and fauna

There are four different natural vegetation types in the study area, although the two Shale Renosterveld types (Central and Eastern Ruens Shale Renosterveld) are superficially identical and are treated as one unit for purposes of the report. Ruens Silcrete Renosterveld occurs on the hilltops, and Cape Lowland Alluvial Vegetation occupies the drainage lines and wetlands. All four vegetation types on site are regarded as Critically Endangered in terms of the National Spatial Biodiversity Assessment (Rouget et al. 2004) and the National List of Threatened Ecosystems (DEA 2011).

All remaining natural areas on site may be regarded as special habitats – in that they are either sparsely vegetated areas of shale or silcrete, or wetlands. The former are likely to support various plant Species of Conservation Concern (SCC), although only one was recorded on site due to the site visit being undertaken outside the optimal flowering season. The following eight SCC are known to occur within 4 km of the study area, in similar habitat (CREW GIS data), and are very likely to occur within the study area:

- » *Polhillia brevicalyx* (Critically Endangered)
- » *Aspalathus smithii* (Endangered)
- » *Erica venustiflora ssp. glandulosa* (Vulnerable)

- » *Acmadenia macropetala* (Vulnerable)
- » *Xiphotheca guthriei* (Vulnerable)
- » *Aspalathus incompta* (Near Threatened)
- » *Agathosma foetidissima* (Near Threatened)
- » *Peucedanum striatum* (Near Threatened; also seen on site)

It is considered very likely that more SCC are present within the study area. All such species can be expected to occur only within the identified High sensitivity areas. Alien invasive vegetation is not currently a major problem on the site.

Project component/s	» Any infrastructure or activity that will result in disturbance to natural areas.
Potential Impact	» Loss of indigenous natural vegetation from the construction of the access roads and associated cabling to the turbine sites near wetland crossings and wetland buffer areas.
Activities/risk sources	<ul style="list-style-type: none"> » Design of roads and associated cabling do not consider botanical sensitive areas and lead to unnecessary clearing of natural habitat. » Excessive and unnecessary clearing of natural habitat; » Top soil is mixed with other material (e.g. rock and rubble) and cannot be replaced as part of the rehabilitation programme; » Construction impacts are not properly managed; » Dumping or damage of the environment by construction equipment outside of demarcated construction areas; » Disturbed areas are left un-rehabilitated for a long period, leading to erosion, especially on steep slopes; and » Erosion can occur and alien vegetation can spread rapidly if areas have been poorly rehabilitated.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Remove and store all topsoil from areas to be excavated; and use this topsoil in later rehabilitation of disturbed areas, e.g. the lay-down area, construction yard, trenches for electrical cables, and the access roads; » Minimise the impact of construction on fauna; » Ensure that the storage and operation of construction equipment and activities of personnel are contained within the designated work areas; » Avoid soil erosion within and in the vicinity of the construction area; » Effective rehabilitation of new access roads after construction; and » EO to ensure implementation of the mitigation measures.

Mitigation: Action/control	Responsibility	Timeframe
Access roads and associated cabling to be placed at least 30m from the edge of the renosterveld.	Contractor	Duration of construction
Ensure crossing of drainage lines is according to project design.	Proponent, Contractor	Planning and design, duration of

Mitigation: Action/control	Responsibility	Timeframe
		construction
Any excavation, including those for cables, must be supervised by the EO.	EO	Duration of construction
No excavations may be left open for more than a week, and they should preferably be closed up within a day, using the carefully stockpiled soil that came out of the trench. In the case of turbine footings some 45m ³ of soil will be displaced by the concrete, and this should not be dumped on any natural vegetation.	Contractor	Duration of construction
Demarcate the areas to be cleared (e.g. with snow netting), and do not allow vehicles and construction activities to extend outside of these demarcated areas.	Contractor	Duration of construction
Excavated topsoil (top 20cm, if this exists) to be stockpiled in the demarcated areas.	Contractor	Duration of construction
Excavated/disturbed areas on site and adjacent to the site (apart from on-site borrow pits, which are subject of a separate application and approval) have topsoil replaced to a depth of at least 10cm during the rehabilitation phase of the construction period (provided such soil is available from on-site stockpiles). This applies to the underground electrical cable route, road verges, and the rehabilitation along on the edges of the access roads.	Contractor	Duration of construction
A speed limit of 60 km/h needs to be implemented on the access roads to the site and a 40 km/h speed limit on the construction sites and for the cranes.	Contractor	Duration of construction
Before construction commences, a site map is to be prepared by the Contractor, showing designated work areas, locations of temporary toilets, no-go areas, eating & cooking areas, smoking areas, concrete mixing areas (if any), fuel storage areas, vehicle routes and laydown areas.	Contractor	Planning and design
Before construction commences, mark the designated work areas on each site using poles and hazard tape or snow netting.	Contractor	Prior to commencement of construction and duration construction
Establish laydown areas in areas that are already degraded (e.g. through grazing).	Contractor	Planning and design
Educate workers on the need to stay on paths	Contractor	Duration of

