ESTABLISHMENT OF 132kV GRID CONNECTION INFRASTRUCTURE FOR THE HOUTHAALBOOMEN PV CLUSTER, NORTH WEST PROVINCE

Basic Assessment Report

savannah environmental

t +27 (0)11 656 3237
f +27 (0)86 684 0547
e info@savannahsa.com
w www.savannahsa.com

Prepared for:

Houthaalboomen Grid (Pty) Ltd

Prepared by:

savannah environmental

t +27 (0)11 656 3237 f +27 (0)86 684 0547 e info@savannahsa.com w www.savannahsa.com

First Floor, Block 2, 5 Woodlands Drive Office Park, Cnr Woodlands Drive & Western Service Road, Woodmead, 2191

PROJECT DETAILS

DEFF Reference No.	:	TBD
Title	:	Establishment of 132kV Grid Connection Infrastructure for the Houthaalbomen PV Cluster, North West Province
Authors	:	Rendani Rasivhetshele Karen Jodas
Applicant	:	Houthaalboomen Grid (Pty) Ltd
Report Status	:	Draft for Public Review
Date	:	May 2022

When used as a reference this report should be cited as: Savannah Environmental (2022) Basic Assessment for Establishment of 132kV Grid Connection Infrastructure for the Houthaalboomen PV Cluster, North West Province

COPYRIGHT RESERVED

This technical report has been produced for Houthaalboomen Grid (Pty) Ltd The intellectual property contained in this report remains vested in Savannah Environmental (Pty) Ltd. No part of the report may be reproduced in any manner without written permission from Savannah Environmental (Pty) Ltd or Houthaalboomen Grid (Pty) Ltd

PURPOSE OF THE EIA REPORT AND INVITATION TO COMMENT

Houthaalboomen Grid (Pty) Ltd proposes the construction and operation of a 132kV power line, and collector substation to connect the Houthaalboomen PV Cluster comprising the Barleria PV, Dicoma PV, and Setaria PV facilities to the Eskom grid at the existing Watershed Substation. The grid connection corridor is located approximately 5.5km northwest of the town of Lichtenburg in the Ditsobotla Local Municipality and Ngaka Modiri Molema District Municipality.

The nature and extent of the grid connection corridor, as well as the potential environmental impacts associated with the construction, operation, and decommissioning phases of infrastructure of this nature are explored in detail in this Basic Assessment Report. Site specific environmental issues and constraints within the grid connection corridor are considered within independent specialist studies in order to test the environmental suitability of the corridor for the development of the grid connection infrastructure. Two alternative grid connection solutions (within a 200m wide corridor) are considered in this Basic Assessment, and a preferred alternative is nominated.

This Basic Assessment (BA) Report (hereafter referred to as the BA Report) consists of the following sections:

- **Chapter 1** provides background to the proposed Houthaalboomen Grid Connection solution and the basic assessment process.
- **Chapter 2** provides a description of the project details, identified project alternatives, and the need and desirability for the development.
- **Chapter 3** outlines the strategic regulatory and legal context for energy planning in South Africa and specifically for the grid connection.
- **Chapter 4** outlines the approach to undertaking the basic assessment process
- **Chapter 5** describes the existing biophysical and social environment within and surrounding the grid connection corridor proposed for the development
- **Chapter 6** provides an assessment of the potential issues and impacts associated with the development of the grid connection solution and presents recommendations for the mitigation of significant impacts.
- **Chapter 7** provides an assessment of the potential for cumulative impacts
- **Chapter 8** presents the conclusions and recommendations based on the findings of the BA Report
- **Chapter 9** provides references used in the compilation of the BA Report

The BA Report is available for review from Friday, 13 May to Monday 13 June 2022 at the following locations https://savannahsa.com/public-documents/grid-infrastructure/

Please submit your comments by **Monday, 13 June 2022** to:

Nondumiso Bulunga
PO Box 148, Sunninghill, 2157
Tel: 011-656-3237
Fax: 086-684-0547
Email: publicprocess@savannahsa.com

Comments can be made as written submission via fax, post or email.

.

EXECUTIVE SUMMARY

Houthaalboomen Grid (Pty) Ltd proposes the construction and operation of a 132kV power line, and collector substation to connect the Houthaalboomen PV Cluster comprising the Barleria PV, Dicoma PV, and Setaria PV facilities to the Eskom grid at the existing Watershed Substation. Two alternative grid connection solutions (within a 200m wide corridor) have been assessed and includes:

Grid Connection Alternative 1: Houthaalboomen Collector Substation, centrally positioned on the southern boundary of Portion 1 of the Farm Houthaalboomen 31, and a 132kV power line connecting into the existing Watershed MTS. The grid connection infrastructure is located within a 6km long and 200m wide grid connection corridor

Grid Connection Alternative 2: Houthaalboomen Collector Substation, positioned on the south-eastern corner of Portion 1 of the Farm Houthaalboomen 31, and a 132kV power line connecting into the existing Watershed MTS. The grid connection infrastructure is located within a 4.5km long and 200m wide grid connection corridor

The grid connection corridor is located within the Ditsobotla Local Municipality within the Ngaka Modiri Molema District Municipality, and comprises the following affected properties:

- Portion 1 of the Farm Houthaalboomen 31
- Portion 0 of Farm Talene 25
- Portion 39 of Farm Elandsfontein 34-
- Portion 93 of Farm Elandsfontein 34
- Portion 41 of Farm Elandsfontein 34
- Portion 0 of Farm Priem 30
- Portion 25 of Farm Houthaalboomen 31
- Portion 1 of Farm Lichtenburg Town and Townlands, No 27

Environmental Sensitivity of the Assessed Grid Connection Corridor

From the specialist investigations undertaken for the grid connection infrastructure, the following sensitive areas/environmental features have been identified and demarcated within grid connection corridor for both alternative configurations. The sensitive features would need to be considered by the developer for the location of the grid connection infrastructure within the assessed grid connection corridor.

- A medium sensitivity slightly degraded to near-natural savanna grassland type line is located within the grid connection corridor. It is recommended that vegetation clearing to commence only after walkthrough has been conducted to locate species of conservation concern that can be translocated or avoided.
- A high sensitivity artificial livestock watering points are located within the grid connection corridor. It is recommended that watering points be moved away from electrical infrastructure.
- Heritage features of high potential significance (Grade IIIa) are located within the grid connection corridor. It is recommended that a 10m no-development buffer zone be implemented.

The potential environmental impacts associated with the grid connection infrastructure identified and assessed through the BA process include:

- Impacts on ecology (terrestrial and freshwater).
- Impacts on avifauna.
- Impacts on agricultural
- Impacts on heritage resources, including archaeology and palaeontology.
- Visual impacts on the area as a result of the grid connection infrastructure.

Impacts on Ecology (Terrestrial and Freshwater)

There are no highly sensitive features impacted by the Houthaalboomen Grid Connection corridor. However, it is recommended that vegetation clearing to commence only after walkthrough has been conducted to locate species of conservation concern that can be translocated or avoided. From the findings of the Ecological Impact Assessment, it can be concluded that the grid connection corridor assessed for the development of the grid connection infrastructure is of moderate to low ecological sensitivity. As a result, there are no specific long-term impacts associated with the grid connection infrastructure that cannot be reduced to an acceptable level through mitigation and avoidance. There are no high residual impacts or fatal flaws associated with the development and it can be supported from a terrestrial ecology perspective.

Impacts on Avifauna

Given the level of degradation the level of degradation already present and the lower bird species diversity and abundance recorded in this area, and placement of infrastructure to areas where existing impacts occur (i.e., placing the proposed power line alongside roads), the impacts of the grid connection on avifauna can be managed by adhering to the recommended mitigation measures.

Impacts on Soils

The most significant impacts of the proposed project on soil and agricultural productivity will occur during the construction phase of the power line pylons and collector substation during the construction phase, the vegetation will be removed, and the soil surface prepared for the delivery of materials and erection of the infrastructure. During the operational phase, the risk remains that soil will be polluted by the waste generated or in the case of a spill incident when maintenance workers visit the area to do any maintenance work or repairs. During the decommissioning phase, soil will be prone to erosion when the infrastructure is removed from the soil surface.

Impacts on Heritage Resources (including archaeology and palaeontology)

The Heritage Impact Assessment assessed the impact of the grid connection infrastructure on the heritage features (archaeology, palaeontology and cultural landscape) associated with the assessed grid connection corridor.

A number of stone structures were identified within the study area. Some of these structures are likely to represent human burial (LICBUR10) and as such, these structures are conservatively graded IIIA (high local significance). It is recommended that a 10m no-development buffer zone around each structure or set of

structures is implemented. Additionally, a possible burial was identified within the grid connection corridor by Van der Walt (2014). A further 10m no-development buffer zone must also be implemented around this site (SAHRIS Site ID 51472). Not all the stone structures identified are likely human burials. Some of these less typical stone structures should be avoided where possible, and construction in the vicinity should proceed with caution. Impacts to archaeological and heritage resources are expected to occur during the construction phase of the project, most likely during foundation excavations. However, with the implementation of mitigation measures, the impact to these identified resources is expected to be of Low significance. There are no fatal flaws expected to occur with regards to archaeological resources.

No impact to significant palaeontological heritage is anticipated, and the impact to paleontological resources is expected be of Low significance with and without the implementation of mitigation measures. It is recommended that no additional specialist palaeontological assessment is required.

Visual Impacts

The Visual Impact Assessment identified negative impacts on visual receptors during the construction and the operation phases of the grid connection infrastructure. The impacts include visual impacts due to construction activities, as well as impacts on sensitive visual receptors located within 0.5km to 3km from the grid connection infrastructure, and a visual impact on the sense of place. The Visual Impact Assessment concluded that the visual impact of all grid connection infrastructure will have low to medium impact on observers traveling along the roads and residents of homesteads within a 0.5 - 3km radius of the infrastructure. Furthermore, the anticipated visual impact of the proposed grid connection infrastructure on the regional visual quality (i.e. beyond 3km of the proposed infrastructure), and by implication, on the sense of place, is generally expected to be of low significance.

Assessment of Cumulative Impacts

Based on the specialist cumulative assessment and findings, the development of the Houthaalboomen grid connection infrastructure and its contribution to the overall impact of all existing grid infrastructure to be developed, it can be concluded that the contribution of the project to cumulative impacts will be of a low to high significance depending on the impact being considered. There are, however, no impact significance or fatal flaws identified to be unacceptable with the development of the proposed grid connection infrastructure within the assessed grid connection corridor. In addition, no impacts that will result in whole-scale change are expected to occur.

