

Caledon Wind (Pty) Ltd

**Draft Environmental Management Programme
for the Caledon Wind Farm**

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**DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME FOR
THE CALEDON WIND FARM**

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GLOSSARY OF TERMS, DEFINITIONS AND ABBREVIATIONS

Construction Activity	A construction activity is any action taken by the Contractor, his Sub Contractors, suppliers or personnel during the construction process.
Contractor	That main organisation appointed by the Developer, through the Project Manager, to undertake construction activities on the site.
DEA	Department of Environmental Affairs.
Demolition	The tearing down of buildings and other structures: the opposite of construction.
Developer	Caledon Wind.
ECO	Environmental Control Officer. The ECO monitors compliance with the EMP during the construction phase and advises the Project Manager on environmental matters relating to construction.
EMP	Environmental Management Programme. The EMP for the project sets out general instructions that will be included in a contract document for the construction phase of the project. The EMP will ensure the construction activities are conducted and managed in an environmentally sound and responsible manner. The EMP also details the organisational structure required to ensure the effective implementation of the EMP and measures to monitor and improve the application of the EMP.
Environment	Means the surroundings within which humans exist and that are made up of: a. The land, water and atmosphere of the earth; b. Micro-organisms, plant and animal life; c. Any part or combination of a) and b) and the interrelationships among and between them; and d. The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.
Environmental Specifications	Instructions and guidelines for specific construction activities designed to help prevent, reduce and/or control the potential

	environmental implications of these construction activities.
Method Statement	<p>A written submission by the Contractor to the Project Manager in response to the Specification setting out the plant, materials, labour, timing and method the Contractor proposes using to carry out an activity.</p> <p>The Method Statement shall cover applicable details with regard to:</p> <ul style="list-style-type: none"> • 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 solid material that may occur • Timing and location of activities • Compliance/ non-compliance with the Specifications • Any other information deemed necessary by the PM.
MSDS	Material Safety Data Sheet.
Project	This refers to all construction activities associated with the proposed activities.
PM	<p>Project Manager</p> <p>Appointed firm responsible for overall management of the construction phase of the project including the management of all Contractors.</p>
Rehabilitation	Rehabilitation is defined as the return of a disturbed area, feature or structure to a state that approximates to the state (where possible) that it was before disruption, or to an improved state.
SHE	Safety, Health and Environment.
Solid Waste	Means all solid waste, including construction debris, chemical waste, excess cement/concrete, wrapping materials, timber, tins and cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).

1 INTRODUCTION

Caledon Wind Energy Trading (Pty) Ltd, formerly Epsispan (Pty) Ltd (hereafter referred to as Caledon Wind) is proposing to establish a commercial wind farm and associated infrastructure on a site near Caledon in the Theewaterskloof Municipality, Western Cape Province. The proposed wind farm is known as the Caledon wind farm which will comprise of 71 turbines generating up to 243 MW.

In terms of the EIA Regulations, an application of this nature has to undergo both Scoping and Environmental Impact Assessment (EIA). This draft Environmental Management Programme (EMP) will accompany the Environmental Impact Report (EIR) to the competent authority for review and decision-making. Conditions stipulated by the competent authority will be incorporated in the final EMP for the proposed wind farm, should a positive authorisation be issued. Arcus GIBB (Pty) Ltd (GIBB) has been commissioned by Caledon Wind to undertake the EIA and EMP.

1.1 Background

The bulk of South Africa's electricity is generated from coal (90%), with approximately 5% generated by nuclear energy and the remaining 5% by a combination of small scale hydro and pumped storage energy ventures. The Western Cape Province has no significant electricity generation capacity as the majority of generation capacity is situated outside its borders in the Gauteng and Western Cape Provinces.

Coal combustion in South Africa is the main contributor to carbon dioxide emissions. Consequently, South Africa has one of the highest levels of carbon dioxide emissions per capita in the World. As concerns about global climate change grow, impacts on the South African economy, especially with regards to coal exports, is imminent. Thus, alternative means of producing energy such as renewable energy sources, which have less impact on the environment compared to fossil have to be considered.

Renewable energy that is produced from sustainable natural sources will provide incremental financial resources to stimulate sustainable development. Further, it will contribute towards the country meeting its international commitments made in respect of green house gas emissions, as well as government's objectives set out in the White Paper on Renewable Energy.

Wind energy is plentiful, renewable, widely distributed, clean, and reduces greenhouse gas emissions when it displaces fossil-fuel derived electricity. It is thus attractive to many governments, organizations, and individuals. As most of the sources are indigenous and naturally available, wind energy is more secure in that it

is not subject to disruption by international crises or limited supplies, being naturally available.

1.2 Summary of the Proposed Development

1.2.1 Proposed Development Sites

Exact locations for wind turbine placements within the site have been identified. This was based on a number of environmental and engineering considerations including, amongst others, the presence of consistent and strong wind, availability of land, road access, distance from urban centres and settlements, and the location of sensitive or endangered fauna and flora.

1.2.2 Proposed Turbine Technology

The developer has committed himself to use the latest turbine technology in the proposed development. The typical turbines to be used will produce 3 to 3,6 MW. The hub height will vary between 80 m and 105 m and the turbine blade length between 45 m and 55 m.

1.2.3 Transporting the Turbines

All considered turbines will be fully imported and will arrive per ship at the port of Saldanha. From the harbour turbines will be transported by road on large specialised low bed trucks. The turbine units are then transported to the proposed site in separate components. Permission must be obtained from the relevant authorities with jurisdiction to use all roads and bridges en route to the construction site.

1.2.4 Assembly and Installation

Normally the machine parts are pre-assembled on site upon arrival. The trucks leave the site after unloading is completed. Delivery of the tower sections follows the arrival of the machine parts. Pre-assembly of machine parts and installation of tower section occur concurrently. Installation of the machine house, rotor and the hub with blades follow. Two cranes are required for the installation of the tower. A small and a large crane simultaneously lifts the bottom and top of the tower section, respectively. Once the cranes have lifted the tower section for about two to three meters, the small crane stops lifting, while the large crane continues to lift the top of the section. The tower section is disconnected from the small crane once the section reaches its vertical position. The large crane lifts the tower section to its final position where it is bolted to the other tower section already installed by two or three construction workers. The large crane lifts the nacelle which is placed to the top section of the tower during the installation of the turbine.

1.2.5 Service Area and Roads

The service area will be sufficiently large during the construction phase to allow the assembly crane/s to operate as well as allowing the offloading of components of the turbines.

Access roads to the proposed turbine locations have to be constructed before transportation and installation of the turbines is embarked upon. These roads will also serve as maintenance roads for repair or service of the turbines in the operational phase. The roads have to be constructed to be able to carry heavy load trucks with an axle load of approximately 12-16 tons, and a maximum total weight of approximately 120 tons. Initially, the road will be 10 m wide to accommodate the cranes but will be reduced to a width of 4 meters once the wind farm is operational.

1.2.6 Transmission Lines

Transmission cables between closely spaced individual turbines are to be buried underground. The internal cables will then converge to a point where it will converge into a 33 kV line. This line will then run to a new substation, where the voltage will be transformed to 132 kV so the electricity can be fed into the national grid.

1.3 Impacts known to be Associated with the Proposed Development

1.3.1 Direct Impacts

(a) Visual Impacts

Wind turbines have the potential of attracting people's attention. Typically wind farms with several wind turbines spread on the territory may become dominant points on the landscape. Elements of wind farm development that may cause visual impacts include the turbines (size, height, number, material and colour), access and site tracks, substation buildings, compounds, grid connection, anemometer masts, and transmission lines.

(b) Shadow Casting

Wind turbines, like all large buildings, cast their shadow over the surrounding area when the sun shines. When the rotor is turning, it cuts through the sunlight at three times the frequency of rotation of the rotor, producing an unpleasant flickering effect when the shadow falls onto the observer. If a number of turbines simultaneously cast their shadows onto an emission point, the effect is cumulative and occurs at higher

frequency. The shadow can create a disturbance to people inside buildings exposed to this flickering effect.

(c) Noise during Construction and Operation

Wind turbines produce two types of noise: mechanical noise from gearboxes and generators, and aerodynamic noise from blades. Modern wind turbines have virtually eliminated the mechanical noise through good insulation materials in the nacelle. The aerodynamic noise is produced by the rotation of the blades generating a broad-band swishing sound and it is a function of tip speed. The sound emissions of a wind turbine increase as the wind speed increases. However, the background noise will typically increase faster than the sound of the wind turbine, tending to mask the wind turbine noise in higher winds. Sound levels decrease as the distance from the wind turbines increases.

(d) Land Use

The proposed wind farm development may be incompatible with existing land use patterns at the proposed site. It may potentially also disrupt established communities or modify the overall character of the surrounding area.

(e) Birds

Potential impacts on birds include collision with turbine blades and towers, habitat disturbance due to operation and maintenance of turbines, interference with the movement of birds between feeding, wintering, breeding and moulting habitats, and the reduction or loss of available habitat.

The main factors which determine the mortality of birds by collision at wind farms are landscape topography, direction and strength of local winds, turbine design characteristics, and the specific spatial distribution of turbines on the location. The mortality caused by wind farms is further very dependent on the season, specific site (offshore, mountain ridge or migration route), species (large and medium versus small, and migratory versus resident) and type of bird activity (nocturnal migrations and movements from and to feeding areas).

(f) Specific Construction Impacts

Impacts during the construction phase include impacts associated with:

- Air Quality - During the construction period one of the main impacts would be dust production which could be avoided or minimized through appropriate dust suppression management measures. ;
- Waste water - Waste water would mainly stem from the batching processes which are expected to be relatively small scale;

- Noise - The use of construction instruments, tools and vehicles will temporarily raise the noise levels;
- Solid waste - The solid waste mainly includes general solid waste and construction waste, but excludes toxic waste;
- Ecological environment – Minor influence to birds and invertebrates are predicted;
- Accidents – Potential risks exists with the possibility of accidents occurring during both the turbine construction and the road construction; and
- Ground water contamination – Contamination may occur through accidental spillage to ditches and gullies, and to the soil itself, of remains of concrete, residues of machinery washes, oils, lubricants etc.

1.3.2 Cumulative Impacts

At the time of undertaking the EIA for the Caledon Wind Farm it was understood that there are 4 other wind farms being investigated within the Theewaterskloof Local Municipality (TLM). The establishment of more than one wind farm in the area is likely to have a significant negative cumulative impact on the area's sense of place and the landscape and may also affect the capacity of environmental resources within the geographic area to respond to change and withstand further stress. The cumulative impact of an increased number of turbines themselves cannot be meaningfully mitigated within the EMP of the Caledon Wind farm, so every endeavour must be made to mitigate the individual construction and operational phase impacts so that the intensity of these are minimised.

2 ENVIRONMENTAL POLICY

2.1 Environmental Policies and Guidelines

The Contractor is required to develop an environmental management policy before commencement of the proposed works. This policy must consider:

- The Contractor's mission, vision and core values;
- Guiding principles;
- Requirements of, and communication with interested and affected parties (I&APs);
- The commitment to prevent pollution and ecological degradation;
- The importance of coordination with other organisational policies (e.g. quality, occupational health and safety, etc.);
- Reference to specific local and/or regional conditions; and
- A commitment to comply with relevant environmental laws, regulations, by-laws.

The policy, once approved by Project Manager and ECO, must be communicated to all employees and Contractors (and sub-Contractors) of the Contractor, and made available to the public, if requested.

2.2 Legislative Framework

This EMP informs the Contractor as to his duties in the fulfilment of the project objectives, with particular reference to the prevention and mitigation of environmental impacts caused by construction activities associated with the project. All parties associated with the project should note that obligations imposed by the approved EMP are legally binding in terms of environmental statutory legislation. In the event that any rights and obligations contained in this document contradict those specified in the standard or project specifications then the latter shall prevail.

