ENVIRONMENTAL IMPACT ASSESSMENT PROCESS
SCOPING REPORT

PROPOSED HARTEBEEST WIND FARM NEAR
MOORREESBURG, WESTERN CAPE PROVINCE

DRAFT FOR PUBLIC REVIEW
09 September 2016 - 10 October 2016

Prepared for:
Hartebeest Wind Farm (Pty) Ltd
7 Walter Sisulu Avenue
Foreshore
Cape Town
8001

Prepared by:
Savannah Environmental Pty Ltd

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PROJECT DETAILS

Title : Environmental Impact Assessment Process
Scoping Report: Proposed Hartebeest Wind Farm near Moorreesburg, Western Cape Province.

Authors : Savannah Environmental (Pty) Ltd
Thalita Botha
Jo-Anne Thomas

Specialists : Simon Todd of Simon Todd Consulting cc
Ricardo Ramalho of Bioinsight
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Toni Belcher of Blue Science
Tim Hart of ACO-Associates
Jon Marshall of Afzelia Environmental Consultants
Gabriele Wood of Savannah Environmental
Morné de Jager of Enviro-Acoustic Research cc
Tony Barbour of Environmental Consulting and Research

Client : Hartebeest Wind Farm (Pty) Ltd

Report Status : Scoping Report for Public Review


When used as a reference this report should be cited as: Savannah Environmental (2016)
Scoping Report: Proposed Hartebeest Wind Farm near Moorreesburg, Western Cape Province.
PURPOSE OF THIS SCOPING REPORT

Hartebeest Wind Farm (Pty) Ltd is proposing to establish a commercial wind energy facility and associated infrastructure on a site located approximately 4km south-south east of Moorreesburg in the Swartland Local Municipality of the Western Cape Province and within the greater West Coast District Municipality.

The facility is proposed within the following farm portions:

- Farm Zwartfontein 414
  - Portion 20, 21 and 23
  - Remainder of Portion 8, 11, 12, 13, 17 and 18
- Farm Zwartfontein 416
  - Portion 1, 5 and 7
  - Remainder of Portion 3
- Farm Hartebeestfontein 412
  - Portion 2 and 6
- Portion 0 of Farm 1066
- Portion 1 of the Farm Tontelberg 424
- Portion 9 of the Farm Biesjesfontein 413

The proposed project will include up to 40 wind turbines with a combined installed generation capacity of up to 160MW (described as a wind energy facility or a wind farm) and associated infrastructure to be constructed over an area of approximately 3830 ha in extent, with a total footprint of less than 1%. The project is to be known as the Hartebeest Wind Farm.

Hartebeest Wind Farm (Pty) Ltd has appointed Savannah Environmental as independent environmental consultant to undertake the Environmental Impact Assessment (EIA) Process for the proposed Hartebeest Wind Farm. The EIA process is being undertaken in accordance with the requirements of the EIA Regulations of December 2014 (of GNR982) promulgated in terms of the National Environmental Management Act (NEMA; Act No. 107 of 1998).

This Scoping Phase aims to:

- Identify and evaluate potential environmental (biophysical and social) impacts and benefits of the proposed development (including design, construction, operation and decommissioning) within the broader study area through a desktop review of existing baseline data and specialist studies, including limited field work.
- Identify potentially sensitive environmental features and areas on the site to inform the preliminary design process of the facility.
- Define the scope of studies to be undertaken within the EIA process.
- Provide the authorities with sufficient information in order to make a decision regarding the scope of issues to be addressed in the EIA process, as well as
proposed hartbeest wind farm near moorreesburg, western cape province
scoping report  

purpose of the scoping report

regarding the scope and extent of specialist studies that will be required to be undertaken as part of the EIA Phase of the process.

within this context, the objectives of this scoping phase are to, through a consultative process:

» identify the relevant policies and legislation relevant to the project (refer to chapter 3);

» motivate the need and desirability of the proposed project, including the need and desirability of the activity in the context of the preferred location (refer to chapter 2, section 2.3);

» identify and confirm the preferred activity and technology alternative (refer to chapter 2);

» identify and confirm the preferred site (refer to chapter 2, section 2.3 and 2.4);

» identify the key issues to be addressed in the EIA phase (refer to chapter 7 and 8);

» agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the project will impose on the preferred site through the life of the project, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site (refer to chapter 8); and

» identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored (refer to chapter 6).

this scoping report consists of the following sections:

» chapter 1 provides background to the proposed project and the environmental impact assessment.

» chapter 2 describes the activities associated with the project (project scope) and provides insight of the available technologies.

» chapter 3 provides the regulatory and planning context.

» chapter 4 outlines the process which was followed during the scoping phase of the EIA process, including the consultation programme that was undertaken and input received from interested and affected parties.

» chapter 5 describes the existing biophysical and socio-economic environment.

» chapter 6 provides an identification and evaluation of the potential issues associated with the proposed wind energy facility and associated infrastructure.

» chapter 7 presents the conclusions of the scoping evaluation for the proposed wind energy facility.

» chapter 8 describes the plan of study for EIA.

» chapter 9 provides references used to compile the scoping report.
PROPOSED HARTEBEEST WIND FARM NEAR MOORREESBURG, WESTERN CAPE PROVINCE
Scoping Report

September 2016

LEGAL REQUIREMENTS IN TERMS OF THE EIA REGULATIONS

Table 1 below details how the legal requirements of Appendix 2 and Regulation 21(1) of the 2014 EIA Regulations have been addressed within this report.

Table 1: Legal requirements in terms of the EIA regulations

<table>
<thead>
<tr>
<th>CONTENT OF THE DRAFT SCOPING REPORT</th>
<th>Cross-reference in this Scoping Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Scoping Report must contain all the information that is necessary for a proper understanding of the nature of issues identified during scoping, and includes -</td>
<td></td>
</tr>
<tr>
<td>(a) details of—</td>
<td>The details and expertise of the EAP who has undertaken this scoping report is included in <strong>Section 1.4 of Chapter 1 and Appendix A</strong> of this scoping report.</td>
</tr>
<tr>
<td>(i) the EAP who prepared the report; and</td>
<td></td>
</tr>
<tr>
<td>(ii) the expertise of the EAP to carry out scoping procedures; including a curriculum vitae</td>
<td></td>
</tr>
<tr>
<td>(b) the location of the activity, including—</td>
<td>The location of the proposed Hartebeest Wind Farm is included in <strong>Section 1.2 and Table 1.1 of Chapter 1</strong>.</td>
</tr>
<tr>
<td>(i) the 21 digit Surveyor General code of each cadastral land parcel;</td>
<td></td>
</tr>
<tr>
<td>(ii) where available, the physical address and farm name;</td>
<td></td>
</tr>
<tr>
<td>(iii) where the required information in items (i) and (iv) is not available, the coordinates of the boundary of the property or properties;</td>
<td></td>
</tr>
<tr>
<td>(c) a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is—</td>
<td>A locality map illustrating the proposed site for the development of the project is included as <strong>Figure 1.1</strong>, as well as <strong>Section 1.2 and Table 1.1 of Chapter 1</strong>. Figure 1.1 is also included in Appendix O of this scoping report.</td>
</tr>
<tr>
<td>(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or</td>
<td></td>
</tr>
<tr>
<td>(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;</td>
<td></td>
</tr>
<tr>
<td>(d) a description of the scope of the proposed activity, including—</td>
<td>All listed activities that are triggered through the development of the wind energy facility and a description of the activities to be undertaken are included in <strong>Section 4.1 and Table 4.1 of Chapter 4</strong>.</td>
</tr>
<tr>
<td>(i) all listed and specified activities triggered;</td>
<td></td>
</tr>
<tr>
<td>(ii) a description of the activities to be undertaken, including associated structures and infrastructure;</td>
<td></td>
</tr>
</tbody>
</table>
| (e) a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process; | Legislation, policies, plans, guidelines, municipal development planning frameworks and instruments associated and considered with the development of the
### EIA REGULATIONS 2014 GNR 982: Appendix 2

<table>
<thead>
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<tr>
<td>(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;</td>
<td>The need and desirability for the development of the Hartebeest Wind Farm is included within <strong>Section 2.3 of Chapter 2.</strong></td>
</tr>
<tr>
<td>(g) Missing as per the EIA REGULATIONS 2014 GNR 982: Appendix 2; pg 58</td>
<td></td>
</tr>
<tr>
<td>(h) a full description of the process followed to reach the proposed preferred activity, site and location within the site, including—</td>
<td></td>
</tr>
<tr>
<td>(i) details of all the alternatives considered;</td>
<td>The details of all alternatives considered (including site alternatives, layout and design alternatives, technology alternatives, grid connection alternatives and the ‘Do-nothing’ alternatives) are included within <strong>Section 2.4 of Chapter 2.</strong></td>
</tr>
<tr>
<td>(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;</td>
<td>The public participation process that has been undertaken (including the identification of stakeholders, the registration of interested and affected parties, the distribution of notifications and publishing of adverts, consultation and involvement of the public and the identification and recording of issues and concerns) for the scoping phase of the wind energy facility is detailed within <strong>Section 4.3.2 of Chapter 4 and Appendix C</strong> of this report.</td>
</tr>
<tr>
<td>(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;</td>
<td>All issues and concerns raised by interested and affected parties will be included within the Comments and Responses Report in Appendix C of the scoping report.</td>
</tr>
</tbody>
</table>
## Legal Requirements in terms of the EIA Regulations

### EIA REGULATIONS 2014 GNR 982: Appendix 2

### CONTENT OF THE DRAFT SCOPING REPORT

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;</td>
<td>The environmental attributes associated with the development of the wind energy facility is included as a whole within <strong>Chapter 5</strong>.</td>
</tr>
<tr>
<td>(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts—</td>
<td></td>
</tr>
<tr>
<td>(aa) can be reversed;</td>
<td>The impacts and risks identified for both the construction and operation phases are included within <strong>Section 6.4 and Section 6.5 of Chapter 6</strong>.</td>
</tr>
<tr>
<td>(bb) may cause irreplaceable loss of resources; and</td>
<td></td>
</tr>
<tr>
<td>(cc) can be avoided, managed or mitigated;</td>
<td></td>
</tr>
<tr>
<td>(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;</td>
<td>The methodology used for the assessment of potential impact and risks associated with the preferred activity, and technology on the preferred site, is detailed in <strong>Section 6.2 of Chapter 6</strong>.</td>
</tr>
<tr>
<td>(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;</td>
<td>The impacts and risks identified for both the construction and operation phases of the preferred activity is included within the <strong>Section 6.4 and Section 6.5 of Chapter 6</strong>.</td>
</tr>
<tr>
<td>(viii) the possible mitigation measures that could be applied and level of residual risk;</td>
<td>Possible mitigation measures and the level of residual risk associated with the impacts of the proposed activity on the preferred site is included within the <strong>Section 6.4 and Section 6.5 of Chapter 6</strong>.</td>
</tr>
<tr>
<td>(ix) the outcome of the site selection matrix;</td>
<td>The outcome of the site selection process is supported by the assessment of the receptiveness of the study area for the development of a wind energy facility. This outcome is included within</td>
</tr>
<tr>
<td>EIA REGULATIONS 2014 GNR 982: Appendix 2</td>
<td>Cross-reference in this Scoping Report</td>
</tr>
<tr>
<td>CONTENT OF THE DRAFT SCOPING REPORT</td>
<td>Section 2.3.1 and Section 2.3.1 of Chapter 2.</td>
</tr>
<tr>
<td>(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and</td>
<td>All information regarding alternatives considered or not considered as included within Section 2.4 of Chapter 2.</td>
</tr>
<tr>
<td>(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity</td>
<td>A concluding statement regarding the Hartebeest Wind Farm is included within Chapter 7 as a whole.</td>
</tr>
<tr>
<td>(i) a plan of study for undertaking the environmental impact assessment process to be undertaken</td>
<td>A plan of study for the undertaking of the EIA phase for the wind energy facility is included within Chapter 8 as a whole.</td>
</tr>
<tr>
<td>(j) an undertaking under oath or affirmation by the EAP in relation to—</td>
<td>An undertaking under oath or affirmation by the EAP is included in Appendix M.</td>
</tr>
<tr>
<td>(i) the correctness of the information provided in the report;</td>
<td></td>
</tr>
<tr>
<td>(ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and</td>
<td></td>
</tr>
<tr>
<td>(iii) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;</td>
<td></td>
</tr>
<tr>
<td>(k) an undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment;</td>
<td>An undertaking under oath or affirmation by the EAP is included in Appendix M.</td>
</tr>
<tr>
<td>(l) where applicable, any specific information required by the competent authority.</td>
<td>To be included in the final Scoping Report</td>
</tr>
</tbody>
</table>
INVITATION TO COMMENT ON THE SCOPING REPORT

This Scoping Report has been prepared by Savannah Environmental in accordance with the requirement of the EIA Regulations of GNR982. The Scoping Report has made available for public review at the following places, which lie in the vicinity of the proposed project area from 09 September 2016 – 10 October 2016:

» Hard copy at the Moorreesburg Public Library (Main Street, Moorreesburg)
» Hard copy at the West Coast District Municipal Offices (58 Long Street, Moorreesburg)

The report is also available for download on:
» www.savannahSA.com

Please submit your comments to

<table>
<thead>
<tr>
<th>Gabriele of Savannah Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO Box 148, Sunninghill, 2157</td>
</tr>
<tr>
<td>Tel: 011 656 3237</td>
</tr>
<tr>
<td>Fax: 086 684 0547</td>
</tr>
<tr>
<td>Email: <a href="mailto:gabriele@savannahsa.com">gabriele@savannahsa.com</a></td>
</tr>
</tbody>
</table>

The due date for comments on the Scoping Report is 10 October 2016

Comments can be made as written submission via fax, post or e-mail.
EXECUTIVE SUMMARY

Background

Hartebeest Wind Farm (Pty) Ltd is proposing to establish a commercial wind energy facility and associated infrastructure on a site located approximately 4km south-south east of Moorreesburg in the Swartland Local Municipality of the Western Cape Province and within the greater West Coast District Municipality.

The facility is proposed within the following farm portions:

» Farm Zwartfontein 414
   * Portion 20, 21 and 23
   * Remainder of Portion 8, 11, 12, 13, 17 and 18
» Farm Zwartfontein 416
   * Portion 1, 5 and 7
   * Remainder of Portion 3
» Farm Hartebeestfontein 412
   » Portion 2 and 6
» Portion 0 of Farm 1066
» Portion 1 of the Farm Tontelberg 424
» Portion 9 of the Farm Biesjesfontein 413

The proposed project will include up to 40 wind turbines with a combined installed generation capacity of up to 160MW (described as a wind energy facility or a wind farm) and associated infrastructure to be constructed over an area of approximately 3830 ha in extent, with a total footprint of less than 1%. The project is to be known as the Hartebeest Wind Farm.

The proposed Hartebeest Wind Farm project site is proposed to accommodate the following infrastructure:

» Up to 40 wind turbines of up to 4MW in capacity each, with a maximum hub height of up to 120m and a rotor diameter of up to 136m;
» Concrete foundations to support the turbines;
» Cabling between the turbines, to be laid underground where practical;
» An on-site substation of approximately 50m x 50m in extent to facilitate the connection between the wind energy facility and the electricity grid;
» An overhead power line to connect the facility to the electricity grid.

Two alternatives are being considered:

* Alternative 1: A connection to the existing Moorreesburg 132/66kV substation at 132kV via a 3.5km power line up to 132kV.
* Alternative 2: A connection to the existing Moorreesburg 132/66kV substation at 66kV via a 3km power line up to 132kV.

» Internal access roads to each turbine and to the on-site substation;
» Access roads to the site and between project components;
» Temporary infrastructure including a concrete batching plant of 50m x 50m in extent to
facilitate with the concrete requirements for turbine foundations and/or towers construction and laydown areas; and
» Workshop area / office for control, maintenance and storage.

The overarching objective for the wind energy facility planning process is to maximise electricity production through exposure to the wind resource, while minimising infrastructure, operational and maintenance costs, as well as social and environmental impacts. The Hartebeest Wind Farm should also aim to minimise pressure on the surrounding environment, without threatening the natural area or any conservation measures, in line with national legislation.

This Scoping Report is aimed at detailing the nature and extent of this facility, identifying potential issues associated with the proposed project, and defining the extent of studies required within the EIA. This was achieved through an evaluation of the proposed project, involving the project proponent, specialist consultants, and a consultation process with key stakeholders that included both relevant government authorities and interested and affected parties (I&APs). In accordance with the requirements of the EIA Regulations, feasible project-specific alternatives (including the “do nothing” option) have been identified for consideration within the EIA process.

Evaluation of the Proposed Project

The key issues and potential impacts identified through this scoping study associated with the Hartebeest Wind Farm are summarised in Table 1 and Table 2.

From this table it can be concluded that the majority of potential impacts identified to be associated with the construction of the proposed Hartebeest Wind Farm are anticipated to be localised with few impacts extending to a local to regional extent. The majority of potential impacts identified to be associated with the operation of the proposed Hartebeest Wind Farm are anticipated to be restricted to the site with few impacts extending to a local, regional and national extent.

The potentially sensitive areas which have been identified through the environmental scoping study are shown in Figure 2.

The scoping phase sensitivity map provides an informed illustration of sensitivity within and around the larger site. The detail is based on the desktop review of the available baseline information for the study area as well as limited field surveys. The sensitivity map is intended to inform the location and layout footprint of the wind energy facility and associated infrastructure within the broader site, and must be used as a tool by the developer to avoid those areas flagged to be of potential high sensitivity as far as possible.
At this stage in the process, there are no environmental fatal flaws which have been identified to be associated with the Hartebeest Wind Farm, and there is no reason for the proposed development not to be evaluated further. It is however recommended that the focus areas for the development of the facility be considered outside of the identified no-go areas and areas of high sensitivity as far as possible.

With an understanding of which areas within the site are considered sensitive to the development of the proposed wind energy facility, Hartebeest Wind Farm (Pty) Ltd can prepare the detailed infrastructure layout footprint for consideration within the EIA Phase. During the EIA phase more detailed environmental studies will be conducted in line with the Plan of Study contained in Chapter 8 of this report. These studies will consider feasible alternative layouts within the development site in order to ensure that impacts on the environment are minimised as far as possible. A detailed comparative assessment of development footprint alternatives must be undertaken in order to define the least impact alternative for implementation.
Table 1: Summary of the extent of the potential impacts associated with the construction and decommissioning of the Hartebeest Wind Farm, as identified at the scoping phase.

<table>
<thead>
<tr>
<th>Construction / Decommissioning Impacts</th>
<th>Extent</th>
<th>Applicable listed activities</th>
<th>Page Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of intact vegetation and listed plant species</td>
<td>L</td>
<td>GN983, 11(i); GN984, 1; GN984, 15; GN985, 12(a)(ii); GN985, 14(xii)(a)(f)(ff); GN985, 18(f)(i)(aa)</td>
<td>103</td>
</tr>
<tr>
<td>Fauna impacted by noise and disturbance during construction</td>
<td>L</td>
<td>GN983, 11(i); GN985, 18(f)(i)(aa)</td>
<td>104</td>
</tr>
<tr>
<td>Habitat loss and disturbance</td>
<td>L</td>
<td>GN983, 12(xiii)(c); GN984, 1; GN984, 15, GN985, 12(a)(ii); GN985, 18(f)(i)(aa)</td>
<td>106</td>
</tr>
<tr>
<td>Displacement from feeding areas</td>
<td>L</td>
<td>GN983, 12(xiii)(c), GN983, 19(i), GN984, 1</td>
<td>110</td>
</tr>
<tr>
<td>Disturbance and/or destruction of roots</td>
<td>L</td>
<td>GN983, 12(xiii)(c), GN983, 19(i), GN984, 15</td>
<td>110</td>
</tr>
<tr>
<td>Reduction of ecosystem services due to disruption of bat population</td>
<td>L</td>
<td>GN983, 12(xiii)(c), GN983, 19(i), GN984, 15</td>
<td>110</td>
</tr>
<tr>
<td>Disturbance caused by turbine facilities and on-site substation</td>
<td>L</td>
<td>GN983, 12(xiii)(c), GN983, 19(i), GN985, 14(xii)(a)(f)(ff)</td>
<td>112</td>
</tr>
<tr>
<td>Loss of habitat within streams, riparian areas and wetland habitats, loss of indigenous vegetation within riparian zones</td>
<td>L</td>
<td>GN983, 12(xiii)(c), GN983, 19(i), GN985, 14(xii)(a)(f)(ff)</td>
<td>113</td>
</tr>
<tr>
<td>Loss of agricultural land</td>
<td>S</td>
<td>GN983, 11(i); GN984, 1</td>
<td>114</td>
</tr>
<tr>
<td>Soil erosion</td>
<td>S</td>
<td>GN983, 11(i); GN984, 1</td>
<td>114</td>
</tr>
<tr>
<td>Disturbance to agricultural activities</td>
<td>S</td>
<td>GN983, 11(i); GN984, 1</td>
<td>115</td>
</tr>
<tr>
<td>Loss of topsoil</td>
<td>S</td>
<td>GN983, 11(i); GN984, 1</td>
<td>116</td>
</tr>
<tr>
<td>Physical disturbance to archaeological resources</td>
<td>L</td>
<td>GN983, 11(i); GN984, 1</td>
<td>116</td>
</tr>
<tr>
<td>Destruction of protected structures</td>
<td>L</td>
<td>GN983, 11(i); GN984, 1</td>
<td>117</td>
</tr>
<tr>
<td>Landscape quality - Change to the overall cultural landscape, setting and character</td>
<td>L</td>
<td>GN983, 11(i); GN984, 1</td>
<td>117</td>
</tr>
<tr>
<td>Increase in noise levels at closest receptors</td>
<td>S-L</td>
<td>GN983, 11(i); GN984, 1</td>
<td>120</td>
</tr>
<tr>
<td>Potential visual impact on observers travelling along main (i.e. the N7 and the R311) and secondary roads</td>
<td>S</td>
<td>GN983, 11(i); GN984, 1</td>
<td>123</td>
</tr>
<tr>
<td>Potential visual impact on urban centres and populated places</td>
<td>S</td>
<td>GN983, 11(i); GN984, 1</td>
<td>124</td>
</tr>
</tbody>
</table>
**Table 2:** Summary of the extent of the potential impacts associated with the Operation Hartebeest Wind Farm, as identified at the scoping phase.

<table>
<thead>
<tr>
<th>Construction / Decommissioning Impacts</th>
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<td>Fauna impacted by noise and disturbance during construction</td>
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<td>Habitat loss and disturbance</td>
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DEFINITIONS AND TERMINOLOGY

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

Betz Limit: It is the flow of air over the blades and through the rotor area that makes a wind turbine function. The wind turbine extracts energy by slowing the wind down. The theoretical maximum amount of energy in the wind that can be collected by a wind turbine’s rotor is approximately 59%. This value is known as the Betz Limit.

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

Commercial Operation date: The date after which all testing and commissioning has been completed and is the initiation date to which the seller can start producing electricity for sale (i.e. when the project has been substantially completed).

Commissioning: Commissioning commences once construction is completed. Commissioning covers all activities including testing after all components of the wind turbine are installed.

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

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

Cut-in speed: The minimum wind speed at which the wind turbine will generate usable power.
**Cut-out speed:** The wind speed at which shut down occurs.

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

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

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

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

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

**Emergency:** An undesired/unplanned event that results in a significant environmental impact and requires the notification of the relevant statutory body, such as a local authority.

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

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

i. The land, water and atmosphere of the earth;

ii. Micro-organisms, plant and animal life;

iii. Any part or combination of (i) and (ii) and the interrelationships among and between them; and

iv. The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.
Environmental impact: An action or series of actions that have an effect on the environment.

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

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

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

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

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

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

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

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

Method statement: A written submission to the ECO and the site manager (or engineer) by the EPC Contractor in collaboration with his/her EO.

Nacelle: The nacelle contains the generator, control equipment, gearbox and anemometer for monitoring the wind speed and direction.
No-go areas: Areas of environmental sensitivity that should not be impacted on or utilised during the development of a project as identified in any environmental reports.

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

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

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

Red data species: Species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species, and/or in terms of the South African Red Data list. In terms of the South African Red Data list, species are classified as being extinct, endangered, vulnerable, rare, indeterminate, insufficiently known or not threatened (see other definitions within this glossary).

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

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

Tower: The tower, which supports the rotor, is constructed from tubular steel. It is between 80m and 120m tall. The nacelle and the rotor are attached to the top of the tower. The tower on which a wind turbine is mounted is not just a support structure. It also raises the wind turbine so that its blades safely clear the ground and so it can reach the stronger winds at higher elevations. The tower must be strong enough to support the wind turbine and to sustain vibration, wind loading and the overall weather elements for the lifetime of the wind turbine.
**Wind power:** A measure of the energy available in the wind.

**Wind rose:** The term given to the diagrammatic representation of joint wind speed and direction distribution at a particular location. The length of time that the wind comes from a particular sector is shown by the length of the spoke, and the speed is shown by the thickness of the spoke.

**Wind speed:** The rate at which air flows past a point above the earth's surface.
### ABBREVIATIONS AND ACRONYMS

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<tr>
<td>BID</td>
<td>Background Information Document</td>
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<tr>
<td>CBOs</td>
<td>Community Based Organisations</td>
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<td>CDM</td>
<td>Clean Development Mechanism</td>
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<tr>
<td>CSIR</td>
<td>Council for Scientific and Industrial Research</td>
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<tr>
<td>CO(_2)</td>
<td>Carbon dioxide</td>
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<tr>
<td>D</td>
<td>Diameter of the rotor blades</td>
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<td>DAFF</td>
<td>Department of Forestry and Fishery</td>
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<tr>
<td>m(^2)</td>
<td>Square meters</td>
</tr>
<tr>
<td>m/s</td>
<td>Meters per second</td>
</tr>
<tr>
<td>MW</td>
<td>Mega Watt</td>
</tr>
<tr>
<td>NEMA</td>
<td>National Environmental Management Act (Act No 107 of 1998)</td>
</tr>
<tr>
<td>NERSA</td>
<td>National Energy Regulator of South Africa</td>
</tr>
<tr>
<td>NHRA</td>
<td>National Heritage Resources Act (Act No 25 of 1999)</td>
</tr>
<tr>
<td>NGOs</td>
<td>Non-Governmental Organisations</td>
</tr>
<tr>
<td>NIRP</td>
<td>National Integrated Resource Planning</td>
</tr>
<tr>
<td>NWA</td>
<td>National Water Act (Act No 36 of 1998)</td>
</tr>
<tr>
<td>SAHRA</td>
<td>South African Heritage Resources Agency</td>
</tr>
<tr>
<td>SANBI</td>
<td>South African National Biodiversity Institute</td>
</tr>
<tr>
<td>SANRAL</td>
<td>South African National Roads Agency Limited</td>
</tr>
<tr>
<td>SDF</td>
<td>Spatial Development Framework</td>
</tr>
<tr>
<td>SKA</td>
<td>Square Kilometre Array</td>
</tr>
</tbody>
</table>
Hartebeest Wind Farm (Pty) Ltd is proposing to establish a commercial wind energy facility and associated infrastructure on a site located approximately 4km south-south east of Moorreesburg in the Swartland Local Municipality of the Western Cape Province and within the greater West Coast District Municipality (refer to Figure 1.1). The facility is proposed within the following farm portions:

» Farm Zwartfontein 414
   » Portion 20, 21 and 23
   » Remainder of Portion 8, 11, 12, 13, 17 and 18
» Farm Zwartfontein 416
   » Portion 1, 5 and 7
   » Remainder of Portion 3
» Farm Hartebeestfontein 412
   » Portion 2 and 6
» Portion 0 of Farm 1066
» Portion 1 of the Farm Tontelberg 424
» Portion 9 of the Farm Biesjesfontein 413

The proposed project will include up to 40 wind turbines with a combined installed generation capacity of up to 160MW (described as a wind energy facility or a wind farm) and associated infrastructure to be constructed over an area of approximately 3830 ha in extent, with a total footprint of less than 1%. The project is to be known as the Hartebeest Wind Farm.

It is the developer’s intention to bid the Hartebeest Wind Farm under the Department of Energy’s (DoE) Renewable Energy Independent Power Producer Procurement (REIPPPP) Programme. The power generated from the project will be sold to Eskom and will feed into the national electricity grid. Ultimately, the project is intended to be a part of the renewable energy projects portfolio for South Africa, as contemplated in the Integrated Resource Plan 2010.

A previous Environmental Impact Assessment (EIA) process was undertaken for the same project (previously known as the Moorreesburg Wind Farm) in accordance with the EIA Regulations of 2010 (GNR543) (DEA Ref 12/12/20/2200). This process was however not completed. A new EIA process is currently being undertaken in accordance with the EIA Regulations published on 08 December 2014.

The nature and extent of the Hartebeest Wind Farm, as well as potential environmental impacts associated with the construction, operation and decommissioning phases are explored in more detail in this Scoping Report.
Figure 1.1: Locality map of proposed area for the establishment of the Moorreesburg Wind Farm near Moorreesburg, Western Cape.
This Scoping Report consists of eight chapters, which include:

» **Chapter 1** provides background to the proposed project and the environmental impact assessment.

» **Chapter 2** describes the activities associated with the project (project scope) and provides insight of the available technologies.

» **Chapter 3** provides the Regulatory and Planning Context.

» **Chapter 4** outlines the process which was followed during the Scoping Phase of the EIA process, including the consultation programme that was undertaken and input received from interested and affected parties.

» **Chapter 5** describes the existing biophysical and socio-economic environment.

» **Chapter 6** provides an identification and evaluation of the potential issues associated with the proposed wind energy facility and associated infrastructure.

» **Chapter 7** presents the conclusions of the scoping evaluation for the proposed wind energy facility.

» **Chapter 8** describes the Plan of Study for EIA.

» **Chapter 9** provides references used to compile the Scoping Report.

### 1.1. Legal Requirements as per the EIA Regulations, 2014

This Scoping report has been prepared in accordance with the requirements of the EIA Regulations published on 08 December 2014 promulgated in terms of Chapter 5 of the National Environmental Management Act (Act No 107 of 1998). This chapter of the scoping report includes the following information required in terms of Appendix 2: Content of the Scoping Report:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Relevant Section</th>
<th>Page Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)(i) the details of the EAP who prepared the report and (ii) the expertise of the EAP to carry out scoping procedures; including a curriculum vitae</td>
<td>The details and expertise of the EAP who has undertaken this scoping report is included in <strong>Section 1.4</strong> of the chapter and <strong>Appendix A</strong> of this scoping report.</td>
<td>Page 7</td>
</tr>
</tbody>
</table>

(b) the location of the activity, including (i) the 21 digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name and (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties | The location of the proposed Hartebeest Wind Farm is included in **Section 1.2**, and within **Table 1.1** of this chapter. | Page 5; 11 |
1.2. Project Overview

Hartebeest Wind Farm (Pty) Ltd is proposing to establish a commercial wind energy facility and associated infrastructure on a site located approximately 4km south-south east of Moorreesburg in the Swartland Local Municipality of the Western Cape Province and within the greater West Coast District Municipality (refer to Table 1.1). The proposed Hartebeest Wind Farm site is proposed to accommodate the following infrastructure:

- Up to 40 wind turbines of up to 4MW in capacity each, with a maximum hub height of up to 120m and a rotor diameter of up to 136m;
- Concrete foundations to support the turbines;
- Cabling between the turbines, to be laid underground where practical;
- An on-site substation of approximately 50m x 50m in extent to facilitate the connection between the wind energy facility and the electricity grid;
- An overhead power line to connect the facility to the electricity grid. Two alternatives are being considered:
  * Alternative 1: A connection to the existing Moorreesburg 132/66kV substation at 132kV via a 3.5km power line up to 132kV.
  * Alternative 2: A connection to the existing Moorreesburg 132/66kV substation at 66kV via a 3km power line up to 132kV.
- Internal access roads to each turbine and to the on-site substation;
- Access roads to the site and between project components;
- Temporary infrastructure including a concrete batching plant of 50m x 50m in extent to facilitate with the concrete requirements for turbine foundations and/or towers construction and laydown areas; and
- Workshop area / office for control, maintenance and storage.

Turbines use kinetic energy from the wind to generate electricity. In essence, the blades of the turbine are turned by the wind and the energy captured is converted into electrical energy and supplied to the electricity grid for use in homes and
elsewhere. The wind energy facility is to be constructed within an area of approximately 3830ha, and together with the associated infrastructure listed above will constitute a development footprint of less than 1% of the total site. The facility is proposed to have a generating capacity of up to 160MW, depending on the final turbine type selected and a layout alternative authorised. The optimal position for each turbine will be defined in order to optimise the energy generating potential of the wind resource, taking into consideration any environmental sensitivities identified through the EIA process. A more detailed description of the final development footprint will be provided during the EIA Phase of the project.

**Table 1.1:** Project details

<table>
<thead>
<tr>
<th>Province</th>
<th>Western Cape Province</th>
</tr>
</thead>
<tbody>
<tr>
<td>District Municipality</td>
<td>West Coast District Municipality</td>
</tr>
<tr>
<td>Local Municipality</td>
<td>Swartland Local Municipality</td>
</tr>
<tr>
<td>Ward number(s)</td>
<td>1, 3 and 4</td>
</tr>
<tr>
<td>Nearest town(s)</td>
<td>Moorreesburg</td>
</tr>
<tr>
<td>Farm name(s) and number(s)</td>
<td>Farm Zwartfontein 414</td>
</tr>
<tr>
<td></td>
<td>Farm Zwartfontein 416</td>
</tr>
<tr>
<td></td>
<td>Farm Hartebeestfontein 412</td>
</tr>
<tr>
<td></td>
<td>Farm 1066</td>
</tr>
<tr>
<td></td>
<td>Farm Tontelberg 424</td>
</tr>
<tr>
<td></td>
<td>Farm Biesjesfontein 413</td>
</tr>
<tr>
<td>Portion number(s)</td>
<td>Farm Zwartfontein 414 - Portion 20, 21, 23 and Remainder of Portion 8, 11, 12, 13, 17 and 18</td>
</tr>
<tr>
<td></td>
<td>Farm Zwartfontein 416 – Portion 1, 5, 7 and Remainder of Portion 3</td>
</tr>
<tr>
<td></td>
<td>Farm Hartebeestfontein 412- Portions 2 and 6</td>
</tr>
<tr>
<td></td>
<td>Farm 1066 – Portion 0</td>
</tr>
<tr>
<td></td>
<td>Farm Tontelberg 424 – Portion 1</td>
</tr>
<tr>
<td></td>
<td>Farm Biesjesfontein 413 – Portion 9</td>
</tr>
<tr>
<td>Farm Zwartfontein 414 - SG 21 Digit Code (s)</td>
<td>C04600100000041400020</td>
</tr>
<tr>
<td></td>
<td>C04600100000041400021</td>
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<tr>
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<td>C04600100000041400023</td>
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<td>C04600100000041400017</td>
</tr>
<tr>
<td></td>
<td>C04600100000041400018</td>
</tr>
<tr>
<td>Farm Zwartfontein 416 - SG 21 Digit Code (s)</td>
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</tr>
<tr>
<td></td>
<td>C04600100000041600005</td>
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<td>C04600100000041600003</td>
</tr>
<tr>
<td></td>
<td>C04600100000041200002</td>
</tr>
</tbody>
</table>
1.3. Requirement for an Environmental Impact Assessment Process

The construction and operation of the proposed Hartebeest Wind Farm is subject to the requirements of the EIA Regulations published in terms of Section 24(5) of the National Environmental Management Act (NEMA) 107 of 1998. This section provides a brief overview of the EIA Regulations, 2014 and their application to this project.

NEMA is the national legislation that provides for the authorisation of 'listed activities’. In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these activities must be considered, investigated, assessed and reported on to the competent authority that has been charged by NEMA with the responsibility of granting environmental authorisations. As this is a proposed electricity generation project and thereby considered to be of national importance, the National Department of Environmental Affairs (DEA) is the competent authority1 and the Western Cape Department of Environmental and Development Planning (DEA&DP) will act as a commenting authority.

The need to comply with the requirements of the EIA Regulations ensures that the competent authority is provided with the opportunity to consider the potential environmental impacts of a project early in the project development process and to assess if potential environmental impacts can be avoided, minimised or mitigated to acceptable levels. Comprehensive, independent environmental studies are

1 In terms of Government Notice 779 of 01 July 2016, the Minister of Environmental Affairs is the competent authority for all activities which relate to the Integrated Resource Plan (IRP) 2010-2030 and any updates thereto.
required in accordance with the EIA Regulations to provide the competent authority with sufficient information in order to make an informed decision.

An EIA is an effective planning and decision-making tool for the project developer as it allows for the identification and management of potential environmental impacts. It provides the opportunity for the developer to be forewarned of potential environmental issues, and allows for resolution of the issues reported on in the Scoping and EIA Reports as well as dialogue with interested and affected parties (I&APs).

The EIA process comprises two phases – i.e. Scoping and Impact Assessment - and involves the identification and assessment of environmental impacts through specialist studies, as well as public participation. The process followed in these two phases is as follows:

» The Scoping Phase includes the identification of potential issues associated with the proposed project through a desktop study (considering existing information) and consultation with affected parties and key stakeholders. This phase considers the broader site in order to identify and delineate any environmental fatal flaws, no-go or sensitive areas. Following a public review period of the scoping report, this phase culminates in the submission of a final Scoping Report and Plan of Study for EIA to the competent authority for acceptance.

» The EIA Phase involves a detailed assessment of potentially significant positive and negative impacts (direct, indirect, and cumulative) identified in the Scoping Phase. This phase considers a proposed development footprint and includes detailed specialist investigations and public consultation. Following a public review period of the EIA report, this phase culminates in the submission of a final EIA Report and an Environmental Management Programme (EMPr), including recommendations of practical and achievable mitigation and management measures, to the competent authority for final review and decision-making.

1.4. Details of Environmental Assessment Practitioner

Savannah Environmental was contracted by Hartebeest Wind Farm (Pty) Ltd as an independent consultant to undertake an EIA process for the proposed project, as required by the NEMA EIA Regulations. Neither Savannah Environmental, nor any of its specialist sub-consultants on this project are subsidiaries of or affiliated to Hartebeest Wind Farm (Pty) Ltd. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed project.
Savannah Environmental is a specialist environmental consulting company providing a holistic environmental management service, including environmental assessment and planning to ensure compliance and evaluate the risk of development; and the development and implementation of environmental management tools. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team.

The Savannah Environmental team have considerable experience in environmental impact assessments and environmental management, and have been actively involved in undertaking environmental studies, for a wide variety of projects throughout South Africa, including those associated with electricity generation.

- **Thalita Botha**, the principle author of this report, holds a BSc degree with Honours in Environmental Management. Her key focus is on environmental impact assessments, public participation, environmental management plans and programmes.

- **Gabriele Wood**, the public participation consultant for this project, holds an Honours Degree in Anthropology, obtained from the University of Johannesburg. She has 6 years consulting experience in public participation and social research. Her experience includes the design and implementation of public participation programmes and stakeholder management strategies for numerous integrated development planning and infrastructure projects. Her work focuses on managing the public participation component of Environmental Impact Assessments and Basic Assessments undertaken by Savannah Environmental.

- **Jo-Anne Thomas**, the lead Environmental Assessment Practitioner (EAP) for the project, is a registered Professional Natural Scientist and holds a Master of Science degree. She has 18 years of consulting experience in the environmental field. Her key focus is on strategic environmental assessment and advice; management and co-ordination of environmental projects, which includes integration of environmental studies and environmental processes into larger engineering-based projects and ensuring compliance to legislation and guidelines; compliance reporting; the identification of environmental management solutions and mitigation/risk minimising measures; and strategy and guideline development. She is currently responsible for the project management of EIAs for several renewable energy projects across the country.

In order to adequately identify and assess potential environmental impacts associated with the proposed project, the following specialist sub-consultants have provided input into this scoping report:

<table>
<thead>
<tr>
<th>Specialist</th>
<th>Area of Expertise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simon Todd</td>
<td>Ecology</td>
</tr>
<tr>
<td>Ricardo Ramalho (Bioinsight South Africa)</td>
<td>Avifauna</td>
</tr>
<tr>
<td>Specialist</td>
<td>Area of Expertise</td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Ricardo Ramalho (Bioinsight South Africa)</td>
<td>Bats</td>
</tr>
<tr>
<td>Toni Belcher (Blue Science)</td>
<td>Hydrology</td>
</tr>
<tr>
<td>Tim Hart (ACO Associates)</td>
<td>Heritage</td>
</tr>
<tr>
<td>Johann Lanz</td>
<td>Soil and Agricultural Potential</td>
</tr>
<tr>
<td>Jon Marshall (Afzelia Environmental Consultants &amp; Environmental Planning and Design)</td>
<td>Visual</td>
</tr>
<tr>
<td>Tony Barbour</td>
<td>Social</td>
</tr>
<tr>
<td>Morné de Jager (Enviro-Acoustic Research cc)</td>
<td>Noise</td>
</tr>
</tbody>
</table>

Appendix A includes the curricula vitae for the environmental assessment practitioners from Savannah Environmental and the specialist consultants.
This chapter provides an overview of the Hartebeest Wind Farm and details the project scope which includes the planning/design, construction, operation and decommissioning activities. This chapter also explores site and technology alternatives as well as the ‘do nothing’ option. Lastly, it explores the use of wind energy as a means of power generation.

This chapter of the scoping report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 2: Content of the Scoping Report:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Relevant Section</th>
<th>Page Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location</td>
<td>The need and desirability for the development of the Hartebeest Wind Farm is included within Section 2.3 of this chapter.</td>
<td>Page 12</td>
</tr>
<tr>
<td>(h)(i) details of all the alternatives considered</td>
<td>The details of all alternatives considered (including site alternatives, layout and design alternatives, technology alternatives, grid connection alternatives and the ‘Do-nothing’ alternatives) are included within Section 2.4 of this chapter.</td>
<td>Page 21</td>
</tr>
<tr>
<td>(h)(ix) the outcome of the site selection matrix</td>
<td>The outcome of the site selection process is supported by the assessment of the receptiveness of the study area for the development of a wind energy facility. This outcome is included within Section 2.3.1 and Section 2.3.2 of this chapter.</td>
<td>Page 14</td>
</tr>
<tr>
<td>(h)(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such</td>
<td>All information regarding alternatives considered or not considered as included within Section 2.4 of this chapter.</td>
<td>Page 21</td>
</tr>
</tbody>
</table>
2.1. Nature and extent of the Hartebeest Wind Farm

In responding to the growing electricity demand within South Africa, the need to promote renewable energy and sustainability within the Western Cape Province, as well as the country’s targets for renewable energy, Hartebeest Wind Farm (Pty) Ltd is proposing to establish a commercial wind energy facility and associated infrastructure on a site located approximately 4km south-south east of Moorreesburg in the Western Cape Province to add new capacity to the national electricity grid. The site would include up to 40 turbines with a capacity of approximately 4 MW each. The facility is proposed to have a generating capacity of up to 160MW. The final turbine capacity and model will be dependent on what is deemed suitable for the site in relation to, among other things, further studies of the wind regime, terrain, and potential environmental constraints.

