
PROPOSED ACCESS ROADS AND WATERCOURSE CROSSINGS WITHIN THE AUTHORISED NOJOLI WIND FARM NEAR COOKHOUSE, EASTERN CAPE PROVINCE

CONSTRUCTION & OPERATION ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

Submitted as part of the Draft Basic Assessment

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PROJECT DETAILS

- Title** : Environmental Impact Assessment Process
Environmental Management Programme: Proposed Access
Roads and Watercourse Crossings within the authorised
Nojoli Wind Farm near Cookhouse, Eastern Cape Province
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DEFINITIONS AND TERMINOLOGY

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Waste: Any substance, whether or not that substance can be reduced re-used, recycled and recovered; that is surplus, unwanted, rejected, discarded, abandoned or disposed of which the generator has no further use for the purposes of production. Any product which must be treated and disposed of, that is identified as waste by the minister of Environmental affairs (by notice in the Gazette) and includes waste generated by the mining, medical or other sectors, but: A by-product is not considered waste, and portion of waste, once re-used, recycled and recovered, ceases to be waste (Van der Linde and Feris, 2010; pg 186).

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

Watercourse: as per the National Water Act means -

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

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PROJECT DETAILS

CHAPTER 1

ACED Cookhouse South Wind Farm (Pty) Ltd (in the process of being changed to Nojoli Wind Farm (RF) Pty Ltd) obtained an environmental authorisation in March 2012 from the National Department of Environmental Affairs (DEA Ref No. 12/12/20/1569/3) for the construction of a wind energy facility and associated infrastructure on a site near Cookhouse in the Eastern Cape Province (referred to as the Nojoli Wind Farm (previously referred to as Southern Stage Wind Energy Facility)).

The Nojoli Wind Farm received preferred bidder status for Round 3 projects from the Department of Energy in October 2013 and is currently working towards Financial Close.

The proposed Nojoli Wind Farm was authorised under the 2006 EIA Regulations with the following listed activities having been applied for:

Listed Activity	Activity Description
GN R. 386 Item 1(m)	The construction of facilities or infrastructure, including associated structures or infrastructure for any purpose in the one in ten year floodline of a river or stream where the flood line is unknown, excluding proposed associated with existing residential use, but including- (i). canal; (ii). channels; (iii). bridges; (iv). dams; and (v)weirs
GN R. 386 Item 7	The above ground storage of dangerous good, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30 cubic metres but less than 1000 cubic metres at any one location or site
GN R. 386 Item 12	The transformation or removal of indigenous vegetation of 3 hectares or more or of any size where the transformation or removal would occur within a critically endangered or an endangered ecosystem listed in terms of section 52 of the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004).
GN R. 386 Item 13	The abstraction of groundwater at a volume where any general authorisation issued in terms of the National Water Act (Act No. 36 of 1998) will be exceeded
GN R. 386 Item 14	The construction of masts of any material of type and of any height, including those used for telecommunications broadcasting and radio transmission, but excluding (a). masts of 15m and lower exclusively used by:

Listed Activity	Activity Description
	(i). radio amateurs; or (ii). for lighting purposes; (b). flagpoles; and (c). lightning conductor poles
GN R. 386 Item 15	The construction of a road that is wider than 4 metres or that has a reserve wider than 6 metres, excluding roads that fall within the ambit of another listed activity or which are access roads of less than 30 metres long
GN R. 386 Item 16(a)	The transformation of undeveloped, vacant or derelict land to residential, mixed, retail, commercial, industrial or institutional use where such developments does not constitute infill and where the total area to be transformed is bigger than 1 hectare
GN R. 387 Item 1(a)	The construction of facilities or infrastructure, including associated structures or infrastructures, for the generation of electricity where (i). the electricity output is 20 megawatts or more; or (ii). the elements of the facility cover a combined area in excess of 1 hectare
GN R. 387 Item 1(l)	The construction of facilities or infrastructure, including associated structures or infrastructures, for the transmission and distribution of above ground electricity with a capacity of 120 kilovolts or more
GN R. 386 Item 2	Any development activity including associated structures and infrastructure, where the total area of the developed area is, or is intended to be 20 hectares or more

ACED Cookhouse South Wind Farm (Pty) Ltd (in the process of being changed to Nojoli Wind Farm (RF) Pty Ltd) (the applicant) is now applying for authorisation for identified Activities listed within the 2010 EIA Regulations, for which no application was previously made but which are triggered by the construction and operation of the Nojoli Wind Farm. These activities include:

- » The infilling and deposition of material within a watercourse
- » The widening or lengthening of roads within a watercourse
- » The construction of buildings or infrastructure within a watercourse

The proposed Nojoli Wind Farm is located ~12 km east to south east of Cookhouse within the Blue Crane Route Local Municipality, Eastern Cape Province (refer to Figure 1). The following farms were authorised for the siting of the wind farm:

- » Klipfontein 150/2
- » Bavianz Krantz 151
- » Bavianz Krantz 151/2
- » Farm 148
- » Farm 148/1
- » Rooi Draai 146

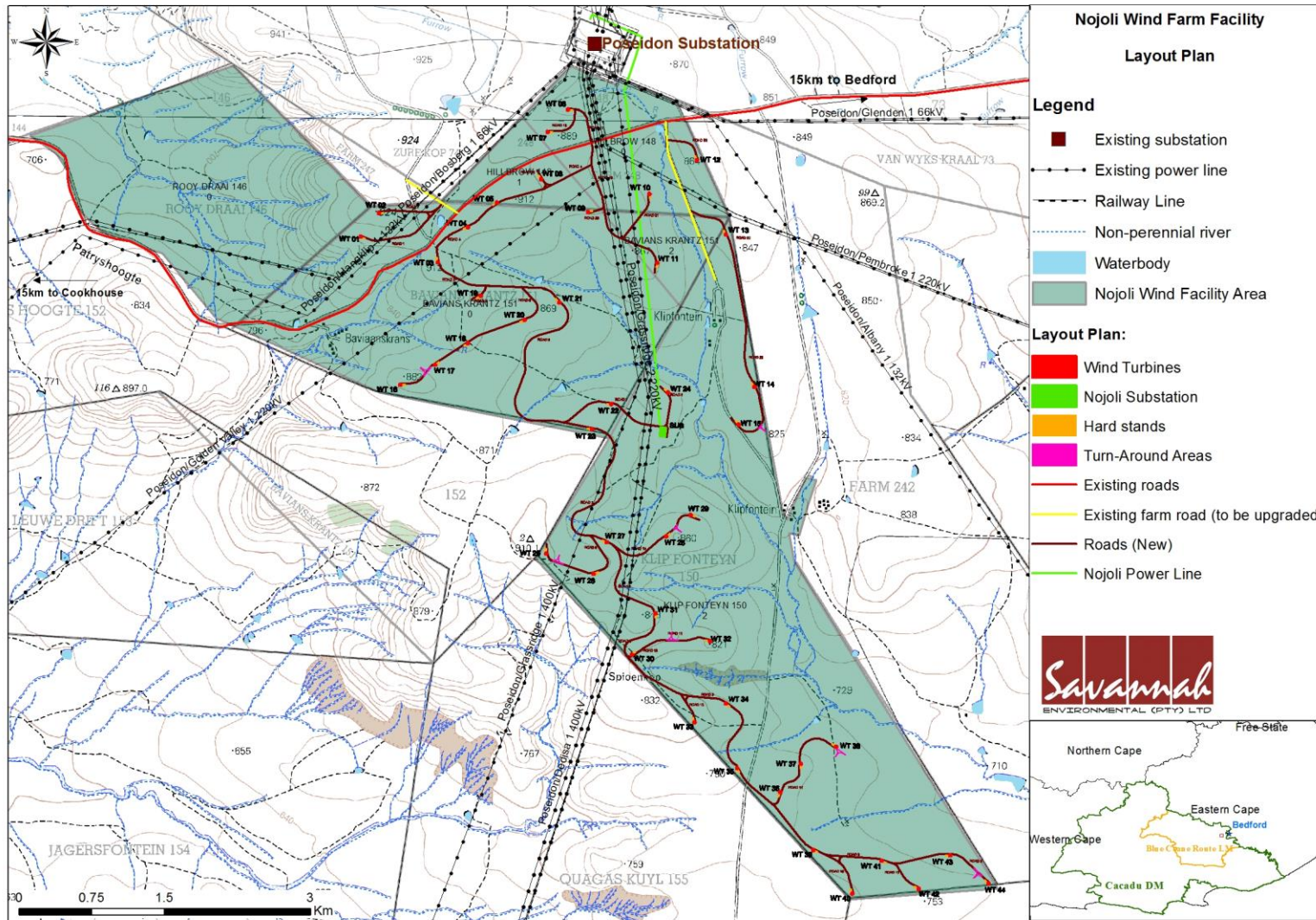


Figure 1: Layout map showing the proposed access roads and watercourse crossing with the authorised Nojoli Wind Farm

LEGISLATIVE REQUIREMENTS

CHAPTER 2

Table 2.1 provides an outline of the relevant environmental legislation and permitting requirements associated with the proposed project. This list of legislation is applicable at this time and should be updated on a continuous basis as the environmental legislation within South Africa changes.

Table 2.1: Relevant legislative permitting requirements applicable to the Concentrated Solar Power Facility Project

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
National Legislation			
National Environmental Management Act (Act No. 107 of 1998)	<ul style="list-style-type: none"> » NEMA requires, inter alia, that: <ul style="list-style-type: none"> * Development must be socially, environmentally, and economically sustainable. * Disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied. * A risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions. » EIA Regulations have been promulgated in terms of Chapter 5. Activities which may not commence without an environmental authorisation are identified within these Regulations. » In terms of S24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed and reported on to the competent authority charged by NEMA 	<ul style="list-style-type: none"> » Eastern Cape DEDEAT 	<ul style="list-style-type: none"> » The Final BA Report is to be submitted to the DEDEAT for review and decision making.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>with granting of the relevant environmental authorisation.</p> <ul style="list-style-type: none"> » In terms of GNR 543 of 18 June 2010, a Basic Assessment Process is required to be undertaken for the proposed project. 		
National Environmental Management Act (Act No. 107 of 1998)	<ul style="list-style-type: none"> » A project proponent is required to consider a project holistically and to consider the cumulative effect of potential impacts. » In terms of the Duty of Care provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with a project is avoided, stopped or minimised. 	<ul style="list-style-type: none"> » Eastern Cape DEDEAT 	<ul style="list-style-type: none"> » While no permitting or licensing requirements arise directly, the holistic consideration of the potential impacts of the proposed project has found application in the BA process. » The implementation of mitigation measures are included as part of the Draft EMP and will continue to apply throughout the life cycle of the project.
National Environmental Management: Biodiversity Act (Act No. 10 of 2004)	<ul style="list-style-type: none"> » In terms of the Biodiversity Act, the developer has a responsibility for: <ul style="list-style-type: none"> * The conservation of endangered ecosystems and restriction of activities according to the categorisation of the area (not just by listed activity as specified in the EIA regulations). * The application of appropriate environmental management tools to ensure integrated environmental management of activities. 	<ul style="list-style-type: none"> » Eastern Cape DEDEAT 	<ul style="list-style-type: none"> » As the applicant will not carry on any restricted activity in terms of S57, no permit is required to be obtained in this regard. » A permit would be required for the protected plant species found on site to be disturbed or destroyed by the proposed development.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<ul style="list-style-type: none"> * Limit further loss of biodiversity and conserve endangered ecosystems. » In terms of S57, a person may not carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 4. In this regard the Minister of Environmental Affairs has published a list of critically endangered, endangered, vulnerable, and protected species in GNR 151 in Government Gazette 29657 of 23 February 2007 and the regulations associated therewith in GNR 152 in GG29657 of 23 February 2007, which came into effect on 1 June 2007. » In terms of S75, (1). The control and eradication of a listed invasive species must be carried out by means of methods that are appropriate for the species concerned and the environment in which it occurs. (2) Any action taken to control and eradicate a listed invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment. (3) The methods employed to control and eradicate a listed invasive species 		