Consideration of Alternatives

Two alternative collector substation positions were considered as part of this assessment. As such, the 200m wide power line corridor is wide power line corridor footprint is largely the same for both alternatives, and deviates only to accommodate the two alternative positions for the Collector substation. This assessment, therefore, considered two alternative grid connection solutions, both terminating at Watershed Substation. As part of specialist assessments both alternative grid connection solutions were assessed and determined to be acceptable from an environmental perspective. A summary of the assessment of impacts for the grid connection and associated infrastructure alternatives are detailed below:

Aspect	Grid Connection Alternative 1	Grid Connection Alternative 2

Ecology	*Acceptable*	*Preferred & Acceptable*
Avifauna	*Acceptable*	*Preferred & Acceptable*
Soils and agriculture potential	*Preferred & Acceptable*	*Preferred & Acceptable*
Heritage	*Preferred & Acceptable*	*Preferred & Acceptable*
Visual	*Preferred & Acceptable*	*Acceptable*

Grid Connection Alternative 2 was identified by the developer as the preferred alternative from a technical feasibility perspective and has been fully considered and assessed as part of this BA process and within this BA Report to be acceptable from an environmental perspective.

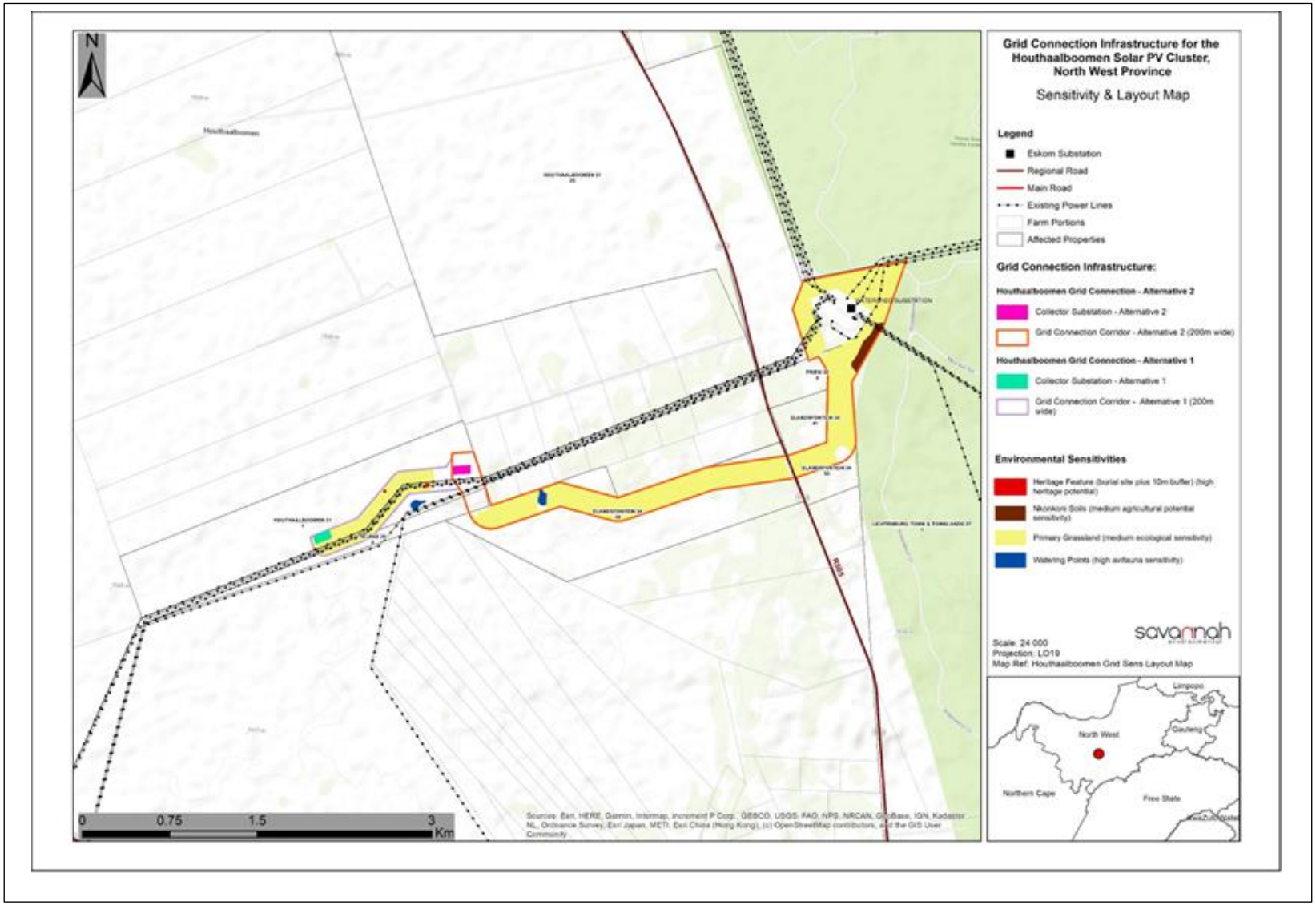

Figure 1: Environmental sensitivity map overlain with the assessed grid connection corridor within which the grid connection infrastructure for the Houthaalboomen Grid Connection alternative configuration 1 and 2 is proposed to be developed (**Appendix M**)

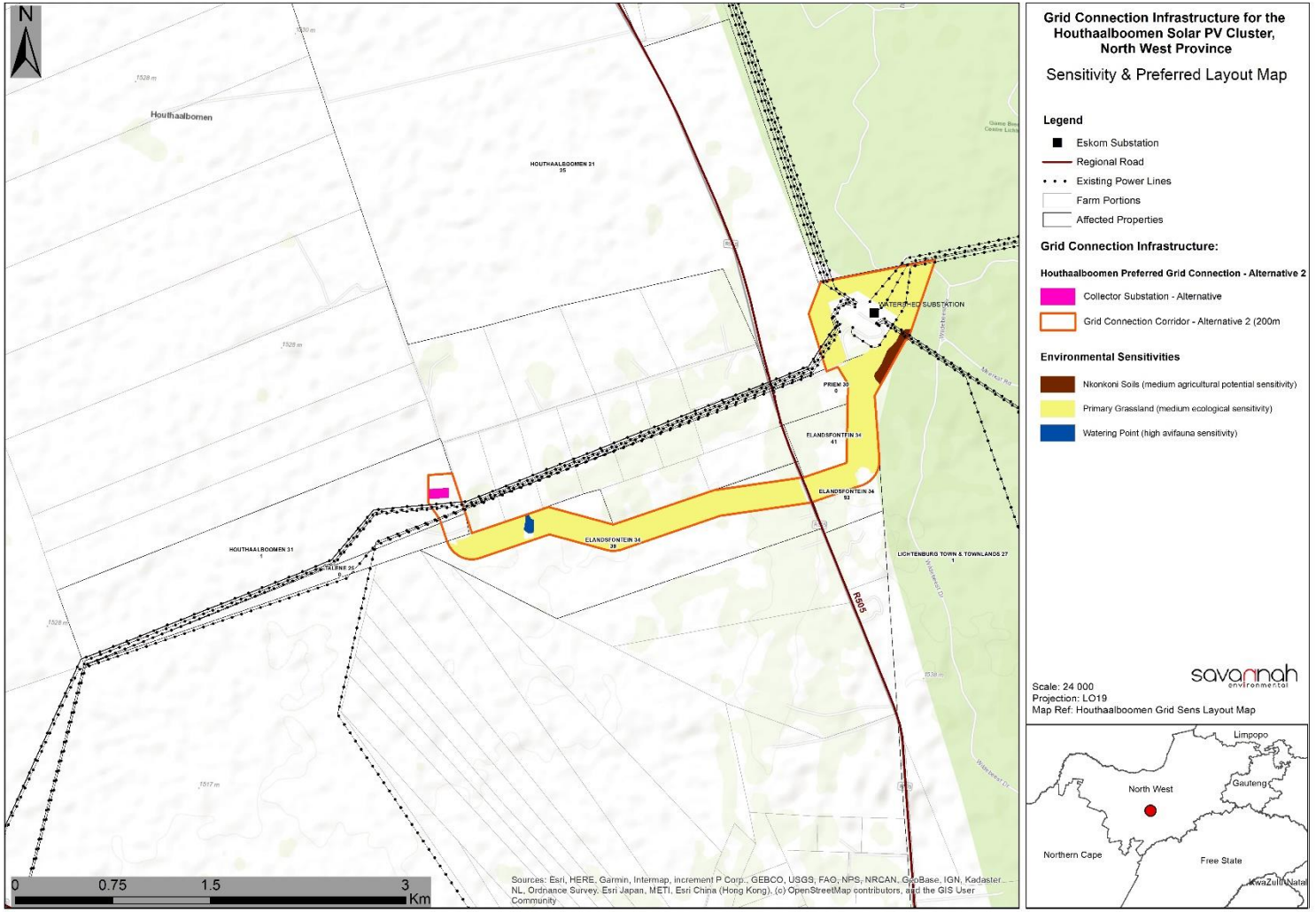

Figure 2: Environmental sensitivity map overlain with the assessed grid connection corridor within which the preferred grid connection infrastructure for the Houthaalboomen Grid Connection is proposed to be developed (Appendix M)

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.

Archaeological material: Remains resulting from human activities which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.

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

Construction: Construction means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity. 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.

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.

'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.

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.

Mitigation hierarchy: The mitigation hierarchy is a framework for managing risks and potential impacts related to biodiversity and ecosystem services. The mitigation hierarchy is used when planning and implementing development projects, to provide a logical and effective approach to protecting and

conserving biodiversity and maintaining important ecosystem services. It is a tool to aid in the sustainable management of living, natural resources, which provides a mechanism for making explicit decisions that balance conservation needs with development priorities.

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.

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

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

Pre-construction: The period prior to the commencement of construction, 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).