The study area lies approximately 4 km south-south east of Moorreesburg, in the West Coast District Municipality of the Western Cape Province. The proposed development area is located on the following farm portions:

» Farm Zwartfontein 414
  » Portion 20, 21 and 23
  » Remainder of Portion 8, 11, 12, 13, 17 and 18
» Farm Zwartfontein 416
  » Portion 1, 5 and 7
  » Remainder of Portion 3
» Farm Hartebeestfontein 412
  » Portion 2 and 6
» Portion 0 of Farm 1066
» Portion 1 of the Farm Tontelberg 424
» Portion 9 of the Farm Biesjesfontein 413

2.2. Components of the Proposed Project

The broader site is proposed to accommodate both the wind turbines as well as the associated infrastructure which is required for such a facility including, but not limited to:

» Up to 40 wind turbines of up to 4MW in capacity each, with a maximum hub height of up to 120m and a rotor diameter of up to 136m;
» Concrete foundations to support the turbines;
» Cabling between the turbines, to be laid underground where practical;
» An on-site substation of 50m x 50m in extent to facilitate the connection between the wind energy facility and the electricity grid;
An overhead power line to connect the facility to the electricity grid. Two alternatives are being considered:

- Alternative 1: A connection to the existing Moorreesburg 132/66kV substation at 132kV via a 3.5km power line up to 132kV.
- Alternative 2: A connection to the existing Moorreesburg 132/66kV substation at 66kV via a 3km power line up to 132kV.

Access roads to the site and between project components;

Internal access roads to each turbine and to the on-site substation;

Temporary infrastructure including a concrete batching plant of 50m x 50m in extent to facilitate with the concrete requirements for turbine foundations and/or towers construction and laydown areas; and

Workshop area / office for control, maintenance and storage.

The wind energy facility is to be constructed within an area of approximately 3830ha, and together with the associated infrastructure listed above is expected to constitute a development footprint of less than 1% of the total site. The facility is proposed to have a generating capacity of up to 160MW, depending on the final turbine selected.

2.3. Need and Desirability of the Development at the Preferred Site Location

The overarching objective for the wind energy facility planning process is to maximise electricity production through exposure to the wind resource, while minimising infrastructure, operational and maintenance costs, as well as social and environmental impacts. The Hartebeest Wind Farm should also aim to minimise pressure on the surrounding environment, without threatening the natural area or any conservation measures, in line with national legislation. The Hartebeest Wind Farm is proposed to be constructed outside of the urban edge on properties currently zoned for agricultural use. The affected farm portions have not been considered for an alternative land use such as urban development. The site is also located within an area which has become a node for renewable energy projects (refer to Table 2.1), with three preferred bidder projects located within 25km of the project development site.

Given the competitive nature of the Renewable Energy Independent Power Producer Procurement (REIPPP) Programme, a good wind resource and grid connectivity suitability are some of the most important factors for success. The selection of the above-mentioned projects as Preferred Bidders and the location of Hartebeest Wind Farm being located east of the Hopefield Wind Farm and west the Gouda Wind Farm is a confirmed indicator that the Hartebeest project site possesses the required wind resources and grid connectivity characteristics to be highly competitive and suitable for the selection process by the Department of Energy for future bidding rounds of the REIPPP Programme.
### Table 2.1: Other wind energy facilities within 30km of the project site

<table>
<thead>
<tr>
<th>Project Name</th>
<th>DEA Ref. No</th>
<th>Location</th>
<th>Approximate distance from the Hartebeest Wind Farm project site</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>30MW Wind Energy Facility near Gouda</td>
<td>12/12/20/2227</td>
<td>Portion 1 and 2 of Farm 397.</td>
<td>22km south east</td>
<td>Authorised</td>
</tr>
<tr>
<td>Gouda Wind Farm</td>
<td>12/12/20/1859</td>
<td>Portion 0, 4, 6 ,7, 8, 9, 10, 11 and 14 of Farm La Bonne Esperance 397, Farm Bellevue 94 and Farm Bellevue 409.</td>
<td>22km east</td>
<td>Preferred Bidder (Round 2 REIPPP) Operational</td>
</tr>
<tr>
<td>Hopefield Community Wind Farm</td>
<td>14/12/16/3/3/1/1099</td>
<td>Portion 1 of Farm Leliefontein 317.</td>
<td>24km north west</td>
<td>Authorised Preferred Bidder – Small Projects REIPPP</td>
</tr>
<tr>
<td>Hopefield Wind Farm</td>
<td>14/12/16/3/3/2/407</td>
<td>Remaining Extent and Portion 8 of Farm Schaplaatsfontein 345, Remaining Extent of Farm Koperfontein 346 and the Remaining Extent of Farm Gazekraal 386.</td>
<td>21km south east</td>
<td>Preferred Bidder (Round 1 REIPPP) Operational</td>
</tr>
<tr>
<td>Zen Wind Farm</td>
<td>14/12/16/3/3/2/322</td>
<td>Portion 1 and 2 of Farm Bonne Esperance 83, Portion 9 of the Farm 88, Remaining Extent of Portion 4 Farm Kleinbergrivier 1, Remaining Extent of Far Moolenaars Drift 85 and the Remaining Extent of Portion 1 of the</td>
<td>17 km east</td>
<td>In Process</td>
</tr>
</tbody>
</table>
2.3.1. Need for the Project

The need for the proposed wind energy facility at a National Level is linked to increasing pressure on countries to increase their share of renewable energy generation due to concerns such as exploitation of non-renewable resources, ensuring national energy supply meets our economic growth and the rising cost of fossil fuels. In order to meet the long-term goal of a sustainable renewable energy industry, a target of 17.8 GW of renewables by 2030 has been set by the Department of Energy (DoE) within the Integrated Resource Plan (IRP) 2010 and incorporated in the REIPPPP Programme initiated by the DoE. This programme has been designed so as to contribute towards a target of 3725 MW to be generated from renewable energy sources, required to ensure the continued uninterrupted supply of electricity. It contributes towards socio-economic and environmentally sustainable growth, and will further stimulate the renewable industry in South Africa. The energy procured through this programme will be produced mainly from wind, solar, biomass, and small-scale hydro (with wind and solar comprising the bulk of the power generation capacity). This 17.8GW of power from renewable energy as required in terms of the IRP amounts to ~42% of all new power generation being derived from renewable energy forms by 2030.

At present, a significant quantity of power supplied to the Western Cape is generated in the Eskom coal-fired power stations elsewhere in the country (predominantly located in Mpumalanga) and transferred to the Cape via the national transmission network. A portion of the Province’s electricity is however generated locally, including energy from the Koeberg Nuclear Power Plant, the Acacia Gas Turbines, the Palmiet Pumped Storage Facility, the Open Cycle Gas Turbine plants at Atlantis and Mossel Bay (peaking power) and several IPP-operated renewable energy facilities. The City of Cape Town also produces a small amount of electricity through the Steenbras Pumped Storage facility and local gas turbines. Although Eskom has transmission power line strengthening plans in place to assist in securing electricity supply for the Western Cape, there are a range of other options that may be preferable. This includes the diversification of the energy supply mix and the broadening of the localised energy generation options.
At a provincial level, the proposed project would contribute towards the target of 15% renewable energy for the province and reduction in carbon emissions as set by the White Paper on Sustainable Energy (the purpose of which is to create an enabling policy environment in the Western Cape in order to promote and facilitate energy generation from renewable sources, as well as efficient energy use technologies and initiatives). In addition, it is in line with the Climate Change Strategy and Action Plan for the Western Cape in that it would contribute to one of the four programmes which are prioritised (i.e. the reduction of the province’s carbon footprint which is identified as the key mitigatory response) and its associated strategies (including promotion of energy efficiency (including demand management), and the development of renewable and alternate sustainable energy resources).

The Western Cape Provincial Growth and Development Strategy (PGDS) lays great emphasis on the extreme vulnerability of the province to climate change (generally hotter, drier conditions are generally predicted for the WC), and is aligned with the Western Cape Climate Change Strategy. The PGDS notes that, with current available budgeting, a key necessary intervention is that, “assistance needs to be provided in the development of new economic sectors e.g. renewable energy sector, solar, wind and wave energy and water sector.” The proposed project is in line with this identified intervention.

Renewable energy projects are currently under development within the Western Cape as part of the Department of Energy’s Renewable Energy Independent Power Producer Programme (REIPPP). In addition, a number of projects are proposed for development within the Province. The proposed project would provide a further opportunity for a wind energy development, with the aim of contributing to the Provincial target for renewable energy.

At a local level, the proposed project will assist the municipality in meeting the objectives and actions for the 12 Strategic Outcomes identified within the Swartland Integrated Development Plan (IDP) for the period 2012 – 2017 (adopted by the Municipal Council on 31 May 2011). The most relevant aspect for the proposed wind energy facility is linked to Strategic Outcome 8: Economic infrastructure relating to water and electricity supply within the municipality. A key action to achieve the objective has been defined as “moving to less carbon-intensive electricity production through procuring at least 20 000MW of renewable energy”.

2.3.2. Site Selection and Pre-Feasibility Analysis

Due to the nature of the development (i.e. a wind energy facility), the location of the project site is largely dependent on technical factors such as the availability of wind (i.e. the fuel source), wind characteristics (including speed), availability of suitable land (extent and topography of the site), suitable proximity in relation to
the existing electricity grid, estimated grid capacity available at the nearest Eskom substation and construction and technical point of view. The developer has determined the proposed project site to be technically suitable for the development of a wind energy facility due to the prevailing wind resources based on on-site data collected for more than a 12-month period using strategically placed 80m and 100m wind monitoring mast. The monitoring confirmed the wind resource and regime on the project site. The proposed project site was also identified by the developer as being technically and commercially feasible i.e. able to offer electricity to the citizens of South Africa at a competitive tariff.

Four sites were initially considered in the lead up to the selection of the project site and was based on internal screening for sites appropriate for wind energy facilities. An internal naming protocol was used, specific to the developer and only used for filing and tracking purposes. One of the considered site was situated within the Koringberg (Moorreesberg) as well as an area within the Akkisberg (Elim) and was discarded primarily due to biodiversity concerns, as both being located within critically endangered vegetation types. Two areas were discarded due to capacity constraints in the vicinity of Veldrift and an area along the West Coast close to Kleinsee.

The Hartebeest Wind Farm project site was selected as the preferred site due to:
» Short distance to a connection point at the Moorreesburg 132/66 kV substation;
» Available transformation capacity;
» The least environmental constraints compared to other sites considered; and
» The area is largely transformed and used for wheat farming. Due to the nature of the wind energy facility, farming practices could still continue without a significant reduction in agricultural output.

The Hartebeest Wind Farm project site was therefore the only site in the area identified as being technically feasible and viable to take forward to further investigation in support of an application for authorisation by way of EIA due to a number of characteristics associated with the site (refer to Section 2.3.3). The environmental feasibility of the project site for the proposed development is to be determined through the EIA process currently being undertaken for the site.

2.3.3. Receptiveness of the site to development of the wind energy facility

The site located south-south-east of the town of Moorreesburg has been identified by the developer as a desirable site based on extensive pre-feasibility analysis of significant areas in the Western Cape Province (refer to Section 2.4 below for more details in this regard). The site displays characteristics which make it a preferred site for a wind energy facility. These include:
Extent of site: the properties desirable for and available for wind farm development cover an area of 3830 ha. This area is sufficient for the proposed development and allows for avoidance of environmental sensitivities should these be present.

Site access: Access to the site is currently possible via existing farm access from the Main Road which transects the northern portion of the project site.

Current land use: The proposed development area was identified as being an area which is potentially suitable for a development of this nature from an environmental perspective. The site is currently being utilised for agricultural purposes (wheat) and only a small portion of the farm is natural vegetation. Minimal biodiversity sensitivities are therefore expected to be present. The potential does however exist for impacts on agricultural potential and activities on the site unless appropriate planning is implemented. However, the proposal for the establishment of a wind energy facility is not viewed to be in conflict (or result in unacceptable opportunity costs) with current and/or planned future land uses. Due to the nature of the facility, the land occupied by the facility is able to be utilised for agriculture once the turbines are in place and operational.

Grid Connection: The proposed project site is located close to the existing Moorreesburg substation and Eskom power line infrastructure, which provides a direct connection point to the electricity grid. The capacity of the power line to be constructed to accommodate the transmission of the power generated at the proposed facility to the electricity grid is to be established by Hartebeest Wind Farm (Pty) Ltd in consultation with Eskom.

Wind resource: This is considered to be the main criteria determining the feasibility of the proposed development, as the resource will affect the efficiency and economic viability of the facility. Wind monitoring is currently taking place on site using a 80m and 100m wind monitoring mast to confirm the wind resource and regime on the site and inform the turbine selection process. Currently the average wind speed is, on average, above 7 m/s at hub height, and is considered to be an excellent resource for wind farm development. The environmental feasibility of the site for the proposed development is to be determined through EIA process currently being undertaken for the site.

Proximity to Towns with a Need for Socio-Economic Upliftment: The project site is located approximately 4km south-south east to the town of Moorreesburg, which will act as a ready source of local labour during construction of the proposed wind energy facility. The Hartebeest Wind Farm is situated within a 50km radius of Malmesbury, Hopefield, Saron and Porterville. Consequently, local labour would be easy to source, which fits in well with the REIPPP Programme’s economic development criteria for socio-economic upliftment.
The Swartland Local Municipality’s unemployment rate is 14.6% and is likely to be linked to the influx of job seekers to the West Coast District Municipality and the Swartland Local Municipality and their inability to find employment. The development of the proposed wind energy facility will create a new avenue for economic and skills development within the West Coast District Municipality and the Swartland Local Municipality.

**Proximity to Access Road for Transportation of Material and Components:**
As material and components would need to be transported to the site during the construction phase of the proposed development, accessibility was a key factor in determining the viability of the project, particularly taking transportation costs (direct and indirect) into consideration and the impact of this on project economics.

Sufficient access is available in the surrounding areas and in close proximity to the site for a development of this nature (i.e. a development which is heavily dependent on the transportation of materials and components). The national road, N7 is aligned on the western boundary and traverses the north western section of the project site. The regional road, R311, is located adjacent to the western boundary and traverses the north western area of the project site. Direct access to the site is possible through a main road which traverses the northern area of the project site. A railway line is located along the western boundary of the project site.

**2.3.4. Benefits of Renewable Energy**

The generation of electricity from renewable energy resources offers a range of potential socio-economic and environmental benefits for South Africa. These benefits include:

**Increased energy security:** Given that renewables can often be deployed in a short timeframe and in a decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality in the short-term, while reducing expensive distribution losses. As a result of the power constraints in the first half of 2015, power generators meant to be the “barely-ever-used” safety net for the system (diesel-fired gas turbines) were running at > 30% average load factor in the first half of 2015. Load shedding occurred during 82 days in the first half of 2015 (out of 181 days). Results of a CSIR Energy Centre study for the period January to June 2015 (CSIR, August 2015), concluded that the already implemented renewable projects (wind and solar) within the country avoided 203 hours of so-called ‘unserved energy’. During these hours the supply situation was so tight that some customers’ energy supply would have had to be curtailed (‘unserved’) if it had not been for the renewables. The avoidance of unserved energy cumulated into the effect that during 15 days from January to June 2015
load shedding was avoided entirely, delayed, or a higher stage of load shedding prevented thanks to the contribution of the wind and PV projects².

**Resource saving:** It is estimated that the achievement of the targets in the Renewable Energy White Paper will result in water savings of approximately 16.5 million kilolitres per annum. As an already water-stressed nation, it is critical that South Africa engages in a variety of water conservation measures, particularly due to the detrimental effects of climate change on water availability. Renewable energy also translates into revenue savings, as fuel for renewable energy facilities is free while compared to the continual purchase of fuel for conventional power stations. Results of a CSIR Energy Centre study for January – June 2015 (CSIR, August 2015) have quantified the contribution from renewable energy to the national power system and the economy over the first 6 months of 2015 compared to the 12 months of 2014:

<table>
<thead>
<tr>
<th>2015 (6 months)</th>
<th>2014 (12 months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R3.60 billion saving in diesel and coal fuel costs</td>
<td>R3.64 billion saving in diesel and coal fuel costs</td>
</tr>
<tr>
<td>200 hours of unserved energy avoided, saving at least an additional R1.20 billion– R4.60 billion for the economy</td>
<td>120 hours of unserved energy avoided, saving at least an additional R1.67 billion for the economy</td>
</tr>
<tr>
<td>Generated R4.0 billion more financial benefits than cost</td>
<td>Generated R0.8 billion more financial benefits than cost</td>
</tr>
</tbody>
</table>

**Exploitation of our significant renewable energy resource:** At present, valuable renewable resources including biomass by-products, solar radiation and wind power remain largely unexploited. The use of these energy flows will strengthen energy security through the development of a diverse energy portfolio in South Africa.

**Economics:** As a result of the excellent resource and competitive procurement processes, both wind power and solar PV power are now proven in South Africa as cheaper forms of energy generation than coal power. They offer excellent value for money to the economy and citizens of South Africa.

**Pollution reduction:** The releases of by-products through the burning of fossil fuels for electricity generation have a particularly hazardous impact on human health and contribute to ecosystem degradation. The use of solar radiation or wind for power generation is a non-consumptive use of a natural resource which produces zero emissions during its operation.

²([http://ntww1.csir.co.za/plsql/ptl0002/PTL0002_PGE157_MEDIA_REL?MEDIA_RELEASE_NO=7526896](http://ntww1.csir.co.za/plsql/ptl0002/PTL0002_PGE157_MEDIA_REL?MEDIA_RELEASE_NO=7526896))
**Climate friendly development:** The uptake of renewable energy offers the opportunity to address energy needs in an environmentally responsible manner and thereby allows South Africa to contribute towards mitigating climate change through the reduction of greenhouse gas (GHG) emissions. South Africa is estimated to be currently responsible for approximately 1% of global GHG emissions (and circa half of those for which Africa is responsible) and is currently ranked 9th worldwide in terms of per capita carbon dioxide emissions. The renewable energy sector saved South Africa 1.4 million tons of carbon emissions over the first 6 months of 2015³.

**Support for international agreements:** The effective deployment of renewable energy provides a tangible means for South Africa to demonstrate its commitment to its international agreements under the Kyoto Protocol, and for cementing its status as a leading player within the international community.

**Employment creation:** The development, procurement, installation, maintenance and management of renewable energy facilities have significant potential for job creation and skills development in South Africa. Employment for South African citizens including people from communities local to the IPP operations in the Northern Cape were 11 652 job years as at the end of June 2015 (Department of Energy. 2015).

**Acceptability to society:** Renewable energy offers a number of tangible benefits to society including reduced pollution concerns, improved human and ecosystem health and climate friendly development.

**Support to a new industry sector:** The development of renewable energy offers the opportunity to establish a new industry within the South African economy, which will create jobs and skill local communities which have potential for further renewable energy projects.

**Protecting the natural foundations of life for future generations:** Actions to reduce our disproportionate carbon footprint can play an important part in ensuring our role in preventing dangerous anthropogenic climate change; thereby securing the natural foundations of life for generations to come. This is the basis of sustainable development.

Hartebeest Wind Farm (Pty) Ltd therefore confirms renewable energy power generation as the preferred activity.

### 2.4. Alternatives Considered in the Scoping Phase

In accordance with the requirements outlined in Appendix 2 of the EIA Regulations 2014, the consideration of alternatives including site and technology alternatives, as well as the “do-nothing” alternative should be undertaken. The follow sections address this requirement.

This Scoping Study identifies environmental sensitivities within this development area which will be used to inform layout footprint alternatives to be assessed in detail by specialist studies in the EIA phase of the process. There is therefore no comparative assessment of alternatives at this stage in the process as information of sufficient detail is not yet available to inform this assessment.

### 2.4.1. Site-specific Alternatives

As a prospective Independent Power Producer, Hartebeest Wind Farm (Pty) Ltd is seeking suitable sites for wind energy facilities across South Africa and has identified suitable sites using the following drivers:

- Wind characteristics (including speed);
- Site accessibility;
- Distance to the nearest grid connection point: a function of power line limits, substation capacity and load flows; and
- An environmental fatal flaws analysis.

Wind resources in the Western Cape are believed to be amongst the best in South Africa. Therefore, the potential to develop wind energy facilities as part of the Western Cape Sustainable Energy Strategy is considered to be high. In terms of the Wind Atlas for South Africa (WASA), the average wind speed as measured across the Province at a height of 12 m is between 5 and 7 m/s (refer to Figure 2.1).

![WASA map. The Moorreesburg area is indicated by the black circle.](image)

**Figure 2.1:** WASA map. The Moorreesburg area is indicated by the black circle.
In light of this potential for wind energy for power generation within the Western Cape, Hartebeest Wind Farm (Pty) Ltd, as an independent power producer, is proposing to establish a commercial wind energy facility on a site near the town of Moorreesburg.

The use of colour shading is used to illustrate the degree of “positive” or the extent of “negative” factors. The dark green areas illustrate areas where wind turbines would face the least constraints in terms of all environmental and planning criteria considered.
Four sites were considered in the lead up to the selection of the project site and was based on internal screening for sites appropriate for wind energy facilities. An internal naming protocol was used, specific to the developer and only used for filing and tracking purposes.

One of the considered site was situated within the Koringberg (Moorreesberg) as well as an area within the Akkisberg (Elim) and was discarded primarily due to biodiversity concerns, as both being located within critically endangered vegetation types. Two areas were discarded due to capacity constraints in the vicinity of Veldrift and an area along the West Coast close to Kleinsee.

The Hartebeest Wind Farm project site was the only site in the area identified as being technically feasible and viable to take forward to further investigation in support of an application for authorisation by way of EIA due to a number of characteristics associated with the site (refer to Section 2.3.3). The environmental feasibility of the project site for the proposed development is to be determined through the EIA process currently being undertaken for the site.

Hartebeest Wind Farm therefore confirms the 3830ha area, ~4km south east of Moorreesburg as the preferred site.

2.4.2. Technology Alternatives

As Hartebeest Wind Farm (Pty) Ltd is an IPP, only renewable energy technologies are being considered. Considering the local resources available (i.e. wind and solar irradiation) for such technologies, the footprint requirements for such developments and the current land use on the site, the site is considered most suitable for the establishment of a wind energy facility. This has been confirmed through the on-site wind measurement campaign undertaken by the developer.

Solar energy technology would not be viable within the preferred site location due to the undulating topography of the landscape as well as the increase development footprint impact it poses on agricultural land. As confirm by on-site wind
measurement campaigns, the wind resource available is greater than the predicted solar irradiance.

Once environmental constraining factors have been determined through the EIA process, and more detailed site-specific wind data is available from the wind monitoring on site, Hartebeest Wind Farm (Pty) Ltd will be considering various wind turbine options. The preferred option will be informed by efficiency as well as environmental impact (such as noise associated with the turbine). In addition, the most optimal layout will be determined in order to maximise the capacity of the site while minimising environmental impacts. The turbines being considered for use at the proposed Hartebeest Wind Farm will be up to 4MW in capacity. The turbines are proposed to have a hub height of up to 120 m, and a rotor diameter of up to 136 m.

Hartebeest Wind Farm therefore confirmed wind energy technology as the preferred technology alternative.

2.4.3. Layout Footprint Design Alternatives

The overall aim of the layout footprint is to maximise electricity production through exposure to the wind resource, while minimising infrastructure, operation, and maintenance costs, and social and environmental impacts. Specialist software is available to assist developers in selecting the optimum position for each turbine. This micro-siting information will inform the specialist impact assessments at the EIA Phase. The planning process will also include the positioning of other ancillary infrastructure, including, but not limited to, access roads, laydown areas, power line and substation site.

An indicative layout has been provided for scoping purposes (refer to Figure 8.1 in Chapter 8). This layout is considered in the context of the broader site to provide assistance in identifying potential impacts and its potential significance for certain assessments and environmental sensitivities for the full extent of the site determined in this scoping study. Once more detailed information is available from an environmental and planning perspective for the broader site, a detailed micro-siting exercise will be undertaken to effectively ‘design’ the wind farm and the turbine positions within the broader study area. Through the process of determining constraining factors and environmentally sensitive areas, the layout of the wind turbines footprint and infrastructure will be planned and adjusted if necessary. A more detailed facility layout will be developed and will be available in the EIA phase as required in terms of EIA Regulations, 2014 - Appendix 3: 2(c) and 3(h)(i) of the Environmental Impact Assessment process.
2.4.4. Grid Connection Alternatives

Planning and design for the transmission of the power generated at the wind energy facility is being undertaken. This will be informed through understanding the local power requirements and the stability of the local electricity network.

The grid connection point for the facility will be finalised based on input from Eskom and the environmental assessment. Two alternatives are being considered at this point of the assessment process:

» Alternative 1: A connection to the existing Moorreesburg 132/66kV substation at 132kV via a 3.5km power line up to 132kV.
» Alternative 2: A connection to the existing Moorreesburg 132/66kV substation at 66kV via a 3km power line up to 132kV.

The footprint of the power line route/s for the grid connection solution/s will be assessed in detail within the EIA phase of the project as required in terms of EIA Regulations, 2014 - Appendix 3:2(c) and 3(h) (i) of the Environmental Impact Assessment process. A corridor of 300m in width will be assessed, within which the most appropriate power line servitude can be aligned.

2.4.5. The ‘do-nothing’ Alternative

The ‘do-nothing’ alternative is the option of Hartebeest Wind Farm (Pty) Ltd not constructing the Hartebeest Wind Farm. This would result in no environment or social impacts as a result of a wind energy facility in this area, i.e. no detrimental impacts but also no positive impacts. As it is suggested that the positive impacts outweigh the detrimental impacts (especially after mitigation), the ‘do-nothing’ alternative is not seen as a desirable alternative.

The electricity demand in South Africa is placing increasing pressure on the country’s existing power generation capacity and the resultant restrictions are severely damaging the economy. There is, therefore, a need for additional electricity generation options to be developed throughout the country. The ‘do nothing’ option in terms of implementing renewable energy projects results in a scenario where a fossil fuel or nuclear facility must rather be developed as the need for power does not go away. Environmental considerations aside, these have long lead times (considerably longer than the time required to implement renewable energy projects) and hence the South African economy and its citizens will suffer. Furthermore, the development of a renewable energy source, as promoted by the South African Government would also not be realised, and the reliance on fossil fuel energy sources would not be reduced, as has been committed to.
The purpose of the proposed wind energy facility is to add new capacity for generation of renewable energy to the national electricity mix and to aid in achieving the goal of a 43% share of all new power generation being derived from independent power producers (IPPs), as targeted by the Department of Energy (DoE). It is fully aligned with government policy – aligns with policy at all three levels of government (see Chapter 2 of this Scoping Report) and for it not to be implemented is at odds with said policies.

The ‘do-nothing’ alternative would result in the additional power from this highly efficient and competitive renewable energy facility not being added to the electricity grid and for the associated socio-economic benefits not being available to enhance the lives of South Africans.

At this time the EAP and Specialists believe that there is no reason for the Hartebeest Wind Farm not to be evaluated further. The “do nothing” option will be further assessed within the EIA phase of the process.

2.5. Wind Energy as a Power Generation Technology

**Wind power** is the conversion of wind energy into a useful form, such as electricity, using wind turbines. The use of wind for electricity generation is a non-consumptive use of a natural resource, and produces an insignificant quantity of greenhouse gases in its lifecycle. Wind power consumes no fuel for continuing operation, and has no emissions directly related to electricity production.

Wind energy is one of the fastest growing electricity generating technologies and features in energy plans worldwide. Operation does not produce carbon dioxide, sulphur dioxide, mercury, particulates, or any other type of air pollution, as do fossil fuel power sources.

Environmental pollution and the emission of CO$_2$ from the combustion of fossil fuels constitute a threat to the environment. The use of fossil fuels is reportedly responsible for ~70% of greenhouse gas emissions worldwide. The climate change challenge needs to include a shift in the way that energy is generated and consumed. Worldwide, many solutions and approaches are being developed to reduce emissions. However, it is important to acknowledge that the more cost effective solution in the short-term is not necessarily the least expensive long-term solution. This holds true not only for direct project cost, but also indirect project cost such as impacts on the environment. Renewable energy is considered a ‘clean source of energy’ with the potential to contribute greatly to a more ecologically, socially and economically sustainable future. The challenge now is ensuring wind energy projects are able to meet all economic, social, and environmental sustainability criteria.
Wind energy has the attractive attribute that the fuel is free. The economics of a wind energy project crucially depend on the wind resource at the site. Detailed and reliable information about the speed, strength, direction, and frequency of the wind resource is vital when considering the installation of a wind farm, as the wind resource is a critical factor to the success of the installation.

**Wind speed** is the rate at which air flows past a point above the earth's surface. Average annual wind speed is a critical siting criterion, since this determines the cost of generating electricity. With a doubling of average wind speed, the power in the wind increases by a factor of 8, so even small changes in wind speed can produce large changes in the economic performance of a wind farm (for example, an increase of average wind speed from 22 km/hr to 36 km/hr (6 m/s to 10 m/s) increases the amount of energy produced by over 130%). Wind turbines can start generating at wind speeds of between 10 km/hr to 15 km/hr (~3 m/s to 4 m/s), with nominal wind speeds required for full power operation varying between ~45 km/hr and 60 km/hr (~12.5 m/s to 17 m/s). Wind speed can be highly variable and is affected by a number of factors, including surface roughness of the terrain.

**Wind power** is a measure of the energy available in the wind.

**Wind direction** at a site is important to understand as it influences the turbulence over the site, and therefore the potential energy output. However, wind turbines can extract energy from any wind direction as the nacelle automatically turns to face the blades into the predominant wind direction at any point in time.

South Africa in general can be considered as having a moderate wind resource as compared to Northern Europe (Scandinavia), Great Britain and Ireland, New Zealand and Tasmania. Typical annual wind speeds range from 15 km/hr to 25 km/hr (4 m/s to 7 m/s) around South Africa's southern, eastern and western coastlines (with more wind typically along the coastline).

The wind speed measurements taken at a particular site are affected by the local topography (extending to a few tens of kilometres from the mast) or surface roughness. This is why local on-site monitored wind speed data is so important for detailed wind farm design. The effect of height variation/relief in the terrain is seen as a speeding-up/slowing-down of the wind due to the topography. Elevation in the topography exerts a profound influence on the flow of air, and results in turbulence within the air stream, and this has to be taken into account in the placement of turbines.

A wind resource measurement and analysis programme is planned to provide measured data and a prediction of the facility's expected energy production over its lifetime. The design (and micro-siting) of a wind farm is sensitive to the
predominant wind directions and wind speeds for the site. Although modern wind turbines are able to yaw to the direction of the wind, the micro-siting must consider the wind direction and strength of the wind in the optimal positioning of the turbines.

Wind turbines typically need to be spaced approximately 2 to 3xD apart, and 5 to 7xD where a turbine is behind another (D = the diameter of the rotor blades). This is required to minimise the induced wake effect that the turbines might have on each other. The micro-sitting of the turbines will be determined using industry software systems once a viable footprint for the establishment of the wind farm has been determined (through the consideration of both technical and environmental criteria), which will automatically consider the spacing requirements.

### 2.5.1. How do wind turbines function

Wind turbines, like windmills, are mounted on a tower to capture the most energy. The kinetic energy of wind is used to turn a wind turbine to generate electricity. At increased height above ground, they can take advantage of the faster and less turbulent wind. Turbines catch the wind's energy with their propeller-like blades. Usually, two or three blades are mounted on a shaft to form a **rotor**. Generally a wind turbine consists of **three rotor blades** and a **nacelle** mounted at the top of a tapered **steel or concrete tower**. The mechanical power generated by the rotation of the blades is transmitted to the generator within the nacelle via a gearbox and drive train.

Turbines are able to operate at varying speeds. The amount of energy a turbine can harness depends on both the wind velocity and the length of the rotor blades. It is anticipated that the turbines utilised for the proposed will have a hub height of up to 84m, and a rotor diameter of up to up to 112 m (i.e. each blade up to 52 m in length). Wind turbines can start generating at wind speed of between 10 km/hr to 15 km/hr (~3 m/s to 4 m/s), with nominal wind speeds required for full power operation varying between ~45 km/hr and 60 km/hr (12.5 m/s and 17 m/s).

The capacity of the wind energy facility will depend on the wind turbine chosen by Hartebeest Wind Farm (Pty) Ltd (turbine capacity and model that will be deemed most suitable for the site). Turbines from up to 4 MW in capacity are being considered for the site. Up to a maximum of 40 turbines are estimated for the project site.

Other infrastructure associated with the facility includes internal service roads, an access road, power line and a small substation (placed within the facility). The construction phase of the wind farm is dependent on the number of turbines erected.
and is estimated at one week per turbine, or in total a maximum of approximately 12 months (including all infrastructure). The lifespan of the facility is approximated at 20 to 25 years.

### 2.5.2. Main Components of a Wind Turbine

The turbine consists of the following major components:
- The rotor
- The nacelle
- The tower
- The foundation unit

![Illustration of the main components of a wind turbine](image)

**Figure 2.3:** Illustration of the main components of a wind turbine

**The Rotor**

The portion of the wind turbine that collects energy from the wind is called the rotor. The rotor comprises of three rotor blades (the approximate rotor diameter is in the range of 132m, and the length of blade is between 40m – 66m long). The rotor blades use the latest advances in aeronautical engineering materials science to maximise efficiency. The greater the number of turns of the rotor the more electricity is produced. The rotor converts the energy in the wind into rotational
energy to turn the generator. The rotor has three blades that rotate at about 15 to 28 revolutions per minute (rpm). The speed of rotation of the blades is controlled by turning the blades to face into the wind (‘yaw control’), and changing the angle of the blades (‘pitch control’) to make the most use of the available wind.

The rotor blades function in a similar way to the wing of an aircraft, utilising the principles of lift (Bernoulli). When air flows past the blade, a wind speed and pressure differential is created between the upper and lower blade surfaces. The pressure at the lower surface is greater and thus acts to "lift" the blade. When blades are attached to a central axis, like a wind turbine rotor, the lift is translated into rotational motion. Lift-powered wind turbines are well suited for electricity generation.

The rotation of the rotor blades produces a characteristic ‘swishing’ sound as the blades pass in front of the tower roughly once a second. The other moving parts, the gearbox and generator, cannot be heard unless the observer is physically inside the turbine tower.

**The nacelle**

The nacelle at the top of the tower accommodates the gears, the generator, anemometer for monitoring the wind speed and direction, cooling and electronic control devices, and yaw mechanism. Geared nacelles generally have a longer form/structure than gearless turbines (as shown in Figure 2.4).

![Figure 2.4: Detailed structure of a typical nacelle of a wind turbine (refer to windenergypros.org).](image)
The tower
The tower is a hollow structure (steel or concrete or a combination of the two materials) allowing access to the nacelle (between 80m and 120m in height). The height of the tower is a key factor in determining the amount of electricity a turbine can generate. Small transformers may occur outside each turbine tower, depending on what make and model of turbine is deemed most suitable for the site. Such a transformer would have its own foundation and housing around it. Alternatively, the transformer could be housed within the tower. The transformers convert the electricity to the correct voltage for transmission into the national energy grid.

The tower on which a wind turbine is mounted is not just a support structure. It also raises the wind turbine so that its blades safely clear the ground and so it can reach the stronger winds at higher elevations. The tower must be strong enough to support the wind turbine and to sustain vibration, wind loading and the overall weather elements for the lifetime of the wind turbine.

The foundation
The foundation is used to secure each wind turbine to the ground. These structures are commonly made of reinforced concrete and are designed to withstand the vertical loads (weight) and lateral loads (wind).

2.5.3. Description of associated infrastructure

Associated infrastructure includes the concrete foundations to support the turbines, cabling between the turbines, an on-site substation, an overhead power line to connect the facility to the electricity grid, internal access roads to each turbine and to the on-site substation; access roads to the site and between project components, concrete batching plant, laydown areas and workshop area / office for control, maintenance and storage.

A summary of the details and dimensions of the planned infrastructure associated with the project is provided in Table 2.2.

Table 2.2: Details or dimensions of typical structures required for the Hartebeest Wind Farm

<table>
<thead>
<tr>
<th>Infrastructure</th>
<th>Footprint and dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of turbines</td>
<td>Up to 40 turbines</td>
</tr>
<tr>
<td>Hub Height</td>
<td>Up to 120m</td>
</tr>
<tr>
<td>Rotor Diameter</td>
<td>Up to 136m</td>
</tr>
<tr>
<td>Project Size</td>
<td>Up to 160 MW</td>
</tr>
<tr>
<td>Area occupied by a substations</td>
<td>~ 50m x 50m, as standard requirement for similar infrastructure.</td>
</tr>
<tr>
<td><strong>Capacity of on-site substation</strong></td>
<td>33kV/132kV</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td><strong>Area occupied by both permanent and construction laydown areas</strong></td>
<td>Is dependent on turbine footprint alternatives. As these areas need to be strategically placed to allow for logistical harmony for the construction, operation and maintenance of the wind energy facility as well as consider sensitivities and stakeholder input.</td>
</tr>
<tr>
<td><strong>Length of internal roads</strong></td>
<td>Up to 25km of internal road linking up to 40 turbine locations</td>
</tr>
<tr>
<td><strong>Proximity to grid connection</strong></td>
<td>Eskom substation is within close proximity of the site locations. The proximity of onsite connection to Eskom substation would be up to 3.5km between the two.</td>
</tr>
<tr>
<td><strong>Concrete bathing plant</strong></td>
<td>50m x 50m</td>
</tr>
</tbody>
</table>

### 2.5.4. Operating Characteristics of a Wind Turbine

A turbine is designed to operate continuously, unattended and with low maintenance for more than 20 years or >120 000 hours of operation. Once operating, a wind farm can be monitored and controlled remotely, with a mobile team for maintenance, when required.

The **cut-in speed** is the minimum wind speed at which the wind turbine will generate usable power. This wind speed is typically between 10 and 15 km/hr (~3 m/s and 4 m/s).

At very high wind speeds, typically over 90 km/hr (25 m/s), the wind turbine will cease power generation and shut down. The wind speed at which shut down occurs is called the **cut-out speed**. Having a cut-out speed is a safety feature which protects the wind turbine from damage. Normal wind turbine operation usually resumes when the wind drops back to a safe level.

It is the flow of air over the blades and through the rotor area that makes a wind turbine function. The wind turbine extracts energy by slowing the wind down. The theoretical maximum amount of energy in the wind that can be collected by a wind turbine's rotor is approximately 59%. This value is known as the Betz Limit. If the blades extracted 100% of the wind’s energy, a wind turbine would not work because the air, having given up all its energy, would entirely stop. Therefore, if a blade were 100% efficient then it would extract 59% of the energy as this is the maximum (due to Betz law). In practice, the collection efficiency of a rotor is not 100%. A more typical efficiency is 35% to 45%. A complete wind energy system incurs losses through friction etc. and modern systems end up converting between 20-25% of the energy in the air into electricity which equates to 34 - 42% of the maximum (due to Betz Law).
Wind turbines can be used as stand-alone applications, or they can be connected to a utility power grid. For utility-scale sources of wind energy, a large number of wind turbines are usually built close together to form a **wind farm**.

### 2.6. Project Construction Phase

The construction phase of the wind farm is dependent on the number of turbines to be erected, but can be estimated at 18 months. The project will create direct construction employment opportunities over this period.

No on-site labour camps are envisaged during the construction period. The most suitable accommodation for construction workers will be identified nearer the time, however it is envisaged that they will be accommodated in the nearby towns such as Moorreesburg, and transported to and from site on a daily basis. Overnight on-site worker presence would be limited to security staff. Services such as waste removal and sanitation will be handled by a contractor whereas electricity will be generated from generator and water will be supplied by the municipality.

Construction is envisaged to begin in 2019 should the project be approved by DEA, allocation granted by Department of Energy, a generating license issued by NERSA, and a Power Purchase Agreement secured with Eskom. In order to construct the proposed wind farm and associated infrastructure, a series of activities will need to be undertaken. The construction process is discussed in more detail below.

#### 2.6.1. Conduct Surveys

Prior to initiating construction, a number of surveys will be required including, but not limited to, geotechnical survey, site survey and confirmation of the turbine micro-siting footprint, survey of the on-site substation site and survey of power line servitude (if applicable) to determine tower locations and all other associated infrastructure.

#### 2.6.2. Establishment of Access Roads to the Site

The proposed project site is accessible from the Main Road which transects the northern portion of the project site. Access/haul roads to the site as well as internal access roads within the site are required to be established prior to the commencement of construction. As far as possible, existing access roads would be utilised to minimise impact, and upgraded where required. Within the site itself, access will be required between the turbines for construction purposes (and later limited access for maintenance). Special haul roads, of up to 11m in width in places if a ‘crawler crane’ is used, may need to be constructed to and within the site to accommodate abnormally loaded vehicle access and circulation during the
construction period. The internal service road alignment will be informed by the final micro-siting/positioning of the wind turbines and are up to 7m wide.

These access roads will have to be constructed in advance of any components being delivered to site, and will remain in place after completion for future access and for maintenance purposes. It is proposed that in preparing the access road, a portion of it (up to 7m in width) will be constructed as a permanent access road and the remainder as a temporary access road that can be de-compacted and returned to its pre-construction condition through rehabilitation.

2.6.3. Undertake Site Preparation

Site preparation activities will include clearance of vegetation at the footprint of each turbine, establishment of the laydown areas (refer to Section 2.6.4 below), the establishment of internal access roads and excavations for foundations. These activities will require the stripping of topsoil, which will need to be stockpiled, backfilled and/or spread on site.