2.2.1 Statutory and Other Applicable Legislation and Standards

The Contractor shall identify and comply with all South African national and provincial environmental legislation, including associated regulations and all local by-laws relevant to the project. Key legislation currently applicable to the design, construction and implementation phases of the project include:

- The Constitution of the Republic of South Africa Act 108 of 1996;
- Environment Conservation Act 73 of 1989;

- National Environmental Management Act 107 of 1998, as amended;
- National Environmental Management: Protected Areas Act 57 of 2003;
- National Environmental Management: Biodiversity Act 10 of 2004;
- National Forests Act 43 of 1983;
- National Water Act 36 of 1998;
- Conservation of Agricultural Resources Act 43 of 1983;
- National Veld and Forest Fire Act 101 of 1998;
- Hazardous Substances Act 15 of 1973;
- National Heritage Resources Act 25 of 1999;
- National Environmental Management: Air Quality Act 39 of 2004;
- National Environmental Management: Waste Management Act 59 of 2008;
- Mineral and Petroleum Resources Development Act 28 of 2002;
- Health Act 63 of 1977;
- Occupational Health and Safety Act 85 of 1993;
- White Paper on the Conservation and Sustainable Use of South Africa's Biological Diversity; and
- All relevant provincial legislation, Municipal by-laws and ordinances.

The following permit requirements would be relevant to the proposed project:

- Permit for the removal of protected plants on the site;
- Approval from the South African Heritage Resources Agency (SAHRA) on cultural issues;
- Hazardous chemicals permit for asphalt plants, if to be used – obtained from the Department Environmental Affairs (DEA);
- Health permits for sanitation (Provincial health authorities);
- Fuel storage permit (temporary and permanent) – obtained from DEA;
- Blasting permit – obtained from the Department of Mineral Resources (DMR), if required;

The list of applicable legislation and permits provided is intended to serve as a guideline only and is not exhaustive.

2.2.2 Environmental Standards

All applicable environmental standards will be adhered to.

3 MANAGEMENT AND ORGANISATIONAL STRUCTURE

3.1 Contractual Obligation

In order to ensure that the EMP and/or derivatives are enforced and implemented, these documents must be given legal standing. This shall be achieved through incorporating the EMP and/or derivatives documents as an addendum to the contract documents for the particular project and specifying under particular conditions of the contract for the tender that the requirements of the EMP and/or derivatives apply and must be met. This will ensure that the obligations are clearly communicated to Contractors and that submitted tenders have taken into account, and budgeted for the environmental requirements specified in the EMP and/or its derivatives. The successful tender ultimately becomes the signed contract, thereby ensuring that the included EMP becomes legally binding.

3.2 The Developer

Caledon Wind is the Developer and has overall responsibility for ensuring that the construction and development of the project is undertaken in an environmentally sound and responsible manner, and in particular, reflects the requirements and specifications of the EMP and recommendations from the relevant authorities.

3.2.1 Role

The Developer will be required to assume overall responsibility for the environmental aspects of the construction and development of the project.

3.2.2 Responsibilities

The responsibilities of the Developer will include the following:

- Establish and maintain regular and proactive communications with the PM, Contractor(s) and ECO.
- Review and comment on environmental reports produced by the ECO.
- Ensure that the EMP is reviewed and updated as necessary.

3.2.3 Reporting Structure

The developer will liaise with and/or take instruction from the following:

- Authorities.
- General Public.

3.3 Project Manager (PM)

On financial close Caledon Wind will appoint an EPC (Engineering, Procurement and Construction) provider who will appoint consulting engineers to oversee the design and implementation of the proposed wind farm development. The EPC Provider will appoint a Project Manager (PM). The PM will ensure that the approved EMP is included in the contract documentation issued to prospective Contractors.

3.3.1 Role

The success of environmental compliance is determined to a large degree by the continual presence of the technically responsible party.

Specific to the implementation of the EMP, the role of the PM will be to:

- Review and approve Method Statements produced by the Contractor in connection with the EMP.
- Oversee the general compliance of the Contractor with the EMP and other pertinent site specifications.
- Liaise between and with the Contractor and ECO on environmental matters, as well as any pertinent engineering matters where these may have environmental consequences.

3.3.2 Responsibilities

The PM's responsibilities will include:

- Be familiar with the contents of the EMP, and his role and responsibilities as defined therein.
- Communicate to the Contractor, verbally and in writing, the advice of the ECO and the contents of the ECO reports.
- Request for, review and approve the Method Statements prepared by the Contractor in consultation with the ECO.
- Review and approve drawings produced by the Contractor or professional team in connection with, for example, the construction site layout, access/haul roads and so on.
- Issue site instructions giving effect to the ECO requirements where necessary.
- Review complaints received and make instructions as necessary.
- Maintain a record of complaints from the public and communicate these to the Contractor and the ECO.
- Ensure adequate feedback is given in respect to complaints received.

- Discuss with the ECO the application of penalties for the infringement of the Environmental Specifications, and other possible enforcement measures when necessary.
- Issue penalties as and when necessary.
- Implement Temporary Work Stoppages as advised by the ECO, where serious environmental infringements and non-compliances have occurred.
- Facilitate proactive communication between all role-players in the interests of effective environmental management.

3.3.3 Reporting Structure

The PM will report to the Developer, as and when required.

3.4 Environmental Control Officer (ECO)

The ECO must be acquainted with all legislation pertaining to the environment applicable to this project and must be appropriately trained in environmental management. The ECO must possess the skills necessary to impart environmental management skills to all personnel involved in the contract.

The ECO will monitor, review and verify the implementation of the EMP. The ECO is independent from the Developer, the PM and the Contractor(s). The ECO is given authority to ensure that the EMP is fully implemented and that appropriate actions are undertaken to address any discrepancies and non-compliances.

3.4.1 Role

The overall role of the ECO is to be the site 'custodian' for the implementation, integration and maintenance of the EMP in accordance with the contractual requirements. The ECO will be required to liaise with the PM on the level of compliance with the EMP achieved by the Contractor on a regular basis for the duration of the contract.

3.4.2 Responsibilities

The ECO will have the following responsibilities, at a minimum:

- To advise the PM on the interpretation and enforcement of the Environmental Specifications (ES), including evaluation of non-compliances.
- To supply environmental information as and when required.
- To review and approve Method Statements produced by the Contractor, in conjunction with the PM.
- To demarcate particularly sensitive areas (including all No-Go areas) and to pass instructions through the PM concerning works in these areas.

- To monitor any basic physical changes to the environment as a consequence of the construction works – e.g. evidence of erosion, dust generation and silt loading in runoff – according to an audit schedule.
- Attend regular site meetings between engineers and Contractors.
- To undertake regular monthly audits of the construction works and to generate monthly audit reports. These reports are to be forwarded to the PM who will communicate with the Developer.
- To communicate frequently and openly with the Contractor and the PM to ensure effective, proactive environmental management, with the overall objective of preventing or reducing negative environmental impacts and/or enhancing positive environmental impacts.
- To advise the PM on remedial actions for the protection of the environment in the event of any accidents or emergencies during construction, and to advise on appropriate clean-up activities.
- Review complaints received and make instructions as necessary.
- Identify and make recommendations for minor amendments to the EMP as and when appropriate.
- Ensure that the Contractor, his employees and/or Sub Contractors receive the appropriate environmental awareness training prior to commencing activities.

3.4.3 Reporting Structure

The ECO will report to the Project Manager, who in turn will report to the Developer.

3.5 Contractor

The Developer, or PM acting on his behalf, will appoint a Contractor(s) to construct the development. The Contractor(s) will be contractually required to undertake their activities in an environmentally responsible manner, as described in the EMP.

3.5.1 Role

Specific to the EMP, the role of the Contractor will be to:

- Implement, manage and maintain the EMP for the duration of his/her contract.
- Designate, appoint and/or assign tasks to personnel who will be responsible for managing all or parts of the EMP.
- Assign appropriate authority, accountability and responsibility for these personnel to carry out their duties.
- Ensure that all Sub Contractors and other workers appointed by the Contractor are aware of their environmental responsibilities while on site or during the provision of their services off site.

- Ensure that all Sub Contractors and other workers appointed by the Contractor are complying with and implementing the EMP during the duration of their specific contracts.
- Provide appropriate resources including budgets, equipment, personnel and training for the effective control and management of the environmental risks associated with the construction.

3.5.2 Responsibilities

The Contractor will have the following responsibilities:

- Be familiar with the contents of the EMP, and his role and responsibilities as defined therein.
- Comply with the Environmental Specifications contained in the EMP and subsequent revisions.
- Confirm legislative requirements for the construction works, and to ensure that appropriate permissions and permits have been obtained before commencing activities.
- Prepare Method Statements, programme of activities and drawings/plans for submission to the PM (and ECO).
- Method Statements must be submitted to the ECO for approval at least 10 working days in advance before construction activities may commence.
- Review the site inspection reports and take cognisance of the information and implement recommendations contained therein.
- Notify the ECO and PM, verbally and in writing, immediately in the event of any accidental infringements of the Environmental Specifications and ensure appropriate remedial action is taken.
- Notify the ECO and PM, verbally and in writing at least 10 working days in advance of any activity he/she has reason to believe may have significant adverse environmental impacts, so that mitigation measures may be implemented timely.
- Ensure environmental awareness among employees, Sub Contractors and workforce so that they are fully aware of, and understand the Environmental Specifications and the need for them.
- Maintain a register of environmental training for site staff and sub-Contractor's staff for the duration of the contract.
- Undertake the required works within the designated working areas.
- Rehabilitating services, utilities, private/public property and other areas adversely affected by construction activities outside of demarcated areas in accordance with the PM's instructions.
- Communicate and liaise frequently and openly with the PM and ECO to ensure effective, proactive environmental management with the overall objective of preventing or reducing negative environmental impacts while enhancing positive environmental impacts.

3.5.3 Reporting Structure

The Contractor will report to and receive instructions from the PM.

3.6 Sub Contractors

The Contractor may from time to time appoint Sub Contractors.

3.6.1 Role

On behalf of the Contractor, Sub-Contractors perform certain services and/or provide certain products. The Sub Contractors will be contractually required to undertake their activities in an environmentally responsible manner, as described in the EMP.

3.6.2 Responsibilities

The Sub-Contractor will have the following responsibilities:

- Be familiar with the contents of the EMP, and his role and responsibilities as defined therein.
- Sub Contractors shall comply with the Environmental Specifications in the EMP and associated instructions issued by the Contractor to ensure compliance.
- Notify the Contractor verbally and in writing, immediately in the event of any accidental infringements of the Environmental Specifications and ensure appropriate remedial action is taken.
- Notify the Contractor, verbally and in writing at least 10 working days in advance of any activity he/she has reason to believe may have significant adverse environmental impacts, so that mitigation measures may be implemented timely.
- Ensure environmental awareness among employees so that they are fully aware of, and understand the Environmental Specifications and the need for them.

3.6.3 Reporting Structure

Sub Contractors will report to and receive instructions from the Main Contractor.

4 DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME: ENVIRONMENTAL AUTHORISATION AND SPECIALIST STUDIES

The Environmental Management Programme typically includes stipulations and mitigation measures identified in mitigation of general and specific issues identified by the Environmental Assessment Practitioner during the EIA process. However, stipulations issued in the Environmental Authorisation, in the event environmental authorisation is granted, recommendations and stipulations made by specialists at the conclusion of their specialist reports, and stipulations made by regulating authorities such as SAHRA are included in this section.

4.1 Environmental Authorisation

The Environmental Authorisation generally stipulates measures deemed necessary by the regulating environmental authority in addition to measures that has been stipulated in the EIA by the EAP. The regulating authority generally also requires the submission of a draft EMP to the authority after environmental authorisation has been granted for review and approval. The EMP will thus incorporate measures stipulated in the Environmental Authorisation before final submission to the regulating authority for approval. These measures and stipulations will be incorporated in this section of the draft EMP.

4.2 Specialist Studies

Any recommendations and mitigation measures made by specialist in their specialists are summarised in this section.