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

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

Waste: means—

a) any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to this Act; or
b) any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister

Watercourse: as per the National Water Act means -

(a) a river or spring;
(b) a natural channel in which water flows regularly or intermittently;

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

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

ACRONYMS

BA	Basic Assessment
BGIS	Biodiversity Geographic Information System
CBA	Critical Biodiversity Area
DFFE	Department of Forestry, Fisheries, and the Environment (National)
DWS	Department of Water and Sanitation
CBA	Critical Biodiversity Area
CR	Critically Endangered
CSIR	Council for Scientific and Industrial Research
DM	District Municipality
DMRE	Department of Mineral Resources Energy
EAP	Environmental Assessment Practitioner
EGIS	Environmental Geographic Information System
EMF	Environmental Management Framework
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
EN	Endangered
EP	Equator Principles
ESA	Ecological Support Area
GA	General Authorisation
GHG	Greenhouse Gas
IBA	Important Bird Area
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IEP	Integrated Energy Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
IRP	Integrated Resource Plan
IUCN	International Union for Conservation of Nature
I&AP	Interested and Affected Party
km	Kilometre
kWh	Kilowatt hour
LC	Least Concern
LM	Local Municipality
LNG	Liquid Natural Gas
m	Metre
m²	Square meters
m³	Cubic meters
m amsl	Metres Above Mean Sea Level
MW	Megawatts
NDP	National Development Plan
NEMA	National Environmental Management Act (No. 107 of 1998)
NEM:AQA	National Environmental Management: Air Quality Act (No. 39 of 2004)
NEM:BA	National Environmental Management: Biodiversity Act (No. 10 of 2004)

NEM:WA	National Environmental Management: Waste Act (No. 59 of 2008)
NFA	National Forests Act (No. 84 of 1998)
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act (No. 25 of 1999)
NT	Near Threatened
NWA	National Water Act (No. 36 of 1998)
ONA	Other Natural Area
PA	Protected Area
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SAIAB	South African Institute for Aquatic Biodiversity
SANBI	South African National Biodiversity Institute
SDF	Spatial Development Framework
TOPS	Threatened or Protected Species
VU	Vulnerable

TABLE OF CONTENTS

PROJECT DETAILS ..... **i**
PURPOSE OF THE EIA REPORT AND INVITATION TO COMMENT ..... **ii**
EXECUTIVE SUMMARY ..... **iii**
DEFINITIONS AND TERMINOLOGY ..... **ix**
ACRONYMS ..... **xiii**
TABLE OF CONTENTS ..... **xv**
APPENDICES LIST ..... **xviii**
CHAPTER 1 INTRODUCTION **19**
1.1 Overview of the Houthaalboomen Grid Connection Infrastructure **19**
1.2 Requirements for an Environmental Impact Assessment Process **23**
1.3 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report **24**
1.4 Objectives of the Basic Assessment Process **25**
1.5 Details of the Environmental Assessment Practitioner and Expertise to conduct the BA process **25**
CHAPTER 2 PROJECT DESCRIPTION & ALTERNATIVES **28**
2.1. Legal Requirements as per the EIA Regulations, 2014 (as amended) **28**
2.2.1. Project Site 28
2.2.2. Components of the Grid Infrastructure for the Houthaalboomen Solar Grid Connection 30
2.2.3. Need and Desirability for the Houthaalboomen Grid Connection Infrastructure 31
2.2.4. Description of Project Alternatives 32
2.2.5 Project Development Phases associated with the Grid Connection Infrastructure for Houthaalboomen Grid Connection 36
CHAPTER 3 REGULATORY AND PLANNING CONTEXT **39**
3.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report **39**
3.2. Strategic Electricity Planning in South Africa **39**
3.3. Policy and Planning Considerations on International, National, Provincial and Local Levels **40**
3.3.1. Policy and Planning on an International Level **40**
3.3.2. Policy and Planning on a National Level **42**
3.3.3. Policy and Planning at a Provincial Level **45**
3.3.3. Policy and Planning on a District and Local Level **48**
CHAPTER 4: APPROACH TO UNDERTAKING THE BA PROCESS **51**
4.1 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report **51**
4.2 Relevant legislative permitting requirements **52**
4.2.1 National Environmental Management Act (No. 107 of 1998) (NEMA) 52
4.2.2 National Water Act (No. 36 of 1998) (NWA) 55
4.2.3 National Heritage Resources Act (No. 25 of 1999) (NHRA) 55
4.3 Overview of the Basic Assessment Process for the Houthaalboomen Grid Connection **56**
4.3.1. Authority Consultation and Application for Authorisation in terms of the 2014 EIA Regulations (as amended) 57
4.3.2. Public Participation Process 57
4.4 Assessment of Impacts Identified through the BA Process **66**
4.5 Assumptions and Limitations of the BA Process **70**

4.6 .....Legislation and Guidelines that have informed the preparation of this Basic Assessment Report 70
CHAPTER 5: DESCRIPTION OF THE RECEIVING ENVIRONMENT 83
5.1 .....Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report 83
5.2. ....Regional Setting 84
5.3. ....Geographical Setting: Location and description of the Broader Study area and the Development Area..84
5.4. ....Climatic Conditions 85
5.4. ....Biophysical Characteristics of the Development Area 86
5.4.1. Topographical profile 86
5.4.2. Geology, Soils and Agricultural Potential 87
5.4.3. Ecological Profile of the Study Area and the Development Area 94
5.4.4. Avifauna profile for the area 115
5.5. ...Integrated Heritage including Archaeology, Palaeontology and the Cultural Landscape 122
5.5.1. Historical, Archaeological and Built Environment Heritage 122
5.5.2. Palaeontology 123
5.6 .....Social Context 124
5.7 .....Visual Quality 126
5.7.1 Settlement and infrastructure 126
CHAPTER 6. ASSESSMENT OF IMPACTS 128
6.1. ....Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report 129
6.2. Quantification of Areas of Disturbance within the Grid Connection Corridor 130
6.3. ....Assessment of impacts on Terrestrial (Flora and Fauna) and Freshwater Ecological Resources 130
6.3.1 Results of the Terrestrial and Freshwater Ecological Impact Assessment 130
6.3.2 Description of Terrestrial and Freshwater Ecological impacts 131
6.3.3 Impact tables summarising the significance of impacts on ecology during construction and operation (with and without mitigation) 132
6.3.4 Comparative Assessment of Alternatives 140
6.3.5 Implications for Project Implementation 141
6.4. ....Assessment of Impacts on Avifauna 141
***6.4.1* Results of the Avifauna Impact Assessment** 141
6.4.2 Description of Avifaunal Impacts 142
6.4.3 Impact tables summarising the significance of impacts on avifauna during construction and operation (with and without mitigation) 143
6.4.4 Comparative Assessment of Alternatives 146
6.4.5 Implications for Project Implementation 146
6.5. ....Assessment of Impacts on Heritage Resources 146
6.5.1 Results of the Heritage Impact Assessment (including archaeology, palaeontology and cultural landscape) 147
Assessment of Impacts on Heritage Resources 147
6.5.2 Results of the Heritage Impact Assessment (including archaeology, palaeontology and cultural landscape) 147
6.5.3 Description of the soils and agricultural potential 148
6.5.4 Impact tables summarising the significance of impacts on soils and agricultural potential related to the grid connection infrastructure during construction and operation (with and without mitigation). The below tables are applicable to both Alternative 1 & 2. 148

6.5.5 Comparative Assessment of Alternatives 151
6.5.6 Implications for Project Implementation 151
6.5.7 Description of the Heritage Impacts 152
6.5.8 Impact tables summarising the significance of impacts on heritage related to the grid connection infrastructure during construction and operation (with and without mitigation). The below tables are applicable to both Alternative 1 & 2. 152
6.5.9 Comparative Assessment of Alternatives 153
6.5.10 Implications for Project Implementation 153
6.6. Assessment of Visual Impacts 154
6.6.1 Results of the Visual Impact Assessment 154
6.6.2 Description of the Visual Impacts 157
6.6.3 Impact table summarising the significance of visual impacts during construction and operation (with and without mitigation) 158
6.6.4 Comparative Assessment of Alternatives 161
6.6.5 Implications for Project Implementation 161
6.7. Assessment of the 'Do Nothing' Alternative 162
CHAPTER 7. ASSESSMENT OF POTENTIAL CUMULATIVE IMPACTS 163
7.1 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report 163
7.2 Approach taken to Assess Cumulative Impacts 163
7.3 Cumulative Impacts on Ecological 166
7.4 Cumulative Impacts on Avifauna 167
7.5 Cumulative Impacts on Land Use, Soil and Agricultural Potential 169
7.6 Cumulative Impacts on Heritage (including archaeology and palaeontology) 170
7.7 Cumulative Visual Impacts 171
7.8 Conclusion regarding Cumulative Impacts 172
CHAPTER 8. CONCLUSIONS AND RECOMMENDATIONS 174
8.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report 174
8.2. Environmental Sensitivity of the Assessed Grid Connection Corridor 175
8.3. Evaluation of the grid connection infrastructure of the Houthaalboomen Grid Connection 175
8.2.1 Impacts on Ecology (Terrestrial and Freshwater) 176
8.2.2 Impacts on Soils 176
8.2.3 Impacts on Soils 176
8.2.4 Impacts on Heritage Resources (including archaeology and palaeontology) 177
8.2.4. Visual Impacts 177
8.2.5 Assessment of Cumulative Impacts 177
8.2.6 Consideration of Alternatives 177
8.4. Environmental Costs of the grid connection infrastructure versus Benefits of the grid connection infrastructure 178
8.5. Overall Conclusion (Impact Statement) 182
8.6. Overall Recommendation 182
CHAPTER 9. REFERENCES 184

APPENDICES LIST

Appendix A: **EIA Project Consulting Team**
Appendix B: **Correspondence with Authorities**
Appendix C: **Public Participation Process Report**
Appendix D: **Ecology Impact Assessment**
Appendix E: **Avifauna Impact Assessment**
Appendix F: **Soils and Agricultural Potential Impact Assessment**
Appendix G: **Heritage and Palaeontological Impact Assessment**
Appendix H: **Visual Impact Assessment**
Appendix I: **Generic Environmental Management Programme – Collector Substation**
Appendix J: **Generic Environmental Management Programme – Grid Lines**
Appendix K: **EAP Affirmation and Declaration**
Appendix L: **Specialist Declarations**
Appendix M: **A3 Maps**
Appendix N: **Screening Tool Report**

CHAPTER 1 INTRODUCTION

Houthaalboomen Grid (Pty) Ltd proposes the construction and operation of a 132kV power line, and collector substation to connect the Houthaalboomen PV Cluster comprising the Barleria PV, Dicoma PV, and Setaria PV facilities to the Eskom grid at the existing Watershed Substation. The grid connection corridor is located approximately 5.5km northwest of the town of Lichtenburg in the Ditsobotla Local Municipality and Ngaka Modiri Molema District Municipality.