Site preparation will be undertaken in a systematic manner to reduce the risk of open ground to erosion. In addition, site preparation will include search and rescue of floral species of concern (where required), as well as identification and excavation of any sites of cultural/heritage value (where required).

2.6.4. Establishment of Laydown Areas and Batching Plant on Site

Laydown areas will need to be established at each turbine position for the storage of wind turbine components. The laydown area will need to accommodate the cranes required in tower/turbine assembly. Laydown and storage areas will be required to be established for the normal civil engineering construction equipment which will be required on site.

A large laydown area will be required at each position where the main lifting crawler crane may be required to be erection and/or disassembled. Each turbine needs a flat and hardened lay-down area of approximately 40 m x 40 m, needed during the construction process, though this can be less in difficult access terrain. This area would be required to be compacted and levelled to accommodate the assembly crane, which would need to access the crawler crane from all sides. The proposed wind energy facility will require access and internal roads of up 7m in width and no borrow pits will be located on site. Any infilling or depositing materials will be sourced from licenced borrow pits within the surrounding areas. A concrete batching plant of 50m x 50m in extent to facilitate with the concrete requirements for turbine foundations and/or towers construction.
2.6.5. **Construct Foundation**

Concrete foundations will be constructed at each turbine location. Foundation holes will be mechanically excavated to a depth of approximately 2 m. Concrete will possibly be batched at an appropriate location off-site and brought to site when required via ready-mix cement trucks. The reinforced concrete foundation of approximately 15 m x 15 m x 2 m will be poured and support a mounting ring. The foundation will then be left up to a week to cure. If the geological conditions dictate, the use of alternative foundations will be considered (e.g. reinforced piles).

2.6.6. **Transport of Components and Equipment to Site**

The wind turbine, including the tower, will be brought to the site by the turbine supplier likely in sections on flatbed trucks. Turbine units which must be transported to site consist of: the tower (in segments), hub, nacelle, and three rotor blades. The individual components are defined as abnormal loads in terms of Road Traffic Act (Act No 29 of 1989)\(^4\) by virtue of the dimensional limitations (abnormal length of the blades) and load limitations (i.e. the nacelle). In addition, components of various specialised construction and lifting equipment are required on site to erect the wind turbines and need to be transported to site. In addition to the specialised lifting equipment/cranes, the normal civil engineering construction equipment will need to be brought to the site for the civil works (e.g. excavators, trucks, graders, compaction equipment, cement trucks, site offices etc.).

The components required for the establishment of the substation/s (including transformers) as well as the associated infrastructures will also be transported to site as required.

The dimensional requirements of the load during the construction phase (length/height) may require alterations to the existing road infrastructure (e.g. widening on corners), accommodation of street furniture (e.g. street lighting, traffic signals, telephone lines etc.) and protection of road-related structures (i.e. bridges, culverts, portal culverts, retaining walls etc.) as a result of abnormal loading.

The equipment will be transported to the site using appropriate National and Provincial roads, and the dedicated access/haul road to the site itself.

2.6.7. **Construct Turbine**

A large lifting crane will be brought on site. It will lift the tower sections into place. The nacelle, which contains the gearbox, generator, and yawing mechanism, will

\(^4\) A permit will be required for the transportation of these abnormal loads on public roads.
then be placed onto the top of the assembled tower. The next step will be to
assemble or partially assemble the rotor (i.e. the blades of the turbine) on the
ground. It will then be lifted to the nacelle and bolted in place. A small crane will
likely be needed for the assembly of the rotor while a large crane will be needed to
put it in place. It will take approximately 1 week to erect a single turbine, although
this will depend on the climatic conditions as a relatively wind-free day will be
required for the installation of the rotor.

The lifting cranes will be required to move between the turbine sites. The crawler
crane is self-powered and can “crawl” between locations should the ground
conditions allow. When assembled, the crawler crane has a track width of
approximately 11 m, and would require a track of up to 13 m in width to move on.
Because of this, crawler cranes will not be used unless there are no other options
available.

2.6.8. Construct Substation

One substation will be constructed within the site footprint. The turbines will be
connected to the substation via underground cabling. The final position of the
substation will be informed by the final micro-siting/positioning of the wind turbines
as the layout of the turbines will determine the optimum position for the
construction of a substation. The internal substation will be constructed with a
high-voltage (HV) yard footprint of up to 50 m x 50 m.

The proposed substation would be constructed in the following simplified sequence:

Step 1: Survey of the site
Step 2: Site clearing and levelling and construction of access road to substation
site
Step 3: Construction of terrace and substation foundation
Step 4: Assembly, erection and installation of equipment (including
transformers)
Step 5: Connection of conductors to equipment
Step 6: Rehabilitation of any disturbed areas and protection of erosion sensitive
areas.

2.6.9. Connection of Wind Turbines to the Substation

Each wind turbine will be connected to an optimally positioned substation on site
by underground electrical cables. The installation of these cables will require the
excavation of trenches, approximately 1-2 m in depth within which these cables
can then be laid. The underground cables will be planned to follow the internal
access roads, as far as possible.
2.6.10. Establishment of Ancillary Infrastructure

A workshop, contractor’s equipment camp, temporary storage areas and a construction compound may be required to be constructed. Service buildings for site offices, storage and safe refuelling areas are also required. The establishment of these facilities/buildings will require the clearing of vegetation and levelling of the development site and the excavation of foundations prior to construction. A laydown area for building materials and equipment associated with these buildings will also be required.

2.6.11. Connect Substation to Power Grid

The on-site 33/132 kV or 22/132 kV substation will connect either to the existing Moorreesburg 132/66kV substation at 132kV via a 3.5 km overhead 132kV power line or at 66kV via a 3 km overhead 132kV power line. If a power line between the on-site substation and this existing power line is required to be constructed, the authorised route for the power line will be assessed, surveyed, and pegged prior to construction.

2.6.12. Undertake Site Rehabilitation

As construction is completed in an area, and as all construction equipment is removed from the site, the site will be rehabilitated where practical and reasonable. On full commissioning of the facility, any access points to the site which are not required during the operation phase will be closed and prepared for rehabilitation.

2.7. Project Operation Phase

Depending on various factors, power generation is envisaged to begin in 2016. It is anticipated that there will be full time security, maintenance and control room staff required on site.

Each turbine within the wind energy facility will be operational except under circumstances of mechanical breakdown, inclement weather conditions, or maintenance activities. The wind turbine will be subject to periodic maintenance and inspection. Periodic oil changes will be required. Any waste products (e.g. oil) will be disposed of in accordance with relevant waste management legislation.

2.8. Project Decommissioning Phase

The turbine infrastructure which will be utilised for the proposed Wind farm is expected to have a lifespan of approximately 20 - 25 years (with maintenance). Equipment associated with this facility would only be decommissioned once it has reached the end of its economic life or a decision to repower the facility is
considered. The following decommissioning activities have been considered to form part of the project scope.

### 2.8.1. Site Preparation

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

### 2.8.2. Disassemble and Remove Turbines

A large crane will be brought on site. It will be used to disassemble the turbine and tower sections. These components will be reused, recycled, or disposed of in accordance with regulatory requirements. All parts of the turbine would be considered reusable or recyclable except for the blades. The concrete will be removed to a depth as defined by an agricultural specialist and the area rehabilitated, and cables excavated and removed.

Any decommissioning activities will be required to comply with the legislation relevant at the time.
This chapter of the scoping report includes the following information required in terms of Appendix 2:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Relevant Section</th>
<th>Page Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>(e) a description of the policy and legislative context within which the</td>
<td>Legislation, policies, plans, guidelines, municipal development planning frameworks and instruments associated and considered with the development of the Project are included within <strong>Section 3.2</strong> of this chapter and <strong>Table 3.1</strong>.</td>
<td>Page 43; 55</td>
</tr>
<tr>
<td>development is proposed including an identification of all legislation,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>policies, plans, guidelines, spatial tools, municipal development planning</td>
<td></td>
<td></td>
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<tr>
<td>frameworks and instruments that are applicable to this activity and are to</td>
<td></td>
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<td>be considered in the assessment process</td>
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3.1. Strategic Electricity Planning in South Africa

The need to expand electricity generation capacity in South Africa is based on national policy and is informed by on-going strategic planning undertaken by the Department of Energy (DoE). The hierarchy of policy and planning documentation that support the development of renewable energy projects such as wind energy facilities is illustrated in **Figure 3.1**. These policies are discussed in more detail in the following sections, along with the provincial and local policies or plans that have relevance to the development of the proposed Hartebeest Wind Farm.
Figure 3.1: Hierarchy of electricity policy and planning documents

The regulatory hierarchy for an energy generation project of this nature consists of three tiers of authority who exercise control through both statutory and non-statutory instruments – that is National, Provincial and Local levels.

At **National Level**, the main regulatory agencies are:

- **Department of Energy (DoE):** This Department is responsible for policy relating to all energy forms, including renewable energy, and is responsible for forming and approving the IRP (Integrated Resource Plan for Electricity).
- **National Energy Regulator of South Africa (NERSA):** This body is responsible for regulating all aspects of the electricity sector, and will ultimately issue licenses for renewable energy developments to generate electricity.
- **Department of Environmental Affairs (DEA):** This Department is responsible for environmental policy and is the controlling authority in terms of NEMA and the EIA Regulations. The DEA is the competent authority for this project, and charged with granting the relevant environmental authorisation.
- **The South African Heritage Resources Agency (SAHRA):** SAHRA is a statutory organisation established under the National Heritage Resources Act, No 25 of 1999, as the national administrative body responsible for the protection of South Africa’s cultural heritage.
- **Department of Transport – South African Civil Aviation Authority (SACAA):** This department is responsible for aircraft movements and radar, which are aspects that influence renewable energy development location and planning.
- **South African National Roads Agency Limited (SANRAL):** This Agency is responsible for the regulation and maintenance of all national routes.
Department of Water and Sanitation (DWS): This Department is responsible for water resource protection, water use licensing and permits.

The Department of Agriculture, Forestry and Fisheries (DAFF): This Department is the custodian of South Africa’s agriculture, fisheries and forestry resources and is primarily responsible for the formulation and implementation of policies governing the Agriculture, Forestry and Fisheries Sector. This Department is also responsible for the issuing of permits for impacts on protected tree species.

The Department of Science and Technology: This department is the administering authority for the Astronomy Geographical Advantage Act (Act 21 of 2007).

Department of Water and Sanitation: This Department is responsible for water resource protection, water use licensing and permits.

Department of Mineral Resources (DMR): Approval from the DMR is required to use land surface contrary to the objects of the Act in terms of Section 53 of the Mineral and Petroleum Resources Development Act, (Act No 28 of 2002): In terms of the Act approval from the Minister of Mineral Resources is required to ensure that proposed activities do not sterilise a mineral resource that might occur on site.

At Provincial Level, the main regulatory agencies are:

- Provincial Government of the Western Cape – Department of Environmental Affairs and Development Planning (DEA&DP): This department is the responsible authority for review of environmental assessments and development planning applications within the Western Cape. They are the commenting authority for this project.

- Department of Transport and Public Works (Western Cape): This department is responsible for Provincial roads within the Western Cape, and for the granting of exemption permits for the conveyance of abnormal loads on public roads.

- CapeNature: This Department’s involvement relates specifically to the biodiversity and ecological aspects of the proposed development activities on the receiving environment to ensure that developments do not compromise the biodiversity value of an area. The Department considers the significance of impacts specifically in threatened ecosystems as identified by the National Spatial Biodiversity Assessment or systematic biodiversity plans.

- Department of Agriculture: This Department’s involvement relates specifically to sustainable agricultural resource management and land care.

- Heritage Western Cape: The provincial heritage resources authority within the Western Cape. This public entity seeks to identify, protect and conserve the rich and diverse heritage resources of the Western Cape. HWC is mandated to promote co-operative governance between national, provincial and local authorities for the identification, conservation and management of heritage resources.
» **Catchment Management Agencies (CMA):** The Western Cape West Coast Rivers CMA is responsible for evaluating and issuing licenses pertaining to water use.

At **Local Level** the local and municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. In the Western Cape, both the local and district municipalities play a role. The local municipality is the Swartland Local Municipality which forms part of the West Coast District Municipality.

### 3.2. National Policy and Planning

Further to the South African government’s commitment in August 2011 to support the development of 3,725MW of renewable energy capacity, the Department of Energy ("DoE") initiated the Renewable Energy Independent Power Producer Procurement Program ("REIPPPP") to procure renewable energy from the private sector in a series of rounds. To date, the DoE has procured more than 6 000MW of renewable energy capacity from 92 independent producers, with 37 having started commercial operation, adding 1 860MW to the grid.

#### 3.2.1 The Kyoto Protocol, 1997

South Africa’s electricity is mainly generated from coal-based technologies. South Africa accounts for ~38% of Africa’s CO\(_2\) (a greenhouse gas contributing to climate change) from burning of fossil fuels and industrial processes. The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change. South Africa ratified the Kyoto Protocol in 2002. The Kyoto Protocol requires developing countries to reduce its greenhouse gas emissions through actively cutting down on using fossil fuels, or by utilising more renewable resources. Therefore, certain guidelines and policies (discussed further in the sections below) were put in place for the Government’s plans to reduce greenhouse gas emissions. The development of renewable energy projects (such as the proposed Hartebeest Wind Farm) is therefore in line with South Africa’s international obligations in terms of the Kyoto Protocol. A second commitment period commenced from 1 January 2013, and extends to 31 December 2020.

#### 3.2.2 United Nations Framework Convention on Climate Change and COP21 – Paris Agreement

Climate change is one of the major global challenges of the 21st century that require global response. The adverse impacts of climate change include persistent drought and extreme weather events, rising sea levels, coastal erosion and ocean acidification, further threatening food security, water, energy and health, and more broadly efforts to eradicate poverty and achieving sustainable development. Combating climate change would require substantial and sustained reductions in
greenhouse gas emissions (GHGs), which, together with adaptation, can limit climate change risks. The convention responsible for dealing with climate change is called United Nations Framework Convention on Climate Change (UNFCCC).

The UNFCCC was adopted in 1992 and entered into force in 1994. It provides the overall global policy framework for addressing the climate change issue and marks the first international political response to climate change. The UNFCCC sets out a framework for action aimed at stabilizing atmospheric concentrations of greenhouse gases to avoid dangerous anthropogenic interference with the climate system.

The Convention has established a variety of arrangements to govern, coordinate and provide for oversight of the arrangements described in this document. The oversight bodies take decisions, provide regular guidance, and keep the arrangements under regular review in order to enhance and ensure their effectiveness and efficiency. The Conference of Parties (COP), established by Article 7 of the Convention, is the supreme body and highest decision-making organ of the Convention. It reviews the implementation of the Convention and any related legal instruments, and takes decisions to promote the effective implementation of the Convention.

COP 21 was held in Paris from 30 November to 12 December 2015. From this conference, an agreement to tackle global warming was reached between 195 countries. This Agreement shall be open for signature and subject to ratification, acceptance or approval by States and regional economic integration organizations that are Parties to the Convention from 22 April 2016 to 21 April 2017. Thereafter, this Agreement shall be open for accession from the day following the date on which it is closed for signature. The agreement can only enter into force once it has been ratified by 55 countries, representing at least 55% of emissions.

This Agreement, in enhancing the implementation of the Convention, including its objective, aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, by:

(a) Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change;
(b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production;
(c) Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.
In order to achieve the long-term temperature goal set out in Article 2 of the Agreement, Parties aim to reach global peaking of greenhouse gas emissions as soon as possible. Recognizing that peaking will take longer for a developing country and to undertake rapid reductions thereafter in accordance with best available science, so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century, on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty.

In working towards this goal, advanced economies have already included renewables in their energy mix and have planned to increase their use in order to meet their mitigation goals: Japan aims to derive 22-24% of its electricity production from renewable sources by 2030 and the European Union plans for them to reach 27% of its final energy consumption. Developing countries are also playing their part, including South Africa which has included a goal of 17,8GW of renewables by 2030 within the IRP.

South Africa supports the adoption of the Paris Agreement and will be required to communicate a nationally determined contribution to the global response to climate change every five years from 2020.


"Ensuring that an equitable level of national resources is invested in renewable technologies, given their potential and compared to investments in other energy supply options."

The White Paper on Renewable Energy sets out Government’s vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa. It also informs the public and the international community of the Government’s vision, and how the Government intends to achieve these objectives; and informs Government agencies and organs of their roles in achieving the objectives.
South Africa relies heavily on coal to meet its energy needs because it is well-endowed with coal resources in particular. However South Africa is endowed with renewable energy resources that can be sustainable alternatives to fossil fuels, but which have so far remained largely untapped. This White Paper fosters the uptake of renewable energy in the economy and has a number of objectives that include:

- ensuring that equitable resources are invested in renewable technologies;
- directing public resources for implementation of renewable energy technologies;
- introducing suitable fiscal incentives for renewable energy and;
- creating an investment climate for the development of renewable energy sector.

The objectives of the White Paper are considered in six focal areas, namely: financial instruments, legal instruments, technology development, awareness raising, capacity building and education, and market based instruments and regulatory instruments. The policy supports the investment in renewable energy facilities as they contribute towards ensuring energy security through the diversification of energy supply, reducing GHG emissions and the promotion of renewable energy sources.

The White Paper set a target of 10 000GWh to be generated from renewable energy by 2013. The target was reviewed during the renewable energy summit of 2009 held in Pretoria. The summit raised the issue over the slow implementation of renewable energy projects and the risks to the South African economy of committing national investments in the energy infrastructure to coal technologies. Other matters that were raised include potential large scale roll out of solar water heaters and enlistment of Independent Power Producers (IPP) to contribute to the diversification of the energy mix.

### 3.2.4. The National Energy Act (2008)

The National Energy Act was promulgated in 2008 (Act No 34 of 2008). One of the objectives of the Act was to promote diversity of supply of energy and its sources. In this regard, the preamble makes direct reference to renewable resources, including wind:

“To ensure that diverse energy resources are available, in sustainable quantities, and at affordable prices, to the South African economy, in support of economic growth and poverty alleviation, taking into account environmental management requirements; to provide for increased generation and consumption of renewable energies (Preamble).”
The National Energy Act provides the legal framework which supports the development of renewable energy facilities for the greater environmental and social good.

### 3.2.5. The Electricity Regulation Act, 2006 (Act No. 4 of 2006), as amended

The Electricity Regulation Act, 2006, replaced the Electricity Act, 1987 (Act No. 41 of 1987), as amended, with the exception of Section 5B, which provides for the funds for the energy regulator for the purpose of regulating the electricity industry. The Act establishes a national regulatory framework for the electricity supply industry & introduces the National Energy Regulator as the custodian and enforcer of the National Electricity Regulatory Framework. The Act also provides for licences & registration as the manner in which generation, transmission, distribution, trading and the import & export of electricity are regulated.

### 3.2.6. Renewable Energy Policy in South Africa

Internationally there is increasing development of the use of renewable technologies for the generation of electricity due to concerns such as climate change and exploitation of resources. In response, the South African government ratified the United Nations Framework Convention on Climate Change (UNFCCC) in August 1997 and acceded to the Kyoto Protocol, the enabling mechanism for the convention, in August 2002. In addition, national response strategies have been developed for both climate change and renewable energy.

Investment in renewable energy initiatives, such as the proposed wind energy facility, is supported by the National Energy Policy (DME, 1998). This policy recognises that renewable energy applications have specific characteristics which need to be considered. The Energy Policy is “based on the understanding that renewables are energy sources in their own right, and are not limited to small-scale and remote applications, and have significant medium- and long-term commercial potential.” In addition, the National Energy Policy states that “Renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future”.

The support for the Renewable Energy Policy is guided by a rationale that South Africa has a very attractive range of renewable resources, particularly solar and wind, and that renewable applications are, in fact, the least cost energy service in many cases from a fuel resource perspective (i.e. the cost of fuel in generating electricity from such technology); more so when social and environmental costs are taken into account. In spite of this range of resources, the National Energy Policy acknowledges that the development and implementation of renewable energy applications has been neglected in South Africa.
Government policy on renewable energy is therefore concerned with meeting the following challenges:

- Ensuring that economically feasible technologies and applications are implemented;
- Ensuring that an equitable level of national resources is invested in renewable technologies, given their potential and compared to investments in other energy supply options; and
- Addressing constraints on the development of the renewable industry.

3.2.7. National Development Plan

The National Development Plan (NDP) contains a plan aimed at eliminating poverty and reducing inequality by 2030. The NDP identifies 9 key challenges and associated remedial plans. Managing the transition towards a low carbon national economy is identified as one of the 9 key national challenges. Expansion and acceleration of commercial renewable energy is identified as a key intervention strategy.

The proposed project will support many of the objectives of the National Development Plan (NDP). Some of these objectives are listed below:

- Create 11 million jobs by 2030; and
- Procuring about 20 000MW of renewable electricity by 2030.

Infrastructure is a key priority of the NDP, which identifies the need for South Africa to invest in a strong network of economic infrastructure to support the country’s medium- and long-term economic and social objectives. The NDP has been approved and adopted by government and has received strong endorsement from broader society. The plan sets out steps that aim to ensure that, in 20 years, South Africa's energy system looks very different to the current situation: coal will contribute proportionately less to primary-energy needs, while gas and renewable energy resources – especially wind, solar and imported hydroelectricity – will play a much larger role.

3.2.8. Integrated Energy Plan

The development of a national Integrated Energy Plan (IEP) was envisaged in the White Paper on Energy Policy of 1998 and the Minister of Energy, as entrenched in the National Energy Act of 2008, is mandated to develop and publish the IEP on an annual basis. The IEP takes existing policy into consideration and provides a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development.
The IEP takes into consideration the crucial role that energy plays in the entire economy of the country and is informed by the output of analyses founded on a solid fact base. It is a multi-faceted, long-term energy framework which has multiple aims, some of which include:

» To guide the development of energy policies and, where relevant, set the framework for regulations in the energy sector.
» To guide the selection of appropriate technologies to meet energy demand (i.e. the types and sizes of new power plants and refineries to be built and the prices that should be charged for fuels).
» To guide investment in and the development of energy infrastructure in South Africa.
» To propose alternative energy strategies which are informed by testing the potential impacts of various factors such as proposed policies, introduction of new technologies, and effects of exogenous macro-economic factors.

Eight key objectives for energy planning were identified:

» Objective 1: Ensure the security of supply
» Objective 2: Minimise the cost of energy
» Objective 3: Increase access to energy
» Objective 4: Diversify supply sources and primary sources of energy
» Objective 5: Minimise emissions from the energy sector
» Objective 6: Promote energy efficiency in the economy
» Objective 7: Promote localisation and technology transfer and the creation of jobs
» Objective 8: Promote the conservation of water

The IEP recognises the potential of renewable energy for power generation.

3.2.9. Final Integrated Resource Plan 2010 - 2030

The Integrated Resource Plan (IRP) 2010-30 was promulgated in March 2011. The primary objective of the IRP 2010 is to determine the long term electricity demand and detail how this demand should be met in terms of generating capacity, type, timing and cost. However, the IRP 2010 also serves as input to other planning functions, inter alia economic development, and funding, environmental and social policy formulation. The accuracy of the IRP 2010 is to be improved by regular reviews and updates, and a draft revised Plan is currently available for public comment. The IRP 2010 projected that an additional capacity of up to 56 539MW of generation capacity will be required to support the country’s economic development and ensure adequate reserves over the next twenty years. The
required expansion is more than two times the size of the existing capacity of the system.

The current iteration of the Integrated Resource Plan (IRP) for South Africa, initiated by the Department of Energy (DoE) after a first round of public participation in June 2010, led to the Revised Balanced Scenario (RBS) that was published in October 2010. The document outlines the proposed generation new build fleet for South Africa for the period 2010 to 2030. This scenario was derived based on the cost-optimal solution for new build options (considering the direct costs of new build power plants), which was then “balanced” in accordance with qualitative measures such as local job creation. In addition to all existing and committed power plants, the RBS included a nuclear fleet of 9.6 GW; 6.3 GW of coal; 17.8 GW of renewables (including wind and solar); and 8.9 GW of other generation sources. This means that 75% of new generation capacity by 2030 will be derived from energy sources other than coal.

### 3.2.10. Strategic Integrated Projects

In 2010, a National Development Plan was drafted to address socio economic issues affecting development in South Africa. These issues were identified and placed under 18 different Strategic Integrated Projects (SIPs) to address the spatial imbalances of the past by addressing the needs of the poorer provinces and enabling socio-economic development. Amongst these is the green energy in support of South African Economy i.e. SIP 8 (Green energy in support of the South African economy). The SIP aims at supporting sustainable green energy initiatives on national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP, 2010). The proposed Hartebeest Wind Farm is a potential Strategic Infrastructure Project

- **SIP 8: Green energy in support of the South African economy:**
  The proposed Hartebeest Wind Farm is a potential SIP 8 Project and would only become a SIP project if selected as a preferred bidder project by the Department of Energy. SIP 8 supports sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP 2010).

- **SIP 9: Electricity generation to support socioeconomic development:**

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1. The South African Government adopted a National Infrastructure Plan in 2012 with the objective that government aims to transform South Africa’s economic landscape whilst simultaneously creating significant numbers of new jobs, and strengthening the delivery of basic services. The plan also supports the integration of African economies. The SIPs cover social and economic infrastructure across all nine provinces (with an emphasis on lagging regions). The SIPs include catalytic projects that can fast-track development and growth.
The proposed Hartebeest Wind Farm is a potential SIP 9 Project and would only become a SIP 9 project if selected as a preferred bidder project by the Department of Energy. SIP 9 supports the acceleration the construction of new electricity generation capacity in accordance with the IRP2010 to meet the needs of the economy and address historical imbalances.

3.3. Provincial and Local Level Developmental Policy

3.3.1. White Paper on Sustainable Energy for the Western Cape (2010)

The White Paper on Sustainable Energy compliments the Climate Change Strategy and Action Plan, specifically by *inter alia* setting targets for renewable energy generation. The White Paper is currently in Final Draft form. Once approved by Provincial cabinet, it will constitute the formal Western Cape’s policy document on which the Western Cape Sustainable Energy Facilitation Bill will be based. The purpose of the White Paper and the envisaged Bill is to create an enabling policy environment in the Western Cape in order to promote and facilitate energy generation from renewable sources, as well as efficient energy use technologies and initiatives.

The White Paper forms part of PGWC’s strategy to aimed at removing a number of barriers (e.g. energy pricing, legal, institutional, low levels of investment confidence, insufficient knowledge) currently frustrating the province’s energy goals by preventing the adoption and commercialization of clean energy (including electricity generation from renewable sources such as wind and solar) technologies and initiatives. The White Paper notes that, with regard to sources of renewable energy, wind and solar both represent commercially viable options in the province. The document proposes that special focus should be given to these renewables subsectors and specific associated technologies in particular in order to achieve critical mass of installation, and thus drive down establishment costs and ensure permanent employment opportunities.

In summary, the purpose of the White Paper on Sustainable Energy (further referred to as the “White Paper“ in this subsection) is to create an enabling policy environment in the Western Cape in order to promote and facilitate energy generation from renewable sources, as well as efficient energy use technologies and initiatives. This objective forms an integrated part of the Province’s overarching energy policy objectives, namely:

- To ensure medium-term energy security, sufficient in order to support economic growth;
- To reduce energy poverty;
- To increase the efficient use of energy;
• To limit the greenhouse emissions footprint (associated with the use of fossil fuels);
• To decrease reliance on finite fossil fuel resources and associated unpredictable commodity markets.

The White Paper notes that, with regard to sources of renewable energy, wind and solar both represent commercially viable options in the province. The document proposes that special focus should be given to these renewables subsectors and specific associated technologies in particular in order to achieve critical mass of installation, and thus drive down establishment costs and ensure permanent employment opportunities.

3.3.2. Western Cape Draft Strategic Plan (WCDSP) (2014-2019)

The Western Cape Provincial Strategic Plan (WCPSP) was adopted by Cabinet in 2014. It builds upon the 2009-2014 Draft Provincial Strategic Plan (‘Building an Open Opportunity Society for All’) which formed the overarching strategic framework during the incumbent provincial government’s first term in office. The WCDSP 2014-2019 sets out the overarching vision and priorities for its second term in office, i.e. until 2019. It is hoped that the systems, structures and budgets which were put in place during the first term would help facilitate implementation of the new Plan. At the same time, the current Plan reflects provincial government’s (PGWC) shift from a ‘silo-based’ (single department) to a transversal (cross-cutting) approach to government. The five strategic goals identified for the 2014-2019 period are:

» Creating opportunities for growth and jobs;
» Improving education outcomes and opportunities for youth development;
» Increasing wellness and safety, and tackling social skills;
» Enabling a resilient, sustainable, quality and inclusive living environment; and
» Embedding good governance and integrated service delivery through partnerships and spatial alignment.

3.3.4. Western Cape Provincial Spatial Development Framework (2014)

The Western Cape Provincial Spatial Development Framework (PSDF) was approved by MEC Bredell (Local Government, Environmental Affairs and Development Planning) in April 2014. In his Preface to the 2014 PSDF, the MEC indicated that the 2014 PSDF carries the buy-in of all the Provincial Departments to inform and guide their sector planning/spatial development strategies, and is therefore ‘owned’ by all Heads of Department. The 2014 PSDF reflects Provincial Government Western Cape’s (PGWC) new transversal (cutting across departments) approach to government, while providing greater clarity with regard to the planning responsibilities of the three spheres of government.
The PSDF is based on guiding principles, namely:

» Spatial justice
» Sustainability and resilience;
» Spatial efficiency;
» Accessibility; and
» Quality and Liveability.

Under sustainability and resilience, the PSDF notes that land development should be spatially compact, resource-frugal, compatible with cultural and scenic landscapes, and should not involve the conversion of high potential agricultural land or compromise ecosystems.

The PSDF is in response to a number of associated escalating risks, including understanding the spatial implications of known risks (e.g. climate change and its economic impact and sea level rise, flooding and wind damage associated with extreme climatic events); and energy insecurity, high levels of carbon emissions, and the economic impacts of the introduction of a carbon tax.

### 3.3.5. Guidelines for the Management of Development on Mountains, Hills and Ridges in the Western Cape (2002)

The aim of the Guideline is to provide a decision-making framework with regard to developments which include listed activities in terms of National Environmental Management Act Regulations, and which are proposed in an environment which is characterised by mountains, hills and ridges. The Guideline notes that mountains, hills and ridges are subject to a range of development pressures. A guiding framework is therefore needed to control development in these areas. Key reasons listed are:

» Provide catchment areas for valuable water resources;
» Often characterized by unique and sensitive ecosystems;
» Have aesthetic / scenic value; and
» Provide “wilderness” experience opportunities.

The Guideline defines a mountain, hill or ridge as “a physical feature that is elevated above the surrounding landscape”.

The Guideline is divided into 2 sections. The second deals with key decision-making criteria which need to be taken into account when adjudicating the suitability of developments in such areas. Key criteria which are of specific relevance to the proposed wind energy facility include:
Development on the crest of a mountain, hill or ridge should be strongly discouraged;
Preserve landform features through ensuring that the siting of facilities is related to environmental resilience and visual screening capabilities of the landscape;
Adopt the precautionary principle to decision making; and
The criteria used to assess developments in these areas include, amongst others, density of the development, aesthetics, location, value in terms of “sense of place”, character of adjacent land use, character of the general area, and cumulative impacts which may arise from other existing and planned developments in the area.

It should be noted that the proposed Hartebeest Wind Farm project site is located in a landscape characterised by rolling hills in an agricultural setting. However, as indicated above, these Guidelines were developed in 2002 and do not take into account the locational requirements of wind energy facilities (refer to Appendix K).

3.4. District and Local Level Developmental Policy

These strategic policies at the district and local level have similar objectives for the respective areas, namely to accelerate economic growth, create jobs, uplift communities and alleviate poverty. The proposed development is considered to align with the aims of these policies.

3.4.1. West Coast District Municipality Spatial Development Framework (WCSD) (2012-2016)

The vision of the West Coast District IDP (2012-2016) is to provide “A quality destination of choice through an open opportunity society”. The spatial vision contained in WCSDF is “to Promote Sustainable Development, prioritise development in highest growth potential areas, encourage and facilitate development along the key corridors within the West Coast District”. The SDF lists three goals that underpin the West Coast District Spatial Strategy and Vision, namely:

- Goal 1: Enhance the capacity and quality of infrastructure in the areas with the highest economic growth potential, while ensuring continued provision of sustainable basic services to all residents in the District;
- Goal 2: To facilitate and create an enabling environment for employment, economic growth and tourism development, while promoting access to public amenities such as education and health facilities; and
- Goal 3: Enhance and protect the key biodiversity and agricultural assets in the district and plan to minimise the human footprint on nature, while also
mitigating the potential impact of nature (climate change) on the residents of the district.

A sectoral analysis and assessment of the West Coast District Economy identified the key sectors for future growth. Renewable energy has been identified as a key sector. The SDF notes that "wind and solar projects can become a key sector in the study area" and that the manufacturing and distribution of renewable energy components, such as wind turbines, can further promote this sector. With regard to manufacturing, although the sector has contracted since 2008 that there is potential to grow, especially in the context of the Saldanha Bay IDZ, which will enhance industrial development in the area and will create more employment opportunities.

With specific reference to renewable energy the SDF states that the wind resources in the West Coast District are substantial and comparably high in relation to the rest of the country. The region also leads the country in terms of implementation experience with regards to the establishment of a number of wind farms in the WCDM. In addition the Saldannha Harbour, the West Coast District has sufficient infrastructure and capacity to facilitate imported wind turbines.

3.4.2. Swartland Integrated Development Plan (2012-2017)

The 2012-2017 Swartland IDP constitutes the last annual revision of the current 5-year IDP cycle (2012-2017). The 2012-2017 IDP was adopted by Council in May 2012. The mission of the Swartland Municipality is to “promote social and economic stability and growth through the sustainable delivery of services in terms of our legal powers and functions to all our interested parties”. The municipality’ main strategic outcomes include:

» Financially sustainable with well sustained assets.
» Satisfied, involved and well informed clients.
» Effective, efficient, motivated and appropriately skilled workforce.
» Access to affordable and reliable municipal infrastructure.
» Sustainable development of the municipal area (with special emphasis on previously neglected areas).
» A lean, integrated, stable and corruption free Organisation.
» Increased community safety through traffic policing, by-law enforcement and disaster management.

The IDP identifies the following existing trends and concerns with regard to the Municipality: unemployment and under-employment; an increasing gap between rich and poor; inequitable patterns of spatial development; and islands of poverty. A number of root causes are identified, including the prevailing poor economic climate and high levels of local unemployment, which are often linked to low levels
of education and skills. Proposed intervention strategies include support and promotion of education, skills development and training, the growth of the Municipality’s economic sectors with comparative advantage (agriculture, tourism, manufacture), and the promotion of local business development.

3.5. Legislation and Guidelines

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

- EIA Regulations, published under Chapter 5 of NEMA (GNR R982 in Government Gazette No 38282 of December 2014).
- Guidelines published in terms of the NEMA EIA Regulations.
- Provincial Government Western Cape, Department of Environmental Affairs and Development Planning: Guideline for the Management of Development on Mountains, Hills and Ridges in the Western Cape (2002).

Several other Acts, standards or guidelines have also informed the project process and the scope of issues evaluated in the scoping report, and to be addressed in the EIA. Table 3.1 overleaf provides an outline of the legislative permitting requirements applicable to the Hartebeest Wind Farm as identified at this stage in the project process.
### Table 3.1: Relevant legislative permitting requirements applicable to the proposed Hartebeest Wind Farm

<table>
<thead>
<tr>
<th>Legislation</th>
<th>Applicable Requirements</th>
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<tbody>
<tr>
<td>National Environmental Management Act (Act No 107 of 1998)</td>
<td>The EIA Regulations have been promulgated in terms of Chapter 5 of the Act. Listed activities which may not commence without an environmental authorisation are identified within these Regulations. In terms of S24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation. In terms of GN R982, R983, R984 and R985 of December 2014, a Scoping and EIA Process is required to be undertaken for the proposed project.</td>
</tr>
<tr>
<td>Environment Conservation Act (Act No 73 of 1989)</td>
<td>Developments are required to comply with the limits set within the National Noise Control Regulations (GN R154 dated 10 January 1992).</td>
</tr>
<tr>
<td>National Water Act (Act No 36 of 1998)</td>
<td>Water uses under Section 21 of the Act must be licensed, unless such water use falls into one of the categories listed in S22 of the Act or falls under the general authorisation (and then registration of the water use is required). Consumptive water uses may include the taking of water from a water resource and storage - Sections 21a and b. Non-consumptive water uses may include impeding or diverting of flow in a water course - Section 21c; and altering of bed, banks or characteristics of a watercourse - Section 21i.</td>
</tr>
<tr>
<td>Minerals and Petroleum Resources Development Act (Act No 28 of 2002)</td>
<td>A mining permit or mining right may be required where a mineral in question is to be mined (e.g. materials from a borrow pit) in accordance with the provisions of the Act. Requirements for Environmental Authorisation of mining related activities are as detailed within the NEMA EIA Regulations (GNR982 – 985). Section 53 Department of Mineral Resources: Approval from the Department of Mineral Resources (DMR) may be required to use land surface contrary to the objects of the Act in terms of section 53 of the Mineral and Petroleum Resources Act.</td>
</tr>
<tr>
<td>Legislation</td>
<td>Applicable Requirements</td>
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<tr>
<td>Development Act, (Act No 28 of 2002):</td>
<td>In terms of the Act approval from the Minister of Mineral Resources is required to ensure that proposed activities do not sterilise a mineral resource that might occur on site.</td>
</tr>
<tr>
<td>National Environmental Management: Air Quality Act (Act No 39 of 2004)</td>
<td>No air emissions will result from the proposed project and therefore no air emissions license is required to be obtained. Reporting to the Air Emissions Licensing Authority (AELA) on emissions from small boilers (such as may be used for auxiliary power supply sources) would be required. Dust control Regulations have been promulgated under the Air Quality Act. In this regard, a dust monitoring plan may be required to be implemented if required by the AELA.</td>
</tr>
<tr>
<td>National Heritage Resources Act (Act No 25 of 1999)</td>
<td>This Act Provides for the protection of all archaeological and palaeontological sites, and meteorites (S35), the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority (S36), and lists activities which require developers any person who intends to undertake to notify the responsible heritage resources authority and furnish it with details regarding the location, nature, and extent of the proposed development (S38). A heritage permit is required should any sites of heritage significance be impacted by the proposed project.</td>
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| National Environmental Management: Biodiversity Act (Act No 10 of 2004) | » Provides for the MEC/Minister to identify any process or activity in such a listed ecosystem as a threatening process (S53)  
» A list of threatened and protected species has been published in terms of S 56(1) - Government Gazette 29657.  
» Three government notices have been published, i.e. GN R 150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R 151 (Lists of critically endangered, vulnerable and protected species) and GN R 152 (Threatened or Protected Species Regulations).  
» Provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been
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<td>gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GN 1002), 9 December 2011).</td>
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<td>» This Act also regulates alien and invader species.</td>
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<td>» A permit is required to be obtained to impact on any species listed in terms of this Act or associated Regulations.</td>
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<td>» The Department of Environmental Affairs (DEA) published Regulations on Alien and Invasive Species (AIS) in terms of the National Environmental Management: Biodiversity Act, on Friday 1st August 2014. A total of 559 alien species are now listed as invasive, in four different categories. A further 560 species are listed as prohibited, and may not be introduced into the country.</td>
</tr>
<tr>
<td>Conservation of Agricultural Resources Act (Act No 43 of 1983)</td>
<td>» No permitting requirements in terms of this Act are expected to be applicable to the project under investigation.</td>
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<tr>
<td></td>
<td>» Prohibition of the spreading of weeds (S5)</td>
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<td>» Classification of categories of weeds and invader plants (Regulation 15 of GN R1048) and restrictions in terms of where these species may occur.</td>
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<td></td>
<td>» Requirement and methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R1048).</td>
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<tr>
<td>National Forests Act (Act No. 84 of 1998)</td>
<td>» According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that 'no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister’.</td>
</tr>
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<td></td>
<td>» A permit is required to be obtained to impact on any species listed in terms of this Act or associated Regulations.</td>
</tr>
<tr>
<td>National Veld and Forest Fire Act (Act 101 of 1998)</td>
<td>In terms of S12 the applicant must ensure that the firebreak is wide and long enough to have a reasonable chance of preventing the fire from spreading, not causing erosion, and is reasonably free of inflammable material.</td>
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## Legislation

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<th>Applicable Requirements</th>
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| Hazardous Substances Act (Act No 15 of 1973)                              | This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products. Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance
  - Group IV: any electronic product; and
  - Group V: any radioactive material. The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force. |
| National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)   | The Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. The Minister may amend the list by –
  - Adding other waste management activities to the list.
  - Removing waste management activities from the list.
  - Making other changes to the particulars on the list. In terms of the Regulations published in terms of this Act (GN 921 of November 2013), a Basic Assessment or Environmental Impact Assessment is required to be |
## Legislation

**Applicable Requirements**

unekertaken for identified listed activities in support or an application for a waste license.

Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that:

- The containers in which any waste is stored, are intact and not corroded or in any other way rendered unlit for the safe storage of waste.
- Adequate measures are taken to prevent accidental spillage or leaking.
- The waste cannot be blown away.
- Nuisances such as odour, visual impacts and breeding of vectors do not arise; and
- Pollution of the environment and harm to health are prevented.

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<th>National Road Traffic Act (Act No 93 of 1996)</th>
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<tr>
<td>» The technical recommendations for highways (TRH 11): “Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads” outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed.</td>
</tr>
<tr>
<td>» Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts.</td>
</tr>
<tr>
<td>» The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.</td>
</tr>
<tr>
<td>» A permit is required to be obtained for the transportation of abnormal loads.</td>
</tr>
</tbody>
</table>
### Legislation

**Aviation Act (Act No 74 of 1962) 13th amendment of the Civil Aviation Regulations (CARS) 1997**

Any structure exceeding 45m above ground level or structures where the top of the structure exceeds 150m above the mean ground level, the mean ground level considered to be the lowest point in a 3km radius around such structure.