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>must also be directed at the offspring, propagating material and re-growth of such invasive species in order to prevent such species from producing offspring, forming seed, regenerating, or re-establishing itself in any manner.</p> <ul style="list-style-type: none"> » In terms of GNR 152 of 23 February 2007: regulations relating to listed threatened and protected species, the relevant specialists must be employed during the EIA Phase to incorporate the legal provisions as well as the regulations associated with listed threatened and protected species (GNR 152) into specialist reports in order to identify permitting requirements. » In terms of GNR 1477 of 2009: Draft National List of Threatened Ecosystems published under S52(1)(a) of the Act provides for the listing of threatened or protected ecosystems based on national criteria. The list of threatened terrestrial ecosystems supersedes the information regarding terrestrial ecosystem status in the National Spatial Biodiversity Assessment (2004). » GNR1187 Amendment of Critically Endangered, Endangered, Vulnerable 		

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	and Protected Species List published under S56(1) of the Act.		
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)	<ul style="list-style-type: none"> » The Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. » In terms of the regulations published in terms of this Act (GN 922, 29 November 2013), a Basic Assessment or Environmental Impact Assessment is required to be undertaken for identified listed activities. » Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that <ul style="list-style-type: none"> (a) The containers in which any waste is stored, are intact and not corroded or in any other way rendered unfit for the safe storage of waste; (b) Adequate measures are taken to prevent accidental spillage or leaking; (c) The waste cannot be blown away; (d) Nuisances such as odour, visual impacts and breeding of vectors do not arise; and (e) Pollution of the environment and harm to health are prevented. 	<ul style="list-style-type: none"> » Eastern Cape DEDEAT – general waste » DEA – hazardous waste 	<ul style="list-style-type: none"> » As no waste disposal site is to be associated with the proposed project, no permit is required in this regard. » Waste handling, storage and disposal during construction and operation is required to be undertaken in accordance with the requirements of this Act, as detailed in the EMP. » The volumes of waste to be generated and stored on the site during construction and operation of the power line will not require a waste license (provided these remain below the prescribed thresholds).
National Environmental Management: Air Quality	<ul style="list-style-type: none"> » S18, S19 and S20 of the Act allow certain areas to be declared and 	<ul style="list-style-type: none"> » Eastern Cape DEDEAT 	<ul style="list-style-type: none"> » While no permitting or licensing requirements arise from this legislation,

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
Act (Act No. 39 of 2004)	<p>managed as "priority areas"</p> <ul style="list-style-type: none"> » Declaration of controlled emitters (Part 3 of Act) and controlled fuels (Part 4 of Act) with relevant emission standards » The Act provides that an air quality officer may require any person to submit an atmospheric impact report if there is reasonable suspicion that the person has failed to comply with the Act. 		<p>this Act will find application during the construction phase of the project.</p>
National Water Act (Act No. 36 of 1998)	<ul style="list-style-type: none"> » Under S21 of the act, water uses must be licensed unless such water use falls into one of the categories listed in S22 of the Act or falls under the general authorisation. » In terms of S19, the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to prevent and remedy the effects of pollution to water resources from occurring, continuing, or recurring. 	<ul style="list-style-type: none"> » Eastern Cape Department of Water Affairs 	<ul style="list-style-type: none"> » A general permitting or licensing is a requirements from this legislation for river and wetland crossings. However, if the wetlands and rivers can be avoided or spanned by the proposed power line no licence will be needed.
Environment Conservation Act (Act No. 73 of 1989)	<ul style="list-style-type: none"> » National Noise Control Regulations (GN R154 dated 10 January 1992) 	<ul style="list-style-type: none"> » Eastern Cape DEDEAT » Blue Crane Local Municipality 	<ul style="list-style-type: none"> » There is no requirement for a noise permit in terms of the legislation. » Any noisy activities carried out during the construction phase that could present an intrusion impact to the local community should be limited to 6:00am to 6:00pm Monday – Saturday (excluding public holidays).

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
			<ul style="list-style-type: none"> » Should these specific activities need to be undertaken outside of these times, the surrounding communities will need to be notified and appropriate approval will be obtained from the DEDEAT and the Local Municipality.
Minerals and Petroleum Resources Development Act (Act No. 28 of 2002)	<ul style="list-style-type: none"> » A mining permit or mining right may be required where a mineral in question is to be mined (i.e. materials from a borrow pit) in accordance with the provisions of the Act. » Requirements for Environmental Management Programmes and Environmental Management Plans are set out in S39 of the Act. » Section 53? 53 Use of land surface rights contrary to objects of Act (1) Subject to subsection (2), any person who intends to use the surface of any land in any way which may be contrary to any object of this Act or which is likely to impede any such object must apply to the Minister for approval in the prescribed manner. 	<ul style="list-style-type: none"> » Department of mineral Resources 	<ul style="list-style-type: none"> » There is a borrow pit on site that has been authorised.
National Heritage Resources Act (Act No. 25 of 1999)	<ul style="list-style-type: none"> » S38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including <ul style="list-style-type: none"> » The construction of a road, power line, pipeline, canal or other similar linear development or barrier exceeding 300 m in 	<ul style="list-style-type: none"> » South African Heritage Resources Agency 	<ul style="list-style-type: none"> » A permit may be required should heritage sites be unearthed on site during the construction phase.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>length;</p> <ul style="list-style-type: none"> » Any development or other activity which will change the character of a site exceeding 5 000 m² in extent » The relevant Heritage Authority must be notified of developments such as linear developments (i.e. roads and power lines), bridges exceeding 50 m, or any development or other activity which will change the character of a site exceeding 5 000 m²; or the rezoning of a site exceeding 10 000 m² in extent. This notification must be provided in the early stages of initiating that development, and details regarding the location, nature and extent of the proposed development must be provided. » Stand alone HIAs are not required where an EIA is carried out as long as the EIA contains an adequate HIA component that fulfils the provisions of S38. In such cases only those components not addressed by the EIA should be covered by the heritage component. 		
<p>National Forests Act (Act No. 84 of 1998)</p>	<ul style="list-style-type: none"> » In terms of S5(1) no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, 	<ul style="list-style-type: none"> » Department of Agriculture, Forestry and Fisheries 	<ul style="list-style-type: none"> » A permit would need to be obtained for any protected trees that are affected, although none are likely to occur on site.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>sell donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a license granted by the Minister to an (applicant and subject to such period and conditions as may be stipulated".</p> <p>» GN 1042 provides a list of protected tree species.</p>		
National Veld and Forest Fire Act (Act 101 of 1998)	<p>In terms of Section 12 the applicant would be obliged to prepare and maintain firebreaks to ensure that should a veld fire occur on the property, that it does not spread to adjoining land.</p> <p>In terms of section 13 the applicant must ensure that the firebreak is wide and long enough to have a reasonable chance of preventing the fire from spreading, not causing erosion, and is reasonably free of inflammable material.</p> <p>» In terms of section 17, the applicant must have such equipment, protective clothing and trained personnel for extinguishing fires..</p>	» Department of Agriculture, Forestry and Fisheries	» While no permitting or licensing requirements arise from this legislation, this act will find application during the operational phase of the project in terms of fire prevention and management.
Hazardous Substances Act (Act No. 15 of 1973)	» This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising, or inflammable nature or the	» Department of Health	» It is necessary to identify and list all the Group I, II, III, and IV hazardous substances that may be on the site and in what operational context they are used, stored or handled.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products.</p> <ul style="list-style-type: none"> » Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared to be Group I or Group II hazardous substance; » Group IV: any electronic product; » Group V: any radioactive material. » The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force. 		
Provincial Legislation			
<p>Nature Conservation Ordinance (Act No. 19 of 1974)</p>	<ul style="list-style-type: none"> » Article 63 prohibits the picking of certain fauna (including cutting, chopping, taking, and gathering, uprooting, damaging, or destroying). 	<ul style="list-style-type: none"> » Eastern Cape DEDEAT 	<ul style="list-style-type: none"> » Permitting or licensing requirements may arise from this legislation for the proposed activities to be undertaken for the proposed project.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<ul style="list-style-type: none">» Schedule 3 lists endangered flora and Schedule 4 lists protected flora.» Articles 26 to 47 regulate the use of wild animals.		

PURPOSE & OBJECTIVES OF THE EMPR

CHAPTER 3

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

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

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

The EMPr has the following 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 impacts, and to manage environmental impacts associated with the watercourse crossings.

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

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

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

ACED Cookhouse South Wind Farm (Pty) Ltd (in the process of being changed to Nojoli Wind Farm (RF) Pty Ltd) must ensure that the implementation of the project complies with the requirements of any and all environmental authorisations and any other permits (once issued), and obligations emanating from other relevant environmental legislation. This obligation is partly met through the development of the EMPr, and the implementation of the EMPr through its integration into the contract documentation for activities associated with both construction and operation. Since this EMPr is part of the EIA process undertaken for the proposed watercourse crossings, it is important that this guideline document be read in conjunction with the draft Basic Assessment Report. Furthermore, this EMP must be read together with that for the WEF and that generic specifications in the WEF EMPr should be considered relevant to this activity too. This will contextualise the EMPr and enable a thorough understanding of its role and purpose in the integrated environmental process.

This EMPr for construction and operation activities has been compiled in accordance with the EIA Regulations of June 2010 and will be further developed in terms of specific requirements listed in any authorisations issued for the proposed project. This EMPr should be considered a dynamic document, requiring regular review and updating as new information becomes available in order for it to remain relevant to the requirements of the site and the environment.

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

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

STRUCTURE OF THIS EMPr

CHAPTER 4

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

- » Pre-construction (planning and design) activities
- » Construction activities
- » Operation activities
- » Decommissioning activities

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

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

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

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

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

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

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

4.1. Project Team

This draft EMPr was compiled by:

EMPr Compilers	
Lusani Rathanya	Savannah Environmental
Karen Jodas	Savannah Environmental
Brian Colloty	Scherman Colloty & Associates

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

MANAGEMENT PLAN FOR PRE-CONSTRUCTION

CHAPTER 5

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

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

In order to meet this goal, the following objectives have been identified, together with necessary actions and monitoring requirements. As previously stated, this EMPr should be read together with the EMPr prepared for the Nojoli Wind farm. **Specifications not specific to the watercourse crossings structures, i.e. access roads, culverts and power lines, are not repeated within this document.**

5.1. Objectives

(MPPC 1) OBJECTIVE: To ensure that the planning and design of the watercourse crossings responds to the identified environmental constraints and opportunities

Project component/s	<ul style="list-style-type: none"> » power line » watercourse crossings, i.e. access roads and culverts » All other infrastructure
Potential Impact	<ul style="list-style-type: none"> » Design fails to respond optimally to the environmental consideration
Activities/risk sources	<ul style="list-style-type: none"> » Access road upgrade across watercourses
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure that the design of the watercourse crossings responds to the identified environmental constraints and opportunities » To ensure selection of best environmental option for design of infrastructure. » To undertake pre-construction activities in accordance with all relevant legislative requirements.

Mitigation: Action/control	Responsibility	Timeframe
Plan and conduct pre-construction activities in an environmentally acceptable manner	Project Company and Contractor	Design phase
Structures within the watercourse should be kept to a minimum	Project Company and Contractor	Design phase
The watercourse crossings should not trap any run-off, thereby creating inundated areas, but allow for free flowing systems	Contractor	Design phase
Include stormwater management systems along the roads that would reduce flow velocities. These energy dissipation structures should be placed in a manner that flows are managed prior to being discharged back into the natural systems, thus not only preventing erosion, but would support the maintenance of natural base flows within these systems, i.e. hydrological regime (water quantity and quality) is maintained.	Contractor	Design phase
A detailed geotechnical investigation is required for the design phase.	Contractor	Design phase
A permit must be obtained for removal or cutting of any protected trees found on site prior to the commencement of construction.	Project Company	Design phase
Water use license to be obtained for watercourse crossings prior to the commencement of construction.	Project Company	Pre-construction

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

(MPPC 2) OBJECTIVE: To ensure effective communication mechanisms

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

Project component/s	<ul style="list-style-type: none"> » power line » watercourse crossings, i.e. access roads and culverts » All other 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 construction of watercourse crossings
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Effective communication with affected and surrounding landowners » Addressing of any issues and concerns raised as far as possible in as short a timeframe as possible

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

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

(MPPC 3) OBJECTIVE: Search and Rescue of all Translocatable Indigenous Plants

Prior to any earthworks (including road construction) within areas of natural vegetation, a plant Search and Rescue program should be developed and implemented. Principles for the Search and Rescue program are included in **Appendix B**. The section below provides a guideline for the Search & Rescue Plan on site and will need to be supplemented with the relevant methodology depending on the final placement of infrastructure.