Mitigation: Action/control	Responsibility	Timeframe
and established tracks wherever practical.		construction
Construction equipment is not to be operated outside the designated work area.	Contractor	Duration of construction
Activities of personnel are to be restricted to the designated work areas.	Contractor	Duration of construction
It is recommended that a penalty system is included in contractors and sub-contractor's agreements, clearly documenting the penalties applicable for disturbance outside of demarcated areas.	Proponent	Prior to appointment of contractors and sub-contractors (i.e. during drafting of contracts)
Uncontaminated waste water and excess run off must not be concentrated but allowed to dissipate and seep slowly into the soil in a manner which inhibits soil erosion.	Contractor	Duration of construction
Implement an effective rehabilitation programme for the areas leased by developer.	Proponent and Contractor	Duration of construction and operational

Performance Indicator	<ul style="list-style-type: none"> » No loss of natural vegetation within areas deemed as sensitive; » No impact on vegetation outside of demarcated construction areas; and » No loss of red-listed and protected species outside of development footprint.
Monitoring	» Monitoring by ECO and Contractor EO.

OBJECTIVE 11: Ensure on-site waste management.

Solid and liquid wastes (i.e. wastewater from construction) disposed of onsite could cause environmental problems (e.g. pollution / change in soil pH).

Project component/s	» Construction activities
Potential Impact	» Pollution, contamination of groundwater and soil.
Activities/risk sources	<ul style="list-style-type: none"> » Waste water from construction; » Domestic waste; » Used oils; » Cement water; » Wastes burned/buried on site; » Dispersal of waste on site; and » Wastes remaining on site after the construction phase.

Mitigation: Target/Objective	<ul style="list-style-type: none"> » Avoid any storage of solid, liquid or hazardous waste on site and prevent waste spillages; » All waste disposed of as specified in the Environmental Authorisation and relevant regulations; and » Ensure that wastes are managed in an environmentally friendly manner.
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Mitigation: Action/control	Responsibility	Timeframe
All construction waste (concrete, steel, rubbles etc.) to be removed from the site.	Contractor	Duration of construction
Other non-hazardous solid waste (e.g. packaging material) to be disposed of at a licensed landfill.	Contractor	Duration of construction
All liquid waste (used oil, paints, lubricating compounds and grease) to be packaged and disposed of at a licensed site.	Contractor	Duration of construction
Adequate containers for the cleaning of equipment and materials (paint, solvent) must be provided as to avoid spillages.	Contractor	Duration of construction
Waste water from construction and painting activities must be collected in a designated container and disposed of at a suitable disposal point off site.	Contractor	Duration of construction
A refuse control system must be established for the construction period to efficiently separate and remove all forms of solid waste from the site for recycling, or disposal at a licensed disposal site.	Contractor	Duration of construction
Under no circumstances is any solid waste to be burned or buried on or in the vicinity of the site.	Contractor	Duration of construction
Waste collection points must be sealed/enclosed to eliminate the risk of wind scatter and scavenging by wildlife.	Contractor	Duration of construction
All waste products resulting from electrical installations along the road will be entirely removed from the site.	Contractor	Duration of construction
The Environmental Officer must develop, implement and maintain a waste inventory reflecting all waste generated during construction for both general and hazardous waste streams.	EO	Duration of construction