Structures lower than 45m, which are considered as a danger to aviation shall be marked as such when specified.

Overhead wires, cables etc., crossing a river, valley or major roads shall be marked and in addition their supporting towers marked and lighted if an aeronautical study indicates it could constitute a hazard to aircraft.

Section 14 of Obstacle limitations and marking outside aerodrome or heliport – CAR Part 139.01.33 relates specifically to appropriate marking of wind energy facilities.

### Applicable Requirements

**Western Cape Noise Control Regulations: PN 627 of 1998**

The control of noise in the Western Cape Province is legislated in the form of Noise Control Regulations promulgated in terms of section 25 of the Environment Conservation Act No. 73 of 1989.

In terms of Regulation 4 of the Noise Control Regulations: "No person shall make, produce or cause a disturbing noise (greater than 5 dBA), or allow it to be made, produced or caused by any person, animal, machine, device or apparatus or any combination thereof”.


The Nature and Environmental Ordinance 19 of 1974, (as amended by the Western Cape Nature Conservation Laws Amendment Act, Act 2 of 2000) defines the protection status of plants as follows:

- “endangered flora” means flora of any species which is in danger of extinction and is specified in Schedule 3 or Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, 1973; provided that it shall not include flora of any species specified in such Appendix and Schedule 4; (thus all Schedule 3 species)
- “protected flora” means any species of flora specified in Schedule 4 or Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna
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<th>Legislation</th>
<th>Applicable Requirements</th>
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<tbody>
<tr>
<td>Western Cape Transportation Amendment Act of 1996</td>
<td>The provincial MEC may grant permit to undertake works within 200m of the published route upon receipt of a report assessing the potential impacts thereof.</td>
</tr>
<tr>
<td><strong>Standards</strong></td>
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</table>
| Equator Principles 2013                                                  | The Equator Principles is a risk management framework, adopted by financial institutions, for determining, assessing and managing environmental and social risk in projects and is primarily intended to provide a minimum standard for due diligence to support responsible risk decision-making. Should funding for the project by Equator Principles Financial Institutions (EPFIs) be required, the EPs will need to be complied with, whereupon, the following documentation will need to be considered:  
  * The Equator Principles (June 2013)  
  * International Finance Corporations General Environment, Health and Safety |
| International Finance Corporations Performance Standards, 2012            | The Equator Principles’ Social and Environmental Rating Framework integrally derives from the International Finance Corporation (IFC) Performance Standards which were developed to manage social and environmental risks and impacts and to enhance development opportunities. Together, they establish standards that the client is to meet throughout the life of an investment. |
An Environmental Impact Assessment (EIA) process refers to that process (in line with the EIA Regulations) which involves the identification of and assessment of direct, indirect, and cumulative environmental impacts associated with a proposed project/activity. The EIA process comprises two main phases: i.e. Scoping Phase and EIA Phase. The EIA process culminates in the submission of an EIA Report (including an Environmental Management Programme (EMPr)) to the competent authority for decision-making. The EIA process is illustrated below:

The Scoping Phase for the proposed Hartebeest Wind Farm has been undertaken in accordance with the Section 24(5) of the National Environmental Management Act (No 107 of 1998). In terms of the EIA Regulations (2014) of GN R982, a Scoping and EIA Study are required to be undertaken for this proposed project. In accordance with these Regulations, this scoping process aimed at identifying and evaluating potential issues associated with the proposed project, and defining the extent of studies required within the EIA. This was achieved through an evaluation of the proposed project involving consideration of previous assessments undertaken within the area, desk-top specialist studies, limited field surveys, as well as a consultation process with key stakeholders (including relevant government authorities) and interested and affected parties (I&APs).

This chapter serves to outline the process which was followed during the Scoping Phase of the EIA process. This chapter includes the following information required in terms of Appendix 2:
<table>
<thead>
<tr>
<th>Requirement</th>
<th>Relevant Section</th>
<th>Page Reference</th>
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<tr>
<td>(d) a description of the scope of the proposed activity, including (i) all listed and specified activities triggered and (ii) a description of the activities to be undertaken, including associated structures and infrastructure</td>
<td>All listed activities that are triggered through the development of the wind energy facility and a description of the activities to be undertaken are included in Table 4.1 within Section 4.1 of this chapter.</td>
<td>Page 65</td>
</tr>
<tr>
<td>(e) a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process</td>
<td>Legislation, policies, plans, guidelines, municipal development planning frameworks and instruments associated and considered for the development of the wind energy facility is included within Table 3.1 and Section 3.2 of this report.</td>
<td>Page 42; 56</td>
</tr>
<tr>
<td>(h)(ii) details of the public participation process undertaken in terms of Regulation 41 of the Regulations, including copies of the supporting documents and inputs</td>
<td>The public participation process that has been undertaken (including the identification of stakeholders, the registration of interested and affected parties, the distribution of notifications and publishing of adverts, consultation and involvement of the public and the identification and recording of issues and concerns) for the scoping phase of the wind energy facility is detailed within Section 4.3.2 of this chapter and Appendix C of this report.</td>
<td>Page 70</td>
</tr>
<tr>
<td>(h)(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were raised by interested and affected parties will be included within the Comments and Responses</td>
<td>All issues and concerns raised by interested and affected parties will be included within the Comments and Responses.</td>
<td>Appendix C</td>
</tr>
</tbody>
</table>
A previous Environmental Impact Assessment (EIA) process was undertaken for the same project (previously known as the Moorreesburg Wind Farm) in accordance with the EIA Regulations of 2010 (GNR54) (DEA Ref 12/12/20/2200). This process was however not completed. A new EIA process is currently being undertaken in accordance with the EIA Regulations published on 08 December 2014. Information from studies undertaken in the previous EIA process have formed the basis of this Scoping Study.

4.1. Relevant Listed Activities

In terms of the EIA Regulations, 2014 published within GN R983, GN R984 and GN R985, the following 'listed activities' are triggered by the proposed Hartebeest Wind Farm.

Table 4.1: Listed activities triggered by the proposed Hartebeest Wind Farm

<table>
<thead>
<tr>
<th>Number and date of the relevant notice:</th>
<th>Activity No(s) (in terms of the relevant notice):</th>
<th>Listed activity</th>
<th>Description of project activity that triggers listed activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>GN 983, 08 December 2014</td>
<td>11 (i)</td>
<td>The development of facilities or infrastructure for the transmission and distribution of electricity – (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.</td>
<td>The project will entail construction of substations and power line/s with a capacity of &lt;275kV (outside an urban area).</td>
</tr>
<tr>
<td>GN 983, 08 December 2014</td>
<td>12 (xii(c)</td>
<td>The development of – (xii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.</td>
<td>The wind energy facility will include the construction of infrastructure within 32m of a watercourse.</td>
</tr>
<tr>
<td>Number and date of the relevant notice:</td>
<td>Activity No(s) (in terms of the relevant notice):</td>
<td>Listed activity</td>
<td>Description of project activity that triggers listed activity</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-------------------------------------------------</td>
<td>-----------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>GN 983, 08 December 2014</td>
<td>19 (i)</td>
<td>The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from- (i) a watercourse.</td>
<td>The upgrade or construction of road accesses will lead to material being deposited into or removed from watercourses.</td>
</tr>
<tr>
<td></td>
<td>24 (ii)</td>
<td>The development of- (ii) a road with a reserve wider than 13.5 meters, or where no reserve exists where the road is wider than 8 metres</td>
<td>The wind energy facility will require access roads with parts wider than 8m in width, to be constructed outside urban areas as a result of logistical construction vehicle specification and operational requirements.</td>
</tr>
<tr>
<td></td>
<td>56 (ii)</td>
<td>The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre – (ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where the widening or lengthening occur inside urban areas.</td>
<td>The facility will require the widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre to accommodate the logistical construction requirements to access the site and associated infrastructure.</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more.</td>
<td>The wind energy facility will generate an electricity output of more than 20MW. It is expected to generate up to 160MW.</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>The clearance of an area of 20 hectares or more of indigenous vegetation.</td>
<td>The development footprint for the proposed wind energy facility will cover an area greater than 20 hectares and up to 40ha</td>
</tr>
<tr>
<td>Number and date of the relevant notice:</td>
<td>Activity No(s) (in terms of the relevant notice):</td>
<td>Listed activity</td>
<td>Description of project activity that triggers listed activity</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-----------------------------------------------</td>
<td>-----------------</td>
<td>---------------------------------------------------------</td>
</tr>
<tr>
<td>GN 985, 08 December 2014</td>
<td>4(f)(aa)</td>
<td>The development of a road wider than 4 metres with a reserve less than 13,5 metres. (f) In Western Cape: (aa) Areas outside urban areas.</td>
<td>A road wider than 4 m will be constructed. The project site is located in the Western Cape: » Outside urban areas; » In areas containing indigenous vegetation.</td>
</tr>
<tr>
<td>GN 985, 08 December 2014</td>
<td>12(a)(ii)</td>
<td>The clearance of an area of 300 square metres or more of indigenous vegetation; (a) In Western Cape: (i) Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004.</td>
<td>An area of 300 square metres or more of indigenous vegetation cover will be cleared for infrastructure and associated areas. The site is located within a critically endangered ecosystem listed in terms of section 52 of the NEMBA as well as in a critical biodiversity area, due to fragments of intact Renosterveld present on site.</td>
</tr>
<tr>
<td>GN 985, 08 December 2014</td>
<td>14(xii)(a)(f)(ff)</td>
<td>The development of- (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs- (a) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; (f) In Western Cape: Outside urban areas, in: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.</td>
<td>Infrastructure with a physical footprint of 10 square metres or more within 32m of a water course will be required to be constructed. The site is located: » Outside urban areas. » In Critical Biodiversity Areas as identified in systematic biodiversity plans.</td>
</tr>
<tr>
<td>Number and date of the relevant notice:</td>
<td>Activity No(s) (in terms of the relevant notice):</td>
<td>Listed activity</td>
<td>Description of project activity that triggers listed activity</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>-------------------------------------------------</td>
<td>----------------</td>
<td>-----------------------------------------------------------</td>
</tr>
<tr>
<td>GN 985, 08 December 2014</td>
<td>18(f)(i)(aa)</td>
<td>The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. (f) In Western Cape: (i) Outside urban areas, in: (aa) Areas containing indigenous vegetation.</td>
<td>The wind energy facility will require access roads to be upgraded, which will include the widening of the roads as well and lengthening of roads in some areas, thus triggering this activity. The site is located in the Western Cape: » Outside urban areas » In areas containing indigenous vegetation.</td>
</tr>
</tbody>
</table>

On the basis of the above listed activities, a Scoping and an EIA Phase is required to be undertaken for the proposed project. This process is to be undertaken in two phases as follows:

- The Scoping Phase includes the identification of potential issues associated with the proposed project through a desktop study and consultation with affected parties and key stakeholders. Areas of sensitivity within the broader site are identified and delineated in order to identify any environmental fatal flaws, and sensitive or no go areas. Following a public review period of the report, this phase culminates in the submission of a final Scoping Report and Plan of Study for EIA to the DEA.
- The EIA Phase involves a detailed assessment of potentially significant positive and negative impacts (direct, indirect, and cumulative) identified in the Scoping Phase. This phase includes detailed specialist investigations and public consultation. Following public review of the report, this phase culminates in the submission of a Final EIA Report and an Environmental Management Programme (EMPr), including recommendations of practical and achievable mitigation and management measures, to DEA for decision-making.

4.2. Objectives of the Scoping Phase

This Scoping Report documents the evaluation of the potential environmental impacts of the proposed Hartebeest Wind Farm and forms part of the EIA process. The Scoping Phase was conducted in accordance with the requirements of the EIA
Regulations in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998).

This Scoping Phase aims to:

- Identify and evaluate potential environmental (biophysical and social) impacts and benefits of the proposed development (including design, construction, operation and decommissioning) within the broader study area through a desktop review of existing baseline data and specialist studies.
- Identify potentially sensitive environmental features and areas on the site to inform the preliminary design process of the wind energy facility.
- Define the scope of studies to be undertaken within the EIA process.
- Provide the authorities with sufficient information in order to make a decision regarding the scope of issues to be addressed in the EIA process, as well as regarding the scope and extent of specialist studies that will be required to be undertaken as part of the EIA Phase of the process.

The following objectives of the scoping process, through the undertaking of a consultative process and with the assistance of specialist input, have been met.

- Identify the relevant policies and legislation relevant to the project;
- Motivate the need and desirability of the proposed project, including the need and desirability of the activity in the context of the preferred location;
- Identify and confirm the preferred project and technology alternative/s;
- Identify and confirm the preferred site;
- Identify the key issues to be addressed in the EIA phase;
- Agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the project will impose on the preferred site through the life of the project, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and
- Identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

4.3. Overview of the Scoping Phase

The Scoping Phase has been undertaken in accordance with the EIA Regulations published in terms of NEMA in Government Notice 38282 of 4 December 2014 as amended. Key tasks undertaken within the scoping phase included:

- Consultation with relevant decision-making and regulating authorities (at National, Provincial and Local levels).
Submission of the completed application form for authorisation to the competent authority (DEA) in terms of Regulations 5 and 16 of Government Notice R982 of 2014.

Undertaking a public involvement process throughout the Scoping process in accordance with Chapter 6 of Government Notice R982 of 2014 in order to identify issues and concerns associated with the proposed project.

Undertaking of independent specialist studies in accordance with Appendix 6 of Government Notice R982 of 2014.

Preparation of a Scoping Report and Plan of Study for EIA in accordance with the requirements of Appendix 2 of Government Notice No R982 of 2014.

Preparation of a Comments and Response Report detailing key issues raised by I&APs as part of the EIA Process.

The tasks are discussed in detail below.

**4.3.1. Authority Consultation and Application for Authorisation in terms of GNR982 of 2014**

In terms of the Energy Response Plan, the National Department of Environmental Affairs (DEA) is the competent authority for all energy related projects. As the project falls within the Western Cape, the Department of Environmental and Development Planning (DEA&DP) acts as a commenting authority for the project. Consultation with these authorities has been undertaken throughout the Scoping process. This consultation has included the following:

- Submission of the application for authorisation to DEA.
- Submission of the Scoping Report for review by:
  - The competent authority;
  - state department that administers a law relating to a matter affecting the environment relevant to an application for environmental authorisation; and
  - organs of state departments which have jurisdiction in respect of the activity to which this application relates.

A record of consultation undertaken with the competent authority is contained in Appendix B of the Scoping Report. A record of authority consultation undertaken with organ of state departments during the Scoping Phase is included within Appendix C.

**4.3.2. Public Participation Process**

Public participation is an essential and regulatory requirement for an environmental authorisation process and is guided by Regulations under NEMA, specifically Regulations 41 - 44 of the EIA Regulations (GN R982 of December 2014).
The sharing of information forms the basis of the public participation process and offers the opportunity to Interested and Affected Parties (I&APs) to become actively involved in the EIA Process from the outset. The public participation process is designed to provide sufficient and accessible information to I&APs in an objective manner. The public participation process affords I&APs opportunities to provide input into and receive information regarding on the EIA process in the following ways:

» During the Scoping Phase:

* identify issues of concern and suggestions for enhanced benefits;
* verify that their issues have been recorded;
* assist in identifying reasonable alternatives, where required; and
* contribute relevant local information and knowledge to the environmental assessment.

» During the EIA Phase:

* contribute relevant local information and knowledge to the environmental assessment;
* verify that their issues have been considered in the environmental investigations; and
* comment on the findings of the environmental assessments.

» During the decision making phase:

* be advised of the outcome of the competent authority’s decision, and how and by when the decision can be appealed.

The public participation process therefore aims to ensure that:

» Information containing all relevant facts in respect of the application is made available to stakeholders and I&APs.
» Participation is facilitated in such a manner that I&APs are provided with a reasonable opportunity to comment on the proposed development.
» Adequate review periods are provided to I&APs to comment on the findings of the Scoping and EIA Reports.

In terms of the requirement of Chapter 6 of the EIA Regulations of December 2014, the following key public participation tasks are required to be undertaken:

» Fixing a notice board at a place conspicuous to the public at the boundary or on the fence of:

(i) the site where the activity to which the application relates is or is to be undertaken; and
(ii) any alternative site mentioned in the application;

» Giving written notice to:
(i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
(ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
(iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
(iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
(v) the municipality which has jurisdiction in the area;
(vi) any organ of state having jurisdiction in respect of any aspect of the activity; and
(vii) any other party as required by the competent authority.

Placing an advertisement in:

(i) one local newspaper

Open and maintain a register/database of interested and affected parties and organs of state.

Release of a Scoping and EIA Report for Public Review

Preparation of a Comments and Responses Report which documents all of the comments received and responses from the project team.

The following sections detail the tasks which were undertaken as part of the public participation process.

i. Identification of I&APs and establishment of a database

I&APs have been identified through a process of networking and referral, obtaining information from the previous EIA process undertaken and Savannah Environmental’s existing stakeholder databases, liaison with potentially affected parties in the study area and a registration process involving completion of a registration and comment sheet. The key stakeholder groups identified include authorities, local and district municipalities, ward councillors, government bodies and state owned companies, directly affected and adjacent landowners, public stakeholders and non-governmental organisations. An initial list of stakeholders identified and registered is listed in Table 4.2 below:

Table 4.2: List of Stakeholders identified during the Scoping Phase

<table>
<thead>
<tr>
<th>National Government Departments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Agriculture, Forestry and Fisheries (DAFF)</td>
</tr>
<tr>
<td>Department of Communications</td>
</tr>
<tr>
<td>Department of Energy (DoE)</td>
</tr>
<tr>
<td>Department of Environmental Affairs (including the Conservation &amp; Biodiversity Directorate)</td>
</tr>
</tbody>
</table>
As per Regulation 42 of the EIA Regulations, 2014 all relevant stakeholder and I&AP information has been recorded within a database of interested and affected parties (refer to Appendix C for a listing of recorded parties). While I&APs have been encouraged to register their interest in the project from the start of the process, the identification and registration of I&APs will be on-going for the duration of the EIA process. The I&AP database will be updated throughout the EIA process, and will act as a record of the parties involved in the public involvement process.

**ii. Adverts and Notifications**
During the Scoping Phase, newspaper advertisements will be placed to notify and inform the public of the proposed EIA process being undertaken for the proposed Hartebeest Wind Farm, announce the availability of the Scoping Report for review and invite members of the public to submit comments and register as I&APs for this process. These advertisements were placed in the following newspapers:

» The Weslander newspaper on the 09 September 2016; and
» The Cape Times newspaper on the 09 September 2016.

The advertisements will be placed in both English and Afrikaans in order to inform the wider community. Copies of all the advertisement tear sheets will be included within Appendix C of the final Scoping Report which will be submitted to the competent authority.

Site notices (in English and Afrikaans) have been placed on 31 August 2016, in accordance with the requirements of the EIA Regulations, at visible points at the entrance to or boundaries of the affected farm portions and are included within Appendix C.

Other notices were placed at the Moorreesburg Public Library and the West Coast District Municipal Offices. In addition to the advertisements and site notices, key stakeholders and registered I&APs were notified in writing of the commencement of the EIA process and the availability of the Scoping Report. Copies of all the advertisements, site notices and written notifications are included within Appendix C.

iii. Public Involvement and Consultation

In order to accommodate the varying needs of stakeholders and I&APs within the study area, as well as capture their views, issues and concerns regarding the project, various opportunities have been and will continue to be provided in order for I&APs to have their issues noted. I&APs will be consulted through, telephonic consultation sessions, and written, faxed or e-mail correspondence during the Scoping Phase. The Scoping Report has been released for a 30-day review period from 09 September 2016 – 10 October 2016. The comments received from I&APs will be captured within a Comments and Responses Report, and will be included within the final Scoping Report.

A summary of consultation activities undertaken as part of the public participation process to date is provided in Table 4.3 below:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Date</th>
</tr>
</thead>
</table>
### Approach to undertaking the Scoping Phase

<table>
<thead>
<tr>
<th><strong>Scoping Phase</strong></th>
<th><strong>Details</strong></th>
<th><strong>Date</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scoping Phase</strong></td>
<td>Distribution of the letters announcing the EIA process and inviting I&amp;APs to register on the project’s database. These letters were distributed to organs of state departments, ward councillors, affected landowners, neighbouring landowners within the study area and key stakeholder groups.</td>
<td>29 August 2016</td>
</tr>
<tr>
<td></td>
<td>Placement of site notices on-site and at public venues located within the study area.</td>
<td>31 August 2016</td>
</tr>
<tr>
<td></td>
<td>Distribution of notification letters announcing the availability of the Scoping Report for review to I&amp;APs via email notifications and registered post.</td>
<td>09 September 2016</td>
</tr>
<tr>
<td></td>
<td>Distribution of the Scoping Report and notification letters inviting comment on the report via courier to organ of state departments.</td>
<td>09 September 2016</td>
</tr>
<tr>
<td></td>
<td>Placement of advertisements in the Weslander and the Cape Times at the onset of the review period of the Scoping Report</td>
<td>09 September 2016</td>
</tr>
<tr>
<td></td>
<td>30-day review period for the Scoping Report for comment.</td>
<td>09 September 2016 – 10 October 2016</td>
</tr>
</tbody>
</table>

A record of all consultation undertaken is included in **Appendix C**.

#### 4.3.3. Identification and Recording of Issues and Concerns

The Comments and Responses Report includes detailed responses from members of the EIA project team/or project proponent and are included in **Appendix C**. Comments and issues raised during the review of the Scoping Report will be included in the final Scoping Report that will be submitted to the DEA. The Comments and Response Report is include in the final Scoping Report within **Appendix C**.

#### 4.3.4. Public Review of the Scoping Report

The Scoping Report has been made available for public review from **09 September 2016 – 10 October 2016** at the following locations:

- Hard copy at the Moorreesburg Public Library (Main Street, Moorreesburg)
- Hard copy at the West Coast District Municipal Offices (58 Long Street, Moorreesburg)
- Available for download at www.savannahSA.com

All registered I&APs have been notified of the availability of the Scoping Report via email and registered post at the commencement of the review period (refer to **Appendix C**).
4.3.5. Authority comments on the Scoping Report

Organs of State/Authorities who have jurisdiction over matters relating to the environment, as identified in Table 4.2, were invited to comment on the Scoping Report (refer to Appendix C).

4.3.6. Evaluation of Issues Identified through the Scoping Process

Issues (both direct and indirect environmental impacts) associated with the proposed project identified within the scoping process have been evaluated through previous and updated desk-top studies. In evaluating potential impacts, Savannah Environmental has been assisted by the following specialist consultants:

<table>
<thead>
<tr>
<th>Specialist</th>
<th>Area of Expertise</th>
<th>Refer Appendix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simon Todd of Simon Todd Consulting</td>
<td>Ecology</td>
<td>Appendix D</td>
</tr>
<tr>
<td>Ricardo Ramalho Bioinsight South Africa</td>
<td>Avifauna</td>
<td>Appendix E</td>
</tr>
<tr>
<td>Ricardo Ramalho of Bioinsight South Africa</td>
<td>Bats</td>
<td>Appendix F</td>
</tr>
<tr>
<td>Toni Belcher of Blue Science</td>
<td>Hydrology</td>
<td>Appendix G</td>
</tr>
<tr>
<td>Tim Hart of ACO-Associates</td>
<td>Heritage</td>
<td>Appendix H</td>
</tr>
<tr>
<td>Johann Lanz</td>
<td>Soil and Agricultural Potential</td>
<td>Appendix I</td>
</tr>
<tr>
<td>Jon Marshall of Afzelia Environmental Consultants &amp; Environmental Planning and Design</td>
<td>Visual</td>
<td>Appendix J</td>
</tr>
<tr>
<td>Tony Barbour of Tony Barbour Consultants</td>
<td>Social</td>
<td>Appendix K</td>
</tr>
<tr>
<td>Morné de Jager of Enviro-Acoustic Research cc</td>
<td>Noise</td>
<td>Appendix L</td>
</tr>
</tbody>
</table>

The Avifauna, Bats, Hydrology and Visual specialists assessed a “worst-case scenario” layout to inform sensitive areas within the project site.

In order to evaluate issues and assign an order of priority, the following methodology was used to identify the characteristics of each potential issue/impact for each of the proposed project components:

» Identify the **nature** of the potential impact, which includes a description of what causes the effect, what will be affected and how it will be affected.

» Identify the **extent** of the potential impact, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development) or regional.
» Identify sensitive receptors that may be impacted on by the proposed facility and the types of impacts that are most likely to occur.

» Evaluate the significance of potential impacts in terms of the requirements of the EIA Regulations (including (nature, significance, consequence, extent, duration and probability of the impacts, the degree to which these impacts a) can be reversed; (b) may cause irreplaceable loss of resources; and (c) can be avoided, managed or mitigated.

» Identify the potential impacts that will be considered further in the EIA Phase through detailed investigations.

4.3.7. Final Scoping Report

The final stage in the Scoping Phase includes the capturing of responses from stakeholders and I&APs on the Scoping Report in order to refine the report. It is the final Scoping Report upon which the decision-making environmental Authorities provide comment, recommendations and acceptance to undertake the EIA Phase of the process.

4.4. Assumptions and Limitations

The following assumptions and limitations are applicable to the studies undertaken within this Scoping Phase:

» All information provided by the developer to the environmental team was correct and valid at the time it was provided.

» It is assumed that the development site identified by the developer represents a technically suitable site for the establishment of the proposed wind energy facility.

» It is assumed that the proposed connection to the National Grid is correct in terms of viability and need.

» Studies assume that any potential impacts on the environment associated with the proposed development will be avoided, mitigated, or offset.

» This report and its investigations are project-specific, and consequently the environmental team did not evaluate any other power generation alternatives.

Refer to the specialist studies in Appendices D – L for specialist study specific limitations.
This section of the Scoping Report provides a description of the environment that may be affected by the proposed Hartebeest Wind Farm. This information is provided in order to assist the reader in understanding the possible effects of the proposed project on the environment. Aspects of the biophysical, social and economic environment that could be directly or indirectly affected by, or could affect, the proposed development have been described. This information has been sourced from both existing information available for the area as well as collected field data undertaken by specialists who have a working knowledge of the area, and aims to provide the context within which this EIA is being conducted.

This chapter of the scoping report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 2: Content of the Scoping Report:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Relevant Section</th>
<th>Relevant Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>(h)(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects</td>
<td>The environmental attributes associated with the development of the wind energy facility is included as a whole within this chapter. The environmental attributes that are assessed within this chapter includes the following:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The regional setting refers to the location of the site. This is included in Section 5.1.</td>
<td>Page 79</td>
</tr>
<tr>
<td></td>
<td>• The climatic conditions associated with the area, as well as the site. This is included in Section 5.2.</td>
<td>Page 81</td>
</tr>
<tr>
<td></td>
<td>• The biophysical characteristics of the area including topography, hydrology, soil types, agricultural potential and ecological profile. This is included within this chapter under Sections 5.3.</td>
<td>Page 81</td>
</tr>
<tr>
<td></td>
<td>• Heritage features that occur in the region, including archaeological and palaeontological resources. This is included in Section 5.4.</td>
<td>Page 94</td>
</tr>
<tr>
<td></td>
<td>• The visual quality of the area, as well as the effect of the development of the Project on the visual characteristics. This is included in Section 5.5.</td>
<td>Page 95</td>
</tr>
</tbody>
</table>
A more detailed description of each aspect of the affected environment is included within the specialist scoping reports contained within Appendices F - L.

5.1. Regional Setting: Location of the Study Area

The proposed project site for the Hartebeest Wind Farm is located approximately 4km south-south east of Moorreesburg, approximately 35km north east of Malmesbury, south east of Hopefield and south west of Porterville in the Western Cape Province (refer to Figure 5.1). The project site falls within the Swartland Local Municipality (SLM) under the jurisdiction of the West Coast District Municipality (WCDM) and is situated within the farming lands of Moorreesburg (zoned Agriculture I). The Swartland Local Municipality (SLM) is one of the five Local Municipalities that make up the West Coast District Municipality (WCDM). The town of Malmesbury is the administrative seat of the SLM and is located ~ 35km to the south of Moorreesburg.

The N7 and R311 national and provincial roads transect the area proposed for the wind farm in the south-west with a main road (gravel) transecting the site from the west to the east. The N7, situated west of the site, carries significant traffic that would influence the ambient sound levels up to 500 m from this road. There are other small gravel roads leading from the identified larger roads traversing the area.

Access to the site is currently possible via existing farm access from the main road which transects the northern portion of the project site approximately 4km from Moorreesburg.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Relevant Section</th>
<th>Relevant Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The noise quality of the area. This is included in Section 5.6.</td>
<td>Page 96</td>
<td></td>
</tr>
<tr>
<td>• Available access and transportation routes in the region of the study area and surrounding the site. This is included in Section 5.1.</td>
<td>Page 79</td>
<td></td>
</tr>
<tr>
<td>• The social characteristics, including the socio-economic profiles of the regional context and local context. This is included in Section 5.7.</td>
<td>Page 97</td>
<td></td>
</tr>
</tbody>
</table>
Figure 5.1: Map indicating the regional setting of the proposed Hartebeest Wind Farm.
5.2. Climatic Conditions

The average precipitation in this region of the Western Cape is 408 mm per annum, with a peak typically in the winter months. The Mediterranean climate of the Moorreesburg area has the following characteristics (as illustrated in Figure 5.2): i) the mean annual rainfall is about 408 mm, with June typically being the wettest month, averaging at about 64 mm and January being the driest with an average of only 10 mm; ii) the average annual temperature in Moorreesburg is 17.7°C, with February being the warmest (ave. 23°C) and July being the coldest (ave 12°C). The annual evaporation of the site is between 2000 mm and 2200 mm per annum according to Agricultural Geographical Information Systems (AGIS).

![Climate graph for the town of Moorreesburg, Western Cape Province.](image)

5.3. Biophysical Characteristics of the Study Area

The following section provides an overview and description of the biophysical characteristics of the study area and has been informed by specialist studies undertaken for this scoping report.

5.3.1. Topography

The proposed project site is located on land that ranges in elevation from 35m above sea level (a.s.l.) to approximately 320m a.s.l. on the hill crests. The topography of the study area can be described as undulating, typical of the west
coastal plain, with a series of koppies running more-or-less north-south through the centre of the study area.

5.3.2. Hydrology

The main aquatic features within the project site are the Moorreespruit and Sandspruit Tributaries of the middle reaches of the Berg River as well as a smaller tributary at Karnmelksvlei. The tributaries flow in a north easterly direction to join the Berg River upstream of Misverstand Weir. Valley bottom wetland areas occur largely along the Moorreespruit River with small areas within the upper reaches in the other two tributaries in the project site. A small vernal pool also occurs near Krabrivier.

The northern-most and largest tributary, the Moorreespruit rises in the low hills of the Swartland to the south east of Moorreesburg and along the western boundary of the project site. The stream flows in a north westerly and north easterly directly for approximately 40 km over a relatively low gradient catchment that has been largely altered by agricultural activities before joining the Berg River at Misverstand Dam. Moorreesburg is the only large town in the catchment and situated in the middle reaches of the stream.

The other larger tributary and the southern-most tributary in the project site is the Sandspruit River (Figure 5.3). The Sandspruit River is a north easterly flowing seasonal tributary of the Berg River that originates in the western slopes of the Kasteelberg, approximately 4 km west of Riebeek-Wes, which flows for approximately 32 km until it discharges into the Berg River downstream of Kleindrif. Much of the catchment of the river has been transformed by agricultural activities and for much of the river’s length, the riparian zone is reduced to a narrow strip on either side of the river.

Figure 5.3 The Upper Sandspruit Stream at Hartebeestfontein in the south eastern extent of the project site.
The smaller Karnmelksvlei Stream (Figure 5.4) is located between the Moorreespruit and Sandspruit Rivers. It is approximately 17 km in length and discharges into the Berg River at Die Pont just upstream of Misverstand Dam. It consists of a number of smaller tributaries within its upper reaches that drain the low hills of the project site and flow in a north-easterly direction towards the Berg River. As with the other two streams, it is seasonally flowing over a low-gradient catchment that has largely been altered by agricultural activities.

Figure 5.4 The Upper Karnmelksvlei Stream at Biesjesfontein.

5.3.3. Geology and Soils

The soils of the site are residual soils developed on underlying schist, greywacke and phyllite of the Moorreesburg Formation, Malmesbury Group. All soils grade into partially weathered underlying rock with depth, and are limited in depth by this and/or by the development of clay horizons above the rock.

There are six land type classifications across the site (refer Figure 5.5)\(^6\). The most important land types in terms of area of coverage and likely impact are Ab24, Ab23 and Fb548. The three other land types cover only small parts of the site which are unlikely to be impacted by the proposed development. Turbines are ideally proposed to be located toward the higher lying, steeper ground, associated with the north south running ridge identified with land type Fb548, but will be situated on all three of the above land types and will be dependent on sensitivities identified during the impact assessment.

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\(^6\) The land type classification is a nation-wide survey that groups areas of similar soil and terrain conditions into different land types.
The soils of land types Ab24 and Ab23 are predominantly moderately deep to shallow (15 - 120 cm), well-drained, predominantly sandy loams (15-20% clay), but with lighter and heavier soils also occurring. The dominant soil form is Hutton and other soil forms in order of occurrence are Swartland, Mispah and Glenrosa.

The soils of land type Fb548 are associated with higher lying steeper land where there is less soil development on shallow underlying rock. Soils are shallow (30-40cm), well-drained, sandy loams. Rock outcrops cover 45% of the surface area of the land type. In the remaining area, the dominant soil form is Swartland and other soil forms in order of occurrence are, Glenrosa and Mispah.
5.3.4 Agricultural Potential

The proposed project site is located on rolling, cultivated lands and includes some uncultivated land on the steeper hill slopes. Steep slopes of up to 38% occur on the hills.

Land use over the vast majority of the site (but excluding the marginal steep, uncultivated parts that are not used for agriculture) is dryland cultivation of small grains in rotation with grazing. This is by far the dominant land use of the entire surrounding Swartland region. There are no irrigated lands within the project site. Urban and Residential areas are present near the site, in the vicinity of Moorreesburg.

Land capability is the combination of soil suitability and climate factors. Land capability of the different land types within the project site varies from class 3 to class 6 (refer to Appendix I). The natural grazing capacity of the site is given as 26-30 hectares per large stock unit. Potential wheat yield provides a good indication of agricultural potential across the site and is illustrated in Appendix I. It varies from 0 to 4.4 tons per hectare.

5.3.5. Ecological Profile of the Study Area

i. Vegetation

Despite there being a fairly wide variety of vegetation types in the broad area around the project site, the whole site falls within the Swartland Shale Renosterveld vegetation type (Figure 5.7). The other vegetation types are some distance from the site and are not likely to be affected by the development. Swartland Shale Renosterveld forms a large more or less continuous unit covering the Swartland and Boland lowlands, from Het Kruis in the north, southwards between Piketberg and Olifantsrivierberge, widening appreciably in the region around Moorreesburg between Gouda and Hopefield, and encompassing Riebeck-Kasteel, Klipheuwel, Philadelphia, Durbanville, Stellenbosch to the south and Sir Lowry’s Pass Village. Swartland Shale Renosterveld occurs on moderately undulating plains and valleys, supporting low to moderately tall leptophyllous shrubland of varying canopy cover as well as low, open shrubland dominated by renosterbos. Heuweltjies are a typical and prominent feature of the vegetation with low trees and thicket often being associated with the heuweltjies.

ii. Conservation Status

The 2014 Western Cape Biodiversity Framework indicates that all the intact fragments at the site are mapped as CBAs. In addition, the Cape Lowlands
Renosterveld Project (2003), identified Renosterveld priority clusters in the area. The priority clusters consist of Renosterveld remnants which were identified as priority areas based on their known plant and animal species richness, presence of intact ecological process, and habitat connectivity. As such, the priority areas consist of relatively large renosterveld fragments in proximity to one another or positioned along ecological gradients, which are deemed to be critical for conserving biodiversity pattern and process in the Cape Lowlands. Part of the Renosterveld remnants within the site fall within some of the priority clusters, as identified by the Cape Lowlands project, suggesting that these fragments are both locally and regionally significant and any impact to these fragments should be avoided.

Although it does not assign priority to different Renosterveld fragments, the National List of Threatened Terrestrial Ecosystems (2011), with associated GIS layers, is also highly relevant to the current site, given the high threat status of the vegetation types in certain location within the sitearea. The remaining extent coverage available from the BGIS website is based on various landcover maps and provides a map of the current remaining extent of listed vegetation types. Less than 10% of the original extent of Swartland Shale Renosterveld remains and this vegetation type is classified as Critically Endangered within the site area. According to the coverage, there are approximately 114ha of intact remnants within the site. The most significant remnant, which is that identified as part of the priority cluster is 110ha in total extent, about half of which is within the site. The remaining extent of threatened ecosystems and the priority renosterveld clusters are depicted in Figure 5.8.
Figure 5.7: Broad-scale overview of the vegetation in and around the Hartebeest Wind Farm project site.
**Figure 5.8:** Conservation status of remaining vegetation fragments according to the National List of Threatened Ecosystems within the proposed site as mapped by SANBI (2011). The priority renosterveld clusters identified by the Cape Lowlands project are also indicated.
ii. Terrestrial Fauna

Mammals
The site falls within the distribution range of 47 terrestrial mammals, indicating that
the mammalian diversity at the site is potentially moderate, but given the high
level of transformation in the area, the actual number of species present is likely
to be fairly low. Furthermore, there is likely to be a limited variety of habitats
present at the site and as a result, this is also likely to reduce the number of species
which are likely to occur at the site. Diversity of mammals is likely to be closely
linked to the level of vegetation transformation at the site, with diversity within the
cultivated areas being very low compared to the Renosterveld fragments. Species
present in the cultivated areas are likely to restricted to nocturnal species able to
tolerate low vegetation cover such as Steenbok, Cape Gerbil *Gerbilliscus afra* and
African Mole Rat *Cryptomys hottentotus*.

Two listed species occur in the area, the Honey Badger *Mellivora capensis* (SARDB
Endangered) and the White-tailed Mouse *Mystromys albicaudatus* (Endangered).
As both these species are widely distributed in the country, the development of
the site would not constitute significant habitat loss for these species. In addition,
given the high conservation value of the remaining Renosterveld fragments in the
area, the amount of currently intact habitat that would be lost as a result of the
development is likely to be very low.

Reptiles
The site lies in or near the distribution range of 43 reptile species, indicating that
the reptile diversity at the site is likely to be of moderate diversity. Based on
distribution maps and habitat requirements, the composition of the reptile fauna is
likely to comprise the following species: 2 tortoises, 1 terrapin, 19 snakes, 14
lizards and skunks, one chameleon and 6 geckos. Given the low variety of habitats
likely to be present at the site, as well as the high level of transformation, the
diversity of reptiles at the site is likely to be significantly lower than the potential
diversity. Densely vegetated riparian areas and rocky outcrops, if present, are
likely to be the most important areas for reptiles. The intact remnants would clearly
be the most important areas for reptiles and even through the site is heavily
fragmented, the larger patches are likely to harbour fairly diverse reptile
communities, which appear to be more resistant to fragmentation effects than
mammals.

Two Red listed species are known from the area, the Cape Sand Snake *Psammophis
leightoni* (VU) and Geometric Tortoise *Psammobates geometricus*. Although the
Geometric Tortoise is known from the wider area, it is known from east of the site
and is not known to occur within the site itself and as this is a fairly well studied
species, it is not likely that it occurs at the site. If the Cape Sand Snake is present,
it would be associated with the intact remnants and other areas with significant vegetation cover and would not occur within the transformed parts of the site that would be affected by the current development.

**Amphibians**

The site lies within the distribution range of eight amphibian species, of which at least five are highly likely to occur at the site. The only listed species which may occur in the area is the Cape Caco *Cacosternum capense* which is restricted to low lying flat or gently undulating areas with poorly drained clay or loamy soils. There does not appear to be any suitable breeding habitat for this species at the site, but this would need to be confirmed in the field. There are a number of small earth dams at the site as well as a water-filled quarry, all of which would provide breeding habitat for amphibians. Species likely to be present include the Raucous Toad, Cape River Frog and Common Plantanna. Development within the transformed habitats is not likely to have a significant direct impact on amphibians. The proximity of the dams and drainage lines as well as the intact vegetation fragments in general are likely to be the most important areas for amphibians at the site. The major threats to amphibians would stem from increased erosion risk resulting from disturbance associated with the construction phase of the development, as well as pollution related to construction activities and the presence of heavy machinery with the associated risk of fuel and oil spills.

**iii. Bats**

The occurrence of 10 bat species and the potential occurrence of 8 additional species in the study area has been confirmed through a preliminary site visit. Species confirmed include the Egyptian free-tailed bat, Natal long-fingered bat, Egyptian silt-faced bat, Long-tailed serotine, Temminck’s myotis, Cape horseshoe bat, Darling’s horseshoe bat, Robert’s flat-headed bat, Mauritian tomb bat and Cape serotine bat.

Vegetation structure within the landscape will affect the bat distribution in the area. The project site is highly transformed and the natural vegetation is restricted to small pockets in the limits of some drainage areas, steep slopes and hill tops. The area is, therefore, mainly characterized by transformed habitats, represented by agricultural lands used for dry crops in rotation with sheep grazing. Intact Renosterveld (Fynbos biome) pockets could provide refuge and suitable foraging habitat for certain bat species. Three bat species are however highly associated with the type of habitat characteristics of Fynbos areas such as the Cape horseshoe bat, Namibian long-eared bat and the Robert’s flat-headed bat. Other species may be present in the area, based on the terrain features and not for the vegetation structure, which include steep slopes and a quarry which could be suitable habitats for bat roosts. The Natal longfingered bat (*Miniopterus natalensis*), the Temminck’s myotis (*Myotis tricolor*) and Darling’s horseshoe bat (*Rhinolophus darling*) are
examples of species which can be present in these areas due to their preference for roosting in caves and cracks in rocks.

The vegetation description and land use types partially assists in describing the species likely to occur in the study area. Specific features within the landscape will further affect which species occur there. These specifics, or “micro” habitats, are formed by a combination of factors such as vegetation, land cover and man-made structures. Micro habitats will be critically important in siting the proposed turbines within the affected farms.