Project Component/s	<ul style="list-style-type: none"> » power line » watercourse crossings, i.e. access roads and culverts » All other infrastructure
Potential Impact	<ul style="list-style-type: none"> » Substantially increased loss of natural vegetation at construction phase and waste of on-site plant resources, and lack of locally sourced material for rehabilitation of disturbed areas. » Increased cost of having to buy in material for rehabilitation.
Activities/Risk Sources	<ul style="list-style-type: none"> » Construction related loss and damage to remaining natural vegetation via heavy machinery, etc.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Rescue, maintenance and subsequent replanting of at least 40% of the natural vegetation in all development footprints within any areas of natural vegetation on site

Mitigation: Action/Control	Responsibility	Timeframe
Search and Rescue (S&R) of certain translocatable, selected plants occurring in long term and permanent, hard surface development footprints should take place. All such development footprints must be surveyed and pegged out as soon as possible, and then suitably qualified specialist with Search and Rescue experience should be appointed to undertake the S&R. All rescued species should be translocate to a suitable habitat or removed to a suitably maintained nursery.	Contractor	Prior to construction
Compile a site rehabilitation plan for implementation.	Contractor	Prior to construction

Performance Indicator	<ul style="list-style-type: none"> » No disturbance outside of designated work areas. » Minimised clearing of existing/natural vegetation. » Limited impacts on areas of identified and demarcated sensitive habitats/vegetation.
Monitoring	<ul style="list-style-type: none"> » Observation of vegetation clearing activities by ECO throughout construction phase. » Monitoring of vegetation clearing activities in terms of permit conditions. » Supervision of clearing and earthworks as far as possible or practical. » An incident reporting system will be used to record non-conformances to the EMPr.

MANAGEMENT PLAN FOR CONSTRUCTION

CHAPTER 6

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

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

6.1. Institutional Arrangements: Roles and Responsibilities for Construction

As the Proponent, ACED Cookhouse South Wind Farm (Pty) Ltd (in the process of being changed to Nojoli Wind Farm (RF) Pty Ltd) must ensure that the implementation of the Nojoli Wind Farm complies with the requirements of any and all environmental authorisations and permits, and obligations emanating from other relevant environmental legislation. While the proponent has a duty of care in this regard, the Contractor will be held directly responsible for all of these permits. These obligation is partly met through the development of the EMPr, and the implementation of the EMPr through its integration into the contract documentation. ACED Cookhouse South Wind Farm (Pty) Ltd (in the process of being changed to Nojoli Wind Farm (RF) Pty Ltd) will retain various key roles and responsibilities during construction. These are outlined within the EMPr compiled for the Nojoli Wind Farm and are also applicable for the watercourse crossings.

6.2. Objectives

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

(MPC 1) OBJECTIVE: Soil erosion control, water quality management

The natural soil on the site needs to be preserved as far as possible in order to minimise impacts on the environment. Soil degradation including erosion (by wind and water) and subsequent deposition elsewhere is of a concern in areas underlain by fine grained soil which can be mobilised when disturbed, even on relatively low slope gradients

(accelerated erosion). Uncontrolled run-off relating to construction activity will also lead to accelerated erosion. Degradation of the natural soil profile due to excavation, stockpiling, compaction, pollution and other construction activities will affect soil forming processes and associated ecosystems. A set of strictly adhered to mitigation measures are required to be implemented in order to effectively limit the impact on the environment as outline below.

Project component/s	<ul style="list-style-type: none"> » power line » watercourse crossings, i.e. access roads and culverts » All other infrastructure
Potential Impact	<ul style="list-style-type: none"> » Erosion and soil loss into watercourses » Negative impacts on watercourses » Disturbance to or loss of watercourses » Sedimentation of watercourse areas » A loss of indigenous vegetation cover, particularly in watercourse areas » Increased runoff into drainage lines can potentially be associated with accelerated erosion in watercourses
Activities/risk sources	<ul style="list-style-type: none"> » Rainfall and wind erosion of disturbed areas » Excavation, stockpiling and compaction of soil » Concentrated discharge of water from construction activity » Storm water run-off from sealed surfaces » Mobile construction equipment movement on site » Power line construction activities » Drainage line road crossings » Roadside drainage ditches » Project related infrastructure, such as buildings, turbines and fences
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise erosion of soil from site during construction » To minimise deposition of soil into drainage lines » To minimise damage to vegetation by erosion or deposition » To minimise damage to soil and vegetation by construction activity » No accelerated overland flow related surface erosion as a result of a loss of vegetation cover » No reduction in the surface area of drainage lines as a result of the establishment of infrastructure » Minimal loss of vegetation cover due to construction related activities » No increase in runoff into drainage lines as a result of construction of project related infrastructure » No increase in runoff into drainage lines as a result of road construction

Mitigation: Action/control	Responsibility	Timeframe
Identify and demarcate construction areas for general construction work and restrict construction activity to these areas. Prevent unnecessary destructive activity within construction areas (prevent over-excavations and double handling)	Contractor	Before and during construction

Mitigation: Action/control	Responsibility	Timeframe
Stockpile topsoil for re-use in rehabilitation phase. Maintain stockpile shape and protect from erosion. All stockpiles must be positioned at least 50 m away from wetlands and drainage lines. Limit the height of stockpiles as far as possible in order to reduce compaction.	Contractor	During site establishment and any activity related to earthworks as well as the duration of construction
Any excavation, including those for cables, must be supervised by the ECO as far as possible or practical.	Contractor	Duration of construction
Disturbance of vegetation and topsoil must be kept to a practical minimum.	Contractor	Duration of contract
Rehabilitate disturbance areas as soon as construction in an area is completed.	Contractor	During and after construction
Control depth of excavations and stability of cut faces/sidewalls.	Contractor	maintenance over duration of contract
Compile a comprehensive storm water management plan as part of the final design of the project and implement during construction and operation.	Contractor	Construction & operation

Performance Indicator	<ul style="list-style-type: none"> » No activity in identified no-go areas » Acceptable level of activity within disturbance areas, as determined by ECO » Acceptable level of soil erosion around site, as determined by ECO » Acceptable level of increased siltation in drainage lines, as determined by ECO » Acceptable level of soil degradation, as determined by ECO » Acceptable state of excavations, as determined by Resident Engineer & ECO
Monitoring	<ul style="list-style-type: none"> » Fortnightly inspections of the site by ECO » Fortnightly inspections of sediment control devices by ECO » Fortnightly inspections of surroundings, including drainage lines by ECO » Immediate reporting of ineffective sediment control systems » An incident reporting system must record non-conformances to the EMP/IWWMP. » Public complaints register must be developed and maintained on site.

(MPC 2) OBJECTIVE: Limit Damage to watercourses and wetland

Construction within wetlands has been minimised as far as possible and the proposed infrastructure will impact upon non perennial drainage lines only (refer to Figure 2 below). Where impacts are unavoidable, mitigation measures are required to minimise impacts on these systems.

Project component/s	<ul style="list-style-type: none"> » power line » watercourse crossings, i.e. access roads and culverts » All other infrastructure
Potential Impact	» Damage to water course areas by any means that will result in hydrological changes (includes erosion, siltation, dust, direct removal of soil of vegetation, dumping of material).
Activity/risk source	<ul style="list-style-type: none"> » Construction and operation of facility » Construction of access roads
Mitigation: Target/Objective	Minimise damage to watercourse areas where crossings are built or upgraded.

Mitigation: Action/control	Responsibility	Timeframe
Align underground cables and internal access roads as far as possible along existing infrastructure & disturbances.	Contractor, ECO	Construction & Operation
Rehabilitate any disturbed areas as soon as possible once construction is completed in an area.	Contractor, ECO	Construction & Operation
Control storm water and runoff water through the implementation of a storm water management plan for the site.	Contractor, ECO	Construction & Operation
Obtain a permit as required in terms of the National Water Act from DWA to impact on any water resource.	Project company, Contractor, ECO	Construction & Operation

Performance Indicator	» No impacts on water quality, water quantity, natural status of watercourses.
Monitoring	<ul style="list-style-type: none"> » Habitat loss in watercourses should be monitored before and after construction. » The presence and development of erosion features downstream of any construction must be monitored. » The ECO should be responsible for driving this process with the contractor as needed. » An incident reporting system must be used to record non-conformances to the EMP/IWWMP. » Public complaints register must be developed and maintained on site.

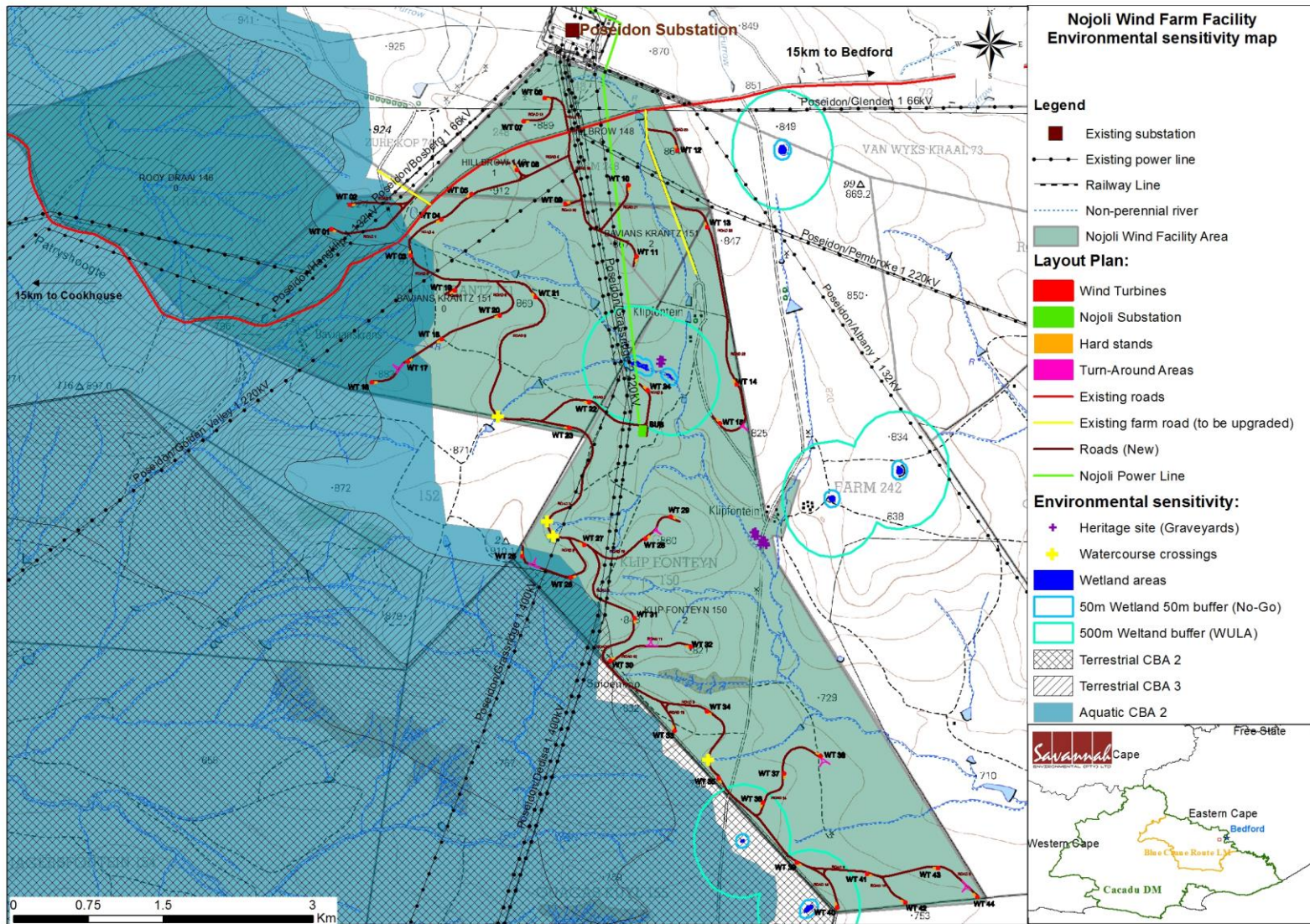


Figure 2: Environmental Sensitivity map for the proposed activities within the authorised Nojoli Wind Farm