4.2.1 Flora Impact Assessment

Detailed requirements for minimizing impacts on flora are as follows:

(a) Construction Activities within Close Proximity to Sensitive Areas

- If any infrastructure is to be placed within areas of high botanical sensitivity as identified in the Flora Impact Assessment, then these development footprints should be surveyed and fenced off with two strand wires that must be kept erect by droppers every 10 metres.;
- These areas must be clearly indicated with flags and/or coloured ropes and signage saying “Sensitive Area – Keep Out” placed every 50m;
- It should be made very clear to all contractors that there is to be no disturbance outside these demarcated areas, at least not without the permission of the ECO;

- It must be ensured that there is no loss of or damage to sensitive vegetation in areas outside the immediate development footprint;
- An ECO must be appointed to monitor all construction areas on a weekly basis until all construction is completed;
- Immediate report backs must be provided to the site manager;
- No dumping or temporary storage of any materials may take place outside designated and demarcated laydown areas; and
- All temporary fencing and coloured rope should be removed once the construction phase has been completed.

(b) Earthworks within Sensitive Areas

- A plant Search and Rescue program should be undertaken prior to any earthworks within high sensitivity Renosterveld areas;
- Provided that all recommended mitigation is put in place this should only be applicable in very limited areas;
- Search and Rescue (S&R) of certain translocatable, selected succulents, shrubs and bulbs occurring in long term and permanent, hard surface development footprints (i.e. all buildings, new roads and tracks, laydown areas, and turbine positions) should take place;
- All such development footprints must be surveyed and pegged out as soon as possible, and a local horticulturist with S&R experience should be appointed to undertake this process;
- All rescued species should be bagged (and cuttings taken where appropriate) and kept in the horticulturist's nursery, and should be returned to site once all construction is completed and rehabilitation of disturbed areas is required;
- Replanting should only occur in autumn or early winter (April – May), once the first rains have fallen, in order to facilitate establishment;
- Genera that can be considered for rescue are all bulbs and tuberous species plus selected specimens of succulents such as *Ruschia* and *Lampranthus* species;
- It must be ensured that at least 20% of the natural vegetation in all development footprints within any areas of High sensitivity natural vegetation on site is rescued, maintained and subsequently replanted;
- The ECO is to monitor the Search and Rescue procedure;
- The horticulturist is to liaise with the botanist and the botanist is to review rehabilitation success after 3 months of replanting of rehabilitation areas;
- Any excavation within designated High sensitivity areas, including those for cables, must be supervised by the ECO;
- No excavations may be left open for more than 1 week, and they should preferably be closed up within 1 day, using the carefully stockpiled soil that came out of the trench;
- All stockpiled sand should be replaced within one week of trench opening;
- All cable trenches, etc, through sensitive areas should be dug by hand in order to minimise damage to surrounding areas; and

- Only suitable locally indigenous Western Rûens Shale Renosterveld species should be used for rehabilitation or planting anywhere on site. No exotic or invasive species should be used for rehabilitation which includes commonly used invasive grass species.

(c) Requirements for the Operational Phase

- Grazing and trampling substantially decreases rehabilitation success, posing a risk of erosion and biodiversity loss. Grazing and trampling also impacts negatively on flowering and seed set of many rare plant species. It is therefore strongly recommended that the landowners should refrain from grazing livestock in the High sensitivity vegetation areas as identified by the Flora Impact Assessment in the main winter and spring growing and flowering periods (1 May – end October). If the nearby annuals and other plants are not grazed this means that natural rehabilitation of the areas disturbed by the project will be significantly improved, as there will be much more locally indigenous seed available nearby for establishment in the disturbed areas, and the site may also act as a seed source for some nearby overgrazed areas.
- The botanist is to review regeneration and seed set success in palatable species every two years, and to check site for compliance in terms of livestock.
- Ongoing alien plant monitoring and removal should be undertaken on all areas of natural vegetation within the project area on an annual basis, with emphasis on areas within 200m of any infrastructure.
- The Department Water Affairs approved methodology 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 of resprouting species (notably *Acacia saligna*) 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 5 minutes of being cut, *Acacia saligna* will resprout, wasting the original effort.
- Small seedlings may be hand pulled.
- No bulldozing or removal by any machinery is allowed, as this disturbs the soil and creates ideal conditions for re-invasion.
- No herbicide spraying should be undertaken anywhere within natural vegetation, due to the extensive collateral damage.
- All cut branches should be stacked into a pyramid (cut ends up) and left to dry.
- Annual follow ups are required in all areas that have been previously cleared (to be undertaken from October to April).
- It must be ensured that all high Sensitivity areas within 200m of any infrastructure are clear of alien vegetation within 2 years of project inception.
- Areas should not be burnt until an area has been clear for at least one year, in order to prevent coppicing and massive seed germination.

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

4.2.2 Faunal Impact Assessment

(a) Construction Phase

A number of mitigation measures are proposed to minimise the potential fauna impacts during the construction phase. These are as follows:

- Any sensitive habitat outside the direct construction zone should be demarcated and no activities should take place within these areas. Demarcation should be with “danger tape” and/or appropriate fencing.
- No construction activities should occur outside the servitude, where there is any sensitive habitat outside the power line servitude. Demarcation should be with “danger tape” and/or appropriate fencing.
- Tower structures should be located a minimum of 50 m outside of mapped wetland and drainage line areas.
- Power line service roads should not cross drainage lines unnecessarily.
- Clearing should be minimised and restricted to the area required for construction and lay-down purposes only and disturbance to adjacent vegetation should be limited. All impacts should be contained within the defined impact zone.
- Habitat should be protected through implementation of erosion and sediment control measures, including storm water management and providing grassy channels at storm water outlets.
- Stockpiles, site offices and infrastructure should be appropriately located to limit damage to any nearby sensitive fynbos vegetation.
- Proper culvert and bridge structures are required for internal access road wetland crossings.
- Water-flow under internal roads must not be channelled in such a way as to promote erosion channels or channels where none existed previously.
- A Water Use License (WUL) must be obtained for any impacts on water courses or wetlands.
- Disturbed areas as a result of the proposed project should be rehabilitated through re-vegetation with site indigenous species. This can provide a buffer to protect indigenous vegetation from invasion by weeds.

(b) Operational Phase

A number of mitigation measures are proposed to minimise the potential faunal impacts during the operational phase. These are as follows:

- Ongoing monitoring and maintenance of any re-vegetation works.
- Implement an environmental monitoring programme prior to construction to document the impact on affected bat species. This should involve the following:

- Determine densities of affected species within the area occupied by the wind farm before construction;
- Document patterns of bat movement in the vicinity of the WEF;
- Record bat mortalities and, as far as possible, the circumstances surrounding collisions. Standard protocols should be used when undertaking such surveys; and
- If significant bat movements are found to occur on site, halt turbine operation during low wind speeds when bats are most active.

4.2.3 Avifauna Impact Assessment

In order to ensure that potential impacts identified are minimised, the following mitigation measures are proposed for the development:

- Ensuring that key areas of conservation importance and sensitivity are avoided. Turbines 10, 11, 19, 32, 34, 42, 44, 45, 46, 51, 63, 69, 71, and 72 are located in high risk areas and their relocation is recommended where feasible.
- Implementing appropriate working practices to protect sensitive habitats. Habitat destruction should be limited to what is absolutely necessary for the construction of the infrastructure, including the construction of new roads;
- Providing adequate briefing for site personnel. Personnel should be adequately briefed on the need to restrict habitat destruction, and must be restricted to the actual building sites;
- Undertaking pre-construction surveys to determine the usage of the on-site dams, usage of the on-site slopes by soaring species, and flight paths over the site;
- Implementing an agreed monitoring programme to establish potential and actual collision and displacement impacts on priority species. This should be designed and implemented under the guidance of a suitably qualified and experienced ornithological consultant, starting at least one year prior to the construction of the infrastructure;
- Based on the results of the monitoring, a policy of adaptive management should be implemented, which could include the halting of turbines during peak flight periods, or the relocation of problem turbines;
- Timing construction to avoid sensitive avifaunal periods;
- Implementing habitat enhancement for species using the site;
- Lighting the turbines with red intermittent lights;
- Placing electricity cables between turbines underground; and
- Marking the transmission line with Bird Flight Diverters on the earth wire.

4.2.4 Visual Impact Assessment

Micro-siting of the wind turbines has been carefully studied to mitigate visual impacts. Due to the large size of the turbines, shielding them from views or keeping them off

the skyline, would require that they are moved to a position where their operating efficiency would be seriously compromised and the resulting mitigation of the impacts would at best be minimal. Placing turbines along a ridgeline in the centre of a valley is preferable in terms of operation efficiency, but then results in views of the structures from all sides. Moving a turbine from one position in order to avoid a particular visual impact would necessitate creating a similar visual impact in its new position but over a slightly different local viewshed.

(a) Construction Phase

Mitigation measures can be employed during the construction phase to lower the intensity of the visual impacts on certain viewpoints. These measures include the following:

- The construction compound is to be carefully planned specifically with the visual impact on the users of the R43 in mind;
- The stands of existing trees adjacent to the construction compound are to be retained and extended along the northern boundary and the northern section of the western boundary of the compound so as to fully shield the activities in the compound from the adjacent road;
- Lighting in the compound, and anywhere else on the site that might need lighting, even if temporarily, must be shielded in such a way as to not cause light pollution away from the site. This applies specifically to any security lighting;
- Littering by the construction crews must be strictly controlled around the compound and also at the turbine erection sites. Littering must not be allowed to affect the surrounding environment, specifically the existing fynbos;
- The construction crews must not be allowed to cross the terrain on any routes other than the new and existing road reserves and access to the fynbos areas outside of the turbine laydown areas for any reason whatsoever must be prohibited;
- Rehabilitation of the disturbed areas must take place immediately after construction is complete. This applies specifically to the rehabilitation of the excess road reserve that will be required to enable the delivery of the turbines and the activities of the crane;
- A professional landscape architect with specific knowledge in fynbos rehabilitation must be appointed to oversee the fynbos rehabilitation process and the restoration of the original profiles of the excavated areas;
- All cut and fill areas must be profiled in such a way that erosion is avoided and it is possible for the natural vegetation to re-establish itself adequately. The scars resulting from steep cut and fill slopes are to be avoided entirely;
- The excavations on the site of the substation are to favour cut rather than fill areas so that structures are lowered into the landscape rather than placed on a podium created by fill areas; and
- Vegetative screening is to be used around the substation site but this is subject to the safety measures required by the electrical engineers.

(b) Operational Phase

Whilst micro-siting of the turbines is not feasible in terms of mitigation, mitigation measures can be employed to reduce the impacts where small incremental visual impacts may occur over time. These measures include the following:

- All necessary lighting, even if it is only used sporadically, must be shielded so as to avoid light spillage and pollution and to preserve the rural night time ambience. This is specifically true of any security lighting that may be required at the substation, and any external lighting that may be required at the turbines;
- Littering by the maintenance crews must be strictly controlled; and
- Any soil erosion that occurs as a result of the implementation of the wind farm must be timeously addressed in a way that is visually unobtrusive.

4.2.5 Socio-Economic Impact Assessment

In order to mitigate negative or enhance the positive socio-economic impacts of the proposed development, the following mitigation measures are proposed:

(a) Construction Employment

- Where reasonable and practical, the Applicant should seek to appoint contractors based in the Theewaterskloof Local Municipality (TLM) ;
- Where reasonable and practical, the Applicant should make it a requirement for contractors to implement a 'locals first' policy, especially for semi and low-skilled job categories;
- Prior to commencement of the construction phase, the Applicant should meet with representatives from the TLM to establish the existence of skills and unemployment databases for the relevant municipal areas. If such databases exists, they should be made available to the appointed contractors;
- The local authorities, community representatives and organisations on the interested and affected party database should be informed by the Applicant of the potential job opportunities for locals and the employment procedures which the Applicant intends to implement during the construction phase;
- Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase.

(b) Business Opportunities during Construction

- The Applicant should develop a database of local companies, specifically companies that qualify as Black Economic Empowerment (BEE) companies, which qualify as potential service providers (e.g. construction companies, catering companies, waste collection companies, security companies etc.) prior to the commencement of the tender process for construction contractors. These

companies should be notified of the tender process and invited to bid for project-related work;

- Where possible, the Applicant should assist local Historically Disadvantaged companies to complete and submit the required tender forms and associated information;
- The TLM, in conjunction with representatives from the local hospitality and retail industries, should identify strategies aimed at maximising the potential benefits associated with the project.