The following micro habitats were identified during the site surveys and desktop analysis of the area:

- **Wetlands**: Wetlands are characterized by slow flowing water and tall emergent vegetation. Insects such as midges and mosquitoes often breed at wetlands emerging in large numbers, creating a perfect feeding site for many bat species. A number of small wetland-like areas occur on the site in small stands of natural, untransformed vegetation. The Lesueur’s wing-gland bat is specifically associated with wetlands.

- **Dams and reservoirs**: Due to the standing nature of water in dams and reservoirs many insects use dams as breeding sites. The presence of these insects often attracts insect-eating bats. Many active dams and reservoirs occur on the site. The Lesueur's wing-gland bat is specifically associated with wetlands.

- **Hills and mounts**: There are undulating hills within the project site to which most of the natural vegetation is restricted. It is likely that some species such as the following may occur: Egyptian slit-faced bat, Lesser long-fingered bat, Natal long-fingered bat, Temminck's myotis, Long-tailed serotine, Darling's horseshoe bat, Cape horseshoe bat, Geoffroy's horseshoe bat, Egyptian free-tailed bat; Egyptian rousette, and the Egyptian free-tailed bat may be present and may use small cavities between rocks as roosts.

- **Natural vegetation**: The project site is comprised of fairly continuous Renosterbos which occurs along the drainage lines and the steeper slopes/hills. Bat species associated to the Fynbos biome, such as the Cape horseshoe bat, Namibian long-eared bat and the Robert’s flat-headed bat are most likely to be associated to these areas.

- **Man-made structures**: Buildings are favoured by many bat species as safe, dry roost sites. They will often roost in the roofs of these structures. The farm houses, staff houses, and abandoned structures on the site, all present suitable roosting habitat for many bat species such as the Egyptian slit-faced bat, the Cape serotine, the Angolan wing-gland bat, the Egyptian free-tailed bat and the Mauritian tomb bat.

- **Exotic Trees**: Scattered trees, such as those present in the project site, are utilised by the different bat species for roosting by tree-dwelling species such
as the Egyptian silt-faced bat, the Cape serotine, the Egyptian free-tailed bat, or the Robert's flat-headed bat. Trees may also be used as feeding roosts during the night by other bat species, such as the Geoffroy's horseshoe bat, which then roost during the day at separate locations (usually caves or mines).

- **Old quarry**: The steep rocky faces of this feature could be used by certain bat species for roosting (i.e. crevice-roosting bats).

- **Cultivated land**: Agricultural fields in the area are highly seasonal. These are dominated by dry croplands, such as wheat, which in the same year the area is likely to be ploughed, with no vegetation, having tall, complete vegetation in the following months and then cut again. These different phases shelter different insect communities, which are likely to attract bats at key moments (e.g. cereal harvest, ploughing). Some bat species such as Robert's flat-headed bat may take advantage of this feature.

Bats are broadly divided into two groups, insect- and fruit-eating bats. Fruit-eating bats are generally found in the warmer, eastern parts of the country where fruit trees, often of a commercial nature, are commonly found. A number of species do, however, occur in the Western Cape Province and it is possible that some may occur at the study site. Insect-eating bats are found across the entire country, including the study site. Therefore, anything that attracts insects is likely to, in turn, attract bats. For example, wetlands, pans, rivers, dumping sites, and animals such as cows, sheep and horses are all likely to attract both insects and bats and the presence of these features should all be taken into account when considering the siting of wind turbines.

### iv. Avifauna

The bird community in the area is likely to be comprised of several diurnal and nocturnal raptor species, bustard species, several waterbirds, as well as a diverse passerines and small birds. Possible bird species that may be present in the project site include up to 17 species of special conservation concern such as: Black Stork *Ciconia nigra* and Verreauxs' Eagle *Aquila verreauxii* considered Vulnerable, Martial Eagle *Polemaetus bellicosus*, Black Harrier *Circus maurus* and Ludwig’s Bustard *Neotis ludwigii* considered Endangered and Greater Flamingo *Phoenicopterus roseus* and Maccoa Duck *Oxyura maccoa* classified as Near Threatened (Taylor, Peacock & Wanless 2015). Species confirmed at the project site which are endemic to South Africa include, the Cape Long-billed Lark and the Cape Bulbul; 14 other species are near-endemic to South Africa and one species are endemic to South Africa, Lesotho and Swaziland (BLSA 2014).

During the pre-construction monitoring field surveys, 28 species of birds considered sensitive were confirmed on the site and its surroundings. Ten of these species are sensitive due to an unfavourable conservation status, i.e.: Greater Flamingo (*Phoenicopterus roseus*), Lesser Flamingo (*Phoeniconaias minor*), Secretarybird
(Sagittarius serpentarius), Verreaux’s Eagle (Aquila Verreauxii), Martial Eagle (Polemaetus bellicosus), African Marsh Harrier (Circus ranivorus), Black Harrier (Circus maurus), Lanner Falcon (Falco biarmicus), Blue Crane (Anthropoides paradiseus) and Ludwig’s Bustard (Neotis ludwigii).

The project site is associated to the Fynbos biome vegetation type and major biotope. This biome is characteristic of higher altitudes and are present in the bottom and top of the mountains. The main land use is for cereal production combined with sheep and cattle grazing, which have resulted in the natural habitats being highly transformed. Some tree stands appear scattered throughout the project site and hills covered with natural vegetation add steep slopes to the otherwise gently undulated landscape.

“Micro” habitats are formed by a combination of factors such as vegetation, land use, and other features. These micro habitats will be critically important in siting the proposed turbines within the affected farms. The following micro habitats are present in the project site:

» **Swartland Shale Renosterveld (Fynbos biome):** Associated to areas with undulating plains and valleys which support low to moderately tall leptophyllous shrubland of varying canopy cover as well as low, open shrubland dominated by renosterbos (Mucina & Rutherford, 2006).

» **Wetlands and dams:** Farm dams, such as those identified in the project site, accommodate communities of large bird species such as Cormorants, Grebes, Herons or Ibises which may use them as stepping stones during their movements or as feeding or roosting areas. These water bodies may attract predatory birds trying to feed on the waterbirds.

» **Hills and mounts:** Raptors and other aerial species may find suitable currents for flight near hills and mounts, which may be used for undertaking regular movements across the project site. These areas will usually present natural vegetation that may well serve as shelter for species raptors may prey upon. Other smaller bird species conditioned by the occurrence of natural vegetation may be found in the area as well.

» **Exotic trees:** Exotic trees, such as Eucalyptus trees, create attractive habitat for priority species such as Black Sparrowhawk, Yellowbilled Kite and Jackal Buzzard. These stands can also provide roosts and nesting sites for different species such as raptors, geese or ibises.

» **Old Quarry:** An old quarry is situated to the north of the proposed project site. The steep rocky faces of this feature could be used by certain raptor as well as swifts, martins and swallows as a nesting and/or roosting habitat.

» **Agricultural fields:** Highly seasonal, these transformed habitats, dominated by wheat, may attract seed eaters such as Blue Cranes after the harvesting and also foraging raptors during and immediately after ploughing. Wheat can also give an appropriate nesting shelter for some species such as the Blue Crane.
Food and water supplements given to cattle and sheep may attract large number of birds, such as Egyptian and Spurwinged Geese and also Blue Cranes, storks, egrets or herons.

5.4. Heritage and Palaeontology

5.4.1. Palaeontology

No known palaeontological resources are present in this area, as it is all underlain by Malmesbury Shale known to be poor in palaeontological resources. The shales are among the oldest rocks in the Cape Province and pre-date most life forms. This means that they are very unlikely to contain fossil remains. The superficial deposits in the project site are soils that are derived from un-fossiliferous Malmsbury shale. Later fossils are known from the calcareous deposits on the West Coast near Hopefield and Duynefontein emanating from sediments relating to the Springfontein formation. However, there are no Springfontein or calcareous deposits in the project site.

5.4.2. Archaeology

The environment within the study area has been transformed by agriculture for more than 2 centuries. In-situ archaeological resources are extremely sparse, but it is expected that at least some Early Stone Age artefacts could be present in the fields. Later Stone Age sites may be found along water courses. It is possible that some historical archaeological resources may be present close to the various farmsteads in the project site.

Built environment

A survey of deeds of the land parcels involved in the project, indicates that all the land that makes up the project site derives from 3 parent farms Zwartfontein, Biesjiesfontein and Tontelfontein which were formalized as grants from quitrent farms in 1818-1835. It is therefore possible that the farms were inhabited and worked before this time.

Many farm building complexes occur in the area with at least 14 complexes of farm buildings occurring on or close to the project site. The conservation status of these buildings needs to be assessed during the EIA process. Although there is a high likelihood that they are greater than 60 years of age, all appear to have been adapted and modified over time.

Graves and graveyards

Farm graveyards are known to occur in the area. A cemetery is situated on close to the southern boundary of the project site. Given the shale substrate, isolated unmarked pre-colonial graves are very unlikely to occur.
**Landscape**

The cultural landscape is one of agriculture (wheat and livestock) with farmsteads and blue gum plantations dotted around and on the various hills. The gum plantations, although not very tall, add vertical components to the landscape and increase the visual clutter.

**Visual landscape**

The proposed project will be visible from the N7 which can be considered a significant scenic route.

5.5. Visual Quality

Landscape character is defined as “a distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another”. Landscape Character is a composite of a number of influencing factors including:

- Landform and drainage;
- Nature and density of development; and
- Vegetation pattern.

**Landform and Drainage**

The study area is located on the eastern edge of the Western Cape coastal plain. The dominant topographical unit or terrain type is slightly undulating plains, with a series of koppies running in a roughly north-south direction through the centre of the project site. The proposed site is also located on a series of ridgelines that run through the koppies. There are several secondary ridgelines with a similar elevation to the main landform. These run in an approximate east west direction and are likely to have a modifying effect on visibility of the proposed development.

Approximately 30km to the west of the site, a remnant dune formation rises above the coastal plain to a level of approximately 150 – 300 m a.s.l. With the ridgeline located within the proposed site, this has the effect of creating a broad north south running valley. Approximately 30km to the east of the site is the Cederberg mountain range. This landform is steep sided and rises to an elevation in excess of 1000ma.s.l. This range also forms a broad north south running valley with the ridgeline on which the site is located. The Koringberg Mountain lies further to the north, approximately 10.2km from the site.

**Nature and Density of the Development**

Development within the study area can be divided into the following types namely:

- **Urban development** including the settlement of Moorreesburg that lies approximately 4km to the north west of the proposed projects site. Moorreesburg is a thriving rural town with a reasonably diverse economy and
has a district centre with District and Local Municipal offices. Its largest economic sector is probably agricultural servicing but it also has a small light industrial component being the home of one of the largest window and door manufacturers in the country. There is a small tourism sector evident with a limited number of guest houses. The town is laid out in a standard grid format with roads running both along contours as well as directly down the slope on which they are located. This results in some roads having channelled views towards the proposed project site. The numerous street trees do however minimise this view of the surrounding landscape from within the settlement.

> **Agricultural development** is the main development type surrounding the proposed site. The main agricultural activity surrounding and including the site is wheat production. This results in an open arable landscape within which the main elements that are likely to influence visibility of the proposed development are the minor ridgelines and valleys that bisect it. Within the matrix of wheat fields, numerous farmsteads are located that include farmhouses, workers accommodation, storage and farm working areas. The farm houses and accommodation areas are often surrounded by trees that were possibly planted as wind breaks as well as for ornamental reasons.

> **Industrial development** is not very obvious in the landscape outside Moorreesburg however, there are four industrial facilities that are worthy of note including;

- A large quarry area that is active and located within the north eastern section of the site overlooking Moorreesburg.
- The substation into which the proposed wind project will connect. This is a relatively large facility in excess of 1ha in extent located on the R311 close to its junction with the N7. There are currently five existing power lines that connects to the Moorreesburg Substation.
- Two existing wind farm developments namely one at Hopefield approximately 30km to the north west of the proposed site and one close to Gouda approximately 30km to the south east of the proposed site.

### 5.6. Noise Quality

The topography can be described as slightly undulating plains. There are no topographical features that will limit the propagation of noise from the facility. The N7 and R311 national and provincial roads transect the area proposed for the wind energy facility in the south-west with a gravel road transecting the site from the west to the east. The N7 carries significant traffic that could influence the ambient sound levels up to 500 meters from this road. There are other small gravel roads leading from the identified larger roads traverse the area but traffic on them is considered to be insignificant.
PROPOSED HATTEBEEST WIND FARM NEAR MOORREESBURG, WESTERN CAPE PROVINCE
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The closest community is the town of Moorreesburg, located approximately 4km north west from the closest wind turbine of the proposed project site. The land use is mainly agricultural. As the night-time noise environment is of particular interest in this document, current land use activities are not expected to impact on the current ambient sound environment. Apart from the N7, there are no other noise sources of significance in the area. Based on the available information, the study area would have a rural character in terms of the ambient sound levels.

5.7. Social Characteristics of the Study Area and Surrounds

5.7.1. Socio-demographic profile of the study area population

The proposed Hartebeest Wind Farm is situated in the Swartland Local Municipality (SLM) in the Western Cape Province. The SLM is one of five constituent Local Municipalities that make up the West Coast District Municipality (WCDM). The administrative seat of the WCDM and SLM are located in Moorreesburg (located within the SLM area) and Malmesbury respectively.

i. Population

The population of the SLM increased from 72,115 in 2001 to 113,762 in 2011 with an average annual growth rate of 3.5%. The population of the WCDM increased from 282,672 in 2001 to 391,766 in 2011 with an average annual growth rate of 3.26%. The increase in the population in both the WCDM and SLM was largely linked to an increase in the economically active 15-65 year age group.

Swartland LM was the second fastest growing municipality in the Western Cape over this period (apart from the Cape Town metro) and is now the sixth largest municipality in the Western Cape of the 24 municipalities (apart from the Cape Town metro). In terms of demographics, 64.8% of the population is Coloured, 18.3% Black African, 15.6% White and 1.3% Other.

ii. Education

The education levels in both the WCDM and SLM improved between 2001 and 2011, with the percentage of the population over 20 years of age with no schooling in the SLM decreasing from 10.6% to 6.0%. For the WCDM, the decrease was from 9.51% to 5.4%. The percentage of the population over the age of 20 with matric also increased in both the WCDM and SLM, from 19.1% to 23.7% in the WCDM and 19.7% to 24.2% in the SLM. The matric pass level in the WCDM and SLM is however lower than the provincial average of 28.1%.
iii. Employment and skills levels

The official unemployment rate in both the WCDM and SLM increased between 2001 and 2011. In the WCDM the rate increased from 13.8% to 14.6% whereas in the SLM the rate increased from 10.2% to 12.7%. Youth unemployment in both the WCDM and SLM also increased over the same period. These increases are likely to be linked to the influx of job seekers to the WCDM and SLM and their inability to find employment. However, the unemployment and youth unemployment rates in the WCDM and SLM are lower than the provincial figures of 21.6% and 29.0% respectively. In addition, job losses are likely to be associated with the decline in the role of the agriculture sector and the subsequent loss of employment opportunities in this sector.

iv. Household Incomes

Based on the data from the 2011 Census, 10.5% of the population of the SLM have no formal income, 1.7% earn between 1 and R 4 800, 2.6% earn between R4 801 and R9 600 per annum, 13.4% between R9 601 and R19 600 per annum and 21.7% between R19 600 and R38 200 per annum (Census 2011). The poverty income datum for households is linked to the number of household members. According to this yardstick, the average poor South African household (5.1 people) requires R1 637/ month just to subsist, and R3 162/ month to meet the most basic of food and other needs. Based on this measure ~ 50% of the SLMs population lives close to or below the poverty line. The low income levels are a major concern given that an increasing number of individuals and households are likely to be dependent on social grants. The low income levels also result in reduced spending in the local economy and less tax and rates revenue for the district and local municipality.
This chapter serves to describe environmental issues and potential impacts (direct, indirect and cumulative impacts) that have been identified to be associated with the proposed Hartebeest Wind Farm and associated infrastructure, and to make recommendations for further studies required to be undertaken in the EIA phase. The scoping process has involved review of existing information (including previous detailed studies undertaken), limited field work, input from the project proponent, stakeholders, and the public.

Environmental issues associated with construction and decommissioning activities may include, among others, impacts on biodiversity (fauna, flora and ecological integrity), loss of habitat, soil erosion, and impacts on the social environment and current land use. Environmental issues specific to the operation of a wind energy facility could include visual impacts; noise produced by the spinning of rotor blades; avian mortality resulting from collisions with blades, and mortality, injury, and disturbance to other faunal species (e.g. bat mortality because of barotrauma).

The significance of impacts associated with the Hartebeest Wind Farm and its associated infrastructure is dependent on site-specific factors, and therefore impacts can be expected to vary significantly from site to site. Sections 6.3 and 6.4 provide a summary of the findings of the scoping study undertaken for the construction and operation phases of the proposed Hartebeest Wind Farm. Impacts of the proposed facility are described and evaluated, and recommendations are made regarding further studies required within the EIA Phase of the process.

In identifying and evaluating impacts associated with the proposed project, it has been assumed that during the operational phase the area affected will be limited and will comprise:

- Up to 40 wind turbines of up to 4MW in capacity each, with a maximum hub height of up to 120m and a rotor diameter of up to 136m;
- Concrete foundations to support the turbines;
- Cabling between the turbines, to be laid underground where practical;
- An on-site substation of approximately 50m x 50m in extent to facilitate the connection between the wind energy facility and the electricity grid;
- An overhead power line to connect the facility to the electricity grid. Two alternatives are being proposed:
  * Alternative 1: A connection to the existing Moorreesburg 132/66kV substation at 132kV via a 3.5km power line of up to 132kV.
  * Alternative 2: A connection to the existing Moorreesburg 132/66kV substation at 66kV via a 3km of up to 132kV.
- Internal access roads to each turbine and to the on-site substation;
- Access roads to the site and between project components;
- Workshop area / office for control, maintenance and storage; and
- Temporary infrastructure including a concrete batching plant of 50m x 50m in extent to facilitate with the concrete requirements for turbine foundations and/or towers construction and laydown areas.

During construction, an area within the study area of approximately 3830 ha could experience some level of disturbance and impact as a result of the required activities on site. However, once construction is complete, it is expected that less than 1% of this area will be permanently impacted by infrastructure associated with the wind farm.

The cumulative impacts associated with the proposed facility are expected to be associated with the scale of the project, i.e. up to a maximum of 40 turbines could be located within the proposed project site. The potential for cumulative impacts associated with multiple facilities in the area are expected to be associated predominantly with the potential for visual impact, potential impacts on ecology, avifauna (birds) and bats in the surrounding area, and impacts on land use and the social environment within the vicinity of the project.

Specialist scoping reports are included within Appendix D to L wherein the potential issues relating to the project are identified. A discussion of the potential cumulative impacts associated with the proposed project at this stage of the process is presented in Section 6.6.

### 6.1. Legal Requirements as per the EIA Regulations, 2014

This chapter of the scoping report includes the following information required by Appendix 2: Content of the Scoping Report of the EIA Regulations, 2014 (GNR982):

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Relevant Section</th>
<th>Page Reference</th>
</tr>
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<tbody>
<tr>
<td>(h)(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts (aa) can be reversed (bb) may cause irreplaceable loss of resources and (cc) can be avoided, managed or mitigated.</td>
<td>The impacts and risks identified for both the construction and operation phases are included within Section 6.3 and Section 6.4.</td>
<td>Page 103; 133</td>
</tr>
</tbody>
</table>
6.2. **Methodology for Impact and Risk Assessment during the Scoping Phase**

The following methodology was used to describe and evaluate the main issues and potential risks and impacts associated with the proposed Hartebeest Wind Farm during the scoping phase:

» The identification of potential sensitive environments and receptors that may be impacted on by the proposed development and the types of impacts (i.e. direct, indirect and cumulative\(^7\)) that are most likely to occur. This was achieved through a review of existing baseline information, desk-top investigations and limited field work.

» Description of the nature, significance, consequence, extent, duration and probability of potential impacts, as well as the degree to which these impacts

---

\(^7\) A cumulative impact refers to the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities (Environmental Impact Assessment Regulations, 2014).
are reversible, may cause irreplaceable loss of resources and can be avoided, managed or mitigated during the construction and operation phases.

» The identification of potential risks to the development and the environment, and identification of ‘No-Go’ areas within the broader site, where applicable.

» The compilation of a summary of the potential impacts that will be considered further in the EIA Phase through specialist assessments.
6.3. Evaluation of potential impacts associated with the Construction Phase

6.3.1. Potential impact on ecology

According to the national vegetation map (Mucina & Rutherford 2006), the site falls within the Swartland Shale Renosterveld vegetation type. There are no other vegetation types in proximity of the site that might be affected by the development. Swartland Shale Renosterveld forms a large more or less continuous unit covering the Swartland and Boland lowlands, from Het Kruis in the north, southwards between Picketberg and Olifantsrivierberge, widening appreciably in the region around Moorreesburg between Gouda and Hopefield, and encompassing Riebeck-Kasteel, Klipheuwel, Philadelphia, Durbanville, Stellenbosch to the south and Sir Lowry’s Pass Village.

The majority of the site comprises highly transformed habitats of low sensitivity. There are however some significant remnant patches of Swartland Shale Renosterveld within the site (refer to Figure 6.1). This vegetation type is classified as Critically Endangered. Furthermore, the large Renosterveld remnant present within the site has been identified as being part of a priority renosterveld cluster with regional significance for biodiversity pattern and process. More than 100 listed species are known from the area, which further highlights the likely sensitivity of the intact Renosterveld fragments at the site. This potentially includes almost 70 species of high conservation concern and 33 species of moderate concern. Development within such areas clearly represents a red flag for the development and should be avoided as far as possible. In terms of fauna, there are not likely to be many listed species in the area. The high level of transformation in the area and the low diversity of habitats at the site are likely to limit faunal diversity at the site. Listed species which may occur at the site include the Honey Badger, White-tailed Mouse, Cape Sand Snake, Geometric Tortoise, Cape Caco. Given the relatively limited footprint of the development and the highly impacted nature of the area, it is not likely that the development would have a significant impact on fauna.

<table>
<thead>
<tr>
<th>Impact: Impacts on ecology</th>
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</thead>
<tbody>
<tr>
<td>There are certainly many listed plant species present within the intact Renosterveld fragments which would be impacted if any development were to occur in these areas. Under the current layouts, impacts are likely to be low, but would become very high should any intact Renosterveld be impacted.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transformation of intact vegetation</td>
<td>Loss of intact vegetation and listed plant species</td>
<td>Local</td>
<td>All intact vegetation remnants.</td>
</tr>
</tbody>
</table>

Description of expected significance of impact
Provided that significant impact to the intact fragments can be avoided, then this impact would be maintained at a low level. All remnant vegetation is critically endangered and all fragments are considered irreplaceable. Impact to these areas would be considered irreversible and leading to irreplaceable loss of resources. The only mitigation would be a avoid impact to these areas.

**Gaps in knowledge and recommendations for further study**

The current study is based on a desktop review of the available information as well as a site visit. The site is however strongly seasonal and as the site visit took place during the summer months, it was very dry and the vegetation was largely dormant. As a result, the intact vegetation fragments at the site could not be adequately characterized as a large proportion of the species are annuals and geophytes which are not present in the summer. The final layout of the facility should be inspected in the field to ensure that impact on intact vegetation is avoided. A turbine and road layout has not been provided for the scoping assessment and this will need to be considered in the EIA and potentially inspected in the field.

**Impact: Impacts on ecology**

Increased levels of noise, pollution, disturbance and human presence will be detrimental to fauna. Sensitive and shy fauna would move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed. Some mammals and reptiles such as tortoises would be vulnerable to illegal collection or poaching during the construction phase as a result of the large number of construction personnel that are likely to be present.

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<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faunal impact</td>
<td>Noise and disturbance will impact fauna during construction.</td>
<td>Local</td>
<td>All intact vegetation remnants.</td>
</tr>
</tbody>
</table>

**Description of expected significance of impact**

Faunal impacts are generally likely to be low due to the high level of transformation in the area. However the intact fragments are considered important for fauna and should not be impacted. Impact on fauna can be avoided through avoiding impact on intact areas, as faunal abundance within the transformed areas is likely to be low. As such an irreplaceable loss of resources is not likely and any impacts on fauna are likely to be of local significance only.

**Gaps in knowledge and recommendations for further study**

The current study is based on a desktop review of the available information as well as a site visit. The site is however strongly seasonal and as the site visit took place during the summer months, it was very dry and the vegetation was largely dormant. As a result, the intact vegetation fragments at the site could not be adequately characterized as a large proportion of the species are annuals and geophytes which are not present in the summer. The final layout of the development should be assessed with regards to important faunal habitats at the site and any potential impacts on fauna and the habitats.
**Figure 6.1:** Ecological Sensitivity map of the proposed Hartebeest Wind Farm.
6.3.2. Potential impact on birds

In terms of general sensitivity for the avifauna community, the area defined for development is considered as a medium sensitivity location, presenting several issues that could be addressed in order to minimise impacts. This sensitivity can be attributed to the following:

» There is a varied community of raptors using the area, some of them of conservation concern, such as the Black Harrier or the Lanner Falcon. Other bird species such as the Verreaux’s Eagle and Martial Eagle were also observed.

» There is an important presence of Blue Cranes in the study area. Pairs with juveniles have been observed on site, which points towards the species breeding in the area.

Possible bird species that may be present in the project site include up to 17 species of special conservation concern such as the Black Stork and Verreauxs' Eagle considered Vulnerable, Martial Eagle, Black Harrier and Ludwig’s Bustard considered Endangered and Greater Flamingo and Maccoa Duck classified as Near Threatened (Taylor, Peacock & Wanless 2015). Species confirmed at the project site which are endemic to South Africa, the Cape Long-billed Lark and the Cape Bulbul; 14 other species are near-endemic to South Africa and one species are endemic to South Africa, Lesotho and Swaziland (BLSA 2014). Figure 6.2 illustrates preliminary avifauna sensitivities identified.

### Impact: Habitat loss

In spite of the limited destructive footprint of most wind energy facilities, some damage to the environment (more or less temporary) is always caused during the construction phase. Construction and to a lesser extent on-going maintenance activities, are likely to cause some disturbance of birds in the general surrounds, and especially of shy and/or ground-nesting species resident in the area.

<table>
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<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
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</thead>
<tbody>
<tr>
<td>Habitat Loss and disturbance</td>
<td>The proposed project site is located in a natural landscape with agricultural use which may result in aggravated disturbance impacts for birds.</td>
<td>Local</td>
<td>Natural vegetation associated with hills/slopes, water bodies, identified active Jackal Buzzard nests.</td>
</tr>
</tbody>
</table>

### Description of expected significance of impact

The project site is mostly occupied by agriculture with patches of remaining natural vegetation, characteristic of the Fynbos biome. Therefore, it is expected that this biotope will be negatively affected by the construction phase. Turbine placement will probably lead to the loss of a portion of hunting and feeding grounds, which could be detrimental to small passerines, accipitrids, falcons and bustards. Nonetheless, the areas required for the construction and implementation of the turbines platforms represent only a small percentage of the total available area with these characteristics. In
addition, habitats disturbed can be recovered to their preconstruction condition, if directed actions are implemented, once the construction activities cease. For these reasons, construction activities are considered to produce low significance impacts: local impact (only within the proposed project site), short-term impact (only during the construction phase), medium intensity (due to the resilience and fast recovery of the intervention areas). Mitigation measures include avoidance of infrastructure placement, especially turbines, in sensitive areas, in a layout planning phase and minimisation of the affected area by the activities of clearance and removal of vegetation as far as possible. It is recommended that the sensitive areas identified for the bird community should be excluded from development.

**Gaps in knowledge and recommendations for further study**

The avifaunal assessment of such a study area will be dependent on the accuracy of both primary (data collection) and secondary data sources. Any inaccuracies or lack of information in the bibliographic sources consulted could limit this study. A detailed assessment of impacts, informed by the outcomes of the on-site monitoring, should be undertaken in the EIA Phase of the process.
Figure 6.2: Preliminary avifauna sensitivity analysis of the proposed Hartebeest Wind Farm. The avifauna specialist assessed a “worst-case scenario” layout footprint to inform areas of avifaunal sensitivity which will be confirmed during the EIA phase.
6.3.3 Potential impact on bats

Vegetation structure within the landscape will affect the bat distribution in the area. The project site is highly transformed and the natural vegetation is concealed to small pockets in the limits of some drainage areas, steep slopes and hill tops. The area is, therefore, mainly characterized by transformed habitats, represented by agricultural lands used for dry crops in rotation with sheep grazing. Intact renosterveld (Fynbos biome) pockets could provide refuge and suitable foraging habitat for certain bat species. Three bat species are however highly associated with the type of habitat characteristics of Fynbos areas such as the Cape horseshoe bat, Namibian long-eared bat and the Robert’s flat-headed bat. Other species may be present in the area not for the vegetation structure but for the terrain features, which include steep slopes and a quarry which could be suitable habitats for bat roosts. The Natal longfingered bat, the Temminck’s myotis and Darling’s horseshoe bat are examples of species which can be present in these areas due to their preference for roosting in caves and cracks in rocks.

At least 35 endemic plant species and 151 Red Data List plant species occur in this Critically Endangered ecosystem (Mucina & Rutherford, 2006). The occurrence of 10 bat species and the potential occurrence of 8 additional species in the study area has been confirmed through the bat monitoring programme undertaken on the site. Species confirmed include the Egyptian free-tailed bat, Natal long-fingered bat, Egyptian silt-faced bat, Long-tailed serotine, Temminck’s myotis, Cape horseshoe bat, Darling’s horseshoe bat, Robert’s flat-headed bat, Mauritian tomb bat and Cape serotine bat.

Considering the bat micro-habitats identified in Chapter 5 and the bat detections captured during the bat monitoring undertaken on site, sensitive areas (e.g. areas most likely to be intensively used by sensitive bat species) have been defined to include Natural Vegetation, Woodland Vegetation (any trees or bush clumps) and confirmed roosts where bat species of Least Concern were identified. Figure 6.3 presents possible bat sensitive areas.

**Impact:** Impacts on bats

The following impacts are identified as potential major impacts associated with the construction of the proposed Hartebeest Wind Farm:

- Displacement from feeding areas
- Disturbance and/or destruction of roots
- Reduction of ecosystem services due to disruption of bat population

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
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<tbody>
<tr>
<td>Displacement from feeding areas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disturbance and/or destruction of roots</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Reduction of ecosystem services</td>
<td></td>
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</tr>
</tbody>
</table>
## Displacement from feeding areas

A large alteration of the remaining natural areas characteristics may affect the foraging and feeding behaviours of bats as some of the species likely to occur are specifically associated to the Renosterveld natural vegetation present.

### Description of expected significance of impact

Construction activities may cause displacement of bat species from feeding areas. This impact is expected to be of low significance with the implementation of appropriate mitigation measures such as avoidance of infrastructure placement in sensitive areas and minimisation of the affected area as far as possible as a result of the activities of clearance and removal of vegetation. The duration of the impact will be short-term and local in extent.

### Disturbance and/or destruction of roosts

Disturbance and/or destruction of roosts due to noise and movements of machinery and human presence.

### Description of expected significance of impact

If turbines are placed near existing roosts (such as temporary night or daytime use of roosts, or more importantly roosts for reproduction or hibernation that play an important role in a bats' life cycle), these will cause some form of disturbance for these bats, especially during the construction phase of the project. The impact is expected to be of low significance, short-term and local in extent.

### Reduction of ecosystem services due to disruption of bat population

A decrease in bat populations can disrupt the balance of this already impacted ecosystem. A decrease in bat populations can be caused by disturbance and/or destruction of roosts and displacement from the area.

### Description of expected significance of impact

The project site is located within an area with small pockets of renosterveld vegetation. As bats play an important role in maintaining a healthy ecosystem by regulating insect populations, a decrease in bat populations can disrupt the balance of this already impacted ecosystem. It can be assumed that any significant impact on bat populations that play an important ecological role on the ecosystem will also have an important impact on the ecosystem services provided by these species. However, this is an impact difficult to assess through standard monitoring programmes. The impact is expected to be local in extent.

### Gaps in knowledge and recommendations for further study

The bat assessment of the study area is dependent on the accuracy of both primary (data collection) and secondary data sources. Any inaccuracies or lack of information in the bibliographic sources consulted could limit this study. A detailed assessment of impacts, informed by the outcomes of the on-site monitoring, should be undertaken in the EIA Phase of the process.
Figure 6.3: Preliminary sensitivity mapping of the high sensitivity areas for bats within a 2km buffer area of the project site. The bat specialist assessed a “worst-case scenario” layout footprint to inform areas of bat sensitivity which will be confirmed during the EIA phase.
6.3.4. Potential impacts on Surface Water

The main aquatic features within the study area are the Moorreespruit and Sandspruit Tributaries of the middle reaches of the Berg River as well as a smaller tributary at Karnmelksvlei. The tributaries flow in a north easterly direction to join the Berg River upstream of Misverstand Weir. The proposed development occur largely within the watershed between the upper reaches of these three tributaries. Valley bottom wetland areas occur largely along the Moorreespruit River with small areas within the upper reaches in the other two tributaries in the study area. A small vernal pool also occurs near Krabrivier.

It is recommended that a buffer of at least 100m should be maintained adjacent to the stream in which valley bottom wetlands occur (as measured from the outer edge of the wetland area). A buffer of at least 50m is recommended for the smaller drainage lines due to the poor vegetative cover as well as the slopes and erodible soils in the area. Karnmelksvlei Tributary Valley bottom wetland Sandspruit Valley bottom Tributary wetland (refer to Figure 7.1).

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disturbance to surface water caused by turbines and on-site substation</td>
<td>Wind energy facilities require high intensity disturbance of a limited surface area at the site of the wind turbine during the construction phase. Concrete foundations for the turbine towers will need to be constructed as well as permanent hard standing bases of compacted gravel adjacent to each turbine location for the cranes used to construct the turbines. The internal collector substation will be also need to be constructed within the site. Activities during the construction phase of the project could thus be expected to result in some disturbance of cover vegetation for clearing and preparation of the turbine and substation footprints.</td>
<td>Local</td>
<td>The 100m buffer adjacent to the stream in which Valley bottom wetlands occur as well as adjacent to the vernal pool. The 50m buffer for the smaller drainage lines.</td>
</tr>
</tbody>
</table>

**Description of expected significance of impact**

A localised shorter term impact of medium to low intensity (depending on the number of turbines and the distance between the construction activities and the freshwater features) could be expected that has a low to very low overall significance in terms of its impact on the identified aquatic ecosystems in the area.

**Gaps in knowledge and recommendations for further study**

The level of aquatic assessment undertaken was considered to be adequate for this study. No further fieldwork is deemed necessary for the EIA phase of the project, provided the project activities remain outside of the delineated aquatic features and the recommended buffers. Invasive alien plant growth
should be monitored on an ongoing basis to ensure that disturbed areas do not become infested with invasive alien plants. Storm water run-off infrastructure must be maintained to mitigate both the flow and water quality impacts of any storm water leaving the wind energy facilities site. Should any erosion features develop, these should be stabilised as soon as possible. Any water supply, sanitation services as well as solid waste management services that should be required for the site should preferably be provided by an off-site service provider.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
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<tbody>
<tr>
<td>Loss of habitat within streams, riparian areas and wetland habitats; loss of indigenous vegetation within riparian zones</td>
<td>An impact of limited significance is expected at the points at which the infrastructure will need to cross streams/drainage lines or wetland areas during and after the construction phase. The major impacts are associated with the internal roads and relate to loss of habitat within streams, riparian areas and wetland habitats, loss of indigenous vegetation within riparian zones and potential invasive alien plant growth as well as the potential for flow and water quality impacts and the direct impacts on the soil (erosion of drainage channels).</td>
<td>Local</td>
<td>The 100 m buffer adjacent to the stream in which Valley bottom wetlands occur as well as adjacent to the vernal pool. The 50m buffer for the smaller drainage lines.</td>
</tr>
</tbody>
</table>

**Description of expected significance of impact**

A localised short and longer term impact of medium to low intensity that is expected to have a low overall significance in terms of the impact on the identified aquatic ecosystems in the area.

**Gaps in knowledge and recommendations for further study**

The level of aquatic assessment undertaken was considered to be adequate for this study. No further fieldwork is deemed necessary for the EIA phase of the project, provided the project activities remain outside of the delineated aquatic features and the recommended buffers. The existing road infrastructure should be utilised as far as possible to minimize the overall disturbance created by the proposed project. Where new roads need to be constructed the existing road infrastructure should be rationalised and any unnecessary roads decommissioned and rehabilitated to reduce the disturbance of the area and within the stream beds.

### 6.3.5. Potential impact on agricultural potential and erosion

The components of the project that can impact on soils, agricultural resources and productivity are:

- Occupation of the site by the footprint of the facility; and
- Construction activities that disturb the soil profile and vegetation, for example for levelling, excavations, etc.

The significance of all agricultural impacts is kept low by two important factors. The first is that the actual permanent footprint of disturbance of the wind farm (including associated infrastructure and roads) is very small in relation to the available agricultural land on the effected
farm portions (less than 1% of the surface area). All agricultural activities will be able to continue unaffected on all parts of the farms other than the small development footprint for the duration of and after the project. The second is the fact that the proposed site is on land of limited agricultural potential (land capability class III and IV) that is arable but does not have potential for irrigation.

### Impact: Impacts on soils and agricultural potential

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
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</thead>
<tbody>
<tr>
<td>Loss of agricultural land</td>
<td>Loss of agricultural land use is due to direct occupation of the land by all development infrastructure. It results in affected portions of land being taken out of agricultural production. This applies to the direct footprint of the development which comprises the turbine foundations, hard standing areas, roads and the footprint of other infrastructure. This represents only a small proportion of the land surface area. During the construction phase there is somewhat more disturbance due to temporary lay down areas.</td>
<td>Site</td>
<td>No-go areas are not required, but the significance of the impact is dependent on the micro-siting of the turbines and access roads in relation to field boundaries.</td>
</tr>
</tbody>
</table>

**Description of expected significance of impact**

Probability is definite and intensity is low because the surface area of arable land occupied by the facility infrastructure is very small. The loss of agricultural land will be for the duration of all phases of the project. Due to the concrete turbine foundations, the impact is partly reversible. Expected significance is therefore low. The loss of agricultural land cannot be avoided, managed or mitigated.

**Gaps in knowledge and recommendations for further study**

The scoping report is limited by being a desktop study only. The EIA phase will include a field investigation. There are no other specific limitations or knowledge gaps relevant to this study. Field work will be conducted as part of the EIA level investigation which will consider the following parameters:

- A more detailed understanding of soil types and soil variation across the site; and
- Ground proofing the existing land type information.

<table>
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<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil erosion</td>
<td>Soil erosion due to alteration of the land surface run-off characteristics. Alteration of run-off characteristics may be caused by construction related land surface disturbance, vegetation removal, and the establishment of hard standing areas and roads. Erosion will cause loss and deterioration of soil resources.</td>
<td>Site</td>
<td>No-go areas are not required, but the significance of the impact is dependent on the micro-siting of the turbines and access roads in relation to field boundaries.</td>
</tr>
</tbody>
</table>
### Description of expected significance of impact

Probability is unlikely and intensity is low because soil erosion can be managed through the implementation of appropriate measures. Soil erosion is expected for the duration of all phases of the project. Impact is partly reversible and erosion can be prevented with effective management. Expected significance is therefore low.

### Gaps in knowledge and recommendations for further study

The scoping report is limited by being a desktop study only. The field investigation will involve a visual assessment of erosion and erosion potential on site. The EIA phase will include a detailed assessment of the specifics of the road and turbine layout in relation to slopes, disturbance of existing contour banks and other existing run-off control measures, and other potential erosion problems.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disturbance of cultivation practices and agricultural activities</td>
<td>Disturbance of cultivation practices and agricultural activities (ploughing, planting, harvesting) due to the construction of turbines and associated infrastructure (such as access roads) within cultivated fields.</td>
<td>Site</td>
<td>No-go areas are not required, but the significance of the impact is dependent on the micro-siting of the turbines and access roads in relation to field boundaries.</td>
</tr>
</tbody>
</table>

### Description of expected significance of impact

Probability is possible and intensity is low as disturbance can be mitigated through appropriate planning and consultation with the affected landowner. Disturbance is expected for the duration of all phases of the project. Impact is reversible and can be mitigated. Expected significance is therefore low.

### Gaps in knowledge and recommendations for further study

EIA phase will assess the layout in relation to cultivated lands in terms of its potential disturbance to agricultural activities in those lands.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disturbance of contour banks</td>
<td>Disturbance of existing contour banks that are used for erosion control by turbine footings, roads, other infrastructure and construction activities, and its resultant potential impact on erosion. Erosion will cause loss and deterioration of soil resources.</td>
<td>Site</td>
<td>None identified.</td>
</tr>
</tbody>
</table>

### Description of expected significance of impact

Probability is possible and intensity is low because only a small area of contours is likely to be affected and the impact can be mitigated. The impact is expected for the duration of the construction phase. Impact is reversible and can be mitigated. Expected significance is therefore low.

### Gaps in knowledge and recommendations for further study

The scoping report is limited by being a desktop study only. A field investigation will be conducted as part of the EIA phase to identify all areas where existing contours occur and indicate these on map. .
### Scoping of Potential Issues

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of topsoil</td>
<td>Loss of topsoil due to poor topsoil management (burial, erosion, etc.) during construction related soil profile disturbance (levelling, excavations, road surfacing, dumping of spoils etc.) and resultant decrease in that soil’s ability to support vegetation.</td>
<td>Site</td>
<td>None</td>
</tr>
</tbody>
</table>

**Description of expected significance of impact**

Probability is possible and intensity is low because only a small area is likely to be affected and the impact can be mitigated. The impact is expected for the duration of the construction phase. Impact is partly reversible and can be mitigated. Expected significance is therefore low.

**Gaps in knowledge and recommendations for further study**

The scoping report is limited by being a desktop study only. A field investigation will be conducted as part of the EIA phase to determine the topsoil stripping depths during more detailed soil investigations.

### 6.3.6. Potential impacts on heritage resources

The environment of the study area has been transformed by agriculture for more than 2 centuries. *In-situ* archaeological resources are extremely sparse, although it is expected that at least some Early Stone Age artefacts may be present in the fields. Later Stone Age sites may be found along water courses and it is possible that some historical archaeological resources may be present close to the various farmsteads.