The nature and extent of the grid connection corridor, as well as the potential environmental impacts associated with the construction, operation, and decommissioning phases of infrastructure of this nature are explored in detail in this Basic Assessment Report. Site specific environmental issues and constraints within the grid connection corridor are considered within independent specialist studies in order to test the environmental suitability of the corridor for the development of the grid connection infrastructure. Two alternative grid connection solutions (within a 200m wide corridor) are considered in this Basic Assessment, and a preferred alternative is nominated.

This Basic Assessment (BA) Report (hereafter referred to as the BA Report) consists of the following sections:

- **Chapter 1** provides background to the proposed Houthaalboomen Grid Connection solution and the basic assessment process.
- **Chapter 2** provides a description of the project details, identified project alternatives, and the need and desirability for the development.
- **Chapter 3** outlines the strategic regulatory and legal context for energy planning in South Africa and specifically for the grid connection.
- **Chapter 4** outlines the approach to undertaking the basic assessment process
- **Chapter 5** describes the existing biophysical and social environment within and surrounding the grid connection corridor proposed for the development
- **Chapter 6** provides an assessment of the potential issues and impacts associated with the development of the grid connection solution and presents recommendations for the mitigation of significant impacts.
- **Chapter 7** provides an assessment of the potential for cumulative impacts
- **Chapter 8** presents the conclusions and recommendations based on the findings of the BA Report
- **Chapter 9** provides references used in the compilation of the BA Report

1.1 Overview of the Houthaalboomen Grid Connection Infrastructure

The consideration of the applications for environmental authorisation for the Houthaalboomen PV Cluster projects (comprising Barleria PV (DFFE Ref: 14/12/16/3/3/2/2107), Dicoma PV (DFFE Ref: 14/12/16/3/3/2/2108), and Setaria PV (DFFE Ref: 14/12/16/3/3/2/2106)) is currently underway. The facilities are located on Farms Portion 1, Portion 9, Portion 10 of the Farm Houthaalboomen 31. Two alternative grid connection solutions (both within a 200m assessment corridor) have been assessed and include:

- Collector substation (footprint up to 1.125 ha)
- Up to 132kV single or double circuit power line (within 200m wide corridor)

Two alternative Collector substation positions are considered as part of this basic assessment. The 200m wide power line corridor footprint is largely the same for both alternatives, and deviates only to accommodate the two alternative positions for the Collector substation. This assessment, therefore,

considers two alternative grid connection solutions, both with a unique starting point, but both terminating at the Eskom Watershed Substation. The key infrastructure components proposed as part of the project, as well as the two alternative grid connection configurations are described in greater detail in Chapter 2 of this BA Report.

Both grid connection corridor alternatives comprises the following 8 affected properties[1]:

- Portion 1 of the Farm Houthaalboomen 31
- Portion 0 of Farm Talene 25
- Portion 39 of Farm Elandsfontein 34-
- Portion 93 of Farm Elandsfontein 34
- Portion 41 of Farm Elandsfontein 34
- Portion 0 of Farm Priem 30
- Portion 25 of Farm Houthaalboomen 31
- Portion 1 of Farm Lichtenburg Town and Townlands, No 27

Details of the grid connection corridor within which the grid connection infrastructure will be developed is included in **Table 1.1**. **Figure 1.1** provides a locality map of the grid connection corridor, as well as the positions of the substation alternatives.

Table 1.1: A detailed description of the grid connection corridor for the development of the Houthaalboomen Grid Connection solution

Province	North West Province
District Municipality	Ngaka Modiri Molema District Municipality
Local Municipality	Ditsobotla Local Municipality
Ward number(s)	Ward 16 Ward 1
Nearest town(s)	Lichtenburg (~5km north-west)
Affected Properties: Farm name(s), number(s) and portion numbers	» Portion 1 of the Farm Houthaalboomen 31 » Portion 0 of Farm Talene 25 » Portion 39 of Farm Elandsfontein 34- » Portion 93 of Farm Elandsfontein 34 » Portion 41 of Farm Elandsfontein 34 » Portion 0 of Farm Priem 30 » Portion 25 of Farm Houthaalboomen 31 » Portion 1 of Farm Lichtenburg Town and Townlands, No 27
SG 21 Digit Code (s)	» Portion 1 of the Farm Houthaalboomen 31 – T0IP00000000003100001 » Portion 0 of Farm Talene 25 – T0IP00000000002500000 » Portion 39 of Farm Elandsfontein 34 - T0IP00000000003400000 » Portion 93 of Farm Elandsfontein 34-T0IP00000000003400000 » Portion 41 of Farm Elandsfontein 34 - T0IP00000000003400000 » Portion 0 of Farm Priem 30 - T0IP00000000003000000 » Portion 25 of Farm Houthaalboomen 31 - T0IP00000000003100000

1 The 200m wide grid connection corridor traverses limited sections of the 8 affected properties. This is a comprehensive listing of these properties.

	» Portion 1 of Farm Lichtenburg Town and Townlands, No 27 - T0IP00000000002700000
Current zoning and land use	Majority land use consist of cattle grazing Agricultural (grazing of cattle)

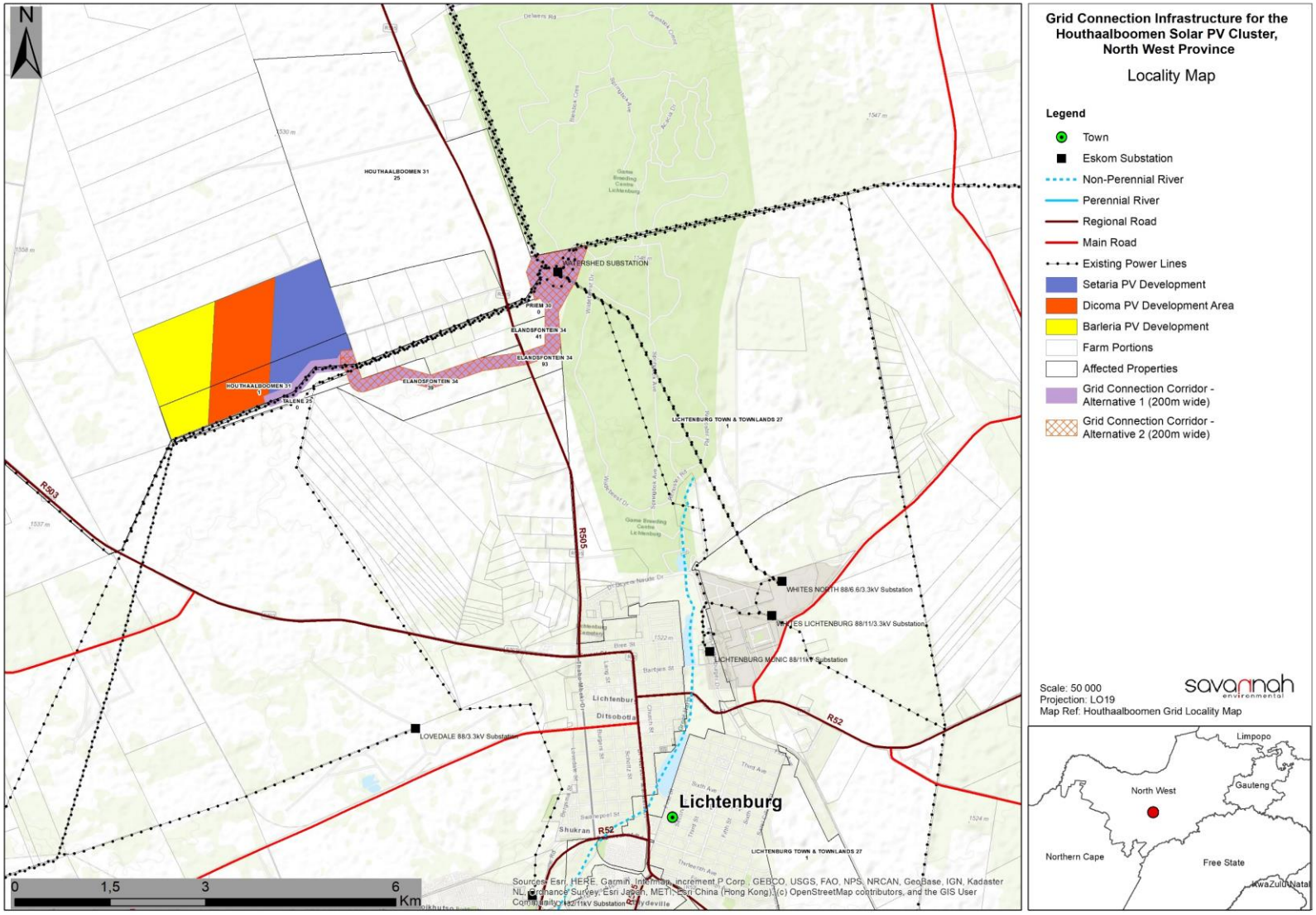

Figure 1.1: A locality map illustrating the grid connection corridor under investigation for the establishment of the Houthaalboomen Grid Connection

1.2 Requirements for an Environmental Impact Assessment Process

The construction and operation of Houthaalboomen Grid Connection is subject to the requirements of the EIA Regulations, 2014 (as amended), published in terms of Section 24(5) of the National Environmental Management Act (NEMA) 107 of 1998. NEMA is the national legislation that provides for the authorisation of certain controlled activities known as "listed activities". In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed, and reported on to the Competent Authority (the decision-maker) charged by NEMA with granting of the relevant environmental authorisation.

The development (i.e. construction and operation) of the grid connection is subject to the requirements of the Environmental Impact Assessment (EIA) Regulations of 2014 published in terms of Section 24(5) of NEMA. In terms of the EIA Regulations of 2014 (as amended) promulgated under Sections 24 and 24D of the NEMA, various aspects of the project are listed as activities that may have a detrimental impact on the environment. The main listed activity triggered by the proposed grid connection infrastructure is Activity 11(i) of Listing Notice 1 (GNR327 of the EIA Regulations, 2014 (as amended)), which relates to the development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts (kV).