It should be noted that while preference to local employees and companies is recommended, it is recognised that a competitive tender process may not guarantee the employment of local labour for the construction phase.

(c) Risks Associated with Construction Workers

The measures to mitigate the risks identified associated with construction workers during the Construction Phase include:

- Where possible, the Applicant should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories;
- The Applicant should consider the establishment of a Monitoring Forum (MF) in order to monitor the construction phase and the implementation of the recommended mitigation measures. The MF should be established before the construction phase commences, and should include key stakeholders, including representatives from local communities, local TLM councillors, farmers and the contractor(s). The MF should also be briefed on the potential risks to the local community associated with construction workers;
- The Applicant and the contractor(s) should, in consultation with representatives from the MF, develop a code of conduct for the construction phase. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be dismissed. All dismissals must comply with the South African labour legislation;
- The Applicant and the contractor should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase;
- The movement of construction workers on and off the site should be closely managed and monitored by the contractors. In this regard the contractors should be responsible for making the necessary arrangements for transporting workers to and from site over weekends or after hours;
- The contractors should make the necessary arrangements for allowing workers from outside the area to return home over weekends and/ or on a regular basis. This would reduce the risk posed to local family structures and social networks.

(d) Risks to Farming Practices during Construction

Mitigation measures which may be considered in order to address potential risks to livestock, crops and farm infrastructure are provided below:

- The Applicant should consider the need to establish a MF (see above). The MF should include local farmers, and develop a Code of Conduct for construction workers. This committee should be established prior to commencement of the construction phase. The Code of Conduct should be signed by the Applicant and all relevant contractors prior to the commencement of any on-site construction activities;
- The Applicant should hold contractors liable for compensating farmers and communities in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should be contained in the Code of Conduct, to be signed between the Applicant, the contractors and neighbouring landowners. The agreement should also cover losses and costs associated with fires caused by construction workers or construction related activities (see below);
- A designated person should be appointed to monitor the conduct of staff. Affected landowners should have ongoing access to this Officer;
- The EMP must outline procedures for managing and storing waste (including arrangements for plastic waste etc) on site;
- Contractors must ensure that all workers are informed of the conditions contained on the Code of Conduct at the outset of the construction phase. The consequences of stock theft, poaching and trespassing on adjacent farms should be emphasised;
- Contractors must ensure that workers who are found guilty of stealing livestock, poaching and/or damaging farm infrastructure are dismissed and formally charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation;
- The contractor must ensure that open fires on the site for cooking or heating are not allowed except in designated areas;
- The contractor must ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include clearing working areas and avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high risk dry, windy summer months;
- The contractor must provide adequate fire fighting equipment on-site;
- The contractor must provide fire-fighting training to selected construction staff. This must take place before construction activities commence;
- As per the conditions of the Code of Conduct, in the advent of a fire being caused by construction workers and or construction activities, the appointed contractors must compensate farmers for any damage caused to their farms. The contractor should also compensate the fire fighting costs borne by farmers and local authorities; and

- The Applicant should enter into legally binding arrangements with regard to compensation with all relevant property owners prior to the start of construction.

(e) Road Impacts during Construction

Measures to mitigate the impact on roads should be outlined in the EMP, and should include:

- Movement of construction traffic should be limited to weekdays;
- Potentially affected farmers should be made aware in advance of planned movements of abnormal loads on local roads;
- The contractor must ensure that damage caused to roads by the construction related activities, including heavy vehicles, is repaired before the completion of the construction phase. The costs associated with the repair must be borne by the Applicant; and
- All vehicles must be road-worthy and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.

(f) Damage to Farm Lands during Construction

- The footprint associated with the construction related activities (access roads, turning circles, construction platforms, workshop etc) should be minimised;
- An Environmental Control Officer (ECO) should be appointed to monitor the entire duration of the construction phase;
- All areas disturbed by construction related activities, such as access roads, construction platforms, workshop area etc, should be rehabilitated at the end of the construction phase;
- The implementation of a rehabilitation programme should be included in the Terms of Reference for the contractor/s appointed to establish the development. The specifications for the rehabilitation programme should be drawn up by suitably recognised Environmental Practitioners;
- The implementation of the Rehabilitation Programme should be monitored by the ECO;
- Compensation should be paid to farmers that suffer a permanent loss of land due to the establishment of the development. Compensation should be paid by the Applicant, and based on accepted land values for the area; and
- The Applicant needs to consult with affected property owners in a timeous fashion in order to enable them to factor construction activities into their rotational land use schedules.

(g) Employment Opportunities during Operation

The enhancement measures listed above, i.e. to enhance local employment and business opportunities during the construction phase, also apply to the operational phase. In addition:

- The Applicant should implement a training and skills development programme for locals during the first 5 years of the operational phase. The aim of the programme should be to maximise the number of people from local communities and the broader TLM area employed during the operational phase of the project; and
- The Applicant, in consultation with the TLM, should continue to implement the structure which the applicant has already established for the project to contribute income generated from the sale of energy from the development to the newly established TLM Community Development Trust.

(h) Renewable Energy Generation

In order to maximise the benefits of the proposed development, the Applicant should:

- Use the project to promote and increase the contribution of renewable energy to the national energy supply; and
- Maximise the public's exposure to the project via an extensive communication and advertising programme.

(i) Impacts on Tourism

- The recommendations as specified for the Visual Impacts should be implemented to also reduce impacts on tourism; and

(j) Decommissioning

- The Applicant should ensure that retrenchment packages are provided for all staff who stand to lose their jobs when the WEF is decommissioned;
- All above-ground structures and infrastructure associated with the development should be dismantled and transported off-site on decommissioning;
- The Applicant should establish an Environmental Rehabilitation Trust Fund to cover the costs of decommissioning and rehabilitation of disturbed areas. The Trust Fund should be funded by a percentage of the revenue generated from the sale of energy to the national grid over the entire operational life of the facility.

4.2.6 Noise Impact Assessment

The operation of the wind turbines will increase noise levels in their immediate vicinity. These noise levels will however decrease with distance until at a distance of 400 m and greater, no noise intrusion will be experienced. It was therefore

recommended in the EIA that wind turbines within 400 m of a Noise Sensitive Area (NSA) be relocated.

The following mitigation measures are recommended:

- Erection of an earthberm should also be erected around the proposed substation;
- Maintenance of wind turbines and blades must ensure that they are in good order at all times. Any damaged blades should not be used until repaired and cleared by the technology provider;
- Construction equipment must comply with the standards as for construction vehicles as explained in the IFC's Environmental Health & Safety Regulations.

4.2.7 Heritage Impact Assessment

In order to ensure that the potential impacts identified above are minimized, the following mitigation measures are proposed:

(a) Pre-colonial and Colonial Archaeology

Early Stone Age tools have been discovered and recorded, and are widely scattered across the landscape and ploughed fields. These are of low significance and it is suggested that photographic record be taken of the Early Stone Age artefacts excavated as a mitigation measure.

(b) Colonial Heritage

No mitigation has been proposed for the five farmsteads. In order to prevent vandalism of the abandoned farmhouse of Klein Windheuwel, it is recommended that the house is fenced off during the construction phase. Alternatively it has been recommended that the structure be upgraded and used as accommodation for construction crews according to the Heritage Western Cape guidelines for buildings over 60 years.

(c) Graveyards

No mitigation is necessary for the graveyard. However should any burials be uncovered during the construction phase then work should cease immediately in that area and Heritage Western Cape should be notified.

(d) Cultural Landscape and Scenic Routes

No mitigation is possible to reduce the effects of the wind farms on the scenery of the area, as the size of the turbines precludes proposing a feasible buffer on either side of the scenic R43. The impact of the turbines on the cultural landscape will be very high and no mitigation measures are feasible.

(e) Substation Locations

There are no foreseen significant impacts with regard to the Phase 1 substation. Whereas, option B of the Phase 2 substation will have a high, negative impact on the scenic route.

(f) Transmission Lines

The impacts of the transmission lines that connect the substations to the existing transmission lines which cross the western section of the study are not seen as significant. This is due to the fact that they do not cross the R43 and are out of sight.

4.2.8 Agricultural Impact Assessment

There are certain mitigation measures that have been proposed in order to minimize the impact of the construction of the wind farm. These mitigation measures are as follows:

- Ensure that as much as possible of the planned infrastructure be confined to transformed land, or non-arable areas;
- Ensure that use is made of existing roads, servitudes etc where at all possible; and
- Most of the above-ground infrastructure could be dismantled at a future stage to return the environment to approximately its original state.

4.2.9 Traffic Impact Assessment

The following measures are recommended to minimize traffic impacts:

- No daily traffic is expected to be generated during the operational phase of Caledon Wind Farm, as the operation will be monitored remotely by both manufacturers in Europe and control centre in Caledon on a daily basis. Minor routine maintenance will be undertaken every year for the removal of unwanted vegetation on site.
- Major maintenance will be carried out every five years to maintain scraping of the roads. Traffic generated by both types of maintenance is considered negligible and assessment of the impact caused by the operational phase is therefore not necessary.
- A pavement integrity assessment is recommended to ensure the generated heavy load will not cause excessive deterioration to the road surface.
- A maximum of two wind turbines will be transported per week during the construction phase. This results in an average of 3.2 abnormal trips per day over 15 months. The vehicles will as far as practicably possible travel during site hours (08:00 – 17:00 weekdays) and will take approximately 5 hours. Escort vehicles will be required.

- Due to height restrictions imposed by two overhead bridges and power lines along the route, it is recommended that heavy load vehicles with a laden height of 5.3 m be used for the transport of abnormal loads.
 - A parking area for site engineers and visitors is to be provided during the site establishment works. Construction vehicles will be parked within the construction site during non-working hours.
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4.3 Regulating Authorities

Regulating authorities may provide comment and recommendations in their approval of the Final EIR. These recommendations will be included in this section if the Final EIR is approved.

5 DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME: PLANNING AND DESIGN

The following section details the minimum range of constraints, controls, procedures and standards that are typically required during the planning and design phase of the proposed wind farm development.

5.1 Environmental Principles and Best Practices Guidelines

5.1.1 Environmental Principles and Best Practices:

- The environment is considered to be composed of both biophysical and social components;
- Construction is a disruptive activity and all due consideration must be given to the environment, including the social environment during the execution of the project to minimise the impact on affected parties;
- Minimisation of areas disturbed by construction activities (i.e. the ‘footprint’ of the construction area) should minimise many of the construction related environmental impacts of the project and reduce rehabilitation requirements and costs;
- All relevant standards relating to international, national, provincial and local legislation, as applicable, should be adhered to. This includes requirements relating to waste emissions, waste disposal practices, noise regulations, road traffic ordinances, etc; and
- Every effort should be made to minimise, reclaim and/or recycle waste materials.

5.1.2 Compliance with Environmental Legislation:

- The Contractor shall ensure that all pertinent legislation concerning the protection of the environment is adhered to and that prevention of pollution is strictly enforced; and
- The ECO/PM shall maintain a database of all pertinent legislation, regulations and guidelines pertinent to the environmental management of the activities being undertaken.

5.1.3 Permits and Permissions:

- The Contractor shall ensure that all relevant permits, certificates and permissions have been obtained prior to any activities commencing on site and are strictly enforced/adhered to; and

- The Contractor shall maintain on site a database of all relevant permits and permissions obtained for the contract as a whole and for pertinent activities for the duration of the contract.