Many farm building complexes occur in the area with at least 14 complexes of farm buildings occurring on or close to the project site. Although there is a high likelihood that they are greater than 60 years of age, all appear to have been adapted and modified over time. Five areas of possible heritage significance have been identified within the project site (refer to Figure 6.4).

**Impact:** Physical disturbance to archaeological resources

<table>
<thead>
<tr>
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<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of / damage to archaeological resources due to disturbance</td>
<td>The heritage and scientific potential of an archaeological site is highly dependent on its geological and spatial context. This means that even though a deep excavation may expose archaeological artefacts, the artefacts are relatively meaningless once removed from the area in which it were found in.</td>
<td>Local</td>
<td>None identified</td>
</tr>
</tbody>
</table>

**Description of expected significance of impact**
In terms of the information that has been collected, indications are that impacts to pre-colonial archaeological material will be limited. In terms of buried archaeological material, it is difficult to know what lies below the ground surface, however indications are that this is extremely sparse and that impacts caused by the construction of footings and other ground disturbance is likely to be negligible. The project area lies in an intensively farmed area, thus any existing archaeological material is out of context. Significance of the impact is likely to be very low, of limited (local extent). Duration of impact is very low.

**Gaps in knowledge and recommendations for further study**

The project area must be subject to a physical survey to establish presence of any heritage resources. This represents a site specific gap in knowledge. Impacts to archaeology are not reversible.

<table>
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<tr>
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<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Destruction of protected structures - Built environment</td>
<td>Historic structures are sensitive to physical damage such as demolition as well as neglect. They are also context sensitive, in that changes to the surrounding landscape will affect their significance.</td>
<td>Local</td>
<td>All farm yards</td>
</tr>
</tbody>
</table>

**Description of expected significance of impact**

Given that there are no structures or historical sites within the study area that are likely to be physically impacted, the significance of any impacts is very low. While it is evident that there are structures in the project area that are generally protected in terms of the NHRA, none are listed or formally graded. Significance of impacts are expected to be low, local and of short duration.

**Gaps in knowledge and recommendations for further study**

Structures in rural areas around Moorreesburg have not been graded. Farms in the project area need to be evaluated and assigned a field grading where appropriate.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landscape quality - Change to the overall cultural landscape, setting and character</td>
<td>Cultural landscapes are highly sensitive to cumulative impacts and large scale development activities that change the character and public memory of a place. In terms of the National Heritage Resources Act, a cultural landscape may also include a natural landscape of high rarity value, aesthetic and scientific significance. The construction of a large facility can result in profound changes to the overall sense of place of a locality, if not a region. It is felt that of all landscapes in South Africa the presence of wind turbines in the study area are compatible with the manicured and swept quality of the surrounds, meaning that although the turbines will be highly visible from within and close to the site, including the N7, the sense of change or diminishment of the significance</td>
<td>Local</td>
<td>There are no no-go areas. However, in order to protect the more natural landscape areas to the east, as much infrastructure as possible should be focused on the western side of the ridgeline.</td>
</tr>
</tbody>
</table>
of the landscape will be minimal, and not necessarily overly negative in status.

<table>
<thead>
<tr>
<th>Description of expected significance of impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>The impact on &quot;setting&quot; of WEF's are very variable depending on context. While the construction of such facilities in rural natural areas can be devastating to the setting of a place, the impact in person-made manicured landscapes is less so. The impact is likely to be of low-medium significance, local in extent but of long duration. It is reversible.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gaps in knowledge and recommendations for further study</th>
</tr>
</thead>
<tbody>
<tr>
<td>The project area and surrounds need to be visited and assessed in terms &quot;setting&quot;. This will involve assigning a landscape field grade to be assessed during EIA phase.</td>
</tr>
</tbody>
</table>
Figure 6.4: Preliminary assessment of location of areas of heritage significance.
6.3.7. Potential impacts on sensitive noise receptors

**Impact:** Potential impacts on sensitive noise receptors

Increased noise levels are directly linked with the various activities associated with the construction of the Hartebeest Wind Farm and related infrastructure, as well as the operational phase of the activity.

Maximum noise levels could be in the region of 90 – 105 dBA when working in close quarters to equipment (within 5 m), but noise levels will reduce the further a conceptual receptor (such as employees) is from the activities. For all construction work, the workers working with or in close proximity to equipment will be exposed to high levels of noise (when working within 10 m of noisy equipment). While maximum noise levels may reach up to 60 dBA at 1 000 meters (worst-case scenario for a pile driver), such noise levels are not a constant, and equivalent A-weighted night-time noise levels of up to 35 dBA (the night-time rating levels as per SANS 10103) would be expected at 2 000 meters.

Potential noise sources identified during the construction phase includes:

» Construction equipment;

» Material supply (concrete batching plant and borrow pits);

» Blasting; and

» Traffic

There are a number of potential noise sensitive developments (NSDs) identified living within and adjacent to the properties where construction activities can take place (refer to Figure 6.5). These activities can increase the noise levels at these receptors, with the levels either changing the ambient sound levels with more than 7 dB or resulting in noise levels higher than the rural night-time rating levels (potentially exceeding the levels recommended by international guidelines such as the noise limits set by the International Finance Corporation).

<table>
<thead>
<tr>
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<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in noise level at receptors. Disturbing noises.</td>
<td>Increased noises or disturbing noises may increase annoyance levels with project.</td>
<td>Multiple night-time construction activities taking place simultaneously may impact an area within 2 000m from the activities.</td>
<td>None identified at this stage</td>
</tr>
</tbody>
</table>

**Description of expected significance of impact**
The potential impact is expected to be negative, probable and long term. Multiple night-time construction activities taking place simultaneously may impact an area within 2,000m from the activities. Mitigation will depend on the layout of infrastructure, status of surrounding receptors and the confirmed significance of the potential noise impact and mitigation measures that will only be defined during EIA.

**Gaps in knowledge and recommendations for further study**
To be defined during EIA stage (information available with regards to the status of receptors as identified, whether any receptors are to be relocated, potential mitigation measures or the exact location of wind turbines). Scoping level assessment is not sufficient, and a full Environmental Noise Impact Assessment is required.
Figure 6.5: Aerial image indicating potentially noise-sensitive receptors close to proposed Hartebeest Wind Farm.
6.3.8. Potential impacts on visual aesthetics and sense of place

**Impact:** The visibility of the facility from, and potential visual impact on observers travelling along main (i.e. the N7 and the R311) and secondary roads in close proximity to the proposed wind farm and within the region.

Impact on linear receivers (roads) that run through the area. These include;
- The N7 Cape to Namibia Route.
- The R311 which is a surfaced road between Moorreesburg and Riebeeck Kasteel to the south east and Moorreesburg and Hopefield to the north west.
- The R307 which is largely an unsurfaced road in the vicinity of Moorreesburg between Moorresburg and Darling to the west.
- A local gravel road that runs between Moorreesburg and the R44 close to the settlement of Gouda.

The N7 is by far the busiest route carrying a mix of local and regional traffic and is a key tourism route. The R311 also has importance for tourism. Other routes predominantly carry local traffic. The impact will gradually increase during construction and decrease during decommissioning.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrialisation of general landscape character.</td>
<td>The impact relates to the possible change in the character of the view from the road from a rural agricultural landscape to an industrialised / developed landscape. The impact on individual users will only be for the short period that they are utilising the road in the vicinity of the site. Due to topography the greatest impacts are likely to occur within 5km of the site. Past this distance, due to the undulating topography, fewer turbines will be visible and visibility will be intermittent as viewer traverse minor valleys and ridges. It isn't until the viewer is generally in excess of 20km from the proposed development that the majority of turbines will be obvious. At this distance the change of character will be significantly mitigated by distance. Atmospheric conditions and lighting could provide further mitigation. Within 5km, the proposed Hartebeest Wind Farm is likely to be highly obvious and potentially could have a high impact on sensitive receptors.</td>
<td>The influence is likely to be over the site and immediate surroundings in terms of the largest impacts and regional for low level impacts.</td>
<td>There are no no-go areas. However, in order to protect the more natural landscape areas to the east, as much infrastructure as possible should be focused on the western side of the ridgeline.</td>
</tr>
</tbody>
</table>
At greater distances however visibility of the development will be significantly reduced and impacts are likely to be relatively low.

### Description of expected significance of impact

The rural landscape will still be evident and the majority of uses in Moorreesburg are unlikely to be sensitive to the change in view. Not all uses within the town are likely to be sensitive include residential areas and the small tourism sector. Impacts are greatest in the vicinity of the southern access to Moorreesburg and on roads within the town that run directly downhill towards the development.

Views from this area have been impacted by development already including the settlement, a quarry site adjacent to the proposed development and a substation with numerous associated overhead power lines. It is therefore not the most cohesive example of a rural landscape in the region. The character of the rural landscape will be changed. Within the "high impact zone" it is likely that the loss of rural characteristics will be highly obvious to the majority of people. It is therefore likely that the change viewed from within this area is likely to cause greatest concern to receptors, the most sensitive are likely to include;

- Householders that overlook the development, and
- Tourism related establishments including guest houses.

It is difficult to gauge the sensitivity of residents to the proposed development. It is likely that there will be mixed feelings, however, given that the economy of the town is largely focused on productive agriculture and not tourism, it is possible that a large proportion of residents will view the development as positive. There is unlikely to be an irreplaceable loss as the impact should reverse on decommissioning of the facility.

### Gaps in knowledge and recommendations for further study

A detailed impact assessment should be undertaken to determine the potential visual impacts. A final layout footprint for assessment will be required.

### Impact

The potential visual impact on urban centres and populated places in close proximity to the proposed wind farm (i.e. Moorreesburg).

The town of Moorreesburg is largely located on an east facing slope overlooking the proposed site. Whilst occasional views over the entire ridgeline on which the wind farm is proposed will be possible, the most common type of view will be one that is channelled down a road that runs directly downhill towards the development. This will produce views of small sections of the wind farm at any one time. This will be part mitigated by street trees which in areas could largely screen views of the development. The impact will gradually increase during construction and decrease during decommissioning.

<table>
<thead>
<tr>
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<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrialisation of general</td>
<td>The impact relates to the possible change in the character of the view from a rural agricultural landscape to an industrialised / developed</td>
<td>The influence is likely to be over the site and immediate surroundings.</td>
<td>There are no no-go areas. However, in order to protect the more natural</td>
</tr>
</tbody>
</table>
landscape character.

landscape. The impact on individual users will only be for the short period that they are utilising the road in the vicinity of the site.

Due to topography the greatest impacts are likely to occur within 5km of the site. Past this distance, due to the undulating topography, fewer turbines will be visible and visibility will be intermittent as viewer traverse minor valleys and ridges. It isn’t until the viewer is generally in excess of 20km from the proposed development that the majority of turbines will be obvious. At this distance the change of character will be significantly mitigated by distance. Atmospheric conditions and lighting could provide further mitigation.

Within 5km, the proposed Hartebeest Wind Farm is likely to be highly obvious and potentially could have a high impact on sensitive receptors. At greater distances however visibility of the development will be significantly reduced and impacts are likely to be relatively low.

<table>
<thead>
<tr>
<th>Description of expected significance of impact</th>
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</thead>
<tbody>
<tr>
<td>There are no protected areas of national importance that are likely to be impacted. It is possible however that there could be sensitive and local conservation / recreational uses. The landscape analysis indicates that the site straddles a ridgeline. The landscape to the east of the ridgeline is rural with little development or infrastructure obvious whereas the landscape to the west of the ridgeline includes the urban area of Moorreesburg as well as areas of obvious infrastructure.</td>
</tr>
</tbody>
</table>

The location of as much of the development as possible on the western side of the ridgeline particularly related infrastructure could help to reduce the significance of impacts. Other mitigation might include;

Planning:
- Ensure that ground level development is minimised; and
- plan the use of non-reflective finishes.

Operations:
- Minimise disturbance; and
- Maintain existing uses below the development.

Decommissioning:
- Remove infrastructure not required for the post-decommissioning use of the site;
• Return all affected areas to productive agricultural use; and
• Monitor rehabilitated areas post-decommissioning and implement remedial actions.

There is unlikely to be an irreplaceable loss as the impact should reverse on decommissioning of the facility.

**Gaps in knowledge and recommendations for further study**
A detailed impact assessment should be undertaken to determine the potential visual impacts. A final layout footprint for assessment will be required.

**Impact:** The visibility of the proposed Hartebeest Wind Farm from, and potential visual impact on residences and homesteads in close proximity to the wind farm and within the region.

Five homesteads are located within the area that the turbines are proposed. A further six homesteads are located within one kilometre and a further 27 farmsteads will have a view over the wind farm from within the high impact zone. The impact will gradually increase during construction and decrease during decommissioning.

<table>
<thead>
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<th>No-Go Areas</th>
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</thead>
<tbody>
<tr>
<td>Industrialisation of general landscape character.</td>
<td>The level of impact for each of these groups will differ significantly; • Residents within the turbine field will have their outlook changed the most. Turbine structures and associated infrastructure will dominate and industrialise the landscape. High levels of impact might be expected. • Residents close to the edge of the turbine field will experience a similar degree of impact over approximately 50% of their outlook. They will at least be able to maintain their rural outlook over the remainder of their view. Moderate to high levels of impact might be expected. • Residents outside the immediate vicinity of the turbines are likely to read the rural landscape between the structures more readily and to some extent the turbines will recede (the greater the distance the more this will occur). Associated lower level infrastructure is likely to be the main hindrance in this regard. Impacts levels are likely to range from low to moderate.</td>
<td>The influence is likely to be over the site and immediate surroundings.</td>
<td>There are no no-go areas. However, in order to protect the more natural landscape areas to the east, as much infrastructure as possible should be focused on the western side of the ridgeline.</td>
</tr>
</tbody>
</table>

**Description of expected significance of impact**
The character of the rural landscape will be changed. Within the “high impact zone” it is likely that the loss of rural characteristics will be highly obvious to the majority of people. It is therefore likely that the change viewed from within this area is likely to cause greatest concern to receptors, the most sensitive are likely to include;

- Householders that overlook the development, and
- Tourism related establishments including guest houses.

A proportion of these people are likely to view the development in a negative light. It is also likely that a proportion of the population, particularly those that may benefit will view the development as a positive addition to the local landscape. Mitigation might include;

**Planning:**
- Ensure that ground level development is minimised; and
- Plan the use of non-reflective finishes.

**Operations:**
- Minimise disturbance; and
- Maintain existing uses below the development.

**Decommissioning:**
- Remove infrastructure not required for the post-decommissioning use of the site;
- Return all affected areas to productive agricultural use; and
- Monitor rehabilitated areas post-decommissioning and implement remedial actions.

There is unlikely to be an irreplaceable loss as the impact should reverse on decommissioning of the facility.

**Gaps in knowledge and recommendations for further study**
A detailed impact assessment should be undertaken to determine the potential visual impacts. A final layout footprint for assessment will be required.

**Impact:** The potential visual impact of the proposed wind farm and ancillary infrastructure on the scenic visual character of the landscape and the sense of place of the region, with specific reference to the high quality pastoral landscape.

The landscape in which the development is proposed is a relatively cohesive rural agricultural landscape which in general has been little affected by infrastructure or built development. The significance of this landscape is made greater by its relationship with the rugged upland landscape of the Cederberg, which is located approximately 30km to the east of the proposed windfarm, with which it provides a strong contrast. This protected wilderness area is possibly the most important area from within which landscape character is experienced. The impact will gradually increase during construction and decrease during decommissioning.
### Issue

<table>
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<tr>
<th>Nature of Impact</th>
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<th>No-Go Areas</th>
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<tbody>
<tr>
<td>The impact relates to the possible change in the character of the view from surrounding landscape areas. The most critical affected landscape in this regard is the protected area of the Cederberg approximately 30km to the east. Distance and the fact that the development will be viewed against landform is likely to mean that whilst the development may be visible, it is unlikely to be highly obvious from this area. Due to topography the greatest impacts are likely to occur within 5km of the site. Past this distance, due to the undulating topography, fewer turbines will be visible and visibility will be intermittent as viewer traverse minor valleys and ridges. It isn't until the viewer is generally in excess of 20km from the proposed development that the majority of turbines will be obvious. At this distance the change of character will be significantly mitigated by distance. Atmospheric conditions and lighting could provide further mitigation. Within 5km, the proposed wind farm is likely to be highly obvious and potentially could have a high impact on sensitive receptors. At greater distances however visibility of the development will be significantly reduced and impacts are likely to be relatively low.</td>
<td>The influence is likely to be over the site and immediate surroundings in terms of the largest impacts and regional for low level impacts.</td>
<td>There are no no-go areas. However, in order to protect the more natural landscape areas to the east, as much infrastructure as possible should be focused on the western side of the ridgeline.</td>
</tr>
</tbody>
</table>

### Description of expected significance of impact

The proposed development is likely to have minimal impact on protected landscapes including the Cederberg from which long distance views may be possible. Impacts within these areas will be mitigated by distance and the fact that the development will be viewed against the landform and not the skyline. The character of the rural landscape will be changed. Within the “high impact zone” which is limited by a series of minor ridgelines to a distance of approximately 5km. It is likely that loss of rural characteristics will be highly obvious to the majority of people within this area. It is therefore likely that the change viewed from within this area is likely to cause greatest concern to receptors.

Outside of the 5km high impact zone, the greatest degree of impact is likely to be limited to a series of ridgelines from which long distance views of the development will be possible. Outside of these ridgelines the visibility of the proposed development is likely to be intermittent and partial until the viewer is approximately 20km away. From this distance whilst the development will be visible, the impact is mitigated by distance and possibly by atmospheric and lighting conditions.
There is unlikely to be an irreplaceable loss as the impact should reverse on decommissioning of the facility.

### Gaps in knowledge and recommendations for further study

A detailed impact assessment should be undertaken to determine the potential visual impacts. A final layout footprint for assessment will be required.

#### 6.3.9. Impacts on the social environment

**Impact:** Impacts on the social environment

The potential positive impacts which could arise as a result of the construction activities include the following:

- Creation of employment and business opportunities, and opportunity for skills development and on-site training;
- Benefits associated with providing technical advice on wind energy to local farmers and municipalities; and
- Potential for providing improved cell phone reception.

The potential negative impacts which could arise as a result of the construction activities include the following:

- Impacts associated with the presence of construction workers on site and in the area;
- Influx of job seekers to the area;
- Increased safety risk to farmers, risk of stock theft and damage to farm infrastructure associated with presence of construction workers on the site;
- Increased risk of veld fires;
- Impact of heavy vehicles, including damage to roads, safety and dust; and
- Potential loss of productive farmland associated with construction-related activities.

<table>
<thead>
<tr>
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<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct employment opportunities and skills development</td>
<td>The creation of employment opportunities and skills development opportunities during the construction phase for the country and local economy.</td>
<td>Local-regional</td>
<td>None</td>
</tr>
</tbody>
</table>

**Description of expected significance of impact**
The potential impact is expected to be positive, highly probable, short term and have a medium significance. This will be confirmed during the EIA phase following detailed investigations and assessment of impacts. In terms of reversibility of the impact and irreplaceable loss of resources, this is not applicable to this type of impact. The potential impact may be enhanced with possible enhancement measures which will be elaborated in the EIA phase.

**Gaps in knowledge and recommendations for further study**

It is recommended that a detailed SIA is undertaken to determine actual impact of job creation and skills development associated with the project construction phase.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impacts on family structures and social networks associated with the presence of construction workers</td>
<td>Potential impacts on family structures and social networks associated with the presence of construction workers</td>
<td>Local</td>
<td>None</td>
</tr>
</tbody>
</table>

**Description of expected significance of impact**

The potential impact is expected to be negative, probable, short term and have a low significance for the community as a whole. The potential impact is expected to be negative, probable, long term-permanent and have a medium-high significance for specific individuals who may be affected by STDs etc. This will be confirmed during the EIA phase following detailed investigations and assessment of impacts. The potential impact cannot be reversed in terms of HIV and AIDS and there is irreplaceable loss of resources (if people contract HIV and AIDS) associated with the potential impact. Residual impacts would include costs to local individuals and families associated with having to raised children from unplanned pregnancies, costs associated with living with STD, specifically HIV/AIDS, and costs associated with becoming dependent on drugs and or alcohol.

**Gaps in knowledge and recommendations for further study**

Consultations with key stakeholders will need to take place in the EIA phase in order to determine the impact on daily living and movement patterns.

<table>
<thead>
<tr>
<th>Issue</th>
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<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure on economic and social infrastructure impacts from an in-migration of people</td>
<td>Potential impacts on family structures, social networks and community services associated with the influx of job seekers.</td>
<td>Local</td>
<td>None</td>
</tr>
</tbody>
</table>

**Description of expected significance of impact**
The potential impact is expected to be negative, probable, permanent and have a low significance. This will be confirmed during the EIA phase following detailed investigations and assessment of impacts. The potential impact can be reversed and there is no irreplaceable loss of resources associated with the potential impact. The potential impact may be mitigated with possible mitigation measures which will be elaborated in the EIA phase.

### Gaps in knowledge and recommendations for further study
Consultations with key stakeholders (ward councillor and municipalities) will need to take place in the EIA phase in order to assess this potential impact.

<table>
<thead>
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<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety and security impacts</td>
<td>Temporary increase in safety and security concerns associated with the influx of people in the study area during the construction phase.</td>
<td>Local</td>
<td>None identified at this stage</td>
</tr>
</tbody>
</table>

### Description of expected significance of impact
The potential impact is expected to be negative, probable, short term and have a medium significance. This will be confirmed during the EIA phase following detailed investigations and assessment of impacts. The potential impact can be reversed (compensation paid for loss of livestock and damages to farm proven to be associated with the project) and there is no irreplaceable loss of resources associated with the potential impact. The potential impact may be avoided with possible mitigation measures which will be elaborated in the EIA phase.

### Gaps in knowledge and recommendations for further study
A site visit and consultations with key stakeholders will need to take place in the EIA phase in order to determine the perceived safety and security risks associated with the proposed development.

<table>
<thead>
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<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
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</thead>
<tbody>
<tr>
<td>Loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of grass fires</td>
<td>Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of grass fires</td>
<td>Local</td>
<td>None</td>
</tr>
</tbody>
</table>

### Description of expected significance of impact
The potential impact is expected to be negative, probable, short term and have a medium significance. This will be confirmed during the EIA phase following detailed investigations and assessment of impacts. The potential impact can be reversed (compensation paid for loss of livestock, etc. proven to have been impacted as a result of the project) and there is no irreplaceable loss of resources associated with the potential impact. The potential impact may be avoided with possible mitigation measures which will be elaborated in the EIA phase.

### Gaps in knowledge and recommendations for further study

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Scoping of Potential Issues
A site visit and consultations with key stakeholders will need to take place in the EIA phase in order to determine the perceived safety and security risks associated with the proposed development.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dust and safety impacts and damage to road surfaces associated with movement of construction related traffic to and from the site</td>
<td>Potential dust and safety impacts and damage to road surfaces associated with movement of construction related traffic to and from the site</td>
<td>Local</td>
<td>None identified at this stage</td>
</tr>
</tbody>
</table>

**Description of expected significance of impact**
The potential impact is expected to be negative, highly probable, short term and have a low significance. This will be confirmed during the EIA phase following detailed investigations and assessment of impacts. The potential impact can be reversed and there is no irreplaceable loss of resources associated with the potential impact. The potential impact may be avoided with possible mitigation measures which will be elaborated in the EIA phase.

**Gaps in knowledge and recommendations for further study**
A site visit and consultations with key stakeholders will need to take place in the EIA phase in order to determine the perceived safety and security risks associated with the proposed development.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of farmland for grazing and cultivation</td>
<td>The activities associated with the construction phase, such as establishment of access roads and the construction camp, movement of heavy vehicles and preparation of foundations for the wind energy facilities and power lines will damage farmlands and result in a loss of farmlands for grazing.</td>
<td>Local</td>
<td>None identified at this stage</td>
</tr>
</tbody>
</table>

**Description of expected significance of impact**
The potential impact is expected to be negative, highly probable, long term-permanent if disturbed areas are not effectively rehabilitated and have a high significance. This will be confirmed during the EIA phase following detailed investigations and assessment of impacts. The potential impact can be reversed with rehabilitation and there is irreplaceable loss of resources associated with the potential impact. However, disturbed areas can be rehabilitated. The potential impact may be avoided with possible mitigation measures which will be elaborated in the EIA phase. Residual impacts will include a loss of productive farmland and impact on farming operations.

**Gaps in knowledge and recommendations for further study**
6.4. Evaluation of potential impacts associated with the Operational Phase

6.4.1. Potential impact on ecology

**Impact:** Impact on ecology

The operation and presence of the facility may lead to disturbance or persecution of fauna within or adjacent to the facility. Increased levels of noise and disturbance may be detrimental to fauna which may be deterred from the area. The turbines would generate noise and movement which may deter some fauna from their vicinity, but most species would likely become habituated in the long-term.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faunal impact</td>
<td>Noise and disturbance will general faunal impact during construction</td>
<td>Local.</td>
<td>All intact vegetation remnants</td>
</tr>
</tbody>
</table>

**Description of expected significance of impact**

The presence and noise generated by the turbines as well as operational activities may deter some fauna from the area. Faunal impacts during operation are however likely to be of low significance due to the high level of transformation in the area and the low abundance of sensitive fauna in the area.

**Gaps in knowledge and recommendations for further study**

The current study is based on a desktop review of the available information as well as a site visit. The site is however strongly seasonal and as the site visit took place during the summer months, it was very dry and the vegetation was largely dormant. As a result, the intact vegetation fragments at the site could not be adequately characterized as a large proportion of the species are annuals and geophytes which are not present in the summer. It is recommended that the final layout of the development should be assessed with regards to important faunal habitats at the site and any potential impacts on fauna and the habitats.

6.4.2. Potential impact on birds

**Impact:** Impacts on avifauna

A number of factors influence the number of birds impacted at wind energy facilities and includes:
Bird related variables: Whilst all birds face some inherent risk of impact by wind turbines, there are definitely certain groups that are more at risk due to their flight behaviour or habitat preferences. Large birds with low manoeuvrability in flight are usually more prone to collide with wind turbines, but raptors and falcons, species that fly at rotor height and exhibit hunting behaviour are also very susceptible to collide with man-made structures. Raptors and falcons potentially present at the proposed project site are regarded as the groups most susceptible to collision with wind turbines, especially since these species generally have smaller population sizes than passerine species and consequently have a higher conservation risk. Such species include the African Harrier-Hawk, Verreauxs’ Eagle, Rock Kestrel and Martial Eagle per example. These species were observed within the proposed project site and surrounding area, and particularly Verreauxs’ Eagle was observed at rotor swept height (above 50m height) and with flight behaviours of risk.

Site variables: Landscape features can channel or funnel birds towards a certain area and in the case of raptors, influence their flight and foraging behaviour. Elevation, ridges and slopes are all important factors in determining the extent to which an area is used by birds in flight. The proposed project site is located in an area with undulating topography, though there is a central section with some hills. These may reveal favourable to the formation of thermals and therefore soaring birds are likely to use the area to gain height through the rising hot air currents.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collision with turbines</td>
<td>Species such as the African Harrier-Hawk, Verreauxs’ Eagle, Rock Kestrel and Martial Eagle were observed within the proposed project site and surrounding area, and particularly Verreauxs’ Eagle was observed at rotor swept height and with flight behaviours of risk. These species are most likely to collide with stationary or rotating turbine blades.</td>
<td>Local</td>
<td>Natural vegetation associated with hills/slopes, water bodies, identified active Jackal Buzzard nests.</td>
</tr>
</tbody>
</table>

**Description of expected significance of impact**

In addition to the fatality risk it must also be considered that the presence of the turbines itself, as well as human and vehicles movements through the area (associated with maintenance movements) has potential to negatively affect the bird community, especially during sensitive seasons (i.e. breeding season). Considering the available data and knowledge of the proposed project site, the negative impacts from the operational phase are considered as medium (regarding potential fatality risk) and low (considering disturbance impacts) significance. It is recommended that the sensitive areas identified for the bird community as indicated in Figure 6.2 should be excluded from development.

| Collision with power lines        | The collision risk is not the same for all species and it varies according to the species’ habits and ecology. Certain bird habits, such as migration, high flight or nocturnal flight, hunting or foraging in mid-air, contribute to species susceptibility to collision. | Regional    | Natural vegetation associated with hills/slopes, water bodies, identified active Jackal Buzzard nests. |

**Description of expected significance of impact**

The potential impact is expected to be negative, highly probable, permanent and have a medium significance. This will be confirmed during the EIA phase following detailed assessment of impacts, informed by the outcomes of the on-site monitoring.
Gaps in knowledge and recommendations for further study
The avifaunal assessment of such a study area will be dependent on the accuracy of both primary (data collection) and secondary data sources. Any inaccuracies or lack of information in the bibliographic sources consulted could limit this study. A detailed assessment of impacts, informed by the outcomes of the on-site monitoring, should be undertaken in the EIA Phase of the process.

6.4.3. Potential impact on bats

**Impact:** Impacts on bat species
The following impacts are identified as potential major impacts associated with the operation of the proposed Hartebeest Wind Farm:

*Fatalities due to collision with turbines and barotrauma:*

Recent studies published have recorded the first events of bat mortality in South Africa due to wind turbines operation, with several bat fatalities of two species being recorded: Cape serotine bat and Egyptian free-tailed bat. Of the 18 bat species considered to have potential occurrence in the proposed project site, (7 species are considered to have low risk of collision with wind turbines, due to their flight and foraging behaviour. From the 11 remaining species, 1 have a medium risk of collision, 7 have a medium to high risk of collision with wind turbines since they have medium or high flight pattern and they are in general clutter-edge foragers. It is therefore possible that these species use the area surrounding the moving turbine blades to forage. The 3 remaining species, the Egyptian free-tailed bat, Robert's flat-headed bat and the Mauritian tomb bat have high risk of collision with wind turbines and was confirmed at the site, due to its flight characteristics as open-air forager.

*Fatalities due to collision with power lines and met masts guyed lines:*

The collision risk is not the same for all species and it varies according to the species' habits and ecology. Certain bird habits, such as migration, high flight or nocturnal flight, hunting or foraging in mid-air, contribute to species susceptibility to collision. In addition, it is important to note the existing records bustard species fatalities at overhead power lines elsewhere in South Africa (Shaw et al. 2010b; a; Jenkins et al. 2011; Shaw 2013). Therefore, it is considered that negative impacts from new power lines to be implemented in the area are likely to occur.

*Disturbance and/or destruction of roosts*
The disturbance and/or destruction of roots can be caused by noise associated with maintenance activities and human presence. Impacts onto bat populations can also be caused by affecting existing roosts, such as: temporary night or daytime use of roosts, or more importantly roosts for reproduction or hibernation that play an important role in a bats’ life cycle.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatalities due to collision with turbines and barotrauma</td>
<td>Bat fatalities due to collision with wind turbines, turbine blades or barotrauma.</td>
<td>Regional</td>
<td>All intact vegetation remnants</td>
</tr>
<tr>
<td></td>
<td>The sudden drop in air pressure at wind farms causes a bat’s lungs to expand that could result in the death of the bat.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Description of expected significance of impact</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potential impact significance is highly dependent on the species affected, the areas where the turbines are sited, the activity level that those species present at such locations, as well as the potential for cumulative impact (presence of migration route per example). The impact is expected to of medium significance and permanent. Mitigation measures include the avoidance of turbine placement in sensitive areas.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fatalities due to collision with power lines and met masts guyed lines</td>
<td>Bat fatalities due to collision with power lines and met masts guyed lines.</td>
<td>Regional</td>
<td>All intact vegetation remnants</td>
</tr>
<tr>
<td>Description of expected significance of impact</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The potential impact is expected to be negative, highly probable, permanent and have a medium significance. This will be confirmed during the EIA phase following detailed assessment of impacts, informed by the outcomes of the on-site monitoring.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disturbance and/or destruction of roosts</td>
<td>Disturbance and/or destruction of roosts due to noise associated with maintenance and human presence.</td>
<td>Local</td>
<td>All intact vegetation remnants</td>
</tr>
<tr>
<td>Description of expected significance of impact</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potential impact significance is highly dependent on the species affected, the areas where the turbines are sited, the activity level that those species present at such locations, as well as the potential for cumulative impact (presence of migration route per example). The impact is expected to of medium significance and permanent. Mitigation measures include the avoidance of turbine placement in sensitive areas.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gaps in knowledge and recommendations for further study</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The bat assessment of the study area is dependent on the accuracy of both primary (data collection) and secondary data sources. Any inaccuracies or lack of information in the bibliographic sources consulted could limit this study. A detailed assessment of impacts, informed by the outcomes of the on-site monitoring, should be undertaken in the EIA Phase of the process.

### 6.4.4. Potential impacts on surface water

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased runoff which could cause erosion and sedimentation</td>
<td>During the operation phase the turbines will operate continuously, unattended and with low maintenance required for more than 20 years. The wind energy facility would be monitored and controlled remotely, with maintenance only taking place when required. The hard surfaces created by the development may lead to increased runoff, in particular on surfaces with a steeper gradient. This may lead to increased erosion and sedimentation of the downslope areas.</td>
<td>Local</td>
<td>The 100 m buffer adjacent to the stream in which valley bottom wetlands occur as well as adjacent to the vernal pool. The 50m buffer for the smaller drainage lines.</td>
</tr>
</tbody>
</table>

**Description of expected significance of impact**

A localised longer term impact (more than 20 years) impact of low intensity (depending on the distance between the turbines and the surface water features) could be expected that has a very low overall significance in terms of its impact on the identified aquatic ecosystems in the area.

**Gaps in knowledge and recommendations for further study**

The level of aquatic assessment undertaken was considered to be adequate for this study. No further fieldwork is deemed necessary for the EIA phase of the project, provided the project activities remain outside of the delineated aquatic features and the recommended buffers. Invasive alien plant growth should be monitored on an ongoing basis to ensure that these disturbed areas do not become infested with invasive alien plants. Storm water run-off infrastructure must be maintained to mitigate both the flow and water quality impacts of any storm water leaving the wind energy facilities site. Should any erosion features develop, they should be stabilised as soon as possible. Any water supply, sanitation services as well as solid waste management services that should be required for the site should preferably be provided by an off-site service provider.
### 6.4.5. Potential impact on agricultural potential and erosion

**Impact:** Impacts on agricultural potential and erosion

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of agricultural land</td>
<td>Loss of agricultural land use is due to direct occupation of the land by all development infrastructure which results in affected portions of land being taken out of agricultural production. This applies to the direct permanent footprint of the development which comprises the turbine foundations, hard standing areas, roads and the footprint of other infrastructure. This represents only a small proportion of the land surface area.</td>
<td>Site</td>
<td>No-go areas are not required, but the significance of the impact is dependent on the micro-siting of the turbines and access roads in relation to field boundaries.</td>
</tr>
</tbody>
</table>

**Description of expected significance of impact**

Probability is definite and intensity is low because the surface area of arable land is very small. The loss of agricultural land will be for the duration of all phases of the project. Due to the concrete turbine foundations, the impact is partly reversible. Expected significance is therefore low. The loss of agricultural land cannot be avoided, managed or mitigated.

**Gaps in knowledge and recommendations for further study**

The scoping report is limited by being a desktop study only. The EIA phase will include a field investigation. There are no other specific limitations or knowledge gaps relevant to this study. Field work will be conducted as part of the EIA level investigation which will consider the following parameters:

- A more detailed understanding of soil types and soil variation across the site; and
- Ground proofing the existing land type information.

<table>
<thead>
<tr>
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<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil erosion</td>
<td>Soil erosion due to alteration of the land surface run-off characteristics. Alteration of run-off characteristics during operation may be caused by the establishment of hard standing areas and roads. Erosion will cause loss and deterioration of soil resources</td>
<td>Site</td>
<td>No-go areas are not required, but the significance of the impact is dependent on the micro-siting of the turbines and access roads in relation to field boundaries.</td>
</tr>
</tbody>
</table>

**Description of expected significance of impact**

Probability is unlikely and intensity is low because soil erosion can be managed. Soil erosion is expected for the duration of all phases of the project. Impact is partly reversible and erosion can be prevented with effective management. Expected significance is therefore low.
Gaps in knowledge and recommendations for further study
The scoping report is limited by being a desktop study only. The field investigation will involve a visual assessment of erosion and erosion potential on site. The EIA phase will include a detailed assessment of the specifics of the road and turbine layout footprint in relation to slopes, disturbance of existing contour banks and other existing run-off control measures, and other potential erosion problems. Erosion and stormwater management measures will be recommended for inclusion in the project EMPr.

<table>
<thead>
<tr>
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<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disturbance of cultivation practices and agricultural activities</td>
<td>Disturbance of cultivation practices and agricultural activities (ploughing, planting, harvesting) due to the obstruction by turbines and other infrastructure within cultivated fields.</td>
<td>Site</td>
<td>No-go areas are not required, but the significance of the impact is dependent on the micro-siting of the turbines and access roads in relation to field boundaries.</td>
</tr>
</tbody>
</table>

Description of expected significance of impact
Probability is possible and intensity is low as disturbance can be mitigated. Disturbance is expected for the duration of all phases of the project. Impact is reversible and can be mitigated. Expected significance is therefore low.

Gaps in knowledge and recommendations for further study
EIA phase will also assess the layout footprint in relation to cultivated lands in terms of its potential disturbance to agricultural activities in those lands.

<table>
<thead>
<tr>
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<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevention of aerial crop spraying</td>
<td>The presence of turbines in an area can prevent or disturb access to crop spraying aircraft, which can potentially cause crop losses to disease.</td>
<td>Site</td>
<td>None identified.</td>
</tr>
</tbody>
</table>

Description of expected significance of impact
Probability is possible and intensity is low as the impact can be mitigated and crop reductions are likely to be minimal. The impact is expected for the duration of all phases of the project. Impact is reversible and can be mitigated. Expected significance is therefore low.

Gaps in knowledge and recommendations for further study
No gaps in knowledge have been identified.

<table>
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<tr>
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<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generation of additional land use income</td>
<td>Generation of additional farm income is a positive impact of the development on the financial sustainability of farming enterprises.</td>
<td>Site</td>
<td>None identified.</td>
</tr>
</tbody>
</table>

Description of expected significance of impact
Probability is possible and intensity is low. The impact is expected for the duration of all phases of the project. Impact is reversible and no enhancement of positive impact is possible. Expected significance is therefore low.

**Gaps in knowledge and recommendations for further study**
No gaps in knowledge have been identified.

### 6.4.6. Potential impact on sensitive noise receptors

**Impact:** Impacts on noise sensitive receptors.

Noise emitted by wind turbines can be associated with two types of noise sources. These are aerodynamic sources due to the passage of air over the wind turbine blades and mechanical sources which are associated with components of the power train within the turbine, such as the gearbox and generator and control equipment for yaw, blade pitch, etc. These sources normally have different characteristics and can be considered separately. There are also other lesser noise sources, such as the sub-stations, traffic (maintenance) and transmission line noise.

The impact assessment for the various activities defined in Appendix L indicate that the operational wind turbines could increase the ambient noise levels in the area. Only the night-time scenario was assessed as this is the most critical time period when a quiet environment is desired.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in noise level at receptors. Disturbing noises</td>
<td>Increased noises or disturbing noises may increase annoyance levels with project.</td>
<td>Numerous wind turbines operating simultaneously may impact an area within 2 000m from the wind turbines.</td>
<td>None identified.</td>
</tr>
</tbody>
</table>

**Description of expected significance of impact**

The potential impact is expected to be negative, probable and long term. Numerous wind turbines operating simultaneously may impact an area within 2 000m from the wind turbines. Mitigation will depend on the layout footprint of infrastructure, status of surrounding receptors and the significance of the potential noise impact and mitigation measures can only be defined with more information in the EIA phase.

**Gaps in knowledge and recommendations for further study**

Gaps in knowledge will be defined during EIA stage (information available with regards to the status of receptors as identified, whether any receptors are to be relocated, potential mitigation measures or the exact location of wind turbines footprint). It is recommended that a full Environmental Noise Impact Assessment be undertaken.
6.4.7. Potential impacts on visual aesthetics and sense of place

Possible visual receptors

» **Area receptors**: The urban area of Moorreesburg including an area of smallholdings on the northern edge of the settlement and a golf course to the south. The analysis has shown that there is a small tourism sector within Moorreesburg. Areas associated with this use as well as residential areas are likely to be the most sensitive to possible changes in outlook associated with the proposed development. People within the mountainous wilderness areas to the north south and east that overlook the agricultural valley below including the ridge on which the site is proposed. People using this area are likely to include; tourists, hikers and climbers. They will be people who visit the area specifically for the wilderness experience. It is possible that development of the valley below the mountain range could degrade the current view and reduce this wilderness experience.

» **Linear Receptors** which include main routes through the area. It is likely that these routes will be mainly used by local people; however, the N7 Cape to Namibia Route is used extensively by tourists. The R311 and R44 are also likely to carry a proportion of tourist traffic.

» **Point Receptors** that include isolated and small groups of homesteads that are generally associated with and located within the agricultural landscape that surrounds the proposed development site

<table>
<thead>
<tr>
<th>Impact: The visibility of the facility from, and potential visual impact on observers travelling along main (i.e. the N7 and the R311) and secondary roads in close proximity to the proposed wind farm and within the region.</th>
</tr>
</thead>
</table>

Impact on linear receivers (roads) that run through the area. These include;

- The N7 Cape to Namibia Route.
- The R311 which is a surfaced road between Moorreesburg and Riebeeck Kasteel to the south east and Moorreesburg and Hopefield to the north west.
- The R307 which is largely an unsurfaced road in the vicinity of Moorreesburg between Moorreesburg and Darling to the west.
- A local gravel road that runs between Moorreesburg and the R44 close to the settlement of Gouda.