Due to the triggering of Activity 11(i) of Listing Notice 1, of the EIA Regulations, 2014 (as amended), a Basic Assessment process must be undertaken in order to obtain Environmental Authorisation for the construction and operation of the Houthaalboomen Grid Connection solution. The grid connection corridor is also located within the northern corridor of the Strategic Transmission Corridors, gazetted on 16 February 2018 (GNR113 and GNR114). These transmission corridors are considered to be of strategic importance for the rollout of the supporting large scale electricity transmission and distribution infrastructure in terms of Strategic Integrated Project 10: Electricity Transmission and Distribution.

Houthaalboomen Grid (Pty) Ltd appointed Savannah Environmental as the independent environmental consultant to conduct the BA process for the grid connection solution. This BA Report is in line with Appendix 1 of the EIA Regulations, 2014 (as amended).

A BA 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 BA Report as well as dialogue with interested and affected parties (I&APs).

The BA process comprises of one phase and involves the identification and assessment of environmental impacts through specialist studies, as well as public participation. The process followed in the BA involves a detailed assessment of potentially significant positive and negative impacts (direct, indirect, and cumulative). This includes detailed specialist investigations and one round of public consultation. Following

the public review period of the BA Report and Environmental Management Programme (EMPr[2]), a final BA Report and an EMPr is submitted to the Competent Authority, which includes the recommendations for practical and achievable mitigation and management measures for final review and decision-making.

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.

In terms of GNR 779 of 01 July 2016, the National Department of Forestry, Fisheries, and the Environment (DFFE) has been determined as the Competent Authority for all projects which relate to the Integrated Resource Plan for Electricity (IRP) 2010 – 2030, and any updates thereto. Through the decision-making process, the DFFE will be supported by the North West Department of Rural, Environment and Agricultural Development (READ) as a commenting authority.

1.3 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This BA Report has been prepared in accordance with the requirements of the EIA Regulations published on 08 December 2014 (as amended) promulgated in terms of Chapter 5 of the National Environmental Management Act (Act No 107 of 1998).

This chapter of the BA Report includes the following information required in terms of Appendix 1: Content of basic assessment reports:

Requirement	Relevant Section
3(a) the details of the (i) EAP who prepared the report and (ii) the expertise of the EAP, including a curriculum vitae.	The details of the EAP who prepared the report and the expertise of the EAP is included in section 1.5. The curriculum vitae of the EAP, project team and independent specialists are included in **Appendix A**.
3(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 co-ordinates of the boundary of the property or properties.	The location of the grid connection corridor, within which the 132kV power line and collector substations will be developed, is included in section 1.1, **Table 1.1** and **Figure 1.1**. The information provided includes the 21-digit Surveyor General code of the affected properties and the farm names. Additional information is also provided regarding the location of the development which includes the relevant province, local and district municipalities, ward and current land zoning.

[2] The generic Environmental Management Programmes, contemplated in Regulation 19(4) of the EIA Regulations, 2014 (as amended) and as per GNR 435 of 22 March 2019 is used for the BA for the Houthaalboomen Grid Connection. This is due to the triggering of activity 11 of Listing Notice 1 of the EIA Regulations, 2014 (as amended). The generic EMPr for substation infrastructure for electricity transmission and distribution and the generic EMPr for overhead electricity transmission and distribution infrastructure is included as part of this BA Report.

1.4 Objectives of the Basic Assessment Process

Appendix 1 of the EIA Regulations, 2014 (as amended), contains the objectives to be achieved through the undertaking of a BA process. The following objectives have been considered, undertaken and achieved through a consultative process within this BA Report for the Houthaalboomen Grid Connection:

- The identification and consideration of the policies and legislative context associated with the location of the grid connection solution (i.e. grid connection corridor) and the manner in which the proposed development complies with and responds to the relevant policies and legislative context.
- The identification and consideration of feasible alternatives associated with the Houthaalboomen Grid Connection that relate to the specific proposed activity and the location of where the development is proposed.
- The consideration of the need and the desirability of the Houthaalboomen Grid Connection considering the alternatives identified, including the desirability for the development within the identified grid connection corridor.
- The identification and consideration of the nature, consequence, extent, duration and probability of the impacts associated with the Houthaalboomen Grid Connection, as well as the degree to which the impacts can be reversed, result in irreplaceable loss of resources and be avoided, managed or mitigated.
- Motivation for the preferred alternative (i.e. collector substation and it's grid connection corridor) and proposed activity.
- Consideration and identification of the environmental sensitivities to provide input in terms of measures to avoid, manage and mitigate the impacts and the residual risks that need to be managed and monitored.

The potential environmental impacts associated with the construction, operation and decommissioning phases of infrastructure associated with the Houthaalboomen grid connection solution are explored in detail in this Basic Assessment Report. Site specific environmental issues and constraints within the assessed corridor are considered within independent specialist studies in order to test the environmental suitability of the corridor for the development of the proposed grid connection solution. The additional objective of the specialist studies is to also delineate areas of sensitivity within the corridor, and ultimately inform the placement of the substations, power line and associated infrastructure with the assessed corridor.

The release of the BA Report for a 30-day review period will provide stakeholders with an opportunity to review and provide input in terms of potential issues and concerns that may be associated with the establishment of the Houthaalboomen Grid Connection. The final BA Report for submission to the DFFE will consider and incorporate all issues, concerns and responses raised during the review period of the BA Report. The DFFE will also consider these issues, concerns and responses in their decision-making of the application for Environmental Authorisation.

1.5 Details of the Environmental Assessment Practitioner and Expertise to conduct the BA process

In accordance with Regulation 12 of the 2014 EIA Regulations (GNR 326), Houthaalboomen Grid (Pty) Ltd has appointed Savannah Environmental (Pty) Ltd (Savannah Environmental) as the independent

Environmental Assessment consultant to undertake the Basic Assessment and prepare the BA Report for the proposed Houthaalboomen Grid Connection solution. Neither Savannah Environmental nor any of its specialists are subsidiaries of, or are affiliated to Houthaalboomen Grid (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 basic 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.

- ***Rendani Rasivhetshele*** is the principle author of this report. She is a registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA), and she holds a Bachelor of Science Honours in Environmental Management. She has 5 years of experience in conducting Environmental Impacts Assessments, public participation, and Environmental Management Programmes for a wide range of projects, including renewable energy projects. She is responsible for overall compilation of the report, this includes specialist engagement, reviewing specialists reports and incorporating specialist studies into the Environmental Impact Assessment report and its associated Environmental Management Programme.
- ***Lehlogonolo Mashego,*** responsible for the Public Participation Process on this project, holds a MSc in Environmental Science as obtained from the University of Witwatersrand. She is a Gauteng Branch Committee Member for IAIAsa facilitating the students and young professionals division. She has 5 years of professional working experience in the public participation field; specialising in overall public facilitation, stakeholder engagement, public awareness, stakeholder liaison and project administration. She is responsible for project management of public involvement participation processes for a wide range of projects across South Africa in industries which include but not limited to mining, renewable energy, infrastructure and recreation.
- ***Karen Jodas*** Karen holds a Master of Science Degree and is registered as a Professional Natural Scientist (400106/99) with the South African Council for Natural Scientific Professions (SACNASP). She has gained extensive knowledge and experience on potential environmental impacts associated with electricity generation and transmission projects through her involvement in related EIA processes over the past 20 years. She has successfully managed and undertaken EIA processes for infrastructure development projects throughout South Africa.

In order to adequately identify and assess potential environmental impacts associated with the proposed Houthaalboomen Grid Connection, the following specialist consultants have provided input into this BA Report:

Company	Specialist Area of Expertise	Specialist Name
Nkurenkuru Ecology & Biodiversity	Ecology and Freshwater	Gerhard Botha

Company	Specialist Area of Expertise	Specialist Name
Pachnoda Consulting	Avifauna	Lukas Niemand
Terra Africa Environmental Consultants	Agricultural Assessment	Marinè Pienaar
LOGIS	Visual Impact Assessment	Lourens du Plessis
CTS Heritage	Heritage (including archaeology and palaeontology)	Jenna Lavin

Appendix A includes the curricula vitae for the environmental assessment practitioners from Savannah Environmental as well as the specialist consultants.

CHAPTER 2 PROJECT DESCRIPTION & ALTERNATIVES

This chapter provides an overview of the Houthaalboomen Grid Connection Infrastructure and details of the project scope, which includes the planning/design, construction, operation and decommissioning activities required for the development. This Chapter also provides an overview of the anticipated suitability of the grid connection infrastructure for the Houthaalboomen Grid Connection Infrastructure to be developed within the proposed grid connection corridor and provides an overview of the need and desirability, and perceived benefits of the project.

2.1. Legal Requirements as per the EIA Regulations, 2014 (as amended)

This chapter of the BA report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 1: Content of BA reports:

Requirement	Relevant Section
3(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 Houthaalboomen Grid Connection Infrastructure corridor is detailed in Chapter 1, **Table 1.1**, as well as section 2.2.1 below.
3(c)(i)(ii) a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or on land where the property has not been defined, the coordinates within which the activity is to be undertaken	A layout map illustrating the grid connection corridor (200m wide) within which the grid connection infrastructure is planned to be developed is included as **Figure 2.2** and **Figure 2.3**.
3(d)(ii) a description of the scope of the proposed activity, including a description of the activities to be undertaken including associated structures and infrastructure	A description of the activities to be undertaken with the development of the Houthaalboomen Grid Connection Infrastructure is included in **Table 2.1** and **Table 2.2**.
3(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.	The need and desirability of the development of the Houthaalboomen Grid Connection Infrastructure is included and discussed as a whole within this chapter.
3(g) a motivation for the preferred site, activity and technology alternative;	A motivation for the preferred development area, activity and technology alternative is included in **section 2.2, 2.4, and 2.6.**
3(h)(i) details of all the alternatives considered;	The details of all alternatives considered are included in **section 2.4**.

2.2 Nature and extent of the Grid Connection for Houthaalboomen Solar PV facilities

2.2.1. Project Site

The grid connection infrastructure corridor is situated within the Ditsobotla Local Municipality within the Ngaka Modiri Molema District Municipality.