(MPC 3)OBJECTIVE: Appropriate handling and storage of chemicals, hazardous substances and waste

The construction phase of the wind energy facility may involve the storage and handling of a variety of chemicals including adhesives, abrasives, oils and lubricants, paints and solvents although in small amounts. The main wastes expected to be generated by the construction of the watercourse crossings will include **general solid waste, hazardous waste and liquid waste.**

Project component/s	<ul style="list-style-type: none"> » power line » watercourse crossings, i.e. access roads and culverts » All other infrastructure
Potential Impact	<p>The watercourse areas could be impacted via:</p> <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 » Litter or contamination of the site or water through poor waste management practices
Activity/risk source	<ul style="list-style-type: none"> » Vehicles associated with site preparation and earthworks » Power line construction activities » Packaging and other construction wastes » Hydrocarbon use and storage » 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 on-site does not cause pollution of the environment or harm to persons » To comply with waste management legislation » To minimise production of waste » To ensure appropriate waste storage and disposal » To avoid environmental harm from waste disposal

Mitigation: Action/control	Responsibility	Timeframe
Storage areas must be located more than 50 m away from the watercourse.	Contractor	Before and during construction
The storage of flammable and combustible liquids such as oils must be in designated areas which are appropriately banded, and stored in compliance with MSDS files, as defined by the SHE Representative / ECO.	Contractor	Duration of contract
Any spills must receive the necessary clean-up action. If required, bioremediation kits are to be kept on-site and used to remediate any spills that may occur.	Contractor	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
Appropriate arrangements to be made for appropriate collection and disposal of all cleaning materials, absorbents and contaminated soils (in accordance with a waste management plan).		
Any storage and disposal permits/approvals which may be required will be obtained, and the conditions attached to such permits and approvals must be complied with.	Contractor	Duration of contract
Routine servicing and maintenance of vehicles is not to take place on-site (except for emergency situations or large cranes which cannot be moved off-site). If repairs of vehicles must take place on site, an appropriate drip tray must be used to contain any fuel or oils.	Contractor	Duration of contract
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations.	Contractor	Duration of contract
Waste disposal records must be available for review at any time.	Contractor	Duration of contract
Construction contractors must provide specific detailed waste management plans to deal with all waste streams.	Contractor	Duration of contract
Specific areas must be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste (wood and metal scrap) and contaminated waste. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage and vermin control.	Contractor	Duration of contract
Where possible, construction and general wastes on-site must be reused or recycled. Bins and skips must be available on-site for collection, separation and storage of waste streams (such as wood, metals, general refuse etc.).	Contractor	Duration of contract
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Contractor	Duration of contract
Hydrocarbon waste must be contained and stored in sealed containers within an appropriately bunded area.	Contractor	Duration of contract
Waste and surplus dangerous goods must be kept to a minimum and must be transported by approved waste transporters to sites designated for their disposal.	Contractor	Duration of contract
Documentation (waste manifest) must be maintained detailing the quantity, nature and fate of any hazardous waste.	Contractor	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
An incident/complaints register must be established and maintained on-site.	Contractor	Duration of contract
Hazardous and non-hazardous waste must be separated at source. Separate waste collection bins must be provided for this purpose. These bins must be clearly marked and appropriately covered.	Contractors	Erection: during site establishment Maintenance: for duration of Contract within a particular area
All solid waste collected must be disposed of at a registered waste disposal site. A certificate of disposal must be obtained and kept on file. The disposal of waste must be in accordance with all relevant legislation. Under no circumstances may solid waste be burnt or buried on site.	Contractors	Erection: during site establishment Maintenance: for duration of Contract within a particular area
Supply waste collection bins at construction equipment and construction crew camps.	Contractors	Erection: during site establishment Maintenance: for duration of Contract within a particular area
Construction equipment must be refuelled within designated refuelling locations, or where remote refuelling is required, appropriate drip trays must be utilised.	ECO/Contractor	Duration of contract
All stored fuels to be maintained within a bund and on a sealed surface.	Contractor	Duration of contract
Fuel storage areas must be inspected regularly to ensure bund stability, integrity and function.	Contractor	Duration of contract
Construction machinery must be stored in an appropriately sealed area.	Contractor	Duration of contract
Oily water from bunds at the substation must be removed from site by licensed contractors.	Contractor	Duration of contract
Spilled cement or concrete must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site.	Contractor	Duration of contract
Corrective action must be undertaken immediately if a complaint is received, 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

Mitigation: Action/control	Responsibility	Timeframe
Any contaminated/polluted soil removed from the site must be disposed of at a licensed hazardous waste disposal facility.	Contractor	Duration of contract
Upon the completion of construction, the area will 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 » No water or soil contamination by chemical spills » No complaints received regarding waste on site or indiscriminate dumping » Internal site audits ensuring that waste segregation, recycling and reuse is occurring appropriately » Provision of all appropriate waste manifests for all waste streams » Designated areas for fires identified on site at the outset of the construction phase » Firefighting equipment and training provided before the construction phase commences
Monitoring	<ul style="list-style-type: none"> » Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase » A complaints register must be maintained, in which any complaints from the community will be logged. Complaints must be investigated and, if appropriate, acted upon » Observation and supervision of waste management practices throughout construction phase » Waste collection to be monitored on a regular basis » Waste documentation completed » An incident reporting system must be used to record non-conformances to the EMP/IWWMP » An appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase. » Public complaints register must be developed and maintained on site.

6.3. Detailing Method Statements

(MPC 4) OBJECTIVE: Ensure all construction activities are undertaken with the appropriate level of environmental awareness to minimise environmental risk

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

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

- » Details of the responsible person/s
- » Construction procedures
- » Materials and equipment to be used
- » Getting the equipment to and from site
- » How the equipment/material will be moved while on-site
- » How and where material will be stored
- » The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur
- » Timing and location of activities
- » Compliance/non-compliance with the Specifications, and
- » Any other information deemed necessary by the Site Manager.

Method Statements must be compiled for all activities which affect any aspect of the environment and should be applied consistently to all activities. The Contractor may not commence the activity covered by the Method Statement until it has been approved by the Site Manager, except in the case of emergency activities and then only with the consent of the Site Manager. Approval of the Method Statement will not absolve the Contractor from their obligations or responsibilities in terms of their contract.

Failure to submit a method statement may result in suspension of the activity concerned until such time as a method statement has been submitted and approved. The ECO

should monitor the construction activities to ensure that these are undertaken in accordance with the approved Method Statement.

6.4. Awareness and Competence

(MPC 5) OBJECTIVE: To ensure all construction personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm

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

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

- » Training should be done either in a written or verbal format but must be in an appropriate format for the receiving audience.
- » Refresher sessions must be held to ensure the contractor staffs is aware of its environmental obligations as practically possible.

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

6.4.1. Environmental Awareness Training

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

6.4.2. Induction Training

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

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

6.4.3. Toolbox Talks

Toolbox talks should be held on a scheduled and regular basis (at least twice a month) where foremen, environmental and safety representatives of different components of the Works and sub-consultants hold talks relating to environmental practices and safety awareness on site. These talks should also include discussions on possible common incidents occurring on site and the prevention of reoccurrence thereof. Records of attendance and the awareness talk subject must be kept on file.

6.5. Monitoring Programme

(MPC 6) OBJECTIVE: To monitor the performance of the control strategies employed against environmental objectives and standards

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

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

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

6.5.1. Non-Conformance Reports

All supervisory staff 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 and must be submitted to DEA for their records as deemed practical or with the Final Audit Report. This report should include details of the activities undertaken in the reporting period, any non-conformances or incidents recorded, corrective action required, and details of those non-conformances or incidents which have been closed out.

6.5.3. Final Audit Report

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

MANAGEMENT PLAN FOR REHABILITATION OF DISTURBED AREAS

CHAPTER 7

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

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

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

(MPR 1) OBJECTIVE: To ensure rehabilitation of disturbed areas

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

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

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

Mitigation: Action/control	Responsibility	Timeframe
		activities in an area
Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved.	Contractor and Project Company in consultation with rehabilitation specialist	Post-rehabilitation
On-going alien plant monitoring and removal should be undertaken on all areas of natural vegetation on an annual basis.	Contractor and Project Company in consultation with rehabilitation specialist	Post-rehabilitation

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

MANAGEMENT PLAN FOR OPERATION

CHAPTER 8

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

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

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

8.2. Objectives

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

(MPO 1) OBJECTIVE: Minimise soil degradation and erosion

Project component/s	<ul style="list-style-type: none"> » power line » watercourse crossings, i.e. access roads and culverts » All other infrastructure
Potential Impact	<ul style="list-style-type: none"> » Soil degradation and erosion. » Increased deposition of soil into drainage systems. » Increased run-off over the site.
Activity/Risk Source	<ul style="list-style-type: none"> » Poor rehabilitation and/or revegetation of cleared areas. » Rainfall - water erosion of disturbed areas. » Wind erosion of disturbed areas. » Concentrated discharge of water from construction activity.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Ensure rehabilitation of disturbed areas is maintained. » Minimise soil degradation (i.e. wetting). » Minimise soil erosion and deposition of soil into drainage lines. » Ensure continued stability of embankments/excavations.

Mitigation: Action/Control	Responsibility	Timeframe
Implement stormwater management and erosion control plan.	Contractor	Operation
The watercourse crossings should not trap any run-off, thereby creating inundated areas, but allow for free flowing systems	Contractor	Operation

Performance Indicator	» Minimal levels of soil erosion around site. » Minimal levels of increased siltation in drainage lines.
Monitoring	» Inspections of site on a bi-annual basis.

(MPO 2) OBJECTIVE: Limit Damage to watercourses and wetlands

Project component/s	» power line » watercourse crossings, i.e. access roads and culverts » All other infrastructure
Potential Impact	» Damage to water course areas by any means that will result in hydrological changes (includes erosion, siltation, dust, direct removal of soil of vegetation, dumping of material).
Activity/risk source	» Construction and operation of facility » Construction of access roads
Mitigation: Target/Objective	» Minimise damage to watercourse areas where crossings are built or upgraded.

Mitigation: Action/control	Responsibility	Timeframe
Align underground cables and internal access roads as far as possible along existing infrastructure & disturbances.	Contractor, ECO	Operation
Rehabilitate any disturbed areas as soon as possible once construction is completed in an area.	Contractor, ECO	Operation
Control storm water and runoff water through the implementation of a storm water management plan for the site.	Contractor, ECO	Operation
Obtain a permit as required in terms of the National Water Act from DWA to impact on any water resource.	Project company, Contractor, ECO	Operation

Performance Indicator	» No impacts on water quality, water quantity, natural status of watercourses.
Monitoring	<ul style="list-style-type: none"> » Habitat loss in watercourses should be monitored before and after construction. » The presence and development of erosion features downstream of any construction must be monitored. » The ECO should be responsible for driving this process with the Contractor as needed. » An incident reporting system must be used to record non-conformances to the EMP/IWWMP. » Public complaints register must be developed and maintained on site.

(MPO 3) OBJECTIVE: Protection of vegetation

Indirect impacts on vegetation during operation could result from maintenance activities and the movement of people and vehicles on site.