The N7 is by far the busiest route carrying a mix of local and regional traffic and is a key tourism route. The R311 also has importance for tourism. Other routes predominantly carry local traffic.
### Issue | Nature of Impact | Extent | No-Go Areas
---|---|---|---
Industrialisation of general landscape character. | The impact relates to the possible change in the character of the view from the road from a rural agricultural landscape to an industrialised / developed landscape. The impact on individual users will only be for the short period that they are utilising the road in the vicinity of the site. Due to topography the greatest impacts are likely to occur within 5km of the site. Past this distance, due to the undulating topography, fewer turbines will be visible and visibility will be intermittent as viewer traverse minor valleys and ridges. It isn’t until the viewer is generally in excess of 20km from the proposed development that the majority of turbines will be obvious. At this distance the change of character will be significantly mitigated by distance. Atmospheric conditions and lighting could provide further mitigation. Within 5km, the proposed Hartebeest Wind Farm is likely to be highly obvious and potentially could have a high impact on sensitive receptors. At greater distances however visibility of the development will be significantly reduced and impacts are likely to be relatively low. | The influence is likely to be over the site and immediate surroundings in terms of the largest impacts and regional for low level impacts. There are no no-go areas. However, in order to protect the more natural landscape areas to the east, as much infrastructure as possible should be focused on the western side of the ridgeline. |

### Description of expected significance of impact
The rural landscape will still be evident and the majority of uses in Moorreesburg are unlikely to be sensitive to the change in view. Not all uses within the town are likely to be sensitive include residential areas and the small tourism sector Impacts are greatest in the vicinity of the southern access to Moorreesburg and on roads within the town that run directly downhill towards the development.

Views from this area have been impacted by development already including the settlement, a quarry site adjacent to the proposed development and a substation with numerous associated overhead power lines. It is therefore not the most cohesive example of a rural landscape in the region. The character of the rural landscape will be changed. Within the “high impact zone” it is likely that the loss of rural characteristics will be highly obvious to the majority of people. It is therefore likely that the change viewed from within this area is likely to cause greatest concern to receptors, the most sensitive are likely to include;

- Householders that overlook the development, and
- Tourism related establishments including guest houses.
It is difficult to gauge the sensitivity of residents to the proposed development. It is likely that there will be mixed feelings, however, given that the economy of the town is largely focused on productive agriculture and not tourism, it is possible that a large proportion of residents will view the development as positive. There is unlikely to be an irreplaceable loss as the impact should reverse on decommissioning of the facility.

**Gaps in knowledge and recommendations for further study**

A detailed impact assessment should be undertaken to determine the potential visual impacts. A final layout footprint for assessment will be required.

**Impact:** The potential visual impact on urban centres and populated places in close proximity to the proposed wind farm (i.e. Moorreesburg).

The town of Moorreesburg is largely located on an east facing slope overlooking the proposed site. Whilst occasional views over the entire ridgeline on which the wind farm is proposed will be possible, the most common type of view will be one that is channelled down a road that runs directly downhill towards the development. This will produce views of small sections of the wind farm at any one time. This will be partly mitigated by street trees which in areas could largely screen views of the development.

<table>
<thead>
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<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrialisation of general landscape character.</td>
<td>The impact relates to the possible change in the character of the view from a rural agricultural landscape to an industrialised / developed landscape. The impact on individual users will only be for the short period that they are utilising the road in the vicinity of the site.</td>
<td>The influence is likely to be over the site and immediate surroundings.</td>
<td>There are no no-go areas. However, in order to protect the more natural landscape areas to the east, as much infrastructure as possible should be focused on the western side of the ridgeline.</td>
</tr>
</tbody>
</table>

Due to topography the greatest impacts are likely to occur within 5km of the site. Past this distance, due to the undulating topography, fewer turbines will be visible and visibility will be intermittent as viewer traverse minor valleys and ridges. It isn’t until the viewer is generally in excess of 20km from the proposed development that the majority of turbines will be obvious. At this distance the change of character will be significantly mitigated by distance. Atmospheric conditions and lighting could provide further mitigation.

Within 5km, the proposed Hartebeest Wind Farm is likely to be highly obvious and potentially could have a high impact on sensitive receptors. At greater distances however visibility of the development will be significantly reduced and impacts are likely to be relatively low.
Description of expected significance of impact

There are no protected areas of national importance that are likely to be impacted. It is possible however that there could be sensitive and local conservation / recreational uses. The landscape analysis indicates that the site straddles a ridgeline. The landscape to the east of the ridgeline is rural with little development or infrastructure obvious whereas the landscape to the west of the ridgeline includes the urban area of Moorreesburg as well as areas of obvious infrastructure.

The location of as much of the development as possible on the western side of the ridgeline particularly related infrastructure could help to reduce the significance of impacts. Other mitigation might include;

Planning:
- Ensure that ground level development is minimised; and
- plan the use of non-reflective finishes.

Operations:
- Minimise disturbance; and
- Maintain existing uses below the development.

Decommissioning:
- Remove infrastructure not required for the post-decommissioning use of the site;
- Return all affected areas to productive agricultural use; and
- Monitor rehabilitated areas post-decommissioning and implement remedial actions.

There is unlikely to be an irreplaceable loss as the impact should reverse on decommissioning of the facility.

Gaps in knowledge and recommendations for further study

A detailed impact assessment should be undertaken to determine the potential visual impacts. A final layout footprint for assessment will be required.

Impact: The visibility of the proposed Hartebeest Wind Farm from, and potential visual impact on residences and homesteads in close proximity to the wind farm and within the region.

Five homesteads are located within the area that the turbines are proposed. A further six homesteads are located within one kilometre and a further 27 farmsteads will have a view over the wind farm from within the high impact zone.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrialisation of general</td>
<td>The level of impact for each of these groups will differ significantly;</td>
<td>The influence is likely to be over the site and</td>
<td>There are no no-go areas. However, in order to protect the more natural</td>
</tr>
<tr>
<td></td>
<td>• Residents within the turbine field will have their outlook changed the most.</td>
<td>immediate surroundings.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Turbine structures and associated infrastructure will</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Scoping of Potential Issues
landscape character. dominate and industrialise the landscape. High levels of impact might be expected.

- Residents close to the edge of the turbine field will experience a similar degree of impact over approximately 50% of their outlook. They will at least be able to maintain their rural outlook over the remainder of their view. Moderate to high levels of impact might be expected.

- Residents outside the immediate vicinity of the turbines are likely to read the rural landscape between the structures more readily and to some extent the turbines will recede (the greater the distance the more this will occur). Associated lower level infrastructure is likely to be the main hindrance in this regard. Impacts levels are likely to range from low to moderate.

landscape areas to the east, as much infrastructure as possible should be focused on the western side of the ridgeline.

Description of expected significance of impact

The character of the rural landscape will be changed. Within the “high impact zone” it is likely that the loss of rural characteristics will be highly obvious to the majority of people. It is therefore likely that the change viewed from within this area is likely to cause greatest concern to receptors, the most sensitive are likely to include;

- Householders that overlook the development, and
- Tourism related establishments including guest houses.

A proportion of these people are likely to view the development in a negative light. It is also likely that a proportion of the population, particularly those that may benefit will view the development as a positive addition to the local landscape. Mitigation might include;

Planning:

- Ensure that ground level development is minimised; and
- Plan the use of non-reflective finishes.

Operations:

- Minimise disturbance; and
- Maintain existing uses below the development.

 Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site;
- Return all affected areas to productive agricultural use; and
- Monitor rehabilitated areas post-decommissioning and implement remedial actions.
There is unlikely to be an irreplaceable loss as the impact should reverse on decommissioning of the facility.

**Gaps in knowledge and recommendations for further study**

A detailed impact assessment should be undertaken to determine the potential visual impacts. A final layout footprint for assessment will be required.

**Impact:** The potential visual impact of ancillary infrastructure (i.e. access roads, workshop, wind monitoring masts, telecommunications masts, the substation and the power line) on observers in close proximity to the infrastructure.

Minimising the extent and visibility of associated infrastructure particularly at lower levels is critical in addressing visual impacts of the overall wind farm particularly from short range views. Due to their size, other than placement and perhaps finish it is impossible to undertake measures that will mitigate the impacts of close views of the turbines. Mitigation therefore has to focus on ensuring that lower level infrastructure does not clutter the view and that existing agricultural land cover is seen to flow cleanly through and around the turbine towers. This will at least help to give the impression that the turbines are located in an agricultural landscape rather than creating a new industrialised area.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrialisation of general landscape character.</td>
<td>This impact is only likely to be significant within the high impact zone (5km).</td>
<td>The influence is likely to be over the site and immediate surroundings.</td>
<td>There are no no-go areas. However, in order to protect the more natural landscape areas to the east, as much infrastructure as possible should be focused on the western side of the ridgeline.</td>
</tr>
</tbody>
</table>

**Description of expected significance of impact**

The character of the rural landscape will be changed. Within the “high impact zone” it is likely that the loss of rural characteristics will be highly obvious to the majority of people. It is therefore likely that the change viewed from within this area is likely to cause greatest concern to receptors.

Mitigation might include:

Planning:

- Ensure that ground level development is minimised;
- Plan to underground connecting infrastructure as far as possible;
- Plan to keep visible infrastructure to the western side of the ridgeline; and
- Plan to keep infrastructure off the ridgeline.

Operations:
- Minimise disturbance; and
- Maintain existing uses below the development.

Decommissioning:
- Remove infrastructure not required for the post-decommissioning use of the site;
- Return all affected areas to productive agricultural use; and
- Monitor rehabilitated areas post-decommissioning and implement remedial actions.

There is unlikely to be an irreplaceable loss as the impact should reverse on decommissioning of the facility.

### Gaps in knowledge and recommendations for further study

A detailed impact assessment should be undertaken to determine the potential visual impacts. A final layout footprint for assessment will be required.

### Impact: The potential visual impact of shadow flicker on observers residing on or in close proximity to the proposed wind farm.

The term “shadow flicker” refers to the flickering effect caused when rotating wind turbine blades periodically cast shadows over neighbouring properties as they turn, through constrained openings such as windows. There are a number of homesteads in close proximity to the turbines that could be affected by shadow cast by the turbine structures. Five homesteads are located within the area that the turbines are proposed and a further six homesteads are located within one kilometre. If buildings are in shadow during clear weather when the turbine is turning then they are likely to be affected by shadow flicker. It has to be stated that homesteads close to edges of potentially shaded areas edges are only likely to at least risk and then may only be subject to shadow for short periods of the year and so the risk of shadow flicker is low. Whereas homesteads over which shadow is cast for long periods of the year are at greater risk of the impact. Shadow flicker is primarily a nuisance related impact which has the potential to last as long as shadow is cast on the subject. It is also possible that in some people suffering from epilepsy an epileptic seizure may be triggered by light flickers (photosensitive epilepsy).

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrialisation of general landscape character.</td>
<td>The residents of approximately 13 homesteads may be at risk of experiencing shadow flicker. Impacts may be significant.</td>
<td>The influence is likely to be over the site and immediate surroundings.</td>
<td>This is unknown. The affected properties and mitigation measures need to be analysed in detail in the EIA phase.</td>
</tr>
</tbody>
</table>

### Description of expected significance of impact
Research has indicated that the greatest shadow flicker impact can be expected inside a property where the change in light intensity is most noticeable and when turbines are rotating at between 5 and 14 Hz, below 2.5 Hz and above 40 Hz will cause “hardly any nuisance”.

Mitigation might include;

Planning:
- Undertake consultation with affected parties to inform them and offer mitigation.
- Sensitive design to minimise risk of impact.
- Investigate / plan mechanism to shut down individual turbines in high risk conditions.

Operations:
- Install blinds on affected windows.
- Shut down individual turbines in high risk conditions.

Decommissioning:
- No mitigation necessary.

Gaps in knowledge and recommendations for further study

A detailed impact assessment should be undertaken to determine the potential visual impacts. A final layout footprint for assessment will be required.

Impact: The potential visual impact of the proposed wind farm and ancillary infrastructure on the scenic visual character of the landscape and the sense of place of the region, with specific reference to the high quality pastoral landscape.

The landscape in which the development is proposed is a relatively cohesive rural agricultural landscape which in general has been little affected by infrastructure or built development. The significance of this landscape is made greater by its relationship with the rugged upland landscape of the Cederberg, which is located approximately 30km to the east of the proposed windfarm, with which it provides a strong contrast. This protected wilderness area is possibly the most important area from within which landscape character is experienced.

### Issue | Nature of Impact | Extent | No-Go Areas |
---|---|---|---|
Industrialisation of general landscape character. | The impact relates to the possible change in the character of the view from surrounding landscape areas. The most critical affected landscape in this regard is the protected area of the Cederberg approximately 30km to the east. Distance and the fact that the development will be viewed against landform is likely to mean that whilst the development may be visible, it is unlikely to be highly obvious from this area. | The influence is likely to be over the site and immediate surroundings in terms of the largest impacts and regional for low level impacts. | There are no no-go areas. However, in order to protect the more natural landscape areas to the east, as much infrastructure as possible should be focused on the |
Due to topography the greatest impacts are likely to occur within 5km of the site. Past this distance, due to the undulating topography, fewer turbines will be visible and visibility will be intermittent as viewer traverse minor valleys and ridges. It isn’t until the viewer is generally in excess of 20km from the proposed development that the majority of turbines will be obvious. At this distance the change of character will be significantly mitigated by distance. Atmospheric conditions and lighting could provide further mitigation.

Within 5km, the proposed wind farm is likely to be highly obvious and potentially could have a high impact on sensitive receptors. At greater distances however visibility of the development will be significantly reduced and impacts are likely to be relatively low.

**Description of expected significance of impact**

The proposed development is likely to have minimal impact on protected landscapes including the Cederberg from which long distance views may be possible. Impacts within these areas will be mitigated by distance and the fact that the development will be viewed against the landform and not the skyline. The character of the rural landscape will be changed. Within the “high impact zone” which is limited by a series of minor ridgelines to a distance of approximately 5km. It is likely that loss of rural characteristics will be highly obvious to the majority of people within this area. It is therefore likely that the change viewed from within this area is likely to cause greatest concern to receptors.

Outside of the 5km high impact zone, the greatest degree of impact is likely to be limited to a series of ridgelines from which long distance views of the development will be possible. Outside of these ridgelines the visibility of the proposed development is likely to be intermittent and partial until the viewer is approximately 20km away. From this distance whilst the development will be visible, the impact is mitigated by distance and possibly by atmospheric and lighting conditions.

There is unlikely to be an irreplaceable loss as the impact should reverse on decommissioning of the facility.

**Gaps in knowledge and recommendations for further study**

A detailed impact assessment should be undertaken to determine the potential visual impacts. A final layout footprint for assessment will be required.

**Impact:** The potential visual impact of operational, safety and security lighting of the facility at night on observers in close proximity to the facility.
Light pollution changing the nature of the night time landscape from natural to a developed area.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrialisation of general landscape character.</td>
<td>Aviation warning lights on the wind turbines and security lighting around key installations could change the nature of the night time landscape.</td>
<td>The influence is likely to be over the site and immediate surroundings in terms of the largest impacts and regional for low level impacts.</td>
<td>There are no no-go areas. However, in order to protect the more natural landscape areas to the east, as much infrastructure as possible should be focused on the western side of the ridgeline.</td>
</tr>
</tbody>
</table>

Description of expected significance of impact

From reference to manufacturer’s specifications, it appears that aviation warning lights have an intensity and performance requirement range of up to 4 nautical miles which is approximately 8km. Subject to weather conditions, lighting at night may be visible at a greater distance but the performance is likely to deteriorate significantly with distance. It is likely that security lighting will only be utilised around the control building. The areas that are likely to be most sensitive to lighting are the mountainous wilderness areas that overlook the coastal plain. These areas are in excess of 30km from the proposed Hartebeest Wind Farm and are unlikely to be impacted.

Aviation warning lighting and security lighting will be visible from areas surrounding the proposed site. If security lighting is located to the west of the ridgeline on which the turbines are proposed, this will not be out of keeping with lights from the near-by urban area, lights from traffic on the relatively busy N7 as well as security lighting at the adjacent quarry and Moorreesburg substation. However, if security lighting is on the eastern side of the hill, this area is more tranquil and is less developed hence the general level of lighting is relatively low. The addition of a bright patch of security lighting on this side of the ridgeline is likely to be more obvious.

Gaps in knowledge and recommendations for further study

A detailed impact assessment should be undertaken to determine the potential visual impacts. A final layout footprint for assessment will be required.
### 6.4.8. Impacts on the social environment

**Impact:** Impacts on the social environment

The potential positive impacts which could arise as a result of the construction activities include the following:

- Creation of employment and business opportunities. The operational phase will also create opportunities for skills development and training;
- Benefits associated with the establishment of a Community Trust; and
- The establishment of renewable energy infrastructure.

The potential negative impacts which could arise as a result of the construction activities include the following:

- The visual impacts and associated impact on sense of place; and
- Potential impact on tourism.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creation of employment and business opportunities associated with the operational phase</td>
<td>Creation of employment and business opportunities associated with the operational phase.</td>
<td>Local-regional</td>
<td>None at this stage</td>
</tr>
</tbody>
</table>

**Description of expected significance of impact**

The potential impact is expected to be positive, probable, long term and have a low significance. This will be confirmed during the EIA phase following detailed investigations and assessment of impacts. Reversibility of the impact is not applicable to this type of impact and no irreplaceable loss of resources is associated with the potential impact. The potential impact may be enhanced with possible enhancement measures which will be elaborated in the EIA phase.

**Gaps in knowledge and recommendations for further study**

A site visit and consultations with key stakeholders will need to take place in the EIA phase in order to determine the perceived safety and security risks associated with the proposed development.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishment of a community trust funded by revenue generated from the sale of energy. The revenue can be used to fund local community development</td>
<td>Establishment of a community trust funded by revenue generated from the sale of energy. The revenue can be used to fund local community development</td>
<td>Local</td>
<td>None at this stage</td>
</tr>
</tbody>
</table>
revenue generated from the sale of energy. The revenue can be used to fund local community development.

**Description of expected significance of impact**
The potential impact is expected to be positive, probable, long term and have a medium significance. This will be confirmed during the EIA phase following detailed investigations and assessment of impacts. Reversibility of the impact is not applicable to this type of impact and no irreplaceable loss of resources is associated with the potential impact. The potential impact may be enhanced with possible enhancement measures which will be elaborated in the EIA phase.

**Gaps in knowledge and recommendations for further study**
A site visit and consultations with key stakeholders will need to take place in the EIA phase in order to determine the perceived safety and security risks associated with the proposed development.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promotion of clean, renewable energy.</td>
<td>Promotion of clean, renewable energy.</td>
<td>Local, Regional and National</td>
<td>None at this stage</td>
</tr>
</tbody>
</table>

**Description of expected significance of impact**
The potential impact is expected to be negative, highly probable, long term and have a medium significance. This will be confirmed during the EIA phase following detailed investigations and assessment of impacts. The potential impact can be reversed and there is irreplaceable loss of resources, such as impact on climate change and ecosystems associated with the potential impact.

**Gaps in knowledge and recommendations for further study**
A site visit and consultations with key stakeholders will need to take place in the EIA phase in order to determine the perceived safety and security risks associated with the proposed development.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual impact and impact on sense of place</td>
<td>Visual impact associated with the proposed WPP and the potential impact on the areas rural sense of place.</td>
<td>Local</td>
<td>None at this stage</td>
</tr>
</tbody>
</table>
The potential impact is expected to be negative, probable, long term and of medium significance. This will be confirmed during the EIA phase following detailed investigations and assessment of impacts. The potential impact can be reversed and there is irreplaceable loss of resources associated with the potential impact. The potential impact may be avoided with possible mitigation measures which will be elaborated in the EIA phase.

### Gaps in knowledge and recommendations for further study

A site visit and consultations with key stakeholders will need to take place in the EIA phase in order to determine the perceived safety and security risks associated with the proposed development.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Extent</th>
<th>No-Go Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential impact on local tourism</td>
<td>Potential impact of the Hartebeest Wind Farm on local tourism</td>
<td>Local</td>
<td>None at this stage</td>
</tr>
</tbody>
</table>

### Description of expected significance of impact

The potential impact is expected to be negative, probable, long term and have low significance. This will be confirmed during the EIA phase following detailed investigations and assessment of impacts. The potential impact can be reversed and there is irreplaceable loss of resources associated with the potential impact. The potential impact may be avoided with possible mitigation measures which will be elaborated in the EIA phase.

### Gaps in knowledge and recommendations for further study

A site visit and consultations with key stakeholders will need to take place in the EIA phase in order to determine the perceived safety and security risks associated with the proposed development.
CONCLUSIONS

CHAPTER 7

Hartebeest Wind Farm (Pty) Ltd is proposing to establish a commercial wind energy facility and associated infrastructure on a site located approximately 4km south-south east of Moorreesburg in the Swartland Local Municipality of the Western Cape Province and within the greater West Coast District Municipality.

The facility is proposed within the following farm portions:

- Farm Zwartfontein 414
  - Portion 20, 21 and 23
  - Remainder of Portion 8, 11, 12, 13, 17 and 18
- Farm Zwartfontein 416
  - Portion 1, 5 and 7
  - Remainder of Portion 3
- Farm Hartebeestfontein 412
  - Portion 2 and 6
- Portion 0 of Farm 1066
- Portion 1 of the Farm Tontelberg 424
- Portion 9 of the Farm Biesjesfontein 413

As detailed in Chapter 2, this was identified as the preferred site alternative for investigation after consideration of a number of sites within the broader region. This Scoping Study identifies environmental sensitivities within this development area which will be used to inform layout footprint alternatives to be assessed in detail by specialist studies in the EIA phase of the process. There is therefore no comparative assessment of development footprint alternatives within the preferred site at this stage in the process as information of sufficient detail is not yet available to inform this assessment.

The Scoping Study for the proposed Hartebeest Wind Farm has been undertaken in accordance with the EIA Regulations published in Government Notice 38282 of 4 December 2014, in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998).

This Scoping Report is aimed at detailing the nature and extent of the proposed facility, identifying and evaluating potential issues associated with the proposed project, and defining the extent of studies required within the EIA phase. This was achieved through an evaluation of the proposed project, involving the project proponent, specialist consultants, and a consultation process with key stakeholders (including relevant government authorities) and interested and affected parties (I&APs). The public consultation process is on-going and every effort is being made to include representatives of all relevant stakeholder groupings in the study area.
This chapter concludes the Scoping Report and provides an evaluation of the identified potential environmental risks and impacts associated with the construction and operation phases of the Hartebeest Wind Farm based on the findings of the specialist studies undertaken. Recommendations regarding investigations required to be undertaken within the EIA are provided within the Plan of Study for EIA, contained within Chapter 8 of this scoping report.

7.1 Legal Requirements as per the EIA Regulations, 2014

This chapter of the scoping report includes the following information required in terms of Appendix 2: Content of the Scoping Report of the EIA Regulations, 2014:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Relevant Section</th>
<th>Page Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>(h)(xi) a concluding statement indicating the preferred alternatives, including the preferred location of the activity.</td>
<td>A concluding statement regarding the Hartebeest Wind Farm is included within this chapter as a whole.</td>
<td>Page 154</td>
</tr>
</tbody>
</table>

7.2 Conclusions drawn from the Evaluation of the Proposed Hartebeest Wind Farm

The proposed Hartebeest Wind Farm will have an installed generation capacity of up to 160MW. Proposed infrastructure to be constructed within a broader area of approximately 3830 ha in extent includes the following infrastructure:

- Up to 40 wind turbines of up to 4MW in capacity each, with a maximum hub height of up to 120m and a rotor diameter of up to 136m;
- Concrete foundations to support the turbines;
- Cabling between the turbines, to be laid underground where practical;
- An on-site substation of approximately 50m x 50m in extent to facilitate the connection between the wind energy facility and the electricity grid;
- An overhead power line to connect the facility to the electricity grid. Two alternatives are being considered:
  - Alternative 1: A connection to the existing Moorreesburg 132/66kV substation at 132kV via a 3.5km power line up to 132kV.
  - Alternative 2: A connection to the existing Moorreesburg 132/66kV substation at 66kV via a 3km power line up to 132kV.
- Internal access roads to each turbine and to the on-site substation;
- Access roads to the site and between project components;
- Workshop area / office for control, maintenance and storage; and
- Temporary infrastructure including a concrete batching plant of 50m x 50m in extent to facilitate with the concrete requirements for turbine foundations and/or towers construction and laydown areas.
The key issues and potential impacts identified through this scoping study associated with the Hartebeest Wind Farm are summarised in Table 7.1. From this table it can be concluded that the majority of potential impacts identified to be associated with the construction of the proposed Hartebeest Wind Farm are anticipated to be localised with few impacts extending to a local to regional extent. The majority of potential impacts identified to be associated with the operation of the proposed Hartebeest Wind Farm are anticipated to be restricted to the site with few impacts extending to a local, regional and national extent.

Impacts identified are discussed further in Section 7.4. No environmental fatal flaws were identified to be associated with the proposed project at this stage in the process. This conclusion must however be confirmed through a detailed investigation of the development footprint within the EIA Phase of the process. Alternative layouts within the larger development area should and will be considered in the EIA phase in order to ensure that impacts are minimised as far as possible.
### Table 7.1: Summary of the extent of the potential impacts associated with the Hartebeest Wind Farm, as identified at the scoping phase

<table>
<thead>
<tr>
<th>Construction / Decommissioning Impacts</th>
<th>Extent</th>
<th>Applicable listed activities</th>
<th>Page Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of intact vegetation and listed plant species</td>
<td>L</td>
<td>GN983, 11(i); GN984, 1; GN984, 15; GN985, 12(a)(ii); GN985, 14(xii)(a)(f)(ff); GN985, 18(f)(i)(aa)</td>
<td>103</td>
</tr>
<tr>
<td>Fauna impacted by noise and disturbance during construction</td>
<td>L</td>
<td>GN983, 11(i); GN985, 18(f)(i)(aa)</td>
<td>104</td>
</tr>
<tr>
<td>Habitat loss and disturbance</td>
<td>L</td>
<td>GN983, 12(xiii)(c); GN984, 1; GN984, 15; GN985, 12(a)(ii); GN985, 18(f)(i)(aa)</td>
<td>106</td>
</tr>
<tr>
<td>Displacement from feeding areas</td>
<td>L</td>
<td>GN983, 12(xiii)(c), GN983, 19(i), GN984, 1; GN984, 15;</td>
<td>110</td>
</tr>
<tr>
<td>Disturbance and/or destruction of roots</td>
<td>L</td>
<td>GN983, 12(xiii)(c), GN983, 19(i), GN984, 15;</td>
<td>110</td>
</tr>
<tr>
<td>Reduction of ecosystem services due to disruption of bat population</td>
<td>L</td>
<td>GN983, 12(xiii)(c), GN983, 19(i), GN984, 15;</td>
<td>110</td>
</tr>
<tr>
<td>Disturbance caused by turbine facilities and on-site substation</td>
<td>L</td>
<td>GN983, 12(xiii)(c), GN983, 19(i), GN985, 14(xii)(a)(f)(ff)</td>
<td>112</td>
</tr>
<tr>
<td>Loss of habitat within streams, riparian areas and wetland habitats, loss of indigenous vegetation within riparian zones</td>
<td>L</td>
<td>GN983, 12(xiii)(c), GN983, 19(i), GN985, 14(xii)(a)(f)(ff)</td>
<td>113</td>
</tr>
<tr>
<td>Loss of agricultural land</td>
<td>S</td>
<td>GN983, 11(i); GN984, 1</td>
<td>114</td>
</tr>
<tr>
<td>Soil erosion</td>
<td>S</td>
<td>GN983, 11(i); GN984, 1</td>
<td>114</td>
</tr>
<tr>
<td>Disturbance to agricultural activities</td>
<td>S</td>
<td>GN983, 11(i); GN984, 1</td>
<td>115</td>
</tr>
<tr>
<td>Loss of topsoil</td>
<td>S</td>
<td>GN983, 11(i); GN984, 1</td>
<td>116</td>
</tr>
<tr>
<td>Physical disturbance to archaeological resources</td>
<td>L</td>
<td>GN983, 11(i); GN984, 1</td>
<td>116</td>
</tr>
<tr>
<td>Destruction of protected structures</td>
<td>L</td>
<td>GN983, 11(i); GN984, 1</td>
<td>117</td>
</tr>
<tr>
<td>Landscape quality - Change to the overall cultural landscape, setting and character</td>
<td>L</td>
<td>GN983, 11(i); GN984, 1</td>
<td>117</td>
</tr>
<tr>
<td>Increase in noise levels at closest receptors</td>
<td>S-L</td>
<td>GN983, 11(i); GN984, 1</td>
<td>120</td>
</tr>
<tr>
<td>Potential visual impact on observers travelling along main (i.e. the N7 and the R311) and secondary roads</td>
<td>S</td>
<td>GN983, 11(i); GN984, 1</td>
<td>123</td>
</tr>
<tr>
<td>Potential visual impact on urban centres and populated places</td>
<td>S</td>
<td>GN983, 11(i); GN984, 1</td>
<td>124</td>
</tr>
<tr>
<td>Potential visual impact on residences and homesteads in close proximity</td>
<td>S</td>
<td>GN983, 11(i); GN984, 1</td>
<td>126</td>
</tr>
<tr>
<td>Potential visual impact of ancillary on observers</td>
<td>S</td>
<td>GN983, 11(i); GN984, 1</td>
<td>127</td>
</tr>
<tr>
<td>Creation of employment and business opportunities</td>
<td>L-R</td>
<td>GN984, 1</td>
<td>129</td>
</tr>
<tr>
<td>Impacts on family structures and social networks</td>
<td>L</td>
<td>GN984, 1</td>
<td>130</td>
</tr>
<tr>
<td>Pressure on economic and social infrastructure impacts from an in-migration of people.</td>
<td>L</td>
<td>GN984, 1</td>
<td>130</td>
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<tr>
<td>Safety and security impacts</td>
<td>L</td>
<td>GN984, 1</td>
<td>131</td>
</tr>
<tr>
<td>Loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of grass fires</td>
<td>L</td>
<td>GN984, 1</td>
<td>131</td>
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<tr>
<td>Dust and safety impacts and damage to road surfaces associated with movement of construction related traffic to and from the site</td>
<td>L</td>
<td>GN983, 11(i); GN984, 1</td>
<td>132</td>
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<tr>
<td>Loss of farmland for grazing</td>
<td>L</td>
<td>GN984, 1</td>
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</table>

### Operational Impacts

<table>
<thead>
<tr>
<th>Operational Impacts</th>
<th>Extent</th>
<th>Applicable listed activities</th>
<th>Page Reference</th>
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<tbody>
<tr>
<td>Faunal impacts due to operation</td>
<td>L</td>
<td>GN983, 11(i); GN984, 1</td>
<td>133</td>
</tr>
<tr>
<td>Collision with turbines</td>
<td>L</td>
<td>GN983, 11(i); GN984, 1</td>
<td>134</td>
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<tr>
<td>Collision with power lines</td>
<td>R</td>
<td>GN983, 11(i); GN984, 1</td>
<td>134</td>
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<tr>
<td>Fatalities due to collision and barotrauma</td>
<td>R</td>
<td>GN983, 11(i); GN984, 1</td>
<td>136</td>
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<tr>
<td>Disturbance and/or destruction of roots</td>
<td>L</td>
<td>GN983, 11(i); GN984, 1</td>
<td>136</td>
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<tr>
<td>Fatalities due to collision with power lines and met masts guyed lines</td>
<td>R</td>
<td>GN983, 11(i); GN984, 1</td>
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</tr>
<tr>
<td>Increased runoff which could cause erosion and sedimentation</td>
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<td>Loss of agricultural land</td>
<td>S</td>
<td>GN983, 11(i); GN984, 1</td>
<td>138</td>
</tr>
<tr>
<td>Soil erosion</td>
<td>S</td>
<td>GN983, 11(i); GN984, 1</td>
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<td>Disturbance to agricultural activities</td>
<td>S</td>
<td>GN983, 11(i); GN984, 1</td>
<td>138</td>
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<tr>
<td>Prevention of aerial crop spraying</td>
<td>S</td>
<td>GN983, 11(i); GN984, 1</td>
<td>138</td>
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<tr>
<td>Generation of additional land use income</td>
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<td>GN983, 11(i); GN984, 1</td>
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<tr>
<td>Increases in noise levels at closest receptors</td>
<td>L-R</td>
<td>GN983, 11(i); GN984, 1</td>
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<td>Potential visual impact on observers travelling along main (i.e. the N7 and the R311) and secondary roads</td>
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<td>Potential visual impact on urban centres and populated places</td>
<td>S</td>
<td>GN983, 11(i); GN984, 1</td>
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<tr>
<td>Potential visual impact on residences and homesteads in close proximity</td>
<td>S</td>
<td>GN983, 11(i); GN984, 1</td>
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## Operational Impacts

<table>
<thead>
<tr>
<th>Operational Impacts</th>
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<th>Applicable listed activities</th>
<th>Page Reference</th>
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<tr>
<td>Potential visual impact of ancillary on observers</td>
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<td>GN983, 11(i); GN984, 1</td>
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<tr>
<td>Shadow flicker on observers residing on or in close proximity</td>
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<td>GN983, 11(i); GN984, 1</td>
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<tr>
<td>Scenic visual character of the landscape and the sense of place</td>
<td>S</td>
<td>GN983, 11(i); GN984, 1</td>
<td>148</td>
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<tr>
<td>Operational safety and security lighting of the facility at night on observers</td>
<td>S</td>
<td>GN983, 11(i); GN984, 1</td>
<td>150</td>
</tr>
<tr>
<td>Employment and business creation</td>
<td>L-R</td>
<td>GN983, 11(i); GN984, 1</td>
<td>151</td>
</tr>
<tr>
<td>Benefits associated with establishment of a community trust</td>
<td>L</td>
<td>GN983, 11(i); GN984, 1</td>
<td>151</td>
</tr>
<tr>
<td>Implementation of clean, renewable energy</td>
<td>L-R-N</td>
<td>GN983, 11(i); GN984, 1</td>
<td>152</td>
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<tr>
<td>Visual impact and impact on sense of place</td>
<td>L</td>
<td>GN983, 11(i); GN984, 1</td>
<td>152</td>
</tr>
<tr>
<td>Impacts on tourism</td>
<td>L</td>
<td>GN983, 11(i); GN984, 1</td>
<td>153</td>
</tr>
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</table>
7.4 Sensitivity Analysis and Risks Associated with the Proposed Project

The potentially sensitive areas which have been identified through the scoping study are discussed below and summarised in Figure 7.1. The scoping phase sensitivity map provides an informed illustration of sensitivity within and around the larger site. The detail is based on the desktop review of the available baseline information for the study area as well as limited field surveys. The sensitivity map is intended to inform the location and layout of the wind energy facility and associated infrastructure within the broader site, and must be used as a tool by the developer to avoid those areas flagged to be of potential high sensitivity as far as possible. Specific sensitivities identified within the scoping study are summarised in the sections below.

Those portions of the site which are proposed for the project development footprint will be subject to survey and ground-truthing during the EIA phase of the project. The potentially sensitive areas identified to date will therefore be further investigated and assessed through detailed specialist studies (including field surveys and footprint specific impact assessments) during the EIA phase of the process (refer to Chapter 8 for further details) and the sensitivity map will be further refined on the basis of these specialist studies, in order to provide an assessment of environmental acceptability and suitability of the facility layout footprint of the Hartebeest Wind Farm.

7.4.1. Ecological sensitive features

The intact vegetation fragments within the study area are classified as Very High sensitivity on account of their high threat status as well as the likely presence of high numbers of species of conservation concern. As the large Renosterveld remnant towards the eastern half of the site has also been identified as part of a regionally significant Renosterveld cluster, development within this fragment would generate impacts which would be deemed to have very high significance and would be considered to constitute a fatal flaw for the development if not avoided. The site presents a highly contrasting sensitivity, with the transformed areas being considered to be of low sensitivity, with little risk of significant ecological impact and the intact areas being considered essentially no-go areas of exceptional sensitivity.

The impacts for the construction and operational phase are considered to be on a local level. The most significant potential impacts expected are:

- Loss of intact vegetation and listed plant species should development occur within areas of remaining natural vegetation. This impact is expected to be unlikely to occur as the layout can be designed such that these areas are avoided.
Fauna impacted by noise and disturbance. This impact is likely to occur predominantly during construction.

### 7.4.2. Avifaunal Sensitivities

In terms of general sensitivity for the avifauna community in the area, the area defined for development is considered as a medium sensitivity location. A community of raptors such as the Black Harrier or the Lanner Falcon utilises the area. There is also an important presence of Blue Cranes within the project site. Pairs with juveniles have been observed on site, which points towards the species breeding in the area.

Areas of natural vegetation are restricted to hills and slopes and are frequently used by raptors. The natural vegetation represents important habitat for sensitive, endangered species, such as the Black Harrier. These areas must be considered as no-go areas and no development footprint are to be sited in these areas.

A 300m buffer around water bodies is considered as sensitive, as these features may attract birds under certain conditions and are the only places were certain sensitive species such as Greater and Lesser Flamingos were observed on site. These areas must be avoided and are considered as no-go areas.

A 500-1000m buffer around the active Jackal Buzzard nests identified on site must be applied (refer to Figure 7.1). The 500m buffer should be considered as no-go areas and the 1000m buffer should be considered as being of medium to high sensitivity within which limited infrastructure should be placed.

The impacts for the construction and operational phase are expected to be localised. The most significant potential impacts expected are:

- Habitat destruction during construction. This impact is considered likely to occur.
- Collision with turbines and associated infrastructure during operation. This impact is considered likely to occur but can be minimised through the appropriate placement of turbines within the site.

### 7.4.3. Bat Sensitivities

Several areas that are considered to be sensitive have been identified within the project site and include areas that are associated with Natural and Woodland Vegetation. Considering the Best practice recommendations, the sensitivity areas were delineated according to the buffer areas indicated in the “Bat Sensitivity Buffer Zone Recommendations” of the South African Bat Assessment Advisory Panel (SABAAP) (SABAAP 2013):
Moderate sensitivity - 200m buffer around all potentially bat important features:

- Natural vegetation: bat activity was seasonally related to this type of vegetation. Additionally, the ultrasound detection indicated that species with higher collision risk were more frequently detected in these areas.
- Woodland vegetation (any trees or bush clumps considered important on site, including alien vegetation): it is in this type of habitat where bats usually forage, preferentially in forest openings, or along the vertical or horizontal edge created by the junction of forest stands with other type of vegetation, roads, lakes and ponds.
- Confirmed roosts, where bat presence was not observed but evidence of their presence was found (e.g. bat droppings).

High sensitivity - 500m buffer around confirmed roosts (permanent or seasonal roosts), where 1 to 50 Least Concern Bats were found.

The impacts for the construction and operational phase are expected to be local with only one impact that is on a regional level. The most significant potential impacts expected are:

- Displacement from feeding areas during construction and operation. This impact is likely to occur but would be of a short-term duration.
- Disturbance and/or destruction of roosts during construction. This impact can be avoided through the appropriate placement of infrastructure.
- Reduction of ecosystem services due to disruption of bat populations during construction and operation. This impact can be minimised through the appropriate placement of infrastructure.
- Fatalities due to collision and barotrauma during operation. This impact can be minimised through the appropriate placement of infrastructure.

7.4.4. Hydrological Sensitivities

Due to the limited footprint of the proposed Hartebeest Wind Farm, the impact on the surface water features will be minimal. It is recommended that a buffer of at least 100m should be maintained adjacent to the streams in which valley bottom wetlands occur as well as adjacent to the vernal pool (as measured from the outer edge of the wetland area). A buffer of at least 50m is recommended for the smaller drainage lines due to the poor vegetative cover as well as the slopes and erodible soils in the area.

The impacts for the construction and operational phase are localised. The most significant potential impacts expected are:

- Disturbance caused by the footprint of the turbine and on-site substation. This impact can be avoided through the appropriate placement of infrastructure.
» Loss of habitat within streams, riparian areas and wetland habitats, loss of indigenous vegetation within riparian zones. This impact can be avoided through the appropriate placement of infrastructure.

» Increased runoff which could cause erosion and sedimentation. This impact can be minimised through the implementation of appropriate management measures.

7.4.5. Soil and Agricultural Potential

Impacts on soils and agricultural potential during the construction and operational phase will be at a site level. The overall impacts of the proposed facility on agriculture and soil conditions will be low, principally because of the actual footprint of disturbance of the Hartebeest Wind Farm is very small in relation to the available agricultural land on the affected farm portions and the limited potential for irrigation. There is the potential for the loss of soil resources through erosion, particularly during the construction phase. No areas of sensitivity in this regard were identified through this Scoping Study.

The most significant potential impacts expected are:

» Loss of agricultural land. This impact is likely to occur but will be limited in extent.

» Soil erosion and loss of topsoil. This impact can be minimised through the implementation of appropriate mitigation and management measures.

» Disturbance of cultivation practices and agricultural activities. This impact can be avoided through the appropriate placement of infrastructure.

» Prevention of aerial crop spraying. This impact can be avoided through the appropriate placement of infrastructure.

» Generation of additional land use income. This impact is likely to occur.

» Disturbance of contour banks. This impact can be avoided through the appropriate placement of infrastructure.

7.4.6. Visual receptors

From the scoping assessment it appears that the proposed development is likely to have minimal impact on protected landscapes. Impacts from these areas will be mitigated by distance and the fact that the development will be viewed against the landform and not the skyline. The scoping assessment also indicates that the ridgeline on which the windfarm is proposed separates an area or relatively cohesive rural agricultural landscape on its eastern side from a landscape that is more influenced by urban development and infrastructure on its western side. Whilst the rural agricultural landscape is not protected, the need to minimise impacts on this area are highlighted. This is likely to be best achieved by ensuring that the clutter associated with related infrastructure is minimised on the eastern side of the ridge.
The assessment found that whilst views of the development will be possible over a wide area, it is only likely to be receptors within a ring of intervening ridgelines close to the site that are likely to be adversely impacted to a significant degree. The scoping assessment also indicates that shadow flicker may affect a number of homesteads in the vicinity of the wind farm. No areas of sensitivity in this regard were identified through this Scoping Study.