Performance Indicator	<ul style="list-style-type: none"> » No chemical spills outside of designated storage areas; » No water or soil contamination by spills; » No complaints received regarding waste on site or indiscriminate dumping; » Internal site audits ensuring that waste segregation, recycling and reuse is occurring appropriately; and » Provision of all appropriate waste manifests for all waste streams.
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Monitoring	<ul style="list-style-type: none"> » Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase; » Once a waste inventory has been established, targets for recovery of waste (minimisation, re-use, recycling) should be set; » A complaints register must be maintained, in which any complaints from the community will be logged. Complaints will 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; » A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon; and » An incident reporting system will be used to record non-conformances to the EMPr.
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OBJECTIVE 12: Minimise construction noise

Various construction activities will be taking place during the development of the facility and may pose a noise risk to them. These activities could include temporary or short-term activities where small equipment is used (such as the digging of trenches to lay underground power cables).

Project component/s	<ul style="list-style-type: none"> » Construction of infrastructure, including but not limited to: turbine system (foundation, tower, nacelle, and rotor), substation(s), access roads, construction vehicles and machinery, and electrical power cabling.
Potential Impact	<ul style="list-style-type: none"> » Increased noise levels at potentially sensitive receptors; and » Potentially changing the acceptable land use capability.
Activities/risk sources	<ul style="list-style-type: none"> » Any construction activities taking place within 500m from potentially sensitive receptors; and » Construction activities occur during the night.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Prevent the generation of disturbing or nuisance noises; » Ensure acceptable noise levels at surrounding stakeholders and potentially sensitive receptors; » Construction activities occur during the day. SANS 10103:2008; » Maximum limit for ambient noise for rural areas of 45 dB(A) adhered to; and » Ensuring compliance with the Noise Control Regulations.

Mitigation: Action/control	Responsibility	Timeframe
Construction operations should only occur during daylight hours, if possible.	Contractor	Duration of construction
No construction piling to occur at night. Ideally, piling should be during the hottest part of the day when atmospheric conditions are unstable and noise is readily dissipated.	Contractor	Duration of construction
Construction staff to be given "noise sensitivity" training so they understand how to minimise noise impacts from construction activities.	Contractor	Prior to commencement of construction

Performance Indicator	<ul style="list-style-type: none"> » Equivalent A-weighted noise levels below 45 dBA at potentially sensitive receptors (8 hours); » Ensure that maximum noise levels at potentially sensitive receptors are less than 65 dBA; and » No noise complaints are registered.
Monitoring	<ul style="list-style-type: none"> » Noise monitoring to be conducted downwind from all noisy activities or at potentially sensitive receptors when work is taking place within 1 000m from a potentially sensitive receptor; » Monitoring to take place every time that a noise complaint is registered; and » EO to monitor all mitigation measures.

OBJECTIVE 13: Ensure overall compliance with the conditions of the environmental authorisation

Environmental authorisation for the BA for the Crossings of Wetlands and Wetland Buffer Areas as Part of the Excelsior Wind Energy Facility Near Swellendam, Western Cape was issued by the Department of Environmental Affairs (DEA) in August 2013.

Project component/s	» Construction activities.
Potential Impact	<ul style="list-style-type: none"> » Non-compliance with the environmental authorisation; and » Fines issued to the Project Proponent.
Activity/risk source	» Environmental conditions of approval (issued by DEA) for the construction phase are not satisfied, leading to the project operation being delayed.
Mitigation: Target/Objective	» Full compliance with the EMPr specifications and Environmental Authorisation requirements for construction phase.

Mitigation: Action/control	Responsibility	Timeframe
Audit the implementation of the EMPr requirements for the construction phase.	ECO	Duration of construction

Performance Indicator	» Non-compliance with the EMPr and environmental authorisation.
Monitoring	» Audit report on compliance with actions and monitoring requirements in the Construction Phase EMPr.

