BIOTHERM WIND ENERGY FACILITY BETWEEN UITKYK AND EXCELSIOR NEAR SWELLENDAM IN THE WESTERN CAPE PROVINCE

ENVIRONMENTAL MANAGEMENT PROGRAMME

Revision 1
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PROJECT DETAILS

DEA Reference No.	:	12/12/20/1798
Title	:	Environmental Impact Assessment Process Environmental Management Programme: Biotherm Wind Energy Facility Between Uitkyk and Excelsior Near Swellendam in the Western Cape Province
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Project Company	:	Amstilinx (RF) Proprietary Limited
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DEFINITIONS AND TERMINOLOGY

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

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

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

Assessment: The process or 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.

Construction: Construction means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity as per the EIA Regulations. Construction begins with any activity which requires Environmental Authorisation.

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

Cut-in speed: The minimum wind speed at which the wind turbine will generate usable power.

Cut-out speed: The wind speed at which shut down occurs.

Decommissioning: To take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned. This usually occurs at the end of the life of a facility.

Department/ the competent authority: Refers to the Department of Environmental Affairs.

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

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

Disturbing noise: A noise level that exceeds the ambient sound level measured continuously at the same measuring point by 7 dB or more, in accordance with the Noise Control Regulations.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Nacelle: The nacelle contains the generator, control equipment, gearbox, and anemometer for monitoring the wind speed and direction.

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

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

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).

Rotor: The portion of the wind turbine that collects energy from the wind is called the rotor. The rotor converts the energy in the wind into rotational energy to turn the generator. The rotor has three blades that rotate at a constant speed of about 15 to 28 revolutions per minute (rpm).

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.

Tower: The tower, which supports the nacelle to which the rotor is attached, is constructed from tubular steel or concrete. It is approximately 80 m to 120m tall. The nacelle and the rotor are attached to the top of the tower. The tower on which a wind turbine is mounted is not just a support structure. It also raises the wind turbine so that its blades safely clear the ground and so it can reach the stronger winds at higher elevations. Larger wind turbines are usually mounted on towers ranging from 80 to 120 m tall. The tower must be strong enough to support the nacelle and blades, and to sustain vibration, wind loading and the overall weather elements for the lifetime of the wind turbine.

Waste: Any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 of the NEM WA; or any other substance, material or object that is not included in Schedule 3 of the NEM WA that may be defined as a waste by that is identified as waste by the Minister of Environmental Affairs (by notice in the Gazette). Any waste or portion of waste, referred to in the section above, ceases to be a waste:

(i) once an application for its re-use, recycling or recovery has been approved or, after such approval, once it is, or has been re-used, recycled or recovered;
(ii) where approval is not required, once a waste is, or has been re-used, recycled or recovered;
(iii) where the Minister of Environmental Affairs has, in terms of Section 74 of the NEM WA, exempted any waste or a portion of waste generated by a particular process from the definition of waste; or
(iv) where the Minister of Environmental Affairs has, in the prescribed manner, excluded any waste stream or a portion of a waste stream from the definition of waste.

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

Wind speed: The rate at which air flows past a point above the earth's surface.

TABLE OF CONTENTS

APPENDICES

INTRODUCTION CHAPTER 1

Amstilinx (RF) Proprietary Limited received an Environmental Authorisation (EA) for the construction of the Excelsior Wind Energy Facility near Swellendam in the Western Cape (DEA ref: 12/12/20/1798) on 27 September 2011. Six Amendments to the original EA have subsequently been issued:

1. Holder of EA changed from BioTherm Energy (Pty) Ltd to Excelsior Wind Energy Facility (Pty) Ltd – 24 May 2012
2. Appeal Resolution (29 November 2012)
3. Extension of validity period – 13 August 2013
4. Turbine length specifications – 31 August 2013
5. Extension of validity period – 24 June 2015
6. Project description and conditions related to the powerline – 22 February 2016
7. SPV name change and blade length amendment (20 October 2016)

The project was selected as a Preferred Bidder project under the Fourth Round of the Department of Energy's (DOE) Renewable Energy Independent Power Producers Procurement Programme (REIPPP).

This Environmental Management Programme (EMPr) is an update of the EMPr submitted with the Environmental Impact Assessment (EIA) for the project and includes the conditions of the Environmental Authorisation of September 2011 as well as recommendations from the specialist walk-though surveys undertaken for the project.

The EMPr has been developed on the basis of the findings of the EIA, and must be implemented to protect sensitive on-site and off-site features through controlling preconstruction, construction, operation and decommissioning activities that could have a detrimental effect on the environment, and through avoiding or minimising potential impacts. This EMPr is a revision of the EMPr contained within the EIA Report for the project (CSIR, 2011), and has been updated in accordance with the requirements of the Environmental Authorisation. This EMPr is applicable to all Amstilinx (RF) Proprietary Limited employees and contractors working on the pre-construction, construction, and operation, maintenance phases and decommissioning of the Excelsior Wind Energy Facility. The document will be adhered to and updated as relevant throughout the project life cycle. Any amendments must be approved by the Competent Authority (i.e. DEA) prior to implementation through the relevant process/es as required in terms of the relevant legislation, unless these are required to address an emergency situation.

PROJECT DETAILS *CHAPTER 2*

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

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

The power line to connect the facility to the Eskom grid was the subject of a separate Basic Assessment and is already authorised under DEA reference no: 14/12/16/3/3/1/1478 and is not included in this EMPr.

2.1. Findings of the Environmental Impact Assessment

In terms of the findings of the EIA Report, various planning, construction, and operation-related environmental impacts were identified, including:

» Disturbance of the ecological environment (i.e. flora and fauna)
» Impacts on water resources (i.e. in terms of quantity and quality)
» Impacts on the visual aesthetics and sensitive receptors
» Impacts on heritage resources
» Socio-economic impacts

Several areas of high sensitivity were identified (refer to Figure 2.1). These have been considered in the development of the final layout for the facility.

2.2. Final Layout

As per Condition 6.4 of the Environmental Authorisation, a final layout has been prepared by Amstilinx (RF) Proprietary Limited (refer to Figure 2.1 and Appendix B). This layout indicates the following:

» Position of turbines;
» Foundation footprint;

- Laydown area footprints;
- Construction period footprint;
- Internal roads indicating width (construction period width and operation period width), and with numbered sections between the other site elements which they serve;
- Wetlands, drainage lines, rivers, streams and water crossings of roads and cables indicating the type of bridge structures which will be used;
- Substation(s) inverters and/or transformer(s) sites including their entire footprint;
- All existing infrastructure on the site, especially the roads;
- Buildings, including accommodation; and
- All "no-go" areas, and
- Buffer areas.
- All sensitive features e.g. CBAs, heritage sites, wetlands, pans and drainage channels that will be affected by the facility and associated infrastructure;

This layout has been overlaid on the sensitivity map developed through the EIA process (refer to Figure 2.1 and Appendix B). The final layout avoids the No-Go areas identified within the EIA process as per the specialist's recommendations.

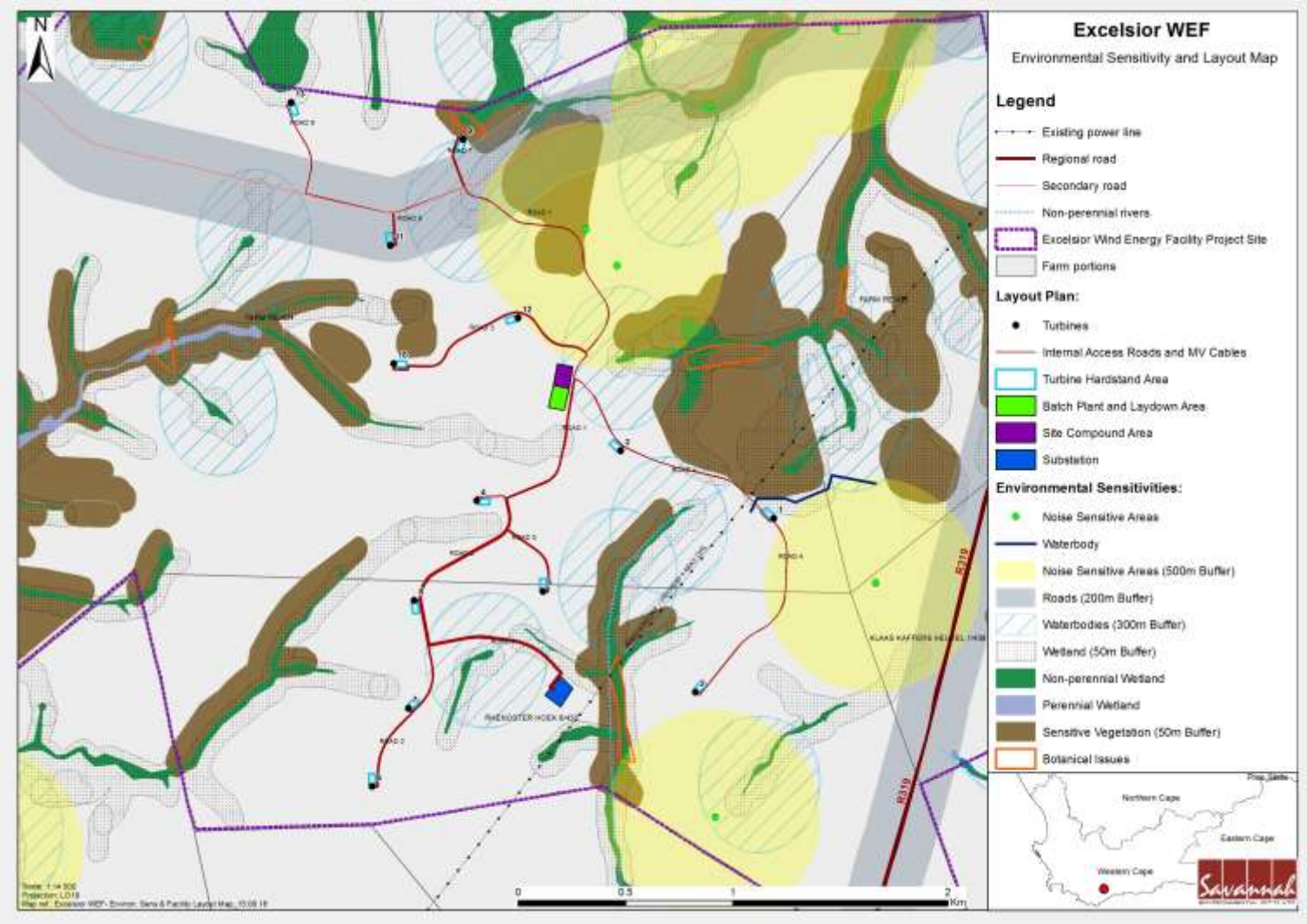

Figure 2.1: Facility layout overlain onto the environmental sensitivity map

2.3. Activities and Components associated with the Wind Energy Facility

The main activities/components associated with the proposed facility are detailed in the tables which follow.

Table 1.1: Activities Associated with Planning (Post Authorisation), Construction, Operation and Decommissioning of the Facility

Main Activity/Project Component	Components of Activity	Details
	Planning (Post-Authorisation)	
Conduct technical surveys and undertake micro-siting Micro-siting will be done as part of the detailed site planning process to ensure that the environmental risks are minimised and the technical requirements of the project can be achieved. Micro-siting will ensure that the turbine positions or associated infrastructure will be located outside of areas mapped or identified as sensitive no-go zones and that any environmental constraints at the specific turbine positions and road alignments are identified, avoided or managed.	» Detailed geotechnical investigations and surveys by geotechnical engineer » Site survey by specialists and confirmation of the infrastructure micro-siting footprint » Survey of internal access routes » Survey of on-site substation site and grid route	» All surveys are to be undertaken prior to initiating construction. » The turbine positions may be micro-sited based on additional site data from these surveys.
	Construction	
Establishment of access roads	» Construction of access/haul roads to the site. » Establish internal access roads: within the site between the turbines for use during construction and operational	» Access roads will be constructed/upgraded in advance of any components being delivered to site, and will remain in place after completion for future access and possibly access for replacement of parts if necessary. » Existing access roads to the site will be utilised, and

Main Activity/Project Component	Components of Activity	Details
	phases. » Temporary tracks to be established for use during construction phase only where applicable.	upgraded where required. Special haul roads may need to be constructed to and within the site to accommodate abnormally loaded vehicle access and circulation. » The internal service road alignment is informed by the final micro-siting/positioning of the wind turbines (as well as specialist surveys). Permanent roads are expected to be up to 6m in width.
Undertake site preparation	» Site establishment of offices / workshop with ablutions and stores, contractor's yards. » Clearance of vegetation at the footprint of each turbine.	» These activities will require the stripping of topsoil, which will need to be stockpiled, backfilled and/or spread on site.
Establishment of lay down and hardstand areas on site	» Lay down areas (temporary footprint) at each turbine position for the storage of wind turbine components » Hardstand areas (permanent) for crane lifting equipment. » Temporary lay down area for crane assembly. » Construction site offices.	» Each turbine needs a flat lay down area during the construction process for the storage of wind turbine components. This area can be rehabilitated after construction unless required during operation. » The hardstand area will need to accommodate the cranes required in tower/turbine assembly. Hardstand and lay down areas will be required to be established for the normal civil engineering construction equipment which will be required on site. A large hardstand area will be required at each position where the main lifting crawler crane may be required to be erected and/or disassembled. This area would be required to be compacted and levelled to accommodate the assembly crane, which would need to access the crawler crane from all sides.
Excavate wind turbine foundations	» Concrete foundations at each turbine location.	» Foundation holes will be mechanically excavated (with blasting being utilised with circumspection, only where necessary).

Main Activity/Project Component	Components of Activity	Details
		» Shoring and safety barriers will be erected around open excavation. » Aggregate and cement will be mixed on site.
Transport of components and equipment to site	» Flatbed trucks will be used to transport all components to site, including: a. Components of the wind turbines, comprising typically 9 segments including a nacelle, rotor and three blades b. The normal civil engineering construction equipment for the civil works (e.g. excavators, trucks, graders, compaction equipment, cement mixers, etc.). c. Components required for the establishment of the substation (including transformers) d. Components required for the establishment of the power line (including towers and cabling)	» The wind turbines, including towers, will be brought to site by the supplier in sections. The individual components are defined as abnormal loads in terms of the Road Traffic Act (Act No 29 of 1989) by virtue of the dimensional limitations (abnormal length of the blades) and load limitations (i.e. the nacelle). The dimensional requirements of the load during the construction phase (length/height) may require alterations to the existing road infrastructure (widening on corners, removal of traffic islands), accommodation of street furniture (electricity, street lighting, traffic signals, telephone lines etc.) and protection of road-related structures (bridges, culverts, portal culverts, retaining walls etc.) as a result of abnormal loading. » The equipment and project components will be transported to the site using appropriate National and Provincial routes, and the dedicated access/haul road to the site itself.
Erect turbines	» Large lifting crane used for lifting of large, heavy components. » A small crane for the assembly of the rotor.	» The large lifting crane will lift the tower sections into place, assisted by the smaller crane. » The nacelle, which contains the gearbox, generator and yawing mechanism, will then be placed onto the top of the assembled tower. » The rotor (i.e. the blades of the turbine) will then be assembled or partially assembled on the ground by the smaller crane. It will then be lifted to the nacelle by the large crane, and bolted in place. Alternatively the blades

Main Activity/Project Component	Components of Activity	Details
		may be lifted into position on the nacelle individually by the main crane. » It will take approximately 2-4 days to erect each turbine, although this will depend on the climatic conditions as a relatively wind-free day will be required for the installation of the rotor.
Connection of the wind turbines to the on-site substations	» Wind turbines » Electrical turbine transformer for each turbine » 33 kV electrical cabling connecting each turbine to the substations. » There will be an electrical substations (33/132kV) on site	» The installation of some of these cables will require the excavation of trenches, approximately 1 m in depth within which these cables can then be laid. The underground cables would follow the internal access roads as far as reasonably possible. » There will also be overhead cables that link the turbine strings together and also the on-site substation.
Commissioning of the facility	» Wind Energy Facility commissioning	» Prior to the start-up of a wind turbine, a series of checks and tests will be carried out, including both static and dynamic tests to make sure the turbine is working within appropriate limits. » Grid interconnection and unit synchronisation will be undertaken to confirm the turbine performance. Physical adjustments may be needed such as changing the pitch of the blades of the turbines.
Undertake site rehabilitation	» Remove all construction equipment from the site. » Rehabilitation of temporarily disturbed areas where practical and reasonable. » Clean up the site from all construction related rubble, stockpiles and waste.	» On full commissioning of the facility, any access points to the site which are not required during the operation phase will be closed and prepared for rehabilitation. » All rubble, stockpiles and any other waste materials resulting from the construction process will be cleared.
	Operation	
Operation	» Operation of turbines within the wind energy facility and grid connection	» Once operational, the wind energy facility will be monitored through the O&M facility and remotely.

Main Activity/Project Component	Components of Activity	Details
	infrastructure » Operation and maintenance (O&M) facility to be a site-based control centre with communications infrastructure for remote access.	» Operations staff will be required on site but not always there for any extended period. It is anticipated that there will be full time security, maintenance and control room staff required on site. » Each turbine in the facility will be operational, except under circumstances of mechanical breakdown, shut-down due to hazard (e.g. extreme weather conditions), or maintenance activities.
Maintenance	Regular Maintenance activities include: » Oil and grease – turbines; » Transformer oil – substation and ring main units; and » Waste product disposal Other maintenance activities relate to mechanical, communications, electronic and control functions.	» The wind turbines and associated infrastructure will be subject to periodic maintenance and inspection. » Periodic oil changes will be required and any waste products (e.g. oil) will be disposed of in accordance with relevant waste management legislation. » The turbine infrastructure is expected to have a lifespan of approximately 25 - 30 years, with maintenance.
Decommissioning		
Site preparation	» Confirming the integrity of the access to the site to accommodate required equipment. » Preparation of the site (e.g. lay down areas, etc.) » Mobilisation of de-construction equipment and cranes.	» Equipment associated with this facility would only be decommissioned once it has reached the end of its economic life. » It is most likely that decommissioning activities of the infrastructure of the facility would comprise the disassembly and removal of the turbines and other infrastructure from the site.
Disassemble wind turbines	» A large crane will be used to disassemble the turbine and tower sections.	» Turbine components would be reused, recycled or disposed of in accordance with regulatory requirements.

KEY LEGISLATION APPLICABLE TO THE DEVELOPMENT CHAPTER 3

The following legislation and guidelines have informed the scope and content of this EMPr:

» National Environmental Management Act (Act No 107 of 1998)
» EIA Regulations, published under Chapter 5 of the NEMA (GNR R983, GNR984 and GN985)
» International Standards – IFC Standards and Equator Principles

Several other Acts, standards, or guidelines have also informed the project process and the scope of issues addressed and assessed in the EIA Report. A review of legislative requirements applicable to the proposed project is provided in the table that follows.

Table 3.1: Relevant legislative and permitting requirements applicable to the establishment of the Excelsior Wind Energy Facility

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	National Legislation		
National Environmental Management Act (Act No. 107 of 1998)	» NEMA requires, inter alia, that: * 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 with granting of the relevant environmental authorisation.	» National Department of Environmental Affairs » Western Cape Department of Environmental Affairs and Development Planning	Excelsior Wind Energy Facility (Pty) Ltd received an Environmental Authorisation (EA) for the construction of the Excelsior Wind Energy Facility near Swellendam in the Western Cape (DEA ref: 12/12/20/1798) on 27 September 2011. Six amendments to the original EA have been subsequently issued as described in chapter 1 of this EMPr.
National Environmental	» A project proponent is required to	» National Department of	» While no permitting or licensing

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
Management Act (Act No. 107 of 1998)	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.	Environmental Affairs	requirements arise directly, the holistic consideration of the potential impacts of the proposed project has found application in the EIA Phase. » The implementation of mitigation measures are included as part of the EMPr and will continue to apply throughout the life cycle of the project.
National Environmental Management: Biodiversity Act (Act No. 10 of 2004)	» Provides for the MEC/Minister to identify any process or activity in such a listed ecosystem as a threatening process (S53) » A list of threatened and protected species has been published in terms of S56(1) - Government Gazette 29657. » Three government notices have been published, i.e. GN R 150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R 151 (Lists of critically endangered, vulnerable and protected species) and GN R 152 (Threatened or Protected Species Regulations). » Provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or	» National Department of Environmental Affairs » DEA&DP » Cape Nature	» In terms of GNR 152 specialist flora and fauna studies were undertaken as part of the EIA process. » The ecological walk-through survey for the site has confirmed that there are no protected species in terms of the NEM:BA which may be impacted on by the development.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GN 1002), 9 December 2011). » This Act also regulates alien and invader species.		
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)	» 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 921 of 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	» National Department of Environmental Affairs (hazardous waste) » DEA&DP (general waste)	» In terms of GNR921, no waste license is required for the project » 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 this EMPr, as well as in accordance with the relevant Norms and Standards.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	(a) The containers in which any waste is stored, are intact and not corroded or in any other way rendered unlit 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.		
National Environmental Management: Air Quality Act (Act No. 39 of 2004)	» S18, S19 and S20 of the Act allow certain areas to be declared and managed as "priority areas". » 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. » Dust control regulations promulgated in November 2013 may require the implementation of a dust management plan.	» National Department of Environmental Affairs » Local authority – Overberg Municipality	While no permitting or licensing requirements arise from this legislation, this Act will find application during the construction phase of the project. The Air Emissions Authority (AEL) may require the compilation of a dust management plan.
National Water Act (Act No. 36 of 1998)	» Under S21 of the Act, water uses must be licensed unless such water use falls into one of the categories listed in S22 of	» Department of Water and Sanitation » CMA	Requirements set by S19 will apply throughout the life cycle of the project.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	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.		
Environment Conservation Act (Act No. 73 of 1989)	» National Noise Control Regulations (GN R154 dated 10 January 1992)	» National Department of Environmental Affairs » DEA&DP	There is no requirement for a noise permit in terms of the legislation.
Minerals and Petroleum Resources Development Act (Act No. 28 of 2002)	» 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. » S53 Department of Mineral Resources: Approval from the Department of Mineral Resources (DMR) may be required to use land surface contrary to the objects of the Act in terms of section 53 of the Mineral and Petroleum Resources Development Act, (Act No 28 of 2002): In terms of the Act approval from the Minister of Mineral Resources is required to ensure that proposed activities do not sterilise a mineral resource that might occur on site.	Department of Mineral Resources	S53 approval already obtained
National Heritage Resources Act (Act No. 25	» S38 states that Heritage Impact Assessments (HIAs) are required for	» South African Heritage Resources Agency	» As per S38 an HIA has been undertaken as part of the EIA for

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
of 1999)	certain kinds of development including » The construction of a road, power line, pipeline, canal or other similar linear development or barrier exceeding 300 m in length; » Any development or other activity which will change the character of a site exceeding 5 000 m^2 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 m^2; or the re-zoning of a site exceeding 10 000 m^2 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.	» Heritage Western Cape	the project. » In terms of comments from Heritage Western Cape a final walk-through survey of the site was undertaken prior to commencement of construction. » If concentrations of archaeological heritage material and human remains are uncovered during construction, all work must cease immediately. The find must be reported to a heritage specialist so that systematic and professional investigation/ excavation can be undertaken. » No permits are required as confirmed by heritage specialist
National Forests Act (Act No. 84 of 1998)	» According to this Act, the Minister may declare a tree, group of trees, woodland	National Department of Agriculture, Forestry and	No protected trees are present on the site.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	or a species of trees as protected. The prohibitions provide that 'no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister'. » GN 1042 provides a list of protected tree species.	Fisheries (DAFF)	
National Veld and Forest Fire Act (Act 101 of 1998)	» Provides requirements for veld fire prevention through firebreaks and required measures for fire-fighting. Chapter 4 places a duty on landowners to prepare and maintain firebreaks, and Chapter 5 places a duty on all landowners to acquire equipment and have available personnel to fight fires. » In terms of S21 the landowner would be obliged to burn firebreaks to ensure that should a veld fire occur on the property, that it does not spread to adjoining land. » In terms of S13 (a) the firebreak would need to be 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. » In terms of Section 17, the applicant must have such equipment, protective	National Department of Agriculture, Forestry and Fisheries (DAFF)	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.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	clothing, and trained personnel for extinguishing fires.		
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 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. » 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	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
	license being in force.		
National Road Traffic Act (Act No 93 of 1996)	» The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. » Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts. » The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.	» South African National Roads Agency Limited (national roads) » Provincial Department of Transport	» An abnormal load/vehicle permit may be required to transport the various components to site for construction. These include route clearances and permits will be required for vehicles carrying abnormally heavy or abnormally dimensioned loads. » Transport vehicles exceeding the dimensional limitations (length) of 22m. » Depending on the trailer configuration and height when loaded, some of the power station components may not meet specified dimensional limitations (height and width).

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	Provincial Legislation		
Western Cape Noise Control Regulations: PN 627 of 1998	The control of noise in the Western Cape Province is legislated in the form of Noise Control Regulations promulgated in terms of section 25 of the Environment Conservation Act No. 73 of 1989.	Western Cape DEA&DP	In terms of Regulation 4 of the Noise Control Regulations: "No person shall make, produce or cause a disturbing noise (greater than 5 dBA), or allow it to be made, produced or caused by any person, animal, machine, device or apparatus or any combination thereof".
Western Cape Nature and Environmental Ordinance 19 of 1974, (as amended by the Western Cape Nature Conservation Laws Amendment Act, Act 2 of 2000	The Nature and Environmental Ordinance 19 of 1974, (as amended by the Western Cape Nature Conservation Laws Amendment Act, Act 2 of 2000) defines the protection status of plants as follows: » **''endangered flora''** means flora of any species which is in danger of extinction and is specified in Schedule 3 or Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, 1973; provided that it shall not include flora of any species specified in such Appendix and Schedule 4; (thus all Schedule 3 species). » **''protected flora''** means any species of flora specified in Schedule 4 or Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, 1973;	CapeNature	Removal or relocation of protected plant or animal species requires a permit to be obtained from the CapeNature. No species were identified in a walkthrough and no permits are required.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	provided that it shall not include any species of flora specified in such Appendix and Schedule 3. » **''indigenous unprotected flora''** means any species of indigenous flora not specified in Schedule 3 or 4;		

Table 3.2: Standards applicable to the Excelsior Wind Energy Facility

Theme	**Standard**	**Summary**
Air	National Dust Control Regulations	National ambient air quality standards
	SANS 1929: Ambient Air Quality	Sets limits for common pollutants
Noise	SANS 10103:2008: The Measurement and Rating of Environmental Noise with Respect to Land Use, Health, Annoyance and Speech Communication	Provides noise levels for various areas
	Provincial Noise Control Regulations	Provides noise impact criteria
Waste	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) – National norms and standard for the storage of waste.	» Provides uniform national approach relating the management of waste facilities » Ensure best practice in management of waste storage » Provides minimum standards for the design and operation of new and existing waste storage
Water	Best Practise Guideline (G1) Storm Water Management DWA 2006	Provides guidelines to the management of storm water
General	IFC guidelines	Environmental, Health, and Safety Guidelines
	Equator Principals	Risk management framework

PURPOSE AND OBJECTIVES OF THE EMPR *CHAPTER 4*

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." The objective of this EMPr is to provide consistent information and guidance for implementing the management and monitoring measures established in the permitting process and help achieve environmental policy goals. The purpose of an EMPr is to 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 (i.e. site clearing and site establishment), during the construction activities themselves (i.e. erosion, noise, dust, and visual impacts), during site remediation (i.e. soil stabilisation, re-vegetation), during operation and decommissioning (i.e. similar to construction phase activities).

This EMPr has been compiled in accordance with Appendix 6 of the 2014 EIA Regulations and will be further developed in terms of specific requirements listed in any authorisations issued for the proposed project. The EMPr has been developed as a set of environmental specifications (i.e. principles of environmental management), 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).

This EMPr has the following objectives:

» Outline mitigation measures and environmental specifications which are required to be implemented for the planning, construction and rehabilitation, operation, and decommissioning phases of the project in order to manage and minimise the extent of potential environmental impacts associated with the facility.
» Ensure that all the phases of the project do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential environmental benefits are enhanced.
» Identify entities responsible for the implementation of the measures and outline functions and responsibilities.

- » Propose mechanisms and frequency for monitoring compliance, and preventing long-term or permanent environmental degradation.
- » Facilitate appropriate and proactive responses to unforeseen events or changes in project implementation that was not considered in the EIA process.

The management and mitigation measures identified within the Environmental Impact Assessment (EIA) process are systematically addressed in this EMPr, and ensure the minimisation of adverse environmental impacts to an acceptable level.

Amstilinx (RF) Proprietary Limited must ensure that the implementation of the project complies with the requirements of all environmental authorisations, permits, and obligations emanating from relevant environmental legislation. This obligation is partly met through the development and the implementation of this EMPr and through its integration into the contract documentation. Since this EMPr is part of the EIA process it is important that this document be read in conjunction with the final Scoping and EIA Reports for the project. This will contextualise the EMPr and enable a thorough understanding of its role and purpose in the integrated environmental management process. Should there be a conflict of interpretation between this EMPr and the environmental authorisation, the stipulations in the environmental authorisation shall prevail over that of the EMPr, unless otherwise agreed by the authorities in writing. Similarly, any provisions in current legislation overrule any provisions or interpretations within this EMPr.

This EMPr shall be binding on all the parties involved in the construction and operational phases and shall be enforceable at all levels of contract and operational management within the project.

STRUCTURE OF THIS EMPR *CHAPTER 5*

The preceding chapters provide background to the EMPr and the proposed project, while the chapters which follow consider the following:

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

These chapters set out the procedures necessary for the project, as the project owner, to minimise environmental impacts and achieve environmental compliance. For each of the phases of implementation for the wind energy facility project, an over-arching environmental **goal** is stated. In order to meet this goal, a number of **objectives** are listed. The management programme has been structured in table format in order to show the links between the goals for each phase and their associated objectives, activities/risk sources, mitigation actions, monitoring requirements and performance indicators. A specific EMPr 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 to meet the overall goals; which take into account the findings of the EIA specialist studies

Project Component/s	» List of project components affecting the objective.
Potential Impact	» Description of potential environmental impact if objective is not met.
Activity/Risk Source	» Description of activities which could affect achieving objective.
Mitigation: Target/Objective	» Description of the target and/or desired outcomes of mitigation.

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 programme.
Monitoring	Mechanisms for monitoring compliance; the key monitoring actions

	required to check whether the objectives are being achieved, taking into consideration responsibility, frequency, methods, and reporting.

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

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

5.1. Project Team

This EMPr was compiled by Jo-Anne Thomas and John von Mayer of Savannah Environmental. This EMPr is a revision of the EMPr contained within the EIA Report for the project (CSIR, April 2011). The Savannah Environmental team has extensive knowledge and experience in EIA and environmental management, having been involved in EIA processes over the past ten years. The company has drafted EMPrs for other power generation projects throughout South Africa, including numerous wind and solar energy facilities.

MANAGEMENT PROGRAMME: PRE-CONSTRUCTION CHAPTER 6

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

» Ensures that the design of the wind energy facility 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).
» Ensures that the best environmental options are selected for the linear components, including the access roads.
» Enables the wind energy facility 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.

6.1. Objectives

OBJECTIVE 1: Ensure the facility design responds to identified environmental constraints and opportunities

The following potentially sensitive areas were identified:

Areas of high ecological sensitivity – there are sensitive habitats which include listed and red data species, recorded for the site.

Project Component/s	» Wind turbines and associated infrastructure » Access roads.
Potential Impact	» Impact on identified sensitive areas.
Activities/Risk Sources	» Positioning of all the facility components.
Mitigation: Target/Objective	» The design of the facility responds to the identified environmental constraints and opportunities. » Site sensitivities are taken into consideration and avoided as far as possible, thereby mitigating potential impacts.

Mitigation: Action/Control	Responsibility	Timeframe
Plan and conduct pre-construction activities in an environmentally acceptable manner	Developer/Owner EPC Contractor	Pre-construction
Turbine selection, design and layout to minimise impact on the visual character of the area. a) 13 turbines should have uniform design, speed, colour, height, scale and rotor diameter.	Developer	Design
During the design development phase, the location of the seven turbines (36, 37, 38, 39, 40, 41 and 42) elsewhere on the site should be explored such that they can be a minimum of 500 m from the sensitive receptors, e.g. the R319 and homesteads. e.g. on the western extent of site.	Developer	Design (Already completed – refer to Figure 2.1)
Locate turbines to minimize loss of botanical sensitive areas. Refine the final layout of turbines on each site during the detailed design phase, to minimise the footprint on valuable renosterveld habitat.	Developer	Design (Already completed – refer to Figure 2.1)
Infrastructure to be ideally located 30 m from the edge of any High Botanical Sensitivity areas.	Developer	Design (Already completed – refer to Figure 2.1)
Turbines 17 and 33 should be moved at least 30 m away from the edge of the sensitive renosterveld areas. It is thus recommended that turbine 17 be moved 40 m to the east (to a point centred on the coordinates 34° 14’ 01.8” S and 20° 13’ 17.9” E) and that turbine 33 be moved about 30 m to the southwest (to a point centred on the coordinates 34° 13’ 44.1” S and 20° 14’ 26.6” E).	Developer	Design (Already completed – refer to Figure 2.1)
Re-alignment of three internal roads and associated cabling (Figures 6.3 A-C in Chapter 6 of the EIA report, CSIR, 2011) to minimise length of drainage line crossings.	Developer	Design (Already completed – refer to Figure 2.1)
A botanical site visit should be undertaken at the appropriate time of year (June – September), in order to assess the micro-scale botanical issues in the relatively few areas where infrastructure is likely to impact on natural vegetation. The focus should be on identifying and locating Species of Conservation Concern in these areas, and suggesting possible mitigation measures.	Ecology specialist	Design (Already completed)
During the design phase of the project, a botanist must be employed to prepare specifications for rehabilitation (seed collection, plant propagation, topsoil stripping, topsoil stockpiling, and management, topsoil replacing, rehabilitation and	Developer & specialist	Design (Already completed)

Mitigation: Action/Control	Responsibility	Timeframe
establishment) for the rehabilitation of disturbed, natural areas. Similarly, specifications for rehabilitation of disturbed, cultivated areas must be prepared.		
Undertake a heritage pre-construction survey of the facility development area (as required by SAHRA). Obtain the required permits where significant sites are to be impacted on.	Heritage specialist	Design (Already completed)
Undertake a geotechnical pre-construction survey to inform the final design of the facility.	Geotechnical specialist	Design (Already completed)
Consider and incorporate design level mitigation measures recommended by the specialists as detailed within the EIA Report and relevant appendices.	Engineering design consultant, turbine component supplier, and Developer	Design (Already completed – refer to Figure 2.1)
External access point and internal access road to be carefully planned to maximise road user safety.	Developer/Owner EPC Contractor	Design (Already completed)
Compile a comprehensive storm water management plan for hard surfaces as part of the final design of the project. This must include appropriate means for the handling of stormwater within the site, e.g. separate clean and dirty water streams around the plant, install stilling basins to capture large volumes of run-off, trapping sediments, and reduce flow velocities as well as appropriate drainage around the site.	Developer/Owner EPC Contractor	Design
Water usage design - optimise the design or technology to reduce consumptive water requirements as far as possible.	Developer/Owner EPC Contractor	Design
Plan the placement of light fixtures for the plant and the ancillary infrastructure in such a manner as to minimise impacts on the surrounding environment.	Developer/Owner EPC Contractor	Planning
Develop a comprehensive construction rehabilitation plan for the site.	Developer/Owner	Pre-construction
Fourteen (14) days written notice must be given to the Department that the activity will commence. The notification must include a date on which the activity will commence as well as the reference number.	Developer/Owner	Pre-construction
ECO to be appointed prior to the commencement of any authorised activities. Once appointed the name and contact details of the ECO must be submitted to the Director: Compliance Monitoring at the DEA.	Developer/Owner	Pre-construction
The terms of this EMPr and the Environmental	Developer/Owner	Tender process

Mitigation: Action/Control	Responsibility	Timeframe
Authorisation must be included in all tender documentation and Contractors contracts	EPC Contractor	
For access roads, colour and material selection during design phase should fit in with surroundings. The colour of imported road and standing area gravel and or paving material to be dark grey or brown, not light grey or white. During the design phase and in the construction tender documentation, the specification of materials should make allowance for these darker coloured materials. White stone (e.g. crushed sandstone and quartzite) is to be avoided as this material will be very visible when placed in this landscape.	Developer/Owner EPC Contractor	Planning
Employment of local community members (i.e. source labour from within the municipal area focused on the communities in closest proximity to the site) should be undertaken where possible.	EPC Contractor Owner	Tender process
Conduct a pre-construction bird monitoring survey over a 12 month period to establish baseline data on bird densities and flight patterns at the site, to inform the final turbine position. Results of the monitoring to be recorded in regular reports.	Developer	Pre-construction (Already completed)
Plan power lines between turbines to be underground (except possibly where lines cross water courses) and minimise above-ground connection to sub-station.	Developer	Design (Already completed)
Turbine blades and towers to be white to maximize conspicuousness to flying birds.	Developer	Design
Ensure that key areas of bird conservation importance and sensitivity are avoided.	Developer	Design (Already completed – refer to Figure 2.1)
All turbines to be located at a setback distance of 500 m from any homestead and a noise criteria level at the nearest residents of 45 dB(A) should be used to locate the turbines.	Developer	Design (Already completed – refer to Figure 2.1)
Water use license must be obtained for road crossings	Developer	Pre-construction
Appropriate road management strategies must be implemented on external and internal roads with all employees and contractors required to abide by standard road and safety procedures.	EPC Contractor (or appointed transportation contractor)	Pre-construction
All relevant permits for abnormal loads must be applied for from the relevant authority.	EPC Contractor (or appointed transportation contractor)	Pre-construction

Performance Indicator	» The design meets the objectives and does not degrade the environment. » Design and layouts respond to the mitigation measures and recommendations in the EIA Report. » Minimal impact on natural vegetation. » No-Go areas and areas of high sensitivity are avoided. » Environmental permits are obtained where required.
Monitoring	» Review of the design by the Construction Manager and the Environmental Control Officer prior to the commencement of construction.

OBJECTIVE 2: Minimise stormwater runoff and subsequent alteration of the local hydrological regime

Project Component/s	» Stormwater management components » All hard engineered surfaces (i.e. access roads).
Potential Impact	» Poor stormwater management and alteration of the hydrological regime.
Activities/Risk Sources	» Construction of the facility (i.e. placement of hard engineered surfaces).
Mitigation: Target/Objective	» Appropriate management of stormwater to minimise impacts on the environment.

Mitigation: Action/Control	Responsibility	Timeframe
A buffer zone of 50m must be maintained around the main drainage system (outside the development area) with 30m buffer zones around its tributaries.	EPC Contractor	Planning and design (already completed)
Reduce the potential increase in surface flow velocities and the resultant impact on the localised drainage system through increased sedimentation.	Developer/Owner EPC Contractor	Planning and design
Construction must include appropriate design measures that allow surface and sub-surface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of stormwater runoff.	Developer/Owner EPC Contractor	Planning and design
Design must ensure the separation of dirty and clean water runoff from the site, and appropriate containment of dirty water.	Developer/Owner EPC Contractor	Planning and design
New access roads within the site are to be constructed according to design and contract specifications. The access routes must have suitable stormwater management plans and erosion control measures.	Developer/Owner EPC Contractor	Planning and design

Mitigation: Action/Control	Responsibility	Timeframe
Wind screening and stormwater control systems should be implemented to reduce/prevent erosion from the project site.	Developer/Owner EPC Contractor	Planning and design
All stormwater mitigation measures must be undertaken according to the Stormwater Management Plan compiled by (refer to Appendix E).	Developer/Owner EPC Contractor	Planning and design, construction

Performance Indicator	» Sound water management.
Monitoring	» Appropriate stormwater management system in place

OBJECTIVE 3: 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 wind energy facility. Any issues and concerns raised should be addressed as far as possible in as short a timeframe as possible.

Project component/s	» Wind energy facility
Potential Impact	» Impacts on affected and surrounding landowners and land uses
Activity/risk source	» Activities associated with construction » Activities associated with facility operation
Mitigation: Target/Objective	» 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
Implement a transparent approach and open consultation with adjacent property owners, prior and throughout the construction period in order to provide a platform where grievances or requests can be addressed before issues become contentious.	Developer/Owner EPC Contractor	Pre-construction (construction procedure) Pre-operation (operation procedure)
Before construction commences, representatives from the local municipality, community leaders, community-based organisations and the surrounding property owners, should be informed of the details of the contractors, size of the workforce and	Owner	Pre-construction

Mitigation: Action/control	Responsibility	Timeframe
construction schedules.		

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

MANAGEMENT PROGRAMME: CONSTRUCTION CHAPTER 7

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

» Ensures that construction activities are appropriately 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 noise impacts, farming practices, traffic and road use, and effects on local residents.
» Minimises the impact on the indigenous natural vegetation, and habitats of ecological value.
» Minimises impacts on fauna using the site.
» Minimises the impact on heritage sites should they be uncovered.

7.1. Institutional Arrangements: Roles and Responsibilities for the Construction Phase

As the proponent, Amstilinx (RF) Proprietary Limited must ensure that the implementation of the facility complies with the requirements of all environmental authorisations and permits, and obligations emanating from other relevant environmental legislation. This obligation is partly met through the development and implementation of the EMPr, and through its integration into the contract documentation. Excelsior Wind Energy Facility (Pty) Ltd retain various key roles and responsibilities during the construction of the facility.

OBJECTIVE 1: Establish clear reporting, communication, and responsibilities in relation to overall implementation of environmental management programme during construction

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Technical Director/Manager; Site Manager; Internal Environmental Officer, Safety and Health Representative; Independent Environmental Control Officer (ECO) and Contractor for the construction phase of this project are as detailed below. Formal responsibilities are necessary to ensure that key procedures are executed. Figure 6.1 provides an organogram indicating the organisational structure for the implementation of the EMPr.

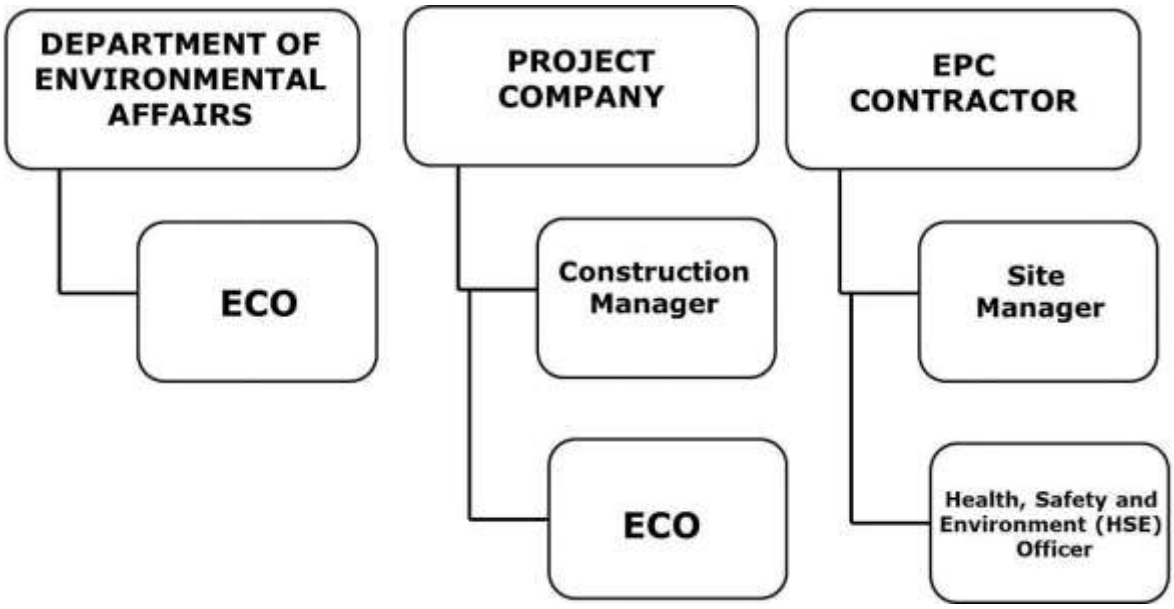

Figure 6.1: Organisational structure for the implementation of the EMPr

Construction Manager will:

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

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

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

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

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

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

As a general mitigation strategy, the Environmental Control Officer (ECO) should be present for the site preparation and initial clearing activities to ensure the correct demarcation of no-go areas, facilitate environmental induction with construction staff and supervise any flora relocation and faunal rescue activities that may need to take place during the site clearing (i.e. during site establishment, and excavation of foundations). Thereafter weekly site compliance inspections would probably be

sufficient. However, in the absence of the ECO there should be a designated owner's environmental officer present to deal with any environmental issues that may arise such as fuel or oil spills. The ECO shall remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site handed over for operation.

Contractors and Service Providers: It is important that Contractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMPr. The Contractor will appoint an Internal Environmental Officer whom will be responsible for informing contractor employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. The Internal Environmental Officer and Contractor's obligations in this regard include the following:

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

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

» Ensuring adherence to the environmental management specifications.

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

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

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

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

7.2. Objectives

In order to meet the overall goal for construction, the following objectives, actions, and monitoring requirements have been identified.

OBJECTIVE 2: Minimise impacts related to inappropriate site establishment

The contractor must take all reasonable measures to ensure the safety of the public in the surrounding area.

Project Component/s	» Area infrastructure (i.e. wind turbines, laydown areas). » Access roads.
Potential Impact	» Hazards to landowners and public. » Damage to indigenous natural vegetation, due largely to ignorance of where such areas are located. » Loss of threatened plant species and protected tree species.
Activities/Risk Sources	» Open excavations (foundations and cable trenches). » Movement of construction vehicles in the area and on-site.
Mitigation: Target/Objective	» To secure the site against unauthorised entry. » To protect members of the public/landowners/residents. » No loss of or damage to sensitive vegetation in areas outside the immediate development footprint.

Mitigation: Action/Control	Responsibility	Timeframe
Secure site, working areas and excavations in an appropriate manner.	EPC Contractor	Site establishment, and duration of construction
Prior to the commencement of construction activities, the no go areas must be clearly demarcated with fencing.	EPC Contractor	Site establishment
The Contractor is to provide a method statement, including a construction site layout plan, before site clearance commences. The method statement must clearly indicate all material storage areas, offices and other site infrastructure, waste disposal/ storage areas etc., designed to minimize removal of vegetation and damage to surrounding areas.	EPC Contractor	Site establishment
Fence and secure contractor's equipment camp.	EPC Contractor	Site establishment
Develop an efficient access control system which allows for the identification of all people on site	EPC Contractor	Site establishment and duration of contract
Where access roads cross natural drainage lines, culverts must be regularly maintained to allow free flow of water.	EPC Contractor	During construction
Where the public could be exposed to danger by any of	EPC Contractor	Site

Mitigation: Action/Control	Responsibility	Timeframe
the works or site activities, the contractor must, as appropriate, provide suitable flagmen, barriers and/or warning signs in English, Afrikaans and any other relevant local language/s, all to the approval of the Site Manager.		establishment and duration of contract
All unattended open excavations must be adequately demarcated and/or fenced. Adequate protective measures must be implemented to prevent unauthorised access to the working area and the internal access/haul routes.	EPC Contractor	Site establishment and duration of contract
Minimise vegetation clearance or removal associated with site establishment activities.	EPC Contractor	Site establishment
Topsoil is to be stripped to a depth of at least 150 mm where possible from construction areas and preserved for rehabilitation. Stockpiles must be established in a designated area, not exceeding a height of 2 m. The stockpile must be located away from seepage zones, floodlines, water courses and other ecological sensitive areas.	EPC Contractor	Site establishment
Excavated/disturbed areas on site and adjacent to the site have topsoil replaced to a depth of at least 10 cm during the rehabilitation phase of the construction period (provided such soil is available from on-site stockpiles). This applies to the underground electrical cable route, road verges, area around turbine concrete foundation (to enable grazing to the edge of the foundation), parts of lay-down area where topsoil was disturbed, and the rehabilitation along on the edges of the access roads.	EPC Contractor	Site establishment
Establish SABS 089: 1999 Part 1 approved bunded areas for storage of hazardous materials and hazardous waste.	EPC Contractor	Site establishment
Establish the necessary ablution facilities with chemical toilets and provide adequate sanitation facilities and ablutions for construction workers (1 toilet per every 15 workers) at appropriate locations on site.	EPC Contractor	Site establishment, and duration of construction
Ablution or sanitation facilities should not be located within 50 m of water courses and wetlands.	EPC Contractor	Site establishment, and duration of construction
Supply adequate weather and vermin proof waste collection bins and skips (covered at minimum with secured netting or shadecloth) at site where construction is being undertaken. Separate bins should be provided for general and hazardous waste. As far as possible, provision should be made for separation of	EPC Contractor	Site establishment, and duration of construction

Mitigation: Action/Control	Responsibility	Timeframe
waste for recycling.		
Locate construction site office in a visually discreet area away from the R319.	EPC Contractor	Site establishment

Performance Indicator	» Site is secure and there is no unauthorised entry. » No members of the public/ landowners injured. » Appropriate and adequate waste management and sanitation facilities provided at construction site. » Unnecessary vegetation clearing and levelling is not undertaken.
Monitoring	» An incident reporting system will be used to record non-conformances to the EMPr. » ECO to monitor all construction areas on a continuous basis until all construction is completed. Non-conformances must be immediately reported to the site manager.

OBJECTIVE 3: Appropriate management of the construction site and construction workers

Only security personnel will be accommodated on site. Contractors and their employees are expected to be accommodated at existing accommodation facilities in the study area or within an appropriately sited construction camp. Construction equipment will need to be stored at appropriate locations on site.

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

Project Component/s	» Area and linear infrastructure.
Potential Impact	» Damage to indigenous natural vegetation and sensitive areas. » Damage to and/or loss of topsoil (i.e. pollution, compaction etc.). » Impacts on the surrounding environment due to inadequate sanitation and waste removal facilities. » Pollution/contamination of the environment.
Activities/Risk Sources	» Vegetation clearing and levelling of equipment storage area/s. » Access to and from the equipment storage area/s. » Ablution facilities. » Accommodation facilities. » Contractors not aware of the requirements of the EMPr, leading to

	unnecessary impacts on the surrounding environment.
Mitigation: Target/Objective	» Limit equipment storage within demarcated designated areas. » Ensure adequate sanitation facilities and waste management practices. » Ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment.

Mitigation: Action/Control	Responsibility	Timeframe
The siting of the construction equipment camp/s must take cognisance of any sensitive areas identified by the EIA studies and reflected on the site layout plan included within this EMPr. No temporary site camps will be allowed outside the footprint of the development area.	EPC Contractor	Pre-construction
Ensure that all personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm. This can be achieved through the provision of appropriate environmental awareness training to all personnel. Records of all training undertaken must be kept.	EPC Contractor	Duration of construction
Safety representatives, managers and workers must be trained in workplace safety. The construction process must be compliant with all safety and health measures as prescribed by the relevant Act.	H&S Representative	Duration of contract
Emergency numbers for the police, fire department, clinic and relevant responsible staff will be made available in conspicuous locations.	EPC Contractor	Duration of contract
Employees must use chemical toilets/ablution facilities situated at designated areas of the site; no ablution activities will be permitted outside the designated areas.	EPC Contractor and sub-contractor/s	Duration of contract
Ensure ablution facilities are appropriately maintained. Ablutions must be cleaned regularly and associated waste disposed of at a registered/permitted waste disposal site. Portable ablutions must be removed from site when construction is completed.	EPC Contractor	Site establishment, and duration of construction
Cooking/meals must take place in a designated area. No firewood or kindling may be gathered from the site or surrounds. Designate smoking areas as well as areas for cooking, where the fire hazard could be regarded as insignificant.	EPC Contractor and sub-contractor/s	Duration of contract
Informal vending stations should not be allowed on or near the construction site.	EPC Contractor	Construction
Fire-fighting equipment and training must be provided	EPC Contractor	Duration of

Mitigation: Action/Control	Responsibility	Timeframe
before the construction phase commences.	and sub-contractor/s	contract
All litter must be deposited in a clearly marked, closed, animal-proof disposal bin in the construction area. Particular attention needs to be paid to food waste.	EPC Contractor and sub-contractor/s	Duration of contract
Ensure waste disposal facilities are maintained and emptied as and when required.	EPC Contractor	Site establishment, and duration of construction
All work sites must be kept free of waste. No solid waste may be burned or buried on site or disposed of by any other method on site or within quarries or borrows pits. Solid waste (general waste) to be disposed of at the closest municipal landfill site. Slips of disposal to be retained as proof of responsible disposal	EPC Contractor	Site establishment, and duration of construction
No one may disturb flora or fauna outside of the demarcated construction area/s.	EPC Contractor and sub-contractor/s	Duration of contract
Sub-contractors appointed by the Contractor must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms.	EPC Contractor and sub-contractor/s	Construction
Water resources to be used sparingly and use not to exceed the resource potential or recharge rate. Contractor to keep detailed records of water quantities used.	EPC Contractor	Pre-Construction
Educate workers on the dangers of open and/or unattended fires.	EPC Contractor	Erection: during site establishment Maintenance: duration of contract
Rehabilitate all disturbed areas at the construction equipment camp as soon as construction is complete within an area.	EPC Contractor	Duration of Contract
Information distributed as part of the existing HIV/Aids awareness campaigns should again be focused on and communicated to the local workforce.	Owner EPC Contractor	Construction
No vehicles or machinery are to be washed on site, outside of the designated areas.	EPC Contractor	Duration of contract

Performance Indicator	» The construction equipment camps have avoided sensitive areas. » Ablution and waste removal facilities are appropriately maintained and do not pollute the environment due to mismanagement. » All areas are rehabilitated promptly after construction in an area is complete. » No complaints regarding contractor behaviour or habits. » Appropriate training of all staff is undertaken prior to them commencing work on the construction site. » Contractors' Code of Conduct drafted before commencement of construction phase. » Fire-fighting training given to workers prior to construction commencing
Monitoring	» Regular audits of the construction camps and areas of construction on site by the ECO. » Proof of maintenance of ablution facilities available on site » An incident reporting system should be used to record non-conformances to the EMPr. » Complaints investigated and, if appropriate, acted upon.

OBJECTIVE 4: Maximise local employment associated with the construction phase

Employment opportunities could be created during the construction phase, specifically for semi-skilled and unskilled workers. As far as possible, these workers should be sourced from local areas.

Project Component/s	» Construction activities associated with the establishment of the facility, including the associated infrastructure.
Potential Impact	» The opportunities and benefits associated with the creation of local employment.
Activities/Risk Sources	» Contractors who make use of their own labour for unskilled tasks, thereby reducing the employment for locals. » The inflow of various specialists from outside the study area and even abroad. » Sourcing of individuals with skills similar to the local labour pool outside the municipal area.
Mitigation: Target/Objective	» Employment of a maximum number of low-skilled to semi-skilled workers for the project from the local area where possible.