Project component/s	» Watercourse crossings
Potential Impact	» Disturbance to or loss of vegetation and/or habitat
Activity/risk source	<ul style="list-style-type: none"> » Movement of employee vehicles within and around site » Disturbed areas
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To maintain minimised footprints of disturbance of vegetation/habitats on-site » To ensure and encourage plant regrowth in areas of post-construction rehabilitation

Mitigation: Action/control	Responsibility	Timeframe
Vehicle movements must be restricted to designated roadways	Contractor and Project Company	Operation
An on-going alien plant monitoring and eradication programme must be implemented, where necessary.	Contractor and Project Company	Operation
An independent environmental manager should be appointed during operation whose duty it will be to minimise impacts on surrounding sensitive habitats	Contractor and Project Company	Operation
A botanist familiar with the vegetation of the area should monitor the rehabilitation success and alien plant removal on an annual basis, for the first 5 years of the operational phase, or until deemed unnecessary by the botanist,	Contractor and Project Company and Specialist	Annual monitoring until successful re-establishment

			of vegetation in an area
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Performance Indicator	<ul style="list-style-type: none"> » No further disturbance to vegetation » Continued improvement of rehabilitation efforts » No colonisation of the site by alien vegetation
Monitoring	<ul style="list-style-type: none"> » Observation of vegetation on-site by Site Manager and environmental manager » Regular inspections to monitor plant regrowth/performance of rehabilitation efforts and weed infestation compared to natural/undisturbed areas » If necessary, an on-going alien plant monitoring and removal should be undertaken on an annual basis , for the first 5 years of the operational phase, or until deemed unnecessary by a suitably qualified botanist

MANAGEMENT PLAN FOR DECOMMISSIONING

CHAPTER 9

It is considered unlikely that the proposed activities (roads and culverts) would be decommissioned after the economic life of the wind farm, as the existing farming activities will continue these may be utilised. However, should the activity ever cease or become redundant, the applicant shall be required to undertake the required actions as prescribed by legislation at the time and comply with all relevant legal requirements administered at any relevant and competent authority at that time.

FINALISATION OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

CHAPTER 10

The EMPr is a dynamic document, which must be updated when required. It is considered critical that this draft EMPr be updated to include site-specific information and specifications following the final walk-through survey by specialists of the power line, and development site. This will ensure that the construction and operation activities are planned and implemented taking sensitive environmental features into account.

**APPENDIX A:
GRIEVANCE MECHANISM FOR PUBLIC COMPLAINTS
AND ISSUES**

GRIEVANCE MECHANISM / PROCESS

AIM

The aim of the grievance mechanism is to ensure that grievances / concerns raised by local landowners and or communities are addressed in a manner that is:

- » Fair and equitable;
- » Open and transparent;
- » Accountable and efficient.

1 It should be noted that the grievance mechanism does not replace the right of an individual, community, group or organization to take legal action should they so wish. However, the aim should be to address grievances in a manner that does not require a potentially costly and time consuming legal process.

Proposed generic grievance process

- » Local landowners, communities and authorities will be informed in writing by the proponent (the renewable energy company) of the grievance mechanism and the process by which grievances can be brought to the attention of the proponent.
- » A company representative will be appointed as the contact person for grievances to be addressed to. The name and contact details of the contact person will be provided to local landowners, communities and authorities.
- » Project related grievances relating to the construction, operational and or decommissioning phase must be addressed in writing to the contact person. The contact person should assist local landowners and or communities who may lack resources to submit/prepare written grievances.
- » The grievance will be registered with the contact person who, within 2 working days of receipt of the grievance, will contact the Complainant to discuss the grievance and agree on suitable date and venue for a meeting. Unless otherwise agreed, the meeting will be held within 2 weeks of receipt of the grievance.
- » The contact person will draft a letter to be sent to the Complainant acknowledging receipt of the grievance, the name and contact details of Complainant, the nature of the grievance, the date that the grievance was raised, and the date and venue for the meeting.
- » Prior to the meeting being held the contact person will contact the Complainant to discuss and agree on who should attend the meeting. The people who will be required to attend the meeting will depend on the nature of the grievance. While the Complainant and or proponent are entitled to invite their legal representatives to attend the meeting/s, it should be made clear that to all the parties involved in the process that the grievance mechanism process is not a legal process. It is therefore recommended that the involvement of legal representatives be limited.

- » The meeting will be chaired by the company representative appointed to address grievances. The proponent will provide a person to take minutes of and record the meeting/s. The costs associated with hiring venues will be covered by the proponent. The proponent will also cover travel costs incurred by the Complainant, specifically in the case of local, resource poor communities.
- » Draft copies of the minutes will be made available to the Complainant and the proponent within 4 working days of the meeting being held. Unless otherwise agreed, comments on the Draft Minutes must be forwarded to the company representative appointed to manage the grievance mechanism within 4 working days of receipt of the draft minutes.
- » In the event of the grievance being resolved to the satisfaction of all the parties concerned, the outcome will be recorded and signed off by the relevant parties. The record should provide details of the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.
- » In the event of a dispute between the Complainant and the proponent regarding the grievance, the option of appointing an independent mediator to assist with resolving the issue should be discussed. The record of the meeting/s will note that a dispute has arisen and that the grievance has not been resolved to the satisfaction of all the parties concerned;
- » In the event that the parties agree to appoint a mediator, the proponent will be required to identify three (3) mediators and forward the names and CVs to the Complainant within 2 weeks of the dispute being declared. The Complainant, in consultation with the proponent, will identify the preferred mediator and agree on a date for the next meeting. The cost of the mediator will be borne by the proponent. The proponent will provide a person to take minutes of and record the meeting/s.
- » In the event of the grievance, with the assistance of the mediator, being resolved to the satisfaction of all the parties concerned, the outcome will be recorded and signed off by the relevant parties, including the mediator. The record should provide details on the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.
- » In the event of the dispute not being resolved, the mediator will prepare a draft report that summarises the nature of the grievance and the dispute. The report should include a recommendation by the mediator on the proposed way forward with regard to the addressing the grievance.
- » The draft report will be made available to the Complainant and the proponent for comment before being finalised and signed by all parties. Unless otherwise agreed, comments on the draft report must be forwarded to the company representative appointed to manage the grievance mechanism within 4 working days.

The way forward will be informed by the recommendations of the mediator and the nature of the grievance. As indicated above, the grievance mechanism does not replace the right of an individual, community, group or organization to take legal action should they so wish. In the event of the grievance not being resolved to the satisfaction of Complainant and or the proponent, either party may be of the opinion that legal action may be the most appropriate option.

**APPENDIX B:
PRINCIPLES FOR PLANT SEARCH AND SEARCH AND
RESCUE, RE-VEGETATION AND REHABILITATION**

METHODS FOR PLANT RESCUE AND HABITAT REHABILITATION

List of Abbreviations

CARA:	Conservation of Agricultural Resources Act 43 of 1983
DEA:	Department of Environmental Affairs
EA:	Environmental Authorisation
ECO:	Environmental Control Officer
EMP:	Environmental Management Plan
NEMA:	National Environmental Management Act 107 of 1998
LFA:	Landscape Functional Analysis (Tongway and Hindley 2004)
IAP:	Invasive Alien Plant

List of Definitions:

Accelerated soil erosion: Soil erosion induced by human activities.

Acceptable cover: An acceptable cover shall mean that not less than 75% (in an area with rainfall above 400 mm per annum), or 40% (in regions receiving less than 400 mm rain per annum), of the area planted or hydroseeded shall be covered with grass and that there shall be no bare patches of more than 500 mm in maximum dimension.

Alien: originating from another country or continent and originally different environment, commonly used to describe plants that are not indigenous to South Africa and have become problematic (spreading rapidly, threatening existing biodiversity).

Allelopathic components: one or more biochemical compound produced by a plant and released through leaf litter or roots that suppresses the growth, survival, and reproduction of other surrounding vegetation.

Bare soil: Un-vegetated soil surface, unaltered by humans.

Compacted soil surface: A soil surface that has been hardened by an outside source, causing the soil to be more compacted than the surrounding area.

Container plants: Container plants include all vegetation which are bought or supplied in acceptable containers from nurseries or vegetation lifted out of their natural position and placed in containers.

Desirable end state: the future condition or target on which the rehabilitation is designed and that will serve later as a basis for rehabilitation success evaluation. This can be based on a reference site or modelled according to available information on historic vegetation.

Ecological rehabilitation: The process of assisting the recovery of a degraded or damaged ecosystem in a trajectory that renders the ecosystem fully functional, stable, and able to develop further, but not necessarily returning to the original historic state.

Ecological restoration: The process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed, in a trajectory that ultimately returns the ecosystem to its natural successional stage.

Ecosystem: The combination of biota within a given area, together with a suitable environment that sustains the biota and the interactions between biota. It can have a spatial unit of any size, but shows some degree of homogeneity as far as structure, function and species composition is concerned. Small-scale ecosystems typically link up to larger scale ecosystems and all contribute to the ecosystem function and services at the landscape-scale.

Environmental Management Plan: an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction and operation, and decommissioning of a project are prevented; and that the positive benefits of the projects are enhanced.

Establishment of grass: All procedures necessary to produce an acceptable cover of grass on an area.

Establishment Period: The Establishment Period is defined as the period beginning from the actual planting or placing of vegetation until three months thereafter, unless otherwise specified or unless grass cover is unacceptable or unless plants have not taken.

Extinction debt: is a concept that describes the future extinction of species due to events in the past. Extinction debt occurs because of time delays between impacts on a species, such as destruction of habitat or reduction of population size, and the species' ultimate disappearance.

Geophytic: resprouting during the growing season from an underground storage organ such as bulbs, corms, tubers or rhizomes, and dying back completely during unfavourable seasons.

Hydroseeding: To apply seed in a slurry with water (plus other materials to enhance growth) by means of a spraying device.

Indigenous: refers to a plant or animal that occurs naturally in the place in which it is currently found.

Invasive plant: a kind of plant which has under section 2 (3) of CARA been declared an invader plant, and includes the seed of such plant and any vegetative part of such plant which reproduces itself asexually.

Landscape: Consists of a mosaic of two or more ecosystems that exchange organisms, energy, water, and nutrients.

Nursery conditions: These are the necessary conditions to maintain healthy growth of rescued and/or container plants. This includes protection of such plants against wind, frost, direct sunlight, pests, rodents, diseases, and drought. It also includes the provision of suitable water, fertilizer and any other measures required to maintain the container plants.

Period of Maintaining: The Period of Maintaining is defined as the period following directly after the Establishment Period until the end of the Period

of Maintenance for the whole Contract as defined in the General Conditions of Contract, unless otherwise specified.

Revegetation: The process of establishing a vegetative cover on exposed soils, regardless of species composition or structure, as long as the species are non-invasive and their presence will not impede the gradual process of ecological rehabilitation or –restoration.

Soil Erosion: is a natural process whereby the ground level is lowered by wind or water action and may occur as a result of inter alia chemical processes and or physical transport on the land surface.

Scarifying: To roughen the surface of soil as a preparation for seeding or topsoil addition.

Trimming: To neatly round off the levels of existing or previously shaped earthworks to blend in with the levels of other earthworks, constructed works, or natural landforms.

Transformation: The conversion of an ecosystem to a different ecosystem or land use type.

Topsoil: uppermost layer of soil, in natural vegetation maximally 30 cm, in cultivated landscapes the total depth of cultivation, containing the layer with humus, seeds and nutrients. Topsoils that are applied to landscapes to be rehabilitated must be free of refuse, large roots and branches, stones, alien weeds and/or any other agents that would adversely affect the topsoils suitability for re-vegetation.

Weed: a plant that grows where it is not wanted, and can therefore be an indigenous or alien species. An unwanted plant growing in a garden is just called a weed, but the 198 listed IAPs are called “declared weeds and invaders”.

1. Purpose

The Plant Rescue and Revegetation Management Plan addresses the need to mitigate all impacts leading to disturbed vegetation, loss of species and/or agricultural potential, disturbed soil surfaces, and generally bare soils prone to erosion and further degradation on the proposed development site. The plan overlaps to some degree with the Storm Water and Erosion Management Plan, and for successful rehabilitation, it is imperative that this plan is at all times used in conjunction with other EMPs mentioned.