The grid connection corridor is located on the following properties:

Grid Connection Infrastructure	Farm Portion
132kV Switching Substation (Alternative 1 and Alternative 2)	Portion 1 of the Farm Houthaalboomen 31
132kV Overhead Power Line (shared corridor for Alternative 1 and Alternative 2)	Portion 1 of the Farm Houthaalboomen 31 Portion 0 of Farm Talene 25 Portion 39 of Farm Elandsfontein 34- Portion 93 of Farm Elandsfontein 34 Portion 41 of Farm Elandsfontein 34 Portion 0 of Farm Priem 30 Portion 25 of Farm Houthaalboomen 31 Portion 1 of Farm Lichtenburg Town and Townlands, No 27

The grid connection corridor is located within the Northern Corridor of the Strategic Transmission Corridors which is one of five corridors identified for the rollout of large-scale electricity transmission and distribution infrastructure (refer to **Figure 2.1**).

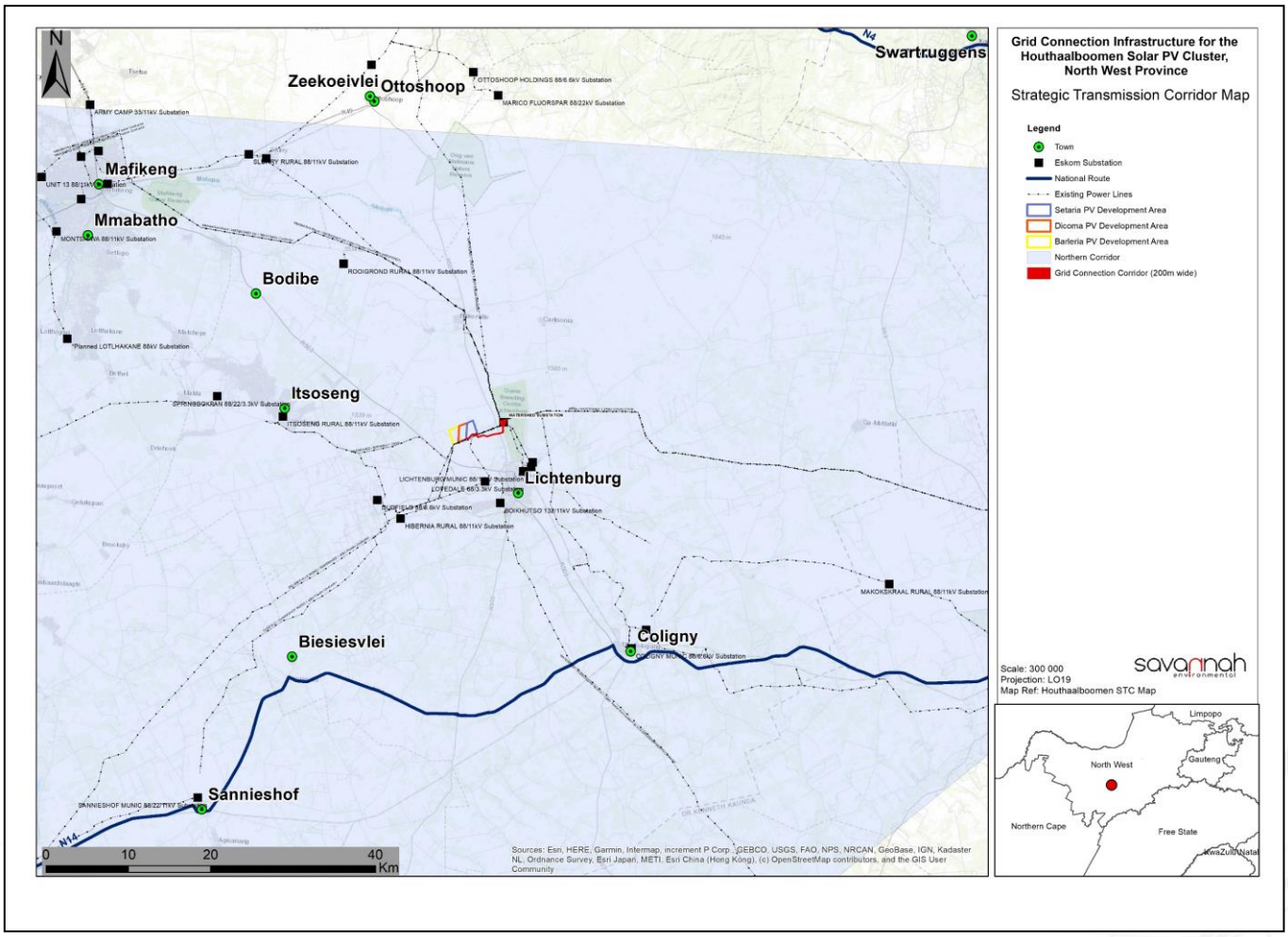

Figure 2.1: The location of the grid connection infrastructures located within the Northern corridor of the Strategic Transmission Power Corridors.

Access to the grid connection corridor is possible via numerous existing roads (R505) in close vicinity to the corridor. Apart from these existing roads, gravel roads will also be utilised. Where no existing roads are available, access roads to the substation sites and service tracks will be constructed.

2.2.2. Components of the Grid Infrastructure for the Houthaalboomen Solar Grid Connection

The development of the grid connection infrastructure is required in order to connect the Houthaalboomen PV Cluster projects (comprising Barleria PV (DFFE Ref: 14/12/16/3/3/2/2107), Dicoma PV (DFFE Ref: 14/12/16/3/3/2/2108), and Setaria PV (DFFE Ref: 14/12/16/3/3/2/2106)) to the Eskom grid via the existing Watershed Substation.

The grid connection infrastructure will be located within a grid connection corridor, and will consist of the below associated infrastructure:

- Up to 132kV Collector Substation (footprint up to 1.125ha)
- Up to 132kV single or double circuit power line (within 200m wide corridor)

Two alternative Collector substation positions are considered as part of this basic assessment. The 200m wide power line corridor footprint is largely the same for both alternatives, and deviates only to accommodate the two alternative positions for the Collector substation. This assessment, therefore, considers two alternative grid connection solutions, each with a unique starting point, but both terminating at the Eskom Watershed Substation. The two alternative grid connection solutions (within a 200m wide corridor) have include:

- ***Grid Connection Alternative 1:*** Houthaalboomen Collector Substation, centrally positioned on the southern boundary of Portion 1 of the Farm Houthaalboomen 31, and an up to 132kV power line connecting into the existing Watershed MTS. The grid connection infrastructure is located within a 6km long and 200m wide grid connection corridor.
- ***Grid Connection Alternative 2:*** Houthaalboomen Collector Substation, positioned on the south-eastern corner of Portion 1 of the Farm Houthaalboomen 31, and an up to 132kV power line connecting into the existing Watershed MTS. The grid connection infrastructure is located within a 4.5km long and 200m wide grid connection corridor.

Figure 2.1 illustrates the grid connection configurations proposed for the development of the Houthaalboomen Grid Connection Infrastructure. A summary of the details and dimensions of the planned infrastructure associated with the project is provided in **Table 2.1 and Table 2.2.**

Table 2.1: Confirmed details or dimensions of the Houthaalboomen Grid Connection Infrastructure – **Alternative 1**

Infrastructure	Footprint, dimensions and details
Corridor width (for assessment purposes)	A 200m wide grid connection corridor is assessed within which the grid connection infrastructure will be constructed and operated.
Power line capacity	Up to 132kV single or double circuit
Power line servitude width	Up to 36m
Length of the power line	~ 6 km
Height of the towers	Up to 36m

Collector substation capacity	Up to 132kV
Collector Substation footprint	Up to 1.125 ha
Access roads/ tracks	Access roads to substation sites and services tracks (up to 8m wide) where no existing roads are available.
Coordinates Collector Substation (centre)	26° 6'37.14"S 26° 6'2.13"E
Coordinates of grid corridor	Start: 26° 5'13.81"S26° 8'53.52"E Mid: 26° 6'24.47"S 26° 7'35.71"E End: 26° 6'40.04"S 26° 6'0.65"E

[1] The confirmed details and dimensions of the Houthaalboomen Grid Connection Infrastructure was assessed as part of the independent specialist studies.

Table 2.2: Confirmed details or dimensions of the Houthaalboomen Grid Connection Infrastructure – **Alternative 2** [3]

Infrastructure	**Footprint, dimensions and details**
Corridor width (for assessment purposes)	A 200m wide grid connection corridor is assessed within which the grid connection infrastructure will be constructed and operated.
Power line capacity	Up to 132kV single or double circuit
Power line servitude width	Up to 36m
Length of the power line	~4.5 km
Height of the towers	Up to 36m
Collector substation capacity	Up to 132kV
Collector Substation footprint	1.125ha
Access roads/ tracks	Same as Alternative 1
Coordinates Collector Substation (centre)	26° 6'16.37"S, 26° 6'43.32"E
Coordinates of grid corridor	Start: 26° 5'13.81"S26° 8'53.52"E Mid: 26° 6'20.41"S26° 7'49.77"E End: 26° 6'17.51"S 26° 6'41.55"E

2.2.3. *Need and Desirability for the Houthaalboomen Grid Connection Infrastructure*

The construction and operation of the Houthaalboomen grid connection infrastructure is considered to be essential associated infrastructure for the development of the Barleria PV, Dicoma PV, and Setaria PV facilities. The grid connection infrastructure, consisting of a collector substation and a 132kV powerline, will facilitate the evacuation of the electricity generated by the proposed PV facilities, into the national grid via the existing Watershed Substation.

The identified corridor being assessed for the development of the grid connection infrastructure displays characteristics that contribute to the overall desirability. These include:

[3] The confirmed details and dimensions of the Houthaalboomen Grid Connection Infrastructure was assessed as part of the independent specialist studies.

» ***Access to the National Grid*** – This grid connection solution will enable the evacuation of the electricity generated by the three PV facilities to the national grid. The solution eliminates the need for the development of 3 separate power lines in this area. This grid connection solution is also considered to be the shortest feasible connection to the national grid and therefore limits the infrastructure requirements and on-ground disturbance. The Watershed substation is considered to have adequate capacity in order to evacuate the generated electricity into the national grid.

Considering that access to the national grid is readily available through a connection to the Watershed Substation, the opportunity to develop consolidated and shared linear infrastructure and the opportunity to minimise the extent of infrastructure required in order to establish a connection to the national grid, the development of the grid connection infrastructure within the grid connection corridor is identified as desirable.

» ***Geographical and topographical considerations*** – The location of the grid connection infrastructure is considered to be appropriately located as the entire extent of the grid connection corridor is located within the Northern corridor of the Strategic Transmission Power Corridors (refer to **Figure 2.2**) which are identified as areas preferred for the development of grid connection infrastructure.