Mitigation: Action/Control	Responsibility	Timeframe
Employment of local community members (i.e. source labour from within the municipal area focused on the communities in closest proximity to the site) should	EPC Contractor Owner	Duration of construction

Mitigation: Action/Control	Responsibility	Timeframe
be undertaken where possible.		
An equitable process should be promoted whereby locals and previously disadvantaged individuals (including women) are considered for employment opportunities.	EPC Contractor	Duration of construction
A local labour desk should be set-up (if not already established) in the beneficiary communities to co-ordinate the process of involving local labour.	EPC Contractor	Pre-construction
Skills training and capacity building should be embarked where possible during the construction process.	EPC Contractor	Pre-construction and construction
Develop a transparent communication and recruitment process to minimise the influx of jobseekers to the area.	EPC Contractor	Pre-construction
The recruitment process and the use of contractors should be clearly communicated to the local communities. The communication strategy should ensure that unrealistic employment expectations are not created.	Owner EPC Contractor	Pre-construction

Performance Indicator	» Job opportunities, especially of low to semi-skilled positions, are awarded to members of local communities as appropriate. » Locals and previously disadvantaged individuals (including women) are considered during the hiring process. » The involvement of local labour is promoted. » Reports are not made from members of the local communities regarding unrealistic employment opportunities or that only outsiders were employed.
Monitoring	» The Owner and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.

OBJECTIVE 5: Minimise the potential impact on health, safety and security

An inflow of workers could, as a worst case scenario and irrespective of the size of the workforce, pose some security risks. Criminals could also use the opportunity due to "outsiders" being in the area to undertake their criminal activities. Employing local community members could minimise the potential for criminal activity or perceived perception of an increase in criminal activity due to the presence of an outside workforce.

The actual safety of construction workers is also of concern. Further health and safety issues associated with the actual construction site include unauthorised entry to the site and construction areas, the usage of large equipment on site, the risks associated with the storage of equipment and material on site, as well as the increased risk of accidents due to the increased movement of construction vehicles on the local roads.

Other concerns relate to littering, unwanted behaviour of construction workers, transmission of Sexually Transmitted Diseases (STDs), environmental pollution, an increase risk in fires and so forth. Although such perceptions cannot be substantiated or be changed it should be sensitively dealt with. It is thus clear that even though the construction phase when these impacts could occur is only of a short duration, the effects of the impacts could remain in the medium term.

Project Component/s	» Inflow of workers could result in increased safety and security risks.
Potential Impact	» Outside workers are involved in criminal activities and/or fires occur.
Activities/Risk Sources	» Theft of construction material. » On-site accidents. » Spread of sexually transmitted diseases. » Littering and environmental pollution.
Mitigation: Target/Objective	» Employment of local labour should be maximised and strict security measures should be implemented at the construction site.

Mitigation: Action/Control	Responsibility	Timeframe
On-site security should be active prior to the construction phase.	EPC Contractor	Pre- construction
Construction workers should be easily identifiable by wearing uniforms and identification tags/ induction cards.	EPC Contractor	Construction
All staff should undergo a general H&S induction and simplified environmental awareness training session	EPC Contractor (and sub-contractor/s)	Duration of contract
Procedures and measures to prevent, and in worst cases, attend to fires should be developed in consultation with the surrounding property owners and the Local Municipality	Owner, Local Municipality, and local communities	Pre- construction and when required
Appropriate fire-fighting equipment must be present on site and members of the workforce should be appropriately trained in using this equipment in the fighting of veld fires	EPC Contractor	Construction
Contact details of emergency services should be prominently displayed on site.	EPC Contractor	Construction

Performance Indicator	» No theft of material or equipment on site » No fires originating on the site or on-site accidents occur.
Monitoring	» The Owner, and appointed ECO must monitor indicators listed above to ensure that they have been implemented.

OBJECTIVE 6: Minimise the potential impact on the daily living and movement patterns

Some intrusion impacts due to the construction activities and vehicular movements (noise and dust) on the surrounding property owners could be experienced.

Project Component/s	» Construction activities associated with the area and linear infrastructure. » Delivery of any component required within the construction phase.
Potential Impact	» Impact of heavy construction vehicles on road surfaces, and possible increased risk in accidents involving people and animals. » Traffic congestion, particularly on narrow roads or on road passes where overtaking is not permitted. » Deterioration of road pavement conditions (both surfaced and gravel road) due to abnormal loads. » Possible increase in dust, noise, and general intrusion.
Activities/Risk Sources	» Construction vehicle movement. » Increased risk of accidents due to increase in vehicle movement. » Mobile construction equipment movement on-site. » Possible degradation of local roads. » Site preparation and earthworks. » Emissions from construction vehicles. » Excavation, grading, scraping, levelling, digging, drilling
Mitigation: Target/Objective	» Limit any negative impacts on the surrounding property owners' daily living and movement patterns. » Minimise impact of traffic associated with the construction of the facility on local traffic volume, existing infrastructure, property owners, animals, and road users. » To minimise nuisance to the community from dust emissions and to comply with workplace health and safety requirements for the duration of the construction phase

Mitigation: Action/Control	Responsibility	Timeframe
Adequate parking for all employees, contractors and sub-contractors will be made available and should not impact negatively on neighbouring farmers.	EPC Contractor	Pre-construction and construction
Access roads and entrances to the site should be carefully planned to limit any intrusion on the neighbouring property owners and road users and to limit any accident risks. Additional access roads should be kept to a minimum.	EPC Contractor	Pre-construction and construction
Source general construction material and goods locally where available to limit transportation over long distances.	EPC Contractor	Construction
Local labourers should be used as far as possible during the construction phase to limit the inflow of outsiders to the area.	EPC Contractor	Construction
Construction activities should not interfere with the farming activities on surrounding properties.	EPC Contractor	Construction
Minimise noise from construction - Vehicles, earth moving and terracing of sites, construction of access roads and hard standing areas.	EPC Contractor	Construction
Compile and implement a traffic management plan for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted.	EPC Contractor	Pre-construction
Gravel roads and cleared areas should be sprayed with an appropriate dust suppressant to limit dust creation.	EPC Contractor	Construction
Construction vehicles and those transporting materials and goods should be inspected by the contractor or a sub-contractor to ensure that these are in good working order and not overloaded.	EPC Contractor	Construction
Strict vehicle safety standards should be implemented and monitored.	Developer/Owner	Construction
No deviation from approved transportation routes must be allowed, unless roads are closed for whatever reason outside the control of the contractor.	EPC Contractor	Duration of contract
Any traffic delays because of construction traffic must be co-ordinated with the appropriate authorities.	EPC Contractor	Duration of contract
The movement of all vehicles within the site must be on designated roadways.	EPC Contractor	Duration of contract
Signage must be established at appropriate points warning of turning traffic and the construction site, identifying speed limits, travel restrictions, and other standard traffic control information. All signage to be in accordance with prescribed standards and must be	EPC Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
appropriately maintained for the duration of the construction period.		
Ensure that any damage to internal roads because of construction activities is repaired before completion of the construction phase.	EPC Contractor	Duration of contract
Haul vehicles moving outside the construction site carrying material that can be wind-blown will be covered with suitable material.	EPC Contractor	Duration of contract
Speed of construction vehicles must be restricted, as defined by the EPC contractor.	EPC Contractor	Duration of contract
Dust-generating activities or earthworks may need to be rescheduled or the frequency of application of dust control/suppressant increased during periods of high winds if visible dust is blowing toward nearby residences outside the site.	EPC Contractor	Duration of contract

Performance Indicator	» Limited noise and dust pollution. » Limited intrusions on surrounding property owners. » Vehicles are in good working order and safety standards are implemented. » Local residents and road users are aware of vehicle movements and schedules. » Local road conditions and road surfaces are maintained » No reports from property owners regarding problems with construction activities and workforce. » Limited degradation of local roads.
Monitoring	» Owner, and appointed ECO must monitor indicators listed above to ensure that they have been implemented. » Immediate reporting by personnel of any potential or actual issues with nuisance dust or emissions to the Site Manager. » A complaints register must be maintained, in which any complaints from residents/the community will be logged, and thereafter complaints will be investigated and, where appropriate, acted upon. » An incident reporting system must be used to record non-conformances to the EMPr.

OBJECTIVE 7: Minimisation of development footprint

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

Project	» Area infrastructure (i.e. wind turbines, laydown areas).

Component/s	» Substation, offices and workshops. » Access roads.
Potential Impact	» Impacts on natural vegetation and faunal habitats. » Loss of indigenous natural vegetation due to construction activities.
Activity/Risk Source	» Vegetation clearing » Site preparation and earthworks. » Excavation of foundations. » Construction of site access roads. » Site preparation (e.g. compaction). » Foundations or plant equipment installation. » Substation construction activities. » Stockpiling of topsoil, subsoil and spoil material.
Mitigation: Target/Objective	» To retain natural vegetation, where possible. » To minimise footprints of disturbance of vegetation/habitats on-site » Minimise loss of topsoil. » Minimise spoil material.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
Areas to be cleared must be clearly marked on-site to eliminate the potential for unnecessary clearing.	EPC Contractor	Duration of Construction
Mitigation measures must be implemented to reduce the risk of erosion and the invasion of alien species.	EPC Contractor	Site establishment & duration of contract
No-Go areas are to be demarcated with tape and warning signs prohibiting access erected. Plant and vehicle operators must be instructed by the SHE on where these No-Go sites are.	EPC Contractor	Construction
No vegetation removal must be allowed outside the designated project development footprint.	EPC Contractor	Construction
A site rehabilitation programme must be implemented.	EPC Contractor in consultation with Ecologist	Duration of contract
Disturbed areas should be rehabilitated when construction in an area is completed. Rehabilitated areas must be inspected on a monthly basis and maintained, if necessary	EPC Contractor	Rehabilitation; Post-construction

Performance Indicator	» No disturbance outside of designated work areas. » Minimise clearing of existing vegetation.
Monitoring	» Observation of vegetation clearing activities by SHE representative and ECO throughout construction phase. » Supervision of all clearing and earthworks. » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 8: Appropriate management of topsoil

Project Component/s	» Any infrastructure or activity that will result in disturbance to natural areas.
Potential Impact	» Loss of topsoil
Activity/Risk Source	» Site preparation and earthworks. » Excavation of foundations. » Construction of site access roads. » Site preparation (e.g. compaction). » Foundations or plant equipment installation. » Stockpiling of topsoil, subsoil and spoil material.
Mitigation: Target/Objective	» To minimise footprints of disturbance » Minimise loss of topsoil

Mitigation: Action/Control	Responsibility	Timeframe
Topsoil is to be stripped to a depth of 150 mm where possible from construction areas and will be stockpiled in a designated area, not exceeding a height of 2 m. The stockpile shall be located away from seepage zones, floodlines, water courses and other ecological sensitive areas (drainage lines).	EPC Contractor	Site establishment, during construction
Topsoil must be stockpiled and appropriately managed to ensure viability for reuse during rehabilitation.	EPC Contractor	Duration of contract
No mixing of topsoil and subsoil must be permitted. Stockpiles must be stored separately and returned for backfilling in the correct soil horizons.	EPC Contractor	Site establishment, during construction
Should topsoil be stockpiled for longer than 6 months it must be vegetated or otherwise protected against erosion.	EPC Contractor	Site establishment & duration of contract

Performance Indicator	» Minimised loss of topsoil. » Appropriate stockpiling and management of topsoil
Monitoring	» Monitoring of topsoil clearing activities » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 9: Minimise soil degradation and erosion

The soil on site may be impacted in terms of:

» Uncontrolled run-off relating to construction activity (excessive wetting, uncontrolled discharge, etc.) will also lead to accelerated erosion.
» Incorrect storage of topsoil
» Accidental spillages
» Poor rehabilitation
» Erosion from rainwater

Project Component/s	» Area infrastructure (i.e. wind turbines, laydown areas). » Substation, offices and workshops. » Access roads.
Potential Impact	» Soil and rock degradation. » Soil erosion. » Increased deposition of soil into drainage systems. » Increased run-off over the site.
Activities/Risk Sources	» Removal of vegetation, excavation, stockpiling, compaction, and pollution of soil. » Rainfall - water erosion of disturbed areas. » Wind erosion of disturbed areas. » High velocity discharge of water from construction activity.
Mitigation: Target/Objective	» Minimise extent of disturbance areas. » Minimise activity within disturbance areas. » Minimise soil degradation (mixing, wetting, compaction, etc.). » Minimise soil erosion. » Minimise deposition of soil into drainage lines as a result of runoff. » Minimise instability of embankments/excavations.

Mitigation: Action/Control	Responsibility	Timeframe
Identify disturbance areas and restrict construction activity to these areas.	EPC Contractor	Before and during construction
Rehabilitate disturbance areas as soon as practicable when construction in an area is complete.	EPC Contractor	During and after construction
Access roads to be carefully planned and constructed to minimise the impacted area and prevent unnecessary excavation, placement, and compaction of soil.	EPC Contractor	Design and construction
Minimise removal of vegetation which adds stability to soil.	EPC Contractor	Construction
Erosion and loss of soil must be prevented by	EPC Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
minimizing the construction site exposed to surface water run-off. Where necessary erosion stabilizing actions such as gabions or re-vegetation must be implemented to prevent further habitat deterioration.		
Erosion control measures: Run-off attenuation on slopes (sand bags, logs), silt fences, storm water catch-pits, shade nets, gabions or temporary mulching over denuded area as required.	EPC Contractor	Erection: Before construction Maintenance: Duration of contract
No soil is to be stripped from areas within the site that the contractor does not require for construction works.	EPC Contractor	Construction
Erosion control measures to be regularly maintained.	EPC Contractor	Construction

Performance Indicator	» No activity outside demarcated disturbance areas. » Limited soil erosion around site. » No increase in siltation in drainage lines as a result of construction activities. » No activity in restricted areas.
Monitoring	» On-going inspections of the site by the ECO. » Monthly inspections of sediment control devices by the ECO » Monthly inspections of surroundings, including drainage lines (outside the development area) by the ECO. » An incident reporting system will record non-conformances.

OBJECTIVE 10: Minimise the impacts on fauna

Project Component/s	» Any infrastructure or activity that will result in disturbance to natural areas.
Potential Impact	» Loss or displacement of fauna
Activity/Risk Source	» Site preparation and earthworks. » Construction-related traffic. » Foundations or plant equipment installation. » Mobile construction equipment.
Mitigation: Target/Objective	» To minimise footprints of habitat destruction » To minimise disturbance to (and death of) resident and visitor faunal and avifaunal species

Mitigation: Action/Control	Responsibility	Timeframe
Areas to be cleared must be clearly marked in the field to eliminate unnecessary clearing/disturbance. Remove	EPC Contractor	Pre-construction

Mitigation: Action/Control	Responsibility	Timeframe
tortoises and other fauna from the turbine sites before the start of site clearing construction.		
The extent of clearing and disturbance to the native vegetation must be kept to a minimum so that impact on fauna and their habitats is restricted.	EPC Contractor	Site establishment & duration of contract
A speed limit of 60 km/h needs to be implemented on the access roads to the site and a 40 km/h speed limit on the access roads within the construction site.	EPC Contractor	Construction
The intentional harming or killing of animals will be prohibited through on-site supervision and worksite rules.	EPC Contractor	Construction
A site rehabilitation programme should be implemented.	EPC Contractor in consultation with Specialist	Duration of contract

Performance Indicator	» No disturbance outside of designated work areas » Minimised clearing of existing/natural vegetation and habitats for fauna » Limited impacts on faunal species (i.e. noted/recorded fatalities)
Monitoring	» Observation of vegetation clearing activities by ECO throughout construction phase » Supervision of all clearing and earthworks » Recording faunal fatalities to monitor success of relocation efforts » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 11: Minimise impacts on water resources

Project Component/s	» Construction activities » Storage of chemicals and hazardous materials. » Ablution facilities.
Potential Impact	» Pollutants such as lime-containing (high pH) construction materials such as concrete, cement, grouts, etc. could be harmful to aquatic biota, particularly during low flows when dilution is reduced.
Activity/Risk Source	» Fuelling, usage and maintenance of construction vehicles. » Cement batching and usage. » Labourer using ablution facilities. » Use of any chemicals or hazardous materials during construction.
Mitigation: Target/Objective	» No incidents related to spills of chemicals and hazardous materials. » No release of contaminated water in drainage lines. » No misbehaviour of construction workers (i.e. ablution activities, washing).

Mitigation: Action/Control	Responsibility	Timeframe
Implement strict management of all hazardous materials used on site. Spilled fuel, oil or grease is retrieved where possible, and contaminated soil removed, cleaned and replaced. Contaminated soil to be collected by the Contractor and disposed of at a waste site designated for this purpose.	EPC Contractor	Construction
Ensure strict management of potential sources of pollution (hydrocarbons from vehicles and machinery, cement during construction, etc.). Bunded containment to be provided below and around any fuel storage containers.	EPC Contractor	Construction
Construction equipment is to be checked daily (by Contractor) to ensure that no fuel spillage takes place from construction vehicles or machinery.	EPC Contractor	Construction
Portable bioremediation kit (to remedy chemical spills) is to be held on site and used as required.	EPC Contractor	Construction
Proper use of chemical toilets should be strictly enforced.	EPC Contractor	Construction
No activities shall be allowed to encroach into a water course or wetland/pan without a Water Use License being in place from the Department of Water and Sanitation (DWS).	EPC Contractor Owner	Design Construction
If any concrete mixing takes place on site, this is to be done on a board or plastic sheeting, which is to be removed from the site once concreting is completed; or in areas to be covered by further construction.	EPC Contractor	Construction
Sand, stone and cement are stored in demarcated areas, and are covered or sealed to prevent wind erosion and resultant deposition of dust on the surrounding indigenous vegetation.	EPC Contractor	Construction
Any excess sand, stone and cement must be removed from site at the completion of the construction period.	EPC Contractor	Construction

Performance Indicator	» No major preventable spillages are recorded
Monitoring	» Monitor management measures in place for potentially hazardous materials

OBJECTIVE 12: Appropriate Stormwater Management

Project Component/s	» Alteration of sandy substrata into hard surfaces impacting on the local hydrological regime
Potential Impact	» Poor stormwater management and the alteration of hydrological regime
Activities/Risk Sources	» Placement of hard engineered surfaces
Mitigation: Target/Objective	» Reduce the potential increase in surface flow velocities and the impact on dry riverbeds and the localised drainage systems

Mitigation: Action/Control	Responsibility	Timeframe
Any stormwater within the site must be handled in a suitable manner, i.e. clean dirty water streams around the plant and install stilling basins to capture large volumes of run-off, shade nets, or gabions trapping sediments and reduce flow velocities.	EPC Contractor	Planning, design and construction
Stormwater control systems must be implemented to reduce erosion on the project site.	EPC Contractor	Design Construction
New access roads within the site are to be constructed according to design and contract specifications. The access routes must have suitable stormwater management plans and erosion control measures.	EPC Contractor	Design Construction
Drainage measures must promote the dissipation of storm water run-off.	EPC Contractor Owner	Design Construction
All stormwater mitigation measures must be implemented according to the Stormwater Management Plan (refer to Appendix E).	EPC Contractor	Construction

Performance Indicator	» Water quality and quantity management
Monitoring	» Appropriate stormwater management system in place

OBJECTIVE 13: Protection of heritage resources

The main cause of impacts to archaeological sites is physical disturbance of the material itself and its context. The heritage and scientific potential of an archaeological site is highly dependent on its geological and spatial context. This means that even though, for example a deep excavation may expose archaeological artefacts, the artefacts are

relatively meaningless once removed from the area in which they were found. Large-scale excavations for foundations will damage archaeological sites, as will road construction activities.

Archaeological or other heritage materials occurring in the path of any surface or sub-surface disturbances associated with any aspect of the development are highly likely to be subject to destruction, damage, excavation, alteration, or removal. The objective should be to limit such impacts to the primary activities associated with the development and hence to limit secondary impacts during the medium and longer term working life of the facility.

Project Component/s	» Turbines » Substation » Offices and workshops. » Access roads.
Potential Impact	» Heritage objects or artefacts found on site are inappropriately managed or destroyed
Activity/Risk Source	» Site preparation and earthworks » Foundations or plant equipment installation » Mobile construction equipment movement on site
Mitigation: Target/Objective	» To ensure that any heritage objects found on site are treated appropriately and in accordance with the relevant legislation

Mitigation: Action/control	Responsibility	Timeframe
Areas required to be cleared during construction must be clearly marked in the field to avoid unnecessary disturbance of adjacent areas (which will not be surveyed in detail by a heritage specialist).	EPC Contractor in consultation with Heritage Specialist	Pre-construction
Familiarise all staff and contractors with procedures for dealing with heritage objects/sites.	Heritage Specialist	Pre-construction
Project employees and any contract staff must maintain, at all times, a high level of awareness of the possibility of discovering heritage sites.	EPC Contractor	Duration of contract
If a heritage object is found, work in that area must be stopped immediately, and appropriate specialists brought in to assess the site, notify the administering authority of the item/site, and undertake due/required processes.	EPC Contractor in consultation with Heritage Specialist	Duration of contract
If any substantial fossil remains are found or exposed, these should be safe-guarded, preferably in situ, while SAHRA is contacted by the HSE Officer/EO and a qualified palaeontologist is contracted to record and sample the occurrence. Mitigation in the form of fossil recording and collection will have a positive impact on	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
our appreciation of local fossil heritage.		
HSE Officer/EO to provide training for contractors and sub-contractors on site to assist them in identifying potential features of palaeontological value.	Contractor and HSE Officer/EO	Construction

Performance Indicator	» No disturbance outside of designated work areas » All heritage items located are dealt with as per the legislative guidelines
Monitoring	» Observation of excavation activities by SHE throughout construction phase » HSE Officer/EO to be present on site during major excavation and trenching. » Due care taken during earthworks and disturbance of land by all staff and any heritage objects found reported. » Appropriate permits obtained from SAHRA prior to the disturbance or destruction of heritage sites (if required). » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 14: Minimisation of visual impacts associated with construction

During the construction phase heavy vehicles, components, equipment and construction crews will frequent the area and may cause, at the very least, a visual nuisance to landowners and residents in the area as well as road users. The placement of lay-down areas and temporary construction camps should be carefully considered in order to not negatively influence the future perception of the facility. Secondary visual impacts associated with the construction phase, such as the sight of construction vehicles, dust and construction litter must be managed to reduce visual impacts. The use of dust-suppression techniques on the access roads (where required), timely removal of rubble and litter, and the erection of temporary screening will assist in doing this.

Project Component/s	» Construction site and laydown areas.
Potential Impact	» Visual impact of general construction activities and laydown areas and the potential scarring of the landscape due to vegetation clearing.
Activity/Risk Source	» The viewing of the above mentioned by observers on or near the site.
Mitigation: Target/Objective	» Minimal visual intrusion by construction activities and laydown areas and intact vegetation cover outside of immediate works areas.

Mitigation: Action/Control	Responsibility	Timeframe
Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. Clearly demarcate construction areas to minimize disturbance.	EPC Contractor	Construction
Ensure that rubble, litter, and disused construction materials are managed and removed regularly.	EPC Contractor	Construction
Ensure that all infrastructure and the site and general surrounds are maintained in a neat a manner.	EPC Contractor	Construction
Reduce and control construction dust using approved dust suppression techniques.	EPC Contractor	Construction
As far as possible, restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting. The construction tender documentation should specify that lighting at the construction site office should be restricted to security lighting and that such lighting should be restricted to the site area and immediate surrounds and should be down lighting and not up-lighting. Similarly, if night work is required in work areas, lighting is to be down lighting and not up-lighting and directed away from neighbouring farmsteads and the R319 where possible, particularly in close proximity to such areas.	EPC Contractor	Construction
Rehabilitate all disturbed areas, construction areas, roads, and servitudes to acceptable visual standards.	EPC Contractor	Construction
Any additional external lighting of the facility will be limited.	EPC Contractor	Construction
Ensure that the turbines are painted a non-reflective white colour (as required by the Civil Aviation Regulations).	Developer and turbine supplier	Construction

Performance Indicator	» Vegetation cover on and near the site is intact with no evidence of degradation or erosion. » Construction site is kept in a neat and tidy state.
Monitoring	» Monitoring of vegetation clearing during construction. » Monitoring of rehabilitated areas post construction.

OBJECTIVE 15: Appropriate handling and management of waste

The construction of the wind energy facility will involve the generation of various wastes. In order to manage the wastes effectively, guidelines for the assessment, classification, and management of wastes, along with industry principles for minimising construction wastes must be implemented. The main wastes expected to be generated by the construction of the wind energy facility will include:

» general solid waste
» hazardous waste
» liquid waste (including grey water and sewage)

Project Component/s	» Turbines » Offices and workshops. » Access roads.
Potential Impact	» 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	» Packaging » Other construction wastes » Hydrocarbon use and storage » Spoil material from excavation, earthworks and site preparation
Mitigation: Target/Objective	» 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. » A waste manifest should be developed for the ablutions showing proof of disposal of sewage at appropriate water treatment works.

Mitigation: Action/Control	Responsibility	Timeframe
Construction method and materials should be carefully considered in view of waste reduction, re-use, and recycling opportunities.	EPC Contractor	Duration of contract
Construction contractors must provide specific detailed waste management plans to deal with all waste streams.	EPC 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 as required. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including	EPC Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
prevention of contaminated runoff, seepage, and vermin control.		
Where practically 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.).	EPC Contractor	Duration of contract
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	EPC Contractor	Duration of contract
All wastes must be removed for recycling/ disposal at an appropriate frequency.	EPC Contractor	Duration of contract
Disposal of waste will be in accordance with relevant legislative requirements, including the use of licensed contractors.	EPC Contractor	Duration of contract
Hydrocarbon waste must be contained and stored in sealed containers within an appropriately bunded area and clearly labelled.	EPC Contractor	Duration of contract
Waste must be kept to a minimum and must be transported by approved waste transporters to sites designated for their disposal.	EPC Contractor	Duration of contract
No liquid waste, including grey water, may be discharged into any water body or drainage line. All sewage disposal to take place at a registered and operational wastewater treatment works. Slips of disposal to be retained as proof of responsible disposal	EPC Contractor	Maintenance: duration of contract within a particular area
Ensure compliance with all national, regional and local legislation with regard to the storage, handling and disposal of hydrocarbons, chemicals, solvents and any other harmful and hazardous substances and materials. The onus is on the Contractor to identify and interpret the applicable legislation. Hazardous waste to be disposed of at a registered landfill site. Depending on the classification of the waste, a registered service provider with the necessary permits is to collect, transport and dispose of hazardous waste. Proof of appropriate disposal to be kept on site.	EPC Contractor	During and post construction.
Documentation (waste manifest) must be maintained detailing the quantity, nature, and fate of any regulated waste. Waste disposal records must be available for review at any time.	EPC Contractor	Duration of contract
SABS approved spill kits to be available and easily accessible.	EPC Contractor	Duration of contract
Regularly serviced chemical toilets facilities and septic	EPC Contractor	Duration of

Mitigation: Action/Control	Responsibility	Timeframe
tanks must be used to ensure appropriate control of sewage.		contract
Under no circumstances may waste be burnt on site.	EPC Contractor	Duration of construction
Where a registered waste site is not available close to the construction site, provide a method statement with regard to waste management.	EPC Contractor	Duration of construction
Implement an integrated waste management approach that is based on waste minimisation and incorporates reduction, recycling, re-use and disposal where appropriate.	EPC Contractor	Duration of construction
Upon the completion of construction, the area must be cleared of potentially polluting materials. Spoil stockpiles must also be removed and appropriately disposed of or the material re-used for an appropriate purpose.	EPC Contractor	Completion of construction

Performance Indicator	» No complaints received regarding waste on site or indiscriminate dumping. » Internal site audits ensuring that waste segregation, recycling and reuse is occurring appropriately. » Provision of all appropriate waste manifests for all waste streams.
Monitoring	» Observation and supervision of waste management practices throughout construction phase. » Waste collection will be monitored on a regular basis. » Waste documentation completed. » Proof of disposal of sewage at an appropriate waste water treatment works. » A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon. » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 16: Appropriate handling and storage of chemicals, hazardous substances

The construction phase will involve the storage and handling of a variety of chemicals including adhesives, abrasives, oils and lubricants, paints and solvents. Chemical storage is likely to occur within the on-site substation.

Project Component/s	» Storage and handling of chemicals, hazardous substances.
Potential Impact	» Release of contaminated water from contact with spilled chemicals. » Generation of contaminated wastes from used chemical containers. » Pollution of water and soil resources.
Activity/Risk Source	» Vehicles associated with site preparation and earthworks. » Construction activities of area and linear infrastructure. » Hydrocarbon use and storage. » Oil in transformers and ring main units.
Mitigation: Target/Objective	» 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.

Mitigation: Action/Control	Responsibility	Timeframe
All chemicals, fuels and other hazardous materials are to be stored in designated and bunded areas, where the bunded area is impermeable and is impervious to the stored substance as per the requirements of SABS 089:1999 Part 1. The bunded area will contain 110% volume of the largest container stored.	EPC Contractor	Construction
Bunds and service area platforms to be cleaned and maintained regularly.	EPC Contractor	Construction
SABS approved Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants. The relevant construction crew members must be trained in their use.	EPC Contractor	Duration of contract
Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures. Refer to Emergency Response procedure included in the appendices.	EPC 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.	EPC Contractor	Duration of contract
Spilled cement must be cleaned up as soon as possible, stored as hazardous waste and disposed of at a suitably licensed waste disposal site.	EPC Contractor	Duration of contract
Any contaminated/polluted soil must be removed, stored as hazardous waste and disposed of at a licensed hazardous waste disposal facility.	EPC Contractor	Duration of contract
Routine servicing and maintenance of vehicles must not	EPC Contractor	Duration of

Mitigation: Action/Control	Responsibility	Timeframe
take place on-site (except for emergencies). If repairs of vehicles must take place, an appropriate drip tray must be used to contain any fuel or oils.		contract
Fuel storage areas must be inspected regularly to ensure bund stability, integrity, and function.	EPC Contractor	Duration of contract
Keep a record of all hazardous substances stored on site. Clearly label all the containers storing hazardous waste.	Contractor	Duration of contract
Any water that collects in bunds must not be allowed to stand. Should the water be contaminated, it is to be removed and treated prior to discharge, or disposed of as hazardous waste. Clean stormwater contained within the bunds may be reused.	EPC Contractor	Duration of contract
Construction machinery must be stored in an appropriately sealed area. If machinery cannot be stored in a sealed area then a drip tray must be used to prevent spillage from any leaks.	EPC Contractor	Duration of contract
All generators on site, including generators that are not in use should be located in a bunded area or on a drip tray. Bunded areas and drip trays must be maintained on a regular basis.	EPC Contractor	Duration of contract
No chemicals must be stored or vehicle maintenance undertaken within 100m of wetlands or drainage lines.	EPC Contractor	Duration of contract
The storage of flammable and combustible liquids such as oils will be in designated areas which are appropriately bunded, and stored in compliance with Material Safety Data Sheets (MSDS) files and applicable regulations and safety instructions.	EPC Contractor	Duration of contract
Any storage and disposal permits/approvals which may be required must be obtained, and the conditions attached to such permits and approvals will be complied with.	EPC Contractor	Duration of contract
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations.	EPC Contractor	Duration of contract
An effective monitoring system must be put in place to detect any leakage or spillage of all hazardous substances during their transportation, handling, installation and storage.	EPC Contractor	Construction
Precautions must be in place to limit the possibility of oil and other toxic liquids from entering the soil or clean stormwater system.	EPC Contractor	Construction
Upon the completion of construction, the area must be cleared of potentially polluting materials.	EPC Contractor	Completion of construction

Performance Indicator	» No chemical spills outside of designated storage areas. » No unattended water or soil contamination by spills.

	» No complaints received regarding waste on site or indiscriminate dumping.
Monitoring	» 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. » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 17: Effective management of concrete batching plants

A considerable amount of concrete is required during the construction of a wind energy facility. In this regard there may be a need to establish a batching plant within the site. Batching plants are facilities/installations that combine various ingredients to form concrete. Some of these inputs include sand, water, aggregate (rocks, gravel, etc.), fly ash, potash, and cement.

Turbid and highly alkaline wastewater, dust emissions and noise are the key potential impacts associated with concrete batching plants. Concrete batching plants, cement, sand and aggregates can produce dust. Potential pollutants in batching plant wastewater and stormwater include cement, sand, aggregates, chemical additive mixtures, fuels and lubricants.

Project component/s	» Batching plant and associated activities.
Potential Impact	» Dust emissions. » Release of contaminated water. » Generation of contaminated wastes from used chemical containers » Inefficient use of resources resulting in excessive waste generation.
Activity/risk source	» Operation of the batching plant. » Packaging and other construction wastes. » Hydrocarbon use and storage. » Spoil material from excavation, earthworks and site preparation.
Mitigation: Target/Objective	» To ensure that the operation of the batching plant does not cause pollution to the environment or harm to persons.

Mitigation: Action/control	Responsibility	Timeframe
Where possible concrete batching plants should be sited such that impacts on the environment or the amenity of the local community from noise, odour or polluting emissions are minimised.	Contractor	Construction phase

Mitigation: Action/control	Responsibility	Timeframe
The provision of natural or artificial wind barriers such as trees, fences and landforms may help control the emission of dust from the plant.	Contractor	Construction phase
Where there is a regular movement of vehicles. Access and exit routes for heavy transport vehicles should be planned to minimise noise and dust impacts on the environment.	Contractor	Construction phase
The concrete batching plant site should demonstrate good maintenance practices, including regular sweeping to prevent dust build-up.	Contractor	Construction phase
The prevailing wind direction should be considered to ensure that bunkers and conveyors are sited in a sheltered position to minimise the effects of the wind.	Contractor	Construction phase
Aggregate material should be delivered in a damp condition, and water sprays or a dust suppression agent should be correctly applied to reduce dust emissions and reduce water usage.	Contractor	Construction phase
Conveyors must be designed and constructed to prevent fugitive dust emissions. This may include covering the conveyor with a roof, installing side protection barriers and equipping the conveyor with spill trays, which direct material to a collection point. Belt cleaning devices at the conveyor head may also assist to reduce spillage.	Contractor	Construction phase
Any liquids stored on site, including admixtures, fuels and lubricants, should be stored in accordance with applicable legislation.	Contractor	Construction phase
Contaminated stormwater and process wastewater should be captured and recycled where possible. A wastewater collection and recycling system should be designed to collect contaminated water.	Contractor	Construction phase
Process wastewater and contaminated stormwater collected from the entire site should be diverted to a settling pond, or series of ponds, such that the water can be reused in the concrete batching process. The settling pond or series of ponds should be lined with an impervious liner capable of containing all contaminants found within the water they are designed to collect.	Contractor	Construction phase
Areas where spills of oils and chemicals may occur should be equipped with easily accessible spill control kits to assist in prompt and effective spill control.	Contractor	Construction phase
Ensure that all practicable steps are taken to minimise the adverse effect of noise emissions. This responsibility includes not only the noise emitted from the plant and equipment but also associated noise sources, such as radios, loudspeakers and alarms.	Contractor	Construction phase

Mitigation: Action/control	Responsibility	Timeframe
Where possible, waste concrete should be used for construction purposes at the batching plant or project site.	Contractor	Construction phase

Performance Indicator	» No complaints on dust. » No water or soil contamination by chemical spills. » No complaints received regarding waste on site or indiscriminate dumping.
Monitoring	» Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase. » A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon. » A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon. » An incident reporting system will be used to record non-conformances to the EMPr. » ECO must monitor indicators listed above to ensure that they have been met for the construction phase.

OBJECTIVE 18: Avifaunal Monitoring

Formal monitoring during construction will be implemented with 10 environmental workers being deployed to site. The construction period will be used to learn and monitor bird activity and feeding patterns of predatory birds in the area in order to help the Developer formulate possible mitigation strategies before the operational phase of the Facility.

Project component/s	» Wind Energy Facility
Potential Impact	» Lack of baseline data on bird activity
Activity/risk source	» N/A
Mitigation: Target/Objective	» Learn and monitor bird activity and feeding patterns of predatory birds in the area.

Mitigation: Action/control	Responsibility	Timeframe
Monitoring should take place during the construction phase to assess the impact of the construction activities on the breeding pairs of priority species. This must include an	Developer Specialist	Construction phase

Mitigation: Action/control	Responsibility	Timeframe
inspection by the avifaunal specialist to establish if the pair of Blue Cranes recorded breeding in the vicinity of Turbine 10 in October 2015, is present. If the presence of the pair is confirmed, construction of Turbine 10 should not take place in the period October to February if at all possible, unless it is clearly evident that the birds are not disturbed by the construction activities.		

Performance Indicator	» Collection of baseline data
Monitoring	» Monitoring throughout construction phase

7.3. Detailing Method Statements

OBJECTIVE 19: 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. Method statements must be reviewed by the ECO and owner's engineering team for further technical, legislative and health and safety input.

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. Specific areas to be addressed in the method statement: pre, during and post construction include:

» Site establishment (which explains all activities from induction training to offloading, construction sequence for site establishment and the different amenities and to be established etc. Including a site camp plan indicating all of these).
» Preparation of the site (i.e. Clearing vegetation, compacting soils and removing existing infrastructure and waste).
» Soil management/stockpiling and erosion control.
» Excavations and backfilling procedure.
» Stipulate norms and standards for water supply and usage (i.e.: comply strictly to licence and legislation requirements and restrictions)
» Stipulate the storm water management procedures recommended in the storm water management method statement.
» Ablution facilities (placement, maintenance, management and servicing)
» Solid Waste Management:
  * Description of the waste storage facilities (on site and accumulative).
  * Placement of waste stored (on site and accumulative).
  * Management and collection of waste process.
  * Recycle, re-use and removal process and procedure.
» Liquid waste management:
  * To design, establish, maintain and operate suitable pollution control facilities necessary to prevent discharge of water containing polluting matter or visible suspended materials into rivers, streams or existing drainage systems.
  * Should grey water (i.e. water from basins, showers, baths, kitchen sinks etc.) need to be disposed of, link into existing facilities where possible. Where no facilities are available, grey water runoff must be controlled to ensure there is no seepage into wetlands or natural watercourses.
» Dust and noise pollution
  * Describe necessary measures to ensure that noise from construction activities is maintained within lawfully acceptable levels.
  * Procedure to control dust at all times on the site, access roads, borrow pits and spoil sites (dust control shall be sufficient so as not to have significant impacts in terms of the biophysical and social environments). These impacts include visual pollution, decreased safety due to reduced visibility, negative effects on human health and the ecology due to dust particle accumulation.

- Hazardous substance storage (Ensure compliance with all national, regional and local legislation with regard to the storage of oils, fuels, lubricants, solvents, wood treatments, bitumen, cement, pesticides and any other harmful and hazardous substances and materials. South African National Standards apply).
  - Lists of all potentially hazardous substances to be used.
  - Appropriate handling, storage and disposal procedures.
  - Prevention protocol of accidental contamination of soil at storage and handling areas.
  - All storage areas, (i.e.: for harmful substances appropriately bunded with a suitable collection point for accidental spills must be implemented and drip trays underneath dispensing mechanisms including leaking engines/machinery).
- Fire prevention and management measures on site.
- Fauna and flora protection process on and off site (i.e. removal to reintroduction or replanting, if necessary).
  - Rehabilitation, re-vegetation process and bush clearing.
- Incident and accident reporting protocol.
- General administration
- Designate access road and the protocol while roads are in use.
- Requirements on gate control protocols.

The Contractor may not commence the activity covered by the Method Statement until it has been approved by the owner's Construction/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.

7.4. Awareness and Competence: Construction Phase of the Wind Energy Facility

OBJECTIVE 20: 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:

- All Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment. This includes the discussion/explanation of site environmental matters during toolbox talks.
- The content and requirements of Method Statements are to be clearly explained to all plant operators and general workers. All staff acting in a supervisory capacity is to have copies of the relevant Method Statements and be aware of the content thereof.
- Ensuring that a copy of the EMPr is readily available on-site, and that all senior site staff is aware of the location and have access to the document. Senior site staff will be familiar with the requirements of the EMPr and the environmental specifications as they apply to the construction of the facility.
- Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended site induction training which includes the environmental impacts associated with the construction of the wind energy facility. The training must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
  - 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 appropriate for the receiving audience.
  - Refresher sessions must be held to ensure the contractor staff are aware of their environmental obligations as far as practically possible.
- All sub-contractors must have a copy of the EMPr and sign a declaration/acknowledgement that they are aware and familiar with the contents and requirements of the EMPr and that they will conduct work in such a manner as to ensure compliance with the requirements of the EMPr.

» Contractors and main sub-contractors should have a basic training in the identification of archaeological sites/objects, and protected flora and fauna that may be encountered on the site.
» 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.

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:

7.4.1 Environmental Awareness Training

Environmental Awareness Training must be undertaken by the EPC Contractor and must take the form of an on-site talk and demonstration by the ECO and/or SHE Officer/EO before the commencement of site establishment and construction on site. The education/awareness programme should be aimed at all levels of management within the contractor team. A record of attendance of this training must be maintained by the SHE Officer/EO on site.

7.4.2 Induction Training

Environmental impacts and requirements should be included in induction training and 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 be undertaken by the Contractor's Environmental Officer and 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 "dos 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.

7.4.3 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.

7.5. Monitoring Programme: Construction Phase of the Wind Energy Facility

OBJECTIVE 21: To monitor the performance of the control strategies employed against environmental objectives and standards

A monitoring programme must be in place not only to ensure conformance with the EMPr, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPr that are, or could result in significant environmental impacts for which corrective action is required. The period and frequency of monitoring will be stipulated by the Environmental Authorisation. Where this is not clearly dictated, Amstilinx (RF) Proprietary Limited will determine and stipulate the period and frequency of monitoring required in consultation with relevant stakeholders and authorities. The ECO 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

7.5.1. Non-Conformance Reports

All supervisory staff including Foremen, Resident Engineers, IEO 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.

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.

7.5.2. Monitoring Reports

A monitoring report will be compiled by the independent ECO on a weekly and monthly basis and must be submitted to the Contractor and Developer. 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.

7.5.3. Final Audit Report

A final environmental audit report must be compiled by the independent ECO and be submitted to DEA within 30 days of completion of the construction phase. This report must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the environmental authorisation conditions and the requirements of the EMPr. Further details of the audit report are contained in Condition 24 - 25 of the Environmental Authorisation (Appendix A). A final ECO construction monitoring report will be submitted to DEA.

MANAGEMENT PROGRAMME: REHABILITATION CHAPTER 8

Overall Goal: 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.

8.1. Objectives

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

OBJECTIVE 1: Ensure appropriate rehabilitation of disturbed areas such that residual environmental impacts are remediated or curtailed

Areas requiring rehabilitation will include all areas disturbed during the construction phase and that are not required for regular operation and maintenance operations. As far as possible, rehabilitation should be undertaken in an area as soon as possible after the completion of construction activities within that area.

Project Component/s	» Area and linear infrastructure.
Potential Impact	» Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion and increased runoff, and the requirement for on-going management intervention.
Activity/Risk Source	» Temporary construction areas. » Temporary access roads/tracks. » Other disturbed areas/footprints.
Mitigation: Target/Objective	» Ensure and encourage site rehabilitation of disturbed areas. » 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
Implement re-vegetation and rehabilitation plan.	EPC Contractor	Following execution of the works
As far as possible, restoration must be undertaken as soon as possible after completion of construction activities to reduce the area of habitat converted at	EPC Contractor	Following execution of the works

Mitigation: Action/Control	Responsibility	Timeframe
any one time and to speed up recovery of natural habitats if impacted on during construction.		
All temporary facilities, equipment, and waste materials must be removed from site.	EPC Contractor	Following execution of the works
All temporary fencing and danger tape must be removed once the construction phase has been completed.	EPC Contractor	Following completion of construction activities in an area
The area that previously housed the construction equipment camp is to be checked for spills of substances such as oil, paint, etc. and these should be cleaned up.	EPC Contractor	Following completion of construction activities in an area
All hardened surfaces within the construction camp area should be disced, all imported materials removed, and the area shall be top soiled and re-vegetated.	EPC Contractor	Following completion of construction activities in an area
Temporary roads (if any) must be closed and access across these blocked.	EPC Contractor	Following completion of construction activities in an area
Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion.	EPC Contractor	Following completion of construction 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.	O&M Operator in consultation with rehabilitation specialist	Post-rehabilitation
Newly rehabilitated areas must be adequately demarcated and access restricted (specifically vehicular access) until vegetation is established. Appropriate signage must be established and maintained to ensure personnel are aware of these areas.	EPC Contractor	Construction/ operation
On-going alien plant monitoring and removal must be undertaken on all areas of natural vegetation on an annual basis.	O&M Operator in consultation with rehabilitation specialist	Post-rehabilitation
All compacted areas to be rehabilitated should be ripped to allow organic breakdown and promote vegetation establishment.	EPC Contractor	Rehabilitation; Post-construction

Performance Indicator	» All portions of site, including construction equipment camp and working areas, cleared of equipment and temporary facilities. » Topsoil replaced on all areas and stabilised where practicable or required after construction and temporally utilised areas. » Disturbed areas rehabilitated and acceptable plant cover achieved on rehabilitated sites. » Completed site free of erosion and alien invasive plants.
Monitoring	» On-going inspection of rehabilitated areas in order to determine effectiveness of rehabilitation measures implemented during the operational lifespan of the facility. » On-going alien plant monitoring and removal should be undertaken on an annual basis.

MANAGEMENT PROGRAMME: OPERATION CHAPTER 9

Overall Goal: To ensure that the operation of the facility does not have unforeseen impacts on the environment and to ensure that all impacts are monitored and the necessary corrective action taken in all cases. In order to address this goal, it is necessary to operate the wind energy facility in a way that:

» Ensures that operation activities are properly managed in respect of environmental aspects and impacts
» Enables the operation activities associated with the wind energy facility to be undertaken without significant disruption to other land uses in the area, in particular with regard to farming practices, traffic and road use, and effects on local residents
» Minimises impacts on fauna using the site

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

9.1. Objectives

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

OBJECTIVE 1: Establish clear reporting, communication, and responsibilities in relation to overall implementation of environmental management programme during operation

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Operations Manager, and Environmental Manager for the operation phase of this project are detailed below.

The **Operations Manager** will:
» Ensure that adequate resources (human, financial, technology) are made available and appropriately managed for the successful implementation of the operational EMPr.
» Conduct annual basis reviews of the EMPr to evaluate its effectiveness.
» Take appropriate action as a result of findings and recommendations in management reviews and audits.
» Provide forums to communicate matters regarding environmental management.

The **Environmental Manager** will:

» Maintain a register of all known environmental impacts and manage the monitoring thereof.
» Conduct internal environmental audits and co-ordinate external environmental audits.
» Liaise with statutory bodies such as the National and Provincial Department of Environmental Affairs (DEA) on environmental performance and other issues.
» Conduct environmental training and awareness for the employees who operate and maintain the wind energy facility.
» Compile environmental policies and procedures.
» Liaise with interested and affected parties on environmental issues of common concern.
» Track and control the lodging of any complaints regarding environmental matters.

The developer must provide fourteen (14) days written notification to the DEA that the operational phase will commence.

OBJECTIVE 2: Protection of indigenous natural vegetation, fauna and maintenance of rehabilitation

Indirect impacts on vegetation and terrestrial fauna during operation could result from maintenance activities and the movement of people and vehicles on site. In order to ensure the long-term environmental integrity of the site following construction, maintenance of the areas rehabilitated post-construction must be undertaken until these areas have successfully re-established.

Project component/s	» Areas requiring regular maintenance. » Route of the security team. » Areas disturbed during the construction phase and subsequently rehabilitated at its completion.
Potential Impact	» Disturbance to or loss of vegetation and/or habitat. » Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention.
Activity/Risk Source	» Movement of employee vehicles within and around site. » Maintenance activities.
Mitigation: Target/Objective	» Maintain minimised footprints of disturbance of vegetation/habitats on-site. » Ensure and encourage plant regrowth in non-operational areas of post-construction rehabilitation.

Mitigation: Action/Control	Responsibility	Timeframe
Vehicle movements must be restricted to designated roadways.	O&M Operator	Operation
Operation and maintenance personnel must restrict all activities to within the facility. No disturbance of the surrounding areas must be permitted.	O&M Operator	Operation
Existing roads must be maintained to ensure limited erosion and impact on areas adjacent to roadways.	O&M Operator	Operation
An on-going alien plant monitoring and eradication programme must be implemented, where necessary.	O&M Operator	Operation

Performance Indicator	» No further disturbance to vegetation or terrestrial faunal habitats. » Continued improvement of rehabilitation efforts.
Monitoring	» Observation of vegetation on-site by O&M Manager and environmental manager. » Regular inspections to monitor plant regrowth/performance of rehabilitation efforts and weed infestation compared to natural/undisturbed areas.

OBJECTIVE 3: Minimise the establishment and spread of alien invasive plants

Ongoing alien plant monitoring and removal should be undertaken on all areas of natural vegetation within the project area on an annual basis (in October), with emphasis on areas within 100 m of any infrastructure. The Department of Water Affairs' approved methods should be employed for all alien clearing operations. No earthmoving machinery should be used for this purpose, as this disturbs the soil and creates ideal conditions for re-invasion. All stems must be cut as close to ground level as possible, using loppers or chainsaws (depending on size), and stumps must be immediately hand painted with a suitable Triclopyr herbicide (e.g. Garlon, Timbrel, with colour dye) to prevent resprouting. If this is not done within five minutes of being cut some stems may resprout, wasting the original effort. No herbicide spraying should be undertaken anywhere within natural vegetation, or within wetlands, due to the extensive collateral damage. All cut branches should be stacked into pyramids (cut ends up) and left to dry – where rodents will eat the available seed under the pile, reducing seed germination. Annual follow ups are required in all areas that have been previously cleared. Small seedlings may be hand pulled. Control of erosion and possible associated siltation of wetlands must be monitored throughout the construction phase by the ECO, and thereafter by an independent botanist once every two years until botanist is satisfied that no further monitoring is required.

Project	» Any infrastructure or activity that will result in disturbance to natural

Component/s	areas.
Potential Impact	» Invasion of natural vegetation surrounding the site by declared weeds or invasive alien species.
Activities/Risk Sources	» Construction, environmental management.
Mitigation: Target/Objective	» There is a target of no alien plants within project control area during the construction and operation phases.

Mitigation: Action/Control	Responsibility	Timeframe
Establish an on-going monitoring programme to detect and quantify any alien species that may become established and identify the problem species (as per the NEM: Biodiversity Act (No. 10 of 2004).	O&M Operator	Construction and operation
Avoid creating conditions in which alien plants may become established: » Keep disturbance of indigenous vegetation to a minimum. » Rehabilitate disturbed areas as quickly as possible. » Do not import soil from areas with alien plants.	O&M Operator	Construction and operation
On-going alien vegetation clearing must be implemented.	O&M Operator	Construction and operation
Immediately control any alien plants that become established using registered control methods.	O&M Operator	Construction and operation
The use of herbicides and pesticides and other related horticultural chemicals should be carefully controlled and only applied by personnel adequately certified to apply pesticides and herbicides.	O&M Operator	Construction and rehabilitation
Areas of indigenous vegetation being impacted on must be rehabilitated using indigenous plant species	EPC Contractor	Rehabilitation; Post-construction

Performance Indicator	» For each alien species: number of plants and aerial cover of plants within project area and immediate surroundings.
Monitoring	» Ongoing monitoring of area by Environmental Manager and Operational Manager during operation. » Audit of project area and immediate surroundings by qualified botanist every 2 years. » The results should be interpreted in terms of the risk posed to sensitive habitats within and surrounding the project area. » The Environmental Manager should be responsible for driving this process. » Reporting frequency depends on legal compliance framework.

OBJECTIVE 4: Minimisation of visual impacts

The primary visual impact of the facility and its associated infrastructure is not possible to mitigate. The functional design of the structures cannot be changed in order to reduce visual impacts.

Project Component/s	» Area infrastructure (i.e. wind turbines, laydown areas). » Substation, offices and workshops. » Access roads.
Potential Impact	» Visual impact of facility degradation and vegetation rehabilitation failure. » Lighting influences from the facility on surrounding areas.
Activity/Risk Source	» The proposed facility. » Substation & Access roads.
Mitigation: Target/Objective	» To minimise potential for visual impact. » To ensure a well maintained and neat facility.

Mitigation: Action/Control	Responsibility	Timeframe
Maintain the general appearance of the facility in an aesthetically pleasing way.	O&M Operator	Operation.
Monitor rehabilitated areas, and implement remedial action as and when required.	O&M Operator	Operation.
Use of light fixtures and the fitment of covers and shields will be designed to contain rather than spread light.	O&M Operator	Operation and maintenance

Performance Indicator	» Well maintained and neat facility with intact vegetation on and near the facility. » Lighting impact and visual intrusion is minimal and no complaints received from settlements or homesteads.
Monitoring	» Monitoring of rehabilitated areas.

OBJECTIVE 5: Minimise soil degradation and erosion

The soil on site may be impacted in terms of:

» Soil degradation including erosion (by wind and water) and subsequent deposition elsewhere is of a concern across the entire site which is 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 (excessive wetting, uncontrolled discharge, etc.) will also lead to accelerated erosion.
» Degradation of the natural soil profile due to pollution.

Project Component/s	» Wind turbines. » Substation, offices and workshops. » Access roads.
Potential Impact	» Soil degradation. » Soil erosion. » Increased deposition of soil into drainage systems. » Increased run-off over the site.
Activities/Risk Sources	» Poor rehabilitation of cleared areas. » Rainfall - water erosion of disturbed areas. » Wind erosion of disturbed areas. » Concentrated discharge of water from construction activity.
Mitigation: Target/Objective	» Ensure rehabilitation of disturbed areas is maintained. » Minimise soil degradation. » Minimise soil erosion and deposition of soil into drainage lines. » Ensure continued stability of embankments/excavations.

Mitigation: Action/Control	Responsibility	Timeframe
Rehabilitate disturbance areas should the previous attempt be unsuccessful.	Owner O&M Operator	Operation
Ensure dust control on site through the use of an appropriate dust suppression measure.	Owner O&M Operator	Operation
Maintain erosion control measures implemented during the construction phase (i.e. run-off attenuation on slopes (sand bags, logs), silt fences, storm water catch-pits, and shade nets).	Owner O&M Operator	Operation

Performance Indicator	» Minimal soil erosion around site. » No increased siltation in drainage lines as a result of the project.
Monitoring	» Monitoring of rehabilitated areas.

OBJECTIVE 6: Minimise dust and air emissions

During the operational phase, limited gaseous or particulate emissions are anticipated from exhaust emissions (i.e. from operational vehicle), and from the augmentation plant. Windy conditions and the movement of vehicles on site may lead to dust creation.

Project Component/s	» Hard engineered surfaces » On-site vehicles
Potential Impact	» Dust and particulates from vehicle movement to and on-site.
Activities/Risk Sources	» Re-entrainment of deposited dust by vehicle movements. » Wind erosion from unsealed roads and surfaces. » Fuel burning vehicle and combustion engines.
Mitigation: Target/Objective	» To ensure emissions from all vehicles are minimised, where possible. » To minimise nuisance to the community from dust emissions and to comply with workplace health and safety requirements.

Mitigation: Action/Control	Responsibility	Timeframe
Roads must be maintained to a manner that will ensure that nuisance to the community from dust is not visibly excessive.	O&M Contractor	Site establishment and construction
Appropriate dust suppressant must be applied to the roads as required to minimise/control airborne dust.	O&M Contractor	Duration of contract
Speed of vehicles on site must be restricted to 40k/h.	O&M Contractor	Duration of contract
Vehicles and equipment must be maintained in a road-worthy condition at all times.	O&M Contractor	Duration of contract

Performance Indicator	» No complaints from affected residents or community regarding dust or vehicle emissions. » Dust suppression measures implemented for where required. » Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed.
Monitoring	» Immediate reporting by personnel of any potential or actual issues with nuisance dust or emissions to the Site Manager. » A complaints register must be maintained, in which any complaints from residents/the community will be logged, and thereafter complaints will be investigated and, where appropriate, acted upon. » An incident reporting system must be used to record non-conformances to the EMPr.