The objective of the plan is therefore to provide:

- » Protocols for the removal, temporary storage and replanting of plant species of conservation concern
- » Protocols for the rehabilitation of vegetative cover across the project area
- » Tools for planning the rehabilitation work and responding to unforeseen events
- » Guidelines on implementation and post-implementation tasks
- » Criteria for evaluating rehabilitation success
- » A summary of items to be included in the rehabilitation budget to ensure that there is sufficient allocation of resources on the project budget so that the scale of EMP-related activities is consistent with the significance of project impacts

2. Scope

This document is a plant rescue, rehabilitation, and revegetation plan that provides a guideline to be applied by all contractors on the development site. This plan, as part of the project EMP, is a legally binding document that must be implemented to fulfill the requirements of relevant legislation. However, the management plan is an evolving guideline that needs to be updated or adapted as progress is made with the rehabilitation and revegetation of the project area, and successes and failures of procedures identified.

The objective of rescuing plants, rehabilitation and revegetation on the project area is:

- » Preventing the loss of species either directly or through future extinction and minimising impacts of development on population dynamics of species of conservation concern.
- » Preserving the natural configuration of habitats as part of ecosystems, thus ensuring a diverse but stable hydrology, substrate and general environment for species to be able to become established and persist.
- » Preserving or re-creating the structural integrity of natural plant communities.
- » Actively aid the improvement of indigenous biodiversity according to a desirable end state according to a previously recorded reference state. This reference

state, if healthy, will be dynamic and able to recover after occasional disturbances without returning to a degraded state.

- » Improving the ecosystem function of natural landscapes and their associated vegetation.

3. Legislation and Standards

Relevant legislation:

- » Conservation of Agricultural Resources Act 43 of 1983
- » Environmental Conservation Act 73 of 1989
- » National Forestry Act 84 of 1998
- » National Environmental Management Act 107 of 1998
- » Northern Cape Nature Conservation Act (Act No. 9 of 2009)

4. Effect of clearing alien vegetation

Invasive and Alien Plants (IAPs) gradually displace and suppress indigenous and/or herbaceous vegetation as their stands become bigger and denser. In addition, they use more water, hence desiccate the soil more, and may alter chemical properties of the soil – partially through secondary compounds released from their litter, partially from compounds released from roots. These altered soils suppress the germination and establishment of herbaceous species, leading to bare soil underneath dense IAP canopies.

After clearing dense stands of invasive shrubs, soil surfaces are thus generally bare with topsoil exposed to erosion and often already somewhat capped and eroded.

5. Effect of removing individuals of species of conservation concern

Species of conservation concern are declining either due to overexploitation or because their range of occupancy is limited and further infringed on by development. Most plant populations require a certain minimum number of individuals within a population or metapopulation to allow for sufficient genetic transfer between individuals. This prevents genetic erosion and hence weakening of the ability of individuals to persist in their environments. Similarly, where the distance between metapopulations is significantly increased due to fragmentation and the resultant loss of some populations, populations may suffer genetic decline due to restricted movement of pollen. Pollinators or other species that depend on a particular plant species for a specific microhabitat or food source may be equally affected because of the reduction of available resources. Therefore the aim of plant rescue actions are always to maintain as many individuals of a plant population in as close proximity to the original habitat as possible to minimise loss of individuals and fragmentation of populations to prevent the creation of future extinction debts of the development.

6. General: Plant rescue and protection

Successful plant rescue can only be achieved if:

- » Species can be removed from their original habitat with minimal damage to the plant, especially the roots.
- » All plants removed are safely stored and treated according to their specific requirements prior to being transplanted again.
- » They are relocated into a suitable habitat and protected from further damage and all disturbances to aid their re-establishment.
- » Timing of planting activities is planned with the onset of the growing season.
- » Steps are taken where necessary to aid the initial establishment of vegetation, including occasional watering.

6.1. Time of planting

- » All planting shall be carried out as far as is practicable during the period most likely to produce beneficial results (i.e. during the peak growing season), but as soon as possible after completion of a section of earthworks.
- » Drainage line rehabilitation preparation must be done during autumn, and planting of appropriate species in these areas should commence during early spring after the first rains.

7. General: IAP removal

Removal of invasive plants should at all time follow the specifications and guidelines of the Working for Water Programme (refer also to invasive plant management plan).

Information can be obtained from the relevant website:

<http://www.dwaf.gov.za/wfw>

Detailed information on clearing methods is available on the above websites "Alien Invasive Plants" menu (clearing methods, operational standards and species-specific treatment methods).

8. General: Rehabilitation and re-vegetation

Successful rehabilitation can only be achieved with:

- » A long-term commitment
- » Practical, adaptive management
- » Viable goals of desired outcomes

Prior to vegetation rehabilitation, all stakeholders involved should be consulted to determine:

- » What the rehabilitation is ultimately aiming for– rehabilitation of cropping/grazing lands or rehabilitation of indigenous vegetation, after soil erosion and storm water management is in place and IAPs have been cleared?
- » A clear definition of incompatible and compatible vegetation on and in the immediate surroundings of the development must be defined and maintained as such. No tree or shrubs shall be allowed to grow to a height in excess of the horizontal distance of that tree or shrub from the nearest newly developed structure or to grow in such a manner as to endanger the development or its operation
- » Who will take long-term ownership and hence responsibility for the rehabilitation and its subsequent monitoring and management? Continued monitoring of vegetation establishment and composition, as well as erosion detection will have to be coupled with continued follow-up maintenance of rehabilitation and erosion control from commencement of activity up to the decommissioning phase.

The ultimate objective for rehabilitation should focus on the stabilisation of soil erosion, retaining agricultural potential of transformed areas and /or the establishment of a dense and protective plant cover and the maintenance of habitats to enable vegetation to persist and flourish on rehabilitated areas indefinitely, ultimately relying only on environmental resources.

8.1. Map and create management areas

The entire project area must be mapped and divided into management areas indicating:

- » Current land cover
 - Roads and residential
 - Areas with IAPs, subdivided further in sparse or dense infestations where applicable
 - Transformed areas
 - Untransformed indigenous vegetation

For every one of the management areas, the project proponent, in consultation with the land users, will have to decide what intervention will be necessary, desirable, and feasible to enable the development of the project and long-term sustainable maintenance of infrastructure. Thus for every management area there must be an operational outline on:

- » what will happen there
- » what needs to be mitigated – including storm water- and erosion management
- » which management units need priority intervention/mitigation
- » how will this mitigation / intervention be done (method statements) including schedule of work
- » realistic and desirable end states including list of species that should be established to initiate rehabilitation after initial revegetation

- » approximate timeframes
- » monitoring protocol to evaluate success or failures of interventions
 - establish permanently marked transects and monitor with fixed-point photography
- » who will be responsible for doing what
- » how will different actions be integrated to achieve and maintain or improve the desirable end state of the environment of that management unit

Special attention will have to be given to drainage zones, as these not only have very active morphodynamics, but are also distributors of seeds – both indigenous and of IAPs. Thus clearing a downstream invasion of aliens to enable maintenance of the development will be futile if the upstream IAPs are not cleared or at least aggressively controlled.

8.2. Setting realistic rehabilitation goals

Rehabilitation efforts typically aim at improving ecosystem function that consists of a series of processes, which can in the end be evaluated against a desired outcome or reference state of the vegetation and environment.

Attainable goals of rehabilitation on the project area should be possible and viable for at least the following:

- » Stabilisation of soils
- » Stabilisation of riparian areas
- » Storm water reduction through management and wetland integrity
- » Clearing of IAPs
 - The degree to which IAPs can be cleared from the project area needs to be determined according to desirability, available project funding, personnel and project requirements
- » Restoring and/or rehabilitating vegetative cover on non-transformed areas to obtain an acceptable vegetation cover that can be maintained or persists on its own indefinitely

8.3. Remove or ameliorate the cause of degradation

This will include:

- » Physical rehabilitation of topsoil where it has been removed.
- » Topsoil on areas that have not been cultivated are considered as the upper 20 - 30 cm only. These contain the most important nutrients, micro flora and –fauna essential for nutrient cycling processes. Topsoils are also an important source of seeds.
- » Subsoils and overburden substrata lack the above elements and will first have to be used for physical rehabilitation of landscapes as and where necessary, and then overlain with topsoils

- » Stabilisation of topsoils and prevention of erosion – refer to the Erosion management plan
- » Removal of all invasive vegetation – refer to the Invasive Management Plan
 - Where it is desirable to use brush or logs of the cleared vegetation for soil stabilisation, such material must be free of regenerative material – e.g. seeds or root suckers

8.4. Initial revegetation

Immediately after clearing of vegetation, the soil surface must be inspected for signs of erosion and stabilised as soon as possible. After completion of construction, such erosion stabilisation should preferably be with a cover of vegetation. A dense initial grass or other perennial cover will be desirable. The appropriate seed mix should be determined in consultation with an ecologist familiar with the area. The aim of the first vegetation cover is to form a protective, relatively dense indigenous layer to slow runoff, increase moisture infiltration into the soil, and gradually change the soil nutrient status in order for it to be more favourable for other desirable indigenous vegetation to become established.

8.5. Plant Search and Rescue

Prior to construction, once all the areas where topsoil will be removed or areas will be transformed have been demarcated, the ECO and contractor will be responsible to remove all bulbous species from the topsoil, as well as succulents and small indigenous shrubs that can be transplanted. These are to be kept in a raised, protected position in a designated area until they can be replanted again as part of the rehabilitation process. Further details are listed in the operation standards.

8.6. Natural seed banks and improvement of plant structural and compositional diversity

It is expected that soil seed banks of indigenous vegetation will be present to initiate initial vegetation cover, but may not be sufficient to establish an acceptable cover of desirable species. After deciding which indigenous species should be re-introduced, seed should be ideally collected from site or an environmentally-matched site nearby.

Seed collection may be done throughout the year as seed ripens, but can also be restricted to summer, when a large amount of the perennial seed should have ripened. Seeds should be stored in paper or canvas bags dusted with insecticide, and sown at the onset of the rainy season.

Alternatively, slower-growing perennials may be raised from seed or cuttings in a nursery and then transplanted once established. It will be beneficial to investigate if community members would be able to create and maintain such a nursery, or if there are nurseries in the area, that raise indigenous flora from the area.

The final vegetation cover should resemble the original (non-encroached) vegetation composition and structure as far as practicable possible or permissible within each management unit.

For drainage areas:

- » First restore drainage line morphology following the guidelines of the Erosion management plan – without that ecological recovery cannot be initiated
- » Determine if natural seed sources may be present further upstream
- » If such upstream seed sources are still present, rehabilitation of riparian vegetation after soil erosion management will most likely occur naturally, PROVIDED that follow-up monitoring of the establishment of vegetation is carried out, and all invasive species eradicated as they emerge. This can only be achieved with a long-term commitment (> 5 years minimum)
- » Should no upstream seed resources be available, suitable species (as determined in consultation with an ecologist) should be sown or planted.

8.7. Monitoring and follow-up action

Throughout the lifecycle of the development, regular monitoring and adaptive management must be in place to detect any new degradation of ecosystems affected by the development, and remedy these as soon as detected.

During the construction phase, the ECO and contractor will be responsible for initiating and maintaining a suitable monitoring system. Once the development is operational, the project proponent will have to identify a suitable entity that will be able to take over and maintain the monitoring cycle and initiate adaptive management as soon as it is required. Monitoring personnel must be adequately trained.