6.4 Awareness and Competence: Construction Phase of the Roads and Cabling near and within watercourses (crossing of wetlands) for the Excelsior Wind Energy Facility

OBJECTIVE 1: 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. This includes the discussion/explanation of site environmental matters during regular toolbox talks;
- » The content and requirements of Method Statements are to be clearly explained to all plant operators and general workers. All staff acting in a supervisory capacity is to have copies of the relevant Method Statements and be aware of the content thereof;
- » Ensuring that a copy of the EMPr is readily available on-site, and that all site staff are aware of the location and have 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;
- » Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended an Environmental Awareness Training course. The course must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented;

- » Basic training in the identification of archaeological sites/objects, paleontological sites, and protected flora and fauna that may be encountered on the site;
- » Awareness of any other environmental matters, which are deemed necessary by the ECO;
- » Ensuring that appropriate communication tools are used to outline the environmental "do's" and "don'ts" (as per the environmental awareness training course) to employees;
- » Records must be kept of those that have completed the relevant training;
- » Refresher sessions must be held to ensure the contractor's staff are aware of their environmental obligations;
- » All sub-contractors must have a copy of the EMPr and sign a declaration/acknowledgement that they are aware and familiar with the contents and requirements of the EMPr and that they will conduct work in such a manner as to ensure compliance with the requirements of the EMPr. All subcontractors performing the works should appoint a qualified Environmental Officer for the implementation of this EMPr and other project permits and authorisations; and
- » Contractors and main sub-contractors should have a basic training in the identification of archaeological sites/objects, and protected flora and fauna that may be encountered on the site.

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:

6.4.1 Environmental Awareness Training

Environmental Awareness Training must take the form of an on-site talk and demonstration by the EO or responsible personnel 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. A record of attendance of this training must be maintained by the EO or responsible person 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 proponent'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: Construction Phase of the Roads and Cabling near and within watercourses (crossing of wetlands) for the Excelsior Wind Energy Facility

OBJECTIVE 1: To monitor the performance of the control strategies employed against environmental objectives and standards.

A monitoring programme must 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 must be in line with the requirements of the relevant legislation and that of the environmental authorities. The Project Manager / Site Manager 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; and
- » Aid communication and feedback to authorities and stakeholders.

The ECO will ensure compliance with the EMP, and conduct monitoring activities. The ECO must have the appropriate experience and qualifications to undertake the necessary tasks. The ECO will report any non-compliance or where corrective action is necessary to the Site Manager and/or any other monitoring body stipulated by the regulating authorities.

The following reports will be applicable:

6.5.1 Non-Conformance Reports

All supervisory staff including Foremen, Resident Engineers, 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 will be compiled by the ECO on a monthly basis. 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.

The EO will be responsible for the weekly and monthly reports which will be submitted internally and will aid the ECO in compiling the monitoring report.

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 and the requirements of the EMPr.

MANAGEMENT PLAN FOR THE OPERATION

CHAPTER 7

7.1. Overall Goal for Operation

Overall Goal for Operation: To ensure that the operation of the Wind Energy Facility does 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 Wind Energy Facility in a way that:

- » Ensures that operation activities are properly managed in respect of environmental aspects and impacts;
- » Enables the Wind Energy Facility operation activities to be undertaken without significant disruption to other land uses in the area, in particular with regard to noise impacts, farming practices, traffic and road use, and effects on local residents;
- » Minimises impacts on birds and other fauna using the site;
- » Monitors and evaluates the impacts of the Wind Energy Facility on birds that frequent the area, in particular monitoring of bird strikes, bird nesting activities and water bird uses of the wetlands on the site;
- » Monitors the actual noise impacts of the Wind Energy Facility; and
- » Establishes an environmental baseline for Wind Energy Facility sites in South Africa, particularly with regard to priority bird species using the site.

7.2. Objectives

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

OBJECTIVE 1: Prevent loss of wetland habitat and ecological structure during operation

During operation the loss of wetland habitat and ecological structure should be minimised.

Project component/s	» Access roads and cabling.
Potential Impact	» Loss of wetland habitat and ecological structure.
Activity/risk	» Maintenance activities result in an alteration of the wetland bed

source	material or river bed profile; and » Proliferation of alien plants within impacted areas.
Mitigation: Target/Objective	» Prevent loss of wetland habitat and ecological structure during operation.