OBJECTIVE 7: Ensure the implementation of an appropriate fire management plan during the operation phase

The vegetation in the study area may be at risk of fire. The increased presence of people on the site could increase the risk of veld fires, particularly in the dry season.

Project	» Operation and maintenance of the energy facility and associated

Component/s	infrastructure.
Potential Impact	» Veld fires can pose a personal safety risk to local farmers and communities, and their homes, crops, livestock and farm infrastructure, such as gates and fences. In addition, fire can pose a risk to the facility infrastructure.
Activities/Risk Sources	» The presence of operation and maintenance personnel and their activities on the site can increase the risk of veld fires.
Mitigation: Target/Objective	» To avoid and or minimise the potential risk of veld fires on local communities and their livelihoods and the wind energy facility and associated infrastructure.

Mitigation: Action/Control	Responsibility	Timeframe
Maintain adequate fire fighting equipment on site.	O&M Operator	Operation
Provide fire-fighting training to selected operation and maintenance staff.	O&M Operator	Operation
Ensure that appropriate communication channels are established to be implemented in the event of a fire.	O&M Operator	Operation
Fire breaks should be established where and when required. Cognisance must be taken of the relevant legislation when planning and burning firebreaks (in terms of timing, etc.). This must be done in consultation with the landowners	O&M Operator	Operation
Upon completion of the construction phase, an emergency evacuation plan must be drawn up to ensure the safety of the staff and surrounding land users in the case of an emergency.	O&M Operator	Operation
Contact details of emergency services should be prominently displayed on site.	Owner O&M Operator	Operation

Performance Indicator	» Appropriate fire breaks in place.
Monitoring	» The project developer must monitor indicators listed above to ensure that they have been met.

OBJECTIVE 8: Protection of avifauna, priority bird species and bat species

During operation of the facility, the threat of collision of birds and bats with the turbine blades is a potential issue. However, the real extent of this threat is not currently well understood within the South African context due to the limited numbers of wind turbines in South Africa with which bird and bat interactions have been monitored. Lighting of turbines and other infrastructure has the potential to attract birds, thereby increasing the risk of collisions with turbines. Bird and bat monitoring is to be undertaken during

the operation of the facility in order to monitor impacts on the facility on these communities and make recommendations for any additional measures which may be required to be implemented to minimise this impact.

Monitoring must be conducted under the current edition of the Best Practice Guidelines. At minimum, post-construction monitoring for birds shall be undertaken for the first two years of operations and then repeated again in the fifth year of operation and every five years thereafter. Bat monitoring will only be undertaken for the first two years of operation but carcass searching for the lifetime of the project.

Amstilinx will undertake monitoring in a manner guided by local specialists that is comprehensive and current in terms of the Best Practice Guidelines and will ensure that those impacts are assessed and responded to during the lifetime of the project.

Project component/s	» Wind energy facility (turbines) » Substation
Potential Impact	» Disturbance to or loss of birds as a result of collision with the turbine blades » Disturbance to or loss of bats as a result of collision with turbines and/or barotrauma
Activity/risk source	» Spinning turbine blades » Substation
Mitigation: Target/Objective	» More accurately determine the impact of the operating wind energy facility on priority bird species » Minimise impacts associated with the substation

Mitigation: Action/control	Responsibility	Timeframe
A site monitoring programme must be implemented for surveying bird and bat movements in relation to the operating wind energy facility and fully documenting all collision casualties with the turbines. This monitoring will include the introduction of a food source removal programme consisting of a pro-active management strategy with the landowners which will firstly focus on an effective procedure to ensure the timeous removal of all food resources before it attracts vultures, irrespective of whether mortalities are identified or not, from the day the first turbine starts to turn.	Developer	Operation
A management strategy must be agreed upon with the landowner. This strategy should incorporate one of the following measures: (1) lambing ewes to be removed from camps where turbines are located; or (2) turbines located in camps where lambing ewes are located should be curtailed for the duration of the	Developer	Operation

Mitigation: Action/control	Responsibility	Timeframe
lambing period, or (3) an effective procedure should be developed (with input from a suitably qualified avifaunal specialist) and implemented to ensure the timeous removal of all carrion before it attracts any vultures.		
Implement curtailment strategy to minimise bat fatalities. A draft curtailment plan is included as Appendix M. This curtailment plan will be updated as required during the construction monitoring and post-construction monitoring.	Developer	Operation
Periodically collate and analyse post-construction monitoring data for bird and bat monitoring and recommend additional mitigation measures for implementation as required.	Advising scientist/biologist	Every 3 months of monitoring
Review bird and bat monitoring report on the full year of post-construction monitoring, and integrate findings into operational EMPr and broader mitigation scheme.	Advising scientist/biologist, monitoring agency	1 year post-construction
A total of ten carcass searchers will be deployed during the operational phase of the Facility, to enable a more thorough coverage of each turbine. The results of the avifauna monitoring should inform the number of carcass searchers required on site.	Advising scientist/biologist, monitoring agency	Operation
Monitoring reports should be shared with relevant stakeholders (as per the conditions of authorisation).	Developer	Operation
Raw data from monitoring should be made available to BirdLife South Africa and/or an appropriate academic institute for further analysis.	Developer	Operation

Performance Indicator	» Minimal additional disturbance to bird or bat populations on the wind energy facility site. » Continued improvement of bird and bat protection devices, as informed by the operational monitoring. » Regular provision of clearly worded, logical and objective information on the interface between the local avifauna and bats and the proposed/ operating wind energy facility. » Clear and logical recommendations on why, how and when to institute mitigation measures to reduce avian impacts of the development, from pre-construction to operational phase.
Monitoring and Reporting	» Observation of avifaunal populations and incidence of injuries/death from collisions from turbine blades. » Systematic searches for carcasses will be undertaken daily as part of the monitoring. » The monitoring team to monitor turbine field for fatalities. » Review of bird monitoring report on the full year of post-construction

	monitoring. » The ongoing inputs of a suitable experienced avifaunal specialist will be obtained to oversee the post-construction monitoring and assist with the on-going management of bird impacts.

OBJECTIVE 9: Noise control

The resulting future noise projections indicated that the operation of the facility would comply with the Noise Control Regulations (GN R154) as well as the guidelines as proposed by SANS 10103:2008 during periods when the wind speeds are less than 6 m/s. The significance of this noise impact was determined to be low. Mitigation measures, however, are proposed to ensure that the potential noise impacts and risks be optimally minimised.

The following measures are recommended to define the performance of the developer in mitigating the projected impacts and reducing the significance of the noise impact.

Project Component(s)	Wind turbines
Potential Impact	» Increased noise levels at potentially sensitive receptors. » Changing ambient sound levels could change the acceptable land use capability. » Disturbing character of sound.
Activity/Risk source	» Simultaneous operation of a number of turbines.
Mitigation Target/Objective	» Ensure that the change in ambient sound levels as experienced by potentially sensitive receptors is less than 7 dBA. » Prevent the generation of nuisance noises. » Ensure acceptable noise levels at surrounding stakeholders and potentially sensitive receptors.

Mitigation: Action/control	Responsibility	Timeframe
Design and implement a noise monitoring programme.	Acoustical Consultant / Approved Noise Inspection Authority	Before operational phase commence

Performance Indicator	» Ensure that the change in ambient sound levels as experienced by potentially sensitive receptors is less than 7 dBA.
Monitoring	» Once, shortly after the start of operational phase, during all wind conditions that falls within the wind speed range wherein the wind turbine operates. The Acoustical Consultant must then advise if whether further acoustic monitoring or mitigation is required which

	must also take into consideration if whether any public complaints in terms of noise have been received.

OBJECTIVE 10: Maximise local employment, business opportunities and skills development

The proposed facility is expected to require approximately 20 permanent employees including security personnel who would be on site on a permanent basis.

Some local procurement of goods, materials and services could occur which would result in positive economic spin-offs. These opportunities for local service providers to render services to the proposed facility could include maintenance of the guardhouse, gardening at the guardhouse, cleaning services, security services and maintenance or replacement of general equipment

Project Component/s	» Operation and maintenance of the facility.
Potential Impact	» The opportunities and benefits associated with the creation of local employment and business should be maximised. » Capacity building and skills training undertaken during the operational phase.
Activities/Risk Sources	» Locals are not employed where the skills exist. » Local procurement is not undertaken if possible. » Local businesses are not supported. » No contribution towards local development initiatives. » Inefficient training or lack of capacity building and skills training.
Mitigation: Target/Objective	» Maximise the appointment of local employees. » Capacity building and skills training continuously undertaken during the operational phase of the project. » Positive social responsibility initiatives.

Mitigation: Action/Control	Responsibility	Timeframe
A skills development plan should be developed which should concentrate on the transfer of skills to employees to increase their capacity.	O&M Operator	Operation
The Owner should employ local community members where practical.	O&M Operator	Operation
The Owner should consider training and capacity building programmes to lessen the skills disparity.	O&M Operator	Operation
The skill requirements should be communicated to the local community leaders and community based	O&M Operator	Operation

Mitigation: Action/Control	Responsibility	Timeframe
organisations.		
Make use of local recruitment agencies or other relevant community based organisations to obtain a list of jobseekers.	O&M Operator	Operation
An equitable process whereby minorities and previously disadvantaged individuals (including women) are taken into account should be implemented.	O&M Operator	Operation
Local sourcing of materials, general services to assist in providing economic, and employment opportunities for the local people.	O&M Operator	Operation
Capacity building and skills training programmes should form part of the social development support provided to local communities. These programmes should be undertaken according to the needs identified as part of the IDP of the Swellendam Local Municipality.	O&M Operator	Operation
In cases for the middle to lower skilled jobs, where the relevant skills do not exist, training should be provided to willing local community members to enable them to fill the positions.	O&M Operator	Operation

Performance Indicator	» Local procurement and employment is undertaken. » Local development initiatives are supported. » Capacity building and skills training programmes part of the social development support provided to local communities.
Monitoring	» The project developer should be able to demonstrate that the above indicators are implemented.

OBJECTIVE 11: Appropriate handling and management of hazardous substances and waste

The operation of the wind energy facility will involve the storage of chemicals and hazardous substances, as well as the generation of limited waste products. The main wastes expected to be generated by the operation activities includes general solid waste, hazardous waste and liquid waste.

Project Component/s	» Substation. » Operation and maintenance staff. » Workshop.
Potential Impact	» Inefficient use of resources resulting in excessive waste generation. » Litter or contamination of the site or water through poor waste management practices.

	» Contamination of water or soil as a result of poor materials management.
Activity/Risk Source	» Water storage. » Fuel and oil. » Maintenance building.
Mitigation: Target/Objective	» Comply with waste management legislation. » Minimise production of waste. » Ensure appropriate waste disposal. » Avoid environmental harm from waste disposal. » Ensure appropriate storage of chemicals and hazardous substances.

Mitigation: Action/Control	Responsibility	Timeframe
Hazardous substances must be stored in sealed containers within a clearly demarcated designated area.	O&M Operator	Operation
All structures and/or components replaced during maintenance activities must be appropriately disposed of at an appropriately licensed waste disposal site or sold to a recycling merchant for recycling.	O&M Operator	Operation
Care must be taken to ensure that spillage of oils and other hazardous substances are limited during maintenance. Handling of these materials should take place within an appropriately sealed and bunded area. Should any accidental spillage take place, it must be cleaned up according to specified standards regarding bioremediation.	O&M Operator	Operation and maintenance
The storage of flammable and combustible liquids such as oils will be in designated areas which are appropriately bunded, and stored in compliance with Material Safety Data Sheets (MSDS) files and applicable regulations and safety instructions.	O&M Operator	Operation and maintenance
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.	O&M Operator	Operation and maintenance
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	O&M Operator waste management contractor	Operation
Waste handling, collection, and disposal operations must be managed and controlled by a waste management contractor in the event that the site is not serviced by the local municipality.	O&M Operator waste management contractor	Operation
Used oils and chemicals: » Appropriate disposal must be arranged with a licensed facility in consultation with the administering authority » Waste must be stored and handled according to the	O&M Operator	Operation

Mitigation: Action/Control	Responsibility	Timeframe
relevant legislation and regulations		
General waste must be recycled where possible or disposed of at an appropriately licensed landfill.	O&M Operator	Operation
Hazardous waste (including hydrocarbons) and general waste must be stored and disposed of separately.	O&M Operator	Operation

Performance Indicator	» No complaints received regarding waste on site or indiscriminate dumping. » Internal site audits identifying that waste segregation recycling and reuse is occurring appropriately. » Provision of all appropriate waste manifests. » No contamination of soil or water.
Monitoring	» Waste collection must be monitored on a regular basis. » Waste documentation must be completed and available for inspection. » An incidents/complaints register must be maintained, in which any complaints from the community must be logged. » Complaints must be investigated and, if appropriate, acted upon. » Regular reports on exact quantities of all waste streams exiting the site must be compiled by the O&M Operator and monitored by the Operational Manager.

MANAGEMENT PROGRAMME: DECOMMISSIONING CHAPTER 10

The site infrastructure which will be utilised for the proposed wind energy facility is expected to have a lifespan of at least 20 years and eventual extensions (i.e. with maintenance). Equipment associated with this facility would only be decommissioned once it has reached the end of its economic life. It is most likely that decommissioning activities of the infrastructure of the facility would comprise the disassembly and replacement of the turbine infrastructure with more appropriate technology/ infrastructure available at that time.

The relevant mitigation measures contained under the construction section should be applied during decommissioning and therefore is not repeated in this section.

» ***Site Preparation***
Site preparation activities will include confirming the integrity of the access to the site to accommodate required equipment, preparation of the site (e.g. lay down areas, construction platform) and the mobilisation of construction equipment.

» ***Disassemble and Remove Infrastructure***
Disassembled components will be reused, recycled, or disposed of in accordance with regulatory requirements.

10.1. Objectives

In decommissioning the facility, Amstilinx (RF) Proprietary Limited (Pty) Ltd must ensure that:

» All sites not already vegetated are vegetated as soon as possible after operation ceases with the same indigenous vegetation that was previously present or crops as agreed to with landowners .
» Any fauna encountered during decommissioning should be removed to safety by a suitably qualified person,
» All structures, foundations and sealed areas are demolished, removed and waste material disposed of at an appropriately licensed waste disposal site or as requirement by the relevant legislation.
» All access/service roads not required to be retained by landowners are closed and fully rehabilitated.
» All vehicles to adhere to low speed limits (i.e. 30km/h max) on the site, to reduce risk of faunal collisions as well as reduce dust.
» All disturbed areas are compacted, sloped and contoured to ensure drainage and runoff and to minimise the risk of erosion.
» All rehabilitated areas are monitored for erosion.

» Components of the facility are removed from the site and disposed of appropriately.
» Retrenchments should comply with South African Labour legislation of the day.

The general specifications of Chapter 7 (Construction) and Chapter 8 (Rehabilitation) are also relevant to the proposed project and must be adhered to.

OBJECTIVE 1 : To avoid and or minimise the potential environmental and social impacts associated with the decommissioning phase

Project component/s	» Wind turbines and associated infrastructure.
Potential Impact	» Impacts on people, flora, fauna, soils etc.
Activity/risk source	» Decommissioning of the Wind Energy Facility.
Mitigation: Target/Objective	» To avoid and or minimise the potential social impacts associated with decommissioning phase of the Wind Energy Facility.

Mitigation: Action/control	Responsibility	Timeframe
Retrenchments should comply with South African Labour legislation of the day.	O&M Operator	Decommissioning.
Project Company must ensure that all relevant regulations, national and local legislation are adhered to and that the relevant authorities are informed and involved in the process as much as possible.	Owner	Decommissioning
Rehabilitation should start immediately after decommissioning is completed.	O&M Operator	Decommissioning
Re-vegetation specifications to be developed and implemented.	O&M Operator	Decommissioning
Areas of natural vegetation that was impacted on be rehabilitated with indigenous species and the rest to be rehabilitated to its current land use or what the landowners want.	O&M Operator	Decommissioning
Where necessary, implement appropriate erosion control measures.	O&M Operator	Decommissioning
All excavations must be rehabilitated with soil and topsoil, which should not contain invasive plant species (in compliance with the CARA, as amended).	O&M Operator	Decommissioning
All building materials must be removed from the site. All compacted surfaces must be ripped and re-vegetated as per the re-vegetation specifications.	O&M Operator	Decommissioning
Rehabilitation to be conducted in a progressive manner	O&M Operator	Decommissioning

Mitigation: Action/control	Responsibility	Timeframe
(i.e. once decommissioning in an area has been completed the area will be rehabilitated). Where areas are being rehabilitated with indigenous vegetation the rehabilitation of the area with indigenous vegetation must coincide with the rainfall events and all alien invasive vegetation shall be removed.		
All recyclable rubble and solid waste (e.g. scrap metal, cables, bottles, cans, and plastic residues) shall be collected and disposed of through a registered recycling company. Waste manifests will be kept by the Contractor and shown to the ECO on request. All non-recyclable rubble and solid waste shall be collected and disposed of at an approved waste disposal site. Waste manifests will be shown to the ECO on request.	O&M Operator	Decommissioning

Performance Indicator	» South African Labour legislation at the relevant time; and » Successful re-vegetation and rehabilitation of the site
Monitoring	Monitoring of Rehabilitation & Rehabilitation Close-Out Report.

APPENDIX A:
ENVIRONMENTAL AUTHORISATION

confidential
Kilpatrick Archer
Actis
Mar 21, 2019 10:53

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Environmental Authorisation

In terms of regulation 37 of the Environmental Impact Assessment Regulations, 2006

Biotherm Wind Energy Facility between Uitkyk and Excelsior near Swellendam in the Western Cape Province

Cacadu District Municipality

Authorisation register number:	*12/12/20/1798*
NEAS reference number:	*DEA/NEAS/12254/2011*
Last amended:	*Re-issue*
Holder of authorisation:	*BioTherm Energy (Pty) Ltd*
Location of activity:	*WESTERN CAPE PROVINCE: between Uitkyk and Excelsior near Swellendam in the Overberg region within the Swellendam Municipality*

This authorisation does not negate the holder of the authorisation's responsibility to comply with any other statutory requirements that may be applicable to the undertaking of the activity.

Decision

The Department is satisfied, on the basis of information available to it and subject to compliance with the conditions of this environmental authorisation, that the applicant should be authorised to undertake the activities specified below.

Details regarding the basis on which the Department reached this decision are set out in Annexure 1.

Activities authorised

By virtue of the powers conferred on it by the National Environmental Management Act, 1998 (Act 107 of 1998) and the Environmental Impact Assessment Regulations, 2006 the Department hereby authorises –

BIOTHERM ENERGY (PTY) LTD

with the following contact details –

Mr. Werner Engelbrecht
Biotherm Energy (Pty) Ltd
PO Box 69408
BRYANSTON
2021

Tel: (011) 367 4600
Fax: (011) 367 4601
Cell: (082) 566 8965
E-mail: wengelbrecht@biothermenergy.com

to undertake the following activities (hereafter referred to as "the activity"):

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."

Item 16(a): *The transformation of undeveloped, vacant or derelict land to residential mixed, retail, commercial, industrial, or institutional use where such development 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 infrastructure, 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.*

Item 1(l): *The construction of facilities or infrastructure, including associated structures or infrastructure for the transmission and distribution of above ground electricity with a capacity of 120 kilovolts or more.*

Item 10 *Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004).*

as described in the Environmental Impact Report (EIR) dated November 2010 at:

Site	Latitude	Longitude
Biotherm Wind Energy Facility	34° 13'48.98" S	20° 13'26.46" E

- for the proposed establishment of the Biotherm Wind Energy Facility and its associated infrastructure located on the following farms: Farm Uitkyk, Remaining portion of the Farm 434; Farm Excelsior, Portion 6, a portion of the Farm Goereesoe No.432; Farm De Kop Aangrensende Farm Vryheid No.

435/0 and Farm Klaas Kaffer Heuwel 438/1 between Uitkyk and Excelsior near Swellendam within the Swellendam Municipality in the Western Cape Province, hereafter referred to as "the property".

The infrastructure associated with this facility includes:

- Up to 42 wind turbines;
- Foundations (16m x 16m x 2.5m) depth to support the turbine towers;
- Underground cables (where practical) between the turbines;
- Electrical transformers will be placed beside each turbine,
- Gravel surfaced hard steering areas (maximum 40m x20m) adjacent to each turbine for use by cranes during construction;
- The wind turbines will be connected to the existing Vryheid substation;
- A wind monitoring mast of up to 80m; and
- Operations and maintenance building;

Conditions

1. Scope of authorisation

1.1 The site for the proposed Biotherm wind energy project and its associated infrastructure located on the following farms: Farm Uitkyk, Remaining portion of the Farm 434; Farm Excelsior, portions 6, a portion of the Farm Goereesoe No.432; Farm De Kop Aangrensende Farm Vryheid No. 435/0 ; and Farm Klaas Kaffer Heuwel 438/1 between Uitkyk and Excelsior near Swellendam within the Swellendam Municipality in the Western Cape Province as indicated on the map attached in the EIR dated April 2011 is hereby approved.

1.2 Authorisation of the activity is subject to the conditions contained in this authorisation, which form part of the environmental authorisation and are binding on the holder of the authorisation.

1.3 The holder of the authorisation shall be responsible for ensuring compliance with the conditions contained in this environmental authorisation. This includes any person acting on the holder's behalf, including but not limited to, an agent, servant, contractor, sub-contractor, employee, consultant or person rendering a service to the holder of the authorisation.

1.4 The activities authorised may only be carried out at the properties as described above.

1.5 The recommendations and mitigation measures recorded in the EIR dated April 2011 must be adhered to.

1.6 Any changes to, or deviations from, the project description set out in this authorisation must be approved, in writing, by the Department before such changes or deviations may be effected. In assessing whether to grant such approval or not, the Department may request such information as it deems necessary to evaluate the significance and impacts of such changes or deviations and it may be necessary for the holder of the authorisation to apply for further authorisation in terms of the regulations.

1.7 This activity must commence within a period of three (3) years from the date of issue. If commencement of the activity does not occur within that period, the authorisation lapses and a new application for environmental authorisation must be made in order for the activity to be undertaken.

1.8 Commencement with one activity listed in terms of this authorisation constitutes commencement of all authorised activities.

1.9 This authorisation does not negate the holder of the authorisation's responsibility to comply with any other statutory requirements that may be applicable to the undertaking of the activity

1.10 Relevant legislation that must be complied with by the holder of this authorisation includes, *inter alia*:

- Archaeological remains, artificial features and structures older than 60 years are protected by National Heritage Resources Act, 1999 (Act No. 25 of 1999). Should any archaeological artefacts be exposed during excavation for the purpose of construction, construction in the vicinity of the finding must be stopped immediately. A registered Heritage Specialist must be called to the site for inspection. Under no circumstances shall any heritage material be destroyed or removed from the site and the relevant heritage resource agency must be informed about the finding. Heritage remains uncovered or disturbed during earthworks must not be disturbed further until the necessary approval has been obtained from the South African Heritage Resources Agency and/or any of their delegated provincial agencies.
- Relevant provisions of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993).
- Relevant provisions of the National Water Act, 1998 (Act No. 36 of 1998).
- Relevant provisions of the National Forests Act, 1998 (Act No. 84 of 1998).
- Relevant provisions of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).
- Relevant provisions of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) and its Regulations.

- Relevant provisions of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) and its Regulations.
- Relevant provisions of the Hazardous Substance Act (Act No. 15 of 1973).
- Relevant Provisions of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004).
- Relevant provisions of the Civil Aviation Act, 2009 (Act No. 13 of 2009).
- Should fill material be required for any purpose, the use of borrow pits must comply with the provisions of the Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) administered by the Department of Mineral Resources.

1.11 The holder of an environmental authorisation has the responsibility to notify the competent authority of any alienation, transfer and change of ownership rights in the property on which the activity is to take place.

2. Notification of authorisation

2.1 The holder of the authorisation must notify every registered interested and affected party, in writing and within 12 (twelve) calendar days of the date of this environmental authorisation, of the decision to authorise the activity.

2.2 The notification referred to must –

2.2.1 specify the date on which the authorisation was issued;

2.2.2 inform the interested and affected party of the appeal procedure provided for in Chapter 7 of the Environmental Impact Assessment (EIA) Regulations, 2010;

2.2.3 advise the interested and affected party that a copy of the authorisation will be furnished on request; and

2.2.4 give the reasons for the decision.

3. Management of the activity

3.1 The Environmental Management Plan (EMP) submitted as part of application for environmental authorisation must be amended and submitted to the Department for written approval prior to commencement of the activity. The recommendations and mitigation measures recorded in the EIR dated April 2011 must be incorporated as part of the EMP. Once approved, the EMP must be implemented and adhered to. The amended EMP must also include the following:

3.1.1 The applicant must conduct a comprehensive search, rescue and storage in a suitable constructed nursery and storage area of plants deemed to be requiring either rescue for replanting and plants that will be useful during rehabilitation and plants of high conservation value;

3.1.2 A detailed Re-vegetation and Rehabilitation Plan for the construction and initial operation must be included in the EMP;

3.1.3 An Open Space Management Plan must be incorporated in the EMP. The Open Space Management Plan must incorporate ecological processes areas into the buffer as recommended by the wetland specialist.

4. Monitoring

4.1 The applicant must appoint a suitably experienced independent Environmental Control Officer (ECO) for the construction phase of the development that will have the responsibility to ensure that the mitigation/rehabilitation measures and recommendations referred to in this authorisation are implemented and to ensure compliance with the provisions of the EMP.

4.2 The ECO must be appointed before commencement of any authorised activity.

4.3 Once appointed, the name and contact details of the ECO must be submitted to the *Director: Compliance Monitoring* of the Department.

4.4 The ECO must keep daily record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.

4.5 A detailed incident (including spillage of bitumen, fuels, chemicals, or any other material) and complaint register must be kept on site indicating how these issues were addressed, what rehabilitation measures were taken and what preventative measures were implemented to avoid re-occurrence of incidents/complaints.

4.6 In addition the ECO must maintain the following on site:

4.6.1 A daily site diary.

4.6.2 Copies of all reports submitted to the Department.

4.6.3 A schedule of current site activities including the monitoring of such activities.

4.7 The ECO must remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site is ready for operation.

4.8 Records relating to monitoring and auditing must be kept on site and made available for inspection to any relevant and competent authority in respect of this development.

5. Recording and reporting to the Department

5.1 All documentation e.g. audit/monitoring/compliance reports and notifications, required to be submitted to the Department in terms of this authorisation, must be submitted to the *Director: Compliance Monitoring* at the Department.

5.2 The holder of the authorisation must submit an environmental audit report to this Department upon completion of the construction and rehabilitation activities.

5.3 The environmental audit report must:

5.3.1 Be conducted by an independent environmental auditor;

5.3.2 Indicate the date of the audit, the name of the auditor and the outcome of the audit;

5.3.3 Evaluate compliance with the requirements of the approved EMP and this environmental authorisation;

5.3.4 Include measures to be implemented to attend to any non-compliances or degradation noted;

5.3.5 Include copies of any approvals granted by other authorities relevant to the development for the reporting period; and

5.3.6 Highlight any outstanding environmental issues that must be addressed, along with recommendations for ensuring these issues are appropriately addressed.

5.4 The audit report must be submitted prior to commencement of the operation phase of the project.

6. Commencement of the activity

6.1 The authorised activity shall not commence within twenty (20) days of the date of signature of the authorisation.

6.2 An appeal under section 43 of the National Environmental Management Act (NEMA), Act 107 of 1998 (as amended), does not suspend an environmental authorisation or exemption, or any provisions or conditions attached thereto, or any directive, unless the Minister, MEC or delegated organ of state directs otherwise.

6.3 The applicant must obtain a Water Use Licence from the Department of Water Affairs (DWA) prior to the commencement of the project should the applicant impact on any wetland or water resource. A copy of the license must be submitted to the *Director: Environmental Impact Evaluation* at the Department.

6.4 The applicant must submit a final layout plan for the entire wind energy facility for approval to the department. The layout should indicated the following:

- Turbine positions;
- Foundation footprint;
- Permanent laydown area footprint;
- Construction period laydown footprint;
- Internal roads indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible);
- Wetlands, drainage lines, rivers, stream and water crossing of roads and cables indicating the type of bridging structures that will be used;
- Substation(s) and/or transformer(s) sites including their entire footprint;
- Cable routes and trench dimensions (where they are not along internal roads);
- Connection routes to the distribution/transmission network;
- Cut and fill areas at turbine sites along roads and at substation/transformer sites indicating the expected volume of each cut and fill;
- Borrow pits;
- Spoil heaps (temporary for topsoil and subsoil and permanently for excess material);
- Buildings including accommodation; and
- All "no-go" areas.

6.5 The applicant must appoint a qualified botanical and fauna specialist to ground-truth every turbine footprint and their recommendation must form part of the final layout of the Wind Energy Facility and EMP to be submitted to the department for approval.

7. Notification to authorities

7.1 Fourteen (14) days written notice must be given to the Department that the activity will commence. Commencement for the purposes of this condition includes site preparation. The notice must include a date on which it is anticipated that the activity will commence. This notification period may coincide with the period contemplated in 6.1 above.

8. Operation of the activity

8.1 Fourteen (14) days written notice must be given to the Department that the activity operational phase will commence.

8.2 The applicant must compile an operational EMP for the operational phase of the activity or alternatively, if the applicant has an existing operational environmental management system, it must be amended to include the operation of the authorised activity.

9. Site closure and decommissioning

9.1 Should the activity ever cease or become redundant, the applicant shall undertake the required actions as prescribed by legislation at the time and comply with all relevant legal requirements administered by any relevant and competent authority at that time.

10. Specific conditions

10.1 Avifauna and bats

10.1.1 A bird and bat monitoring programme must be implemented to document the effect of the operation of the wind energy facility on avifauna and bats. This should commence prior to construction, and continue during operation of the wind energy facility.

10.1.2 The results of the pre-construction bird monitoring programme must inform the final layout and the construction schedule of the wind energy facility.

10.1.3 Reports regarding bird monitoring must be submitted to the relevant provincial environmental department, Birdlife South Africa, the Endangered Wildlife Trust (EWT) and this Department on a quarterly basis. The report will assist all stakeholders in identifying potential and additional mitigation measures and to establish protocols for a bird monitoring programme for wind energy development in the country.

10.1.4 The baseline data collected and documented during the survey must be shared with the EWT and Birdlife South Africa for a better understanding of the distribution or breeding behaviour of any of the priority species.

10.1.5 Habitat destruction must be kept to an absolute minimum by keeping the lay-down areas as small as possible, reducing the number and size/length or roads and reducing the final extent of the developed area.

10.1.6 Anti-collision devices such as bird flappers must be installed where power lines cross avifaunal corridors. The input of an avifaunal specialist must be obtained for the fitting of the anti-collision devices onto specific sections of the line once the exact positions of the towers have been surveyed and pegged. Sufficient bird diverters must be installed on the central 10 meters of the

lines between pylons/poles for the length of the powerline within the De Beers section as well as being installed on the entire span length between pylons/poles for the section of the power line where it turns west towards the Homestead Substation. Flappers must be fitted in place so that they do not drift along the line and be readily and cost effectively installed on, or removed from the existing lines.

10.1.7 The applicant must ensure that lighting on the turbines is kept to a minimum and is coloured (red or green) and intermittent, rather than permanent and white, to reduce confusion effects for nocturnal migrants.

10.1.8 The facility must be designed to discourage their use as perching or roosting substrates by birds and bats.

10.2 Vegetation, wetlands and water resources

10.2.1 All species of special concern must be identified and every effort must be made to rescue them with a search and rescue plan to be included in the EMP.

10.2.2 Vegetation clearing must be limited to the required footprint. Mitigation measures must be implemented to reduce the risk of erosion and the invasion of alien species.

10.2.3 Critical available biodiversity information must be consulted for the final placement of turbines and infrastructure.

10.2.4 The applicant must ensure that the continuous monitoring and removal of alien plant species is undertaken. An alien removal program must be developed and implemented.

10.2.5 A "Plant Rescue and Protection" plan which allows for the maximum transplant of conservation important species from areas to be transformed must be compiled by a vegetation specialist familiar with the site in consultation with the ECO. This plan must be implemented prior to commencement of the construction phase.

10.2.6 Before the clearing of the site, the appropriate permits must be obtained from the Department of Agriculture, Forestry and Fisheries (DAFF) for the removal of plants listed in the National Forest Act and from the relevant provincial department for the destruction of species protected in terms of the specific provincial legislation. Copies of the permits must be submitted to the Department for record keeping.

10.2.7 Construction activities must be restricted to demarcated areas to restrict impact on vegetation and animals.

10.2.8 A comprehensive habitat rehabilitation plan must be developed for the site. Restoration must be undertaken as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.

10.2.9 All areas of disturbed soil must be reclaimed using only indigenous grass and shrubs. Reclamation activities should be undertaken as early as possible on disturbed areas.

10.2.10 All electrical collector lines must be buried in a manner that minimizes additional surface disturbance.

10.2.11 Topsoil from all excavations and construction activities must be salvaged and reapplied during reclamation.

10.2.12 The applicant is required to inform the relevant provincial department and/or this Department should the removal of protected species, medicinal plants and "data deficient" plant species be required.

10.2.13 All hard infrastructures should be located within existing areas of low sensitivity, as far as possible.

10.2.14 All turbine and infrastructure must be located at least 100m from the edge of any highly sensitive areas.

10.2.15 No exotic plants may be used for rehabilitation purposes; only indigenous plants of the area may be utilised.

10.2.16 No activities will be allowed to encroach into a water resource without a water use license being in place from the Department of Water Affairs.

10.2.17 Appropriate erosion mitigation must be implemented to prevent any potential erosion.

10.2.18 Cleared alien vegetation must not be dumped on adjacent intact vegetation during clearing but should be temporarily stored in a demarcated area.

10.2.19 Removal of alien invasive species or other vegetation must be in accordance with the Conservation of Agricultural Resources Act (Act 43 of 1983), and follow-up procedures for the duration of the project.

10.2.20 The applicant must ensure that all the "No-go" areas are clearly demarcated (using fencing and appropriate signage) before construction commences.

10.2.21 Contractors and construction workers must be clearly informed of the no-go areas.

10.2.22 Siting of turbines should adhere to >500m setbacks from large water bodies, riparian vegetation and rocky crevices, if and where high bat occurrence is found after monitoring.

10.2.23 Where roads pass right next to major water bodies provision should be made for fauna such as toads to pass under the roads by using culverts or similar.

10.2.24 Bridge design must be such that it minimise impact to the riparian areas with minimal alterations to water flow and must be permeable to movement of fauna and flora

10.3 Roads and transportation

10.3.1 Existing road infrastructure must be used as far as possible for providing access to proposed turbine positions. Where no road infrastructure exists, new roads should be placed within existing disturbed areas or environmental conditions must be taken into account to ensure the minimum amount of damage is caused to natural habitats.

10.3.2 A transportation plan must be developed, particularly for the transport of turbine components, main assembly cranes and other large pieces of equipment. A permit must be obtained from the relevant transport department for the transportation of all components (abnormal loads) to the sites.

10.3.3 A traffic management plan must be prepared for the site access roads to ensure that no hazards would results from the increased truck traffic and that traffic flow would not be adversely impacted.

10.3.4 Signs must be placed along construction roads to identify speed limits, travel restrictions, and other standard traffic control information. To minimize impacts on local commuter, consideration should be given to limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time.

10.3.5 Roads must be designed so that changes to surface water runoff are avoided and erosion is not initiated.

10.3.6 Internal access roads must be located away from drainage bottoms and avoid wetlands, if feasible.

10.3.7 Internal access roads must be located to minimize stream crossings. All structures crossing steams must be located and constructed so that they do not decrease channel stability or increase water velocity.

10.3.8 Existing drainage must not be altered, especially in sensitive areas.

10.3.9 A designated access to the site must be created and clearly marked to ensure safe entry and exit.

10.3.10 Signage must be erected at appropriate points warning of turning traffic and the construction site.

10.3.11 Construction vehicles carrying materials to the site should avoid using roads through densely populated built-up areas so as not to disturb existing retail and commercial operations.

10.3.12 Road borders should be regularly maintained to ensure that vegetation remains short and that they therefore serve as an effective firebreak.

10.4 Noise

10.4.1 Construction staff to be given training in actions to minimise noise impacts.

10.4.2 Noise from the turbines at the identified noise sensitive areas must be less than the 45dB(A) limit for rural areas presented in SANS10103.

10.4.3 The applicant must ensure that the National Noise Control Regulations and SANS10103:2008 are adhered to and reasonable measures to limit noise from the work site are implemented.

10.4.4 The applicant must ensure that the construction staff working in areas where the 8-hour ambient noise levels exceed 75dBA must wear ear protection equipment.

10.4.5 The applicant must ensure that all equipment and machinery are well maintained and equipped with silencers.

10.4.6 The applicant must provide a prior warning to the community when a noisy activity e.g. blasting is to take place.

10.4.7 All construction operations should only occur during daylight hours if possible.

10.4.8 All wind turbines should be located at a setback distance of 500m from any homestead and a day/night noise criteria level at the nearest residents of 45 dB(A) should be used to locate the turbines. The 500m setback distance can be relaxed if local factors; such as high ground between the noise source and the receiver, indicates that a noise disturbance will not occur.

10.4.9 Positions of turbines jeopardizing compliance with accepted noise levels should be revised during the micro-siting of the units in question and predicted noise levels re-modelled by the noise specialist, in order to ensure that the predicted noise levels are less than 45 dB(A).

10.5 Visual resources

10.5.1 The applicant must reduce visual impacts during construction by minimising areas of surface disturbance, controlling erosion, using dust suppression techniques and restoring exposed soil as closely as possible to their original contour and vegetation.

10.5.2 A lighting engineer must be consulted to assist in the planning and placement of light fixtures in order to reduce visual impacts associated with glare and light trespass.

10.5.3 Signs near wind turbines should be avoided unless they serve to inform the public about wind turbines and their function.

10.5.4 Commercial messages and graffiti on turbines must be avoided.

10.5.5 The applicant must ensure that the painting of the wind turbines are in accordance with the Aviation Act, 1962, Thirteenth Amendment of the Civil Aviation Regulations, 1997.

10.5.6 Laydown areas and stockyards should be located in low visibility areas (e.g. valleys between ridges) and existing vegetation should be used to screen them from view where possible.

10.5.7 Construction activities must be restricted to daylight hours in order to negate or reduce visual impacts associated with lighting.

10.5.8 Night lighting of the construction sites should be minimised within the requirements of safety and efficiency.

10.6 Human health and safety

10.6.1 A health and safety programme must be developed to protect both workers and the general public during construction, operation and decommissioning of the wind energy facility. The programme must establish a safety zone for wind turbines from residences and occupied buildings, roads, right-of-ways and other public access areas that is sufficient to prevent accidents resulting from the operation of the wind turbines.

10.6.2 Potentials interference with public safety communication systems (e.g. radio traffic related to emergency activities) must be avoided.

10.6.3 The applicant must ensure that the operation of the wind facility has minimal electromagnetic interference (EMI) (i.e. impacts to microwave, radio and television transmissions) and should comply with the relevant communication regulations.

10.6.4 The applicant must obtain a written permit or approval from the South Africa Civil Aviation Authority that the wind facility will not interfere with the performance of aerodrome radio Communication, Navigation and Surveillance (CNS) equipment especially the radar prior to commencement of the activity. The approval/permit must be submitted to the Director: Environmental Impact Evaluation.

10.6.5 The applicant must train safety representatives, managers and workers in workplace safety. The construction process must be compliant with all safety and health measures as prescribed by the relevant act.

10.6.6 Liaison with land owners/farm managers is to be done prior to construction in order to provide sufficient time for them to plan agricultural activities. If possible, construction should be scheduled to take place within the post-harvest, pre planting season, when fields are lying fallow.

10.6.7 No open fires for cooking or heating must be allowed on site.

10.7 Hazardous materials and waste management

10.7.1 Areas around fuel tanks must be bunded or contained in an appropriate manner as per the requirements of SABS 089:1999 Part 1.

10.7.2 Leakage of fuel must be avoided at all times and if spillage occurs, it must be remedied immediately.

10.7.3 Hazardous waste such as bitumen, oils, oily rags, paint tins etc. must be disposed of at an approved hazardous waste landfill site.

10.7.4 An effective monitoring system must be put in place during the construction phase of the development to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. The applicant must ensure that precautionary measures are in place to limit the possibility of oil and other toxic liquids from entering the soil or stormwater system.

10.7.5 Streams, river, pans, wetlands, dams and their catchments and other environmental sensitive areas must be protected from the direct or indirect spillage of pollutants.

10.7.6 No dumping or temporary storage of any materials may take place outside designated and demarcated laydown areas, and these must all be located within areas of low environmental sensitivity.

10.7.7 Hazardous substances must not be stored where there could be accidental leakage into surface or subterranean water.

10.7.8 Hazardous and flammable substances must be stored and used in compliance to the applicable regulations and safety instructions. Furthermore, no chemicals must be stored nor may any vehicle maintenance occur within 350 m of the temporal zone of wetlands, a drainage line with or without an extensive floodplain or hillside wetlands.

10.7.9 Temporary bunds must be constructed around chemical storage to contain possible spills.

10.7.10 Spill kits must be made available on-site for the clean-up of spills.

10.7.11 An integrated waste management approach must be implemented that is based on waste minimisation and must incorporate reduction, recycling, re-use and disposal where appropriate. Any solid waste shall be disposed of at a landfill licensed in terms of section 20(b) of the National Environment Management Waste Act, 2008 (Act No. 59 of 2008).

10.7.12 Temporary ablution facilities must be provided for staff at all times during the construction phase. The ablutions must be cleaned regularly with associated waste being disposed of at a

registered/permitted waste site and must be removed from the site when the construction phase is completed.

10.8 Excavation and blasting activities

10.8.1 Underground cables and internal access roads must be aligned as much as possible along existing infrastructure to limit damage to vegetation and watercourses.

10.8.2 Foundations and trenches must be backfilled with originally excavated materials as much as possible. Excess excavation materials must be disposed of only in approved areas or, if suitable, stockpiled for use in reclamation activities.

10.8.3 Borrow materials must be obtained only from authorized and permitted sites.

10.8.4 Anti-erosion measures such as silt fences must be installed in disturbed areas.

10.9 Air emissions

10.9.1 Dust abatement techniques must be used before and during surface clearing, excavation, or blasting activities.

10.9.2 Appropriate dust suppression techniques must be implemented on all exposed surfaces during periods of high wind. Such measures may include wet suppression, chemical stabilisation, the use of a wind fence, covering surfaces with straw chippings and re-vegetation of open areas.

10.10 Historical / cultural / paleontological resources

10.10.1 If there are any changes to the layout of the turbines, then additional survey work will be required in order to ensure that no sites are directly impacted and/or to identify the need for an excavation permit.

10.10.2 Should any graves be found, all construction activities must be suspended and an archaeologist be contacted immediately. The discovered graves must be cordoned off.

10.11 Storm water management

10.11.1 A comprehensive storm water management plan must be developed for the site to ensure compliance with applicable regulations and to prevent off-site migration of contaminated storm

water or increased soil erosion. The comprehensive storm water management plan should form part of the EMP.

10.11.2 Construction must include appropriate design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of storm water run-off.

10.12 Turbines position

10.12.1 Turbines must be positioned in such a way that they are at least 500m away from residences or farm buildings.

10.12.2 Turbines must be positioned in such a way that shadow flicker does not affect any farm buildings.

10.12.3 The applicant must ensure that the placement of turbines on ridges is avoided.

10.12.4 Wind turbines and its associated laydown areas and access roads, which could potentially impact on sensitive areas, must be shifted in order to avoid these areas of high sensitivity.

10.13 Overhead power line

10.13.1 A walk-through survey of the final survey power line corridor must be undertaken by a botanical specialist, an ornithologist and a heritage specialist to identify areas where mitigation may be required.

10.13.2 All sections of the proposed power line passing over, or in close proximity of grasslands, rivers, and dams must be marked with suitable bird flight diverters in order to deter large birds from colliding with any powerline. Additional areas of high sensitivity along the preferred alignment must be identified by an avifaunal specialist for the fitment of anti-collision devices according to Eskom Transmission Guidelines.

General

1. A copy of this authorisation must be kept at the property where the activity will be undertaken. The authorisation must be produced to any authorised official of the Department who requests to see it and must be made available for inspection by any employee or agent of the holder of the authorisation who works or undertakes work at the property.

2. Where any of the applicant's contact details change, including the name of the responsible person where the applicant is a juristic person, the physical or postal address and/or telephonic details, the applicant must notify the Department as soon as the new details become known to the applicant.
3. The holder of the authorisation must notify the Department, in writing and within 48 (forty eight) hours, if any condition of this authorisation cannot be or is not adhered to. Any notification in terms of this condition must be accompanied by reasons for the non-compliance. Non-compliance with a condition of this authorisation may result in criminal prosecution or other actions provided for in the National Environmental Management Act, 1998 and the regulations.
4. National government, provincial government, local authorities or committees appointed in terms of the conditions of this authorisation or any other public authority shall not be held responsible for any damages or losses suffered by the applicant or his successor in title in any instance where construction or operation subsequent to construction be temporarily or permanently stopped for reasons of non-compliance by the applicant with the conditions of authorisation as set out in this document or any other subsequent document emanating from these conditions of authorisation.

Date of environmental authorisation: 27 September 2011

Mr Sabelo Malaza
Chief Director: Integrated Environmental Authorisations
Department of Environmental Affairs

Re-issue date: 18/05/2016

Annexure 1: Reasons for Decision

1. Information considered in making the decision

In reaching its decision, the Department took, *inter alia,* the following into consideration -

a) The information contained in the EIR dated April 2011;
b) The comments received from interested and affected parties as included in the EIR dated April 2011;
c) Mitigation measures as proposed in the EIR dated April 2011 and the EMP;
d) The information contained in the specialist studies contained in the EIR dated April 2011;
e) The objectives and requirements of relevant legislation, policies and guidelines, including section 2 of the National Environmental Management Act, 1998 (Act No. 107 of 1998).

2. Key factors considered in making the decision

All information presented to the Department was taken into account in the Department's consideration of the application. A summary of the issues which, in the Department's view, were of the most significance is set out below.

a) Details provided of the qualifications of the EAP indicate that the EAP is competent to carry out the environmental impact assessment procedures.
b) The findings of all the Specialist studies conducted and their recommended mitigation measures.
c) The need for the proposed project stems from the need for clean and renewable energy sources to reduce the country's energy supply problems.
d) The EIR dated April 2011 included a description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity.
e) The EIR dated April 2011 identified all legislation and guidelines that have been considered in the preparation of the EIR dated April 2011.
f) The methodology used in assessing the potential impacts identified in the EIR dated April 2011 and the specialist studies have been adequately indicated.
g) A sufficient public participation process was undertaken and the applicant has satisfied the minimum requirements as prescribed in the EIA Regulations, 2006 for public involvement.

3. Findings

After consideration of the information and factors listed above, the Department made the following findings -

a) The identification and assessment of impacts are detailed in the EIR dated April 2011 and sufficient assessment of the key identified issues and impacts have been completed.
b) The procedure followed for impact assessment is adequate for the decision-making process.
c) The proposed mitigation of impacts identified and assessed adequately curtails the identified impacts.
d) All legal and procedural requirements have been met.
e) The information contained in the EIR dated April 2011 is accurate and credible.
f) EMP measures for the pre-construction, construction and rehabilitation phases of the development were proposed and included in the EIR and will be implemented to manage the identified environmental impacts during the construction process.

In view of the above, the Department is satisfied that, subject to compliance with the conditions contained in the environmental authorisation, the proposed activity will not conflict with the general objectives of integrated environmental management laid down in Chapter 5 of the National Environmental Management Act, 1998 and that any potentially detrimental environmental impacts resulting from the proposed activity can be mitigated to acceptable levels. The application is accordingly granted.

M.S

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

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Tel (+ 27 12) 310 3911 · Fax (+ 2712) 322 2682

NEAS Reference:DEAT/EIA/12254/2011
DEA Reference: 12/12/20/1798
Enquiries: Mpho Morudu
Telephone: 012-395-1775 **Fax:** 012-320-7539 **E-mail:** Mmorudu@environment.gov.za

Mr Werner Engelbrecht
Excelsior Wind Energy Facility (Pty) Ltd
PO Box 69408
BRYANSTON
2021

Tel: 011 367 4600
Fax: 086 554 5503

PER FACSIMILE / MAIL

Dear Mr Engelbrecht

AMENDMENT TO THE ENVIRONMENTAL AUTHORISATION ISSUED ON 27 SEPTEMBER 2011 FOR THE PROPOSED BIOTHERM WIND ENERGY FACILITY BETWEEN UITKYK AND EXCELSIOR NEAR SWELLENDAM IN THE WESTERN CAPE PROVINCE

With reference to the abovementioned application, please be advised that the Department in terms of the powers vested in it by regulation 42 of the Environmental Impact Assessment Regulations, 2010, has decided to amend the Environmental Authorisation (EA) dated 27 September 2011 by changing the holder of the authorisation from BioTherm Energy (Pty) Ltd to:

Excelsior Wind Energy Facility (Pty) Ltd
Registration Number: 2011/011735/07
Contact Person: Mr Werner Engelbrecht
Street Address: Building 1, Ground floor, Leslie Avenue, design Quarter District, Fourways
Postal Address: P.O. Box 69408, Bryanston, 2021
Tel: 011 367 4600
Fax: 086 554 5503

This amendment must be read in conjunction with the EA dated 27 September 2011.

In terms of regulation 10(2) of the Environmental Impact Assessment Regulations, 2010 (the Regulations), you are instructed to notify all registered interested and affected parties, in writing and within 12 (twelve) days of the date of the EA, of the Department's decision in respect of your application as well as the provisions regarding the submission of appeals that are contained in the Regulations.

Your attention is drawn to Chapter 7 of the Regulations, which prescribes the appeal procedure to be followed. This procedure is summarised in the attached document. Kindly include a copy of this document with the letter of notification to interested and affected parties.

confidential
Kilpatrick Archer
Actis
Mar 21, 2019 10:53

Should the applicant or any other party wish to appeal any aspect of the decision a notice of intention to appeal must be lodged by all prospective appellants with the Minister, within 20 days of the date of the EA, by means of one of the following methods:

By facsimile: 012 320 7561;
By post: Private Bag X447,
Pretoria, 0001; or
By hand: 2nd Floor, Fedsure Building, North Tower,
cnr. Van der Walt and Pretorius Streets,
Pretoria.

If the applicant wishes to lodge an appeal, it must also serve a copy of the notice of intention to appeal on all registered interested and affected parties as well as a notice indicating where, and for what period, the appeal submission will be available for inspection, should you intend to submit an appeal.

Please include the Department *(Attention: Director: Environmental Impact Evaluation)* in the list of interested and affected parties, notified through your notification letter to interested and affected parties, for record purposes.

Appeals must be submitted in writing to:
Mr T Zwane, Senior Legal Administration Officer (Appeals) of this Department at the above mentioned addresses or fax number. Mr Zwane can also be contacted at:
Tel: 012-310-3929
Email: tzwane@environment.gov.za

The authorised activities shall not commence within twenty (20) days of the date of signature of the authorisation. Further, please note that the Minister may, on receipt of appeals against the authorisation or conditions thereof suspend the authorisation pending the outcome of the appeals procedure.

Yours sincerely

Mr Ishaam Abader
Deputy Director-General: Environmental Quality & Protection
Department of Environmental Affairs
Date: 24/05/2012

CC:	Mr Paul Lochner	CSIR	Tel:(021) 888 2486	Fax:(021)888 2693
	Mr Malepo Phoshoko	DEADP	Tel:(021) 483 2880	Fax:(021)483 4372
	Mr Nico Nel	Swellendam Municipality	Tel: (028)514 8500	Fax:(028)514 2694
	Mr T Zwane	Appeals Authority (DEA)	Tel: (012)3103929	Fax:(012)3207561

APPEALS PROCEDURE IN TERMS OF CHAPTER 7 OF THE NEMA EIA REGULATIONS, 2010 (THE REGULATIONS) AS PER GN R. 543 OF 2010 TO BE FOLLOWED BY THE APPLICANT AND INTERESTED AND AFFECTED PARTIES UPON RECEIPT OF NOTIFICATION OF AN ENVIRONMENTAL AUTHORISATION (EA)

APPLICANT	INTERESTED AND AFFECTED PARTIES (IAPs)
1. Receive EA from the relevant Competent Authori (the Department of Environmental Affairs [DEA])	1. Receive EA from Applicant/Consultant
2. Within 12 days of date of the EA notify all IAPs o the EA and draw their attention to their right to appeal against the EA in terms of Chapter 7 of th Regulations.	2. N/A
3. If you want to appeal against the EA, submit a notice of intention to appeal within 20 days of the date of the EA. with the Minister of Water and Environmental Affairs (the Minister).	3. If you want to appeal against the EA, submit a notice of intention to appeal within 20 days of the date of th EA. with the Minister of Water and Environmental Affairs (the Minister).
4. After having submitted your notice of intention to appeal to the Minister, provide each registered IA with a copy of the notice of intention to appeal within 10 days of lodging the notice	4. After having submitted your notice of intention to appeal to the Minister, provide the applicant with a copy of the notice of intention to appeal within 10 da of lodging the notice
5. The Applicant must also serve on each IAP: • a notice indicating where and for what period the appeal submission will be available for inspection.	5. Appellant must also serve on the Applicant within 10 days of lodging the notice, • a notice indicating where and for what period th appeal submission will be available for inspectio by the applicant.
6. The appeal must be submitted in writing to the Minister within 30 days after the lapsing of the period of 20 days provided for the lodging of the notice of intention to appeal.	6. The appeal must be submitted to the Minister within days after the lapsing of the period of 20 days provided for the lodging of the notice of intention to appeal.
7. Any IAP who received a notice of intention to appeal may submit a responding statement to tha appeal to the Minister within 30 days from the da that the appeal submission was lodged with the Minister.	7. An Applicant who received notice of intention to may submit a responding statement to the appeal to the Minister within 30 days from the date that the appea submission was lodged with the Minister.