The following are the minimum criteria that should be monitored:

- » Composition and density of replanted vegetation, distinguishing between species introduced for initial revegetation only and species that are part of the pre-determined desirable end state
- » Associated nature and stability of surface soils
 - It is recommended that permanent transects are marked and surveyed annually according to the LFA technique (Tongway and Hindley 2004), adapted to integrate both surface soil characteristics and the vegetation to be monitored
- » Re-emergence of IAPs
 - If noted, remedial action must be taken immediately according to Working for Water specifications
- » Nature and dynamics of riparian zones
 - Stability of riparian vegetation
 - Any form of bank erosion, slumping or undercutting

- Stability of channel form and width of streams – if this increases, it shows that vegetation on plains and/or riparian areas and upper drainage lines are not yet in a stable enough state to be fully functional in reducing excess runoff and the ecosystem overall is losing valuable resources

8.8. Timeframes and duration

- » Rehabilitation will occur during construction, as areas for the re-application of topsoil and revegetation become available or where revegetation can be initiated after clearing of invasives or to stabilise erosion.
- » The initial revegetation period post construction is estimated to be over a period of 6 (minimum) to 12 months (maximum), or a time period specified by the Horticultural Landscape Contractor, particularly if planting of trees and shrubs occurs.
- » The rehabilitation phase (including post seeding maintenance) should be at least 12 months (depending on time of seeding and rainfall) to ensure establishment of an acceptable plant cover is achieved (excluding invasive plant species or weeds).
- » If the plants have not established and the acceptable plant cover is not achieved within the specified maintenance period, maintenance of these areas shall continue until at acceptable plant cover is achieved (excluding alien plant species or weeds).
- » Additional seeding or planting may be necessary to achieve acceptable plant cover. Hydroseeding may have to be considered as an option in this case.
- » Any plants that die, during the maintenance period, shall be replaced by the Horticultural Landscape Contractor (at the Horticultural Landscape Contractor's cost if it was due to insufficient maintenance).
- » Succession of natural plant species should be encouraged
- » Monitoring of rehabilitation success and follow-up adaptive management, together with clearing of emerging invasives shall be carried on until the decommissioning phase has been completed.

9. Conclusion

The Plant Rescue and Revegetation Management Plan is a document to assist the contractor, the developer, and the ECO with guidelines on how to plan and implement the required work, and understand the concepts behind successful rehabilitation. This plan will have to be implemented in conjunction with erosion-, storm water- and IAP management plans. The exact details of the rehabilitation plan will depend on the determined extent of rehabilitation that will have to be undertaken, available funding, and desirable end state of the vegetation after rehabilitation.

10. References and further reading

- Clewell, A., Rieger, J. and Munro, J. (2005). *Guidelines for Developing and Managing Ecological Restoration Projects, 2 Edition*. www.ser.org and Tucson: Society for Ecological Restoration International.
- Coetzee, K. (2005). *Caring for Natural Rangelands*. Scottsville: University of KwaZulu-Natal Press.
- Department of Environmental Affairs,(1983). *Conservation of Agricultural Resources Act 43 of 1983*. Pretoria: Department of Environmental Affairs.
- Society for Ecological Restoration International Science & Policy Working Group. 2004. *The SER International Primer on Ecological Restoration*. www.ser.org & Tucson: Society for Ecological Restoration International.
- Tongway, D.J. and Hindley, N.L. (2004) *Landscape Function Analysis: Procedures for Monitoring and Assessing Landscapes*, CSIRO Sustainable Ecosystems, CANBERRA, AUSTRALIA.
- Tongway, D.J., Freudenberg, D.O., Noble, J.C., and Hodgkinson, K.C. (Eds). (2003). *Landscape Ecology, Function and Management*. CSIRO Sustainable Ecosystems, CANBERRA, AUSTRALIA.

A. APPENDIX: RECOMMENDED OPERATIONAL STANDARDS

OBJECTIVE: Revegetate and Rehabilitate disturbed areas

The Contractor must take all reasonable measures to ensure that plant species of conservation concern are rescued and survive indefinitely. Landscaped topsoils as well as areas cleared of IAPs must be adequately rehabilitated and /or revegetated to ensure that the ecosystems affected by the development regain and/or retain their functionality indefinitely.

Throughout the lifecycle of the development, regular monitoring and adaptive management must be in place to detect any new degradation of ecosystems affected by the development and remedy these as soon as detected.

Mitigation measures relating to the vegetative cover as part of a healthy ecosystem must be implemented in order to effectively limit and gradually reverse the impact on the environment. The focus of the mitigation measures laid out below relate to project-related disturbances. Where such disturbances are exacerbated by farming-related disturbances or vice versa, mitigation measures must be carried out in consultation with the land-user responsible.

Project component/s	Project components affecting the objective: <ul style="list-style-type: none"> » Turbines » Access roads and cabling between and to turbine units » Power line » Sealed surfaces (e.g. roofs, concrete surfaces, compacted road surfaces, paved roads / areas) » Substation » All other infrastructure
Potential Impact	<ul style="list-style-type: none"> » Loss of suitable substrate for a stable vegetation cover » De-stabilisation and/or alteration of substrate and hence degradation of vegetation cover, significant change in species composition or loss of agricultural potential » Loss of suitable habitat for flora and fauna » Leaky ecosystem due to loss of nutrients and moisture from the system, leading to a less resilient vegetation cover and loss of ecosystem function and -services » Degradation and/or loss of riparian areas and wetlands on and beyond the project boundaries » A loss of indigenous vegetation cover and possibly endangered species » Disturbance of fauna species
Activities/risk sources	<ul style="list-style-type: none"> » Rainfall and wind erosion of disturbed areas » Excavation, stockpiling and compaction of soil » Existing IAPs as well as clearing thereof » Concentrated discharge of water from construction activity or new

	<p>infrastructure</p> <ul style="list-style-type: none"> » Storm water run-off from sealed, altered or bare surfaces » Mobile construction equipment movement on site » Cabling and access roads construction activities » Power line construction activities » River/stream/drainage line road crossings » Roadside drainage ditches » Project related infrastructure » Premature abandonment of follow-up monitoring and adaptive management of rehabilitation
Mitigation: Target/ Objective	<ul style="list-style-type: none"> » To minimise loss of plant species of conservation concern » To minimise unfavourable runoff conditions and loss of resources from the ecosystems » To minimise erosion of soil from site during and after construction » To minimise and mitigate unfavourable alteration to drainage lines, especially incision » To minimise damage to indigenous vegetation during and after construction » No accelerated overland flow related surface erosion as a result of project infrastructure » No reduction in the surface area or general nature and functionality of wetlands (drainage lines and other wetland areas) as a result of the establishment of infrastructure on the project areas and beyond its boundaries » A clear reduction of IAPs on the project area and replacement thereof by indigenous vegetation according to a pre-determined desirable end state

Mitigation: Action/control	Responsibility	Timeframe
Planning		
Classify the entire project area into management units according to current land cover and state of the environment and map accordingly	Developer / Contractor	Prior to construction
<p>For each management unit</p> <ul style="list-style-type: none"> » establish what interventions will be necessary relating to IAPs, soil erosion management, topsoil handling, landscape rehabilitation and revegetation » where rehabilitation and revegetation will be necessary, decide on the desired end state of vegetation for that management unit and create a list of species to be established on specific sites » outline the management of construction activities, including topsoils, excavated materials and felled biomass in a manner that will optimise the rehabilitation goals as fast and as effective as possible for that management unit 	Developer / Contractor in collaboration with ECO and land-users	Prior to construction
Plant Rescue and indigenous plant materials		
<p>All harvested plant materials shall be labelled with</p> <ul style="list-style-type: none"> » Genus as minimum, species if known » Habitat from which materials were collected 	ECO	Prior to construction

Mitigation: Action/control	Responsibility	Timeframe
<p>Indigenous plant materials for re-vegetation:</p> <ul style="list-style-type: none"> » All plant material shall be obtained from the search-and-rescue operation on the site prior to clearing or from local nurseries or reputable seed providers » Indigenous materials shall only be removed from their habitat with the necessary permits whenever applicable » Each plant removed shall be handled, packed and stored in a manner suitable for that species » Removed plants shall be protected from windburn or other damage during transportation » No plants or plants with exposed roots shall be subjected to excessive exposure to drying winds and sun, or subjected to water logging » All plants shall be kept free from plant diseases and pests and protected from rodents or other damaging agents » All indigenous plants that have been removed prior to clearing shall be returned to conditions resembling their original habitat as close as practically possible 	Contractor in collaboration with ECO	Before, during and after construction
<p>Seed stocks for rehabilitation</p> <ul style="list-style-type: none"> » Seed can be used for cultivation of desirable species for revegetation » Seed shall be utilised for direct sowing or hydroseeding » Seed collected from the site must be dried and stored in a suitable facility under cool (7-10°C), dry, insect free conditions until required for cultivation or seeding. Only viable, ripe seed shall be used » Seed harvested shall be insect- and pathogen free » Seed harvested shall not contain materials of any invasive species » Prior to clearing, seed should be collected from the site on a regular basis as species start to seed to maximise the amount of fully developed seed secured » From sites that will be cleared, 100% of all seeds available may be collected » From sites adjacent to the development, 25% of seeds can be collected for rehabilitation 	Contractor and ECO	Before, during and after construction
<p>Site-specific nursery</p> <ul style="list-style-type: none"> » On-site nursery facilities shall be erected for the holding of rescued plant material and the propagation of appropriate species for re-vegetation » Where nursery facilities can only cater for rescued plants, a suitable (local) nursery shall be identified that will be willing to receive seeds collected and propagate the necessary species for later revegetation » Soil or other propagation media, were used, shall be weed- and pathogen free » Argentine ants shall be controlled at all times » The area where plants are stored shall be kept free of 	Contractor, ECO to control	Prior to construction

Mitigation: Action/control	Responsibility	Timeframe
weeds <ul style="list-style-type: none"> » Plants stored in the designated area shall be protected from rodents, excessive sun and wind, and inspected regularly until being planted for pathogens and pests, and then treated accordingly » The nursery shall be adequately secured to prevent loss or theft of species 		
Protected flora <ul style="list-style-type: none"> » Ensure that no indigenous protected flora is removed from its original habitat in the project area without legal documents from the relevant authorities 	ECO	Before, during and after construction
Topsoil		
Avoid <ul style="list-style-type: none"> » Management units that will not be developed or selected elements – trees, rocky outcrops on site shall be maintained in situ and demarcated clearly to prevent any disturbance during construction » These units will be considered as NO-GO areas during construction 	Contractor and ECO	Before, during and immediately after construction
Invasives <ul style="list-style-type: none"> » Remove all invasive shrubs as per the Working for Water specifications 	Contractor, ECO to control	Before, during and after construction
Mulch <ul style="list-style-type: none"> » all trees felled shall be debranched and the logs used in controlling erosion from re-landscaped topsoils and/or adding surface roughness and organic matter to topsoils to be rehabilitated » all cut branches from trees, as well as all shrubs cleared from the construction site shall be shredded to mulch, either by a chipper or by hand to sticks no longer than 10 cm » preparation of mulch shall be done at source » mulched material shall be free of seed-bearing invasive plant material » the mulch shall be suitably stored – bagged if necessary - and will be used in rehabilitation and soil erosion management on the site » should additional mulch be used for rehabilitation, this should be obtained from invasive shrubs of areas not cleared » mulch shall be stored for as short a period as possible 	Contractor, ECO to control	Before, during and immediately after construction
Storage of topsoil and subsoil: <ul style="list-style-type: none"> » topsoils constitute the upper 20 – 30 cm of soil only, lower layers of soil are regarded as subsoil » stockpiling of topsoils and subsoils shall only be done on previously transformed areas, and be kept at least 50 m from any remaining natural vegetation » care shall be taken during stockpiling to prevent the 	Contractor, ECO to control	During and immediately after construction

Mitigation: Action/control	Responsibility	Timeframe
<p>mixing of topsoil with subsoil and/or any other material</p> <ul style="list-style-type: none"> » topsoils shall be stored in heaps no higher than 100 cm, and shall be re-applied as soon as possible » care shall be exercised during stockpiling of topsoils to prevent compaction thereof » topsoils shall be adequately protected from erosion by preventing concentration of surface water and scouring of slopes » erosion of topsoils has to be contained and repaired as soon as it occurs, before large scale erosion and loss of topsoil develops » any logs obtained during clearing operations can be used in continuous rows to curtail erosion where necessary. Geojute (geotextile) shall be used additionally if the logs are not sufficient to remedy any erosion – for details refer to the erosion management plan » where topsoils need to be stored longer than 6 months, such stockpiles shall be revegetated, even if this has to include re-seeding to achieve an acceptable cover of vegetation 		
<p>Boulders and rocks</p> <ul style="list-style-type: none"> » where removed during clearing, should be stored separately and used in the rehabilitation program » boulders and rocks must be partially buried within the topsoil layer wherever practical to provide greater soil-holding stability and reduce water erosion » placement of rocks and boulders shall mimic the natural occurrence of rocks and boulders in the area 	Contractor, ECO to control	During and after construction
Rehabilitation of surface		
<p>Prior to the application of topsoil</p> <ul style="list-style-type: none"> » subsoil shall be shaped and trimmed to blend in with the surrounding landscape or used for erosion mitigation measures » ground surface or shaped subsoil shall be ripped or scarified with a mechanical ripper or by hand to a depth of 15 – 20 cm, » compacted soil shall be ripped to a depth greater than 25 cm and the trimmed by hand to prevent re-compacting the soil » any rubbish, concrete remnants, steel remnants or other objects introduced to the site during the construction process shall be cleared before ripping, or shaping and trimming of any landscapes to be rehabilitated takes place » shaping will be to roughly round off cuts and fills and any other earthworks to stable forms, sympathetic to the natural surrounding landscapes 	Contractor, ECO to control	During and after construction