5.1.4 Method Statements

- The Contractor shall submit written Method Statements to the PM and ECO for the activities identified by the PM and/or the ECO;
- Method Statements must indicate what will be done to comply with relevant environmental specification as set out in the EMP;
- Method Statements shall be submitted at least 10 working days prior to the proposed commencement of construction activities to allow the PM (and/or ECO) time to study and approve the method statement;
- The Contractor shall not commence work on any activity until such time as the Method Statement has been approved in writing by the ECO and/or PM;
- The ECO may require changes to a Method Statement if it does not comply with the specification or if, in the reasonable opinion of the ECO, the proposal may result in, or carries a greater than reasonable risk of damage to the environment in excess of that permitted by the EMP or any legislation;
- The Contractor shall carry out the activities in accordance with the approved Method Statement;
- Approved Method Statements shall be readily available on the site and shall be communicated to all relevant personnel;
- Approval of the Method Statement shall not absolve the Contractor from any of his obligations or responsibilities in terms of the contract; and
- No claim for delay or additional cost incurred by the Contractor shall be entertained due to inadequacy of a Method Statement.

5.1.5 Content of Method Statements

The Method Statement shall state clearly:

- The type of construction activity;
- Locality where the activity will take place;
- Timing of activities;
- Materials to be used;
- Equipment and staffing requirements;
- Identification of activities, and resultant impacts that may result from the activity;
- Methodology and/or specifications for impact prevention or containment;
- The system to be implemented to ensure compliance with the specifications;
- Emergency or disaster incident and reaction procedures;
- Other information deemed necessary by the ECO; and
- The Contractor shall be responsible for the implementation of the method statements and must demonstrate that these measures are working effectively.

The following Method Statements shall be prepared by the Contractor for approval:

- Contractor's SHE Officer and Fire Officer

The name and letter of appointment of the Contractors SHE Officer and Fire Officer must be given to the ECO and the terms of reference for the work to be undertaken must be detailed including time on site, roles and responsibility, interaction with the Contractor and environmental offices, etc.

- Transportation of components of the turbines and access routes

Details, including a drawing, showing where and how the access points and routes will be located and managed must be provided in a Method Statement. The time of day and route from the relevant port of arrival of the components to the development site must be clearly indicated and adhered to by the transport service provider.

- Pollution control

Expected solid waste types, quantities, methods and frequency of collection and disposal as well as location of disposal sites must be identified and stated in a Method Statement. The Method Statement shall further include methods of minimising, controlling, collecting and disposing of contaminated water, and details of any hazardous substances/materials to be used, together with the transport, storage, handling and disposal procedures for the substances.

- Safety considerations

The Contractor shall provide details identifying what safety precautions will be implemented to ensure the safety of all staff, and the general public at large, on site during the life of the project. This will include protective clothing requirements for all types of construction activities on site, e.g. protection against dust, noise, falling objects, work in trenches, work at heights, etc.

- Emergency procedures

The Contractor shall provide details regarding all relevant emergency procedures that will be implemented for fire control and accidental leaks and spillages of hazardous substances (including fuel and oil). The Contractor shall further include details of risk reduction measures to be implemented including fire fighting equipment, fire prevention procedures and spill kits.

- Waste management control

The Contractor shall provide details regarding how solid and liquid waste generated on the construction site and site camp will be collected, stored, transported and disposed off. Details of any service provider(s) appointed to manage this task must also be provided.

- Stormwater and erosion control

The Contractor shall provide details of how stormwater emanating within or adjacent to the construction site may impact on construction activities. Details on how the Contractor will deal with stormwater runoff and potential erosion within the construction footprint must further be provided. Details of any service provider(s) appointed to manage this task must also be provided.

5.1.6 Site Layout

- The Contractor shall submit to the engineer for his approval a site layout plan at least 7 days before construction can begin.
- The graphical representation with detailed notes of the location, layout and method of establishment of the construction camp must be provided and must include the following:
 - The extent of the Contractors site camp, and other required areas if not located within the site camp;
 - All Contractor's buildings, and/or offices;
 - Lay down areas;
 - Vehicle and plant storage areas, including wash areas;
 - Workshops and drip trays;
 - Fuel storage areas (including filling and dispensing from storage tanks);
 - Cement/concrete batching areas (including the methods employed for the mixing of concrete and particularly the containment of runoff water from such areas and the method of transportation of concrete); and
 - Other infrastructure required for the running of the project.

5.1.7 Record Keeping

- Non-compliances identified by the ECO shall be documented and communicated to the Contractor, or designated representative, during the environmental audit as non-compliances are identified, in the monthly audit reports, and during the formal monthly progress/site meetings.
- The Contractor shall maintain an environmental site file containing at a minimum the following documents:
 - Environmental Management Programme;
 - Final Environmental Impact Assessment Report;
 - Final design documents and diagrams issued to and by the Contractor;
 - All communications detailing changes of design/scope that may have environmental implications;
 - Daily, weekly and monthly site monitoring reports;

- Complaints register;
- Training manual;
- Training attendance registers;
- Incident and accident reports;
- Emergency preparedness and response plans;
- Copies of all relevant environmental legislation;
- Disciplinary procedures;
- Monthly site meeting minutes during construction;
- All relevant permits;
- Letters or legal documents authorising identified site staff to act in a specified authoritative capacity relating to the protection and preservation of the environmental, and on behalf of the Contractor;
- Environmental Authorisation on the EIA from the DEA;
- All method statements from the Contractor for all phases of the project.

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5.1.11 Social Disruption

- The Contractor shall give at least seven days notice to the residents in the vicinity of the construction activities of his intention to begin construction activities in their area.

5.1.12 Existing Services and Infrastructure

- It is the Contractor's responsibility to familiarise himself with the position of existing services and infrastructure that may get damaged due to construction activities.
- The Contractor shall undertake proper planning to ensure that existing services (e.g. roads, pipelines, power lines and telephone services) are not damaged or disrupted unless required by the contract and with the permission of the PM.

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5.1.13 Site Division and Contractor's Camp

- The site for the Contractor's Camp shall be determined in collaboration with the PM and ECO before the Contractor moves on site, such that it is effectively isolated from the surrounding environment and takes into consideration:
- The need to be more than 50 meters from a water body in a position that will facilitate the prevention of storm water runoff from the site from entering a water body.
- The risk of public nuisance through, for example, noise generation, visual intrusion, light pollution or disruption to access, must be reduced.
- Security implications must be reduced.
- The Contractor's Camp should also be of sufficient size to accommodate the needs of all Sub Contractors that may work on the project.
- Utilities and other Service Providers such as Telkom and Eskom shall be advised of the construction activities. The Contractor will be responsible for any damage to these services/utilities.

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5.1.16 Unpleasant Visual Impact at the Construction Site

- Night lighting of the construction sites should be minimised within requirements of safety and efficiency.
- General and construction related waste shall, upon approval by the PM, be contained and stored in the appropriate manner as prescribed by relevant specifications.
- Where appropriate, boundaries of the construction and/or Contractor's camp site shall be cordoned off with appropriate material, (e.g. plywood boards, shade cloth) to minimise unpleasant visual impacts of the construction site.
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5.2 Turbines

5.2.1 Design

- Only red lights and lights that do not attract insects should be used on and around placed turbines to avoid attracting bats.
- The turbines must have, or be painted a white, off-white, or very light grey colour with a matte finish. Any other colours must be avoided.

5.2.2 Associated Infrastructure

- New substation(s) associated with the preferred site alternative should be sheltered from view using existing tree clusters, or visually softened by planting indigenous bush, shrubs or trees.

5.2.3 Layout and Positioning

- Turbines should be positioned at a minimum distance of 400 m from residences to avoid noise impacts.

6 DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME: CONSTRUCTION PHASE

6.1 Health and Environmental Awareness

- The ECO will train the Contractor and his representatives on the conditions of the EMP and Environmental Authorisation and provide them with training material in order to undertake ongoing environmental training on site.
- The Contractor shall ensure that adequate health and environmental training takes place on a continuous basis.
- All employees shall undergo project induction on environmental awareness.
- Where possible, the presentation needs to be conducted in the language of the employees and can be conducted as part of weekly "toolbox talks".
- The Contractor shall provide evidence that such environmental awareness induction courses have been presented.
- The emphasis should be on any (potential) environmental impacts relating to the construction activities to be undertaken on site and the related environmental precautions, which need to be taken to avoid or mitigate these impacts.
- The environmental training should, as a minimum, include the following:
 - The importance of conformance with all environmental policies;
 - The significance of environmental impacts, actual or potential, as a result of their work activities;
 - Their roles and responsibilities in achieving conformance with the environmental policy and procedures, including emergency preparedness and response requirements;
 - The mitigation measures required to be implemented when carrying out their work activities.
 - The importance of not littering;
 - The need to use water sparingly;
 - Details of, and encouragement to, minimise the production of waste and re-use, recover and recycle waste where possible;
 - Details regarding archaeological and/or historical sites which may be unearthed during construction and the procedures to be followed should these be encountered;
 - The procedures which should be followed should a grave be encountered, or unearthed during the construction phase;
 - Details regarding fauna and flora of special concern, including protected/endangered plant and animal species, and the procedures to be followed should these be encountered during the construction phase;
- A training needs analysis shall be conducted by the Contractor and ECO to identify the appropriate environmental and health training programmes, and the appropriate target groups amongst the employees of the Contractor;

- The results of the environment and health training needs analysis shall be filed with the environmental records and used to set objectives and targets;
 - Environmental awareness training programmes should contain the names, positions and responsibilities of personnel to be trained, the framework for appropriate training plans, and a schedule for the presentation of the training courses;
 - The Contractor, or designated representative, shall ensure that records of all training interventions are kept;
 - The ECO shall monitor the records and undertake regular follow ups.
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6.2 Emergency Preparedness

- The Contractor shall compile and maintain environmental emergency procedures to ensure that there will be an appropriate response to unexpected or accidental incidents that may cause environmental impacts.
- Activities that may be addressed in the environmental emergency procedures include, for example, accidental exposure of employees to hazardous substances, veld fires and accidental spillage of hazardous substances.
- These plans should include as a minimum:
 - A list of key personnel;
 - Details of emergency services applicable to the various areas along the route that turbine components will need to be transported and for the site itself (e.g. the fire department, spill clean-up services, etc.);
 - Internal and external communication plans, including prescribed reporting procedures where required by legislation;
 - Actions to be taken in the event of different types of emergencies;
 - Incident recording, progress reporting and remediation measures required to be implemented;
 - Information on hazardous materials, including the potential impact associated with each, and measures to be taken in the event of accidental release;
 - Training plans, testing exercises and schedules for effectiveness;
 - The Contractor shall comply with the emergency preparedness and incident and accident-reporting requirements, as required by the Occupational Health and Safety Act, 1993 (Act No 85 of 1993), the National Environmental Management Act, 1998 (Act No 107 of 1998), the National Water Act, 1998 (Act No 36 of 1998) and the National Veld and Forest Fire Act, 1998 (Act No 101 of 1998) as amended and/or any other relevant legislation.
 - The Contractor shall further maintain an environmental incidents register to record incidents that occur on site as a result of the activities associated

with the contract. Environmental incidents constitute all those activities and incidents that may have a negative impact on the surrounding natural environment.

- Each environmental incident shall be investigated by the ECO and an environmental incident report shall be forwarded to the Contractor, Proponent and relevant authority.
 - Each environmental incident report shall contain as a minimum a description of the incident, a statement on the severity and significance of the impact, and actions taken to remediate the resultant damage.
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6.3 Site Establishment

6.3.1 Site Identification

- Demarcated areas at or close to the sites of construction must be provided by the Contractor for the storage of machinery and trucks as necessary. This area shall also serve as the Contractor's site camp.
- The Contractor will produce a Site Layout Plan illustrating the location and layout of the proposed site camp and working areas. This plan must be approved by the PM.
- The site camp shall be fenced and provided with a lockable access gate to prevent vandalism, theft and unauthorised entry by the public.
- If the site camp is to be situated on private land, approval must be obtained from the landowner prior to site establishment.
- The Contractor shall produce a photographic record of the area earmarked for the site camp prior to site establishment. This will serve as the benchmark against which rehabilitation will be measured and shall be kept in the site environmental file.
- It will be the responsibility of the Contractor to reinstate the site camp to its original condition once the project has been completed.
- The working areas shall be kept to a minimum to reduce the total physical 'footprint' of the construction site thereby reducing environmental damage.
- The Contractor shall not use the land for the site camp for any purpose other than for the proper carrying out of the works under the contract.