NOTES:

1. **An appeal against a decision must be lodged with:-**
   a) the Minister of Water and Environmental Affairs if the decision was issued by the Director- General of the Department of Environmental Affairs (or another official) acting in his/ her capacity as the delegated Competent Authority;
   b) the Minister of Justice and Constitutional Development if the applicant is the Department of Water Affairs and the decision was issued by the Director- General of the Department of Environmental Affairs (or another official) acting in his/ her capacity as the delegated Competent Authority;
2. **An appeal lodged with:-**
   a) the Minister of Water and Environmental Affairs must be submitted to the Department of Environmental Affairs;
   b) the Minister of Justice and Constitutional Development must be submitted to the Department of Environmental Affairs;
3. **An appeal must be:-**
   a) submitted in writing;
   b) accompanied by:
   - a statement setting out the grounds of appeal;
   - supporting documentation which is referred to in the appeal; and
   - a statement that the appellant has complied with regulation 62 (2) or (3) together with copies of the notices referred to in regulation 62.

confidential
Kilpatrick Archer
Actis
Mar 21, 2019 10:53

BROADCAST REPORT

TIME : 28/05/2012 09:30
NAME :
FAX :
TEL :
SER.# : A9J860478

PAGE(S)	03

DATE	TIME	FAX NO./NAME	DURATION	PAGE(S)	RESULT	COMMENT
28/05	09:23	0865545503	02:00	03	OK	
28/05	09:25	0218882693	39	03	OK	ECM
28/05	09:26	0214834372	50	03	OK	ECM
28/05	09:28	0285142694	52	03	OK	ECM
28/05	09:29	0123207561	36	03	OK	ECM

CV : COVERPAGE
PC : PC-FAX

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Actis
Mar 21, 2019 10:53

MINISTER
WATER AND ENVIRONMENTAL AFFAIRS
REPUBLIC OF SOUTH AFRICA

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Ref: LSA 103447
Enquiries: T. Zwane
Fax: 012 320 7561 **Phone:** 012 310 3929 **E-mail:** tzwane@environment.gov.za

Mr Werner Engelbrecht
Biotherm Energy (Pty) Ltd
P.O. Box 98867
BRYANSTON
2021

Tel no: 011 367 4600
Fax no: 011 367 4601
E-mail: wengelbrecht@biothermenergy.com

Dear Mr Engelbrecht

AMENDMENT OF THE ENVIRONMENTAL AUTHORISATION ISSUED TO BIOTHERM ENERGY (PTY) LTD FOR THE CONSTRUCTION OF THE PROPOSED BIOTHERM WIND ENERGY FACILITY BETWEEN UITKYK AND EXCELSIOR NEAR SWELLENDAM, WESTERN CAPE PROVINCE

I refer to the appeals received from Birdlife Overberg and Mr Brian Mc Mahon in the above-mentioned matter. The appellants raised the issue that a decision to issue the EA was taken on the basis of a temporary layout as result the precise location of the wind turbines and associated infrastructure has not been decided. I have considered and decided that the ground of appeal is indeed valid. Therefore I have decided to vary the decision of the Deputy Director General: Environmental Quality and Protection (Acting) of the Department of Environmental Affairs, who acted under delegated authority for the reasons set out hereunder:

DW137

MINISTRY
WATER AND ENVIRONMENTAL AFFAIRS
REPUBLIC OF SOUTH AFRICA

Private Bag x313, Pretoria 0001, 185 Schoeman Street, Sedibeng Building, Tel: +27 12 336 8733, Fax: +27 12 336 7817
Private Bag X9052, Cape Town, 8000, 120 Plain Street. Tel: +27 21 464 1500, Fax: +27 21 465 3362

Fax: 011 367 4601

Mr Werner Engelbrecht
Biotherm Energy (Pty) Ltd
P O Box 98867
BRYANSTON
2021

Dear Mr Engelbrecht

APPEAL AGAINST THE ENVIRONMENTAL AUTHORISATION ISSUED TO BIOTHERM ENERGY (PTY) LTD FOR THE CONSTRUCTION OF THE PROPOSED BIOTHERM WIND ENERGY FACILITY BETWEEN UITKYK AND EXCELSIOR NEAR SWELLENDAM, WESTERN CAPE PROVINCE

The Minister of Water and Environmental Affairs, Mrs B E E Molewa, MP has considered the appeal against the Environmental Authorisation Issued to Biotherm Energy (Pty) Ltd for the Construction of the Proposed Biotherm Wind Energy Facility between Uitkyk and Excelsior near Swellendam, Western Cape Province

After evaluating the appeal and relevant information submitted to her, the Minister has reached a decision. A copy of her decision is attached hereto.

Yours sincerely

MR K GORVENDER
ACTING CHIEF OF STAFF:
MINISTRY OF WATETR AND ENVIRONMENTAL AFFAIRS
DATE: 2012/12/18

MINISTER
WATER AND ENVIRONMENTAL AFFAIRS
REPUBLIC OF SOUTH AFRICA

Reference: LSA 103447

APPEAL DECISION

APPEALS AGAINST THE ENVIRONMENTAL AUTHORISATION ISSUED TO BIOTHERM ENERGY (PTY) LTD FOR THE CONSTRUCTION OF THE PROPOSED BIOTHERM WIND ENERGY FACILITY BETWEEN UITKYK AND EXCELSIOR NEAR SWELLENDAM, WESTERN CAPE PROVINCE

1. INTRODUCTION

In terms of regulation 37 (1) of the Environmental Impact Assessment Regulations, 2006, published by Government Notice (GN) No. R. 385 of 21 April 2006 (the 2006 EIA Regulations), regarding activities identified under section 24 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), the Deputy Director General: Environmental Quality and Protection (Acting) of the Department of Environmental Affairs (DEA) authorised Biotherm (Pty) Ltd (Biotherm) on 27 September 2011 to proceed with the construction of the proposed wind energy facility (WEF) between Uitkyk and Excelsior within Swellendam Local Municipality, Western Cape Province.

2. BACKGROUND

2.1 According to Biotherm the proposed WEF will contribute to the South African government renewable energy. Renewable energy, in particular wind energy, has the potential to play an important role in meeting South Africa's energy demand through diversifying the sources of power generation whilst reducing the country's carbon footprint from power generation. Currently, approximately 93% of South Africa's power generation is derived from coal, with the associated high carbon emissions and water usage. The proposed Biotherm project creates the opportunity to generate an additional 92.4 to 142.8 MW with zero CO^2 emissions and zero water usage. The proposed WEF will contribute in establishing a zero-carbon energy reserve for Overberg region in the Western Cape Province without contributing to air pollution.

2.2 The proposed WEF will consist of up to a maximum of 42 wind turbines, each with a nominal power output of 2.2 MW to 3.4 MW. The estimated total output of the proposed WEF is between 92.4 to 142.8 MW. The proposed WEF will cover an area of approximately 14 hectares.

3 THE APPEAL

3.1 In terms of section 43 (1) of NEMA two appellants, Birdlife Overberg, represented by Dr Stuart Shear, and Mr Brian Mc Mahon, lodged appeals against the environmental authorisation (EA) for the proposed WEF.

3.2 The main thrust of the appeals is that certain issues and information which are central to the granting of the EA and which were required to be included in the environmental impact assessment report (EIAR) in terms of NEMA and the 2006 EIA Regulations were not adequately assessed and placed before the DEA.

4. DECISION

4.1 In reaching my decision on the appeal against the authorisation of Biotherm to proceed with construction of the proposed WEF, I have taken the following into consideration:

4.1.1 Material information contained in the project file (12/12/20/1798);

4.1.2 The grounds of appeal submitted by the appellants;

4.1.3 The response of Biotherm to the grounds of appeal;

4.1.4 The answering statement submitted by the appellants;

4.1.5 The comments received from the Chief Directorate: Environmental Impact Management and Directorate: Biodiversity Management of the DEA on the grounds of appeal; and

4.1.6 The need and desirability of the proposed WEF, as set out in paragraph 2.1 above.

4.2 Having considered the above information, I have concluded that the Deputy Director General: Environmental Quality and Protection (Acting) adequately considered the major anticipated environmental impacts of the proposed WEF and that the decision to authorise the proposed WEF was correct. In addition, the implementation of the mitigation measures proposed in the EIAR and the draft environmental management programme (EMP) and compliance with the conditions contained in the EA will mitigate the anticipated impacts to an acceptable level. However I am of the view that there is merit in the ground of appeal set out in paragraph 4.3.2.1 pertaining to the precise location of the wind turbines and associated infrastructure.

4.3 Amendment to the EA

4.3.1 I hereby amend the EA granted and issued on 27 September 2011 by Deputy Director General: Environmental Quality and Protection (Acting) of the DEA to the Biotherm to include the following specific PPP condition:

4.3.1.1 The applicant must subject the final layout for the entire wind energy facility to the public participation process and consider the comments before it is submitted to the DEA for approval;

4.3 The reasons for my decision are as follows:

4.3.1 The need and desirability for this proposed WEF has been adequately demonstrated.

4.3.2 I am of the view that there is insufficient merit in the grounds of appeal to warrant the setting aside of the decision by the Deputy Director General: Environmental Quality and Protection (Acting) of the DEA. In justification of my view I shall briefly discuss the major grounds of appeal below:

4.3.2.1 **The maps for the proposed project lack clarity and important features are omitted such as water courses, natural vegetation, ridge lines and slopes**

With regard to the appellants' concern that the site maps used in the EIA being incorrect, incomplete, and or contain misleading information. The maps contained in the EIAR often have no proper notation or scaling, have features omitted or which are indefinable for example areas and types of vegetation, water courses, ridge lines and slopes, access roads/lay down areas. Without such information, presented in a clear and undistorted manner, it is not possible for the DEA to properly and fully evaluate the layout for the proposed site and the interested and affected parties (I&APs) to comment on it. These factors significantly diminish the objectivity of a decision- making process of the DEA.

The information before me shows that the EIAR prepared by CSIR, the environmental assessment practitioner (EAP) for the proposed WEF, contains numerous regional and site maps with proper scaling and notations. The specialist studies in the EIAR contain maps that are impact specific. It is my view that maps in the EIAR contained adequate information to enable DEA to develop a reasonable understanding of the environment that would be affected by the proposed WEF and to make an informed decision. The officials of the DEA conducted an inspection to the proposed site in order to gain a clear understanding of the proposed WEF location and to confirm the biophysical aspects indicated on the EIAR. According to Biotherm a wetland specialist, Ms Natasha van der Haar of Scientific Aquatic Services, will be appointed to conduct a Wetland and Riparian Delineation and impact assessment. If any significant environmental impacts are identified, dependant on the extent of these impacts, the layout plan will be amended to avoid the identified

impacts. The aforesaid layout plan will be made available to the interested and affected parties (I&APs) including the appellants for comment before it is submitted to the DEA for a decision. I have further noted that condition 10.2.2.22 of the EA directs Biotherm to adhere to a 500m setback from the large water bodies, riparian vegetation and rocky crevices; if and where high bat occurrence is found after monitoring. In view of the aforementioned this ground of appeal stands to be dismissed.

As regards to the precise location of the wind turbines and associated infrastructure that has not been decided. A decision to issue the EA was taken on the basis of temporary layout. According to the DEA the proposed WEF is a complex project requiring large scale engineering in which case it is the norm that the a developer only initiates a detailed design phase of the project once the EA has been issued. Condition 6.4 requires Biotherm to submit a final layout of the entire WEF to the DEA for approval before commencing with the construction of the proposed project. It sets out, among others, final wind turbine positions, foundation footprint and permanent laydown area footprint. The approval of the final layout will be determined by the location of sensitive environmental features, position of the wind turbines and buffer zones/ setbacks as outlined in the EA. I have noted Biotherm's commitment that the final layout plan will be made available to the I&APs including the appellants for comment before it is submitted to the DEA for a decision. However the EA do not direct that the final layout must be subjected to a PPP or made available to the I&APS for comment. The DEA is empowered in terms of section 24 of the NEMA to make a decision on the final layout plan. The participation of the appellants and the I&APs at this stage will ensure that the decision of the DEA is informed by, and responsive to their concerns. In view of the aforementioned it follows that the final layout must be made available to the appellants and the I&APs for comment before a decision is taken by the DEA. This ground of appeal is upheld.

In addition to the above, I now wish to briefly deal with other concerns raised by the appellants pertaining to the sitting of the wind turbines which, in their view, are shown on, and one outside, the outer farm boundaries:

- The appellants allege that the four wind turbines are shown on, and one outside (T8), the outer farm boundaries. Biotherm denies that there will be wind turbines outside of the farm boundaries. Turbine 8 that appears outside of the farm boundary on the map for the

proposed WEF no longer forms part of the project. In view of the aforementioned, this ground of appeal stands to be dismissed.

- The appellants allege that the wind turbines T36, T37, T38 and T40 are less than the stated minimum of 500m distance from the R319 road. The information before me shows that the EIA and the environmental management plan (EMP) recommended the relocation of certain turbines to be at a 500m from R319 road. Wind turbines 36 and 40 are approximately 502m and 500m away from the R319. Wind turbine 37 and 38 no longer form part of the WEF layout. In view of the aforementioned this ground of appeal stands to be dismissed.

With regard to the issues pertaining to the construction of new access roads for the proposed WEF through sensitive areas, the Biotherm indicated that that 45.65% of the access roads will be the upgrade of the existing roads. The total length of the roads that will go through sensitive areas is 8.5km; and of that 5.22 km are new roads whilst the remainder are upgrades of existing roads. The impacts of the proposed WEF on sensitive areas were assessed during the EIA process, including roads. The overall impacts have been reduced, as the number of wind turbines have been reduced from 22 to 17. I have noted that a number of mitigation measures have been proposed by the specialist to reduce the habitat destruction due to road construction. These measures include the road width and construction areas that will be restricted, to retain as much vegetation as possible. Re - vegetation of disturbed areas as part of the construction phase, and formal erosion management for access roads to prevent erosion scars were also proposed. In addition, condition 10.2.7 of the EA gives effect to the Vegetation Specialist's recommendations that, "*construction activities must be restricted to demarcated areas to restrict impact on vegetation and animals.*" No go areas are to be clearly demarcated before construction commences. Biotherm has further informed the DEA that it will endeavour to limit habitat destruction to what is absolutely necessary for the construction of new roads. In view of the aforementioned I am satisfied that this ground of appeal can be successfully mitigated.

The appellants contend that there is no clear presentation of the proposed wind turbines and access roads in relation to ridges, contours and slopes. This contention is disputed by Biotherm and it states that the layout map that illustrates the contours of the area and the position of the

wind turbines was included in the EIR as Figure 2.2. A clear presentation of the siting of wind turbine layout in relation to ridges, contours and slopes was included in the EIA report. I have noted that Biotherm received a letter with recommendation from the Western Cape Provincial Department of Agriculture. These recommendations will be taken into account in determining the final layout to be submitted and approved by the DEA. Biotherm insist that from the contents of this letter it is evident that the Western Cape Provincial Department of Agriculture do not consider water erosion to be a significant risk. The roads and excavations will be placed along contours, to ensure less cut and fill and visual scarring; they will be positioned off the ridgelines and visible landforms; these measures will be incorporated into the proposed WEF's design phase to mitigate visual impacts.

4.3.2.2 The EA contains material that is conflicting with measures included in the EIA report

With regard to the concerns pertaining to the inconsistency of the authorised 500m setbacks from water bodies if a large bat occurrence is found and the 300m setbacks from water bodies recommended in the EIR, the DEA as the competent authority has the powers to review and make decisions where it reasonably believed that the proposed setbacks in the EIR will lead to negative impacts on the environment. The DEA could propose a more stringent setback to ensure that the environment is protected. The conditions in the EA do not have to be in exact accord with recommendations made in an EIR. The authorised 500m setback was presented to the Directorate: Biodiversity of the DEA and they agreed with the authorised setback of 500m. I am satisfied that the condition that stipulates a setback of 500m from the water bodies is well considered by the DEA and it will provide greater protection for the bats. This ground of appeal stands to be dismissed.

As regards to the concern pertaining to the impact of the proposed project on bats, the information before me shows that the bat impact assessment was undertaken by Dr. Stoffberg, who compiled the Good Practice Guidelines for Surveying Bats. She concluded that the impacts on bats by the proposed project will be low to medium with mitigation. The findings of Dr. Stoffberg were confirmed by the more intensive monitoring study and assessment conducted by South Africa's most prominent specialist in bats, Professor D.S. Jacobs from the University of Cape Town, South Africa. The assessment on the extent of bats was arrived at through site visits, the use of

technologically advanced instruments and a desk top study. In addition, GAIA Environmental Services, in association with Prof David Jacobs, are presently contracted to undertake a 24 month pre-construction bat monitoring programme for the proposed project. The pre-construction bat monitoring programme will determine whether the DEA approves the final layout and it will be made available to the I&APs. In view of the aforementioned I am satisfied that the assessment of the potential bat impacts was adequate and it is not speculative and this ground stands to be dismissed.

The appellants contend that wind turbines and associated infrastructure must be located at least 100m from the edge of any highly sensitive areas, the information before me shows that condition 10.2.14 of the EA addresses the appellants' contention as it requires Biotherm to locate all wind turbine and associated infrastructure at least 100m from the edge of any highly sensitive areas. In view of the aforementioned this ground of appeal stands to be dismissed.

The appellants' contention that the internal access roads must be located away from the drainage lines and avoid wetlands, the information before me shows that condition 10.3.6 of the EA requires Biotherm to locate access road away from the drainage bottoms and avoid wetlands. Biotherm has informed me that a wetland specialist, Natasha van der Haar of Scientific Aquatic Services, has been appointed to conduct a Wetland and Riparian Delineation impact assessment. If any significant environmental impacts are identified, dependant on the extent of these impacts, Biotherm will amend the layout plan to avoid the identified impacts. Furthermore, in terms of condition 6.4 of the EA the DEA will need to approve the final layout plan and if it is of the view that significant environmental impacts will result from the layout, it has the authority not to approve it. In addition, Biotherm advised me that all water crossing and impacts on water resources will be subjected to a Water Use License application to the Department of Water Affairs. In view of the aforementioned this ground of appeal stands to be dismissed.

The appellants expressed concerns pertaining to the condition in the EA outlining project construction scheduling. This condition is intended to allow landowners and famers around the proposed site to plan their farming activities. The fact that the condition differs from the recommendation of the EIR does not qualify the EA as defective. The DEA is the final arbiter on

issues raised and recommendation in the EIR. This concern is misplaced and stands to be dismissed.

The appellants contend that the wind turbines must not be placed on the ridges. The information before me shows that Condition 10.12.3 of the EA requires Biotherm must avoid placement of turbines on the ridges.

In relation to the appellants' concern pertaining to the power line required for phase 2 of the project that allegedly is still in contention between the developer and Eskom; negotiations between the developer and Eskom fall outside DEA's mandate. This ground of appeal cannot stand and it is dismissed.

4.3.2.3 Inadequate project description and Impact Assessment of Transmission Lines

In relation to the appellants' concern pertaining to the capacity of the existing 66 kV transmission line and the inability of Eskom to confirm their plans to upgrade this line, Eskom has submitted an application for an upgrade of this line to accommodate the proposed WEF. Eskom had been advised by the DEA that no EA is required for the proposed power line, as the 275 kV threshold of the relevant activity; Activity 38 of GNR 544 will not be triggered. In view of the upgrade not meeting the required 275 kV threshold of Activity 38 of GNR 544 there will be no need for the EIA process for the proposed transmission line. This ground of appeal stands to be dismissed.

4.3.2.4 The DEA guideline to Wind Farms have not been discussed in the EIA report and not referred to in the EA

The information before me shows that the Strategic Initiative to Introduce Commercial Land Based Wind Energy Development to the Western Cape – Towards Development of a Regional Methodology for Wind Energy Site Selection released in May 2006, was considered amongst other guidelines. This guideline informed the process of deciding an appropriate setbacks and mitigations measures. The fact that the EA and the EIA are inconsistent with the aforesaid guideline does not mean that it was not consulted. Guidelines are intended to guide the parties in the EIA process, the decision makers and specialist to respectively exercise their duties and

compile reports. It does not require the strict compliance because it does not enjoy status of legislation. In addition, the Strategic Environmental Framework for the Optimal Location of Wind Farms in the Coastal Provinces of South Africa (Phase 1 for Refitt 1) (the Strategic Guidelines) was released in February 2011. The draft EIA of the proposed WEF was released in January 2011. The EIA could not therefore adhere to the Strategic Guidelines as it pre- dates them. When the EIA was prepared and submitted to the DEA the Strategic Guidelines was still a draft. In view of the information before me, I am satisfied that the reasons not to consider the Strategic Guidelines to wind farms are justified and this ground of appeal stands to be dismissed.

4.3.2.6 The cumulative impact not considered by the DEA in its decision making process

The appellants' concern pertaining to the accumulative impacts of the proposed WEF, specifically that the DEA did not consider the two Inca –Energy WEF applications with background information documents (BIDS) issued in May 2011. These BIDS were issued after the final EIA for the proposed project has been submitted to the DEA for consideration. There was no information available for the EAP to do accumulative assessment of this nature. The accumulative impacts were assessed and discussed, to the extent possible in the EIA Report and specialist reports, such as the collision of birds with power lines and accumulative mortality as a result of multiple installations. The Vegetation Study concluded that the impacts of the proposed WEF will be significantly less than various existing and expanding agricultural operations in the region which have large scale habitat transformation. Relative impacts were thus assessed and found to be very low to low, as no large scale WEF currently exists in the area.

The appellants further allege that Scoping Report states that wind energy projects, including those in the authorisation process, within 50kms from the site, would be assessed in the EIA, with the assistance of the DEA. The Biotherm disputes these and it informed me that the scoping Report states that, "*The projects that will be considered are other wind project proposals in the local area (within approximately 20 km of the proposed Biotherm project) that have received a positive Environmental Authorisation or with EIAs in progress in the public domain, based on an internet search*". In view of the information before me, I am satisfied that the appellants' contention that the accumulative impacts were not considered is not justified and it stands to be dismissed.

4.3.2.7 The Bird and Bat Monitoring must continue on a regular basis throughout the life of the proposed project

With regard to the appellants concern pertaining to the bat and bird monitoring, I noted that continuous monitoring during pre - construction, construction and post - construction is recommended. The overall aim of monitoring at a proposed wind farm site is to identify and assess the potential impacts that the proposed WEF will have on the bats and birds. As indicated in paragraph 4.3.2.2 above, Biotherm has contracted GAIA Environmental Services, in association with Prof David Jacobs, to undertake a 24 month pre-construction bat monitoring programme for the proposed WEF. Biotherm has further advised me that the EMP will be updated after the monitoring period with additional information or actions required during the design, construction and operational phases. If the bird and bat specialist have further recommendations after the monitoring, this will be included in the EMP. The result of monitoring will inform the final layout to be submitted to the DEA for approval. Biotherm has further informed me that it undertakes to make these results available to stakeholders. In view of the aforementioned, I am satisfied that bird and bat monitoring will continue on a regular basis throughout the life of the proposed WEF and this ground of appeal stands to be dismissed.

4.3.2.8 Inadequate assessment of the traffic impact

As regards to the appellants' concern pertaining to the inadequate traffic impact assessment, a final Project design specification was not completed by the submission of the Final EIA Report, as the EIA process was planned to inform the most appropriate layout, by considering the environmental impacts identified during this process. A detailed traffic impact assessment will be conducted during the planning phase, to ensure that the transportation legislation is adhered to. Reference was made to traffic impacts in the Visual Impacts Report, the Noise Impacts Report and the comments and Response Trial. In order to reduce the traffic impacts, the propose project will procure bricks from its WEF at Klipheuwel. A traffic impact specialist has been appointed to conduct the traffic impact assessment. The traffic impacts will be of a limited duration of four months and will not be significant, with maximum number of trucks per day travelling to the site being 4 trucks.

The EA contains appropriate conditions to ensure that impacts on the road users, local business and Tourism are considered. Condition 10.3.2 of the EA stipulates that a transportation plan must be developed, particularly for the transport of wind turbines components to the site. Condition10.3.3 requires that the traffic management plan must be prepared for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. Condition10.3.4 requires that signs must be placed along construction roads to identify speed limits, travel restrictions, and other standard traffic control information. To minimise the impacts on local commuters, considerations will be given to limit construction vehicles travelling on public roadways during the morning and late afternoon commute time. This ground of appeal stands to be dismissed.

4.3.2.9 Inadequate assessment of the visual impact

The information before me shows that the wind turbines of the proposed WEF will be 500 metres away from the R319 road. The DEA acknowledges that the character of the site will changed from unbuilt rural landscape with very few vertical elements to a landscape with significant vertical elements. Measures to reduce the visual impact of the proposed WEF on the landscape includes the planting of trees around the farmsteads to create a visual screen where necessary, minimising the night-lightning during construction and operation, location of the construction camp in an area that is visibly discreet. Seven wind turbines within 500m of the R319 road will reduce the dominating effect and the shadow flicker impact on users of the R319 road. These mitigation measures will reduce the visual dominance of the wind turbine on road users from high to medium. In view of the proposed measures to mitigate the visual impact by the proposed WEF, I am satisfied that the visual impact has been adequately assessed and this ground of appeal stands to be dismissed.

APPEALS AGAINST THE ENVIRONMENTAL AUTHORISATION ISSUED TO BIOTHERM ENERGY (PTY) LTD FOR THE CONSTRUCTION OF THE PROPOSED BIOTHERM WIND ENERGY FACILITY BETWEEN UITKYK AND EXCELSIOR NEAR SWELLENDAM, WESTERN CAPE PROVINCE

MRS B E E MOLEWA, MP

MINISTER OF WATER AND ENVIRONMENTAL AFFAIRS

DATE: 2012/11/29

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Private Bag X 447· PRETORIA · 0001· Fedsure Building · 315 Pretorius Street · PRETORIA
Tel (+ 27 12) 310 3911 · Fax (+ 2712) 322 2682

NEAS Reference: DEA/EIA/12254/2011
DEA Reference: 12/12/20/1798
Enquiries: Mr Ahmed Ameen
Telephone: (012) 395 1729 **Fax:** (012) 320 7539 **E-mail:** aameen@environment.gov.za

Mr Werner Engelbrecht
BioTherm Energy (Pty) Ltd
PO Box 69408
BRYANSTON
2021

Fax Number: (011) 367 4601
Telephone Number: (011) 367 4600

PER FACSIMILE / MAIL

Dear Mr Engelbrecht

AMENDMENT OF THE ENVIRONMENTAL AUTHORISATION ISSUED ON 27 SEPTEMBER 2011 FOR THE PROPOSED CONSTRUCTION AND OPERATION OF THE BIOTHERM WIND ENERGY FACILITY BETWEEN UITKYK AND EXCELSIOR NEAR SWELLENDAM IN THE WESTERN CAPE PROVINCE

The Department's decision on the above application issued on 27 September 2011 and your application for amendment received by this Department on 02 August 2013 refer.

Based on a review of the reason for requesting an amendment to the above Environmental Authorisation, the Department, in terms of Regulation 42 of the Environmental Impact Assessment Regulations, 2010, has decided to amend the Environmental Authorisation (EA) dated 27 September 2011 as follows:

Amendment to extend the validity period:

The validity period of the Environmental Authorisation is hereby extended for a period of 02 (two) years from the date of signature of this amendment decision. If commencement of the activity does not occur within that period, the authorisation lapses and a new application for environmental authorisation must be made in order for the activity to be undertaken.

Furthermore, a shapefile of the approved development layout/footprint must be submitted to this Department prior to commencement of the construction phase. The shapefile must be created using the Hartebeesthoek 94 Datum and the data should be in Decimal Degree Format using the WGS 84 Spheroid. The shapefile must include at a minimum the following extensions i.e. .shp; .shx; .dbf; .prj; and, .xml (Metadata file). If specific symbology was assigned to the file, then the .avl and/or the .lyr file must also be included. Data must be mapped at a scale of 1:10 000 (please specify if an alternative scale was used). The metadata must include a description of the base data used for digitizing. The shapefile must be submitted in a zip file using the EIA application reference number as the title.

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Kilpatrick Archer
Actis
Mar 21, 2019 10:53

The shape file must be submitted to:

Postal Address:
Department of Environmental Affairs
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Fedsure Forum Building (corner of Pretorius and Lillian Ngoyi Streets)
4th Floor South Tower
315 Pretorius Street
Pretoria
0002

For Attention: Mr Muhammad Essop
Integrated Environmental Authorisations
Strategic Infrastructure Developments
Telephone Number: (012) 395 1734
Fax Number: (012) 395 7539
Email Address: MEssop@environment.gov.za

This letter must be read in conjunction with the EA dated 27 September 2011.

In terms of Regulation 10(2) of the Environmental Impact Assessment Regulations, 2010 (the Regulations), you are instructed to notify all registered interested and affected parties, in writing and within 12 (twelve) days of the date of the Department's decision in respect of the amendment made as well as the provisions regarding the submission of appeals that are contained in the Regulations.

Your attention is drawn to Chapter 7 of the Regulations, which prescribes the appeal procedure to be followed. This procedure is summarised in the attached document. Kindly include a copy of this document with the letter of notification to interested and affected parties.

Should the applicant or any other party wish to appeal any aspect of the amendment decision a notice of intention to appeal must be lodged by all prospective appellants with the Minister, within 20 days of the date of the EA, by means of one of the following methods:

By facsimile: 0123207561;
By post: Private Bag X447,
Pretoria, 0001; or
By hand: 2nd Floor, Fedsure Building, North Tower,
Cnr. Lilian Ngoyi (Van der Walt) and Pretorius Streets,
Pretoria.

If the applicant wishes to lodge an appeal, it must also serve a copy of the notice of intention to appeal on all registered interested and affected parties as well as a notice indicating where, and for what period, the appeal submission will be available for inspection, should you intend to submit an appeal.

Please include the Department *(Attention: Director: Integrated Environmental Authorisations)* in the list of interested and affected parties, notified through your notification letter to interested and affected parties, for record purposes.

Appeals must be submitted in writing to:

Mr Z Hassam, Director: Appeals and Legal Review, of this Department at the above mentioned addresses or fax number. Mr Hassam can also be contacted at:

Tel: 012-310-3271
Email: AppealsDirectorate@environment.gov.za

The authorised activities shall not commence within twenty (20) days of the date of signature of the authorisation. Further, please note that the Minister may, on receipt of appeals against the authorisation or conditions thereof suspend the authorisation pending the outcome of the appeals procedure.

Yours faithfully

Mr Ishaam Abader
Deputy Director-General: Legal, Authorisations, Compliance and Enforcement
Department of Environmental Affairs
Date: 13/08/2013

	Mr S Malaza	Compliance Monitoring (DEA)	Tel: 012-310-3397	Fax: 012-320-5744

APPEALS PROCEDURE IN TERMS OF CHAPTER 7 OF THE NEMA EIA REGULATIONS, 2010 (THE REGULATIONS) AS PER GN R.543 OF 2010 TO BE FOLLOWED BY THE APPLICANT AND INTERESTED AND AFFECTED PARTIES UPON RECEIPT OF NOTIFICATION OF AN ENVIRONMENTAL AUTHORISATION (EA)

APPLICANT	INTERESTED AND AFFECTED PARTIES (IAPs)
1. Receive EA from the relevant Competent Authority (the Department of Environmental Affairs [DEA]).	1. Receive EA from Applicant/Consultant.
2. Within 12 days of date of the EA notify all IAPs of the EA and draw their attention to their right to appeal against the EA in terms of Chapter 7 of the Regulations.	2. N/A.
3. If you want to appeal against the EA, submit a notice of intention to appeal within 20 days of the date of the EA with the Minister of Water and Environmental Affairs (the Minister).	3. If you want to appeal against the EA, submit a notice of intention to appeal within 20 days of the date of the EA. with the Minister of Water and Environmental Affairs (the Minister).
4. After having submitted your notice of intention to appeal to the Minister, provide each registered IAP with a copy of the notice of intention to appeal within 10 days of lodging the notice.	4. After having submitted your notice of intention to appeal to the Minister, provide the applicant with a copy of the notice of intention to appeal within 10 days of lodging the notice.
5. The Applicant must also serve on each IAP: • a notice indicating where and for what period the appeal submission will be available for inspection.	5. Appellant must also serve on the Applicant within 10 days of lodging the notice, • a notice indicating where and for what period the appeal submission will be available for inspection by the applicant.
6. The appeal must be submitted in writing to the Minister within 30 days after the lapsing of the period of 20 days provided for the lodging of the notice of intention to appeal.	6. The appeal must be submitted to the Minister within 30 days after the lapsing of the period of 20 days provided for the lodging of the notice of intention to appeal.
7. Any IAP who received a notice of intention to appeal may submit a responding statement to that appeal to the Minister within 30 days from the date that the appeal submission was lodged with the Minister.	7. An Applicant who received notice of intention to may submit a responding statement to the appeal to the Minister within 30 days from the date that the appeal submission was lodged with the Minister.

NOTES:

1. **An appeal against a decision must be lodged with:-**
   a) the Minister of Water and Environmental Affairs if the decision was issued by the Director- General of the Department of Environmental Affairs (or another official) acting in his/ her capacity as the delegated Competent Authority;
   b) the Minister of Justice and Constitutional Development if the applicant is the Department of Water Affairs and the decision was issued by the Director- General of the Department of Environmental Affairs (or another official) acting in his/ her capacity as the delegated Competent Authority;

2. **An appeal lodged with:-**
   a) the Minister of Water and Environmental Affairs must be submitted to the Department of Environmental Affairs;
   b) the Minister of Justice and Constitutional Development must be submitted to the Department of Environmental Affairs;

3. **An appeal must be:-**
   a) submitted in writing;
   b) accompanied by:
   - a statement setting out the grounds of appeal;
   - supporting documentation which is referred to in the appeal; and
   - a statement that the appellant has complied with regulation 62 (2) or (3) together with copies of the notices referred to in regulation 62.

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Private Bag X 447 · PRETORIA · 0001 · Fedsure Building · 315 Pretorius Street · PRETORIA
Tel (+ 27 12) 310 3911 · Fax (+ 2712) 322 2682

NEAS Reference:DEAT/EIA/12254/2011
DEA Reference: 12/12/20/1798
Enquiries: Nyiko Nkosi
Telephone: 012-395-1694 Fax: 012-320-7539 E-mail:nnkosi@environment.gov.za

Ms Jasandra Nyker
Excelsior Wind Energy Facility (Pty) Ltd
PO Box 69408
BRYANSTON
2021

Tel: 011 367 4600
Fax: 011 367 4601

PER FACSIMILE / MAIL

Dear Ms Jasandra

RE. NOTIFICATION OF CHANGE OF TURBINE SPECIFICATION FOR THE PROPOSED BIOTHERM WIND ENERGY FACILITY BETWEEN UITKYK AND EXCELSIOR NEAR SWELLENDAM IN THE WESTERN CAPE PROVINCE

Your request dated 18 April 2013 for the change of turbine specification as indicated on the final Environmental Impact Assessment report dated April 2011 and received by the Department on 22 April 2013 refers:

It is noted that the blade length of turbines on the final Environmental Impact Assessment report dated April 2011 has changed from 50m to 57 m as described on your letter dated 18 April 2013.

Yours faithfully

Mr Mark Gordon
Chief Director: Integrated Environmental Authorisations
Department of Environmental Affairs
Letter signed by: Ms Millicent Solomons
Designation: Director: Integrated Environmental Authorisations
Date: 3/05/2013.

CC:	Mr Paul Lochner	CSIR	Tel:(021) 888 2486	Fax:(021)888 2693
	Mr Malepo Phoshoko	DEADP	Tel:(021) 483 2880	Fax:(021)483 4372
	Mr Nico Nel	Swellendam Municipality	Tel: (028)514 8500	Fax:(028)514 2694

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Private Bag X 447· PRETORIA · 0001· Environment House · 473 Steve Biko, Arcadia· PRETORIA
Tel (+ 27 12) 399 9372

DEA Reference: 12/12/20/1798/AM4
Enquiries: Ms Dikeledi Mokotong
Telephone: (012) 399 8801 **E-mail:** dmokotong@environment.gov.za

Mr Werner Engelbrecht
BioTherm Energy (Pty) Ltd
PO Box 69408
BRYANSTON
2021

Telephone Number: (011) 367 4600
E-mail Address: eiaadmin@biothermenergy.com

PER EMAIL / MAIL

Dear Mr Engelbrecht

AMENDMENT OF THE ENVIRONMENTAL AUTHORISATION ISSUED ON 27 SEPTEMBER 2011 FOR THE CONSTRUCTION AND OPERATION OF THE BIOTHERM WIND ENERGY FACILITY BETWEEN UITKYK AND EXCELSIOR NEAR SWELLENDAM IN THE WESTERN CAPE PROVINCE

The Environmental Authorisation (EA) issued for the above application by this Department on 27 September 2011 as amended, your application for amendment to the EA received by this Department on 02 June 2015 and the acknowledgement letter dated 08 June 2015 refer.

Based on a review of the reason for requesting an amendment to the above EA, this Department, in terms of Chapter 5 of the Environmental Impact Assessment Regulations, 2014, has decided to amend the EA dated 27 September 2011 as amended as follows:

Amendment 1: Amendment to extend the validity period of the EA:

Condition 1.7 of the EA issued on 27 September 2011 allowed a validity period of 03 years from the date of issue. The EA was to lapse on 27 September 2014.

This Department issued an amendment to the EA on 13 August 2013 for an extension for an additional two years from the date of the signature of this Departments decision, i.e. the EA lapses on 13 August 2015.

The holder of the EA applied for an additional one (01) year from date of expiry of the extension granted on 13 August 2013.

Based on the above, and due to the project being selected as a preferred bidder in the 4th round of the DoE REIPPP, this Department grants an additional two (02) years from the date of expiry of the extension granted on 13 August 2013, (i.e. the EA lapses on 13 August 2017).

This proposed amendment letter must be read in conjunction with the EA dated 27 September 2011 as amended.

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Kilpatrick Archer
Actis
Mar 21, 2019 10:53

M.S

In terms of Regulation 4(2) of the Environmental Impact Assessment Regulations, 2014 (the Regulations), you are instructed to notify all registered interested and affected parties, in writing and within 14 (fourteen) days of the date of the Department's decision in respect of the amendment made as well as the provisions regarding the submission of appeals that are contained in the Regulations.

Your attention is drawn to Chapter 2 of Government Notice No. R.993, which prescribes the appeal procedure to be followed. Kindly include a copy of this document with the letter of notification to interested and affected parties.

An appellant must submit an appeal to the appeal administrator, and a copy of the appeal to the applicant, any registered interested and affected party and any organ of state with interest in the matter within 20 days from the date that the notification of the decision was sent to the applicant by the competent authority.

By post: Private Bag X447,
Pretoria, 0001; or
By hand: Environment House
473 Steve Biko,
Arcadia, Pretoria,
0083

Appeals must be submitted in writing to:

Mr Z Hassam, Director: Appeals and Legal Review, of this Department at the above mentioned addresses. Mr Hassam can also be contacted at:

Tel: (012) 399 9356
Email: Appealsdirectorate@environment.gov.za

Please note that in terms of section 43(7) of the National Environmental Management Act, 1998, an appeal under section 43 of that Act will suspend the environmental authorisation or any provision or condition attached thereto. In the instance where an appeal is lodged, you may not commence with the activity until such time that the appeal is finalised.

For guidance on appeals submitted to the Minister in terms of NEMA and the SEMAs, please find a copy of the guideline on the administration of appeals on the Department's website: (https://www.environment.gov.za/documents/forms#legal_authorisations).

Yours faithfully

Mr Sabelo Malaza
Chief Director: Integrated Environmental Authorisations
Department of Environmental Affairs
Date: 24/06/2015

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Private Bag X 447· PRETORIA · 0001· Environment House · 473 Steve Biko, Arcadia· PRETORIA
Tel (+ 27 12) 399 9372

DEA Reference: 12/12/20/1798/AM6
Enquiries: Mr Muhammad Essop
Telephone: (012) 399 9406 **E-mail:** MEssop@environment.gov.za

Mr Werner Engelbrecht
BioTherm Energy (Pty) Ltd
PO Box 69408
BRYANSTON
2021

Telephone Number: (011) 367 4600
E-mail Address: eiaadmin@biothermenergy.com

PER EMAIL / MAIL

Dear Mr Engelbrecht

AMENDMENT OF THE ENVIRONMENTAL AUTHORISATION ISSUED ON 27 SEPTEMBER 2011 FOR THE CONSTRUCTION AND OPERATION OF THE BIOTHERM WIND ENERGY FACILITY BETWEEN UITKYK AND EXCELSIOR NEAR SWELLENDAM IN THE WESTERN CAPE PROVINCE

The Environmental Authorisation (EA) issued for the above application by this Department on 27 September 2011 as amended, and your application for amendment of the EA received by this Department on 16 February 2016 refer.

Based on a review of the reason for requesting an amendment to the above EA, this Department, in terms of Chapter 5 of the Environmental Impact Assessment Regulations, 2014, has decided to amend the EA dated 27 September 2011 as amended as follows:

Amendment 1: Amendment to the project description and conditions related to the powerline:

The following is hereby removed from the EA:

Point 06 on Page 04 of the EA:

"The wind turbines will be connected to the existing Vryheid substation"

Point 09 of Condition 6.4 on Page 09 of the EA:

"Connection routes to the distribution/transmission network"

Condition 10.1.6 on Page 10 of the EA:

"Anti-collision devises such as bird flappers must be installed where power lines cross avifaunal corridors. The input of an avifaunal specialist must be obtained for the fitting of the anti-collision devises onto specific sections of the line once the exact positions of the towers have been surveyed and pegged. Sufficient bird diverters must be installed on the central 10 meters of the line between pylons/poles for the length of the powerline within the De Beers sections as well as being installed on the entire span length between pylons/poles for the section of the

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Kilpatrick Archer
Actis
Mar 21, 2019 10:53

power line where it turns west towards the Homestead Substation. Flappers must be fitted in place so that they do drift along the line and be readily and cost effectively installed on, or removed from the existing lines.

Condition 10.13.1 on Page 18 of the EA:

"A walk-through survey of the final survey power line corridor must be undertaken by a botanical specialist, an ornithologist and a heritage specialist to identify areas where mitigation may be required.

Condition 10.13.1 on Page 18 of the EA:

"All sections of the proposed power line passing over, or in close proximity of grasslands, rivers, and dams must be marked with suitable bird flight diverters in order to deter large birds from colliding with any powerline. Additional areas of high sensitivity along the preferred alignment must be identified by an avifaunal specialist for the fitment of anti-collision devices according to Eskom Transmission Guidelines."

In terms of Regulation 4(2) of the Environmental Impact Assessment Regulations, 2014 (the Regulations), you are instructed to notify all registered interested and affected parties, in writing and within 14 (fourteen) days of the date of the Department's decision in respect of the amendment made as well as the provisions regarding the submission of appeals that are contained in the Regulations.

Your attention is drawn to Chapter 2 of Government Notice No. R.993, which prescribes the appeal procedure to be followed. Kindly include a copy of this document with the letter of notification to interested and affected parties.

An appellant must submit an appeal to the appeal administrator, and a copy of the appeal to the applicant, any registered interested and affected party and any organ of state with interest in the matter within 20 days from the date that the notification of the decision was sent to the applicant by the competent authority.

By post: Private Bag X447,
Pretoria, 0001; or
By hand: Environment House
473 Steve Biko,
Arcadia, Pretoria

Appeals must be submitted in writing to:

Mr Z Hassam, Director: Appeals and Legal Review, of this Department at the above mentioned addresses. Mr Hassam can also be contacted at:

Tel: (012) 399 9356
Email: Appealsdirectorate@environment.gov.za

Please note that in terms of section 43(7) of the National Environmental Management Act, 1998, an appeal under section 43 of that Act will suspend the environmental authorisation or any provision or condition attached thereto. In the instance where an appeal is lodged, you may not commence with the activity until such time that the appeal is finalised.

MS

For guidance on appeals submitted to the Minister in terms of NEMA and the SEMAs, please find a copy of the guideline on the administration of appeals on the Department's website: (https://www.environment.gov.za/documents/forms#legal_authorisations).

Yours faithfully

Mr Sabelo Malaza
Chief Director: Integrated Environmental Authorisations
Department of Environmental Affairs
Date: 22/02/2016

cc:	Ms Jo-Anne Thomas	Savannah Environmental (Pty) Ltd	Email: joanne@savannahsa.com

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

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Tel (+ 27 12) 399 9372

DEA Reference: 12/12/20/1798/AM5
Enquiries: Mr Muhammad Essop
Telephone: (012) 399 9406 **E-mail:** MEssop@environment.gov.za

Mr Werner Engelbrecht
Amstilinx (RF) Proprietary Limited
PO Box 69408
BRYANSTON
2021

Telephone Number: (011) 367 4600
E-mail Address: eiaadmin@biothermenergy.com

PER EMAIL / MAIL

Dear Mr Engelbrecht

AMENDMENT OF THE ENVIRONMENTAL AUTHORISATION ISSUED ON 27 SEPTEMBER 2011 FOR THE CONSTRUCTION AND OPERATION OF THE BIOTHERM WIND ENERGY FACILITY BETWEEN UITKYK AND EXCELSIOR NEAR SWELLENDAM IN THE WESTERN CAPE PROVINCE

The Environmental Authorisation (EA) issued for the abovementioned application by this Department on 27 September 2011; the amendments dated 24 May 2012, 31 May 2013, 13 August 2013, 24 June 2015 and 22 February 2016; your application for amendment of the EA received by this Department on 09 October 2015; the acknowledgement letter dated 19 October 2015; the draft report received on 20 November 2015; the comments issued by this Department on 06 January 2016; the additional information received on 11 January 2016; the correspondence from this Department dated 18 April 2016, the representations received from Webber Wentzel dated 03 May 2016, Savannah Environmental (Pty) Ltd dated 28 April 2016 and Cliffe Dekker Hofmeyer dated 28 April 2016, the response from this Department dated 14 June 2016, the amended draft report received on 15 June 2016 and the final report received on 20 July 2016 refer.

Based on a review of the reason for requesting an amendment to the above EA, this Department, in terms of Chapter 5 of the Environmental Impact Assessment Regulations, 2014, has decided to amend the EA dated 27 September 2011 as amended as follows:

Amendment 1: Amendment to the holder of the EA:

"Excelsior Wind Energy Facility (Pty) Ltd"

Represented by: Mr Werner Engelbrecht
PO Box 69408
BRYANSTON
2021

Telephone Number: (011) 367 4600
Fax Number: (086) 554 5503
Cell phone Number: (082) 566 8965
Email Address: wengelbrecht@biothermenergy.com

MS

Is hereby amended to:

"Amstilinx (RF) Proprietary Limited"

Represented by: Mr Werner Engelbrecht
PO Box 69408
BRYANSTON
2021

Telephone Number: (011) 367 4600
Fax Number: (086) 554 5503
Cell phone Number: (082) 566 8965
Email Address: eiaadmin@biothermenergy.com

Amendment 2: Amendment of turbine specifications in the EA:

The applicant wishes to amend the EA for the abovementioned project by amending the project description as follows:

- Reduce the number of turbine from 42 to 13;
- Reduce the hub heights from 100m to 90m;
- Increase the rotor diameters from 100m to 121m;
- Increase the blade length from 57m to 59.5m; and,
- The tip height of the turbines will remain the same at 150.5m.

The following table is hereby included on page 04 of the EA and will replace the turbine specifications as outlined in the EA dated 27 September 2011 as amended:

Component	***Description/ Dimensions***
Hub height from ground level	*90m*
Rotor diameter	*121m*
Blade Length	*59.5m*
Tip Height	*150.5m*
Maximum of turbines	*13 turbines*
Generation capacity per turbine	*2.5MW*
Maximum Output of the Wind Energy Facility	*32.5 MW*

Page 04 of the EA:

"Up to 42 wind turbines"

Is hereby amended to:

"Up to 13 wind turbines"

The mitigation measures and recommendations made by the specialists in the amended final report dated July 2016, must be adhered to and are included as an extension to the conditions of the EA dated 27 September 2011 as amended.

The reason for the amendment of the turbine specifications in the EA is due to recent developments in technology after the issuing of the EA and the availability of the turbine options for this project. The Holder wishes to install technology that is best suited to the conditions of the site. The change is also required based on what

has been awarded by DoE based on grid capacity in this area. The change will lead to a decrease in extent of the facility footprint (as only 13 turbines are now proposed for the facility compared to the 42 turbines originally applied for and authorised).

This proposed amendment letter must be read in conjunction with the EA dated 27 September 2011 as amended.

In terms of Regulation 4(2) of the Environmental Impact Assessment Regulations, 2014 (the Regulations), you are instructed to notify all registered interested and affected parties, in writing and within 14 (fourteen) days of the date of the Department's decision in respect of the amendment made as well as the provisions regarding the submission of appeals that are contained in the Regulations.

Your attention is drawn to Chapter 2 of Government Notice No. R.993, which prescribes the appeal procedure to be followed. Kindly include a copy of this document with the letter of notification to interested and affected parties.

An appellant must submit an appeal to the appeal administrator, and a copy of the appeal to the applicant, any registered interested and affected party and any organ of state with interest in the matter within 20 days from the date that the notification of the decision was sent to the applicant by the competent authority.

By post: Private Bag X447,
Pretoria,
0001; or
By hand: Environment House
473 Steve Biko Road,
Arcadia,
Pretoria.

Appeals must be submitted in writing to:

Mr Z Hassam, Director: Appeals and Legal Review, of this Department at the above mentioned addresses. Mr Hassam can also be contacted at:
Tel: (012) 399 9356
Email: Appealsdirectorate@environment.gov.za

Please note that in terms of Section 43(7) of the National Environmental Management Act, 1998, an appeal under Section 43 of that Act will suspend the environmental authorisation or any provision or condition attached thereto. In the instance where an appeal is lodged, you may not commence with the activity until such time that the appeal is finalised.

For guidance on appeals submitted to the Minister in terms of NEMA and the SEMAs, please find a copy of the guideline on the administration of appeals on the Department's website: (https://www.environment.gov.za/documents/forms#legal_authorisations).

Yours faithfully

Mr Sabelo Malaza
Chief Director: Integrated Environmental Authorisations
Department of Environmental Affairs
Date: 20/10/2016

cc:	Ms Jo-Anne Thomas	Savannah Environmental (Pty) Ltd	Email: joanne@savannahsa.com

APPENDIX B:
FINAL FACILITY LAYOUT

Excelsior WEF

Layout Map

Legend

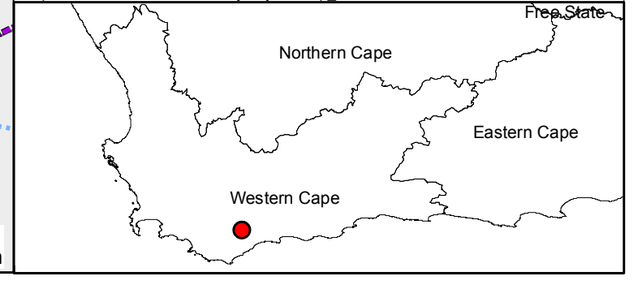
- Existing power line
- Regional road
- Secondary road
- Non-perennial rivers
- Farm portions
- Excelsior Wind Energy Facility Project Site

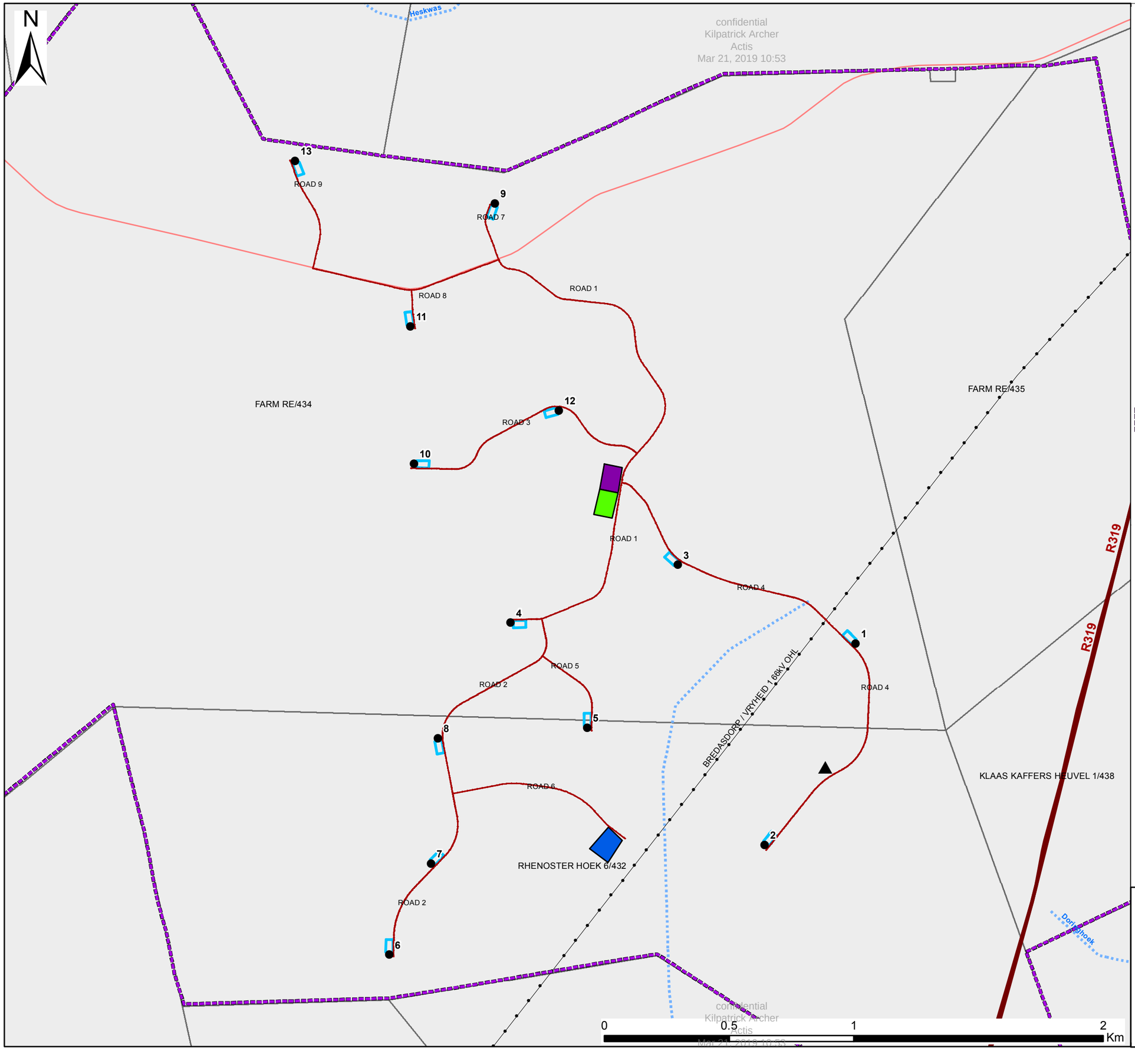
Layout Plan:

- Wind Monitoring Mast
- Turbines
- Internal Access Roads
- Turbine Hardstand Area
- Batch Plant and Laydown Area
- Site Compound Area
- Substation

Savannah ENVIRONMENTAL (PTY) LTD

Scale: 1:14 500
Projection: LO19
Map ref.: Excelsior WEF - Facility Layout Map_12.08.16





Excelsior WEF

Environmental Sensitivity and Layout Map

Legend

- Existing power line
- Regional road
- Secondary road
- Non-perennial rivers
- Excelsior Wind Energy Facility Project Site
- Farm portions

Layout Plan:

- Wind Monitoring Mast
- Turbines
- Internal Access Roads and MV Cables
- Turbine Hardstand Area
- Batch Plant and Laydown Area
- Site Compound Area
- Substation

Environmental Sensitivities:

- Noise Sensitive Areas
- Waterbody
- Noise Sensitive Areas (500m Buffer)
- Roads (200m Buffer)
- Waterbodies (300m Buffer)
- Wetland (50m Buffer)
- Non-perennial Wetland
- Perennial Wetland
- Sensitive Vegetation (50m Buffer)
- Botanical Issues

Savannah ENVIRONMENTAL (PTY) LTD

Scale: 1:14 500
Projection: LO19
Map ref.: Excelsior WEF- Environ. Sens & Facility Layout Map_15.08.16

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APPENDIX C:
REHABILITATION PLAN

BIOTHERM WIND ENERGY FACILITY BETWEEN UITKYK AND EXCELSIOR NEAR SWELLENDAM IN THE WESTERN CAPE PROVINCE

ENVIRONMENTAL MANAGEMENT PROGRAMME: APPENDIX C REVEGETATION AND REHABILITATION PLAN

Prepared for

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TABLE OF CONTENTS

REVEGETATION AND REHABILITATION PLAN

1. PURPOSE

The purpose of the rehabilitation plan is to ensure that areas cleared or impacted during construction activities of the proposed facility and power line are rehabilitated with a plant cover that reduces the risk of erosion from these areas as well as restores ecosystem function. The purpose of the rehabilitation plan for the site can be summarised as follows:

» Achieve long-term stabilisation of all disturbed areas to minimise erosion potential.
» Re-vegetate all disturbed areas with suitable local plant species (only applicable to areas of natural vegetation where disturbance occurs).
» Minimise visual impact of disturbed areas.
» Ensure that disturbed areas are suitable for future uses.