Mitigation: Action/control	Responsibility	Timeframe
Limit the footprint area of any operational related activity to what is absolutely essential in order to minimise environmental damage.	Proponent and Contractor	Operation
Restrict maintenance vehicles to existing access roads.	Proponent	Operation
Monitor disturbed areas during operation for erosion.	Proponent	Operation
Ongoing alien and invader control within impacted areas. Special attention should be paid with the eradication methods chosen so as not to increase impact on the wetland features.	Proponent	Operation
Rip and aerate all compacted soils in order to allow for plant establishment and growth.	Proponent	Operation
Ensure that maintenance activities do not result in an alteration of the wetland bed material or river bed profile.	Proponent	Operation
Ensure that no alteration of the longitudinal and cross sectional profile of the wetland occurs in order to prevent erosion, ponding and sedimentation.	Proponent	Operation

Performance Indicator	» Extent of wetlands prior to construction, during construction and operational phases (aerial images /mapping).
Monitoring	» Ensure that maintenance employees take all mitigation measures into consideration before commencement of any maintenance activity. This is to be done weekly or during each activity near wetland or buffer habitat.

OBJECTIVE 2: Prevent alteration of wetland zonation and hydrological function during operation

Project component/s	» Access roads and cabling.
Potential Impact	» Alteration of wetland zonation and hydrological functioning during operation.
Activity/risk	» Waste, including building material is dumped in wetland areas;

source	and » Run-off from roads and areas located near maintenance activities within buffer zones enter wetland areas.
Mitigation: Target/Objective	» Alteration of wetland zonation and hydrological function is prevented during operation.

Mitigation: Action/control	Responsibility	Timeframe
All waste, with special mention of waste rock and spoils and remaining building material should be removed from the site on completion of the project.	Proponent	Operation
Run-off from roads and areas located near maintenance activities within buffer zones.	Proponent a	Operation
Rip and aerate compacted soils in order to allow for plant establishment and growth within areas not used for crop cultivation.	Proponent	Operation

Performance Indicator	» Extent of wetlands prior to construction, during construction and operational phases (aerial images /mapping).
Monitoring	» Ensure that maintenance employees take all mitigation measures into consideration before commencement of any maintenance activity. This is to be done weekly or during each activity near wetland or buffer habitat.

OBJECTIVE 3: Prevent loss of wetland ecological and socio-cultural services during operation

During the operation, wetland ecological and socio-cultural services should be maintained.

Project component/s	» Access roads and cabling.
Potential Impact	» Maintenance vehicles travelling on site during operation.
Activity/risk source	» Maintenance vehicles are not restricted to existing roads; and » Erosion and sedimentation of water resources occur.
Mitigation: Target/Objective	» Wetland ecological and socio-cultural services is maintained during operation.

Mitigation: Action/control	Responsibility	Timeframe
Restrict maintenance vehicles to existing access roads.	Proponent	Operation
Minimise impediments to surface flows as well as baseflows, as far as possible, to ensure that recharge of wetland areas in the vicinity of the	Proponent	Operation

Mitigation: Action/control	Responsibility	Timeframe
development is afforded.		
Prevent erosion and sedimentation of water resources.	Proponent	Operation
Ongoing alien and invader control within impacted areas. Special attention should be paid with the eradication methods chosen so as not to increase impact on the wetland features.	Proponent	Operation
Rip and aerate compacted soils in order to allow for plant establishment and growth within areas not used for crop cultivation.	Proponent	Operation
Remove alien plants from impacted areas.	Proponent	Operation

Performance Indicator	» Extent of wetlands prior to construction, during construction and operational phases (aerial images /mapping).
Monitoring	» Ensure that maintenance employees take all mitigation measures into consideration before commencement of any maintenance activity. This is to be done weekly or during each activity near wetland or buffer habitat.

MANAGEMENT PROGRAMME: DECOMMISSIONING

CHAPTER 8

The site infrastructure which will be utilised for the proposed wind energy facility is expected to have a lifespan of at least 20 years and eventual extensions (i.e. with maintenance). Equipment associated with this facility would only be decommissioned once it has reached the end of its economic life.

The relevant mitigation measures contained under the construction section should be applied during decommissioning and therefore is not repeated in this section. The proponent should consult with landowner(s) to determine if access roads should be left in place for their continued use. If not required, roads should be decommissioned, ripped and revegetated.

FINALISATION OF THE EMPR

CHAPTER 9

The EMPr is a dynamic document, which must be updated to include any additional specifications as and when required. This EMPr has been updated to include site-specific information and specifications following the final walk-through surveys by specialists of the power line, and development site. This was to ensure that the construction and operation activities are planned and implemented considering sensitive environmental features.