6.3.2 Site Demarcation

- Prior to construction commencing, the ECO, Contractor, and/or PM shall inspect the site and identify any sensitive environments.
- The Contractor will be required to maintain all demarcation fencing and other demarcating materials for the duration of construction activities or as otherwise instructed by the PM.

- The Contractor shall ensure that, insofar as he has the authority, no person, plant equipment or material will enter the No-Go areas at any time.

6.3.3 Vegetation Clearance

- Vegetation clearance shall take place strictly in accordance with the Site Layout Plan developed by the Contractor and specifications provided by the fauna and flora specialists.
- The minimum amount of vegetation clearance must take place.
- All plants not interfering with construction should be left undisturbed.
- Collection or wilful damage to any plants outside of the areas demarcated for clearing is not allowed.
- The Contractor shall destroy all alien vegetation within the designated area.
- The Contractor, or responsible sub-contracted service provider, must ensure that seeds from alien vegetation collected during site clearance are not dispersed so as to counter the spread of alien vegetation type. Failure to do so may result in prosecution in terms of the Conservation of Agricultural Resources Act, Act 43 of 1983, which states that any person removing any weed (which includes alien vegetation) shall ensure that it is not able to reproduce itself. A fine not exceeding R5 000 and/or 2 years imprisonment can be imposed.
- No breaking or cutting of branches, outside of the demarcated areas will be allowed without prior approval from the ECO.
- The ECO and/or Contractor must survey areas within the development footprint prior to any earthworks being carried out to see if there are any endangered plants which should then be removed by a professional botanist and, where possible, replanted in a suitable area. Prior to removal, however, suitable relocation areas need to be identified, either within the site or in other disturbed areas on the property.
- Areas containing species of special concern must be noted and every effort made to reduce the impacts of construction on these sections of vegetation.
- Some endangered plants will not transplant and should thus, as far as possible, be left untouched.
- The ECO must undertake a targeted survey of protected trees within the development footprint, and marked with red tape all protected individuals.
- A permit must be obtained from the Department of Agriculture, Forestry and Fisheries (DAFF) prior to the removal or damage of any protected tree species.
- Only trees and shrubs directly affected by the works may be felled or cleared, subsequent to approval from the ECO or PM in writing.
- In order to acquire a permit to remove plant species that fall under the National Forest Act an application will need to be submitted to DAFF. A letter must be submitted to DAFF prior to the destruction\removal of any PNCO Schedule 4 species listing the species that will be removed or destroyed and the reason for their removal.
- Collected plants species may be removed and placed in a nursery for rehabilitation purposes.

6.3.4 Protection of Natural Features

- The Contractor shall not deface, paint, damage or mark any natural features situated in or around the Site for survey or other purposes unless agreed beforehand with the ECO. Any features affected by the Contractor in contravention of this clause shall be restored / rehabilitated to the satisfaction of the ECO.
- The Contractor shall not permit his employees to make use of any natural water sources (e.g. springs, streams, and open water bodies) for the purposes of swimming, personal washing and the washing of machinery or clothes.

6.3.5 Protection of Flora and Fauna

- Prior to construction, the ECO shall identify No-Go areas where sensitive habitats, vegetation or fauna is located. These No-Go areas will represent a total exclusion zone for all construction staff, plant and activities.
- Flora shall not be removed, damaged or disturbed nor shall any vegetation be planted except to the extent necessary for the carrying out of the construction works.
- The search and rescue of rare, endemic or endangered species prior to Site clearance must be carried out. The necessary permits must be obtained from the permitting authority before rare, endemic or endangered species are relocated.
- The removal and stockpiling of topsoil must also be carried out in accordance with the EMP.
- Trapping, poisoning and/or shooting of animals is strictly forbidden.
- No domestic pets or livestock are permitted on Site.

6.3.6 Protection of Archaeological and Palaeontological Sites

- If any palaeontological/archaeological artefacts (human remains, shell middens, Stone Age tools, fossil bones, graves, etc.) are unearthed during excavations the Contractor shall stop work immediately and inform the ECO and PM. The ECO will inform the South African Heritage Resources Agency (SAHRA) and arrange for a palaeontologist/archaeologist to inspect, and if necessary excavate, the material, subject to acquiring the requisite permits from SAHRA.
- Any person who causes intentional damage to archaeological or historical sites and/or artefacts could be penalised or legally prosecuted in terms of the national Heritage Resources Act 25 of 1999.
- The Contractor shall ensure compliance with the recommendations of the Archaeological Impact Assessment, Palaeontological Impact Assessment and stipulations issued by the SAHRA.

6.3.7 Topsoil

- Topsoil can only be stripped from the following areas in or adjacent to the construction site or site camp:
 - Areas which is to be used for temporary storage of soil and/or materials;
 - Areas which could be polluted by any aspect of the construction activity and;
 - Areas within the footprint of the proposed infrastructure to be constructed.
 - Stripping of topsoil will be undertaken in such a manner as to minimise erosion by wind or runoff.
 - Topsoil will be stripped to a depth not exceeding 150 mm from the original ground level, unless greater depth is required during the execution of the construction phase of the project.
 - Areas from which the topsoil is to be removed will be cleared of any foreign material which may come to form part of the topsoil during removal including bricks, rubble, any waste material, litter, excess vegetation and any other material which could reduce the quality of the topsoil.
 - The Contractor shall ensure that subsoil and topsoil are not mixed during stripping, excavation, reinstatement and rehabilitation.
 - Soils should be exposed for the minimum time possible once cleared.
 - Topsoil will be temporarily stockpiled, separately from (clay) subsoil and rocky materials.
 - Topsoil will be stockpiled in areas designated by the ECO.
 - Soil must not be stockpiled on drainage lines or near watercourses without proper risk assessment conducted and prior consent from the ECO.
 - Stockpiles will either be vegetated with indigenous grasses or covered by a suitable fabric to prevent erosion and invasion of weeds.
 - Stockpiled topsoil will not be compacted and shall not exceed 2 m in height.
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6.4 Site Maintenance

6.4.1 Workshop

- If an on-site workshop is to be established for the duration of construction, the Contractor shall obtain the approval of the PM prior to commencing activities and confine maintenance activities to the identified workshop area.
- The Contractor shall ensure that there is no contamination of the soil or surface water from the on-site workshop.
- Each Contractor must have a spill control kit and staff appropriately trained to utilise it.

6.4.2 Equipment Maintenance and Storage

- All vehicles and equipment shall be kept in good working order and shall be stored in the site camp or an area approved by the PM.

- All vehicles and plant will be inspected daily for leaks and spills. Maintenance checks shall be logged and signed off in a site maintenance file after each inspection.
- Leaking equipment shall be repaired immediately or removed from the site.
- Stationary plant must be supplied with drip trays to prevent soil contamination after hours and when not in use.

6.4.3 Cooking Facilities

- The Contractor shall designate an all weather cooking and eating area, subject to the approval of the PM.
- Any cooking on site shall be done on either well-maintained gas cookers or by contained fires (e.g. in a drum). These shall be located away from flammable vegetation or construction materials. No fires for heating purposes shall be allowed on site.
- The cooking and eating areas must be kept tidy and clean at all times to prevent the luring of vermin, domesticated or wild animals.
- Sufficient bins with vermin proof lids for waste disposal, as described in the Environmental Specification, shall be present within a 5 m radius of the cooking/eating area at all times.

6.4.4 Water for Human Consumption

Water for human consumption should be available at the site offices and at other convenient locations on site.

6.4.5 Light Pollution

The Contractor shall ensure that any lighting installed on site for his activities does not interfere with road traffic or cause an unreasonable disturbance to the surrounding community.

6.4.6 Security

- If deemed necessary, appropriate fencing, security gates, shelter, signage and/or security guards are to be provided at the construction site to prevent theft of plant and materials, as well as to ensure the security of site staff.
- The entrance gates to the site camp shall be locked after hours to prevent unauthorised access to the site camp.

6.4.7 Transport of Materials/Components

- Components and materials shall be appropriately secured to ensure safe passage between destinations. Loads including, but not limited to sand, stone

chip, fine vegetation, refuse, paper and cement, shall have appropriate cover to prevent it from spilling over the side of the vehicle during transit.

- The Contractor shall be responsible for any clean-up resulting from the failure by his staff or supplier to properly secure materials to be transported.

6.4.8 Hazardous Substances

- All potentially hazardous raw and waste materials are to be handled by the Contractor's trained staff and stored on site in accordance with manufacturer's instructions and legal requirements.
- Appropriate training for the handling and use of such materials is to be provided by the Contractor as necessary. This includes providing for any spills and pollution threats that may occur.
- Products should be clearly labelled and symbolic safety/hazard warning signs should be provided.
- Areas for the storage of fuel and other flammable materials shall comply with standard fire safety regulations.
- Fuel and chemical depot(s) shall be located at least 100 m from any water body.
- If potentially hazardous substances are to be stored on site, the Contractor shall provide a Method Statement detailing the substances/materials to be used together with the procedures for the storage, handling and disposal of the materials in a manner which will reduce the risk of pollution that may occur from day to day storage, handling, use and/or from accidental release of any hazardous substances used.
- Hazardous chemical substances used during construction shall be stored in secondary containers.
- The relevant Material Safety Data Sheets (MSDS) shall be available on site. Procedures detailed in the MSDS shall be followed in the event of an emergency situation.
- Where hazardous substances is removed from site for disposal, proof of disposal for auditing purposes shall be kept in the form of disposal certificates.

6.4.9 Fuels (Petrol and Diesel) and Oil

- Unless specifically authorised, fuel shall not be stored on site, but shall be transported to the site in small quantities as and when required.
- Where fuel is to be stored on site, all necessary approvals regarding storage and dispensing shall be obtained from the appropriate authorities.
- The location of the fuel storage area shall be approved by the PM and ECO.
- The Contractor shall ensure that all liquid fuels and oils are stored in tanks with lids and that these are kept firmly locked at all times. The design and construction of the storage tanks shall be in accordance with a recognised code and as approved by the PM.

- The tanks shall be situated in a bunded area that has a volume of at least 110% of the volume of the largest tank. The floor of the bunded area must be impermeable and the bunds must be without leaks.
- Storage tanks are to be removed on completion of the works.
- No smoking shall be allowed in the vicinity of the fuel storage area. At least one no-smoking warning sign must be erected and be clearly visible at the fuel storage area to warn all staff of associated dangers.
- There shall be adequate fire fighting equipment at or close to the fuel storage and dispensing area(s).
- Fuel shall be kept under lock and key at all times.
- Where reasonably practical, plant shall be refuelled at a designated refuelling area or at the workshop as applicable. If it is not reasonably practical then the surface under the temporary refuelling area shall be protected against pollution to the reasonable satisfaction of the PM prior to any refuelling activities.
- The Contractor shall ensure that there is always a supply of absorbent material readily available to absorb/break down any hydrocarbon spillage. The quantity of such materials shall be able to handle a minimum of 200 litres of hydrocarbon liquid spill. This material must be approved by the PM prior to any refuelling or maintenance activities.
- In the case of a spill, contaminated material must be removed from the site immediately and disposed of at an appropriate hazardous waste facility.

6.4.10 Solid Waste Management

- The Contractor will be required to prepare and submit a Method Statement on waste control and management at the site.
- No burning, burying or dumping of any waste materials, vegetation, litter or refuse shall be permitted.
- Solid waste shall be removed from site on a weekly or fortnightly basis by the Contractor or appropriate service provider.
- Solid waste must be recycled where possible and the remainder spoiled at an approved municipal land fill site or waste disposal service provider.
- Disposal certificates for each waste removal event shall be issued and kept in the site environmental file for auditing purposes.
- The Contractor must facilitate the re-use of cleared trees and bush (e.g. by allowing controlled wood cutting and removal of wood).
- No burning of cleared vegetation shall be allowed on site. Chipping or composting of vegetation shall be allowed where viable.
- The Contractor must ensure that cleared trees and wood are removed from the Site within 45 days of commencement of rehabilitation.

6.4.11 Stockpiling

- Any stockpiling of gravel, cut, fill or any other material including spoil shall be in areas approved by the ECO within the defined working area.