This rehabilitation plan should be closely aligned with other site-specific plans for the project, including the erosion management plan, soil management plan, alien plant management plan, and plant rescue and protection plan. Prior to commencement of construction, a detailed rehabilitation plan and Method Statement for the site should be compiled by the EPC Contractor with the aid of a rehabilitation specialist.

2. RELEVANT ASPECTS OF THE SITE

The broader area is predominantly agricultural, with most farms producing sheep and cereals and such grains as wheat, barley and canola. Homesteads, farm buildings and copses of eucalyptus trees are dotted across the landscape. The powerline may require the removal of indigenous vegetation and as such the recommendations made in this plan also apply to the power line iin areas where indigenous vegetation is being disturbed. The wind energy facility site lies within the Fynbos biome and the Cape Floristic Region (CFR), which is recognized as one of the principal centres of diversity and endemism in Africa. Fynbos and Renosterveld are considered to be the main vegetation types in the CFR. Both vegetation types are very species rich, but have been transformed or degraded to a high degree and the remainder is therefore considered to be of high conservation value. The original natural vegetation in the area is a mix of Eastern Ruens Shale Renosterveld and Ruens Silcrete Renosterveld (Mucina & Rutherford 2006). Very little natural vegetation remains on farms in this area, and typically less than 10 or 15% of each farm still supports natural vegetation. The loss of natural vegetation to agriculture within the region has been severe (>85% lost) due to the high agricultural potential of the shale-derived soils.

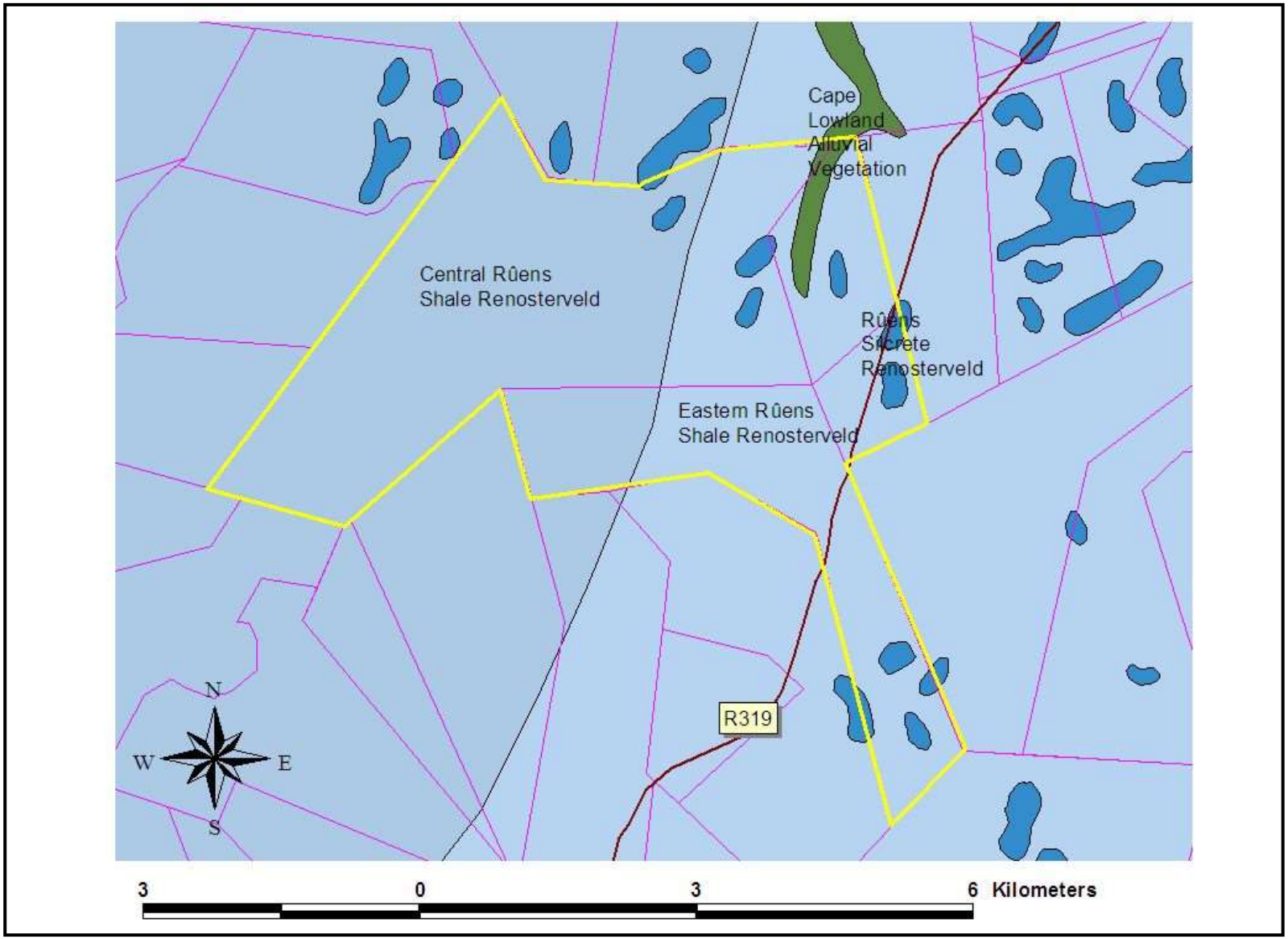

Figure 1: Vegetation types associated with facility (CSIR, 2011)

3. REHABILITATION METHODS

The following rehabilitation methods are only applicable if / where there is construction activity in areas of natural vegetation. These measures can be ignored where construction takes place on agricultural or disturbed land.

» Immediately after replacing topsoils in disturbed areas, the soil surface must be revegetated with a suitable plant cover.
» It is expected that soil seed banks of indigenous vegetation will be present to initiate initial vegetation cover. However, simply applying this topsoil to a well prepared rehabilitation site does not result in the same species richness and diversity as the surrounding areas. In some areas the natural regeneration of the vegetation may be poor and the application of seed to enhance vegetation recovery may be required.
» Where possible, seed should be collected from plants present at the site during plant rescue oprerations. Indigenous seeds may also be harvested for purposes of re-vegetation in areas that are free of alien or invasive vegetation, either at the site prior to clearance or from suitable neighbouring sites.
» Seed collection should be undertaken by a suitably qualified specialist who is familiar with the various seed types associated with the plant species and rehabilitation in the area.
» 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. The collection of unripe seeds will reduce the percentage germination thereby reducing the effectiveness of the rehabilitation efforts. Seeds should be stored in paper or canvas bags dusted with insecticide, and sown at the onset of the rainy season.
» Seed can be sown onto the soil, but should preferably be applied in conjunction with measures to improve seedling survival such as scarification of the soil surface or simultaneous application of mulch. Additional organic material may be added to the soil mix, if required, to assist with water retention during the early stages of seedling establishment.
» It should be ensured that the seed mix is as diverse as possible in the first season. After the first season, when pioneer plant communities have successfully established, attempts should be made to re-sow and replant the area with more perennial and woody species. It is a process that will require several follow-ups.
» Planting is dependent on species involved. Planting of species recommended for rehabilitation should be carried out as far as is practicable to coincide with the onset of the first significant rains. In general however, planting should commence as soon as possible after construction is completed in order to minimise the potential for erosion.

- The final vegetation cover should resemble the original (non-encroached and indigenous) vegetation composition and structure as far as practicably possible.
- Progressive rehabilitation is an important element of the rehabilitation strategy and should be implemented where feasible. Re-vegetation of disturbed surfaces must occur immediately after construction activities are completed.
- Once revegetated, areas should be protected to prevent trampling and erosion.
- No construction equipment, vehicles or unauthorised personnel should be allowed onto areas that have been vegetated.
- Where rehabilitation sites are located within actively grazed areas, they should be fenced.
- Fencing should be removed once a sound vegetative cover has been achieved.
- Any runnels, erosion channels or wash aways developing after revegetation should be backfilled and consolidated and the areas restored to a proper stable condition.

4. 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 rehabilitated areas. During the construction phase, the EO and contractor will be responsible for initiating and maintaining a suitable monitoring system. Once the development is operational, the project company will need 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. This will only be required where there were impacts in areas of natural vegetation. If not impacts on natural vegetation occurred then this will not be required.

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
- Re-emergence of alien and invasive plant species. If noted, remedial action must be taken immediately.

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 rehabilitation specialist, 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).

As rehabilitation success, monitoring and follow-up actions are important to achieve the desired cover and soil protection. The following monitoring protocol is recommended:

» Re-vegetated areas should be monitored every 4 months for the first 12 months following construction.
» Re-vegetated areas showing inadequate surface coverage (less than 20% within 12 months after re-vegetation) should be prepared and re-vegetated;
» Any areas showing erosion, should be re-contoured and seeded with indigenous grasses or other locally occurring species which grow quickly.

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 an acceptable plant cover is achieved (excluding alien plant species or weeds). Additional seeding or planting may be necessary to achieve acceptable plant cover. Hand seeding may have to be considered as an option in this case.

Monitoring of rehabilitation success and follow-up adaptive management, together with clearing of emerging alien plant species should continue until the decommissioning phase has been completed.

APPENDIX D:
EMERGENCY PREPAREDNESS AND RESPONSE PLAN

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BIOTHERM WIND ENERGY FACILITY BETWEEN UITKYK AND EXCELSIOR NEAR SWELLENDAM IN THE WESTERN CAPE PROVINCE

ENVIRONMENTAL MANAGEMENT PROGRAMME: APPENDIX D EMERGENCY RESPONSE PLAN

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TABLE OF CONTENTS

EMERGENCY RESPONSE PLAN

1. PURPOSE

The purpose of the Emergency Response Plan is:

- To assist contractor personnel to prepare for and respond quickly and safely to emergency incidents, and to establish a state of readiness which will enable a prompt and effective response to possible events.
- To control or limit any effect that an emergency or potential emergency may have on site or on neighbouring areas.
- To facilitate emergency response and to provide such assistance on the site as is appropriate to the occasion.
- To ensure communication of all vital information as soon as possible.
- To facilitate the reorganisation and reconstruction activities so that normal operations can be resumed as soon as possible.
- To provide for training so that a high level of preparedness can be continually maintained.

This plan outlines response actions for potential incidents of any size. It details response procedures that will minimise potential health and safety hazards, environmental damage, and clean-up efforts. The plan has been prepared to ensure quick access to all the information required in responding to an emergency event. The plan will enable an effective, comprehensive response to prevent injury or damage to the construction personnel, public, and environment during the project. Contractors are expected to comply with all procedures described in this document. A Method Statement should be prepared at the commencement of construction detailing how this plan is to be implemented as well as details of relevant responsible parties for the implementation.

2. PROJECT-SPECIFIC DETAILS

During construction of the Excelsior Wind Energy Facility, the construction lay-down yard will include a site office, mobile toilets and bathroom facilities, a car yard where all vehicles will be parked to reduce oil spillage, and the hydrocarbon management facility. The potential for contaminating the soil resource is dependent on the presence of vehicles, machinery and processes involving various types of chemicals. For the Excelsior Wind Energy Facility site very little of these are anticipated during the life span of the project. The potential impact is thus assumed to be minor and localised if it should occur (i.e. oil leakage from vehicles and earth moving machines).

The presence of people on the site during both construction and operation could increase the risk of fire in the area if appropriate prevention measures are not in place.

3. EMERGENCY RESPONSE PLAN

There are three levels of emergency as follows:

- Local Emergency: An alert confined to a specific locality.
- Site Emergency: An alert that cannot be localised and which presents danger to other areas within the site boundary or outside the site boundary.
- Evacuation: An alert when all personnel are required to leave the affected area and assemble in a safe location.

If there is any doubt as to whether any hazardous situation constitutes an emergency, then it must be treated as an Evacuation.

Every effort must be made to control, reduce or stop the cause of any emergency provided it is safe to do so. For example, in the event of a fire, isolate the fuel supply and limit the propagation of the fire by cooling the adjacent areas. Then confine and extinguish the fire (where appropriate) making sure that re-ignition cannot occur; for a gas fire it is usually appropriate to isolate the fuel and let it burn itself out but keep everything around the fire cold.

3.1. Emergency Scenario Contingency Planning

3.1.1. Scenario: Spill which would result in the contamination of land, surface or groundwater

i. Spill Prevention Measures

Preventing spills must be the top priority at all operations which have the potential of endangering the environment. The responsibility to effectively prevent and mitigate any scenario lies with the Contractor and the Environmental Manager. In order to reduce the risk of spills and associated contamination, the following principles should be considered during construction and operation activities:

» All equipment refuelling, servicing and maintenance activities should only be undertaken within appropriately sealed designated areas.
» All maintenance materials, oils, grease, lubricants, etc. should be stored in a designated area in an appropriate storage container.

» No refuelling, storage, servicing, or maintenance of equipment should take place within 50m of drainage lines or sensitive environmental resources in order to reduce the risk of contamination by spills.
» No refuelling or servicing should be undertaken without absorbent material or drip pans properly placed to contain spilled fuel.
» Any fluids drained from the machinery during servicing should be collected in leak-proof containers and taken to an appropriate disposal or recycling facility.
» If these activities result in damage or accumulation of product on the soil, the contaminated soil must be disposed of as hazardous waste. Under no circumstances shall contaminated soil be added to a spoils pile and transported to a regular disposal site.
» Chemical toilets used during construction must not be placed within 50m of drainage lines or sensitive environmental resources in order to reduce the risk of contamination by spills. These facilities must be regularly cleaned. Chemicals used in toilets are also hazardous to the environment and must be controlled. Portable chemical toilets could overflow if not pumped regularly or they could spill if dropped or overturned during moving. Care and due diligence should be taken at all times.
» Contact details of emergency services and HazMat Response Contractors are to be clearly displayed on the site. All staff are to be made aware of these details and must be familiar with the procedures for notification in the event of an emergency.

ii. Procedures

The following action plan is proposed in the event of a spill:

1. Spill or release identified.
2. Assess person safety, safety of others and environment.
3. Stop the spill if safely possible.
4. Contain spill to limit entering water bodies and surrounding areas.
5. Identify substance spilled.
6. Quantify spill (under or over guideline/threshold levels).
7. Notify Site Manager and emergency response crew and authorities (DEA) in event of major spill[1].
8. Inform users (and downstream users) of potential risk.
9. Clean up of spill using spill kit or by HazMat team.
10. Record of spill incident on company database.

[1] Any spill > 500 ml of any hazardous material

a) Procedures for containing and controlling a spill (i.e. on land or in water)

Measures can be taken to prepare for quick and effective containment of any potential spills. Each contractor must keep sufficient supplies of spill containment equipment at the construction sites, at all times during and after the construction phase. These should include specialised spill kits or spill containment equipment. Other spill containment measures include using drip pans underneath vehicles and equipment every time refuelling, servicing, or maintenance activities are undertaken.

Specific spill containment methods for land and water contamination are outlined below.

Containment of Spills on Land

Spills on land include spills on rock, gravel, soil and/or vegetation. It is important to note that soil is a natural sorbent, and therefore spills on soil are generally less serious than spills on water as contaminated soil can be more easily recovered. It is important that all measures be undertaken to avoid spills reaching open water bodies. The following methods could be used:

» *Dykes*
Dykes can be created using soil surrounding a spill on land. These dykes are constructed around the perimeter or down slope of the spilled substance. A dyke needs to be built up to a size that will ensure contaminant of the maximum quantity of contaminant that may reach it. A plastic tarp can be placed on and at the base of the dyke such that the contaminant can pool up and subsequently be removed with sorbent materials or by pump into barrels or bags. If the spill is migrating very slowly, a dyke may not be necessary and sorbents can be used to soak up contaminants before they migrate away from the source of the spill.

» *Trenches*
Trenches can be dug out to contain spills. Spades, pick axes or a front-end loader can be used depending on the size of trench required. Spilled substances can then be recovered using a pump or sorbent materials.

Containment of Spills on Water

Spills in water can negatively impact water quality and aquatic life. All measures need to be undertaken to contain spills on open water. The following methods could be used:

» *Weirs*
Weirs can be used to contain spills in streams and to prevent further migration downstream. Plywood or other materials found on site can be placed into and across the width of the stream, such that water can still flow under the weir. Weirs are however only effective for spilled substances which float on the water surface.

» *Barriers*
In some situations barriers made of netting or fence material can be installed across a stream, and sorbent materials placed at the base to absorb spilled substance. Sorbents will need to be replaced as soon as they are saturated. Water will be allowed to flow through.

b) Procedures for transferring, storing, and managing spill related wastes

Used sorbent materials are to be placed in plastic bags for future disposal. All materials mentioned in this section are to be available in the spill kits. Following clean up, any tools or equipment used must be properly washed and decontaminated, or replaced if this is not possible.

Spilled substances and materials used for containment must be placed into empty waste oil containers and sealed for proper disposal at an approved disposal facility.

c) Procedures for restoring affected areas

Criteria that may be considered include natural biodegradation of oil, replacement of soil and revegetation. Once a spill of reportable size has been contained, the Environmental Control Officer and the relevant Authority must be consulted to confirm that the appropriate clean up levels are met.

3.1.2. Scenario: Fire (and fire water handling)

i. Action Plan

The following action plan is proposed in the event of a fire:

1. Quantify risk.
2. Assess person safety, safety of others and environment.
3. If safe – attempt to extinguish fire using appropriate equipment.
4. If not safe to extinguish, contain fire.
5. Notify Site Manager and emergency response crew and authorities.

6. Inform users (and downstream users) of potential risk of fire.
7. Record of incident on company database.

ii. Procedures

Because large scale fires may spread very fast in the environment it is most advisable that the employee/contractor not put his/her life in danger in the case of an uncontrolled fire.

Portable firefighting equipment must be provided in line with the Building Code of South Africa and the relevant provincial building code. All emergency equipment including portable fire extinguisher, hose reels, hydrants must be maintained and inspected by a qualified contractor in accordance with the relevant legislation and National standards.

Current evacuation signs and diagrams for the building or site that are compliant to relevant state legislation must be provided in a conspicuous position, on each evacuation route. Contact details for the relevant emergency services should be clearly displayed on site and all employees should be aware of procedures to follow in the case of an emergency.

a) Procedures for initial actions

Persons should not fight the fire if any of the following conditions exist:

» They have not been trained or instructed in use of a fire extinguisher.
» They do not know what is burning.
» The fire is spreading rapidly.
» They do not have the proper equipment.
» They cannot do so without a means of escape.
» They may inhale toxic smoke.

b) Reporting procedures

» Report fire immediately to the Site Manager, who will determine if it is to be reported to the relevant emergency services and authorities.
» The Site Manager must have copies of the Report form to be completed.

SUMMARY: RESPONSE PROCEDURE

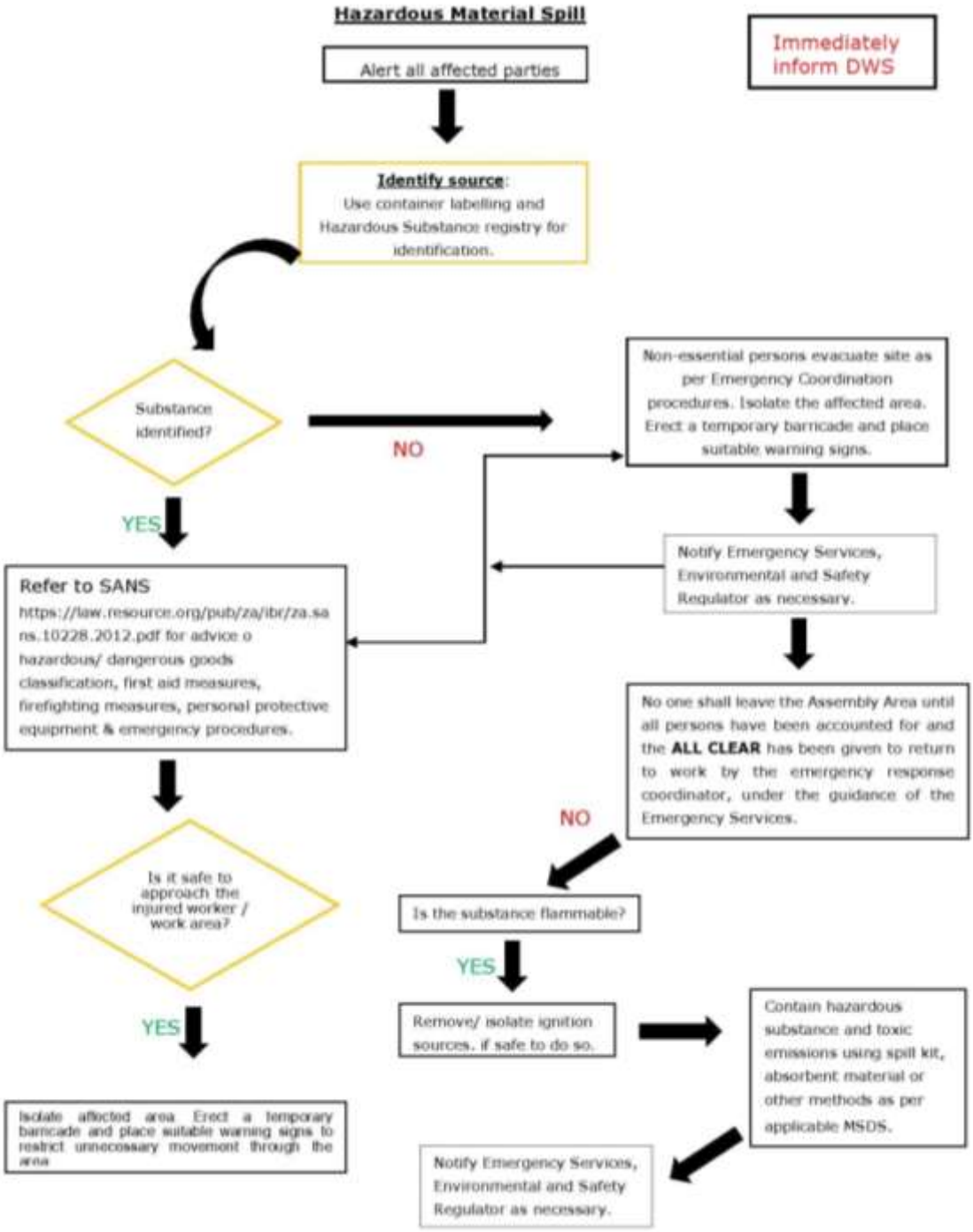

Figure 1: Hazardous Material Spill

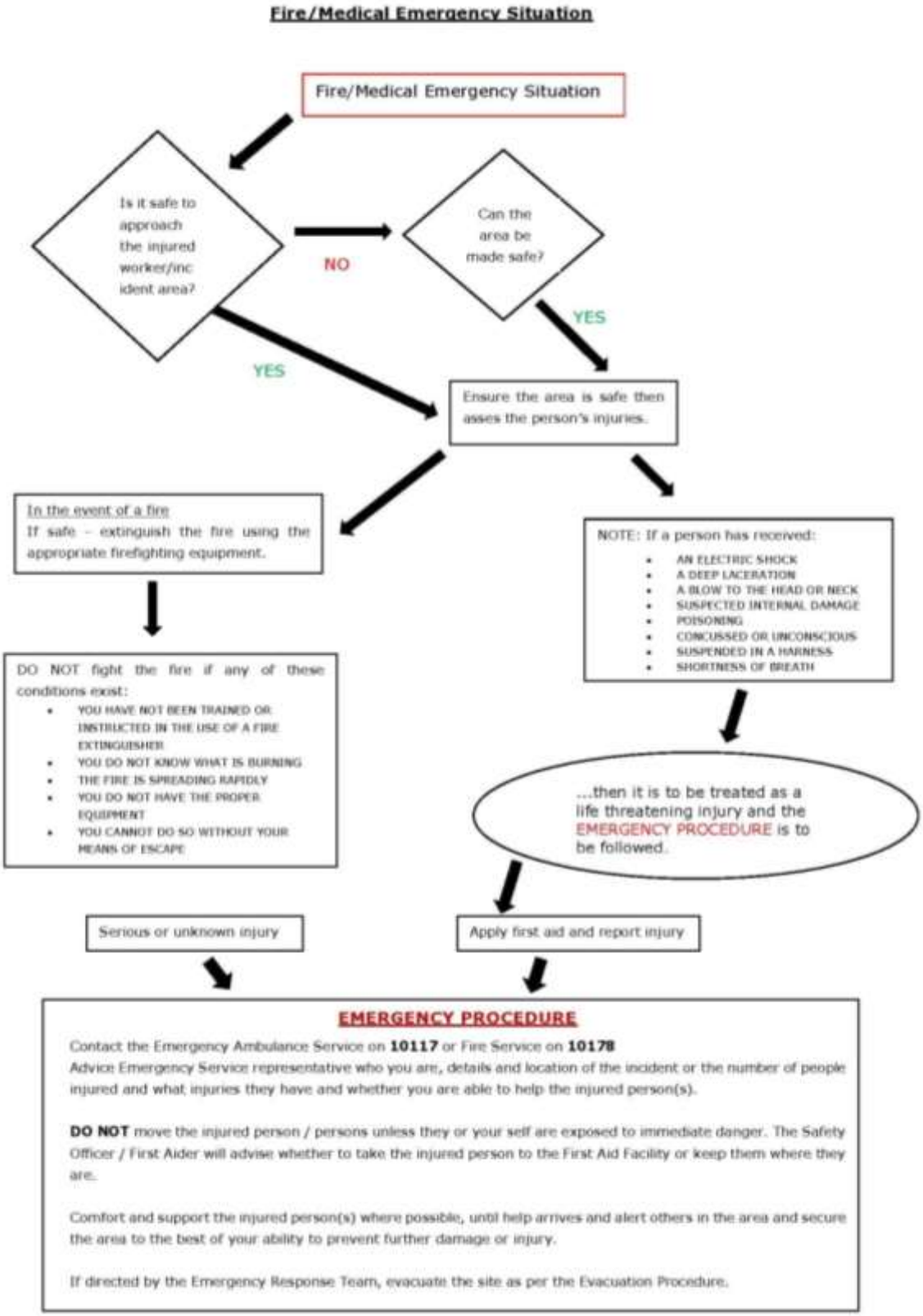

Figure 2: Emergency Fire/Medical

APPENDIX E:
STORMWATER MANAGEMENT PLAN

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Kilpatrick Archer
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Mar 21, 2019 10:53

AECOM

Built to deliver a better world

EXCELSIOR WIND ENERGY FACILITY

Stormwater Management Plan

DRAFT REPORT

March 2016

A003_2016 . 60480873

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Kilpatrick Archer
Actis
Mar 21, 2019 10:53

TITLE	***:***	*Excelsior Wind Energy Facility Stormwater Management Plan*
Project Team	***:***	*AECOM SA (Pty) Ltd*
Client	***:***	*Goldwind Africa (Pty) Ltd*
AECOM Project No	***:***	*60480873*
Status of Report	***:***	*Draft 2*
AECOM Report No	***:***	*60480873-1.2-0000-CW-J-001-R-01*
Key Words	***:***	*Stormwater Management Plan, Wind Energy Facility, Drainage*
Date of this Issue	***:***	*March 2016*

For AECOM SA (Pty) Ltd

Compiled by	**:**	TS Hotchkiss		
		Initials & Surname	**Signature**	**Date**
Reviewed by	**:**	IF Malherbe		
		Initials & Surname	**Signature**	**Date**
Approved by	**:**	W Schneeberger		
		Initials & Surname	**Signature**	**Date**

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Actis
Mar 21, 2019 10:53

Contents

List of Figures

List of Tables

List of Abbreviations

AECOM	AECOM SA (Pty) Ltd
CARA	Conservation of Agricultural Resources Act
DWS	Department of Water and Sanitation
EIA	Environmental Impact Assessment
Goldwind	Goldwind Africa (Pty) Ltd
kV	kilovolt
mamsl	metres above mean sea level
MAP	Mean Annual Precipitation
MW	Megawatt
N2	National Route N2
NEMA	National Environmental Management Act
NWA	National Water Act
R319	Regional Route R319
R317	Regional Route R317
SAWQG	South African Water Quality Guidelines
SWMP	Stormwater Management Plan
TSS	Total Suspended Solids
WEF	Wind Energy Facility
WRC	Water Research Commission

1. Introduction

1.1 Background

AECOM SA (Pty) Ltd (AECOM) was appointed by Goldwind Africa (Pty) Ltd (Goldwind) to provide professional engineering services, including a Stormwater Management Plan (SWMP), associated with the development of the proposed 32.5 MW Excelsior Wind Energy Facility (WEF). Goldwind is the EPC (Engineering, Procurement and Construction) Contractor appointed by BioTherm Energy (Pty) Ltd for the implementation of the abovementioned WEF.

The proposed Excelsior WEF consists of 13 turbines situated close to the R319 Regional Route, approximately half way between Swellendam and Bredasdorp in the Western Cape Province of South Africa, as shown in **Figure 1.1**.

1.2 Purpose of this report

This report provides details of the SWMP for the proposed 32.5 MW Excelsior WEF. The SWMP is required in terms of applicable environmental legislation in order to inform the stormwater design as well as the Environmental Management Programme to be compiled as part of the construction contract.

The scope of work associated with this SWMP includes the identification of stormwater related impacts on the surrounding environment as a result of the abovementioned development, and the associated mitigation measures and design approach proposed to alleviate these impacts. In addition, this SWMP provides a brief legislative context to stormwater management requirements in South Africa.

1.3 Study limitations

The stormwater impacts and associated mitigation measures presented in this SWMP are based on the concept layout received from Goldwind in August 2015 which will likely change during the design stage of the project. Should there be any major changes to this layout, there may be additional impacts identified which are not addressed in this SWMP.

The SWMP takes into account applicable national legislative requirements and it was confirmed with the Swellendam Municipality that there are no additional requirements specific to the local municipality.

1.4 Structure of report

The report is structured as follow:

Section 1 describes the background to, purpose of and structure of this report.

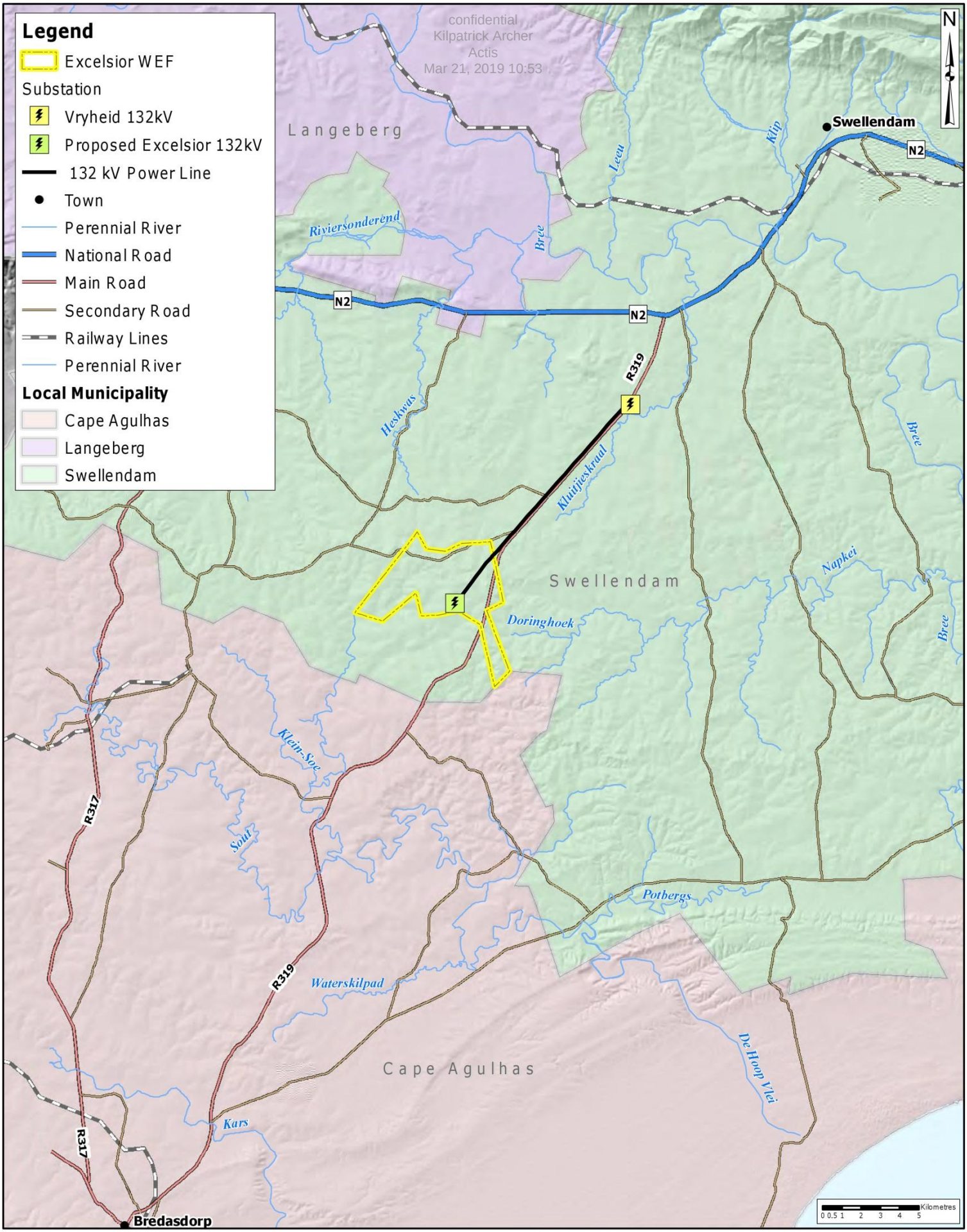
In **Section 2** a description of the site is provided.

The legislative requirements applicable to this investigation are summarised in **Section 3**.

Section 4 describes the necessary stormwater management procedures.

In **Section 5** the conclusions from this investigation are provided and recommendations are presented.

References are listed in **Section 6**.



Project Title:	**Excelsior Wind Energy Facility**
Map Title:	**Locality Plan**

Scale 1:250 000
(When page size is: A4 portrait)

Figure 1.1

Projection:	Transverse Mercator
Datum:	Hartebeesthoek 1994 Central Meridian: 21.0
Compiled By:	T Hotchkiss
GIS QC By:	A Brooksbank- GT0776
Approved By:	IF Malherbe
Date Saved:	2016/03/17
Project Number:	60480873
Map Ref:	Locality_Plan_Rev1.mxd
Revision:	1

Sources:
Roads, Rivers - National Geo-spatial Information (CD:NGI), 2013
Railway Lines - DWA GIS
SA Protected Areas - Department of Environmental Affairs, 2015
Site boundary and proposed infrastructure - Goldwind, 2016

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2. Site description

2.1 General

The proposed Excelsior WEF consists of 13 wind turbines and a 132kV electrical substation positioned on the higher areas of the mildly undulating agricultural lands immediately west of the R319 between Swellendam and Bredasdorp, as shown in **Figure 2.1**. Access to the site for construction and maintenance will be from the Divisional Road DR01259.

A network of approximately 4.5 m wide gravel roads is proposed, allowing access for vehicles to the wind turbines. The positioning of the roads and turbines was carefully considered following an environmental impact assessment (EIA) which took into account existing sensitive areas, including watercourses, wetlands, indigenous fauna and flora, as well as existing farm dwellings.

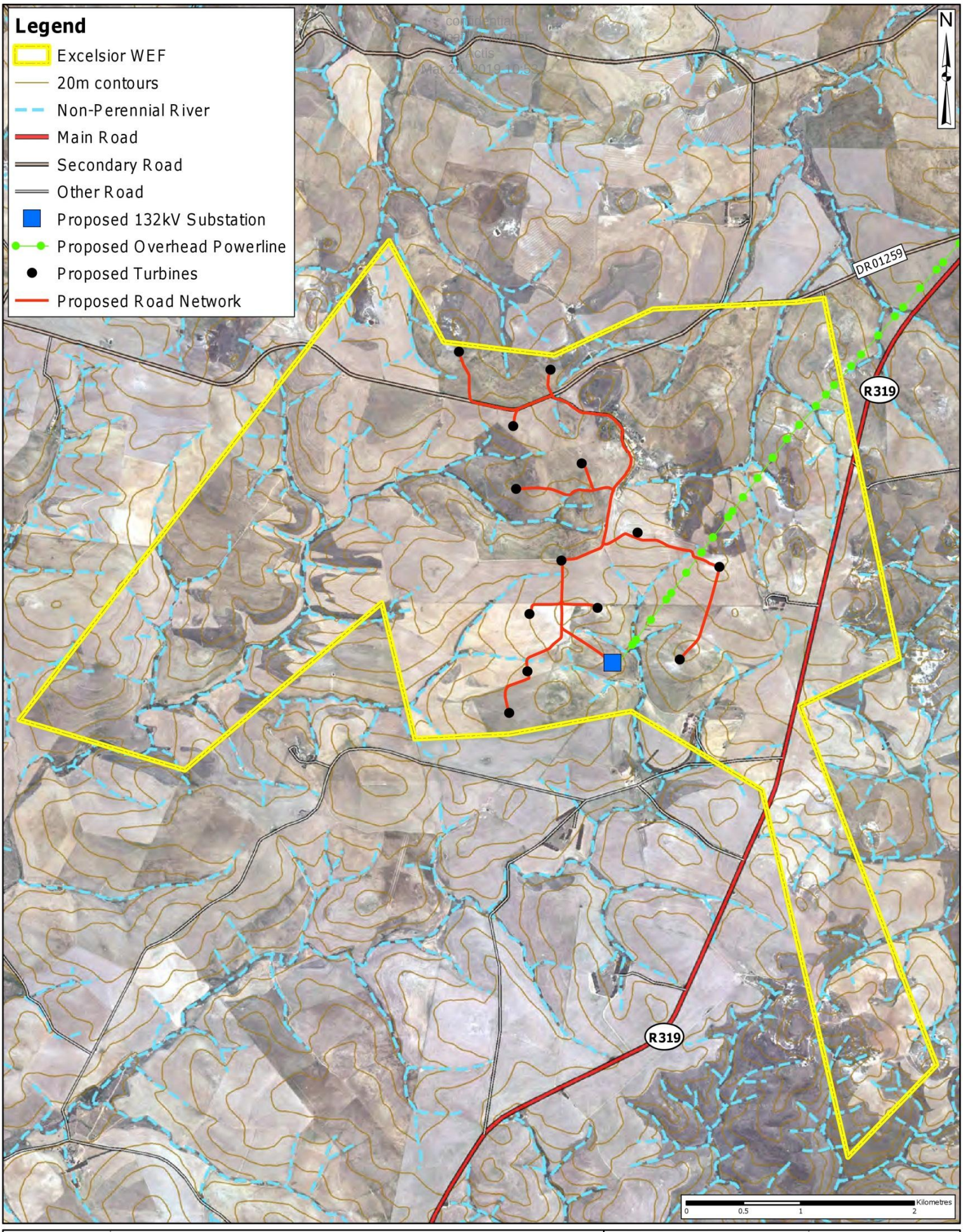
2.2 Hydrological context

The proposed Excelsior WEF site is located at an elevation of approximately 300 metres above mean sea level (mamsl) at the catchment divide between the Riviersonderend catchment to the north, and the De Hoop Vlei catchment to the south. Due to the elevated nature of the site, the watercourses impacting on the new access roads are small and non-perennial, as shown in **Figure 2.1**, and there are no watercourses impacting directly on any of the proposed positions for the wind turbines and substation. It is therefore anticipated that potential stormwater related impacts and corresponding mitigation measures resulting from the proposed WEF will be relatively minor, and generally limited to the local area.

The Mean Annual Precipitation (MAP) at the proposed WEF site is approximately 380 mm (WRC, 2002), with rainfall occurring all year round, but most of the rainfall occurring in the winter months between May and August. Rainfall events in this area are generally of low intensity, with 24-hour rainfall depths and intensities for various recurrence intervals provided in **Table 2.1**:

Table 2.1: 24-hour rainfall depths for various recurrence intervals (WRC, 2002)

Storm recurrence interval (years)	Rainfall depth over 24 hours (mm)	Average intensity over 24 hours (mm/hr)
2	46	1.9
5	67	2.8
10	84	3.5
20	102	4.3
50	129	5.4
100	153	6.4
200	179	7.5



Project Title:	**Excelsior Wind Energy Facility**
Map Title:	**Site Layout**

Scale 1:42 000
(When page size is: A4 portrait)

Figure 2.1

Projection:	Transverse Mercator
Datum:	Hartebeesthoek 1994 Central Meridian: 21.0
Compiled By:	T Hotchkiss
GIS QC By:	A Brooksbank-GT0776
Approved By:	IF Malherbe
Date Saved:	2016/02/11
Project Number:	60480873
Map Ref:	Site_Layout.mxd
Revision:	0

Sources:
Roads, Rivers - National Geo-spatial Information (CD:NGI), 2013

Site boundary and proposed infrastructure - Goldwind, 2016

Imagery - National Geo-spatial Information (CD:NGI), 2014

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3. Legislative requirements

3.1 National Water Act

The National Water Act (Act No 36 of 1998) (NWA) (Republic of South Africa, 1998a) provides the Department of Water and Sanitation (DWS) with the mandate to protect, use, develop, conserve, manage and control the country's water resources in an integrated manner. It provides the legal basis on which to develop tools and the means to implement this mandate. Chapters 3 and 4 of the NWA deals with pollution prevention and water use. The person who owns, controls, occupies, or uses the land in question is responsible for taking measures to prevent pollution of water resources. Any structures which may be located where they may have an impact on current water resources are governed by sections of the NWA and / or regulations published in terms of this Act.

The means necessary to prevent pollution of water resources can be broadly outlined as follow:

- Water contaminated by activities / infrastructure may not be discharged to water resources.
- Prevention of erosion.
- The separation of clean and "dirty" stormwater runoff.
- Monitoring programmes.

3.2 South African Water Quality Guidelines

The NWA, Section 21 (f) and (g), states that the discharging of water containing waste into a water resource and disposing of waste which may detrimentally impact on a water resource should be prevented. The South African Water Quality Guidelines (SAWQG) (DWS, 1996) are a series of documents published by DWS, which forms an integral part of the water quality management strategy to safe keep and maintain the water quality in South Africa. These guidelines are used by the DWS as a primary source of information and decision-support to judge the fitness for use of water and for other water quality management purposes. The content of the SAWQG provides information on the ideal water quality and acceptable concentrations for various constituents of concern.

Construction sites are generally considered as an industrial activity, however, due to the nature of the proposed Excelsior WEF, the water quality guidelines for industrial use are considered onerous. It is therefore recommended that the water quality of stormwater runoff should adhere to the guidelines provided in Volume 7: Aquatic Ecosystems of the SAWQG, to ensure acceptable conditions in the aquatic ecosystems downstream of the WEF, primarily focussing on the concentrations of Total Suspended Solids (TSS), which can be considered as one of the main constituents of concern due to the removal of vegetation and concentration of flow associated which result in accelerated erosion.

According to the abovementioned guideline, "any increase in TSS concentrations must be limited to < 10% of the background TSS concentrations at a specific site and time".

3.3 National Environmental Management Act

The National Environmental Management Act (Act No 107 of 1998) (NEMA) (Republic of South Africa, 1998b) covers the control and management of environmental impacts and, *inter alia*, provides a framework for measures that "prevent pollution and ecological degradation; promotes conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development".

3.4 Conservation of Agricultural Resources Act

The Conservation of Agricultural Resources Act (Act No 43 of 1983) (CARA) (Republic of South Africa, 1983) provides the legislative context for the management of agricultural resources in South Africa and highlights the need to prevent erosion and the destruction to water resources in agricultural areas.

4. Stormwater management

4.1 General

Stormwater management is required both during and after the construction of the WEF to prevent damage to property, degradation of the water quality in water resources and negative impacts to the surrounding environment.

Impacts during the construction phase need to be assessed and mitigated on an ongoing basis during construction, while impacts during the operational phase can often be mitigated by means of sound design principals that limit any long-term impacts and maintenance costs.

Potential impacts identified for both these phases should be controlled at the source, to minimise or prevent the long-term and short-term impacts propagating downstream.

4.2 Construction phase

4.2.1 Possible impacts

During construction there is the potential that stormwater runoff could come into contact with areas dedicated for the handling of contaminants such as fuel storage areas, or in the case of wind turbine sites or the substation, with areas where potential contaminants such as concrete is being handled. This could result in contaminated stormwater runoff being discharged downstream.

During the construction of the turbine foundations, substation and associated access roads, the removal or disturbance of vegetation could result in accelerated erosion due to the soil stability being affected which will result in an increased suspended solids load in the runoff and potential sedimentation in watercourses downstream. Erosion of the proposed roads is further possible at watercourse crossings due to the concentration of flow.

4.2.2 Proposed mitigation measures

Typical mitigation measures for the impacts mentioned in **Section 4.2.1**, *inter alia* include:

Table 4.1: Typical mitigation measures during construction phase

Impact	Typical mitigation measures
Contamination of stormwater runoff	• Construction areas such construction yards, wind turbine sites and the substation site should be protected from external stormwater runoff approaching these sites by implementing cut-off drains or berms along the upstream boundary of the area to divert stormwater runoff away from the site and discharge diverted stormwater as per pre-development conditions. • Inside any construction yards, stormwater runoff must be kept separate from areas dedicated to containing hazardous substances such as bunded areas for wash bays, fuel storage areas and refuelling areas. • Should it become apparent that contamination of a water resource has taken place via stormwater runoff, appropriate water quality testing and remedial action must take place.

Impact	Typical mitigation measures
Erosion	• Minimize the construction footprint, disturbance of drainage paths and ground cover by, *inter alia*, fencing off construction areas and "no-go" areas. • Minimise the extent of earthworks. • Reintroduce the existing topsoil and groundcover of disturbed areas after construction. • Encourage the use of natural flow paths downstream of construction sites. • Apply erosion control, e.g. by using straw bales, and good "house-keeping" practices. • The discharge of stormwater should be spread over a wide area to reduce the energy as a result of concentrated flow and return to sheet flow downstream of construction areas. • Protect stockpiles from erosion. • Water quality must be monitored to ensure that the TSS concentration does not exceed the concentration limits stated in **Section 3.2**. • Trench breakers, such as earth or sand filled sacks, should be used to prevent or slow the unrestricted flow of water along an excavated trench. • Stormwater runoff from disturbed areas should be directed to sediment traps before being discharged into undisturbed areas.

4.3 Operational phase

4.3.1 Possible impacts

During the operation of the WEF, an increase in stormwater runoff is expected due to an increase in impervious surfaces, i.e. proposed roads and hardstanding areas around the turbines. However, this increase in hardened surfaces can be considered as negligible. Therefore, very little to no increase in peak flow in the watercourses are expected.

Other potential impacts due to the additional hardened surfaces include erosion of the surrounding environment. Eroded material carried to downstream water resources can also result in the decrease in quality of downstream water resources, due to sedimentation.

Stormwater runoff in the vicinity of the substation and wind turbines could come into contact with dedicated areas where hazardous substances are handled such as fuels and oils which could result in contaminated stormwater runoff being discharged downstream.

There is a potential risk of localised flooding of the WEF structures if the stormwater infrastructure is not designed correctly or not maintained appropriately.

4.3.2 Proposed mitigation measures

Typical mitigation measures for the impacts mentioned in **Section 4.3.1**, *inter alia,* include the following measures, the majority of which need to be incorporated during the design phase of the project:

Table 4.2: Typical mitigation measures during operational phase

Impact	Typical mitigation measures
Contamination of stormwater runoff	• Prevent stormwater runoff from coming into contact with dedicated areas where hazardous substances are handled, by diverting flow with berms and cut-off drains to divert stormwater runoff away from the site and discharge diverted stormwater as per predevelopment conditions, and good house-keeping.
Erosion	• Where culverts are proposed for road crossings, the number of culvert barrels should be maximised, resulting in a wider discharge area and less concentration of flow (see **Figure SW8** in **Appendix A** for typical details of a culvert inlet and outlet). • Downstream invert levels of culverts should tie into the natural ground level to prevent erosion downstream of the culvert. • Erosion protection measures, such as rip-rap, are required at the downstream end of culverts. • Where drifts or dish drains are proposed, they should be designed so that the road surface follows the natural ground level, minimising the reduction of the cross-sectional area (see **Figure SW2** in **Appendix A** for typical details of a dish drain). • All roads are to be accompanied by side channels which are designed to accommodate runoff from the road, as well as runoff from adjacent areas which may have been cut off by the road (see **Figures SW6** and **SW9** in **Appendix A** for typical road and access track cross section details and see **Figures SW1**, **SW3**, **SW4** and **SW5** for typical stormwater channel details). • Apply erosion protection measures such as reno mattresses and stone pitching downstream of steep roadside channels. • Any sudden change in level at the downstream end of a drift should include a stilling basin to prevent erosion. • Protection of the wind turbine base by means of a cut-off drain or berm along the uphill side of the base with appropriate erosion protection measures such as reno mattresses and stone pitching at the downstream discharge point (see **Figure SW7** in **Appendix A** for details of a typical earth channel cut-off drain). • Stormwater runoff from the wind turbine footings and surrounding hard-standing areas is to be controlled and discharged in a manner which closely mimics the way in which stormwater would have been discharged prior to the development. This would typically consist of an open system of channels and attenuation facilities. • Stormwater infrastructure installed to mitigate possible hydrological impacts must be regularly maintained throughout the lifespan of the infrastructure to ensure its optimum functionality.
Flooding	• Protect structures such as the wind turbine bases and substation building from localised flooding by constructing cut-off berms / diverting flow on the uphill side in flood prone areas. • Ensure a minimum of 2% slope on all hardstanding areas. • Maintain all stormwater infrastructure regularly, as required (e.g. remove silt and debris from channels)

5. Conclusions and recommendations

5.1 Conclusions

Due to the elevated nature of the site proposed for the Excelsior WEF, the watercourses in the vicinity are small and non-perennial, and it is therefore anticipated that stormwater related impacts resulting from the proposed WEF will be relatively minor, and generally limited to the local area. The terrain is gently undulating and rainfall generally of low intensity and the area is typically considered to have a low erosion potential.

This SWMP has identified a number of potential stormwater impacts that could result from the implementation of the WEF unless mitigated during the construction and operational phases of this project. The potential impacts primarily include erosion and stormwater runoff coming in contact with areas dedicated to collect, contain and treat hazardous substances such as fuel storage areas.

Some of the mitigation measures listed in **Section 4**, include structural controls implemented on site such as formalised cut-off drains, berms, sediment traps and erosion protection, as well as general good housekeeping such as limiting the extent of the construction footprint.

5.2 Recommendations

The SWMP for the proposed Excelsior WEF is based on information received during the preliminary design stage. It would be recommended that the SWMP be updated when detail design information is available.

It is further recommended that the mitigation measures, included in **Section 4**, be implemented during the design, construction and operational phases of the project to achieve the stormwater management objectives outlined in this report.

6. References

Department of Water and Sanitation. 1996. *Water Quality Guidelines for South Africa*.

Republic of South Africa. 1983. *Conservation of Agricultural Resources Act. Act No. 43 of 1983*.

Republic of South Africa. 1998a. *National Water Act. Act No. 36 of 1998*.

Republic of South Africa. 1998b. *National Environmental Management Act. Act No. 97 of 1998*.

Water Research Commission (WRC). 2002. *Design Rainfall and Flood Estimation in South Africa*. Report compiled by JC Smithers and RE Schulze. Design Rainfall Estimation in South Africa (Version 3) of July 2012 developed by MJ Gorven.

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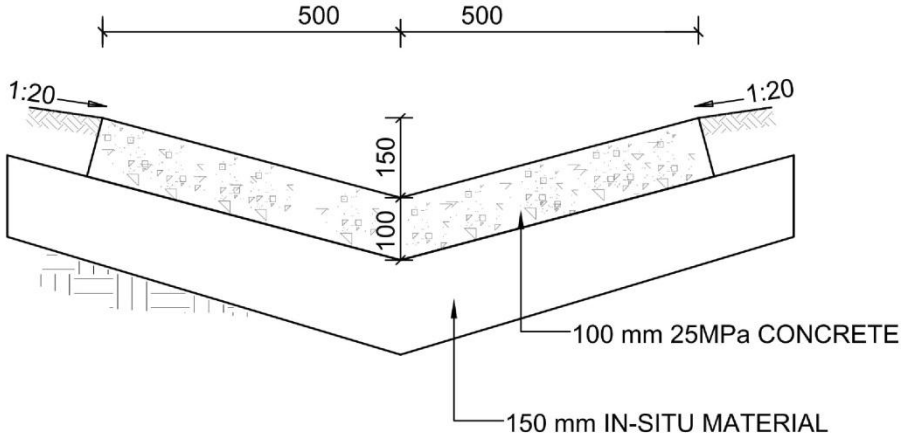
Appendix A

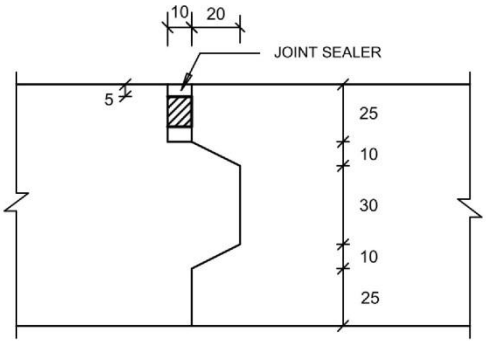
Typical stormwater details



PROPOSED IN-SITU CONCRETE CHANNEL ALONG INVERT OF REGRADED STORMWATER CANAL

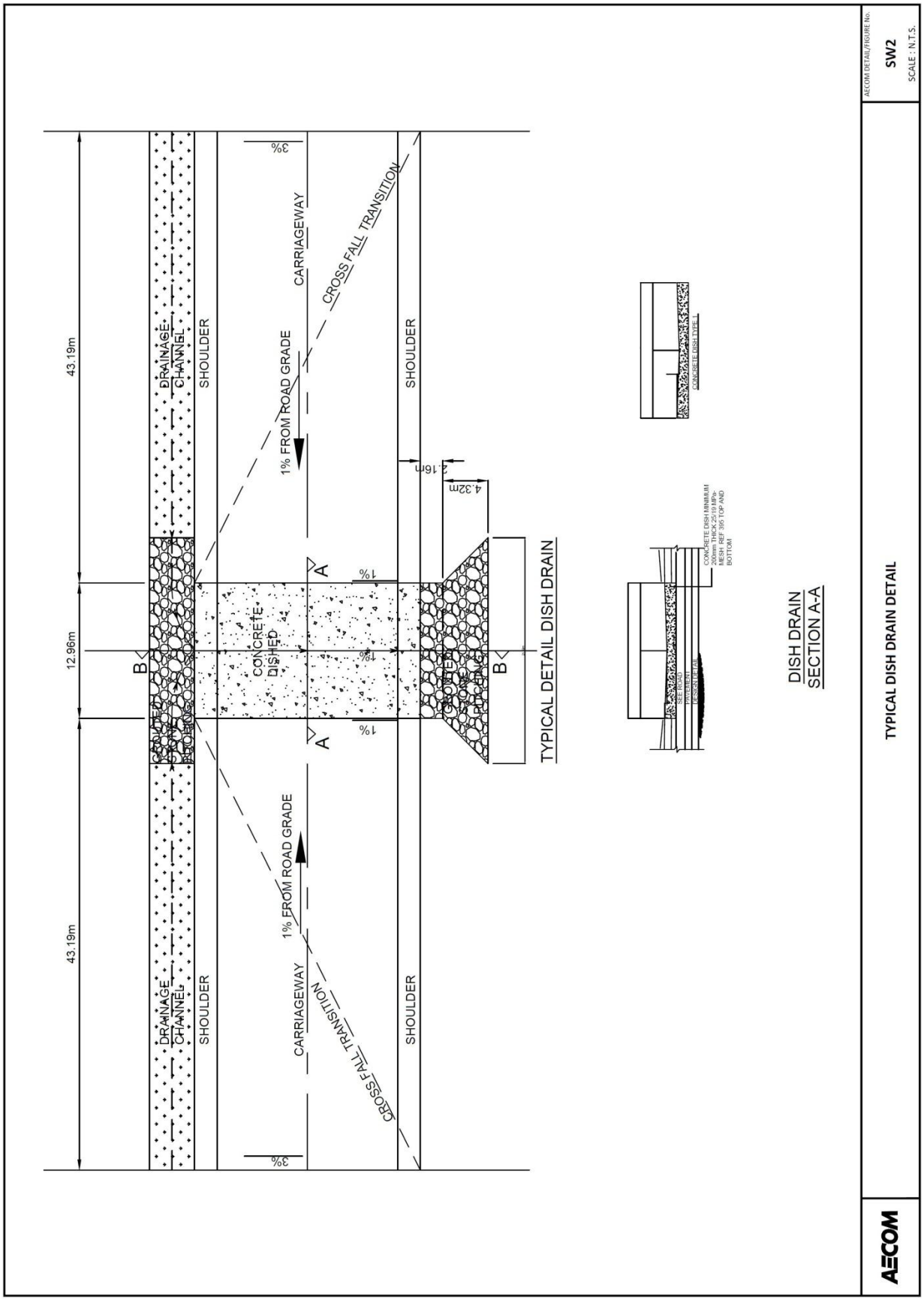
NOTES:

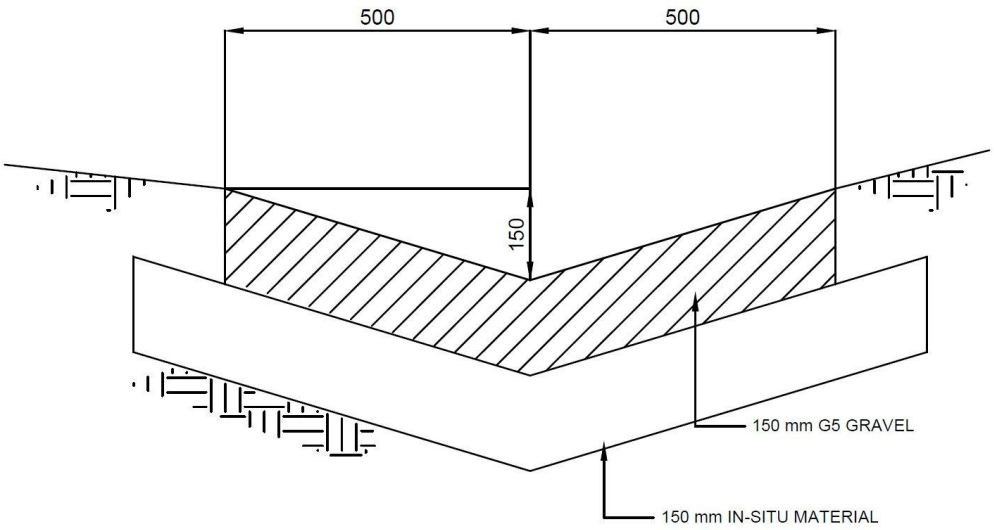
1. CONCRETE LINING TO BE 100mm THICK, USING 25MPa/19mm CONCRETE CAST IN 3,0m LONG SECTION
2. WOOD FLOATED FINISH TO SURFACE OF CONCRETE CHANNEL
3. TOP EDGE OF JOINT TO BE FINISHED WITH 5mm ARRIS
4. JOINT TO BE SEALED USING AN APPROVED SEALANT AS DIRECTED BY THE ENGINEER.