The impacts for the construction and operational phase will be at a site level. The most significant potential impacts expected are during the operation phase and include:

- Potential visual impact on observers travelling along main (i.e. the N7 and the R311) and secondary roads. Due to topography this impacts is likely to occur within 5km of the project site. Past this distance, due to the undulating topography, fewer turbines will be visible and visibility will be intermittent as viewer traverse minor valleys and ridges.
- Potential visual impact on urban centres and populated places. Within 5km, the proposed wind energy facility is likely to be highly obvious and potentially could have a high impact on sensitive receptors. At greater distances however visibility of the development will be significantly reduced and impacts are likely to be relatively low.
- Potential visual impact on residences and homesteads in close proximity. Within the “high impact zone” it is likely that the loss of rural characteristics will be highly obvious to the majority of people.
- Potential visual impact of ancillary infrastructure on observers. Within the “high impact zone” it is likely that the loss of rural characteristics will be highly obvious to the majority of people.
- Shadow flicker on observers residing on or in close proximity. The residents of approximately 13 homesteads may be at risk of experiencing shadow flicker.
- Scenic visual character of the landscape and the sense of place. The proposed development is likely to have minimal impact on protected landscapes including the Cederberg from which long distance views will be possible.
- Operational, safety and security lighting of the facility at night on observers. It is likely that security lighting will only be utilised around the control building.

7.4.7. Archaeological resources

Five areas of possible heritage significance have been identified. The distribution of archaeological heritage will however need to be determined by a field survey. It is expected that much of the impacts to surface archaeological heritage (pre-colonial and colonial) will be controllable through avoidance of sensitive areas in the unlikely event that any have survived the historical agricultural activities in the area. There is always a chance that archaeological material and graves may be exposed during
excavations for the facility and access roads. The impacts are likely to be of medium-low significance as such finds are infrequent is this landscape.

The construction of the project could have a low impact on a local scale. The most significant potential impact expected is:

- Physical disturbance to archaeological resources. This impact is considered unlikely to occur as a result of the infrequency of finds within this landscape.
- Destruction of protected structures. This impact is considered unlikely to occur as a result of the limited presence of such structures within the development area.
- Change to the overall cultural landscape, setting and character. This impact is likely to occur.

### 7.4.8. Palaeontological resources

No known palaeontological resources are present in this area as it is all underlain by Malmesbury Shale. The shales are among the oldest rocks in the Cape Province and pre-date most life forms. This means that they are very unlikely to contain fossil remains. No areas of sensitivity and no potential impacts in this regard were identified through this Scoping Study.

### 7.4.9. Social

The impacts for the construction and operational phase range from local to regional level. The most significant positive potential impacts expected are:

- Creation of employment and business opportunities, and opportunity for skills development and on-site training; and
- Generation of renewable energy

The most significant negative potential impacts expected are:

- Presence of construction workers on site and in the area.
- Influx of job seekers to the area.
- Increased safety risk to farmers, risk of stock theft and damage to farm infrastructure associated with presence of construction workers on the site.
- Increased risk of veld fires.
- Impact of heavy vehicles, including damage to roads, safety and dust.
- Potential loss of productive farmland associated with construction-related activities.
- Visual impacts and associated impact on sense of place.
- Potential impact on tourism.

No areas of sensitivity in this regard were identified through this Scoping Study.
7.4.10. Noise

The assessment indicated there are a number of such developments that occurs in the area. The impacts for the construction and operational phase will be at a local level. Potential noise sensitive receptors within the study area have been identified at this stage and will be verified during the EIA phase of the process.

The most significant potential impacts expected are:
- Increase in noise levels at closest receptors - increased noises or disturbing noises as closest receptors.
Figure 7.1: Environmental Sensitivity Map for the proposed Hartebeest Wind Farm (refer to Appendix O for A3 map).
7.5 Recommendations

At this stage in the process, there are no environmental fatal flaws which have been identified to be associated with the Hartebeest Wind Farm, and there is no reason for the proposed development not to be evaluated further. It is however recommended that the focus areas for the development of the facility be considered outside of the identified no-go areas and areas of high sensitivity as far as possible.

With an understanding of which areas within the site are considered sensitive to the development of the proposed wind energy facility, Hartebeest Wind Farm (Pty) Ltd can prepare the detailed infrastructure layout footprint for consideration within the EIA Phase. During the EIA phase more detailed environmental studies will be conducted in line with the Plan of Study contained in Chapter 8 of this report. These studies will consider feasible alternative layouts within the development site in order to ensure that impacts on the environment are minimised as far as possible. A detailed comparative assessment of development footprint alternatives must be undertaken in order to define the least impact alternative for implementation. Recommendations will be made for the implementation of avoidance strategies (if required), mitigation and management measures to ensure that the final assessed layout footprint retains an acceptable environmental impact.

7.6 Evaluation of potential Cumulative impacts associated with the Hartebeest Wind Farm and Other wind farm Projects in the Area

Cumulative impacts, in relation to an activity, refer to the impact of an activity that in-itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area. For cumulative effects analysis to help the decision-maker and inform interested parties, it must be limited to effects that can be evaluated meaningfully (DEAT, 2004).

Cumulative effects are commonly understood as the impacts which combine from different projects and which result in significant change, which is larger than the sum of all the impacts (DEAT, 2004). The complicating factor is that the projects that need to be considered are from past, present and reasonably foreseeable future development. Cumulative effects can be characterised according to the pathway they follow. One pathway could be the persistent additions from one process. Another pathway could be the compounding effect from one or more processes. Cumulative effects can therefore occur when impacts are:

» additive (incremental);
» interactive;
» sequential; or
» synergistic.
Canter and Sadler (1997) describe a three step process for addressing cumulative effects in an EIA process:
» delineating potential sources of cumulative change (i.e. using GIS to map the relevant renewable energy facilities in close proximity to one another).
» identifying the pathways of possible change (direct impacts)
» indirect, non-linear or synergistic processes; and
» classification of resultant cumulative changes

Table 7.1 below provides details of the known wind energy facilities within 30km from the Hartebeest Wind Farm (5 other facilities, 3 of which are preferred bidder projects) as well as Figure 7.2. It is clear from Table 7.1 that there is a number of wind energy facilities in the broader area around Moorreesburg, and that this area can be considered to be a hub for wind energy facilities.

Table 7.1: Other wind energy facilities within 30km of the project site

<table>
<thead>
<tr>
<th>Project Name</th>
<th>DEA Ref. No</th>
<th>Location</th>
<th>Approximate distance from the Hartebeest Wind Farm project site</th>
<th>Project Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>30MW Wind Energy Facility near Gouda</td>
<td>12/12/20/2227</td>
<td>Portion 1 and 2 of Farm 397</td>
<td>22km south east</td>
<td>Authorised</td>
</tr>
<tr>
<td>Gouda Wind Farm</td>
<td>12/12/20/1859</td>
<td>Portion 0, 4, 6, 7, 8, 9, 10, 11 and 14 of Farm La Bonne Esperance 397, Farm Bellevue 94 and Farm Bellevue 409</td>
<td>22km east</td>
<td>Preferred Bidder (Round 2 REIPPP) Operational</td>
</tr>
<tr>
<td>Hopefield Community Wind Farm</td>
<td>14/12/16/3/3/1/1099</td>
<td>Portion 1 of Farm Leliefontein 317</td>
<td>24km north west</td>
<td>Authorised Preferred Bidder – Small Projects REIPPP</td>
</tr>
<tr>
<td>Hopefield Wind Farm</td>
<td>14/12/16/3/3/2/407</td>
<td>Remaining Extent and Portion 8 of Farm Schapplaatsfontein 345, Remaining Extent of Farm Koperfontein 346</td>
<td>21km south east</td>
<td>Preferred Bidder (Round 1 REIPPP) Operational</td>
</tr>
<tr>
<td>Project Name</td>
<td>DEA Ref. No</td>
<td>Location</td>
<td>Approximate distance from the Hartebeest Wind Farm project site</td>
<td>Project Status</td>
</tr>
<tr>
<td>-------------------</td>
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<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Zen Wind Farm</td>
<td>14/12/16/3/3/2/322</td>
<td>and the Remaining Extent of Farm Gazekraal 386 Portion 1 and 2 of Farm Bonne Esperance 83, Portion 9 of the Farm 88, Remaining Extent of Portion 4 Farm Kleinbergrivier 1, Remaining Extent of Far Moolenaars Drift 85 and the Remaining Extent of Portion 1 of the Farm Moolenaars Drift 85.</td>
<td>17 km east</td>
<td>In Process</td>
</tr>
</tbody>
</table>

The cumulative impacts associated with the proposed Hartebeest Wind Farm and associated infrastructure primarily refer to the contribution of the proposed project to impacts associated with ecology, soil, avifauna, bats, noise, visual, heritage, and social impacts resulting or expected to result from other similar developments in the area. Potential cumulative impacts associated with numerous wind farm developments within the study area are expected to be associated with:

- **Ecology** – natural vegetation within the project site is largely impacted by agricultural activities, and is formally conserved only to a limited extent. Although a wind farm generally results in permanent disturbance of a development site, any impacts on natural vegetation in this area are considered significant. Therefore, numerous developments (regardless of their nature) within the study area are expected to have an impact on vegetation at a regional level. However, it must be noted that this impact can be effectively avoided through the placement of infrastructure outside of natural vegetation and sensitive habitats. Cumulative habitat loss and fragmentation can be expected,

- **Avifauna** – The effects of the proposed project and other wind energy facilities would affect similar species in similar contexts such as Blue Crane and Black Harrier. While the effects on these species due to wind energy facility
developments are still unknown, it is straightforward that a species with serious habitat loss concerns, such as the Black Harrier would be negatively affected by the destruction of its scarce habitat at the regional level. Although the footprint of the wind energy facility is limited to small portions of the affected properties, the construction of roads and building platforms can affect significant portions of natural vegetation and needs investigation.

» **Bats** – Impacts on bat species known to conduct large scale movements caused by other wind energy facilities will aggravate the impacts associated with the construction and operational phase of the Hartebeest Wind Farm. This is particularly relevant for some sensitive bat species which conduct seasonal migration movements such as Natal long-fingered bat, Temminck’s myotis and Egyptian silt-faced bat. All three species were confirmed at the site. Nonetheless, considering the number of wind energy facilities approved and in EIA process at such a short distance from the proposed Hartebeest Wind Farm the potential for cumulative impacts on the bat populations present in the area could be significant and needs investigation.

» **Agricultural and erosion potential** – There is potential for cumulative impacts to arise as a result of numerous projects in the area that impact on agricultural land in the area. Cumulative impacts such as a loss of agricultural production land in the area and increased erosion risk are probable with a low intensity as only a small area is likely to be affected and will be confirmed during the EIA phase.

» **Surface water** – Land use in the area surrounding Moorreesburg currently consists of cultivated agriculture. Current land and water use impacts on the tributaries of the Berg River within the larger study area are moderate. The nature of the proposed wind energy facility allows for minimal impact on the surface water features as the turbines can be placed in such a way so as to not impact on them. The cumulative impact of the proposed project over and above the existing agricultural impacts would not be significant provided mitigation measures are implemented.

» **Heritage** - The most significant impact associated with other wind energy facilities and the proposed Hartebeest Wind Farm is the changes in character to the landscape. Changes in landscape character and the presence of potential sites of heritage and archaeological significance will be determined during the EIA phase. Cumulative impacts including the permanent destruction of heritage resources throughout the wider region due to renewable energy and associated developments in the area will be investigated further in the EIA Phase.

» **Noise** – Wind turbines generally have a cumulative impact on the acoustic environment when they are located closer than 2 000m from receptors that can
experience a cumulative effect of the turbines from two or more developments. The risk of a cumulative noise impact is low but potential cumulative impacts of the project will be investigated in more detail during the EIA phase in order to confirm this.

» Visual impacts – Cumulative visual impacts would occur when the Hartebeest Wind Farm is seen in conjunction with existing and other proposed wind energy facilities in the area. The cumulative impacts associated with wind energy facilities are largely linked to the visual impact on the area’s sense of place and landscape character. The construction of the Hartebeest Wind Farm and the other wind energy facilities in close proximity to one other will increase the cumulative visual impact of industrial type infrastructure within the region.

» Social – The development of numerous wind farms within the project site will have a cumulative impact on several existing issues within the area, predominately associated with the potential influx of workers and job seekers, this exacerbated if the projects occur concurrently. With the increased population density, if so resultant, this may lead to a cumulative impact on housing requirements, services (i.e. water, electricity and sanitation), health issues, safety and security. With the existing rural settlements in the area this may have a cumulative impact on the environment and health (i.e. in terms of water supply and ablution facilities). The main social impacts, however, will be in terms of sense of place and on the local economy.

Potential cumulative impacts associated with numerous wind farm developments within the project site are also positive and these too need to be considered, for instance:

» The development of renewable energy facilities will have a positive impact at a national and international level through the generation of “green energy” which would lessen South Africa’s dependency on coal generated energy and the impact of such energy sources on the bio-physical environment.

» The proposed project would fit in with the government’s aim to implement renewable energy projects as part of the country’s energy generation mix over the next 20 years as committed to by government and as detailed in the Integrated Resource Plan (IRP), inter alia.

» The development of renewable energy facilities will have a positive impact at a regional and local level through increased work and skills development opportunities and the associated reduced poverty levels.

» More projects within a single area will enhance the shareholding benefits that flow to the local community and will create cumulative positive impacts via the increased socio-economic and enterprise obligations that benefit the local community.
Renewable energy, specifically wind energy, is the cheapest form of energy available to the country and hence the exploitation of high wind resource areas so as to reduce electricity tariffs is of direct benefit to the national economy and all South Africa’s citizens.

Cumulative impacts will be fully assessed in the EIA phase. Each specialist study will consider and assess the cumulative impacts of proposed, approved and authorised renewable projects in the area. The role of the cumulative assessment will be to test if such impacts are relevant to the project (preferred activity) in the proposed location (preferred site) when considered together with other similar developments:

- Unacceptable loss of threatened or protected vegetation types or species through clearing, resulting in an impact on the conservation status of such flora or ecological functioning;
- Unacceptable risk to aquatic habitat resulting due to the increase in the extent of hard or impermeable surfaces in the greater area;
- Unacceptable risk to avifauna and bats through loss of habitat, infringement on breeding areas, or risk to collision-prone species;
- Unacceptable loss of heritage resources;
- Unacceptable impact on ambient noise levels;
- Complete or whole-scale change in sense of place and character of an area and unacceptable visual intrusion;
- Positive and negative contribution from a socio-economic perspective; and
- Contribution to climate change mitigation.

The scale at which the cumulative impacts are assessed is important. For example the significance of the cumulative impact on the regional or national economy will be influenced by wind developments throughout South Africa, while the significance of the cumulative impact at a local scale may only be influenced by wind developments that are in closer proximity to each other, up to 30 km apart in this instance. For practical purposes a sub-regional scale will be adopted for this cumulative evaluation.
Figure 7.2: Map illustrating the affected farm portions of known wind energy projects within 30km radius of the proposed Hartebeest Wind Farm. These projects were identified using the Department of Environmental Affairs Geographic Information System digital data (http://egis.environment.gov.za/frontpage.aspx?m=27).
This Scoping Report includes a description of the nature, extent and expected significance of impacts associated with the development of the proposed Hartebeest Wind Farm. This chapter provides the Plan of Study for the Environmental Impact Assessment (EIA) for the wind energy facility, based on the outcomes of the Scoping Study and associated specialist investigations.

The key findings of the Scoping Phase includes inputs from authorities, the public, the proponent and the EIA specialist team, and are used to inform the Plan of Study for EIA together with the requirements of the NEMA EIA Regulations of 2014 and applicable guidelines. The Plan of Study describes how the EIA Phase will proceed and includes details of the detailed specialist studies required to be undertaken for those potential impacts recorded to be of potential significance.

### 8.1 Legal Requirements as per the EIA Regulations, 2014

This chapter of the scoping report includes the following information required in terms of Appendix 2: Content of the Scoping Report of the EIA Regulations, 2014:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Relevant Section</th>
<th>Page Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) a plan of study for undertaking the environmental impact assessment process to be undertaken</td>
<td>A plan of study for the undertaking of the EIA phase for the wind energy facility is included within this chapter as a whole.</td>
<td>Page 175</td>
</tr>
</tbody>
</table>

### 8.2 Aims of the EIA Phase

The EIA Phase to be undertaken for the wind energy facility will aim to achieve the following:

- Provide an overall description and detailed assessment of the social and biophysical environment affected by the development of the proposed wind energy facility and associated infrastructure.
- Assess potentially significant impacts (direct, indirect and cumulative, where required) associated with the proposed wind energy facility and associated infrastructure.
- Identify and recommend appropriate avoidance strategies and mitigation measures for potentially significant environmental impacts.
Undertake a fully inclusive public involvement process to ensure that I&APs are afforded the opportunity to participate, and that their issues and concerns are recorded.

The EIA will address potential environmental impacts and benefits (direct, indirect and cumulative impacts) associated with each phase of the development including design, construction, operation and decommissioning; and will aim to provide the environmental authorities with sufficient information to make an informed decision regarding the proposed projects. The detailed wind energy facility layout footprint will be assessed through detailed specialist impact studies. As required in terms of the EIA Regulations, the assessment will include consideration of the ‘do nothing’ alternative.

8.3 Authority Consultation

Consultation with the regulating authorities (i.e. Department of Environmental Affairs (DEA) and the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP)) will be undertaken and will continue throughout the EIA process. On-going consultation will include the following:

- Submission of a Final Scoping Report following a 30-day review period (and consideration of comments received).
- Submission of a Draft EIA Report for review and comment.
- Submission of a Final EIA Report following a 30-day review period.
- Consultation and a site visit with DEA and Western Cape DEA&DP (if required) in order to discuss the findings and conclusions of the EIA Report.

7.3. Consideration of Alternatives

The following project alternatives will be investigated in the EIA:

- **The ‘do nothing’ alternative:** Hartbeest Wind Farm (Pty) Ltd does not establish the proposed Hartbeest Wind Farm.
- **Site alternatives:** No site alternatives are to be assessed for the location of the Hartbeest Wind Farm, as only one suitable site was identified for further investigation (as detailed within this report).
- **Grid connection alternatives:** The grid connection solution will either be a connection to the existing Moorreesburg 132/66kV substation at 132kV via a 3.5km power line up to 132kV or at 66kV via a 3km power line up to 132kV line.
- **Layout alternatives:** Two layout alternatives will be assessed within the EIA, i.e. a 40 turbine layout footprint, as well as a 25 turbine layout footprint. For an illustration of the preliminary “worst-case scenario” layout, refer to Figure 8.1.
Figure 7.1: Preliminary 40-turbine layout footprint of the proposed Hartebeest Wind Farm to be assessed in the EIA Phase.
8.4 Assessment of Potential Impacts and Recommendations regarding Mitigation Measures

Through the Scoping Study, the following issues were concluded to have impacts of low significance:

- Impacts on palaeontological resources
- Impacts on freshwater resources

No further studies regarding the impact on surface water features potential are required in the EIA phase. The study undertaken by the BlueScience confirmed that the overall impacts of the proposed facility on surface water will be of low significance the implementation of mitigation measures, predominantly because of the minimal impact on surface water features. As a result of the low significance of impacts, no further studies are required to be undertaken. Mitigation measures recommended within the study are however to be included within the project Environmental Management Programme (EMPr), which is to be compiled in the EIA Phase of the process.

The study undertaken by the ACO-Associates confirmed that no known palaeontological resources are present in this area as it is all underlain by Malmesbury Shale. The shales are among the oldest rocks in the Cape Province and pre-date most life forms. This means that they are very unlikely to contain fossil remains. No areas of sensitivity and no potential impacts in this regard were identified through this Scoping Study.

A summary of the issues which require further investigation within the EIA phase, as well as the proposed activities to be undertaken in order to assess and ground-truth the significance of these potential impacts is provided within Table 8.1. The specialists proposed to undertake detailed studies in the EIA Phase are also reflected within this table. These specialist studies will consider the development footprints proposed for the facility and all associated infrastructure, as well as feasible and reasonable alternatives identified for the project.
Table 8.1: Issues requiring further investigation during the EIA Phase and activities to be undertaken in order to assess the significance of these potential impacts relevant to the Hartebeest Wind Farm.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Activities to be undertaken in order to assess significance of impacts</th>
<th>Specialist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecology (Flora and Fauna,)</td>
<td>The EIA Phase will include the following activities:</td>
<td>Simon Todd of Simon Todd Consulting cc</td>
</tr>
<tr>
<td></td>
<td>» Ground-truth and refine the ecological sensitivity map of the site. Particular attention will be paid to the Renosterveld patches as well as the other areas of potential concern which were identified in the scoping report such as the areas associated with the plantations and drainage lines.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>» Identify and map the presence of any unique and special habitats at the site that were not observed in the initial site visit.</td>
<td></td>
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<tr>
<td></td>
<td>» Map the location of significant populations of species of conservation concern as well as evaluate the condition and status of the natural and near-natural vegetation at the site within the area affected by the underground cable.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>» Evaluate the likely presence of listed faunal species at the site such as the Cape Caco and identify associated habitats that should be avoided to prevent impact to such species.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>» Evaluate, based on the site attributes, what the most applicable mitigation measures to reduce the impact of the development on the site would be and if there are any areas where specific precautions or mitigation measures should be implemented.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>» Assess the impacts identified in above in light of the site-specific findings and the final layout to be provided by the developer.</td>
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<tr>
<td></td>
<td>» Make recommendations regarding the preferred project alternatives for implementation</td>
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</tr>
</tbody>
</table>

Assessment of Impacts for the EIA:

This methodology assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).

The nature of the impact will be defined and described, and refers to the causes of the effect, what will be affected and how it will be affected.
<table>
<thead>
<tr>
<th>Issue</th>
<th>Activities to be undertaken in order to assess significance of impacts</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>For each anticipated impact, recommendations will be made for desirable mitigation measures.</td>
</tr>
<tr>
<td></td>
<td><strong>Environmental Management Programme:</strong></td>
</tr>
<tr>
<td></td>
<td>For each overarching anticipated impact, management recommendations for the design, construction, and operational phase will be drafted.</td>
</tr>
<tr>
<td><strong>Avifauna</strong></td>
<td><strong>The EIA Phase will include the following activities:</strong></td>
</tr>
<tr>
<td></td>
<td>» Comparatively assess alternatives in terms of impacts on avifauna considering the results of the 17 month pre-construction bird monitoring programme for the proposed Hartebeest Windfarm (implemented between May 2013 and September 2014). Refer to Appendix E for full details on the bird monitoring programme and the main objectives of this monitoring.</td>
</tr>
<tr>
<td></td>
<td>» Based on the findings of the pre-construction monitoring, the sensitivity zones and suitable buffer zones will be confirmed and mapped for the site.</td>
</tr>
<tr>
<td></td>
<td>» The identified direct and indirect impacts and cumulative impacts will be assessed and final recommendations will be made regarding the significance of each identified impact as well as the layout to be provided by the developer.</td>
</tr>
<tr>
<td></td>
<td>» Where necessary and possible, recommended mitigation measures for the management of the identified impacts will be developed and described.</td>
</tr>
<tr>
<td></td>
<td>» Make recommendations regarding the preferred project alternatives for implementation</td>
</tr>
<tr>
<td></td>
<td><strong>Assessment of Impacts for the EIA:</strong></td>
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<td>This methodology assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).</td>
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<td>The nature of the impact will be defined and described, and refers to the causes of the effect, what will be affected and how it will be affected.</td>
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<td></td>
<td>For each anticipated impact, recommendations will be made for desirable mitigation measures.</td>
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</table>

Ricardo Ramalho of Bioinsight
<table>
<thead>
<tr>
<th>Issue</th>
<th>Activities to be undertaken in order to assess significance of impacts</th>
<th>Specialist</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Environmental Management Programme:</td>
<td>Ricardo Ramalho of Bioinsight</td>
</tr>
<tr>
<td></td>
<td>For each overarching anticipated impact, management recommendations for the design, construction, and operational phase will be drafted.</td>
<td></td>
</tr>
<tr>
<td>Bats</td>
<td>The EIA Phase will include the following activities:</td>
<td></td>
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<tr>
<td></td>
<td>» Comparatively assess alternatives in terms of impacts on bats considering the results of the 17 month pre-construction bird monitoring programme for the proposed Hartebeest Windfarm (implemented between May 2013 and September 2014). Refer to Appendix F for full details on the bat monitoring programme and the main objectives of this monitoring.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>» Based on the findings of the pre-construction monitoring, the sensitivity zones and suitable buffer zones will be confirmed and mapped for the site.</td>
<td></td>
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<tr>
<td></td>
<td>» The identified direct and indirect impacts and cumulative impacts will be assessed and final recommendations will be made regarding the significance of each identified impact as well as the layout to be provided by the developer.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>» Where necessary and possible, recommended mitigation measures for the management of the identified impacts will be developed and described.</td>
<td></td>
</tr>
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<td></td>
<td>» Make recommendations regarding the preferred project alternatives for implementation.</td>
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</tbody>
</table>

Assessment of Impacts for the EIA:
This methodology assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).

The nature of the impact will be defined and described, and refers to the causes of the effect, what will be affected and how it will be affected.

For each anticipated impact, recommendations will be made for desirable mitigation measures.
For each overarching anticipated impact, management recommendations for the design, construction, and operational phase will be drafted.

Soil and Agricultural Potential

The EIA Phase will include the following activities:

- Identify and assess all potential impacts (direct, indirect and cumulative) and economic consequences of the proposed development on agricultural resources and production.
- Describe and map soil types (soil forms) and characteristics (soil depth, soil colour, limiting factors, and clay content of the top and sub soil layers).
- Map soil survey points and supply GPS readings.
- Assess the status of the land including erosion, vegetation and degradation.
- Describe the topography of the site.
- Describe historical and current land use and agricultural infrastructure on and surrounding the site, as well as possible alternative land use options.
- Determine and map the agricultural potential across the site.
- Determine and map the agricultural sensitivity to development across the site.
- Provide recommended mitigation measures, monitoring requirements, and rehabilitation guidelines for identified impacts.
- Comparatively assess the identified project alternatives and make recommendations regarding a preferred option for implementation.

Assessment of Impacts for the EIA:

This methodology assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).

The nature of the impact will be defined and described, and refers to the causes of the effect, what will be affected and how it will be affected.

For each anticipated impact, recommendations will be made for desirable mitigation measures.
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<th>Issue</th>
<th>Activities to be undertaken in order to assess significance of impacts</th>
<th>Specialist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Management Programme:</td>
<td>For each overarching anticipated impact, management recommendations for the design, construction, and operational phase will be drafted.</td>
<td>Tim Hart of ACO-Associates</td>
</tr>
<tr>
<td>Heritage</td>
<td><strong>The EIA Phase will include the following activities:</strong></td>
<td>Jon Marshall of Afzelia Environmental Consultants</td>
</tr>
<tr>
<td></td>
<td>» Engage with consultants who have specialist regional knowledge of the area;</td>
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<td></td>
<td>» Conduct a field survey of the proposed facility footprint tailored to the varying sensitivities and methods required;</td>
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<td></td>
<td>» Map, record and photograph any heritage sites or objects offered protection by the NHRA or any other object or place considered significant by the ACO team;</td>
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<tr>
<td></td>
<td>» Produce an illustrated report describing the findings, defining areas of sensitivity, any further work required and suggesting mitigatory actions for reducing impacts to heritage resources;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>» Make recommendations regarding the preferred project alternatives for implementation.</td>
<td></td>
</tr>
<tr>
<td>Assessment of Impacts for the EIA:</td>
<td>This methodology assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).</td>
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<td>The nature of the impact will be defined and described, and refers to the causes of the effect, what will be affected and how it will be affected.</td>
<td></td>
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<tr>
<td></td>
<td>For each anticipated impact, recommendations will be made for desirable mitigation measures.</td>
<td></td>
</tr>
<tr>
<td>Environmental Management Programme:</td>
<td>For each overarching anticipated impact, management recommendations for the design, construction, and operational phase will be drafted.</td>
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</tr>
<tr>
<td>Visual</td>
<td><strong>The EIA Phase will include the following activities:</strong></td>
<td></td>
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<tr>
<td></td>
<td>From the assessment undertaken it is apparent that the proposed project falls into a Category 5 development as windfarms are listed under this heading. Also from experience of the study area,</td>
<td></td>
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</tbody>
</table>

Plan of Study for EIA
### Issue

- Activities to be undertaken in order to assess significance of impacts
- Specialist

The surrounding landscape might be generally considered to be an area or route of medium to high scenic, cultural, historic significance. The above assessment indicates that the proposed development might be expected to have a high visual impact. The Western Cape Guidelines indicate that if a high visual impact is expected, a level 4 assessment should be undertaken.

A level 4 assessment requires the following input:

- Identification of issues raised in scoping phase, and site visit.
- Description of the receiving environment and the proposed project.
- Establishment of view catchment area, view corridors, viewpoints and receptors.
- Indication of potential visual impacts using established criteria.
- Inclusion of potential lighting impacts at night.
- Description of alternatives, mitigation measures and monitoring programmes.
- Complete 3D modelling and simulations, with and without mitigation.
- Review by independent, experienced visual specialist (if required).

Identified alternatives will be comparatively assessed in terms of the above and recommendations made regarding the preferred project alternatives for implementation.

### Assessment of Impacts for the EIA:

This methodology assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).

The nature of the impact will be defined and described, and refers to the causes of the effect, what will be affected and how it will be affected.

For each anticipated impact, recommendations will be made for desirable mitigation measures.

### Environmental Management Programme:
### Issue

<table>
<thead>
<tr>
<th>Activities to be undertaken in order to assess significance of impacts</th>
<th>Specialist</th>
</tr>
</thead>
<tbody>
<tr>
<td>For each overarching anticipated impact, management recommendations for the design, construction, and operational phase will be drafted.</td>
<td>Tony Barbour of Tony Barbour Consultants</td>
</tr>
</tbody>
</table>

### Social

<table>
<thead>
<tr>
<th>The EIA Phase will include the following activities:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The following typical, generic project information is required in order to inform the Social Impact Assessment:</td>
</tr>
</tbody>
</table>

**Construction phase:**

(INCLUDING ALL RELATED INFRASTRUCTURE SUCH AS TRANSMISSION LINES, ACCESS ROADS, OFFICE AND WAREHOUSE COMPONENTS)

- Comments received from I&APs during the public participation process, including comments reflected in the Final Scoping Report;
- A draft illustration (plan) of the proposed layout(s) of the turbines (including an indication of the phasing sequence on the site), supporting structures and infrastructure;
- Duration of the construction phase (months);
- Number of people employed during the construction phase;
- Breakdown of number of people employed in terms or low skilled, semi-skilled and skilled;
- Estimate of the total wage bill for the construction phase and breakdown in % as per skills categories;
- Estimate of total capital expenditure for construction phase;
- Indication of where construction workers will be housed (on site or in nearest town?);
- Opportunities for on-site skills development and training;
- Description of the typical activities associated with the construction phase, specifically on-site construction activities. This includes a description of how the large components associated with the wind energy facility will be transported to the site and assembled on the site;
- The size of the vehicles needed to transport the components and the routes that will be used to transport the large components to the site, and an estimate of the number of vehicle trips required and duration of each trip; and
- Information on the nature of the agreements with the affected landowners, specifically with regard to compensation for damage to land, infrastructure etc.
**Plan of Study for EIA**

<table>
<thead>
<tr>
<th>Issue</th>
<th>Activities to be undertaken in order to assess significance of impacts</th>
<th>Specialist</th>
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</thead>
<tbody>
<tr>
<td><strong>Operational phase</strong></td>
<td>- Operating budget per annum;</td>
<td></td>
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<tr>
<td></td>
<td>- Total number of people employed;</td>
<td></td>
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<tr>
<td></td>
<td>- Breakdown in terms of skills levels (see above);</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Annual wage bill;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Typical activities associated with the operational phase;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Information on opportunities for skills development and training;</td>
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</tr>
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<td></td>
<td>- Typical lifespan of proposed REF; and</td>
<td></td>
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<tr>
<td></td>
<td>- Information on the lease / rental agreements with local landowners and or communities, specifically with regard to issues relating</td>
<td></td>
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<tr>
<td></td>
<td>to compensation for damage to infrastructure and loss of livestock etc. This information is required so as to indicate how local</td>
<td></td>
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<tr>
<td></td>
<td>landowners and communities stand to benefit from the project.</td>
<td></td>
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</tbody>
</table>

Identified alternatives will be comparatively assessed in terms of the above and recommendations made regarding the preferred project alternatives for implementation.

**Assessment of Impacts for the EIA:**

This methodology assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).

The nature of the impact will be defined and described, and refers to the causes of the effect, what will be affected and how it will be affected.

For each anticipated impact, recommendations will be made for desirable mitigation measures.

**Environmental Management Programme:**

For each overarching anticipated impact, management recommendations for the design, construction, and operational phase will be drafted.
### Noise

The EIA Phase will include the following activities:

- Data as received from the developer will be used to model the potential noise impact;
- The potential impact will be evaluated (where possible) in terms of the nature (description of what causes the effect, what/who might be affected and how it/they might be affected) as well as the extent of the impact;
- The potential significance of the identified issues will be calculated based on the evaluation of the issues/impacts;
- The development of an Environmental Management Plan and a proposal of potential mitigation measures (if required); and
- Recommendations.

### Cumulative Assessment

Assess the cumulative impacts associated with the construction of multiple facilities (i.e. wind developments/power generation facilities) within approximately 30km from the study area on the ecological, heritage, soil and agricultural potential, bats, avifaunal and social impacts of the area.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Activities to be undertaken in order to assess significance of impacts</th>
<th>Specialist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise</td>
<td>The EIA Phase will include the following activities:</td>
<td>Morne de Jager of Enviro Acoustic Research</td>
</tr>
<tr>
<td></td>
<td>- Data as received from the developer will be used to model the potential noise impact;</td>
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</tr>
<tr>
<td></td>
<td>- The potential impact will be evaluated (where possible) in terms of the nature (description of what causes the effect, what/who might be affected and how it/they might be affected) as well as the extent of the impact;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- The potential significance of the identified issues will be calculated based on the evaluation of the issues/impacts;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- The development of an Environmental Management Plan and a proposal of potential mitigation measures (if required); and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Recommendations.</td>
<td></td>
</tr>
<tr>
<td>Cumulative Assessment</td>
<td>Assess the cumulative impacts associated with the construction of multiple facilities (i.e. wind developments/power generation facilities) within approximately 30km from the study area on the ecological, heritage, soil and agricultural potential, bats, avifaunal and social impacts of the area.</td>
<td>Savannah Environmental</td>
</tr>
</tbody>
</table>
8.5 Methodology for the Assessment of Potential Impacts

Direct, indirect and cumulative impacts of the above issues, as well as all other issues identified will be assessed in terms of the following criteria:

» The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.

» The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional:
  * local extending only as far as the development site area – assigned a score of 1;
  * limited to the site and its immediate surroundings (up to 10 km) – assigned a score of 2;
  * will have an impact on the region – assigned a score of 3;
  * will have an impact on a national scale – assigned a score of 4; or
  * will have an impact across international borders – assigned a score of 5.

» The **duration**, wherein it will be indicated whether:
  * the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  * the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  * medium-term (5–15 years) – assigned a score of 3;
  * long term (> 15 years) - assigned a score of 4; or
  * permanent - assigned a score of 5.

» The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
  * 0 is small and will have no effect on the environment;
  * 2 is minor and will not result in an impact on processes;
  * 4 is low and will cause a slight impact on processes;
  * 6 is moderate and will result in processes continuing but in a modified way;
  * 8 is high (processes are altered to the extent that they temporarily cease); and
  * 10 is very high and results in complete destruction of patterns and permanent cessation of processes.

» The **probability of occurrence**, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale, and a score assigned:
  * Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
  * Assigned a score of 2 is improbable (some possibility, but low likelihood);
  * Assigned a score of 3 is probable (distinct possibility);
  * Assigned a score of 4 is highly probable (most likely); and
  * Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
» the **significance**, which shall be determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.

» the **status**, which will be described as either *positive, negative or neutral*.

» the degree to which the impact can be reversed.

» the degree to which the impact may cause *irreplaceable loss of resources*.

» the **degree** to which the impact can be *mitigated*.

The **significance** is determined by combining the criteria in the following formula:

\[
S = (E + D + M) P; \text{ where}
\]

\[S = \text{Significance weighting}\]
\[E = \text{Extent}\]
\[D = \text{Duration}\]
\[M = \text{Magnitude}\]
\[P = \text{Probability}\]

The **significance weightings** for each potential impact are as follows:

» < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),

» 30-60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),

» > 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

Other aspects to be taken into consideration in the specialist studies are:

- Impacts should be described both before and after the proposed mitigation and management measures have been implemented.
- All impacts should be evaluated for the full-lifecycle of the proposed development, including construction, operation and decommissioning.
- The impact assessment should take into consideration the cumulative effects associated with this and other facilities which are either developed or in the process of being developed in the region.
- The specialist studies must quantify the magnitude of potential impacts (direct and cumulative effects) for all alternatives identified. A comparative assessment must be undertaken and recommendations made regarding a preferred option for implementation.

As Hartebeest Wind Farm (Pty) Ltd has the responsibility to avoid and/or minimise impacts as well as plan for their management (in terms of the EIA Regulations), the mitigation of significant impacts will be discussed. Assessment of mitigated impacts will demonstrate the effectiveness of the proposed mitigation measures.
The results of the specialist studies and other available information will be integrated and synthesised by the Savannah Environmental project team. The EIA Report will be compiled in terms of the requirements of the EIA Regulations and will include:

- The details and expertise of the EAP who prepared the report.
- The location of the activity and a locality map illustrating the location of the proposed activity.
- A description of the scope of the proposed activity including all listed activities triggered and a description of associated structures and infrastructure.
- The policy and legislative context within which the development is located and an explanation of how the development complies and responds to the legislation and policy context.
- The need and desirability of the proposed development of the activity in the context of the preferred location.
- A motivation for the preferred development footprint within the approved site.
- A description of the process followed to reach the proposed development footprint within the approved site, including:
  - details of the development footprint considered;
  - details of the public participation process undertaken in terms of Regulation 41 of the 2014 EIA Regulations, including copies of supporting documents;
  - a summary of issues raised by interested and affected parties and the manner in which the issues were incorporated;
  - the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;
  - the impacts and risks identified including the nature, significance, consequence extent, duration and probability of the impacts, including the degree to which these impacts can be reversed, may cause irreplaceable loss of resources and can be avoided, managed or mitigated;
  - the methodology used for determining and ranking the nature, significance, consequence, extent, duration and probability of potential environmental impacts and risks;
  - positive and negative impacts that the activity and alternatives will have on the environment and the community;
  - possible mitigation measures to be applied and the level of residual risk;
  - a motivation for not considering alternative development locations;
  - a concluding statement indicating the preferred alternative development location; and
  - a full description of the process followed to identify, assess and rank impacts of the activity and associated infrastructure on the preferred location including all environmental issues and risks that have been identified and
an assessment of the significance of each issue and risk and the extent to which the issue/risk can be avoided or mitigated.

» An **assessment** of the identified potentially significant impacts and risks.

» A summary of the **findings and recommendations** of any specialist report and an indication as to how these findings and recommendations have been included.

» An **environmental impact assessment** containing a summary of key findings, an environmental sensitivity map and a summary of the positive and negative impacts and risks of the proposed activity.

» **Recommendations** from specialist, the recording of proposed impact management **objectives** and the impact management **outcomes** for inclusion in the **EMPr** as well as inclusion as conditions of authorisation.

» The final **alternatives** which respond to the impact management measures, avoidance and mitigation measures identified.

» Any aspects which were **conditional** to the findings of the assessment.

» Description of the assumptions, uncertainties and gaps in knowledge relating to the assessment and mitigation measures proposed.

» An **opinion** as to whether the proposed activity should or should not be authorised and the conditions thereof.

» An undertaking under **affirmation** by the EAP in relation to the correctness of the information, the inclusion of comments and inputs from stakeholders and Interested and affected parties, the inclusion of inputs and recommendations from the specialists and any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties.

The EIA Report will be released to the public and relevant stakeholders, Organs of State and Authorities for a 30-day review period. The comments received from I&APs will be captured within a Comments and Response Report, which will be included within the Final EIA Report, for submission to the authorities for decision-making.

### 8.6 Public Participation Process

A public participation process will be undertaken by Savannah Environmental during the EIA phase. Consultation with key stakeholders and I&APs will be ongoing throughout the EIA Phase. Through this consultation process, stakeholders and I&APs will be encouraged to verify that their issues were recorded in the Scoping Phase and to identify additional issues of concern or highlight positive aspects of the wind energy facility, and to comment on the findings of the EIA Phase. In order to accommodate the varying needs of stakeholders and I&APs within the study area, as well as capture their inputs, various opportunities will be provided for stakeholders and I&APs to be involved in the EIA Phase of the process, as follows:
Focus group or public meetings (pre-arranged and I&APs invited to attend).
One-on-one consultation meetings (for example with directly affected and surrounding landowners).
Telephonic consultation sessions (consultation with various parties from the EIA project team, including the public participation consultant, lead EIA consultant as well as specialist consultants).
Written, faxed or e-mail correspondence.

The EIA Report will be made available for a 30-day review period prior to finalisation and submission to the DEA for decision-making. In order to provide an overview of the findings of the EIA process and facilitate comments, a public meeting may be held during this public review period, depending on the specific needs of the stakeholders in the area.

### 8.7 Key Milestones of the Programme for the EIA

The envisaged key milestones of the programme for the EIA Phase are outlined in the following table (and include indicative dates):

<table>
<thead>
<tr>
<th>Key Milestone Activities</th>
<th>Proposed timeframe</th>
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</thead>
<tbody>
<tr>
<td>Make Draft Scoping Report available to the public, stakeholders and authorities</td>
<td>9 September 2016 to 10 October 2016</td>
</tr>
<tr>
<td>Finalisation of Scoping Report, and submission of the Final Scoping Report to DEA</td>
<td>October 2016</td>
</tr>
<tr>
<td>Authority acceptance of the Final Scoping Report and Plan of Study to undertake the EIA</td>
<td>43 days from submission of Final Scoping Report</td>
</tr>
<tr>
<td>Undertake specialist studies and public participation process</td>
<td>November – December 2016</td>
</tr>
<tr>
<td>Make Draft EIA Report and EMPr available to the public, stakeholders and authorities</td>
<td>January 2017</td>
</tr>
<tr>
<td>Finalisation of EIA Report, and submission of the Final EIA Report to DEA</td>
<td>February 2017</td>
</tr>
<tr>
<td>Authority review period and decision-making (107 calendar days)</td>
<td>June 2017</td>
</tr>
</tbody>
</table>
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