- The Contractor shall ensure that stockpiled material is not lost due to exposure to the elements. If the stockpiled material is in danger of being washed or blown away, the Contractor shall cover it with a suitable material, such as hessian or plastic. Stockpiles of topsoil shall not be covered with plastic.
- No stockpiling of any material shall be allowed within the 100 m of any residential areas or 20 m of any “no go” area.

6.4.12 Sanitation

- Adequate washing and toilet facilities are to be provided at the construction site camp.
- Portable chemical toilets at a ratio of one toilet per 15 workers shall be provided at the site camp.
- The toilet facilities must be easily accessible and within 500m of any point of work.
- All temporary/portable toilets shall be secured to the ground to the satisfaction of the PM to prevent them from toppling over or being blown over by wind.
- The type and exact location of the toilets shall be approved by the PM prior to establishment. No septic tanks are to be established.
- The Contractor shall ensure maintenance of all toilets in a clean sanitary condition to the satisfaction of the PM. Toilets are to be serviced at least once per week and toilet paper shall be provided.
- The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from the site to an appropriate location/facility. The Contractor/service provider is to provide proof that the toilet contents are disposed of at an appropriate facility.
- Discharge of waste from toilets into the environment and burial of toilet waste is strictly prohibited.

6.4.13 Waste Water and Contaminated Water Management

- The Contractor shall prepare a Method Statement on the control and management of waste water on site, including providing for the appropriate disposal of contaminated water.
- No grey water runoff or uncontrolled discharges from the site/working areas (including wash down areas) to adjacent or nearby water bodies shall be permitted.
- Water containing environmental pollutants shall be discharged into a conservancy tank, where appropriate, for removal from site.
- The Contractor shall also prevent runoff loaded with sediment and other suspended materials from the site/working areas from discharging to adjacent watercourses and/or stormwater infrastructure.
- Potential pollutants of any kind and in any form shall be kept, stored and used in such a manner that any escape can be contained.

- Wash down areas must be approved by the PM and ECO and shall not pollute the surrounding environment.
- The Contractor shall notify the PM and ECO of any pollution incidents on site.

6.4.14 Storm Water Management and Erosion Control

- The following areas will require appropriate erosion control measures and re-vegetation methods as these are regarded as being of high erosion risk:
 - Slopes > 20°;
 - Slopes with convergent sub-surface drainage (percolines);
 - Road culverts;
 - Cut and fill slopes in areas of slope instability or erodable geology.
- The Contractor shall take all reasonable measures to control storm water and the erosive effects thereof and shall provide a Method Statement for approval by the PM and ECO.
- Streams, rivers, pans, wetlands, dams, and their catchments shall be protected from erosion, direct or indirect spillage of pollutants such as refuse, garbage, cement, concrete, sewage, chemicals, fuels, oils, aggregate, tailings, wash water, organic materials and bituminous products.
- During construction, the Contractor shall protect areas susceptible to erosion by installing necessary temporary or permanent drainage works as soon as possible.
- Areas affected by construction related activities and/or susceptible to erosion must be monitored regularly for evidence of erosion.
- Storage containers must be inspected regularly to prevent leaks into the aquatic system.
- Weather forecasts of up to three days in advance must be monitored on a daily basis to avoid exposing soil or building works or materials during a storm event and appropriate action must be taken in advance to protect construction works should a storm event be forecasted.
- On any areas where the risk of erosion is evident, special measures may be necessary to stabilise the areas and prevent erosion. These may include, but not be restricted to:
 - Confining construction activities.
 - Using cut-off berms.
 - Using mechanical cover or packing structures such as geofabric to stabilise steep slopes or hessian, gabions and mattress and retaining walls.
 - Straw stabilising.
 - Brush cut packing.
 - Constructing anti-erosion berms.
 - The erosion prevention measures must be implemented to the satisfaction of the PM and ECO.

- Where erosion does occur on any completed work/working areas, the Contractor shall reinstate such areas and areas damaged by the erosion at his own cost and to the satisfaction of the PM and ECO.
- Traffic and movement over stabilised areas shall be restricted and controlled. Any damage to the stabilised areas shall be repaired and maintained to the satisfaction of the PM and ECO.
- The Contractor shall be liable for any damage to downstream property caused by the diversion of overland storm water flows.

6.4.15 Air Emissions and Odour Control

- The Contractor will be required to ensure that all vehicles and plant used are maintained in good working order to help reduce air emissions.
- The burning of substances that may emit foul smelling smoke or vapour, e.g. oil rags, tar paper etc., is not permitted.

6.4.16 Noise Control

- The Contractor shall keep noise level within acceptable limits. The Contractor shall comply with all relevant guidelines and regulations.
- All vehicles and machinery shall be fitted with appropriate silencing technology that shall be properly maintained.
- Reverse hooters of heavy earthmoving vehicles must be set at such a level that the beeping sound does not create a nuisance to residents of nearby houses.
- The use of all plant and machinery shall be appropriate to the task required in order to reduce noise levels and/or environmental damage.
- Should the PM approve any noisy construction activities outside of normal working hours, affected residents and ECO shall be notified by the Contractor at least 5 days in advance of the event.
- Any complaints received by the Contractor regarding noise will be recorded and communicated to the PM and ECO.

6.4.17 Dust Control

- The Contractor shall be responsible for the control of dust arising from his operations and activities.
- Control measures shall include regular spraying of working/exposed areas with water at an application rate that will not result in soil erosion or runoff. The frequency of spraying will be agreed with the PM.
- The excavation, handling and transport of erodible materials shall be avoided under high wind conditions.
- Soil stockpiles shall be wetted and/or sheltered from the wind, as required.

6.4.18 Fire Prevention and Control

- The Contractor shall take all reasonable and precautionary steps to ensure that fires are not started as a consequence of his activities on site.
- The Contractor shall ensure that there is basic fire-fighting equipment available on site. Fire-fighting equipment must be in working order and serviced to date.
- The Contractor shall appoint a Fire Officer who shall be responsible for ensuring immediate and appropriate actions in the event of a fire and shall ensure that employees are aware of the procedures to be followed. The Contractor shall forward the name of the Fire Officer to the ECO for his approval within 7 days of being on site.
- Flammable materials should be stored under conditions that will limit the potential for ignition and the spread of fires.
- Smoking shall not be permitted in those areas where there is a fire hazard, e.g. fuel storage areas and areas susceptible to the rapid spread of fires.
- The Contractor shall hold fire prevention talks with staff to create an awareness of the risks of fire.

6.4.19 Emergency Procedures

- The Contractor shall ensure that his employees and Sub Contractors on site are aware of the procedure for dealing with accidental spills and leaks.
- The Contractor shall also ensure that the necessary materials and equipment for dealing with the spills and leaks are available on site at all times.
- The site shall have a supply of absorbent material readily available to absorb any accidental hydrocarbon spills. The quantity of such material shall be able to absorb/ deal with a minimum of 200 litres of spill.
- The Contractor may contain the spill using sand berms, sandbags, sawdust or absorbent materials.
- The area shall be cordoned off and secured.
- The Contractor shall notify the ECO, PM and relevant authorities of any spills that occur.
- The treatment and remediation of all spills shall require method statements.
- The Contractor shall assemble and clearly list the relevant emergency telephone contact numbers for staff and brief staff on the required procedures. These contact details shall be listed in English, and any other relevant language, in the site office, construction camp and any other suitable areas.
- The treatment and remediation of areas affected by emergencies shall be undertaken to the satisfaction of the PM and ECO at the cost of the Contractor where his staff have been proven to be responsible for the emergency.

6.5 Demolition Activities

In the event that demolition activities are required during the life of the project, the demolisher shall use razing methods that offer a high degree of control, e.g. jack-hammering and long reach excavators. The use of the wrecking ball or blasting with explosives should only be made as a last resort.

6.5.1 Jack-Hammering and Demolishing with Excavators

- The Contractor shall take all reasonable measures to limit dust generation as a result of jack-hammering and excavator operations.
- Noise and dust nuisances shall comply with the applicable standards.
- The Contractor shall ensure that no pollution results from demolishing operations, e.g. as a result of oil and fuel drips.
- Machine-assisted demolishing is to be undertaken during standard working times only.

6.5.2 Blasting

- The Contractor will be responsible for obtaining a current and valid authorisation from the relevant authorities prior to any blasting activity. A copy of this authorisation shall be given to the PM and ECO.
- A Method Statement shall be required for any blasting related activities. No blasting will be permitted unless the Contractor has satisfied the PM and ECO that his proposed blasting methods and controls are such that no damage will be caused to any adjoining structures, pipelines, service or surrounding sensitive environmental areas.
- A qualified and registered blaster shall supervise all blasting and rock-splitting operations at all times.
- The Contractor shall ensure that appropriate pre blast monitoring records are in place (i.e. photographic and inspection records of structures in close proximity to the blast area).
- The Contractor shall allow for good quality vibration monitoring equipment and record keeping on site at all times during blasting operations as required by the PM.
- The Contractor shall take necessary precautions to prevent damage to special features and the general environment, which includes the removal of fly-rock.
- The relevant occupants/owners of surrounding land shall be notified by the Contractor at least one week prior to blasting and any concerns addressed. Buildings within the potential damaging zone of the blast shall be surveyed preferably with the owner present, and any cracks or latent defects pointed out and recorded either using photographs or video. Failing to do so shall render the Contractor fully liable for any claim of whatsoever nature, which may arise.

- Environmental damage caused by blasting/drilling shall be repaired at the Contractor's expense to the satisfaction of the PM.
 - All warning signals shall be clearly visible.
 - The Contractor shall use blast mats for cover material during blasting. Topsoil shall not be used as blast cover
 - During demolition the Contractor shall ensure, where possible, that vegetation in the area is not damaged.
 - Appropriate blast shaping techniques shall be employed to aid in the landscaping of blast areas, and a Method Statement to be approved by the PM, shall be required in this regard.
 - Blast rock may only be disposed of at a licensed landfill site.
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6.6 Construction Activities

6.6.1 Mortar and Concrete Batching

- The proposed location of batching areas (including the location of cement stores and sand and aggregate stockpiles) shall be indicated on the Site Layout Plan and approved by the ECO.
- Batching areas shall not be located within 150 m of any water body or any "no-go" areas, unless written approval has been granted by the ECO.
- The Contractor shall ensure that minimal water is used for washing of concrete batching equipment.
- Concrete and mortar shall not be mixed directly on the ground. Mixing trays, wheelbarrows or concrete mixing machines can be used.
- The mixing works shall be kept neat and clean at all times.
- Contaminated stormwater and wastewater runoff from the mixing works and aggregate stockpiles shall be led to a pit where the water can soak away, or be tinkered off the site.
- Used cement bags must be stored tidily in weatherproof containers until disposal off-site. Unused cement bags must be stored weatherproof to prevent leaching of cement.
- All reasonable measures must be taken to ensure that transportation of concrete does not result in spillage.
- Cleaning of equipment and flushing of mixers shall not result in pollution of the surrounding environment.
- Suitable screening and containment shall be in place to prevent wind blown contamination associated with any loading and batching.
- Waste concrete, cement sludge and mortar leftovers shall be removed from site to an approved landfill site. Washing the remains into the ground is not acceptable.

6.6.2 Trenching and Excavations

- Top soil and subsoil excavated during trenching may be stockpiled next to the trench, but must be set back from the edge of the trench by a minimum distance of 1 m.
- A ladder or exit point must always be available close to the workforce in the trench.
- The SHE Officer must check the walls of all trenches for stability daily before staff may be allowed to enter a trench.
- The SHE Officer shall further check all trenches for wild animals and dangerous reptiles every morning before staff will be allowed to commence work in a trench. Animals may not be harmed and must be released back into the environment away from the construction site.
- All trenches must be demarcated or barricaded at all times to warn staff and the general public of the danger.
- Staff must wear full protective clothing when work is conducted in trenches.
- Staff shall not be allowed to work in isolation in a trench. Each worker will pair up with a co-worker and will work in close proximity to one another at all times while conducting work in a trench.