DETAIL OF SLAB JOINT

AECOM	IN-SITU CAST CONCRETE CHANNEL IN REGRADED STORMWATER CANAL	AECOM DETAIL/FIGURE No. SW1 SCALE : N.T.S.



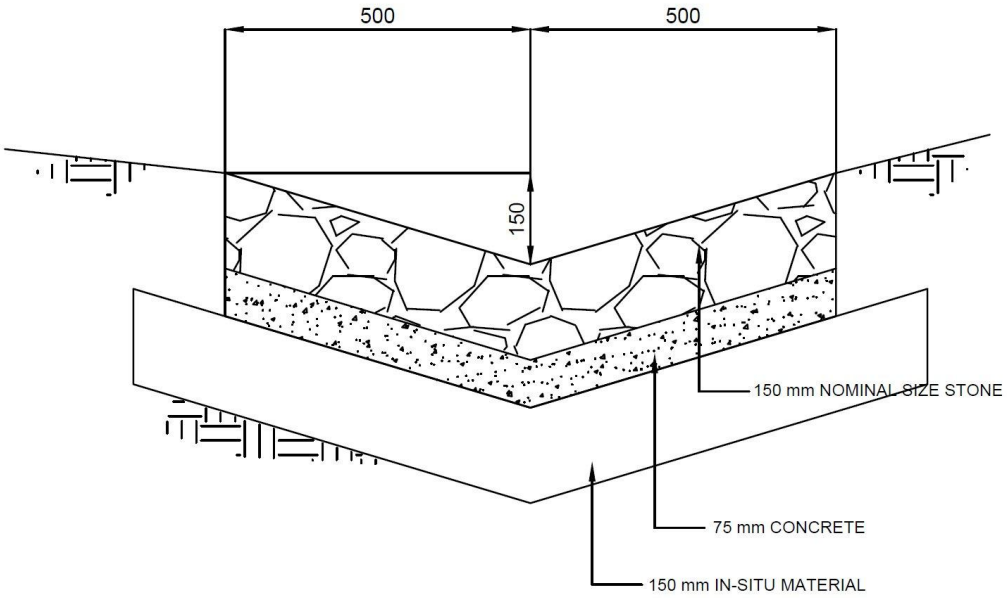


PROPOSED IN-SITU GRAVEL LINED CHANNEL

NOTES:

1. GRAVEL MATERIAL TO BE MINIMUM G5 QUALITY MATERIAL COMPACTED TO 95% MOD AASHTO
2. IN-SITU MATERAIL TO BE RIPPED AND RE-COMPACTED TO 93% MOD AASHTO

AECOM	IN-SITU GRAVEL LINED CHANNEL	AECOM DETAIL/FIGURE No. SW3 SCALE : N.T.S.

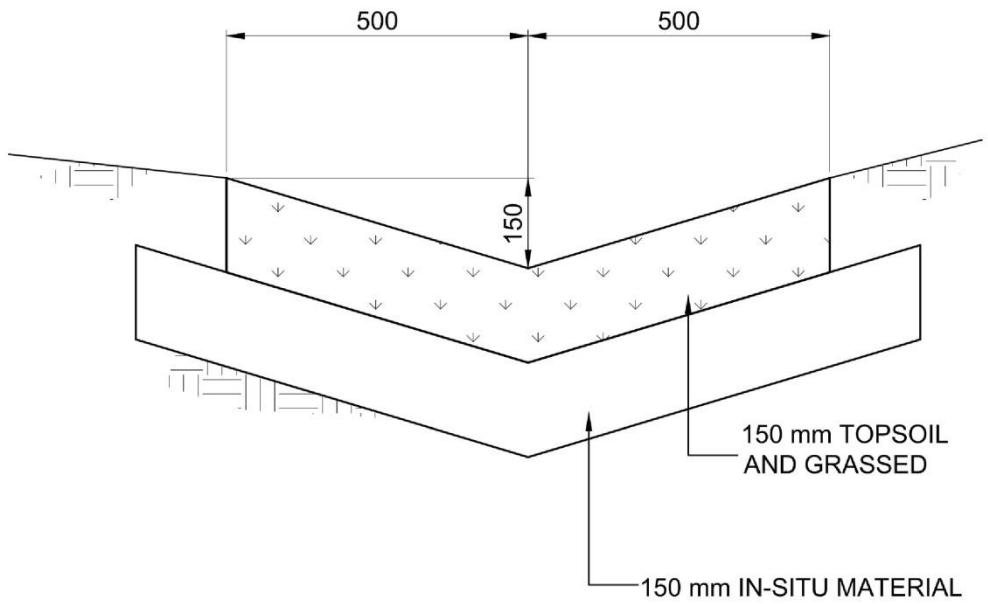


PROPOSED IN-SITU GROUTED STONE PITCH CHANNEL

NOTES:

1. GROUTED STONE PITCHING AS PER SANS 1200 DK WILL APPLY.
2. IN-SITU MATERAIL TO BE RIPPED AND RE-COMPACTED TO 93% MOD AASHTO

AECOM	IN-SITU GROUTED STONE PITCH CHANNEL	AECOM DETAIL/FIGURE No. SW4 SCALE : N.T.S.

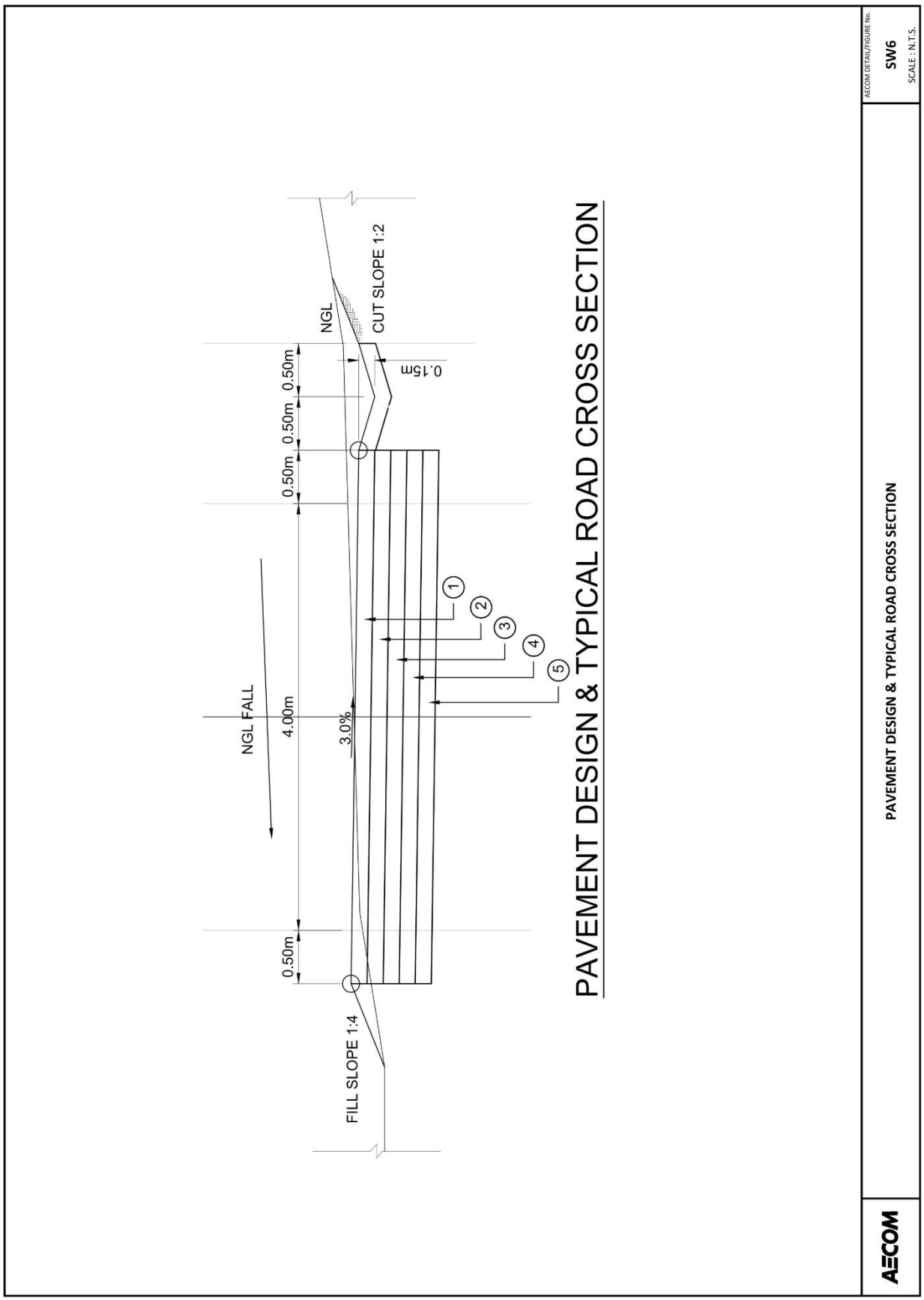


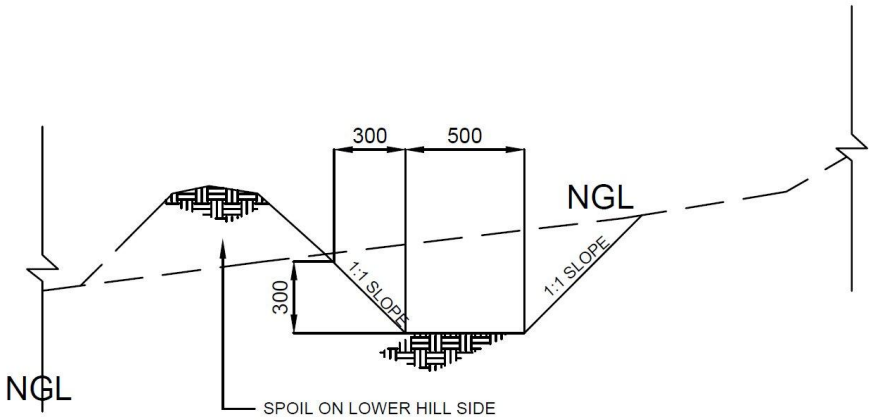
PROPOSED EARTH CHANNEL

NOTES:

1. IN-SITU MATERAIL TO BE RIPPED AND RE-COMPACTED TO 93% MOD AASHTO

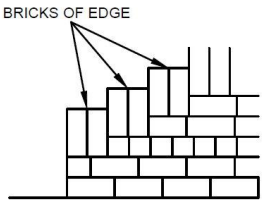
AECOM	EARTH CHANNEL	AECOM DETAIL/FIGURE No. SW5 SCALE : N.T.S.



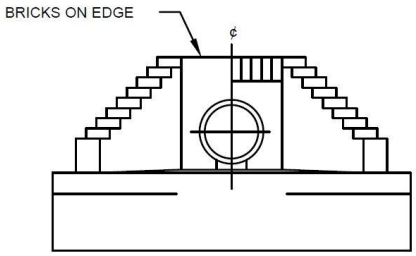


TYPICAL DETAIL EARTH CHANNEL CUT-OFF DRAIN

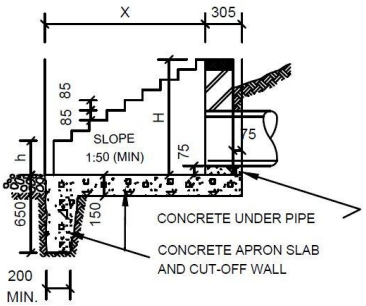
AECOM	TYPICAL EARTH CHANNEL CUT-OFF DRAIN	AECOM DETAIL/FIGURE No. SW7 SCALE : N.T.S.



DETAIL OF STEPPED BRICKWORK



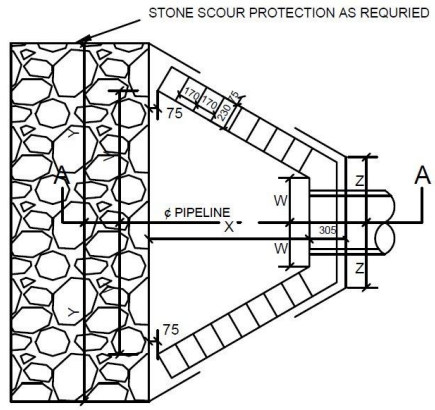
FRONT ELEVATION



SECTION A-A

DIMENSIONS FOR SETTING-OUT PURPOSES:

NOMINAL [	X	Y	Z	W	V	H	h
300	1045	1235	455	280	840	710	285
375	1190	1365	500	325	970	795	285
450	1340	1495	545	370	1100	880	285
525	1340	1535	585	410	1140	965	370
600	1485	1660	625	450	1265	1050	370
675	1635	1790	670	495	1395	1135	370
750	1780	1915	710	535	1520	1220	370
825	1930	2035	750	575	1640	1305	370
900	2075	2165	790	615	1170	1390	370
1050	2225	2335	875	700	1940	1560	455
1200	2515	2585	955	780	2190	1730	455
1350	2810	2835	1045	870	2440	1900	455
1500	3105	3090	1120	945	2695	2070	455

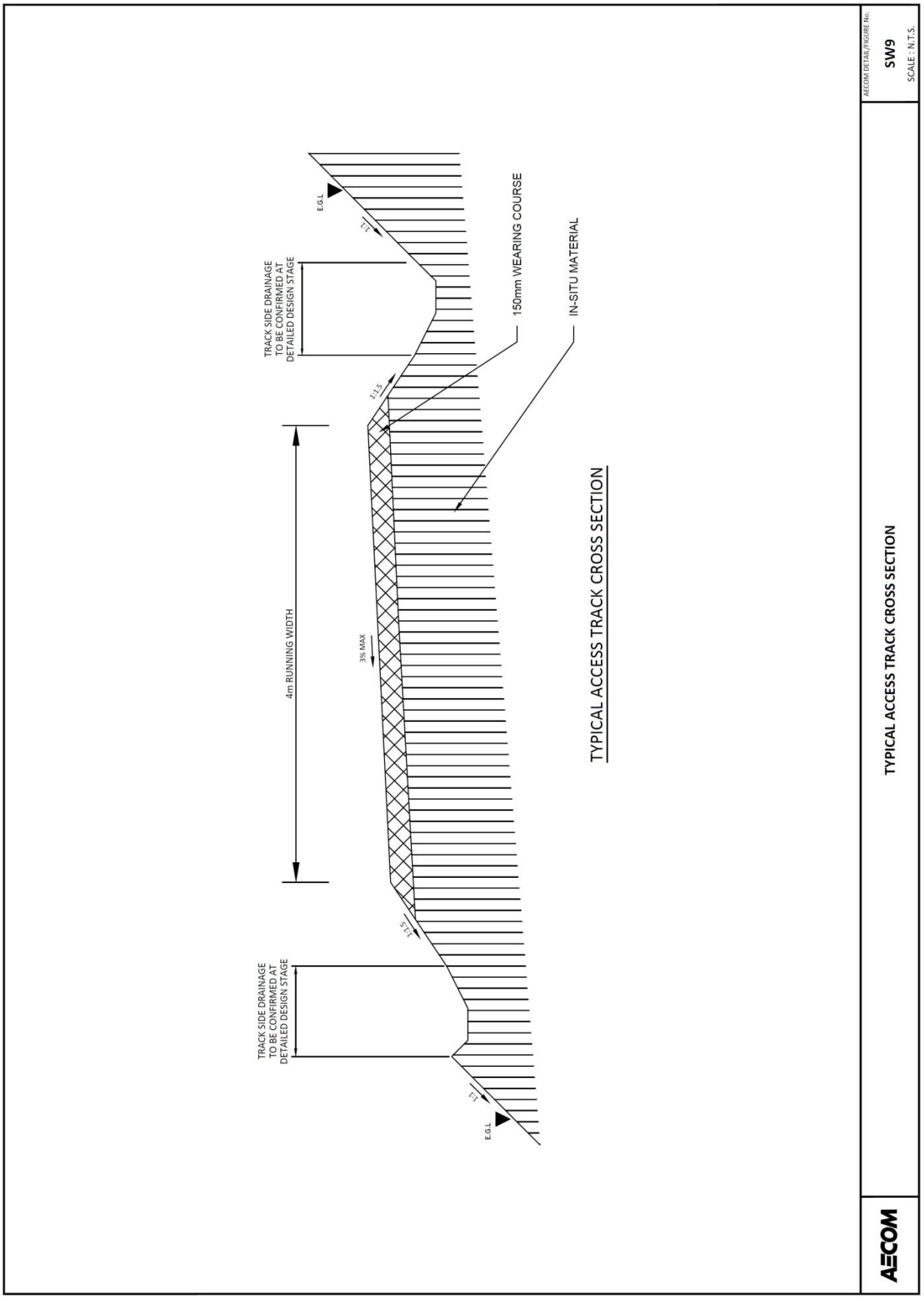


PLAN

NOTES

1. IF, IN THE OPINION OF THE ENGINEER, THE IN-SITU MATERIAL UNDER THE STRUCTURE IS UNSUITABLE, HE SHALL ORDER ITS REMOVAL AND REPLACEMENT BY SUBBASE QUALITY MATERIAL.
2. THE MATERIAL FOR A DEPTH OF 150mm UNDER THE APRON SLAB IS TO BE COMPACTED TO A MINIMUM DENSITY OF 90% Mod. AASHTO.
3. FORMWORK ONLY REQUIRED FOR APRON SLAB; CONCRETE IN CUT-OFF WALL BELOW THIS LEVEL TO BE CAST DIRECTLY AGAINST SIDES OF THE EXCAVATION.
4. CONCRETE TO BE CLASS 20/19.
5. BRICKWORK IN BOND OF 2 STRETCHERS, 1 HEADER COURSE UNPLASTERED AND WITH FLUSH JOINTS. TOP COURSE TO BE HEADER ON EDGE.
6. BRICKS SHALL BE NFX BURNT CLAY MASONRY UNITS AND SHALL COMPLY WITH SANS 227.
7. PROTECTION BY MEANS OF GABION STRUCTURES OR STONE PITCHING TO BE PLACED AT END OF APRON AS ORDERED BY THE ENGINEER.
8. GROUND SURFACE ALL AROUND HEADWALL TO BE TRIMMED TO AT LEAST 150mm LOWER THAN THE TOP OF THE BRICKWORK.
9. ALL DIMENSIONS IN MILLIMETRES.
10. WEEPHOLES IN BRICKWORK TO BE PROVIDED AS DIRECTED BY THE ENGINEER.

AECOM	TYPICAL BRICK HEADWALL AT INLET & OUTLET	AECOM DETAIL/FIGURE No. SW8 SCALE : N.T.S.



APPENDIX F:
PLANT RESCUE AND PROTECTION, AND REHABILITATION PLAN

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Actis
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BIOTHERM WIND ENERGY FACILITY BETWEEN UITKYK AND EXCELSIOR NEAR SWELLENDAM IN THE WESTERN CAPE PROVINCE

ENVIRONMENTAL MANAGEMENT PROGRAMME: APPENDIX F PLANT RESCUE AND PROTECTION PLAN

Prepared for

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TABLE OF CONTENTS

PLANT RESCUE AND PROTECTION PLAN

1. PURPOSE

The purpose of the plant rescue and protection plan is to implement avoidance and mitigation measures to reduce the impact of the development of the Excelsior Wind Energy Facility project on listed and protected plant species and their habitats and to provide guidance on search and rescue of species of conservation concern.

2. RELEVANT ASPECTS OF THE SITE

The conservation status of species of conservation concern were identified based on the SANBI Red List of South African Plants (2013), while species protected at the provincial level are taken from the Western Cape Nature Conservation Laws Amendment Act of 2000. The Western Cape Nature Conservation Laws Amendment Act provides lists of protected species of plant and animals and in some cases whole plant genera or families may be listed as protected. The reader is referred to the schedules of the Act for a full list of species listed under the act. Of particular relevance are the following, which highlights the plant genera and families most likely to be encountered at the site and along the power line route, but is not intended to be a comprehensive list.

Schedule 4 Protected Flora:

- *Amaryllidaceae* – All species
- *Lachenalia* – All Species
- *Iridaceae* – All Species
- *Mesembryanthemaceae* – All species
- *Orchidaceae* – All species
- *Diascia* – All species

However no listed or protected plant species were observed within the development footprint during a walkthrough. The development footprint is restricted to transformed croplands with no likely impact on intact vegetation. There are some indigenous bushes along some of the fences, but these are likely to have colonised these areas secondarily and no geophytes or other species indicating that these areas are historically intact were present. There are however fragments of intact vegetation along the power line route. These have been avoided as far as possible and no impacts are expected on any protected species, however the following principals also apply for the power line where any impacts on protected species will occur.

3. PRINCIPLES FOR SEARCH AND RESCUE

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.

The following principles apply in terms of plant rescue and protection:

» A permit is required to translocate or destroy any listed and protected species even if they do not leave the property. This permit should be obtained prior to any search and rescue operations being undertaken.
» Where suitable species are identified, a search and rescue operation of these species should be undertaken within the development footprint prior to the commencement of construction.
» As far as possible, timing of search and rescue activities should be planned with the onset of the growing season.
» Affected individuals should be translocated to a similar habitat outside of the development footprint and marked for monitoring purposes. For each individual plant that is rescued, the plant must be photographed before removal, tagged with a unique number or code and a latitude longitude position recorded using a hand-held GPS device.
» The rescued plants must be planted into a container to be housed within a temporary nursery on site or immediately planted into the target habitat.
» Rescued plants, if re-planted back in the wild, should be placed as close as possible to where they were originally removed. Re-planting into the wild must cause as little disturbance as possible to existing natural ecosystems. The position of the rescued individual/s must be recorded to aid in future monitoring of that plant.
» During construction, the ECO must monitor vegetation clearing at the site. Any deviations from the plans that may be required should first be checked for listed species by the ECO or Environmental Officer and any listed species present which are able to survive translocation should be translocated to a safe site.
» Any listed species suitable for translocation observed within the development footprint that were not previously observed be translocated to a safe site.

» The collecting of plants or their parts should be strictly forbidden. Staff should be informed of the legal and conservation aspects of harvesting plants from the wild as part of the environmental induction training.
» Sensitive habitats and area outside project development should be clearly demarcated as no go areas during the construction and operational phase to avoid accidental impacts.

APPENDIX G:
ALIEN INVASIVE MANAGEMENT & OPEN SPACE MANAGEMENT PLAN

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ENVIRONMENTAL MANAGEMENT PROGRAMME: APPENDIX G

ALIEN PLANT & OPEN SPACE MANAGEMENT PLAN

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TABLE OF CONTENTS

ALIEN PLANT & OPEN SPACE MANAGEMENT PLAN

1. PURPOSE

Invasive alien species pose the second largest threat to biodiversity after direct habitat destruction. The purpose of this Alien Plant Management Plan is to provide a framework for the management of alien and invasive plant species during the construction and operation of the facility. The broad objectives of the plan include the following:

» Ensure alien plants do not become dominant in parts or the whole site through the control and management of alien and invasive species presence, dispersal & encroachment.
» Develop and implement a monitoring and eradication programme for alien and invasive species.
» Promote the natural re-establishment and planting of indigenous species in order to retard erosion and alien plant invasion.

2. RELEVANT ASPECTS OF THE SITE

The majority of the site consists of transformed habitats, mostly croplands used for dryland cereal or canola cropping or lucerne for grazing. The intact natural vegetation remnants are variable in condition and composition. Most of the smaller fragments are in a poor condition and are considered degraded. While they usually retain some of the natural shrub layer such as *Elytropappus rhinocerotis, Athansia trifurca* and *Oedera gensitifolia* the ground layer is usually impacted by alien grasses such as *Avena fatua, Bromus spp.* and *Lolium spp*., as well as forbs such as *Amsinckia retrorsa* and *Echium plantagineum*.

After loss to agriculture, alien invasive grasses (many of which are annual cereals) and herbs are acknowledged to be the primary threat to remnant Renosterveld vegetation (Von Hase et al 2003). Numerous invasive grasses occur in the area, including *Hyparrhenia hirta* (thatching grass), *Lolium* (rye), *Avena* (oats) and *Bromus* (brome). Alien grasses are a particular problem in burnt areas, and immediately downslope of cultivated lands that are fertilised with commercial fertilisers (pers. obs.).

3. LEGISLATIVE CONTEXT

Conservation of Agricultural Resources Act (Act No. 43 of 1983)

In terms of the amendments to the regulations under the Conservation of Agricultural Resources Act (Act No. 43 of 1983), all declared aliens must be

effectively controlled. Landowners are legally responsible for the control of invasive alien plants on their properties. In terms of this Act, 198 alien species were listed as declared weeds and invaders and ascribed to one of the following categories:

» Category 1: Prohibited and must be controlled.
» Category 2 (commercially used plants): May be grown in demarcated areas provided that there is a permit and that steps are taken to prevent their spread.
» Category 3 (ornamentally used plants): May no longer be planted. Existing plants may be retained as long as all reasonable steps are taken to prevent the spreading thereof, except within the flood line of watercourses and wetlands.

National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004)

The National Environmental Management: Biodiversity Act (NEM:BA) regulates all invasive organisms in South Africa, including a wide range of fauna and flora. Regulations have been published in Government Notices R.506, R.507, R.508 and R.509 of 2013 under NEMBA. According to this Act and the regulations, any species designated under Section 70 cannot be propagated, grown, bought or sold without a permit. Below is an explanation of the three categories:

» Category 1a: Invasive species requiring compulsory control. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.
» Category 1b: Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.
» Category 2: Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones.
» Category 3: Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Category 3 plants to exist in riparian zones.

Plants listed under the categories above are detailed within Notice 1 of the Alien and Invasive Species published in GNR599 of 01 August 2014. The following

guide is a useful starting point for the identification of alien species: Bromilow, C. 2010. Problem Plants and Alien Weeds of South Africa. Briza, Pretoria.
It is important to note that alien species that are regulated in terms of the Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA) as weeds and invader plants are exempted from NEM:BA. This implies that the provisions of the CARA in respect of listed weed and invader plants supersede those of NEM:BA.

4. ALIEN PLANT MANAGEMENT PRINCIPLES

4.1. Prevention and early eradication

A prevention strategy should be considered and established, including regular surveys and monitoring for invasive alien plants, effective rehabilitation of disturbed areas and prevention of unnecessary disturbance of natural areas.

Monitoring plans should be developed which are designed to identify Invasive Alien Plant Species shortly after they arrive in the project area. Keeping up to date on which weeds are an immediate threat to the site is important, but efforts should be planned to update this information on a regular basis. When new Invasive Alien Plant Species are recorded on site, an immediate response of locating the site for future monitoring and either hand-pulling the weeds or an application of a suitable herbicide should be planned. It is, however, better to monitor regularly and act swiftly than to allow invasive alien plants to become established on site.

4.2. Containment and control

If any alien invasive plants are found to become established on site, action plans for their control should be developed, depending on the size of the infestations, budgets, manpower considerations and time. Separate plans of control actions should be developed for each location and/or each species. Appropriate registered chemicals and other possible control agents should be considered in the action plans for each site/species. The key is to ensure that no invasions get out of control. Effective containment and control will ensure that the least energy and resources are required to maintain this status over the long-term. This will also be an indicator that natural systems are impacted to the smallest degree possible.

4.3. General Clearing & Guiding Principles

Alien control programs are long-term management projects and should include a clearing plan which includes follow up actions for rehabilitation of the cleared area. The lighter infested areas should be cleared first to prevent the build-up of

seed banks. Pre-existing dense mature stands ideally should be left for last, as they probably won't increase in density or pose a greater threat than they are currently. Collective management and planning with neighbours may be required in the case of large woody invaders as seeds of aliens are easily dispersed across boundaries by wind or water courses. All clearing actions should be monitored and documented to keep records of which areas are due for follow-up clearing.

i. Clearing Methods

Different species require different clearing methods such as manual, chemical or biological methods or a combination of both. Care should however be taken that the clearing methods used do not encourage further invasion. As such, regardless of the methods used, disturbance to the soil should be kept to a minimum.

Fire should not be used for alien control or vegetation management at the site. The best-practice clearing method for each species identified should be used. The preferred clearing methods for most alien species can be obtained from the Department of Water Affairs and Forestry Working for Water Website. http://www.dwaf.gov.za/wfw/Control/.

» **Mechanical control**

This entails damaging or removing the plant by physical action. Different techniques could be used, e.g. uprooting, felling, slashing, mowing, ringbarking or bark stripping. This control option is only really feasible in sparse infestations or on small scale, and for controlling species that do not coppice after cutting. Species that tend to coppice, need to have the cut stumps or coppice growth treated with herbicides following the mechanical treatment. Mechanical control is labour intensive and therefore expensive, and could cause severe soil disturbance and erosion.

» **Chemical Control**

Although it is usually preferable to use manual clearing methods where possible, such methods may create additional disturbance which stimulates alien invasion and may also be ineffective for many woody species which resprout. Where herbicides are to be used, the impact of the operation on the natural environment should be minimised by observing the following:

* Area contamination must be minimised by careful, accurate application with a minimum amount of herbicide to achieve good control.
* All care must be taken to prevent contamination of any water bodies. This includes due care in storage, application, cleaning equipment and disposal of containers, product and spray mixtures.

- Equipment should be washed where there is no danger of contaminating water sources and washings carefully disposed of in a suitable site.
- To avoid damage to indigenous or other desirable vegetation, products should be selected that will have the least effect on non-target vegetation.
- Coarse droplet nozzles should be fitted to avoid drift onto neighbouring vegetation.
- The appropriate health and safety procedures should also be followed regarding the storage, handling and disposal of herbicides.

For all herbicide applications, the following Regulations and guidelines should be followed:

- Working for Water: Policy on the Use of Herbicides for the Control of Alien Vegetation.
- Pesticide Management Policy for South Africa published in terms of the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947) – GNR 1120 of 2010.
- South African Bureau of Standards, Standard SANS 10206 (2010)

According to Government Notice No. 13424 dated 26 July 1992, it is an offence to "*acquire, dispose, sell or use an agricultural or stock remedy for a purpose or in a manner other than that specified on the label on a container thereof or on such a container*".

Contractors using herbicides need to have a valid Pest Control Operators License (limited weeds controller) according to the Fertilizer, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act No. 36 of 1947). This is regulated by the Department of Agriculture, Forestry and Fisheries.

» **Biological control**

Biological weed control consists in the use of natural enemies to reduce the vigour or reproductive potential of an invasive alien plant. Biological control agents include insects, mites, and micro-organisms such as fungi or bacteria. They usually attack specific parts of the plant, either the reproductive organs directly (flower buds, flowers or fruit) or the seeds after they have dropped. The stress caused by the biological control agent may kill a plant outright or it might impact on the plants reproductive capacity. In certain instances, the reproductive capacity is reduced to zero and the population is effectively sterilised. All of these outcomes will help to reduce the spread of the species.

To obtain biocontrol agents, provincial representatives of the Working for Water Programme or the Directorate: Land Use and Soil Management (LUSM), Department of Agriculture, Forestry and Fisheries (DAFF) can be contacted.

4.4. General management practices

The following general management practices should be encouraged or strived for:

- Establish an ongoing monitoring programme for construction phase to detect and quantify any alien species that may become established and identify the problem species.
- Alien vegetation regrowth on areas disturbed by construction must be immediately controlled once recorded throughout the entire site during construction and operation.
- Care must be taken to avoid the introduction of alien invasive plant species to the site. Particular attention must be paid to imported material such as building sand or dirty earth-moving equipment. Stockpiles should be checked regularly and any weeds emerging from material stockpiles should be removed.
- Cleared areas that have become invaded by alien species can be sprayed with appropriate herbicides provided that these are such that break down on contact with the soil. Residual herbicides should not be used.
- The effectiveness of vegetation control varies seasonally and this is also likely to impact alien species. Control early in the wet season will allow species to re-grow and follow-up control is likely to be required. It is tempting to leave control until late in the wet season to avoid follow-up control. However, this may allow alien species to set seed before control and hence will not contribute towards reducing alien species abundance. Therefore, vegetation control should be aimed at the middle of the wet season, with a follow-up event towards the end of the wet season. There are no exact dates that can be specified here as each season is unique and management must therefore respond according to the state and progression of the vegetation.
- Alien management is an iterative process and it may require repeated control efforts to significantly reduce the abundance of a species. This is often due to the presence of large and persistent seed banks. However, repeated control usually results in rapid decline once seed banks become depleted.
- Regular vegetation control to reduce plant biomass within the site should be conducted. This should be timed so as to coincide with the critical growth phases of the most important alien species on site. This will significantly reduce the cost of alien management as this should contribute towards the control of the dominant alien species and additional targeted control will be required only for a limited number of species.

- » No alien species should be cultivated on-site. If vegetation is required for aesthetic purposes, then non-invasive, water-wise locally-occurring species should be used.
- » During operation, surveys for alien species should be conducted regularly. It is recommended that this be undertaken every 6 months for the first two years after construction and annually thereafter. All aliens identified should be cleared using appropriate means.

4.5. Monitoring

In order to monitor the impact of clearing activities, follow-ups and rehabilitation efforts, monitoring must be undertaken. This section provides a description of a possible monitoring programme that will provide and assessment of the magnitude of alien invasion on site as well as an assessment of the success of the management programme.

In general, the following principles apply for monitoring:

- » Photographic records must be kept of areas to be cleared prior to work starting and at regular intervals during initial clearing activities. Similarly, photographic records should be kept of the area from immediately before and after follow-up clearing activities. Rehabilitation processes must also be recorded.
- » Simple records must be kept of daily operations, e.g. area/location cleared, labour units and, if ever used, the amount of herbicide used.
- » It is important that, if monitoring results in detection of invasive alien plants, that this leads to immediate action.

The following monitoring should be implemented to ensure management of alien invasive plant species.

Construction Phase

Monitoring Action	Indicator	Timeframe
Document alien species present at the site	List of alien species	Preconstruction & monthly thereafter
Document alien plant distribution	Alien plant distribution map within priority areas	3 Monthly
Document & record alien control measures implemented	Record of clearing activities	3 Monthly
Review & evaluation of control success rate	Decline in documented alien abundance over time	Biannually

Operation Phase

Monitoring Action	Indicator	Timeframe
Document alien species distribution and abundance over time at the site	Alien plant distribution map	Biannually
Document alien plant control measures implemented & success rate achieved	Records of control measures and their success rate. A decline in alien distribution and cover over time at the site	Biannually
Document rehabilitation measures implemented and success achieved in problem areas	Decline in vulnerable bare areas over time	Biannually

APPENDIX H:
EROSION MANAGEMENT PLAN

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BIOTHERM WIND ENERGY FACILITY BETWEEN UITKYK AND EXCELSIOR NEAR SWELLENDAM IN THE WESTERN CAPE PROVINCE

ENVIRONMENTAL MANAGEMENT PROGRAMME: APPENDIX H EROSION MANAGEMENT PLAN

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TABLE OF CONTENTS

PRINCIPLES FOR EROSION MANAGEMENT

1. PURPOSE

Exposed and unprotected soils are the main cause of erosion in most situations. Therefore, this erosion management plan and the revegetation and rehabilitation plan are closely linked to one another and should not operate independently, but should rather be seen as complementary activities within the broader environmental management of the site and should therefore be managed together.

This Erosion Management Plan addresses the management and mitigation of significant impacts relating to soil erosion. The objective of the plan is to provide:

- A general framework for soil erosion and sediment control, which enables the contractor to identify areas where erosion can occur and be accelerated by construction related activities.
- An outline of general methods to monitor, manage and rehabilitate erosion, ensuring that all erosion resulting from all phases of the development is addressed.

2. RELEVANT ASPECTS OF THE SITE

According to the 1: 250 000 geology sheet 3420 Riversdale (Council for Geoscience, Pretoria) the proposed BioTherm Wind Energy Facility at the Uitkyk / Excelsior site near Swellendam is largely underlain by Devonian sediments of the Bokkeveld Group (Cape Supergroup). The known fossil record of these rocks is outlined in Table 3.1 (abstracted from Almond & Pether 2008). The palaeontological sensitivity of the Bokkeveld Group is rated as high. Superficial deposits in the area include river alluvium and Neogene (Late Tertiary) silcretes and other pedocretes of the Grahamstown Formation that are of low palaeontological sensitivity.

The soils in the study area are generally derived from Table Mountain sandstone and tend to be shallow, sandy and nutrient poor. Soils are typically loamy, derived from the underlying Bokkeveld group shales. The area's renosterveld flatland soils are generally more nutrient rich and subsequently are heavily exploited for agricultural purposes (Encyclopaedia of the Earth, 2009). Silcrete caps are a prominent feature in this area, and these flat rocky areas often have concave, exposed clay and gravel slopes just below these caps.

No specific areas that may be highly sensitive to erosion were identified in the EIA.

3. EROSION AND SEDIMENT CONTROL PRINCIPLES

The goals of erosion control during and after construction at the site should be to:

» Protect the land surface from erosion;
» Intercept and safely direct run-off water from undisturbed upslope areas through the site without allowing it to cause erosion within the site or become contaminated with sediment; and
» Progressively revegetate or stabilise disturbed areas.

These goals can be achieved by applying the management practices outlined in the following sections.

3.1. On-Site Erosion Management

General factors to consider regarding erosion risk at the site includes the following:

» Soil loss will be greater during wet periods than dry periods. Intense rainfall events outside of the wet season, such as occasional summer thunder storms can also cause significant soil loss. Therefore precautions to prevent erosion should be present throughout the year.
- Soils loss will be greater on steeper slopes. Ensure that steep slopes are not devegetated and subsequently become hydrophobic (i.e. have increased runoff and a decreased infiltration rate) increasing the erosion potential.
» Soil loss is related to the length of time that soils are exposed prior to rehabilitation or stabilisation. Therefore the gap between construction activities and rehabilitation should be minimised. Phased construction and progressive rehabilitation are therefore important elements of the erosion control strategy.
» The extent of disturbance will influence the risk and consequences of erosion. Therefore site clearing should be restricted to areas required for construction purposes only. As far as possible, large areas should not be cleared at a one time, especially in areas where the risk of erosion is higher.
» Roads should be planned and constructed in a manner which minimises their erosion potential. Roads should therefore follow the contour as far as possible. Roads parallel to the slope direction should be avoided as far as possible.
» Where necessary, new roads constructed should include water diversion structures present with energy dissipation features present to slow and disperse the water into the receiving area.
» Roads and other disturbed areas should be regularly monitored for erosion. Any erosion problems recorded should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.
» Compacted areas should have adequate drainage systems to avoid pooling and surface flow. Heavy machinery should not compact those areas which are not intended to be compacted as this will result in compacted hydrophobic, water repellent soils which increase the erosion potential of the area. Where compaction does occur, the areas should be ripped.

» All bare areas should be revegetated with appropriate locally occurring species, to bind the soil and limit erosion potential.
» Silt fences should be used where there is a danger of topsoil or material stockpiles eroding and entering streams and other sensitive areas.
» Gabions and other stabilisation features should be used on steep slopes and other areas vulnerable to erosion to minimise erosion risk as far as possible.
» Activity at the site after large rainfall events when the soils are wet and erosion risk is increased should be reduced.
» Topsoil should be removed and stored separately during construction activities, and should be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas (where applicable – not applicable to farmland / agricultural areas).
» Regular monitoring of the site for erosion problems during construction (ongoing) and operation (at least twice annually) is recommended, particularly after large summer thunderstorms have been experienced.

3.1.1. Erosion control mechanisms

The contractor may use the following mechanisms to combat erosion when necessary:

- Reno mattresses
- Slope attenuation
- Hessian material
- Shade catch nets
- Gabion baskets
- Silt fences
- Storm water channels and catch pits
- Soil bindings
- Geofabrics
- Hydro-seeding and/or re-vegetating
- Mulching over cleared areas
- Boulders and size varied rocks
- Tilling

3.2. Engineering Specifications

A detailed Stormwater Management Plan describing and illustrating the proposed stormwater control measures must be prepared by the Civil Engineers and this should include erosion control measures. Requirements for project design include:

- Erosion control measures to be implemented before and during the construction period, including the final stormwater control measures (post construction).

- The location, area/extent (m²/ha) and specifications of all temporary and permanent water management structures or stabilisation methods must be indicated within the Stormwater Management Plan.
- An onsite Engineer or Environmental Officer to be responsible for ensuring implementation of the erosion control measures on site during the construction period.
- The Developer holds ultimate responsibility for remedial action in the event that the approved stormwater plan is not correctly or appropriately implemented and damage to the environment is caused.

3.3. Monitoring

The site must be monitored continuously during construction and operation in order to determine any indications of erosion. If any erosion features are recorded as a result of the activities on site the Environmental Officer (during construction) or Environmental Manager (during operation) must:

» Assess the significance of the situation.
» Take photographs of the soil degradation.
» Determine the cause of the soil erosion.
» Inform the contractor/operator that rehabilitation must take place and that the contractor/operator is to implement a rehabilitation method statement and management plan.
» Monitor that the contractor/operator is taking action to stop the erosion and assist them where needed.
» Report and monitor the progress of the rehabilitation weekly and record all the findings in a site register.
» All actions with regards to the incidents must be reported on a monthly compliance report which will be submitted to the Competent Authority (during construction) and kept on file for consideration during the annual audits (during construction and operation).

The Contractor/ Developer (in consultation with an appropriate specialist) must:

» Select a system/mechanism to treat the erosion.
» Design and implement the appropriate system/mechanism
» Monitor the area to ensure that the system functions like it should. If the system fails, the method must be adapted or adjusted to ensure the accelerated erosion is controlled.
» Continue monitoring until the area has been stabilised.

4. CONCLUSION

The Erosion Management Plan is a document to assist the Developer with guidelines on how to manage erosion. The implementation of management measures is not only good practice to ensure minimisation of degradation, but also necessary to ensure compliance with legislative requirements. This document forms part of the EMPr, and is required to be considered and adhered to during the design, construction, operation and decommissioning phases of the project.

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APPENDIX I:
SOIL MANAGEMENT PLAN

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BIOTHERM WIND ENERGY FACILITY BETWEEN UITKYK AND EXCELSIOR NEAR SWELLENDAM IN THE WESTERN CAPE PROVINCE

ENVIRONMENTAL MANAGEMENT PROGRAMME: APPENDIX I SOIL MANAGEMENT PLAN

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TABLE OF CONTENTS

SOIL MANAGEMENT PLAN

1. PURPOSE

Some of the most significant impacts on soil properties occur as a result of activities associated with construction. Construction activity can have adverse impacts on soil in a number of ways by:

» Covering soil with impermeable materials, effectively sealing it and resulting in significant detrimental impacts on soils' physical, chemical and biological properties, including drainage characteristics.
» Contaminating soil as a result of accidental spillage or the use of chemicals.
» Over-compacting soil through the use of heavy machinery or the storage of construction materials.
» Reducing soil quality, for example by mixing topsoil with subsoil.
» Wasting soil by mixing it with construction waste or contaminated materials, which then have to be treated before reuse or even disposed of at landfill as a last resort.

Careful management of topsoil and subsoil is an important aspect of sustainable use of materials that are being stripped. Without a proper Soil Resource Plan there is the risk of losing, damaging or contaminating valuable soil resources. The purpose of this Soil Management Plan is to outline principles for soil management to ensure the integrity of the resource during and post-construction. This plan should be read together with the Emergency Response Plan in order to minimise the risk of contamination of soils.

2. SOIL HORIZONS

Topsoil

Topsoil is the top-most soil layer (0-25 cm) in undisturbed areas, however it should be noted that the majority of the site for the wind farm is farmland and no impacts are expected in undisturbed areas. If no impacts are expected in undisturbed areas then the principals that follow do not apply. The principals are also applicable to any undisturbed areas affected by the power line. This soil layer is important as it contains nutrients, organic material, seeds, communities of micro-organisms, fungi and soil fauna. All the contents of the topsoil layer are necessary for soil processes such as nutrient cycling, and support growth of new plants. The biologically active upper layer of soil is fundamental in the development of soils and the sustainability of the entire ecosystem. Fungi, algae, cyanobacteria and non-vascular plants form a 'living crust' on the soil surface that influences the retention of resources (principally nutrients and water), as well as reducing the potential for soil erosion.

In general, the greatest concentration of seeds (i.e. up to 90% of the seedbank) is found in the top 5-10 cm of topsoil. Soil nutrients and other biological elements also have a higher concentration in the top 5 – 10 cm of soil, but can occur up to 25 cm.

Subsoil

Subsoil is soil generally deeper than 25 cm. The subsoil contains lower levels of nutrients, but the soil texture is still suitable for plant growth.

Overburden

Overburden is all the soil below the subsoil layer, generally characterised by a fine soil texture which is sometimes high in clay and salt content which makes plant growth difficult. Such soils comprise a sterile growth medium, devoid of nutrients, and depending on the clay content, are of high salinity and often phytotoxic. Even shallow-lying overburden soils are largely depleted of nutrients. These soils constitute an unsuitable medium for the establishment of plants.

3. PRINCIPLES FOR SOIL MANAGEMENT

3.1. The correct handling of topsoil

» Before beginning work on site, topsoil should be stripped from all areas that will be disturbed by construction activities. Appropriate equipment must be used and appropriate work practices must be implemented for soil stripping as mishandling soil can have an adverse effect on its properties.
» Topsoil should be stripped in the driest condition possible.
» Topsoil must be retained on site in order to be used in site rehabilitation. The correct handling of the topsoil layer is in most cases the key to rehabilitation success.
» It is important that the correct depth of topsoil is excavated in order to ensure good plant growth. If excavation is too shallow, then an important growth medium for new seedlings could be lost. If excavation is too deep, this could lead to the dilution of the seed and nutrient rich topsoil with deeper sterile soil.
» Topsoil and subsoil layers must never be mixed. The mixture of topsoil with the deeper sterile soil hinders the germination of seeds which are buried too deep in the soil layer. Mixture of soil layers also leads to the dilution of nutrient levels which are at highest concentration within the topsoil, resulting in lower levels of nutrients available for new seedlings.
» To enable soil to be reused on site at a later stage, it needs to be stored in temporary stockpiles to minimise any damage or loss of function. Stockpiles should not be higher than 2m. Alternatively topsoil berms can be created on

the site boundaries. There are a number of important considerations when creating stockpiles - including soil erosion, pollution to watercourses and the risk of flooding. These will be affected by the size, height and method of forming stockpiles, and how they are protected and maintained.

» Topsoil must be stored separately from other soil in heaps until construction in an area is complete.
» The duration of topsoil storage should be minimised as far as possible. Storing topsoil for long periods leads to seed bank depletion following germination during storage, and anoxic conditions develop inside large stockpile heaps.
» All stockpiles must be positioned away from drainage lines.
» Sediment fencing should be erected downslope of all stockpiles to intercept any sediment and upslope runoff should be diverted away from stockpiles.

3.2. Stripping of Subsoil

The following protocols must be followed when stripping subsoil:

» On many sites subsoil will not need to be stripped but merely protected from damage. However, on other sites it might need to be temporarily removed. Where subsoil is required to be stripped, this should be undertaken before commencement of construction from all areas that are to be disturbed by construction activities or driven over by vehicles.
» Subsoil stripping depths depend on the correct identification of the sub-soil types on an ad-hoc basis, where no formal survey data exists.
» Subsoil should be stripped in the driest condition possible.
» To enable soil to be reused on site at a later stage, it needs to be stored in temporary stockpiles to minimise any damage or loss of function. There are a number of important considerations when creating stockpiles - including soil erosion, pollution to watercourses and the risk of flooding. These will be affected by the size, height and method of forming stockpiles, and how they are protected and maintained.
» All stockpiles must be positioned away from drainage lines.
» Sediment fencing should be erected downslope of all stockpiles to intercept any sediment and upslope runoff should be diverted away from stockpiles.

APPENDIX J:
CONSTRUCTION WASTE GUIDELINES

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Mar 21, 2019 10:53

BIOTHERM WIND ENERGY FACILITY BETWEEN UITKYK AND EXCELSIOR NEAR SWELLENDAM IN THE WESTERN CAPE PROVINCE

ENVIRONMENTAL MANAGEMENT PROGRAMME: APPENDIX J WASTE MANAGEMENT PLAN

Prepared for

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TABLE OF CONTENTS

WASTE MANAGEMENT PLAN

1. PURPOSE

A Waste Management Plan (WMP) plays a key role in achieving sustainable waste management. The purpose of this plan is to ensure that effective procedures are implemented for the handling, storage, transportation and disposal of waste that is generated from the activities on site. The plan prescribes measures for the collection, temporary storage and safe disposal of the waste streams associated with the project and includes provisions for the recovery, re-use and recycling of waste.

This WMP has been compiled as part of the project Environmental Management Programme (EMPr) and includes waste stream information available at the time of compilation. Construction practices and operations must be measured and analysed in order to determine the efficacy of the plan and whether further revision of the plan is required. This plan should be further updated should further detail regarding waste quantities and categorisation become available, during the construction and/or operational stages.

2. RELEVANT ASPECTS OF THE SITE

Waste generated on site, originates from various sources including:

- Concrete waste generated from foundations.
- Contaminated water, soil and vegetation due to accidental hydrocarbon spills.
- Hydrocarbon waste from vehicle, equipment and machinery parts (oil cans, filters, rags etc), and servicing.
- Hazardous Water (used oils, chemicals, etc.)
- Recycable waste in the form of paper, cardboard, glass, metal offcuts, wood/ wood pallets and plastic.
- Organic waste from food waste and alien vegetation removal.
- Sewage from portable toilets.
- Inert waste from excess rock and soil from site clearence and trenching works.

3. LEGISLATIVE REQUIREMENTS

Waste in South Africa is currently governed by means of a number of pieces of legislation, including:

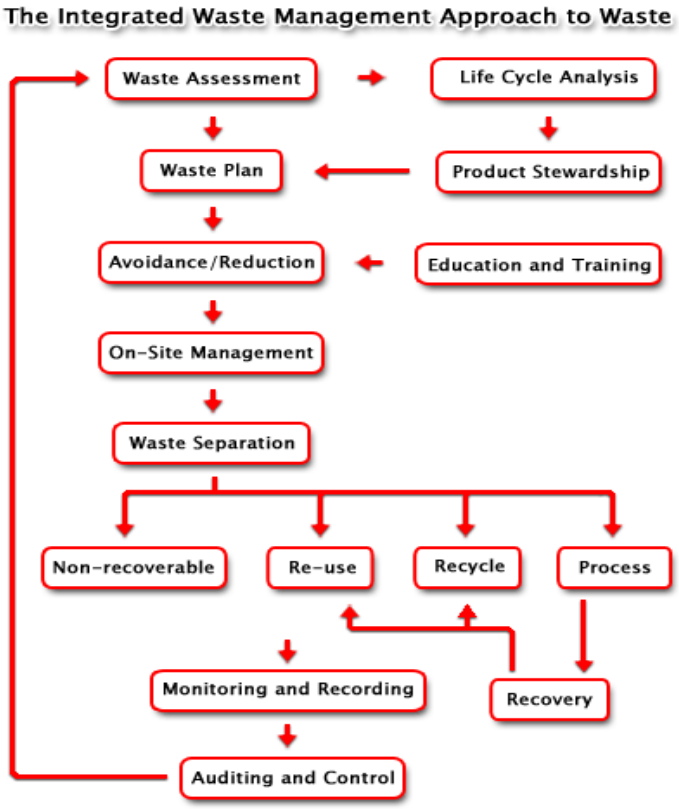
- National Environmental Management: Waste Act (NEM:WA), 2008 (Act 59 of 2008).

- National Environmental Management: Waste Amendment Act, 2014 (Act 26 of 2014).
- The South African Constitution (Act 108 of 1996).
- Hazardous Substances Act (Act 5 of 1973).
- Health Act (Act 63 of 1977).
- Environment Conservation Act (Act 73 of 1989).
- Occupational Health and Safety Act (Act 85 of 1993).
- National Water Act (Act 36 of 1998).
- The National Environmental Management Act (Act 107 of 1998).
- Municipal Structures Act (Act 117 of 1998).
- Municipal Systems Act (Act 32 of 2000).
- Mineral and Petroleum Resources Development Act (Act 28 of 2002).
- Air Quality Act (Act 39 of 2004).