» ***Consideration of sensitive environmental features*** – Through the assessment of a much larger corridor within which the grid connection infrastructure can be placed, an opportunity has been created by the applicant for the avoidance of sensitive environmental features and areas. The consideration of the grid connection corridor enables the avoidance of the environmental sensitivities, thereby ensuring that the grid connection infrastructure can be appropriately placed without resulting in an unacceptable environmental impact. This consideration is in line with the mitigation strategy and enables the achievement of the objectives of the mitigation hierarchy (i.e. avoid, minimise, mitigate). This application of the mitigation strategy will result in the identification of the optimised placement of the grid connection infrastructure within the grid connection corridor.

The development of the Houthaalboomen Grid Connection within the corridor provides an opportunity through the assessment of a larger grid connection corridor which enables the consideration and avoidance of sensitive environmental features located within the grid connection corridor. This is considered to be desirable for the development.

Considering the receptiveness of the grid connection corridor for the development of the grid connection infrastructure it is identified that there is a definite need and desirability for the construction and operation of the Houthaalboomen Grid Connection within the proposed grid connection corridor.

2.2.4. *Description of Project Alternatives*

Collector Substation Location Alternatives

Two alternative Collector Substation positions are considered as part of this assessment. As the function of the collector substations is to collect the generated power from the three Houthaalboomen solar PV facilities, the locations of the collector substations within the grid connection corridor are dependent on the

locations of the facility on-site substations[4]. Considering the dependency of the collector substation location on the solar PV facility on-site substations, two collector substation location alternatives are being assessed and considered as part of this BA process.

Grid Connection Alternative

Two grid connection corridor alternatives have been identified by the developer. These alternatives both connect the Houthaalboomen Solar developments to the Eskom grid via the Watershed Substation (refer to **Figure 2.2**. The 200m wide power line corridor is shared/common for the bulk of its length, and deviates only to accommodate these two alternative positions for the Collector substation.

This assessment, therefore, considers two alternative grid connection solutions, each with a unique starting point, but both terminating at the Eskom Watershed Substation. Both grid connection corridor alternatives have been fully considered and assessed as part of this BA process and within this BA Report. Grid Connection Corridor Alternative 2 is identified by the developer as the preferred alternative from a technical, financial and construction feasibility perspective.

Design and Layout Alternatives

The design of the collector substation, power lines and other associated infrastructure is required to conform to Eskom's technical standards as it forms part of the national electricity supply network and must fit in seamlessly with the existing network systems, technology and infrastructure. The Houthaalboomen Grid Connection includes a collector substation and a power line to be located within a grid connection corridor 200m wide and 6km in length. The assessment of a grid connection corridor (i.e. a wider area than the required servitude within which the infrastructure will be placed) within the BA process allows for the avoidance and optimisation of identified environmental sensitivities through the appropriate placement of the grid connection infrastructure footprint and the servitude within the preferred grid connection corridor.

Technology Alternative

No technology alternatives exist for the distribution of electricity. Therefore, no technology alternatives are being assessed as part of this BA process.

The do-nothing' Alternative

The 'do-nothing' alternative is the option of Houthaalboomen Grid (Pty) Ltd not constructing the grid connection infrastructure within the grid connection corridor. This would result in no environment or social impacts (positive or negative) as a result of the development of the switching substation, 132kV power line and collector substation within the corridor. This alternative is assessed in detail within Chapter 6 of this BA Report.

[4] The collector substations will collect the generated power from the respective on-site facility substations associated with the respective solar PV facilities.

The main reasons why the 'do-nothing' alternative is not considered as a preferred alternative in relation to Houthaalboomen Grid Connection Infrastructure is related to the fact that the grid connection infrastructure is considered as specific required infrastructure in order to enable the evacuation of the generated power into the national grid from the Houthaalboomen solar PV facilities. Should the 'do-nothing' alternative be implemented for the grid connection infrastructure, it will result in the inability of Houthaalboomen solar PV facilities to efficiently connect to the national grid and therefore result in Houthaalboomen solar PV facilities not being viable for operation.

The option of not developing the grid connection solution required for Houthaalboomen solar PV facilities is not preferred.

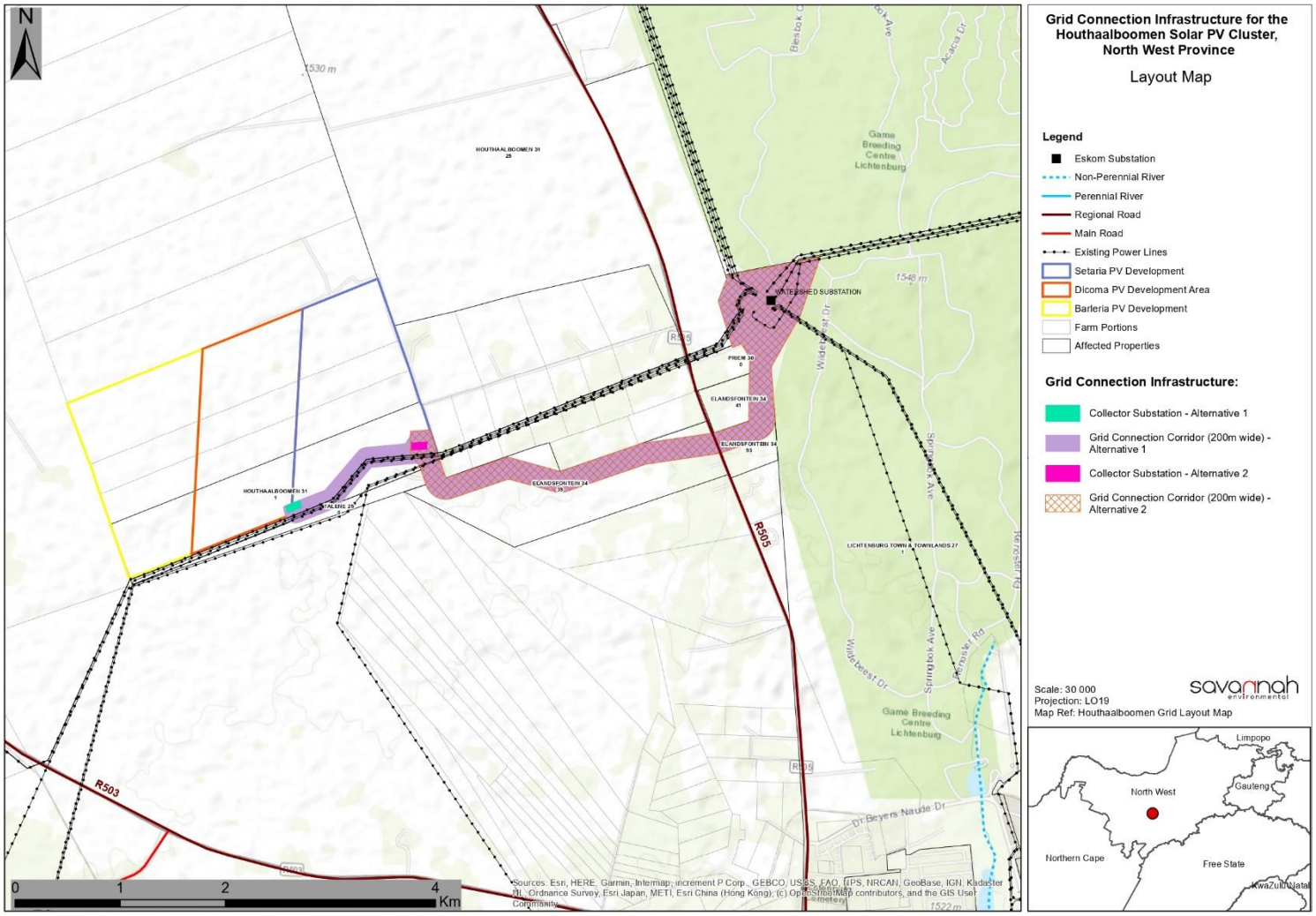

Figure 2.1: Grid connection Alternative 1 and Alternative 2 associated with the Houthaalboomen solar PV facilities. The grid connection infrastructure (collector substation and 132kV power line) will be constructed and operated within the 200m wide corridor

2.2.5 Project Development Phases associated with the Grid Connection Infrastructure for Houthaalboomen Grid Connection

Table 2.2: Details of the grid connection infrastructure development phases (i.e. construction, operation and decommissioning)

Construction Phase	
Requirements	» Duration of the construction phase is expected to be up to 12 months. » Create direct construction employment opportunities. Up to 50 direct employment opportunities will be created during the construction phase. » No on-site labour camps. Employees to be accommodated in the nearby towns such as Lichtenburg and Bakervile and transported to and from site on a daily basis. » Overnight on-site worker presence would be limited to security staff. » Construction waste will be stored on site and waste removal and sanitation will be undertaken by a sub-contractor and will comply with the municipality waste disposal laws. » Where water is required for the construction phase and potable needs, water will be sourced from private service providers.
Construction sequence	Overhead power lines are constructed in the following simplified sequence: » Step 1: Surveying of the development area and negotiating with affected landowners; » Step 2: Final design and micro-siting of the infrastructure based on geo-technical, topographical conditions and potential environmental sensitivities; » Step 3: Vegetation clearance and construction of access roads/tracks (where required); » Step 4: Construction of tower foundations; » Step 5: Assembly and erection of infrastructure on site; » Step 6: Stringing of conductors; » Step 7: Rehabilitation of disturbed areas; » Step 8: Continued maintenance. It is anticipated that the construction of the 132kV power line and associated infrastructure will take up to 12 months to complete. The final definition of the centre line for the power line and co-ordinates of each bend in the line (if applicable) will be determined on receipt of an environmental authorisation of the assessed corridor by the competent authority and after negotiations with landowners and final environmental and technical surveys. Switching substation and Collector substation are constructed in the following simplified sequence: » Step 1: Conduct geotechnical investigations to determine founding conditions; » Step 2: Conduct site survey; » Step 3: Vegetation clearance and construction of access road; » Step 4: Site grading and levelling; » Step 5: Construction of foundations;