Areas requiring rehabilitation include all areas of natural or partly natural vegetation disturbed during the construction phase and that are not required for regular maintenance operations, or for farming activities/cultivation. The main areas thus requiring rehabilitation will be recent disturbance to the edges of roads that pass through natural vegetation, any crane tracks alongside the permanent 4 m roads, and any cable routings where these fall within areas of natural vegetation.

Rehabilitation should only commence once all construction related disturbance associated with the project has been completed.

Most of the ecological management of the site refers only to the High Botanical Sensitivity vegetation areas identified in the baseline report of Helme (2010) for the Excelsior wind energy project. As the proponent does not plan to buy the land, these requirements will thus involve contracts between the proponent and the landowners, who will presumably continue to farm most of the land.

Detailed requirements for the Construction Phase Environmental Management Programme (CEMP) are as follow:

1. If any infrastructure is to be placed within the identified areas of High Botanical Sensitivity (i.e. all areas of natural vegetation) all these development footprints (for roads and underground cables) should be surveyed and fenced off with two strand wire and clearly indicated with flags, coloured rope, or danger tape strips. Only once this has been done can anything else proceed. It should be made very clear to all contractors that there is to be no disturbance of natural vegetation outside these demarcated areas, at least not without the permission of the Environmental Control Officer (ECO).
2. Prior to any earthworks within High Botanical Sensitivity Renosterveld areas a plant Search and Rescue program should be undertaken. Search and Rescue (S&R) of certain translocatable, selected succulents, shrubs and bulbs occurring in long term and permanent, hard surface development footprints (i.e. all buildings, new roads and tracks, laydown areas, and turbine positions) should

take place. All such development footprints must be surveyed and pegged out as soon as possible, and then a local horticulturist with Search and Rescue experience (such a person could be recommended by the botanist) should be appointed to undertake the S&R. All rescued species should be bagged (and cuttings taken where appropriate) and kept in the horticulturist's nursery, and should be returned to site once all construction is completed and rehabilitation of disturbed areas is required. Replanting should only occur in autumn or early winter (April – May), once the first rains have fallen, in order to facilitate establishment. The botanist appointed on this study must confirm in writing that this process has been completed successfully.

3. Where cable trenches need to be constructed through High Botanical Sensitivity areas (all areas of natural vegetation) this must be done by hand, and no machinery may be used in these areas. Machinery may be used for all other (Low Botanical Sensitivity) areas.
4. An ECO must be present during the duration of the construction phase.
5. Any excavation within designated High Botanical Sensitivity areas, including those for cables, must be supervised by the ECO. No excavations may be left open for more than a week, and they should preferably be closed up within a day, using the carefully stockpiled soil that came out of the trench.
6. No dumping or temporary storage of any materials may take place outside designated and demarcated laydown areas.
7. No exotic or invasive species should be used for rehabilitation where natural vegetation was impacted on, and this includes the commonly used invasive grass species such as ryegrass (*Lolium* spp).

Detailed requirements for the Construction Phase Environmental Management Programme (CEMP) are as follows:

1. All temporary fencing and danger tape should be removed once the construction phase has been completed.
2. Ongoing alien plant monitoring and removal should be undertaken on all areas of natural vegetation within the project area on an annual basis (in October), with emphasis on areas within 100 m of any infrastructure. The Department of Water Affairs' approved methods should be employed for all alien clearing operations. No earthmoving machinery should be used for this purpose, as this disturbs the soil and creates ideal conditions for re-invasion. All stems must be cut as close to ground level as possible, using loppers or chainsaws (depending on size), and stumps must be immediately hand painted with a suitable Triclopyr herbicide (e.g. Garlon, Timbrel, with colour dye) to prevent resprouting. If this is not done within five minutes of being cut some stems may resprout, wasting the original effort. No herbicide spraying should be undertaken anywhere within natural vegetation, or within wetlands, due to the extensive collateral damage. All cut branches should be stacked into pyramids (cut ends up) and left to dry – where

rodents will eat the available seed under the pile, reducing seed germination. Annual follow ups are required in all areas that have been previously cleared. Small seedlings may be hand pulled. Control of erosion and possible associated siltation of wetlands must be monitored throughout the construction phase by the ECO, and thereafter by an independent botanist once every two years.

3. The proponent must ensure that there is sufficient budget to implement all management recommendations noted above.