Storage of waste must be undertaken in accordance with the National Norms and Standards for the Storage of Waste published in GN926.

4. WASTE MANAGEMENT PRINCIPLES

An integrated approach to waste management on site is needed. Such an approach is illustrated in the figure below.



Source: http://www.enviroserv.co.za/pages/content.asp?SectionId=496

It is important to ensure that waste is managed with the following objectives in mind during all phases of the project:

» Reducing volumes of waste is a priority;
» If reduction is not feasible, the maximum amount of waste is to be recycled; and
» Waste that cannot be recycled is to be disposed of in the most environmentally responsible manner as possible.

4.1. Construction phase

A plan for the management of waste during construction is detailed below. As previously stated, construction practices must be measured and analysed in order to determine the efficacy of the plan and whether further revision of the plan is required. A Method Statement detailing specific waste management practices during construction should be prepared by the Contractor prior to the commencement of construction.

4.1.1. Waste Assessment / Inventory

» The Environmental Officer must develop, implement and maintain a waste inventory reflecting all waste generated during construction for both general and hazardous waste streams.
» Construction method and materials should be carefully considered in view of waste reduction, re-use, and recycling opportunities.
» Once a waste inventory has been established, targets for recovery of waste (minimisation, re-use, recycling) should be set.

4.1.2. Waste collection, handling and storage

» Each subcontractor must implement their own waste recycling system, i.e. separate bins for food waste, plastics, paper, wood, glass, cardboard, metals, etc.
» Portable toilets must be monitored and maintained daily.
» Below ground storage of septic tanks, if installed, must withstand the external forces of the surrounding environment. The area above the tank must be demarcated to prevent any vehicles or heavy machinery from driving around the area.
» Waste collection bins and hazardous waste containers must be provided by the principal contractor and placed at various areas around site for the storage of organic, recyclable and hazardous waste.
» A dedicated waste area must be established on site for the storage of all waste streams, before removal from site.

- Signage/ colour coding must be used to differentiate disposal areas for the various waste streams (i.e. paper, cardboard, metals, food waste, glass etc.).
- Hazardous waste must be stored within a bunded area constructed according to SABS requirements. The volume of waste stored in the bunds must not exceed 110% of the bund capacity.
- The location of all temporary waste storage areas must aim to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage, and vermin control.
- Waste storage shall be in accordance with all Regulations and best-practice guidelines and under no circumstances may waste be burnt on site.
- Vegetation removed from the site must be chipped, removed from the site and disposed of at an appropriate waste disposal facility or used as mulch on site.
- A dedicated waste management team must be appointed by the principal contractor's EO, whom will be responsible for ensuring the continuous sorting of waste and maintenance of the area. The waste management team must be trained in all areas of waste management and monitored by the EO.
- All waste removed from site must be done so by a registered/ licensed subcontractor, whom must supply information regarding how waste recycling/ disposal will be achieved. The registered subcontractor must provide waste manifests for all removals at least once a month.

4.1.3. Management of waste storage areas

- The position of all waste storage areas must be located away from water courses and ensure minimal degradation to the environment. The main waste storage area must have a suitable storm water system separating clean and dirty storm water.
- Waste storage areas must be under roof or the waste storage containers must be covered with tarpaulins (or similar material) to prevent the ingress of water.
- Collection bins placed around site and at subcontractors' camps must be maintained and emptied on a regular basis by the principal contractor.
- Waste must be stored in designated containers and not on the ground.
- Inspections and maintenance of bunds must be undertaken daily. Bunds must be inspected for leaks or cracks in the foundation and walls.
- It is assumed that any rainwater collected inside the bund is contaminated and must be removed and stored as hazardous waste, and not released into the environment. If any leaks occur in the bund, these must be removed immediately.

4.1.4. Disposal

» Waste generated on site must be removed on a regular basis, as determined by the EO. This frequency may change during construction depending on waste volumes generated at different stages of the construction process.
» Waste must be removed by a suitably qualified contractor and disposed at an appropriately licensed landfill site. Proof of appropriate disposal must be provided by the contractor.

4.1.5. Record keeping

The success of the waste management plan is determined by measuring criteria such as waste volumes, cost recovery from recycling, cost of disposal. Recorded data can indicate the effect of training and education, or the need for education. It will provide trends and benchmarks for setting goals and standards. It will provide clear evidence of the success or otherwise of the plan.

» Documentation (waste manifest, certificate of issue or safe disposal) must be kept detailing the quantity, nature, and fate of any regulated waste for audit purposes.
» Waste management must form part of the monthly reporting requirements in terms of volumes generated, types, storage and final disposal.

4.1.6. Training

Training and awareness regarding waste management shall be provided to all employees and contractors as part of the toolbox talks or on-site awareness sessions.

5. Operation phase

It is expected that the operation phase will result in the production of general waste consisting mostly of cardboard, paper, plastic, tins, metals and a variety of synthetic compounds. Limited hazardous wastes (grease, oils) may also be generated during maintenance activities. All waste generated will be required to be temporarily stored at the facility in appropriate sealed containers prior to disposal at a permitted landfill site.

The following waste management principles apply during the operational phase:

» The Environmental and Site Manager must develop, implement and maintain a waste inventory reflecting all waste generated during operation for both general and hazardous waste streams.

- Adequate waste collection bins at site must be supplied. Separate bins should be provided for general and hazardous waste.
- Recyclable waste must be removed from the waste stream and stored separately.
- All waste must be stored in appropriate temporary storage containers (separated between different operational wastes, and contaminated or wet waste) at each operational area prior to being taken to the waste storage area for final sorting (if required). Waste storage shall be in accordance with all best-practice guidelines and under no circumstances may waste be burnt on site.
- Vegetation removed from the site must be chipped, removed from the site and disposed of at an appropriate waste disposal facility or used as mulch on site.
- Waste generated on site must be removed on a regular basis throughout the operational phase.
- Waste must be removed by a suitably qualified contractor and disposed at an appropriately licensed landfill site. Proof of appropriate disposal must be provided by the contractor.

6. Monitoring of Waste Management Activities

Records must be kept of the volumes/ mass of the different waste streams that are collected from the site throughout the life of the project. The appointed waste contractor is to provide monthly reports to the operator containing the following information:

- Monthly volumes/ mass of the different waste streams collected;
- Monthly volumes/ mass of the waste that is disposed of at a landfill site;
- Monthly volumes/ mass of the waste that is recycled; and
- Data illustrating progress compared to previous months.

This report will aid in monitoring the progress and relevance of the waste management procedures that are in place. If it is found that the implemented procedures are not as effective as required, this WMP is to be reviewed and amended accordingly.

APPENDIX K:
TRAFFIC AND TRANSPORTATION MANAGEMENT PLAN

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Mar 21, 2019 10:53

GW 2.5MW, Guanting Olympic Wind Farm

EXCELSIOR WIND ENERGY FACILITY

TRAFFIC MANAGEMENT PLAN

	Reviewed By	Approved By	Approved By
Name			
Designation			
Signature			
Date			

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Contents

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1 Purpose

This plan describes the management and safe operation of public vehicles and mobile construction equipment during road construction.

2 Scope

This plan addresses:

- General public and traffic interface
- Maintenance crews on roads;
- Vehicle interaction and speed;
- Company vehicle operator training;
- Road conditions;
- Communications;
- Traffic control;
- Road demarcation and signage;
- Restricted areas and escort vehicles;
- Operational machinery;
- Blind crests and corners;
- Excavations;
- Vehicle safety standards;
- Journey management;
- Road rules;
- Blasting near road ways
- Equipment and vehicle inspections;
- Defective light vehicles and mobile plant; and
- Search and rescue and emergency access.

3 Application

It applies to the control of public as well as company vehicles (cars, utilities, sedans, etc.) and mobile plant and personnel who use them on the project land, road, infrastructure or facility.

4 Definitions, Acronyms and Abbreviations

4.1 Company Vehicles and Mobile Construction Equipment

A vehicle and/or mobile equipment leased or rented by the Construction Cluster.

4.2 Vehicle Coordinator

An employee trained in this procedure who the operation shall contact prior to travelling and report to upon arrival or report back to upon return from a remote site.

4.3 Operator

The employee trained in this procedure authorized to operate a vehicle or mobile equipment.

The employee shall have completed an approved operator course and be assessed as being

competent by a suitably authorized person on Site.

4.4 Remote Site

Any unmanned Site (e.g. exploration or survey area) to which a person intends travelling.

4.5 Pre-Start Checklist

A form that requires all vehicle operators to inspect a vehicle prior to operation.

4.6 Maintenance Schedule

A pre-determined regular maintenance programme done by a competent qualified person to mobile construction equipment on Site.

5 General

Any changes to the Traffic Management Plan will be communicated to all affected parties as soon as possible.

6 Identified Hazards

Identified hazards to people working or travelling in, through or around the road construction areas or infrastructure road system include:

- General public and traffic interface;
- Maintenance crews on roads;
- Vehicle interaction and speed;
- Company vehicle operator training;
- Road conditions;
- Communications;
- Traffic Control;
- Road demarcation and signage;
- Restricted areas and escort vehicles;
- Operational machinery;
- Blind crests and corners;
- Excavations;
- Vehicle safety standards;
- Journey management;
- Road rules;
- Blasting near roadways;
- Equipment and vehicle inspections;
- Defective light vehicles and mobile plant; and
- Search and rescue and emergency access.

7 General Public Interface

Due to interface with the general public, extra precautions are required to restrict access or control traffic in to or through the project area.

This will be achieved by the use of signage and/or demarcations and the issuing of public

information bulletins to notify the public that beyond a designated location is a project area and access is restricted to project personnel and contractors only.

Where appropriate, additional warning signs, revolving lights and/or personnel will be used to control traffic flow.

8 Maintenance Crews on Roads

The speed limit for the project is to be limited to a maximum of 40Kph. Roads which have conditions where potentially hazardous work is being undertaken (e.g. culverts, where personnel are close to the access road), shall have a speed restriction of 20Kph, and signs will be placed at both ends of the specific work area.

Where maintenance crews are working close to traffic, additional precautions will be taken to keep visibility and early warning at a maximum. These may include local watering of dust generating areas, wearing of high visibility vests and posting of additional traffic controllers at the extremities of the work environment.

All personnel on site are required to wear high visibility reflective vests or clothing and utilise the correct signage at all times.

9 Flagging

The primary function of a flagman/woman is to guide the flow of traffic (loaders, dozers, dump trucks, excavators, automobiles, etc.) safely and expeditiously through or around work areas or where traffic lanes are intermittently blocked.

9.1 Flagging Traffic

Flagging personnel are used to control traffic flow through work are as at decreased speeds to reduce the hazards to personnel working in the area. The flagman must be clearly visible from a distance to permit appropriate response to the flagman's instructions by a vehicle operator. If at any point the flagman is not visible, all equipment moving through that area must shut down.

9.2 Hand Signalling Devices

Hand signalling devices (orange flags) shall be used in controlling traffic through work areas. Flags used for signalling purposes shall be at least 450mm square, made of a good grade of fluorescent orange material, and securely fastened to a staff approximately one meter in length. Yellow flashing lights must be used during periods of darkness or poor visibility.

9.3 Flagman

Due to the priority the Construction Cluster places on human safety, the selection of capable personnel is essential. Flagman shall wear an orange reflective safety vest as an outer garment. Reflective apparel must be worn at all times.

9.4 Training

Flagmen should be given instruction and training by their Supervisor to develop a clear understanding of their duties and responsibilities.

As a minimum, instruction and training should include:

- Communications;
- Attitude;
- Safety equipment;
- Tools;
- Hand signals;
- Location or positioning;
- Action(s) for directing traffic; and
- Emergency procedures.

Project/Site Management must approve and verify that appropriate training has been conducted for each flagman prior to them being utilised on public highways.

9.5 Flagging Traffic

It is important for the flagman to remain in full view of all vehicles and to avoid standing in congested areas. Under no circumstances should flagman stand in the lane being used for moving traffic. Flagman should stand adjacent to lanes where vehicles and equipment are travelling.

9.6 Flagging Procedures

The following methods of flagging shall be used:

- To stop traffic, the flagman shall face approaching traffic and extend the flag horizontally across the traffic lane in a stationary position so that the full area of the flag hanging below the staff is visible. The free arm maybe raised with the palm turned toward approaching traffic.
- When it is safe for the vehicle operator to proceed, the flagman shall turn parallel to the traffic movement.
- When the flag is used, drop the arm with the flag to lower it from the view of the vehicle operator and motion traffic ahead with the free arm. The orange flag shall never be used to signal traffic to proceed.
- To slow traffic with the flag, the flagman shall give the stop signal and then change to the signal to proceed before the vehicle comes to a stop.

10 Restricted Areas and Escort Vehicles

10.1 Restricted Areas

Site personnel will be informed as to the restricted areas of the project. These areas are not to be accessed without authority from the Project Manager.

The speed limit for the project is to be limited to a maximum of 60Kph on site. National road rules apply to all roads.

10.2 Escort Vehicles

For large or non-routine loads, an escort vehicle provided by the Contractors should be used in front of and when necessary, behind the vehicle or mobile equipment. Other vehicles must

be escorted at the Project Manager's discretion. Drivers entering site must wear the correct PPE.

In order to delineate the paths of the earth moving machinery, a "*Scraper and Mobile Equipment Circuit*" or similar signs shall be erected 100m (325ft) prior to the circuits.

To minimize the potential of light vehicles entering the blind spots of heavy vehicles, all other equipment and light vehicles and mobile equipment are to give way to heavy vehicles operating on any infrastructure road or facility.

11 Vehicle Speed

Unless otherwise stated (i.e. by means of memo or signage), the following speed restrictions shall apply at all times:

- General speed limit – 40 km/h; and
- Areas of increased hazard (i.e. road works and work groups) – 20 km/h
-

Personnel operating a vehicle on any road within the boundaries of facilities, including access roads, MUST ALWAYS DRIVE TO THE CONDITIONS, regardless of the posted speed limit signage, e.g. slower in wet weather or poor visibility, lights on.

12 Excavations

For excavations on roads, barriers will be put in place to prevent vehicle access to the trench.

The barriers must be a suitable height and constructed of high visibility material to make them easily seen by the largest vehicles driving through.

13 Light Vehicle Driver Training

All personnel operating light vehicles shall have the required authorized license.

13.1 Vehicle Safety Standards

Where required, approved Roll Over Protection Structures (ROPS) are to be installed in light vehicles and mobile equipment.

Seatbelts must be installed for each seat in a vehicle and worn at all times by all personnel travelling in the vehicle. Vehicle capacity, stability and terrain capabilities will be considered when selecting suitable light vehicles and mobile equipment for the project facilities.

The responsible vehicle operator shall, at the commencement of each day and when taking over a vehicle, complete a pre-use inspection checklist.

14 Defective Light Vehicles and Mobile Equipment

Any safety related fault or defect in a vehicle or mobile equipment must be reported immediately to the responsible Mechanic and/or Supervisor/Immediate Line Manager.

An unsafe vehicle or unsafe mobile equipment must have a completed "Out of Service" tag attached to the ignitions witch, steering wheel or controls in the Operator's cabin.

Light vehicles and mobile equipment with an “Out of Service” tag shall not be driven by any persons other than Maintenance Personnel required and authorised to move them for repairs.

14.1 No Go Conditions

Under no circumstances may a vehicle be driven if any of the following no-go conditions exist:

a) Defective brakes
b) Defective steering
c) Radiator water leaks
d) Oil leaks
e) Defective or no head lights
f) Defective or no brake lights
g) Defective or no reverse lights
h) Smooth or incorrectly inflated tyres
i) Indicators not working
j) Mirrors damaged or missing

The driver must report all no-go conditions immediately to the responsible Mechanic.

15 Signage

All signage must, as a minimum:

a) Give clear direction;
b) Be visible and not obscured;
c) Be maintained;
d) Be reviewed regularly for relevance;
e) Pictograms may be required where tourists’ numbers are high;
f) Flashing lights will be placed to warn drivers of any hazards present at night or in poor visibility;
g) All side roads to be signed (STOP and NO ENTRY); and
h) No red signage to be erected within 5 meters of any railway.

16 Records

None

17 Work Instruction Maintenance

Any deviation from this work instruction should be discussed with the Construction Manager. Such discussion should be documented, using the Safe Work Method Statement and Risk Assessment, detailing the reason for the deviation as well as clear instructions of the alternative process to follow. The Construction Manager or designated person is to approve the alternative process.

Any change required to this work instruction should be done in accordance with the Project Document Control Procedure.

18 Attachments

None

19 Document Revisions

Date	Revision	Description of change

Common conditions regarding traffic control

Flagman, Stop and goes

Labour used: Foreman, Supervisors, Operators, Drivers and working employees.

CONTROL OF ENVIRONMENTAL IMPACTS:

LIKELY IMPACT	MITIGATION/PRECAUTIONARY ACTIVITY – (relevant Environmental Specifications)	FREQUENCY
Reducing risk accidents (flagman)		
Vehicle accident	• **Properly trained personnel/flagman operating stop and go's** • **Visible flagman present to and from the construction site** • **Correct visible signage on site at every possible access and exit** • **Visible lighting after dark**	**At all times**
Pedestrian and vehicle accident	• **Properly trained personnel operating stop and go's** • **Visible flagman present to and from the construction site** • **Correct visible signage on site at every possible access and exit** • **Visible lighting after dark**	**At all times**

LIKELY IMPACT	MITIGATION/PRECAUTIONARY ACTIVITY – (relevant Environmental Specifications)	FREQUENCY
In the event of an accident		
Vehicle accident	• **Immediately offer first aid where necessary** • **Immediately inform the Traffic Department and the S.A.P.S** • **Immediately inform the supervisor on duty** • **Do not attempt to move the vehicles until a member of the Traffic Department or S.A.P.S. is present and authorizes you to do so.** • **Call for an ambulance if some person is injured**	**When required**

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LIKELY IMPACT	MITIGATION/PRECAUTIONARY ACTIVITY – (relevant Environmental Specifications)	FREQUENCY
Pedestrian and vehicle accident	• **Immediately offer first aid where necessary** • **Immediately inform the Traffic Department and the S.A.P.S** • **Immediately inform the supervisor on duty** • **Do not attempt to move the vehicles until a member of the Traffic Department or S.A.P.S. is present and authorizes you to do so.** • **Call for an ambulance if some person is injured**	**When required**

Road work after dark or in poor visibility

Labour used: Foreman, Supervisors, Operators, Drivers and working employees.

CONTROL OF ENVIRONMENTAL IMPACTS:

LIKELY IMPACT	MITIGATION/PRECAUTIONARY ACTIVITY – (relevant Environmental Specifications)	FREQUENCY
Reducing risk accidents		
Vehicle accident	• **Properly trained personnel/flagman operating stop and go's** • **Correct reflective safety vests to be worn at all times** • **Visible flagman present to and from the construction site** • **Visible reflective signage to be placed before the work place to warn oncoming traffic** • **Visible reflective signage to alert traffic of the end of the danger/work zone** • **The use of bright white strobe lights is not recommended as they can temporary blind oncoming traffic at night** • **Visible lighting after dark**	**At all times**
Pedestrian and vehicle accident	• **Properly trained personnel operating stop and go's** • **Visible flagman present to and from the construction site** • **Correct visible signage on site at every possible access and exit** • **Visible lighting after dark** • **Visible signage displaying emergency numbers in case of an accident**	**At all times**
In the event of an accident		

Vehicle accident	• **Immediately offer first aid where necessary** • **Immediately inform the Traffic Department and the S.A.P.S** • **Immediately inform the supervisor on duty** • **Do not attempt to move the vehicles until a member of the Traffic Department or S.A.P.S. is present and authorizes you to do so.** • **Call for an ambulance if some person is injured**	**When required**
Pedestrian and vehicle accident	• **Immediately offer first aid where necessary** • **Immediately inform the Traffic Department and the S.A.P.S** • **Immediately inform the supervisor on duty** • **Do not attempt to move the vehicles until a member of the Traffic Department or S.A.P.S. is present and authorizes you to do so.** • **Call for an ambulance if some person is injured**	**When required**

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Administrative matters

Labour used: Foreman, Supervisors, Operators, Drivers and working employees.

CONTROL OF ENVIRONMENTAL IMPACTS:

LIKELY IMPACT	MITIGATION/PRECAUTIONARY ACTIVITY – (relevant Environmental Specifications)	FREQUENCY
Reducing risk accidents		
Traffic law legislation	• **Every person driving any vehicle must be in possession of a valid driver's license for the vehicle he/she is driving** • **No talking on a mobile telephonic device whilst driving, you must pull off the road when safe to do so.** • **Vehicle and personnel inspections for signs of alcohol abuse** • **Correct signage indicating no alcohol usage on site**	**At all times**
In event of discrepancies	• **Correct disciplinary procedure followed**	**At all times**

Vehicle roadworthiness

Labour used: Foreman, Supervisors, Operators, Drivers and working employees.

CONTROL OF ENVIRONMENTAL IMPACTS:

LIKELY IMPACT	MITIGATION/PRECAUTIONARY ACTIVITY – (relevant Environmental Specifications)	FREQUENCY
Reducing risk accidents		
Vehicle accident	• **Vehicle checklist to be drawn up** • **All vehicles to have a road worthy certificate** • **Regular vehicle inspections conducted: brake fluid, oil tyre pressure, handbrake etc.** • **Visual aspects checked: indicators, brake lights etc.** • **Driving environment: road too dangerous to travel on, hidden excavations, oil on road surface etc.** • **Check that vehicle has a spare usable tyre**	**At all times**
If vehicle accident occurs	• **Immediately offer first aid where necessary** • **Immediately inform the Traffic Department and the S.A.P.S** • **Immediately inform the supervisor on duty** • **Do not attempt to move the vehicles until a member of the Traffic Department or S.A.P.S. is present and authorizes you to do so.** • **Call for an ambulance if some person is injured**	**At all times**

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APPENDIX L:
DECOMMISSIONING AND CLOSURE PLAN

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BIOTHERM WIND ENERGY FACILITY BETWEEN UITKYK AND EXCELSIOR NEAR SWELLENDAM IN THE WESTERN CAPE PROVINCE

ENVIRONMENTAL MANAGEMENT PROGRAMME: APPENDIX M DECOMMISSIONING AND CLOSURE PLAN

Prepared for
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TABLE OF CONTENTS

DECOMMISSIONING AND CLOSURE PLAN

1. PURPOSE

The purpose of the Decommissioning and Closure Plan is to give details as to the process to be followed when the Excelsior Wind Energy Facility is decommissioned. The Decommissioning and Closure Plan should be read in conjunction with the EMPr for the facility. The general specifications of the EMPr Chapter 7 (Construction) and Chapter 8 (Rehabilitation) are also relevant and must be adhered to during decommissioning of the facility.

2. PROJECT-SPECIFIC DETAILS

The Excelsior facility is expected to be commissioned in 2018 and is expected to be operational for at least 20 years, where after it could be decommissioned or its lifespan extended depending on the power generation requirements at the time.

Equipment associated with this facility would only be decommissioned once it has reached the end of its economic life. It is most likely that decommissioning activities of the infrastructure of the facility would comprise the disassembly and removal of the turbine infrastructure from the site.

2.1. Activities Associated with Decommissioning

Activity	*Detailed description*
Site preparation	» Site preparation activities similar to those undertaken in the construction phase will be required during the decommissioning phase. This will include confirming the integrity of site access to the site in order to accommodate the required equipment (e.g. lay down areas and decommissioning camp) and the mobilisation of decommissioning equipment.
Disassemble and remove existing components	» The components would be disassembled, and reused and recycled (where possible), or disposed of in accordance with regulatory requirements.

Road traffic will temporarily increase due to the movement of decommissioning crews and equipment. There may be an increase in particulate matter (dust) in adjacent areas during the decommissioning phase. Additionally, there will be emissions from the diesel engines of construction machinery and equipment which may cause odour disturbance and localized impacts to air quality. Decommissioning activities may lead to temporary elevated noise levels from heavy machinery and an increase in trips to the project location.

The relevant mitigation measures contained under the construction section of the EMPr should be applied during decommissioning.

3. PRINCIPLES FOR DECOMMISSIONING AND CLOSURE

In decommissioning the facility, the proponent must ensure that:

» All sites not already vegetated are vegetated as soon as possible after decommissioning is completed with species appropriate to the area (where the impacted area is an indigenous vegetation area - otherwise this is not applicable).
» Any fauna encountered during decommissioning are removed to safety by a suitably qualified person.
» All structures, foundations and sealed areas are demolished, removed and waste material which cannot be recycled disposed of at an appropriately licensed waste disposal site or as required by the relevant legislation.
» All access/service roads not required to be retained by landowners are closed and fully rehabilitated.
» Soil erosion and sedimentation control measures, as well as other mitigation measures used during construction will be re-implemented during the decommissioning phase and maintained until the site is stabilized.
» All vehicles adhere to low speed limits (i.e. 30km/h max) on the site, to reduce risk of faunal collisions as well as reduce dust.
» All disturbed areas are compacted, sloped and contoured to ensure drainage and runoff and to minimise the risk of erosion.
» All rehabilitated areas are monitored for erosion until the site is stabilized.
» Components of the facility are removed from the site and recycled or disposed of appropriately.
» Retrenchments should comply with South African Labour legislation of the day.
» Decommissioning and site restoration activities should be undertaken with the input of the landowner(s).
» The process for notification of decommissioning activities will be the same as the process for notification of construction activities. Decommissioning activities may require the notification of stakeholders given the potential for increased noise and traffic volumes at the project location.

3.1. Disposal of Materials

Most of the materials used can be recycled. The majority of the glass and semiconductor materials can be recovered and re-used or recycled. Recyclable materials must be transported off-site by truck and managed at appropriate facilities in accordance with relevant waste management regulations. No waste materials may be left on-site.

All other structures and/or components must be appropriately disposed of at an appropriately licensed waste disposal site by a licensed contractor.

3.2. Dismantling of Wind Turbine Infrastructure

Wind turbines

- » Disconnect all above ground wirings, cables and electrical interconnections.
- » Access roads to turbines may be widened temporarily to sufficient width to accommodate movement of appropriately sized cranes or other machinery required for the disassembly and removal of the turbines.
- » High value components will be stripped. The remaining material will be reduced to shippable dimensions and transported off site for proper disposal. Control cabinets, electronic components, and internal cables will be removed.
- » The blades, hub and nacelle will be lowered to ground for disassembly. The tower sections will be lowered to the ground where they will be further disassembled into transportable sections.
- » The blades, hub, nacelle, and tower sections will either be transported whole for reconditioning and reuse or dissembled into salvageable, recyclable, or disposable components.
- » The area will be thoroughly cleaned of all debris.

Foundations

- » Topsoil will be removed from an area surrounding the foundation and stored for later replacement. Turbine foundations will be excavated to a depth sufficient to remove all anchor bolts, rebar, conduits, cable, and concrete.
- » After removal of all noted foundation materials, the hole will be filled with clean sub-grade material of quality comparable to the immediate surrounding area.
- » The sub-grade material will be compacted to a density similar to surrounding sub-grade material. All unexcavated areas compacted by equipment used in decommissioning shall be decompacted in a manner to adequately restore the topsoil and sub-grade material to the proper density consistent and compatible with the surrounding area. The area will be thoroughly cleaned and all debris removed, and re-seeded.

Transformers & Inverters

- » Disconnect and remove all electrical equipment.
- » Remove electrical components and transport off-site to appropriate facility.
- » Oil filled electrical equipment must be de-polluted, decommissioned and the constituent elements recovered for further re-recycling and reuse. Oil should be disposed of at a hazardous waste facility

Other infrastructure

- » Consult with landowner(s) to determine if access roads should be left in place for their continued use. If not required, roads should be decommissioned, ripped and revegetated.
- » Removal of fencing.
- » Underground electrical lines running between inverters and the substation will be removed.
- » All foundation materials will be removed from the site via truck and managed at appropriate facilities

3.4 Land Use

Based on the zoning and current land use, it is assumed that the probable future use of the project location after decommissioning will be farming land. However, this will be confirmed prior to decommissioning to ensure that restoring the land to its current land use remains the most appropriate option.

APPENDIX M:
DRAFT CURTAILMENT STRATEGY FOR BATS

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CURTAILMENT STRATEGY TO MINIMISE BAT FATALITY AT THE PROPOSED EXCELSIOR WIND ENERGY FACILITY

Date: 24 June 2016

Prepared by: Stacey L. Jordaan (M.Sc.) & Alicia J. Thomas (M.Sc., Pr.Sci.Nat.)

Prepared for: Irene Bezuidenhout- BioTherm Energy (Pty) Ltd.

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Mar 21, 2019 10:53

Contents

List of Figures

List of Tables

Glossary of Terms

Bat Detector	An electronic device that converts ultrasonic echolocation calls of bats into audible signals
Echolocation	A system used by bats and other animals to orient themselves and locate obstacles and prey by analysing returning echoes from emitted calls
Barotrauma	Damage to the lung tissue of bats caused by sudden changes in air pressure associated with vortices that form around moving turbine blades (Baerwald et al. 2008)
WEF	Wind Energy Facility
Cut-in Speed	The cut-in speed of a wind turbine is the wind speed at which the generator is producing electricity and turbine blades are moving at maximum rotation speed (Arnett, Johnson, et al., 2013; Berthinussen et al., 2014)

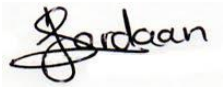
This report should be cited as follows: *S. L. Jordaan & A. J. Thomas, June 2016. Curtailment Plan to Minimise Bat Fatality at the Proposed Excelsior Wind Energy Facility. Report to BioTherm Energy (Pty) Ltd.*

Competence of Specialist Consultants

This report has been prepared by Stacey L. Jordaan and Alicia J. Thomas of Gaia Environmental Services (GES). GES prides itself on its research and data analysis capabilities. We were extensively trained by Prof. David Jacobs who has over 30 years of experience researching bats and has published over 50 scientific articles on bats in peer-reviewed journals. The senior members of the project team all have M.Sc. degrees supervised by Prof. Jacobs and have worked on many different aspects of bat biology and behaviour. Combined we have more than 16 years of experience studying bats in South Africa. To our knowledge we are the only company offering bat services to the wind industry with this level of qualification and experience in the country. GES is therefore well placed to implement a specialist environmental impact assessment for bats on behalf of the applicant, BioTherm Energy (Pty) Ltd. (hereafter referred to as BioTherm Energy).

Declaration of Consultant's Independence

We, Alicia J. Thomas and Stacey L. Jordaan, authors of this report, hereby declare that we are independent consultants appointed by BioTherm Energy to provide specialist input on the proposed Excelsior Wind Energy Facility (WEF) within the Overberg region. We hereby confirm that we, and GES, have no business, financial, personal or other interest in the activity, application or appeal in respect of which we have been appointed other than fair remuneration for work performed in connection with the activity and application. All opinions expressed in this specialist report are of GES. We further acknowledge that we understand and have complied with the requirements as set out in Regulation 17 of the NEMA EIA Regulations, 2010.



Alicia J. Thomas
21-06-2016

Stacey L. Jordaan
21-06-2016

Description of the Proposed Activity

Biotherm Energy (Pty) Ltd proposes to develop a Wind Energy Facility at the farm Excelsior, in the Overberg Region. The WEF will comprise 13 turbines, each with a hub (nacelle) height 90m, and three blades with a length of 59. The rotor sweep would extend from 29.5m to 150.5m, with a total rotor diameter of 121m. The proposed layout can be found in Figure 1.1.

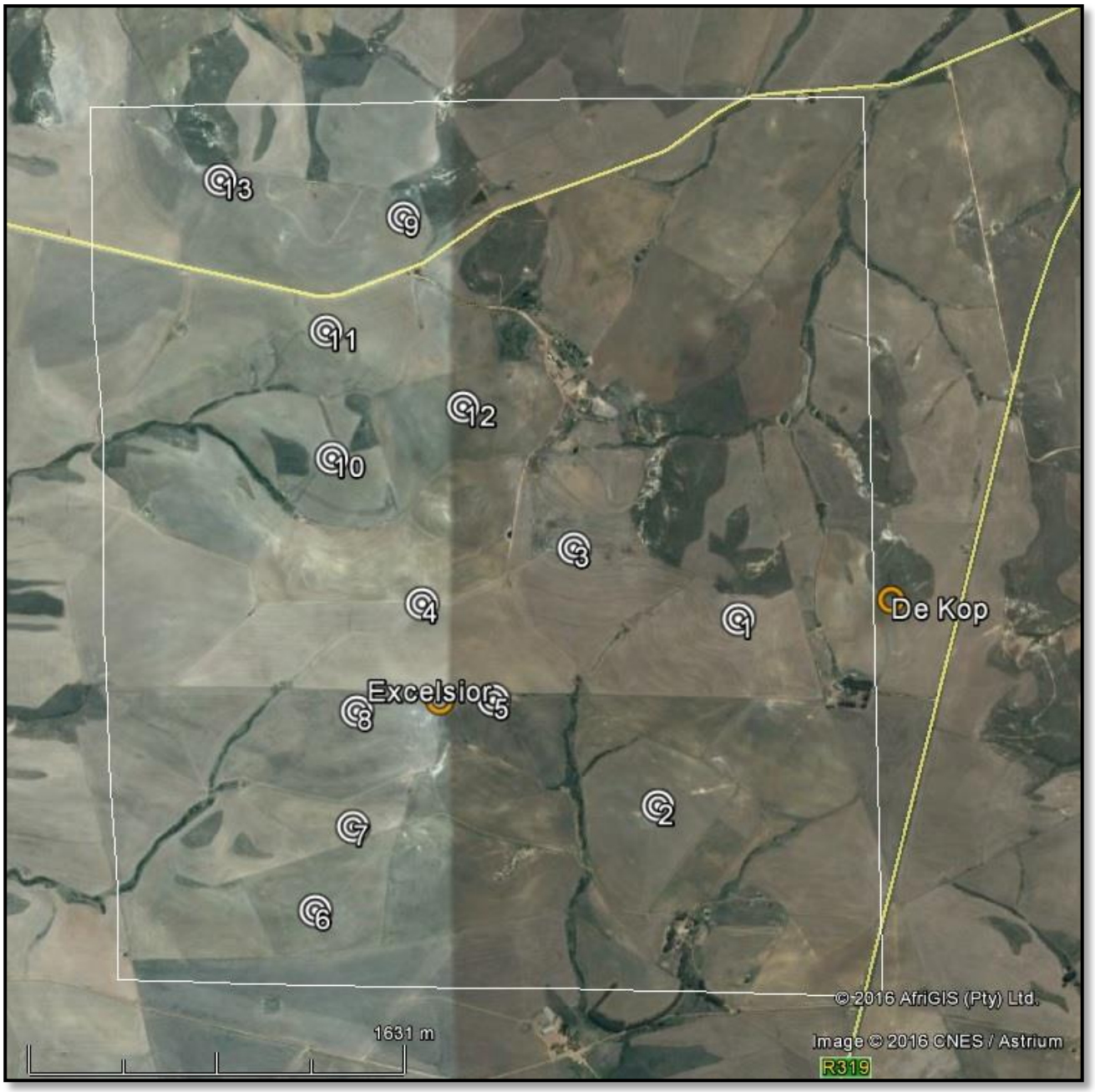


Figure 1.1: Proposed Layout of the Excelsior WEF. Proposed Turbine locations are indicated by white circles and the two monitoring stations are indicated by orange circles.

Terms of Reference

Gaia Environmental Services (Pty) Ltd. were appointed by BioTherm Energy (Pty) Ltd. to formulate an alternative mitigation plan for the proposed Excelsior WEF, in the event that the turbine re-siting recommendations in the pre-construction bat impact assessment report (Jordaan & Thomas, 2015) are not possible.

Assumptions and Limitations

The following limitations are identified:

- Limited knowledge of the biology of bats and the impact of WEF's on bats in South Africa. Most research regarding the impacts of wind turbines on bats has been done in Europe and North America. Only two published studies have been done in South Africa. Furthermore, very little research has been done on the natural history of the bat fauna in South Africa. Deficiencies arising from this limitation will be minimized through the application of the precautionary principle.
- Bat activity was sampled at a height of 5 - 10m, as the monitoring equipment height and location had been determined in the previous study. Ideally, bat activity should be monitored at a range of heights because bat activity is known to vary with height (Collins & Jones, 2009; Cryan & Barclay, 2009). The importance of monitoring bat activity at height is because bats are killed in the rotor swept area, which is high in the air (Collins & Jones 2009). In addition, Kunz *et al.* (2007) have shown that the correlation between bat activity estimates from pre-construction acoustic monitoring and post-construction bat fatality estimates is stronger as the bat detector is deployed at greater heights.
- Echolocation operates over ranges of metres so any monitoring based on echolocation samples only a few metres of space, depending on the type and intensity of the call and the bat detector system used. One must therefore be cautious when extrapolating data from echolocation surveys over large areas. The accuracy of the species assignation is also very dependent on the quality of the calls used for identification.
- Acoustic monitoring cannot determine the absolute number of bats detected in an area. It can only provide an indication of the relative abundance of bats. Ten different bats of the same species passing an ultrasonic detector cannot be distinguished from a single bat passing the same detector 10 times (Kunz et al., 2007). Nonetheless, the results of acoustic monitoring indicate the level of bat activity on the site as each recorded occurrence is a bat flying past the device. Thus the level of risk of mortality to bats can be extrapolated from the results of acoustic monitoring, irrespective of the number of bat individuals recorded, but the results of the acoustic monitoring need to be interpreted with this in mind.
- Due to malfunctioning equipment, bat activity data were not available for all months over the 12 months period and limited data were available for some months (for example, only 5 nights of data were available for September). Thus limits the inferences which can be made from these data to the periods for which data were available. Please refer to Table 2.2.1 in the pre-construction bat impact assessment report (Jordaan & Thomas, 2015) for details on the number of nights analysed for each site.

1. Introduction

The impacts of construction and operation of a WEF at Excelsior on bats were assessed by GES and detailed in a report to Biotherm Energy (Jordaan & Thomas, 2015). The proposed WEF is likely to impact bats at the site through roost abandonment, loss of foraging habitat, mortality via collisions with rotating blades of wind turbines and barotrauma (Baerwald et al., 2008; Cryan & Barclay, 2009; Horn et al., 2008). To minimise these impacts, it was recommended that the following mitigation measures are put into place:

- All buildings already on site, as well as any new structures built must be bat–proofed (ie. completely sealed to bats) to prevent bats roosting in these structures.
- A minimum buffer zone of 200m (Sowler & Stoffberg, 2014) should be placed around all important habitat features for bats (trees, buildings, wetlands, water bodies and natural vegetation) at the proposed WEF (Figures 1.2 and 1.3). No part of the turbines should cross into this zone (no-go buffer zone). This is a standard laid out in the current South African Best Practice Guidelines for Surveying Bats at proposed Wind Energy Developments (Sowler & Stoffberg, 2014; Appendix 3) and was agreed upon by the South African Bat Assessment Association (SABAA).
- A minimum buffer zone of 500m should be placed around the suspected roost detected on site (Sowler & Stoffberg, 2014, Appendix 3; Figures 1.2 and 1.3). No part of the turbines should cross into this zone.
- Acoustic monitoring for bats on site should continue during construction and continue for at least 2 years from the start of operation of the WEF. This should be done using the same (or similar) protocol to the pre-construction monitoring (ensuring that the results are comparable), in addition to monitoring at nacelle height.
- Fatality assessments must be conducted on site according to the South African Good Practice Guidelines for Operational Monitoring for Bats at WEF's (Aronson et al., 2014) from the start of operation of the WEF.

Based on the above buffer zones (Figure 1.3) GES recommended that turbines 5 and 12 be moved away from these zones to decrease the impact of the proposed activity. Turbines located close to important habitat features for bats (trees, buildings, wetlands, water bodies and natural vegetation) would increase the likelihood that bats will be brought into contact with turbines. Turbine 12 is located within 500m of the suspected roost. Bat guano was found inside this structure, although no bats were observed. It is likely that this structure serves as a transient roost for the roof-roosting species recorded on site, in low numbers. Roost sites are very important features for bats, often limiting species distributions (Monadjem et al., 2010), depending on the roosting requirements of the species.

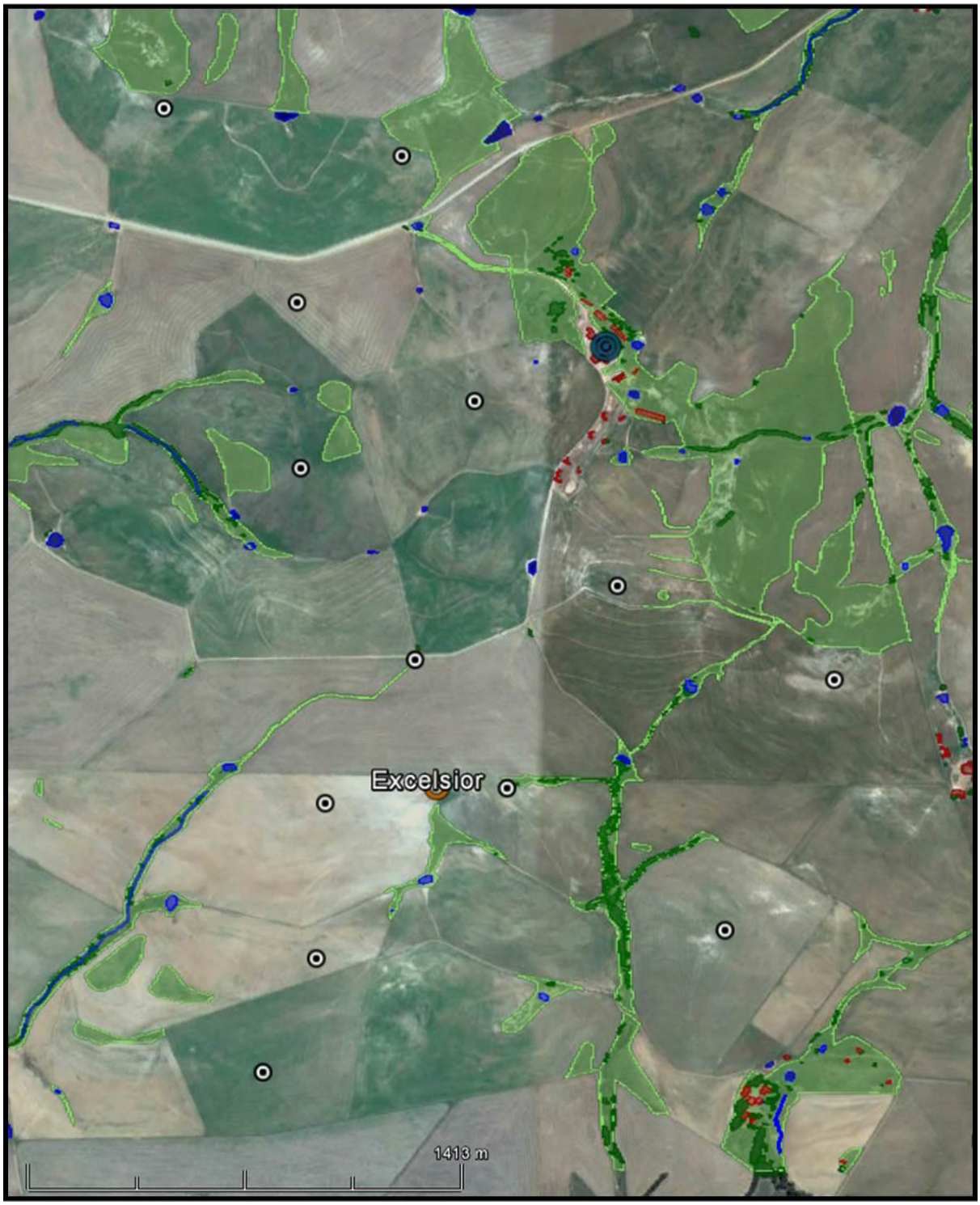


Figure 1.2: Map of Excelsior and surrounds, indicating proposed turbine placement (white circles) and important habitat features for bats. Buildings are indicated by red areas, water bodies are indicated by blue areas, water courses are indicated by blue lines, dark green areas indicate dense natural vegetation with many trees, light green areas indicate less dense vegetation, comprising more shrubs and bush and a blue circle indicating possible roost. Google Earth.

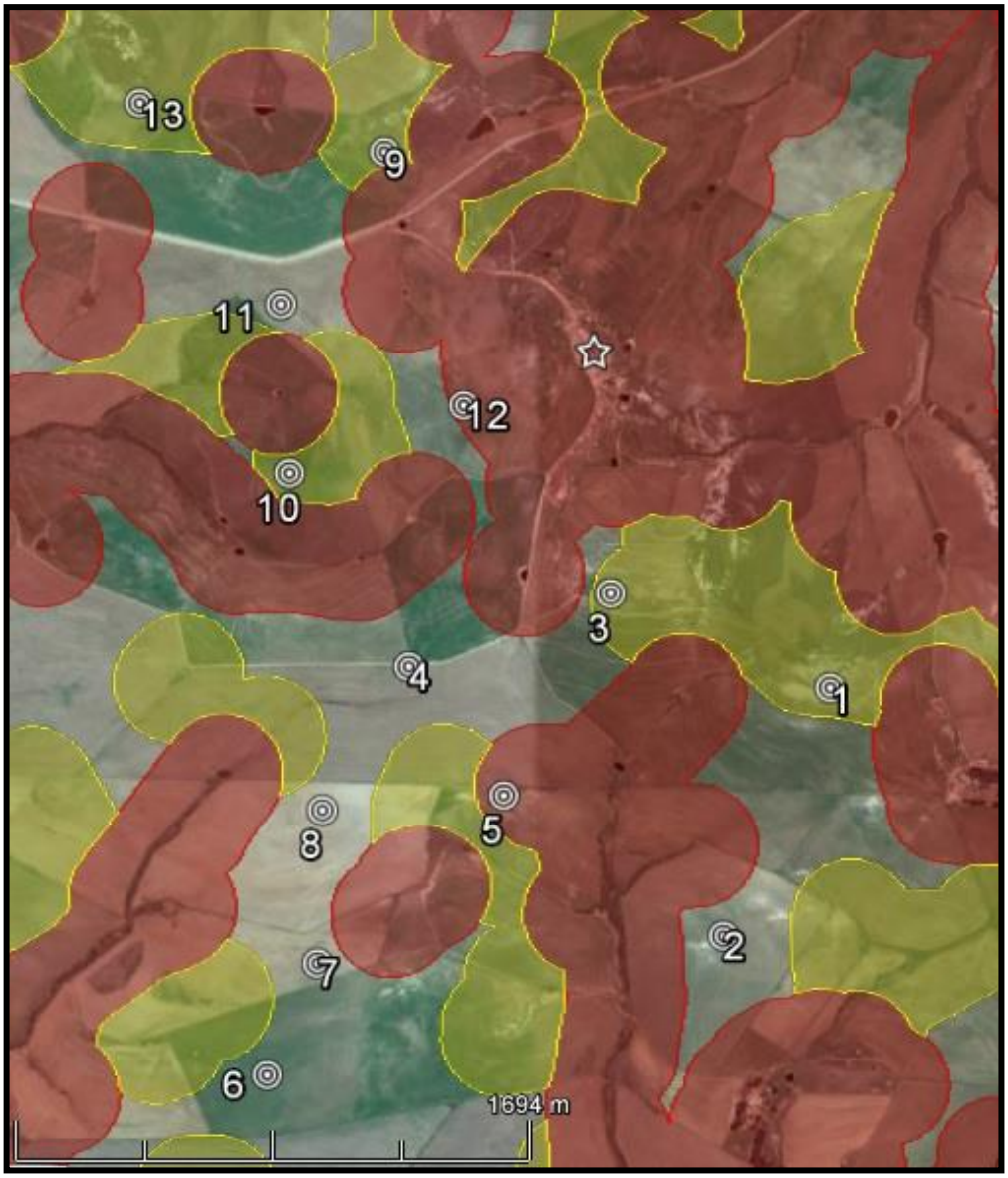


Figure 1.3: Map of the proposed Excelsior WEF indicating 'no-go' buffer zones (red) as well as zones of moderate sensitivity (yellow), based on habitat features which may promote bat activity (Sowler & Stoffberg, 2014). All areas outside these zones may be considered low sensitivity and need not be avoided. Proposed turbine locations are indicated by white circles and the potential roost on site is indicated by a star.

Biotherm Energy has indicated that re-siting turbines 5 and 12 away from the no-go buffer zones is not possible. Thus, should this mitigation measure not be undertaken, alternative mitigation measures are outlined in this document.

The most effective mitigation measure against bat fatality at WEF's is avoidance of important areas for bats (such as roosts, commuting or migration routes or extensive foraging areas). This is achieved by taking bat sensitivity zones (as determined by pre-construction studies) into account when siting turbines. If avoidance strategies are not possible or if residual impacts are likely,

limiting the amount of time turbine blades are in motion could reduce or prevent bat fatalities, since bat fatality does not occur at non-operational turbines (Arnett et al., 2005). This can be achieved by feathering blades and raising turbine cut-in speeds during times of risk. Currently, this type of mitigation strategy is the only proven method to reduce bat fatalities at operational WEF's (Arnett, Barclay, et al., 2013; Arnett, Johnson, et al., 2013). This strategy has significantly reduced bat mortality at a number of operational wind energy facilities (Baerwald et al., 2009; Arnett et al., 2011) because both bat activity and bat fatality are greater in periods with lower wind speeds (Baerwald & Barclay, 2011; Amorim et al., 2012; Köppel et al., 2014). Other strategies, such as those designed to deter bats (aiming to prevent them from entering the air space near turbine blades) using ultrasound or radar have been proposed (Arnett, Hein, et al., 2013; Nicholls & Racey, 2009), however, there is only limited evidence of the effectiveness of these measures and they may be impractical. Ultrasound devices to deter bats are expensive and, because ultrasound attenuates rapidly through air, especially under humid conditions, multiple devices are needed to create an array that will cover a sufficient volume of air (Arnett, Hein, et al., 2013). With Radar, only a constant and intense signal showed a significant effect on activity (Nicholls & Racey, 2009). These signals can be harmful to small-bodied animals and it would be difficult to create that intense a signal at every turbine.

Thus a curtailment strategy, based on the pre-construction bat activity data on site, has been outlined in this document. Curtailment is advised in the time periods when bats are most active in each season and under environmental conditions when bat activity is greatest. This has been based on the relationships between bat activity and environmental parameters at the proposed WEF, as investigated in the pre-construction bat impact assessment study.

The most common species recorded on site (*Miniopterus natalensis, Neoromicia capensis* and *Tadarida aegyptiaca*) all fly at heights which may bring them into contact with wind turbines. Hence these species have a high (*T. aegyptiaca*) or medium – high (*M. natalensis* and *N. capensis*) likelihood of risk of fatality at a WEF (Sowler & Stoffberg, 2012). In addition, *M. natalensis,* which is listed as Near Threatened in South Africa (Monadjem et al., 2010) and which migrates, was the dominant species at the proposed WEF. This species is of particular concern in the Overberg region due to the large maternity colony at the Guano Cave at De Hoop Nature Reserve, which houses approximately 250 000 *M. natalensis* individuals (McDonald et al., 1990; Monadjem et al., 2010). It appears that the *M. natalensis* bats recorded at Excelsior are part of this population. This species may also be migrating across the proposed WEF in low numbers in spring, which may increase the impact on this species and the local population at this time, although this migration appears to be variable and diffuse.

These points are of concern, and thus it is important that an alternative mitigation measure is employed, if buffer zones cannot be adhered to, to minimise bat fatality at the proposed WEF. Any bat fatalities at WEF's are particularly worrying because their populations appear sensitive to changes in mortality rates (Barclay & Harder, 2003). Significant mortality of the bat species

present on site may preclude the ability of the local population to recover. Significant reductions in the local bat populations will likely increase the effects of agricultural pests in the area due to reduced predation of these pests.

2. Pre-Construction Monitoring Results: Summary

Detailed results of the pre-construction bat monitoring program at the proposed Excelsior WEF can be found in the Bat Specialist Study at the Proposed Excelsior Wind Energy Facility, Amendments to the Secondary Environmental Impact Assessment Report (Jordaan & Thomas, 2015). One monitoring station was located within the development area (on the farm Excelsior) and another just outside the development area, on the neighbouring farm Die Kop. Thus data are available from both monitoring stations.

The dominant bat species on site were *Miniopterus natalensis* (67.88% of total activity)*, Tadarida aegyptiaca* (17.58% of total bat activity) and *Neoromicia capensis* (11.60% of total activity). These species have a high and a medium to high risk of fatality from wind turbines (Sowler & Stoffberg, 2014). Bat activity at Excelsior was moderate to high, with a total of 1 871 passes recorded over 210 nights (Figures 2.1 and 2.3). Activity at Die Kop was similar, although generally lower than that at Excelsior (a total of 1 858 passes recorded over 210 nights; Figures 2.2 and 2.4). Activity was highly variable between nights (Figures 2.2 and 2.4).

Bat activity was greatest, and thus the potential impact of a WEF on bats would be greatest, during summer, particularly during the months of December and January, followed by November and February at the Excelsior monitoring station (Figures 2.1 and 2.3). However, bat activity in the area was also notable during spring, thus impacts on bats by an operational WEF are also of concern in spring. At the Die Kop monitoring station, activity was greatest during September (2011), October, January and February, followed by November and December (Figures 2.2 and 2.4). Activity was low to intermediate at both monitoring stations in March and April (Autumn). At both sites activity was very low in winter (as it was in the first year of monitoring; Jacobs, 2012) and thus winter is of low concern (Figures 2.1 - 2.4). Activity at the Excelsior monitoring station was lowest in June, July, August and May.

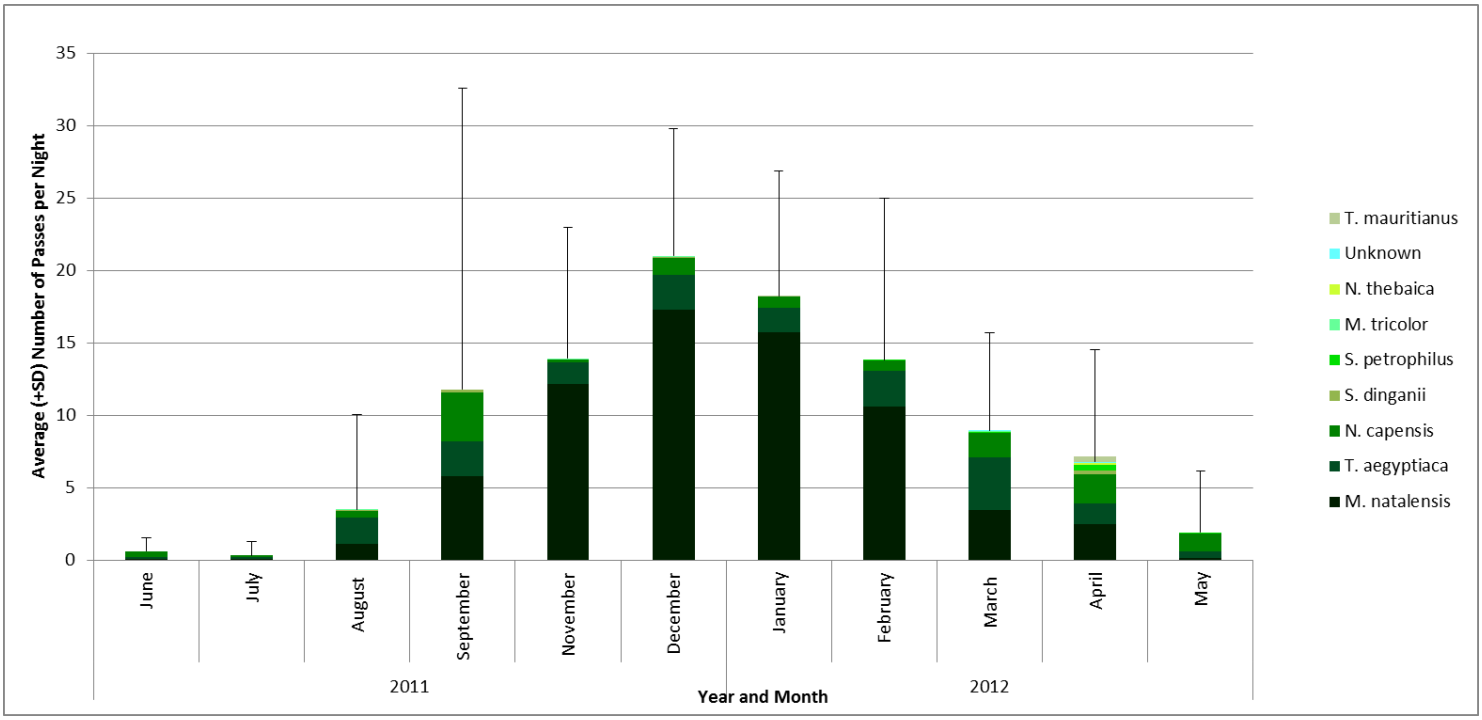


Figure 2.1: Average (+ standard deviation) number of bat passes per night (showing species composition) recorded at the Excelsior monitoring station, in each month for which data was analysed.