Mitigation: Action/control	Responsibility	Timeframe
<p>Application of topsoil</p> <ul style="list-style-type: none"> » topsoils shall be spread evenly over the ripped or trimmed surface, if possible not deeper than the topsoil originally removed » the final prepared surface shall not be smooth but furrowed to follow the natural contours of the land » the final prepared surface shall be free of any pollution or any kind of contamination » care shall be taken to prevent the compaction of topsoil » where applicable, the final prepared surface will also contain scattered rocks and/or logs to mimic the natural condition of the original habitat or area and to aid in soil stabilisation and erosion control 	Contractor, ECO to control	During and after construction
<p>Soil stabilisation</p> <ul style="list-style-type: none"> » mulch from brush shall be applied by hand to achieve a layer of uniform thickness » mulch shall be rotovated into the upper 10 cm layer of soil <ul style="list-style-type: none"> ○ this operation shall not be attempted if the wind strength is such as to remove the mulch before it can be incorporated into the topsoil » in very rocky areas a layer of mulch shall be applied prior to adding the topsoil » measures shall be taken to protect all areas susceptible to erosion by installing temporary and permanent drainage work as soon as possible <ul style="list-style-type: none"> ○ where natural water flow-paths can be identified, subsurface drains or suitable surface drains and chutes need to be installed » additional measures shall be taken to prevent surface water from being concentrated in streams and from scouring slopes, banks or other areas <ul style="list-style-type: none"> ○ if mulch is limited, available mulch, together with harvested seeds, should be concentrated in these hollows to promote rapid re-vegetation in them » runnels or erosion channels developing shall be back-filled and restored to a proper condition <ul style="list-style-type: none"> ○ such measures shall be effected immediately before erosion develops at a large scale » where erosion cannot be remedied with available mulch, logs or rocks, geojute shall be used to curtail erosion 	Contractor, ECO to control	During and after construction
<p>Borrow-pits</p> <ul style="list-style-type: none"> » shall be shaped to have undulating, low-gradient slopes and surfaces that are rough and irregular, suitable for trapping sediments and facilitation of plant growth » upon completion of rehabilitation these reshaped and revegetated areas shall blend into the natural terrain 	Contractor, ECO to control	After construction

Mitigation: Action/control	Responsibility	Timeframe
Revegetation		
<p>Recreate a non-invasive, acceptable vegetation cover that will facilitate the establishment of desirable and/or indigenous species</p> <ul style="list-style-type: none"> » revegetation of the final prepared area is expected to occur spontaneously to some degree where topsoils could be re-applied within 6 months » revegetation will be done according to an approved planting/landscaping plan according to the management units initially delineated and their respective desirable end states and permissible vegetation 	Contractor, ECO to control	Successively during construction , as construction of individual components is completed, then followed up until desired end state is reached
<p>Re-seeding</p> <ul style="list-style-type: none"> » revegetation can be increased where necessary by hand- seeding indigenous species <ul style="list-style-type: none"> ○ previously collected and stored seeds shall be sown evenly over the designated areas, and be covered by means of rakes or other hand tools » re-seeding shall occur at the recommended time to take advantage of the growing season » in the absence of sufficient follow-up rains after seeds started germinating, watering of the new vegetation cover until it is established shall become necessary to avoid loss of this vegetative cover and the associated seedbank » where, after initial re-seeding, the no acceptable vegetation cover has established within 12 months, hydroseeding should be considered as an option for follow-up revegetation work » sowing rates of seeds used during hydro-seeding should be obtained from the relevant supplier and in accordance with the existing environment 	Contractor, ECO to control	Successively during construction , as construction of individual components is completed, then followed up until desired end state is reached
<p>Planting of species</p> <ul style="list-style-type: none"> » species to be planted include all rescued species » the size of planting holes shall be sufficiently large to ensure that the entire root system is well covered with topsoil » soil around the roots of container plants shall not be disturbed » bulbous plants shall be planted in groups or as features in selected areas » before placement of larger plant specimens into prepared holes, the holes shall be watered if not sufficiently moist » during transplanting care shall be taken to limit or 	Contractor, ECO to control	Successively during construction , as construction of individual components is completed, then followed up until desired end state is

Mitigation: Action/control	Responsibility	Timeframe
prevent damage to roots » plants should be watered immediately after transplanting to help bind soil particles to the roots (or soil-ball around rooted plants) and so facilitate the new growth and functioning of roots		reached
Traffic on revegetated areas » designated tracks shall be created for pedestrian or vehicle traffic where necessary » Disturbance of vegetation and topsoil must be kept to a practical minimum, no unauthorised off road driving will be allowed » All livestock shall be excluded from revegetated areas	Contractor	Before, during and after construction
Establishment » The establishment and new growth of revegetated and replanted species shall be closely monitored » Where necessary, reseeding or replanting will have to be done if no acceptable plant cover has been created	Contractor	Successively during construction, as construction of individual components is completed, then followed up until desired end state is reached
Monitoring and follow-up treatments		
Monitor success of rehabilitation and revegetation and take remedial actions as needed according to the respective plan » Erosion shall be monitored at all times and measures taken as soon as detected » Where necessary, reseeding or replanting will have to be done if no acceptable plant cover has been created	ECO during construction, suitable designated person/institution after that	During and after construction, during operational and decommissioning phase
Weeding » It can be anticipated that invasive species and weeds will germinate on rehabilitated soils <ul style="list-style-type: none"> ○ These need to be hand-pulled before they are fully established and/or reaching a mature stage where they can regenerate ○ Where invasive shrubs re-grow, they will have to be eradicated according to the Working for Water specifications 		
Performance Indicator	» No activity in identified no-go areas » Acceptable level of activity within disturbance areas, as	

	<p>determined by ECO</p> <ul style="list-style-type: none">» Natural configuration of habitats as part of ecosystems or cultivated land is retained or recreated, thus ensuring a diverse but stable hydrology, substrate and general environment for species to be able to become established and persist» The structural integrity and diversity of natural plant communities is recreated or maintained» Indigenous biodiversity continually improves according to the pre-determined desirable end state<ul style="list-style-type: none">○ This end state, if healthy, will be dynamic and able to recover by itself after occasional natural disturbances without returning to a degraded state» Ecosystem function of natural landscapes and their associated vegetation is improved or maintained
Monitoring	<ul style="list-style-type: none">» Fortnightly inspections of the site by ECO during construction» An incident reporting system must record non-conformances to the EMP.» Quarterly inspections and monitoring of the site by the ECO or personnel designated to the rehabilitation process until 80% of the desired plant species have become established<ul style="list-style-type: none">○ These inspections should be according to the monitoring protocol set out in the rehabilitation plan» Thereafter annual inspections according to the minimal monitoring protocol

B. APPENDIX: CHECKLIST OF ACTIONS FOR REHABILITATION PLANNING

<p>Conceptual Planning</p>	<ul style="list-style-type: none"> » Identify rehabilitation site locations and its boundaries » Identify ownership of rehabilitation program » Describe improvements that are anticipated following rehabilitation » Identify the kind of ecosystem to be rehabilitated at each site » Identify rehabilitation goals and desirable end state » Identify physical site conditions in need of repair » Identify stressors in need of regulation or re-initiation to maintain the integrity of the ecosystem, such as aliens, erosion, fire-regime » Identify the list and kinds of interventions of abiotic and biotic interventions that are and will be needed » Identify landscape restrictions and whether or not its integrity is dependent on a functioning ecosystem outside the project area » Determine project funding and sources » Identify labour sources and equipment needs » Identify biotic resource needs and sources, e.g. suitable topsoil, seeds » Identify any permit requirements or other legal issues » Determine project duration » Outline adaptable strategies for long-term protection and management
<p>Preliminary Tasks</p>	<ul style="list-style-type: none"> » Appoint a rehabilitation practitioner who is in charge of all the technical aspects of rehabilitation » Appoint a restoration team and train where necessary to ensure effective implementation » Prepare a budget to accommodate the completion of preliminary tasks » Document existing site conditions, also describing biota » Conduct pre-project monitoring as needed, including soil chemistry, that may affect the success of the rehabilitation program » Establish a reference site or past reference that represents the desired end state of the site » Gather information on key species to be re-introduced » Conduct investigations as needed to assess the effectiveness of restoration methods and strategies used in similar habitats up to date » Decide if rehabilitation goals are realistic or need modification » Prepare a list of objectives that need to be reached to achieve restoration goals » Ensure liaison with affected stakeholders, especially as far as rehabilitation goals are concerned » Investigate available accedes and infrastructure needed to facilitate implementation of rehabilitation
<p>Implementation phase</p>	<ul style="list-style-type: none"> » Describe the interventions that will be implemented to attain each set objective » Acknowledge potential for passive restoration where viable » Prepare performance standards and monitoring protocols to measure the attainment of each objective » Schedule tasks needed to fulfil each objective

	<ul style="list-style-type: none">» Obtain equipment, supplies and biotic resources as needed» Prepare an appropriate budget
Implementation tasks	<ul style="list-style-type: none">» Mark boundaries and work areas» Install permanent monitoring fixtures» Implement restoration tasks
Post-implementation tasks	<ul style="list-style-type: none">» Protect the rehabilitation site against initial disturbance, including herbivores» Perform post-implementation maintenance, especially continued monitoring and eradication of emerging IAPs» Monitor site at least once per year, using the LFA technique, and identify needs for adaptive management
Evaluation	<ul style="list-style-type: none">» Assess monitoring data to determine whether performance standards are met and rehabilitation objectives reached and maintained» Conduct an ecological evaluation of the newly completed rehabilitation

C. APPENDIX: TRANSPLANTING GUIDELINES FOR PLANTS WITH UNDERGROUND STORAGE ORGANS

Many of the plants in harsh environments have underground storage organs from which they resprout every year after sufficient rains, flower and then die back soon after fruiting and remain dormant, out of sight until the next growing season. All species of the families Amaryllidaceae, Iridaceae, Orchidaceae are protected provincially, nationally and/or internationally, as are many species of other monocot species.

Root system: underground storage organs are variable in size, but usually between 15 and 40 cm deep in the soil

Transplanting: success of transplanting is usually very high IF handled correctly

Rescue 101: Plants should be lifted and transplanted after flowering and fruiting, preferably as the leaves start to die back. For lifting, loosen the soil or wedge apart rocks working from a circle of about 20 cm away from the base of the plant, working inwards but not closer than about 5 cm of the plant with a sharp narrow object such as a koevoet. Once the soil is loosened, gently feel by hand where the bulb, corm, or other storage organ is, and wedge out by hand, taking care not to damage it. Remove loose soil, gently cleanse off most of remaining soil, or rinse off the storage organ. Group these according to species and label clearly, keep records of labels to include name if that is known, or a brief description or photo, also the average depth of the organs when they were removed, and the habitat they were removed from. Spread these plants so that the storage organ can dry completely, and then loosely pack into newspaper or paper bag and then store in a shaded, dry position for maximally 3 months. Transplant into soil that is as similar as possible to the original habitat, TAKING CARE that the growing point of the organ points to the top, else the plant will die. Make sure the storage organs are positioned according to the records kept about original depth of the storage organ.

Aftercare: Firm down soil around the base of the plant once it is in a new position. Allow plant to resprout naturally after sufficient rains, do not water. As these plants may not be visible for a while, clearly demarcate the area where these have been planted to avoid disturbing and potentially destroying them later on.