6.6.3 Excavations and Cutting Platforms for Towers

- The movements of the construction vehicles must be confined to the immediate vicinity of each tower location.
- Top soil is to be stockpiled upslope of the excavation.
- Rocks and debris are to be stockpiled separately within the immediate construction site, and used as fill where necessary.
- Rocks can be stacked as walls to prevent the loss of top and subsoil on cut or fill banks.
- Banks should not be steeper than 1:3 and cut back where the ECO deems necessary.
- Berms may be specified on sloped sites, depending on the gradient and length of slope affected.

6.6.4 Work Stoppage and Temporary Site Closure

The Engineer, in consultation with the ECO, shall have the right to order work to be stopped in the event of significant infringements of the Project Environmental Specifications until the situation is rectified in compliance with the specifications. In this event, the Contractor shall not be entitled to claim for delays or incurred expenses.

6.6.5 Community Relations

- The Contractor shall erect and maintain information boards in the positions, quantities, designs and dimensions required by municipal specifications. Such boards shall include contact details for complaints by members of the public in accordance with details provided by the ECO.
- The Contractor must keep a Complaints Register on Site. The Register shall contain contact details of complainants, the nature of the complaint, details on the complaint itself, as well as the date and time that the complaint was made and resolved.
- The Contractor, or if required the ECO, shall be responsible for responding to queries and/or complaints and may request assistance from the Contractor's Management Staff.
- The Contractor's staff shall in no way be a nuisance to residents or clients seeking the services of the established businesses in the area. Any complaints received by the PM will be investigated, addressed and, if deemed necessary, the relevant persons will be suspended from the project.
- The PM may request a representative of the Contractor to be available to discuss issues raised by residents and make information available to them on construction activities.

6.6.6 Non-Working Times

- Ordinarily, construction works shall be executed solely between sunrise and sunset from Monday to Saturday, inclusive, of any week, unless work is necessary for the saving of life or property or for the safety of the work.
- For any deviation from the ordinary working hours the written approval of the PM must be obtained before such works commences.

6.6.7 Safety at the Construction Site

- Safety precautions must be taken to ensure that residents and pedestrians residing in the area do not come to harm.
- Construction areas, open sewers, trenches and other potential construction-related danger areas must be clearly demarcated with hazard tape and/or be fenced as appropriate.
- The construction site shall be off limits to the general public at all times during the construction period and during site clean-up.
- The Contractor should ensure that hazard and warning signs are erected in the relevant languages at appropriate positions warning traffic of construction activities ahead and at problem sites, and that they are maintained in good condition.
- The Contractor must ensure that all staff is compliant with the relevant safety regulations on site and wears applicable safety clothing and gear at all times while on site.

6.6.8 Disruption to traffic

- The movement of trucks to and from the construction site must be well coordinated by the PM together with the Contractor, so as to cause the least disruption to the residents in the area during the morning and afternoon rush hour traffic.
- Large trucks and other heavy-duty machinery may not be left unattended outside the Contractor's site camp or designated area.
- Appropriate signage indicating construction works ahead must be erected at strategic locations along the site access road(s), clearly observable by all road users by day and night. Warning signs must comply with the applicable municipal, provincial or SANRAL specifications governing road works.
- All temporary or permanent traffic calming measures, if required, must be erected according to the appropriate municipal, provincial or SANRAL specifications governing road works.

6.6.9 Prevention of Damage to Surrounding Infrastructure

- The Contractor, and his staff, must be extra vigilant, during the construction activities, to prevent damage from occurring to any buildings, road furniture and motor vehicles located in the vicinity of the construction site.
- The Contractor shall be responsible, at his own cost, for the repair and reinstatement of any damages to existing structures resulting from the construction works.
- Any complaints received from the public regarding any of the listings above shall be investigated and, if substantiated, may result in a fine, or suspension or dismissal of the guilty party.

6.6.10 Disruption to existing services

- The Contractor shall be responsible, at his own cost, for the repair and reinstatement of any infrastructure that is damaged or services that are interrupted. Such repair or reinstatement shall receive top priority over all other activities.
- A time limit for the repairs may be stipulated by the PM in consultation with the Contractor.

6.7 Monitoring

6.7.1 Obligations of the Contractor

- The Contractor, or suitably qualified and experienced staff member acting on his behalf, shall inspect the site on a daily basis to ensure that the environmental specifications of the EMP are adhered to.
- The Contractor shall provide the PM with a verbal report, at least fortnightly, detailing compliance with the EMP as well as environmental performance.
- The Contractor shall maintain a record of incidents (spills, impacts, complaints, legal transgressions, etc.) as well as corrective and preventive actions taken, for submission to the PM at the scheduled project meetings.
- The PM shall appoint a qualified and experienced ECO to ensure implementation of and adherence all parties to the EMP.
- The appointed ECO shall conduct a pre-construction site inspection to identify all sensitive environments, habitats, and No-Go areas.
- The ECO shall prepare a pre-construction audit report, which will include a photographic record of the site and will report on the key features of the site. The photographic record of the site shall serve as a measuring staff against which rehabilitation will be measured later.
- The ECO shall conduct regular audits to ensure that the system for implementation of the EMP is operating effectively. The audit shall check that a procedure is in place to ensure that:
 - The EMP and the Method Statements being used are the up to date versions.
 - Variations to the EMP, Method Statements and non-compliances and corrective actions are documented.
 - Emergency procedures are in place and effectively communicated to personnel.
- The audit programme shall consist of the following at a minimum:
 - First audit no later than 1 month after construction commences;
 - Thereafter audits at monthly intervals;
 - An audit one week prior to practical completion of the project is granted; and
 - A post construction audit within 1 week after the Contractor has moved off site. This is to ensure that the Contractor has met all his environmental obligations in terms of the EMP.

6.7.2 Compliance with the EMP

The Contractor and/or his agents are deemed not to have complied with the EMP and remedial action if:

- There is evidence of contravention of the EMP clauses within the boundaries of the site or extensions.
- Environmental damage ensues due to negligence.
- The Contractor fails to comply with corrective or other instructions issued by the PM, within a time period specified by the PM.

6.8 Rehabilitation and Revegetation

- The Contractor shall appoint a suitably experienced landscaping Contractor or horticulturist to compile a vegetation rehabilitation plan that will stipulate seeding methods, planting and vegetation establishment in all construction areas.
- The Contractor shall submit the vegetation rehabilitation plan to the PM and ECO for approval.
- Rehabilitation shall be required for all specified areas disturbed by the works and site camp.
- Rehabilitation shall ensure that all specified areas disturbed by the works are returned to a similar or better state than before the construction works commenced.
- The Contractor shall rehabilitate all disturbed areas to the satisfaction of the PM and the ECO.
- The Contractor shall implement a programme of progressive rehabilitation, i.e. rehabilitation and/or re-vegetation must commence once works are complete in a particular area with acceptable regrowth being achieved after 3 months.
- A programme of progressive rehabilitation will provide an opportunity to assess whether or not the methods employed are suitable and successful. Where rehabilitation of an area is not successful, the Contractor will rehabilitate these areas at no additional cost to the Developer.
- Rehabilitation includes, but is not limited to, the following activities:
 - Clearance of rubble associated with construction, including removal of surplus materials, excavation and disposal of consolidated waste concrete and concrete wash water, litter etc.
 - Removal of all soil/sand contaminated by hydrocarbons by excavation to the depth of contaminant penetration and removal to an appropriate landfill site.
 - Backfilling and contouring using stockpiled subsoil removed during site clearing.
 - Finishing and grading of final levels of all disturbed areas shall be consistent with the master plan for the site.
 - Rehabilitation of all drainage lines affected by construction to approximately their original profile. Where this is not feasible due to technical constraints, the profile is to be agreed upon by the PM.
 - Ripping along the contour of compacted disturbed areas, including stockpile areas, to a depth of 150 mm prior to the replacement of topsoils, except where otherwise specified by the PM.
 - The eradication of young invasive/alien species that may have grown up during the construction period in impacted and rehabilitated areas.
 - The removal of visually detracting or environmentally unacceptable piles of blast rock and boulders to an approved spoil site.
- Areas compacted by vehicles during construction must be scarified to allow penetration of plant roots and the regrowth of natural vegetation.

- Excess subsoil shall be spoiled in a pre-identified location or be used, where possible, as infill material or building material, in conjunction with the ECO's approval.
- The revegetation programme must take cognisance of the climatic and seasonal conditions with the most favourable period being in spring and early summer.

7 DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME: OPERATIONAL PHASE

7.1 Environmental Procedures and Specifications

7.1.1 Natural Vegetation

- Management of the development area during the operational phase shall focus on maintaining biodiversity and managing alien invasion. Achieving these objectives will require the preparation of an Alien Eradication Plan, and a Biodiversity Protection Plan.
- Continued monitoring of the site for potential alien invasion must take place, especially of plant species that were already on site.
- Maintenance of areas set aside within the site for conservation must take place to ensure that these are not being impacted further in any way.

7.1.2 Alien Vegetation

During the operational phase of the project the Proponent will remain responsible for the clearing of alien plants within the development footprint of the wind farm.

7.1.3 Solid Waste Management

During the operation phase, the area of the development should be cleared of litter on a regular basis. Once collected, this litter shall be disposed of at a DEA approved waste disposal site.

7.1.4 Hazardous Waste

- Hazardous materials (if any) which may be generated during the operation phase must be disposed of in a DEA approved hazardous waste landfill site.
- The Proponent or Contractor acting on his behalf shall ensure that an emergency preparedness plan is in place for implementation in the case of a spill.

7.1.5 Emergency Procedures

- The Proponent or Contractor acting on his behalf shall compile and maintain environmental emergency procedures during the operational phase of the project to ensure that there will be an appropriate response to unexpected or accidental environment-related incidents, e.g. during routine maintenance and servicing.
- These plans should include:
 - A list of key personnel, including responsibilities, accountability and liability.

- Details of emergency services applicable to the various areas along the route that the turbine components will need to be transported as well as for the site itself.
- Internal and external communication plans, including prescribed reporting procedures where required by legislation.
- Actions to be taken in the event of different types of emergencies.
- Incident management plans for the site.
- Incident recording, progress reporting and remediation measures required to be implemented.
- Information on hazardous materials, including the potential impact associated with each and measures to be taken in the event of accidental release.
- Training plans and testing exercises and schedules for effectiveness.

7.1.6 Noise Control

- During operation of the wind farm, the Proponent shall ensure that the turbine infrastructure is maintained such that noise levels in identified noise sensitive areas associated with the project do not exceed the legally acceptable level of 45 dB for affected communities or households.
- Any further recommendations made in the noise specialist report in section 4.2 must be strictly adhered to during the operational phase of the project.

7.1.7 Erosion Control

The various protective measures that were installed during the construction phase must be properly maintained, e.g. the vegetation of road verges and cut faces must be inspected and maintained on a regular basis.

7.1.8 Access

All access requirements must be identified and detailed by the Contractor. Communities, landowners and/or developers within the turbine site will be required to apply for access to the Operator. The Operator must consider each application and consult with each applicant in this regard.

7.1.9 Monitoring

- A monitoring programme must be developed and implemented by the Proponent to increase our knowledge of the identified impacts on sensitive, vulnerable and endangered species.
- The monitoring programme should collect data and relevant information on a host of environmental parameters.

7.1.10 Maintenance

- The components of the turbines and associated infrastructure shall be maintained so in a good working order so as to minimise impacts associated with the malfunctioning of a wind turbine.
- The re-establishment of vegetation must be monitored periodically to ensure rehabilitation was successful, and for encroachment of alien vegetation.
- Future maintenance and repairs must be carried out during daylight working hours during the working week.
- Future maintenance and repairs must be carried out with minimal visual intrusions.
- Road maintenance must be conducted on the service roads within and around the development site by the Developer as and when necessary.

The lifespan of a wind energy converter is generally 25 years. Due to the long term nature of the development, no concrete specifications can be made during this time. It is therefore recommended that prior to decommissioning of the wind turbines at some future date, comprehensive decommissioning EMP be prepared that can reassess the potential environmental and socio-economic impacts as future impacts are likely to be different than those identified at present.