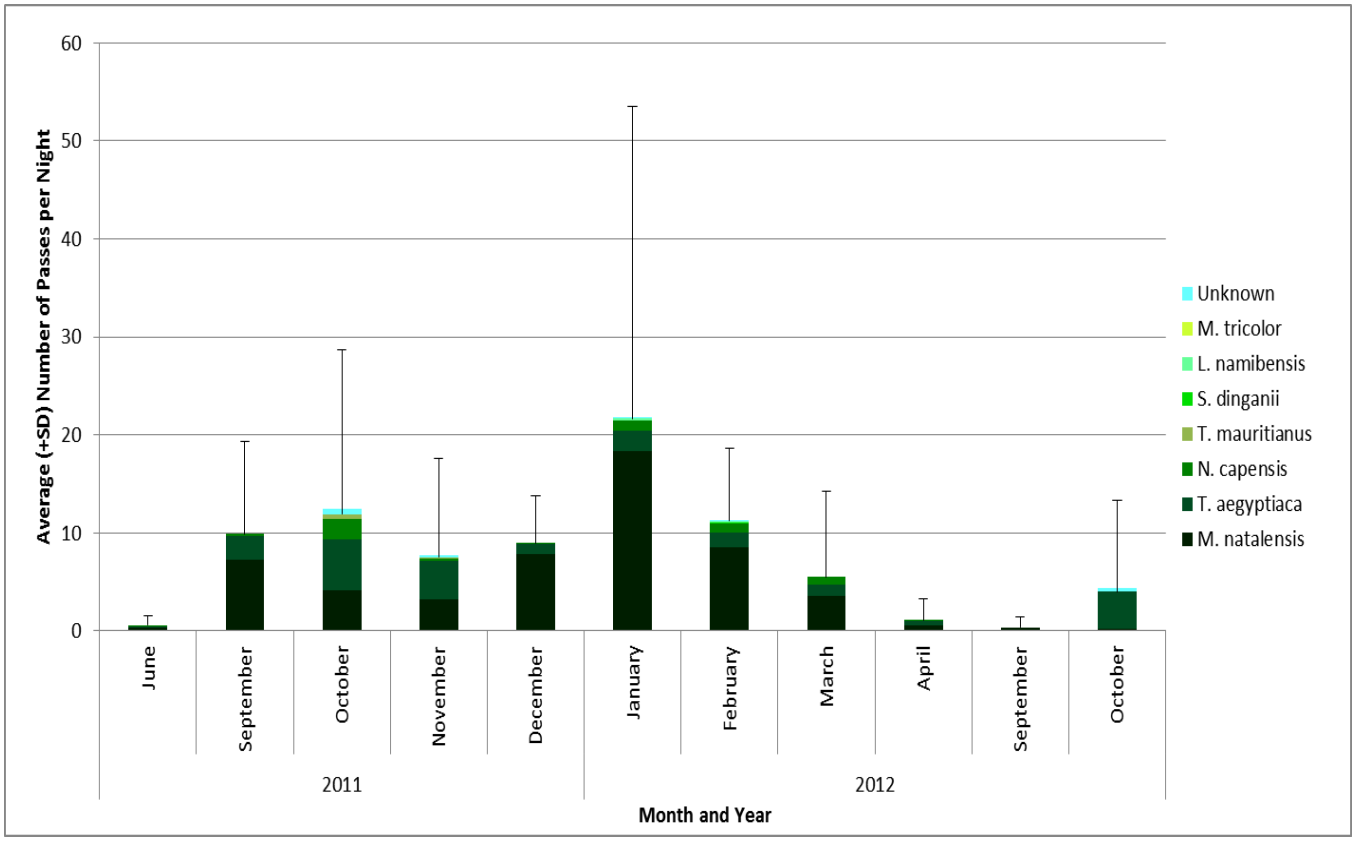


Figure 2.2: Average (+ standard deviation) number of bat passes per night (showing species composition) recorded at the Die Kop monitoring station, in each month for which data was analysed.

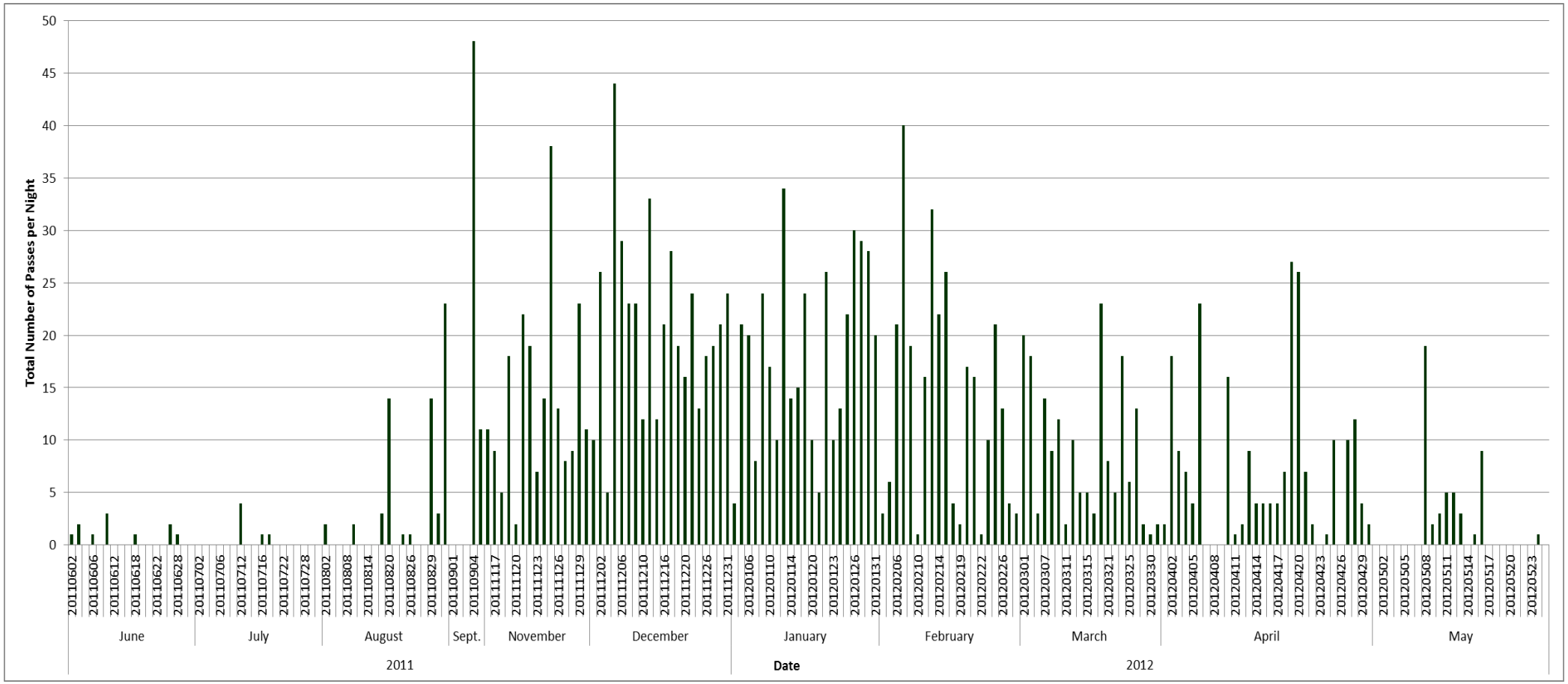


Figure 2.3: Total Number of Passes per Night at the Excelsior monitoring station over the entire monitoring period.

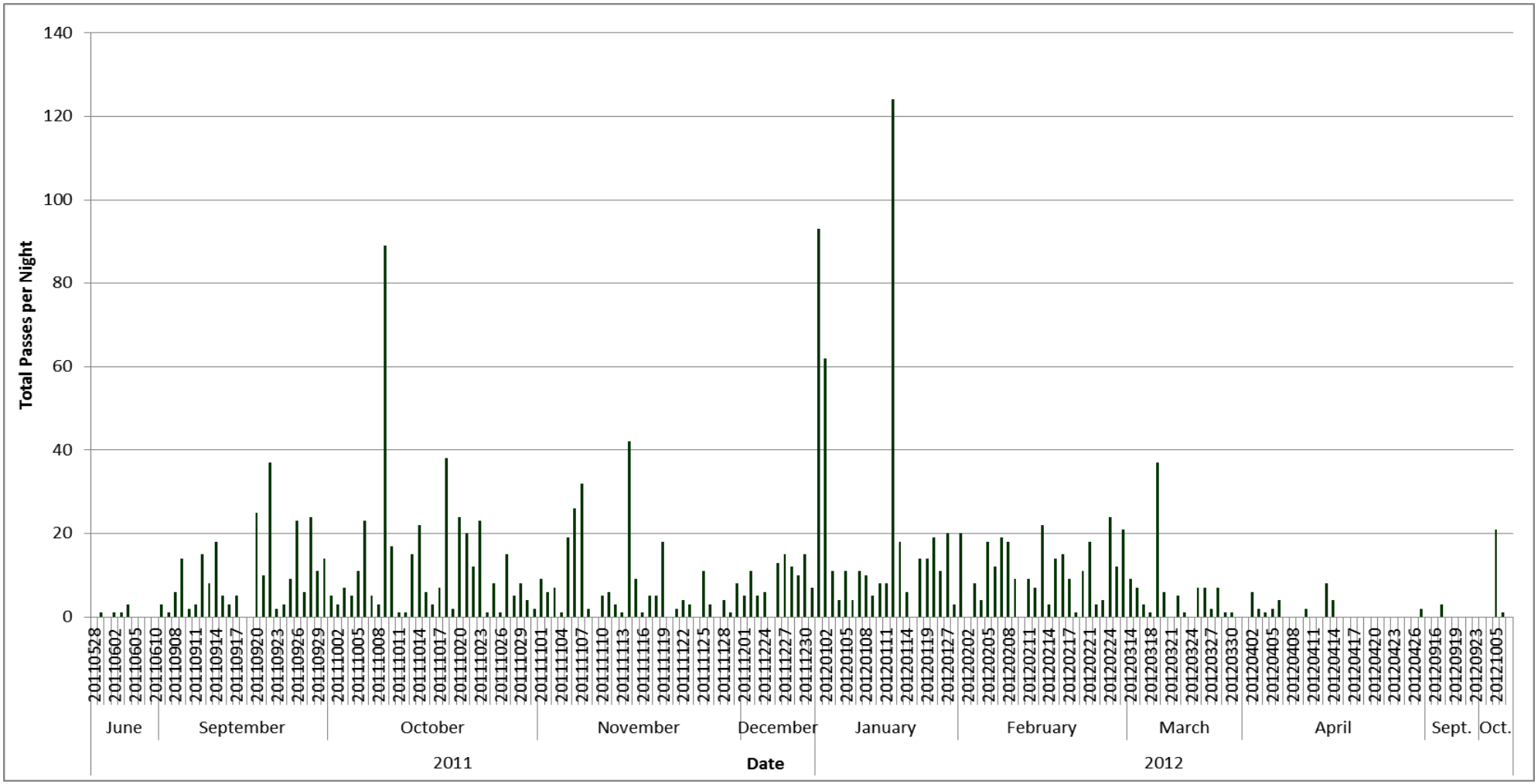


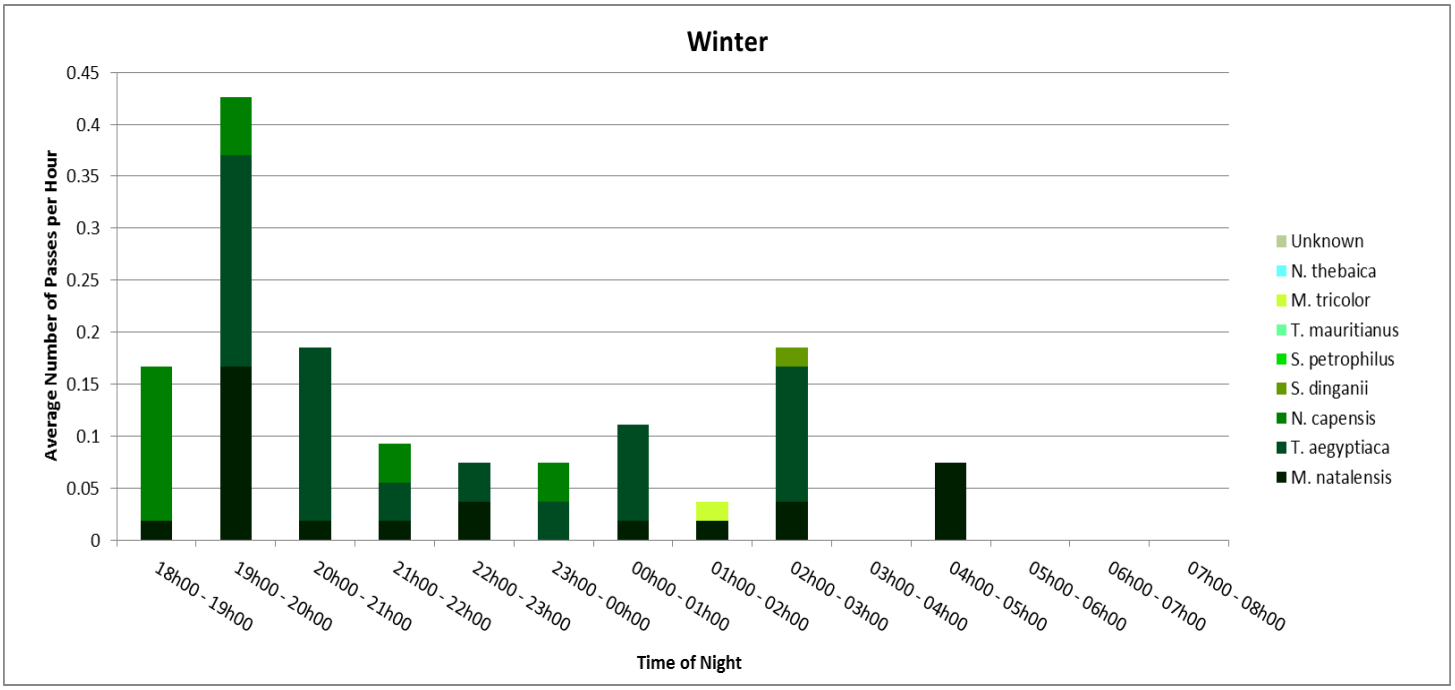
Figure 2.4: Total Number of Passes per Night at the Die Kop monitoring station over the entire monitoring period.

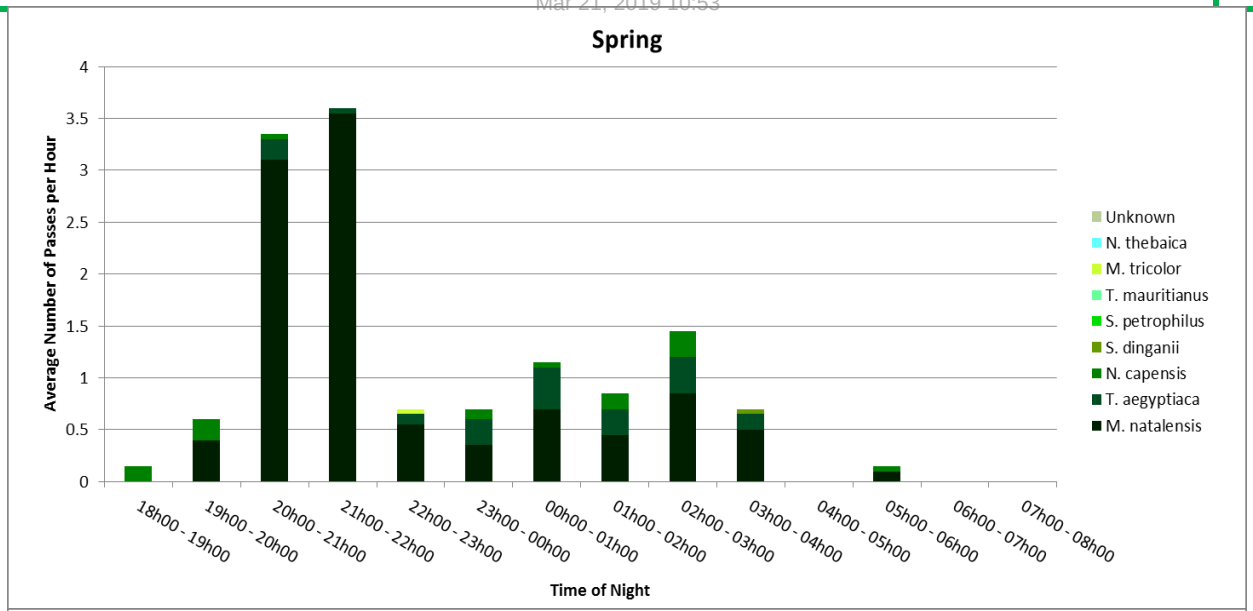
In winter activity at the proposed Excelsior WEF was very low, but much of the activity was recorded early in the night (particularly from 19h00 to 20h00; Figure 2.5). At Die Kop, bats that were active in winter were mostly recorded in the first three hours after sunset (18h00 to 21h00; Figure 2.6). Any impacts on bat activity by a WEF at Excelsior will be greatly reduced in winter, particularly after 21h00.

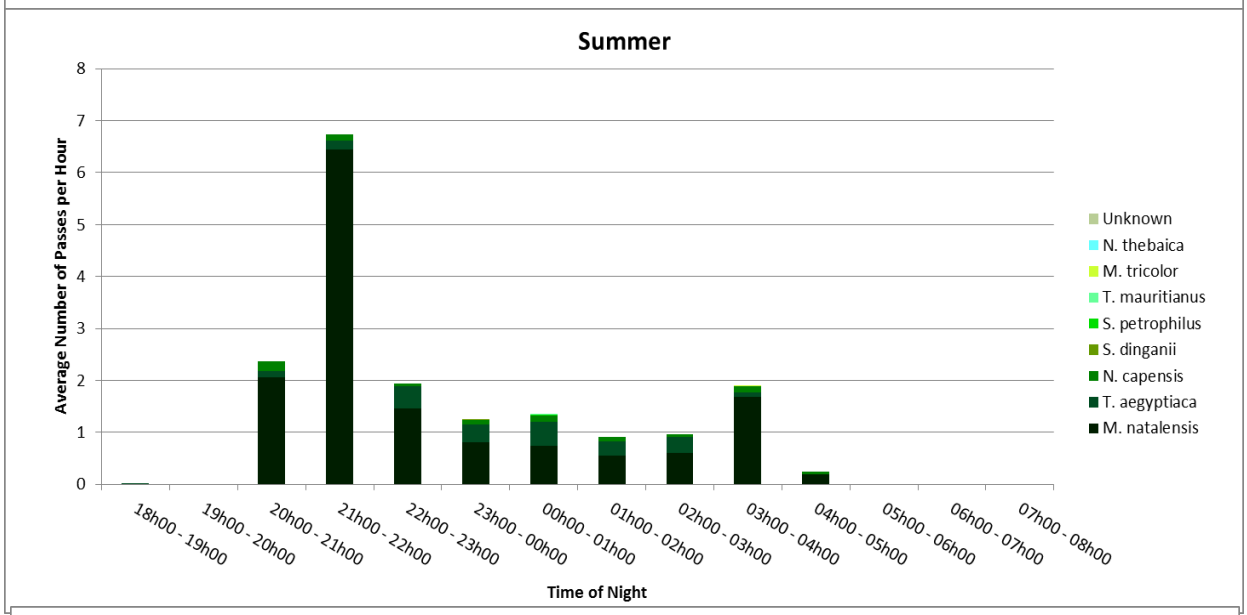
In spring bats were active at Excelsior from sunset to sunrise but activity peaked early in the night (between 19h00 and 22h00) with a second, smaller peak between 00h00 and 03h00. Activity dropped to low levels from 04h00 (Figure 2.5). At Die Kop activity was greatest between 20h00 and 03h00 (Figure 2.6).

In summer, much of the activity at Excelsior was recorded between 20h00 and 04h00, with a clear peak in activity from 21h00 to 22h00 (Figure 2.5). At Die Kop, in summer, bats were active for most of the night, with high levels of activity from 21h00 to 04h00 (Figure 2.6).

In autumn bat activity at Excelsior followed a bimodal distribution, with low levels throughout the night, and a peak in activity between early in the night and before dawn. Activity peaked between 19h00 and 20h00.







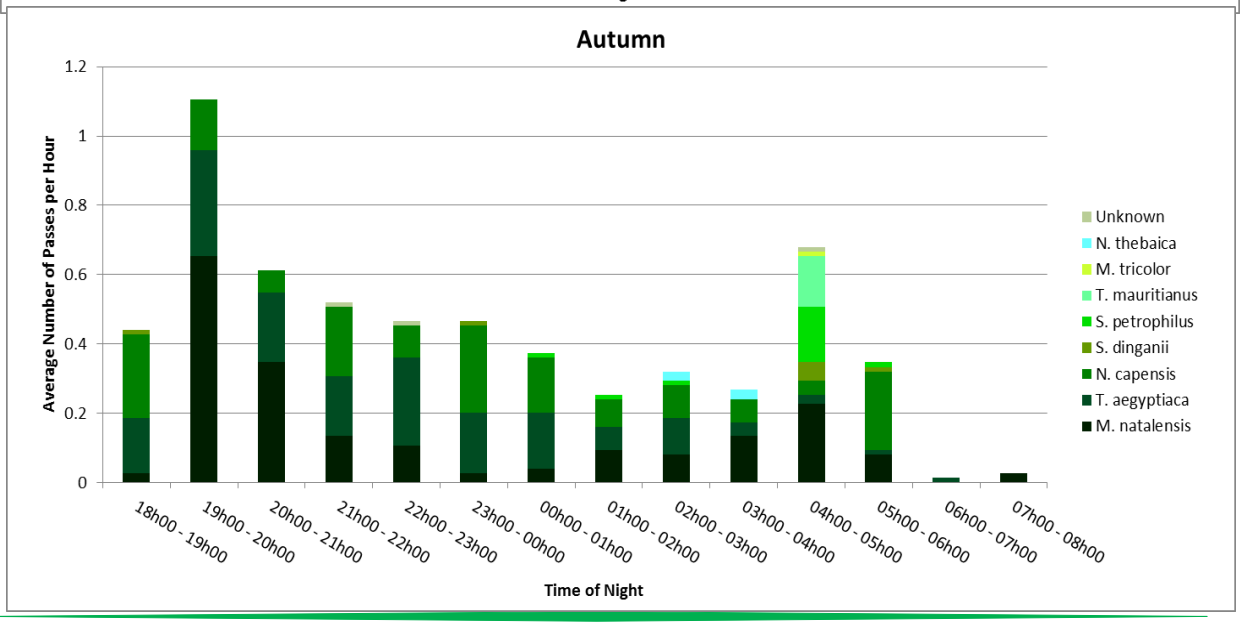


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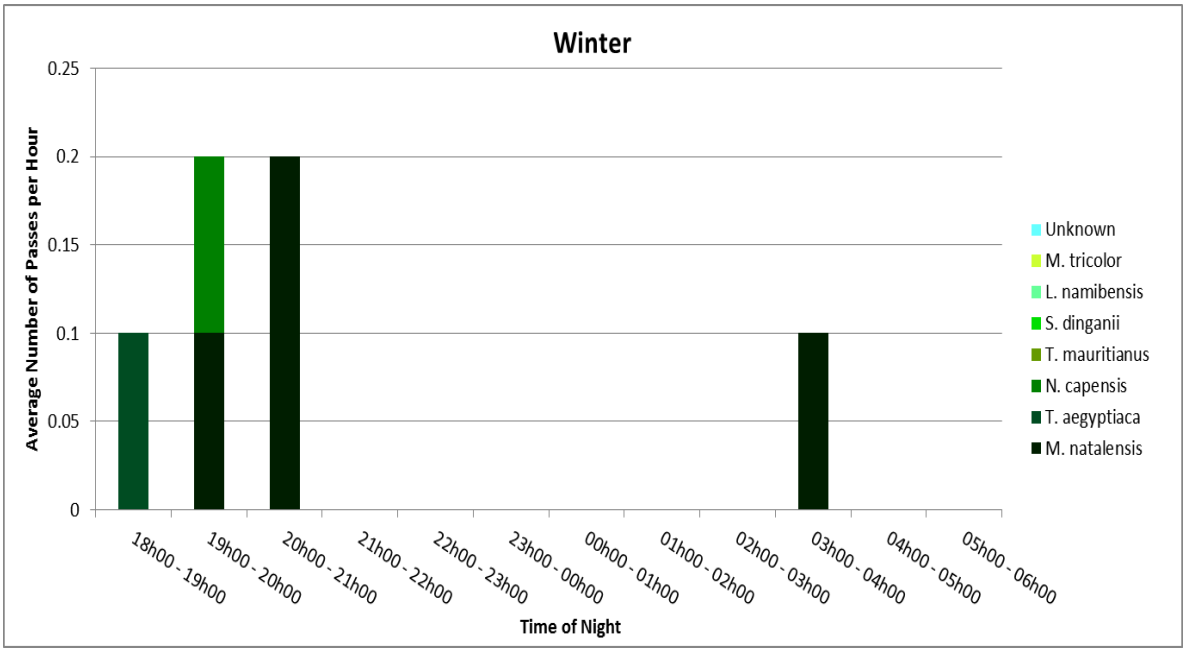
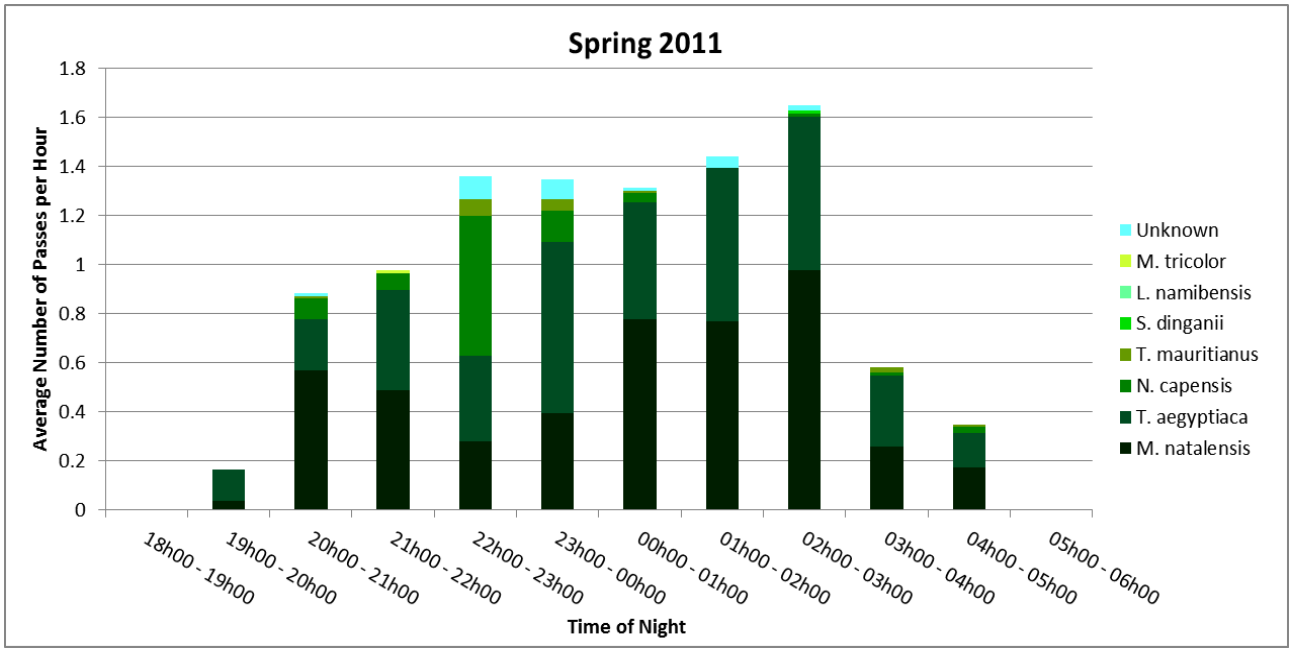
Figure 2.5 (previous page): Average Number of bat passes per hour (showing species composition), over the course of the night, for each season, recorded at the Excelsior monitoring station.





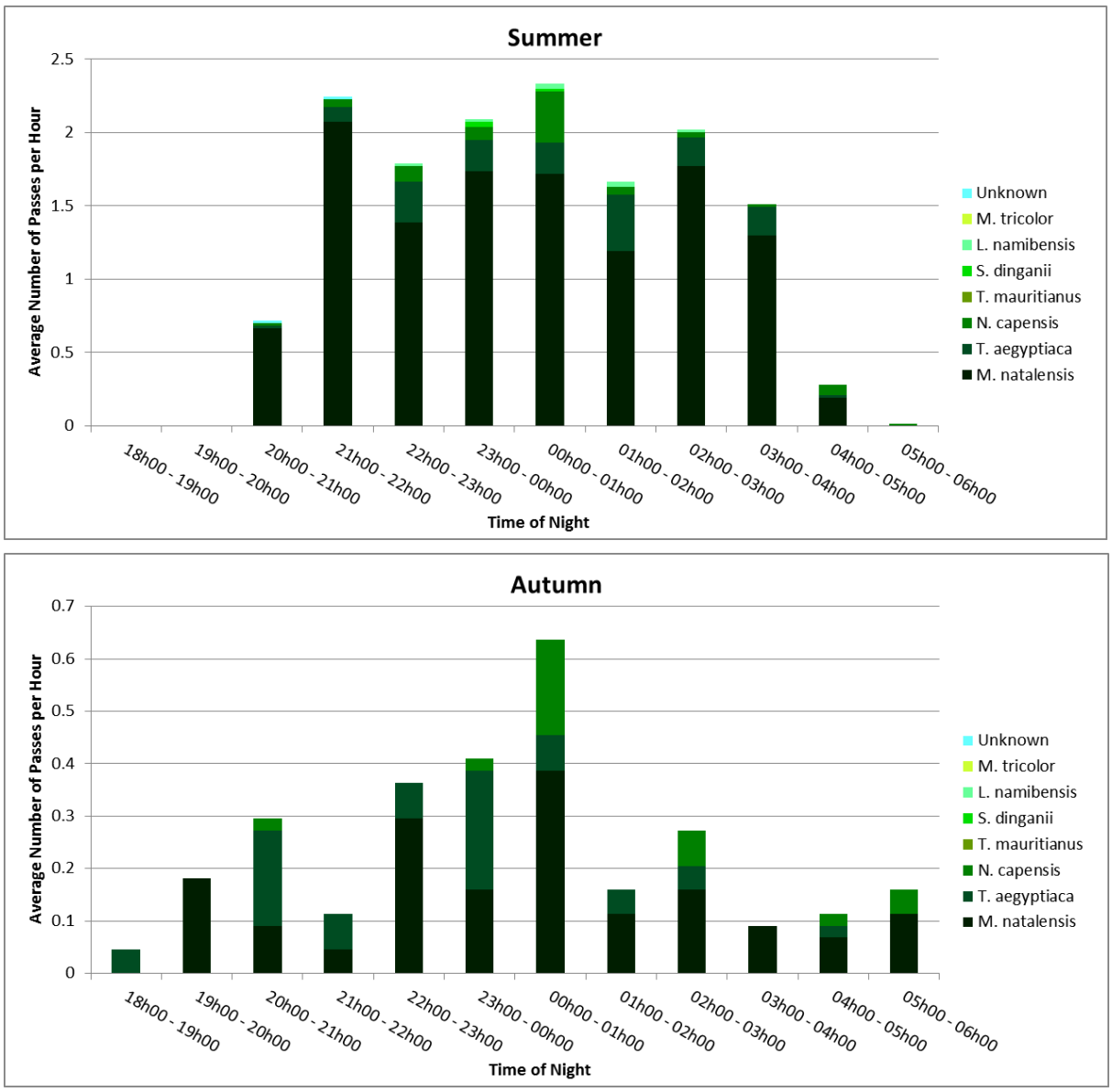


Figure 2.6: Average Number of bat passes per hour (showing species composition), over the course of the night, for each season, recorded at the Die Kop monitoring station.

2.1 Bat Activity and Environmental conditions

Bat activity was correlated with wind speed, temperature and humidity when these relationships were investigated using a GLM. Bats are more active at the site during lower wind speeds and high temperatures and humidity levels (Table 2.1). The highest average wind speed at which bat activity was recorded was 13.02 m/s. The lowest average temperature and humidity at which bat activity was recorded were 8.81 °C and 29.85 %, respectively. No relationship was found between bat activity and barometric pressure. The correlation coefficients of these relationships were low, however, which indicates a limited prediction power of this model. More data are required to

strengthen the model. The strongest relationship was found between temperature and bat activity.

Following the model, low bat activity is predicted at temperatures and humidity below 8.05°C and 5.12%, respectively (Figure 2.8 and Figure 2.9) and at wind speeds above 15.13 m/s (Figure 2.7).

Table 2.1: Results of the GLM that assessed the influence of weather on variation in nightly bat activity from the Excelsior Monitoring Station. The number of bat passes had a negative binomial distribution.

Parameter	Estimate	Std. Error	Z Value	P	95% CI	
(Intercept)	-2.01	0.73	-2.77	0.01	-3.32	-0.71
Wind Speed	-0.17	0.04	-4.44	<0.0001	-0.23	-0.11
Temperature	0.23	0.03	9.29	<0.0001	0.18	0.28
Humidity	0.02	0.01	2.91	0.001	0.01	0.03
AIC = 1170.5						
Dispersion Parameter = 1.15						

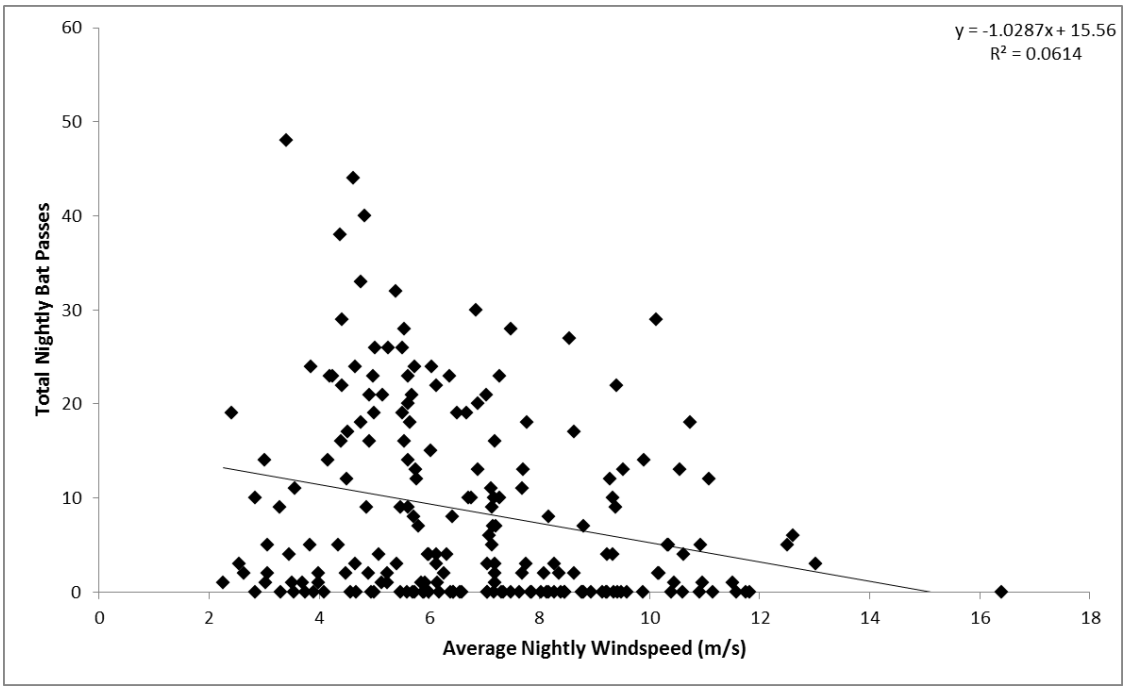


Figure 2.7: Correlation between total number of bat passes per night and average nightly wind speed (m/s), over the sampling period, recorded at the Excelsior monitoring station.

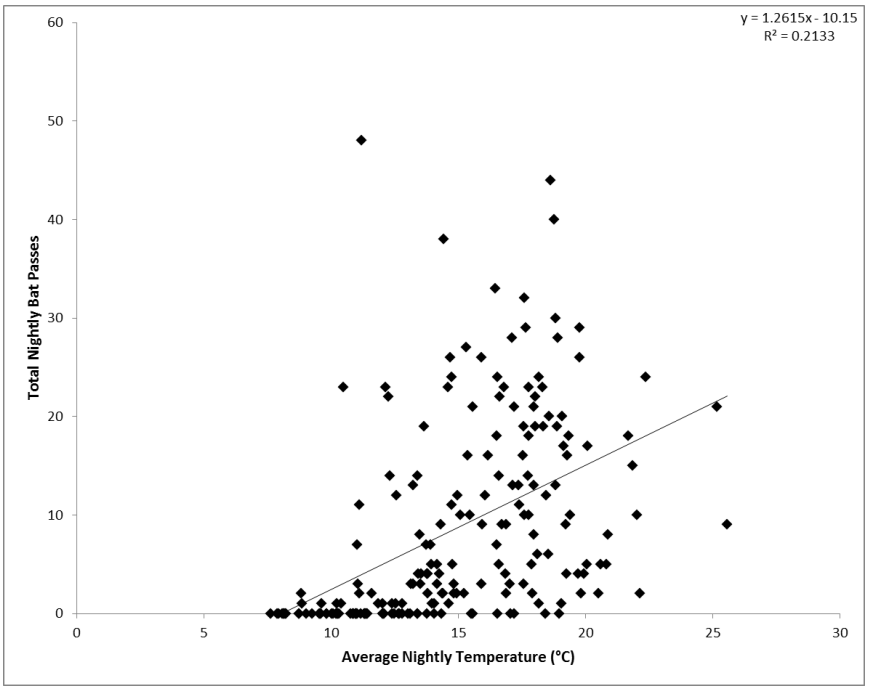


Figure 2.8: Correlation between total number of bat passes per night and average nightly temperature (°C), over the sampling period recorded at the Excelsior monitoring station.

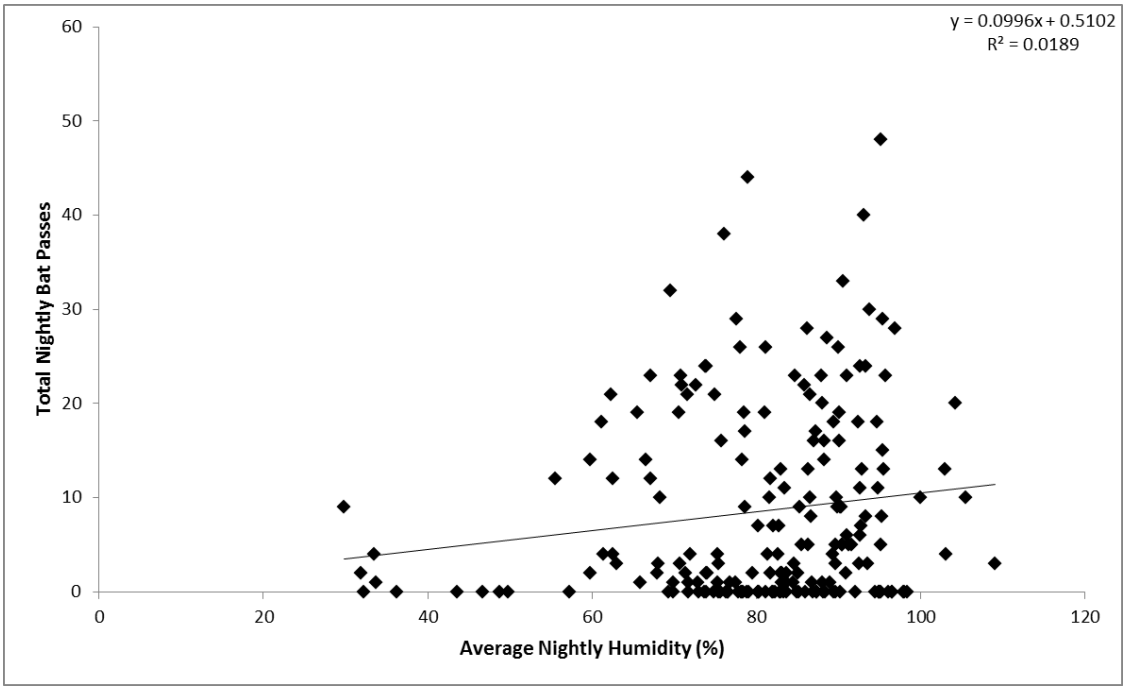


Figure 2.9: Correlation between total number of bat passes per night and average nightly humidity (%), over the sampling period recorded at the Excelsior monitoring station.

3 Curtailment Strategies

A 3-level curtailment plan is outlined below. In the event that re-siting turbines 5 and 12 in the current proposed layout, out of the 'no-go' buffer zones (based on bat habitat) is not possible (Jordaan & Thomas, 2015), a curtailment strategy should be put in place. The baseline strategy at the proposed development would be no curtailment, with continuous monitoring of bat fatality at the facility. **If any bat fatality is detected at the turbines under consideration, level 1 curtailment should be enacted.** However, should high levels of bat fatality be found at any other turbines, this plan may be employed to mitigate this impact at these turbines as well. Close attention should be paid to turbines 1, 3, 9, 10 and 13 in particular, as these fall within moderate sensitivity areas for bats (Jordaan & Thomas, 2015).

As bat activity at the proposed Excelsior WEF is highly variable between nights (Figures 2.3 and 2.4), provision must be made for a conservative curtailment plan. This is because even in months when bat activity may be lower, there may be peaks in bat activity on some nights (Figures 2.5 and 2.6). Thus, if any bat fatality is detected at turbines 5 and 12, the level 1 curtailment plan should be employed. Any further fatalities, while level 1 curtailment is in place, will necessitate the use of the level 2 curtailment plan. If high levels of fatality are still detected at the turbines when the level 2 curtailment plan is in use, the level 3 plan should be adopted. To achieve this, bat fatality monitoring, in accordance with the South African Good Practice Guidelines for Operational Monitoring for Bats at WEF's (Aronson et al., 2014) must take place **daily** at turbines 5 and 12. This must commence on the day that turbine blades start turning at the proposed WEF. These must include seasonal assessments of searcher efficiency, search plot visibility and scavenger removal rates. The fatality estimates must be corrected using these measures (Aronson et al., 2014).

In addition to the below curtailment plans, a strategy (such as blade-feathering) should be put in place to ensure that the blades of turbines 5 and 12 do not turn below the cut-in speed for the turbines. Young *et al.* (2011) and Good *et al.* (2012) demonstrated that blade feathering below the manufacturer's cut-in speed can reduce bat fatalities. It is recommended that this strategy is put in place at all turbines to minimise fatality. This mitigation strategy can result in a small reduction in electricity and revenue generation but has the benefit of reducing wear and tear on the rotor blades and generator (Baerwald et al., 2009).

It is vital that further bat monitoring take place at turbines 5 and 12 during construction. In addition, once construction on these turbines is complete, bat detectors should be installed onto the turbines to record bat activity at rotor-sweep height. This is vital since no data on bat activity in the rotor-sweep area at the proposed WEF are available from pre-construction. The relationship between this bat activity data and environmental parameters (in particular temperature and average wind speed) must also be assessed. These data (from during construction and post-

construction) will provide stronger correlations between bat activity and environmental conditions, as well as substantiate the periods during which bat activity is greatest. **These data must be used to refine the curtailment strategies outlined below**. If higher levels of bat activity are recorded outside of the high risk times listed below (for example, during winter), curtailment should take place during these times. The curtailment strategy must also be refined to be specific for each turbine based on the data collected at that precise location.

Several studies at WEF's in North America have found that weather and environmental variables influence bat activity both positively and negatively (Hayes, 1997; Baerwald & Barclay, 2011; Cryan & Brown, 2007; Arnett et al., 2008). Generally bat activity is reduced during periods of low temperatures, high wind speeds (Baerwald & Barclay, 2011) and high barometric pressure (Paige, 1995). During the monitoring period, wind speed, temperature and humidity were found to significantly affect bat activity (Table 2.1) (Jordaan & Thomas, 2015). At the proposed Excelsior WEF, bat activity increases with decreasing wind speed, increasing humidity and increasing temperature. Thus the operation of turbines 5 and 12 should be arrested under favourable bat conditions (i.e. low wind speeds and high temperatures), as per each level of curtailment plan outlined below. The strength of the relationship with humidity was low and thus this parameter has not been included in the curtailment plans. As stated above, the relationship between bat activity, temperature and wind speed should be refined when additional data are available.

3.1 Level 1 Curtailment Plan

The level 1 curtailment plan should be employed at the proposed WEF if any bat fatality is detected at the turbines under consideration, in the event that the turbines are not re-sited out of 'no-go' buffer zones. This plan is the least conservative, thus it is important that the curtailment strategy is adaptive, allowing for elevation to level 2 or level 3 curtailment in the event that there is further bat fatality at the turbines under consideration. Fatality estimates should be reviewed weekly to allow for adaption of the level of curtailment, although if a fatality event is detected, the **curtailment plan should be elevated to level 1 as soon as is possible, within a month of the event**.

Bat activity was consistently low at both the Excelsior and Die Kop monitoring stations in winter. Thus, based on the current data, no curtailment will be necessary in the winter months of June, July and August at level 1. This is also the case for May, although further data on bat activity in this month may indicate a need to curtail operation.

The cut-in speed for turbines 5 and 12 should be increased to **8.5 m/s** over the times outlined, when temperatures exceed **12 ^{o}C**. The table below (Table 3.1) outlines the times of night when level 1 curtailment should take place at the proposed WEF.

Table 3.1: Time periods for each month during which level 1 curtailment should take place at turbines 5 and 12 at the proposed Excelsior WEF.

Month	Times of Night
January	20h00 – 22h00
February	20h00 – 22h00
March	19h00 – 20h00
April	19h00 – 20h00
May	---
June	---
July	---
August	---
September	20h00 – 22h00
October	20h00 – 22h00
November	20h00 – 22h00
December	20h00 – 22h00

3.2 Level 2 Curtailment Plan

If **any** bat fatality is detected at turbines 5 and 12, while the level 1 curtailment plan is in place, the level 2 curtailment plan should be employed. Daily fatality monitoring at turbines 5 and 12, in addition the fatality monitoring program for the entire facility, must still take place at level 2. Fatality estimates should be reviewed monthly to allow for adaption of the level of curtailment, although if an event of high fatality is detected, the curtailment plan should be elevated to level 3 **within a week of the event**.

At level 2, no curtailment will be necessary in the winter months of June, July and August, as well as May. However, further data on bat activity in May must be reviewed to substantiate this at level 2. At this level, the cut-in speed for turbines 5 and 12 should be increased to **10 m/s** over the times outlined in table 3.2, when temperatures exceed **11 ^{o}C**.

Table 3.2: Time periods for each month during which level 2 curtailment should take place at the relevant turbines, at the proposed Excelsior WEF.

Month	Times of Night
January	20h00 – 01h00 & 03h00 – 04h00
February	20h00 – 01h00 & 03h00 – 04h00
March	19h00 – 20h00
April	19h00 – 20h00
May	---
June	---
July	---
August	---
September	20h00 – 22h00 & 02h00 – 03h00
October	20h00 – 22h00 & 02h00 – 03h00
November	20h00 – 22h00 & 02h00 – 03h00
December	20h00 – 01h00 & 03h00 – 04h00

3.3 Level 3 Curtailment Plan

If high levels of fatality are still detected at the turbines when the level 2 curtailment strategy is in use, the level 3 strategy should be adopted. For the purpose of this plan, high levels of fatality are **50 or more bats killed in a single season, or 15 or more bats killed within a single month** (Aronson & Sowler, 2016). In addition, if any rare bat species or species of conservation concern are killed at turbines at the proposed WEF, the level 3 curtailment plan should be used. Daily fatality monitoring at turbines 5 and 12, in addition the fatality monitoring program for the entire facility, must still take place at level 3.

Although, bat activity is generally low at the proposed WEF in winter, at level 3 curtailment is advised in winter months to minimise the risk of fatality at the WEF. This should be refined based on activity data from the construction and post-construction period. At level 3, the cut-in speed for turbines 5 and 12 should be increased to **13 m/s** over the times outlined in table 3.3, when temperatures exceed **8 ^{o}C**.

Table 3.3: Time periods for each month during which level 3 curtailment should take place.

Month	Times of Night
January	20h00 – 04h00
February	20h00 – 04h00
March	19h00 – 20h00 & 04h00 -05h00
April	19h00 – 20h00 & 04h00 -05h00
May	19h00 – 20h00
June	19h00 – 20h00
July	19h00 – 20h00
August	19h00 – 20h00
September	20h00 – 22h00 & 00h00 – 03h00
October	20h00 – 22h00 & 00h00 – 03h00
November	20h00 – 22h00 & 00h00 – 03h00
December	20h00 – 04h00

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APPENDIX N:
COMPLAINTS AND INCIDENTS REGISTER

PUBLIC COMPLAINTS REGISTER

Project: **Excelsior Wind Farm**

DATE	LANDOWNER	PROPERTY	CONTACT PHONE NUMBER	DETAILED DESCRIPTION OF COMPLAINT	DETAILED DESCRIPTION OF RESOLUTION	CLOSE OUT DATE

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Excelsior Wind Farm: Environmental Incident Register

Date Updated:

Number	Status	Type of Incident	Contractors	
Incident /	OPEN	Spill		
Non Compliance		Fauna		
		Flora		
		Pollution		
	CLOSED	Incorrect storage		
		No mitigation		
		Illegal Dumping		
		Poor Housekeeping		
	HOLD	Unsafe practice		

Number	Status	Type of Incident	Contractor	Location of Incident on site	Description of Incident
1	Closed				
2	Closed				
3	Closed	Spillage risk	Group Five	Site entrace gate	
4	Closed	Spillage risk	Group Five	Between internal road 5 - 7	
5	Closed	Spillage risk	Group Five	Alongside internal access road 6	
6	Closed	Animal rescue	Group Five	Alongside internal access road 1	
7	Closed	Spillage risk	MEV Energy	Substation area	
8	Closed	Spillage risk	Group Five	Site office laydown area	

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Excelsior Wind Farm: Environmental Incident Register

Date Updated:

Number	Status	Type of Incident	Contractors	
Incident /	OPEN	Spill		
Non Compliance		Fauna		
		Flora		
		Pollution		
	CLOSED	Incorrect storage		
		No mitigation		
		Illegal Dumping		
		Poor Housekeeping		
	HOLD	Unsafe practice		

Number	Status	Type of Incident	Contractor	Location of Incident on site	Description of Incident
9	Closed	Spillage risk	Group Five	Conner of A1 and D1 Block at the Substation	

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Excelsior Wind Farm: Environmental Incident Register

Date Updated:

Number	Status	Type of Incident	Contractors	
Incident / Non Compliance	OPEN	Spill		
		Fauna		
		Flora		
		Pollution		
	CLOSED	Incorrect storage		
		No mitigation		
		Illegal Dumping		
		Poor Housekeeping		
	HOLD	Unsafe practice		

Number	Status	Type of Incident	Contractor	Location of Incident on site	Description of Incident

ECO on site:Dakalo Nemalegeni

Responsibility on site	Impact Significance	Time frame	NCR ISSUED :YES / NO
EPC	A= High	Within 24 hours	YES
Civil and earthworks	B= Moderate	Within 72 hours	NO
Surveying of the site	C= Low	Within 1 week	NO
Security			
Fencing			
Substation			

Cause of Incident	Date Opened	Date closed	Impact Significance	Action Taken to Rectify	NCR ISSUED:YES/ NO

ECO on site:Dakalo Nemalegeni

Responsibility on site	Impact Significance	Time frame	NCR ISSUED :YES / NO
EPC	A= High	Within 24 hours	YES
Civil and earthworks	B= Moderate	Within 72 hours	NO
Surveying of the site	C= Low	Within 1 week	NO
Security			
Fencing			
Substation			

Cause of Incident	Date Opened	Date closed	Impact Significance	Action Taken to Rectify	NCR ISSUED:YES/ NO

ECO on site:Dakalo Nemalegeni

Responsibility on site	Impact Significance	Time frame	NCR ISSUED :YES / NO
EPC	A= High	Within 24 hours	YES
Civil and earthworks	B= Moderate	Within 72 hours	NO
Surveying of the site	C= Low	Within 1 week	NO
Security			
Fencing			
Substation			

Cause of Incident	Date Opened	Date closed	Impact Significance	Action Taken to Rectify	NCR ISSUED:YES/ NO

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APPENDIX O:
CHANCE FIND PROCEDURE

BIOTHERM WIND ENERGY FACILITY BETWEEN UITKYK AND EXCELSIOR NEAR SWELLENDAM IN THE WESTERN CAPE PROVINCE

ENVIRONMENTAL MANAGEMENT PROGRAMME: APPENDIX P CHANCE FIND PROCEDURE

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CHANCE FIND PROCEDURE

The aim of this procedure is to establish monitoring and reporting procedures to ensure compliance with this policy and its associated procedures. Construction personnel must be properly inducted to ensure they are fully aware of the procedures regarding chance finds as discussed below.

- If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or rock engraving, this person must cease work at the site of the find and immediately report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.
- It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find, and confirm the extent of the work stoppage in that area.
- The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA.
- Within 60 minutes, the location of the heritage item(s) will be clearly demarcated and a "no go" zone of 20 meters established. This "no go" zone must be clearly marked and the restriction will remain in place at least until such time as the significance of the find has been confirmed by an appropriate external specialist that is retained by the project company, or alternatively, as appointed by the South African Heritage Resources Agency - SAHRA. Within 24 hours the ECO will review the find and communicate the details thereof to the relevant government department – SAHRA (national and provincial).
- Until conclusion of the investigation into the significance of the chance find, the proponent will take reasonable precautions to prevent any person from removing or damaging the find.
- The no-go zone will remain in place until the investigation has been concluded.