	» Step 6: Import and delivery to site of collector substation components; » Step 7: Construction of collector substation; » Step 8: Rehabilitation of disturbed area and protection of erosion sensitive areas; and » Step 9: Testing and commissioning. The footprint of the substations may include administrative buildings required for the operation and management of the substation.
Activities to be undertaken	
Conduct surveys prior to construction	» Including, but not limited to: a geotechnical survey, site survey (including the location of the substations within the grid connection corridor) and confirmation of the power line servitude, and all other associated infrastructure.
Establishment of access roads	» Access roads/tracks to be established within the grid connection corridor (underneath the final confirmed power line route) for construction and/or maintenance activities required. » Access roads/tracks will be established as construction commences at the various locations within the corridor. » Existing access roads will be utilised where possible to minimise impact, and upgraded where required. » Access roads/ tracks will be limited to gravel roads or jeep tracks.
Undertake site preparation	» Including the clearance of vegetation within defined substation footprints and cutline as needed along the final power line route, the establishment of access roads/tracks and excavations for foundations. » Stripping of topsoil to be stockpiled, backfilled, removed from site and/or spread on site. » To be undertaken in a systematic manner to reduce the risk of exposed ground being subjected to erosion. » Include search and rescue of floral species of concern (where required) and the identification and excavation of any sites of cultural/heritage value (where required) along the final power line route and within the substation footprints.
Establishment of laydown areas and batching plant on site	» A laydown area for the storage of grid infrastructure components, including the civil engineering construction equipment. » The laydown area will also accommodate building materials and equipment associated with the construction of buildings. » No borrow pits will be required. Infilling or depositing materials will be sourced from licenced borrow pits within the surrounding areas. » A temporary concrete batching plant of 50m x 50m in extent to facilitate the concrete requirements for grid line and substation foundations and bund areas. Other options include the use of mobile batching plants that allow for *in situ* batching of concrete.
Undertake site rehabilitation	» Commence with rehabilitation efforts once construction is completed in an area, and all construction equipment is removed. On commissioning, access points to the site that will not be required for the operation phase will be closed and prepared for rehabilitation.
<u>Operation Phase</u>	
Requirements	» Duration will be more than 20 years, or longer as needed for the operation of Houthaalboomen PV facilities. » Requirements for security and maintenance of the grid connection infrastructure.

	» Employment opportunities relating mainly to operation activities and maintenance. Very limited employment opportunities will be available[5]. » Current land-use activities, i.e. grazing, can continue in the areas adjacent to the infrastructure.
Activities to be undertaken	
Operation and Maintenance	» Part-time security and maintenance staff, especially for the substations. » Disposal of waste products (e.g. oil) in accordance with relevant waste management legislation. » On-going rehabilitation of those areas which were disturbed during the construction phase. » During this operation phase vegetation within the power line servitude, and around the substations will require management only if it impacts on the safety and operational objectives of the project. » The maintenance of the grid connection infrastructure will be the responsibility of the holder of the Environmental Authorisation.
<u>Decommissioning Phase</u>	
Requirements	» Decommissioning of the Houthaalboomen Grid Connection Infrastructure at the end of its economic life. » Expected lifespan of approximately 20 years (with maintenance) before decommissioning is required. » Decommissioning activities to comply with the legislation relevant at the time.
Activities to be undertaken	
Site preparation	» Confirming the integrity of access to the grid connection infrastructure to accommodate the required equipment. » Mobilisation of decommissioning equipment.
Disassemble components and rehabilitation	» The grid connection infrastructure components will be disassembled and reused and recycled (where possible). » Where components cannot be reused or recycled it will be disposed of in accordance with the regulatory requirements at the time of decommissioning. » Disturbed areas, where infrastructure has been removed, will be rehabilitated, if required and depending on the future land-use of the affected areas and the relevant legislation applicable at the time of decommissioning.

It is expected that the areas affected by the grid connection infrastructure will revert back to its original land-use (i.e. grazing) once the Houthaalboomen PV facilities (and by implication the associated grid connection infrastructure) has reached the end of its economic life and all infrastructure has been decommissioned.

[5] It must be noted that the Houthaalboomen Grid (Pty) Ltd will construct the 132kV power line, however ownership of the line will be transferred to Eskom following the completion of the construction. The operation and maintenance of the line will then be undertaken by Eskom.

CHAPTER 3 REGULATORY AND PLANNING CONTEXT

This chapter provides insight into the policy and legislative context within which the development of the Houthaalboomen PV Cluster Grid Connection will be undertaken. It identifies environmental 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 which may be applicable to or have bearing on the proposed project.

3.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the BA report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 1: Content of Basic Assessment reports:

Requirement	Relevant Section
3(e)(i) 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 have been considered in the preparation of the report	Chapter 4 as a whole provides an overview of the policy and legislative context which is considered to be associated and relevant to the development of the Houthaalboomen PV Cluster Grid Connection. The regulatory and planning context has been considered at international, national, provincial and local level.
3(e)(ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools, frameworks and instruments.	**Tables 3.1, 3.2, 3.3** and **3.4** illustrate the compliance of the proposed solar grid connection solution with the legislation, policies, plans, guidelines, tools, frameworks and instruments.

3.2. Strategic Electricity Planning in South Africa

The regulatory hierarchy of policy and planning documentation that support the development of a 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. 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 proposed development of Houthaalboomen PV Cluster Grid Connection.

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

- ***Department of Forestry, Fisheries and the Environment (DFFE):*** previously known as the Department of Environmental Affairs (DEA), is responsible for environmental policy and is the controlling authority in terms of NEMA and the 2014 EIA Regulations (GNR 326). As per GNR 779 of 01 July 2016, DFFE is the Competent Authority, and is charged with making a decision regarding the granting of the relevant EA for this project based on its association with the Houthaalboomen PV Cluster developments.
- ***South African Heritage Resources Agency (SAHRA):*** SAHRA is a statutory organisation established under the National Heritage Resources Act (No. 25 of 1999) (NHRA), as the national administrative body responsible for the protection of South Africa's cultural heritage.
- ***Department of Water and Sanitation (DWS):*** is responsible for effective and efficient water resources management to ensure sustainable economic and social development. DWS is also responsible for

evaluating and issuing licenses pertaining to water use (i.e. Water Use Licenses (WULs) and / or registration of General Authorisations (GAs)).

- ***Department of Mineral Resources and Energy*** is responsible for minerals and all energy forms and is responsible for forming and approving the IRP (Integrated Resource Plan for Electricity). In addition, approval from the Department may be required to use the land surface contrary to the objects of the Act in terms of Section 53 of the MPRDA (Act No. 28 of 2002). The Act provides that approval is required from the Minister to ensure that proposed activities do not sterilise mineral resources that might occur on site.
- ***The Department of Agriculture, Land Reform and Rural Development:*** DALRRD is dedicated to the Agricultural, social, and economic development of rural South Africa and is responsible for providing a framework for rural and agricultural development.
- ***South African National Roads Agency Limited (SANRAL):*** SANRAL is responsible for the regulation and maintenance of all national roads and routes.
- ***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 IPP projects to generate electricity.

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

- **North West Department of Economic Development, Environment, Conservation and Tourism (NW DEDECT):** DEDECT is the Commenting Authority for the project and is also responsible for issuing any biodiversity and conservation-related permits. DEDECT's involvement relates specifically to sustainable resource management, conservation of protected species and land care.
- ***North West Department of Public Works and Roads (NWDPWR)****:* NWDPWR is responsible for roads and the granting of exemption permits for the conveyance of abnormal loads on public roads.
- ***North West Provincial Heritage Resources Agency (NWPHRA):*** NWPHRA, the North West Provincial Heritage Resources Authority is responsible for the identification, conservation and management of heritage resources, as well as commenting on heritage related issues within the province.
- ***North West Department of Community Safety and Transport Management (NWDCSTM):*** NWDCSTM This Department provides effective co-ordination of crime prevention initiatives, provincial police oversight, traffic management and road safety towards a more secure environment.

At the **Local Level**, the local and district municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. In the North West Province, both the local and district municipalities play a role. The local municipality includes the Ditsobotla Local Municipality which forms part of the Ngaka Modiri Molema District Municipality. In terms of the Municipal Systems Act (Act No 32 of 2000), it is compulsory for all municipalities to go through an Integrated Development Planning (IDP) process to prepare a five-year strategic development plan for the area under their control.

The relevant legislation and policies listed and discussed below are relevant to the Houthaalboomen PV Cluster Grid Connection project and the Houthaalboomen PV Cluster development, which comprises of three individual solar PV facilities (assessed as part of separate Basic Assessment Processes).

3.3. Policy and Planning Considerations on International, National, Provincial and Local Levels

3.3.1. Policy and Planning on an International Level

South Africa has committed to various international policies which relate to environmental concerns, specifically that of climate change and global warming. **Table 3.1** below provides a summary of the

international policies and plans that South Africa has made commitments towards, and how the development of the Houthaalboomen PV Cluster Grid Connection aligns with the thinking or commitments of these agreements.

Table 3.1: International policies and plans relevant to the Houthaalboomen Grid Connection

Policy or Plan	Is the development of the Houthaalboomen PV Cluster Grid Connection aligned with this policy or plan?
The Kyoto Protocol, 1997	Yes. The protocol calls for the reduction of South Africa's greenhouse gas emissions through actively cutting down on using fossil fuels, or by utilising more renewable resources. The development of the Houthaalboomen PV Cluster Grid Connection will enable the evacuation of additional capacity to the renewable energy sector of the country and strengthen the commitment and action plan to achieve the requirements as set out in the protocol.
United Nations Framework Convention on Climate Change and COP21 – Paris Agreement	Yes. South Africa supports the adoption of the Paris Agreement which has the main objective of addressing the climate change issue and marks the first international political response to climate change. South Africa has set out a goal of 17GW of renewable energy by 2030 within the IRP of 2019. Through the development of renewable energy projects additional renewable energy will be made available to the country, which in turn will demonstrate the contribution that South Africa is making to the global response to climate change specifically relating to the development of the renewable energy sector. The development of the proposed solar PV grid connection is required in order to enable the evacuation of the solar power from the Houthaalboomen PV Cluster plants to the national grid.
The Equator Principles III, June 2013	Yes. The Equator Principles (EPs) III constitute a financial industry benchmark used for determining, assessing, and managing a project's environmental and social risks. The EPs are primarily intended to provide a minimum standard for due diligence to support responsible risk decision-making. The EPs are applicable to large infrastructure projects and apply globally to all industry sectors. In terms of the EPs, South Africa is a non-designated country, and as such the assessment process for projects located in South Africa evaluates compliance with the applicable IFC Performance Standards on Environmental and Social Sustainability and Environmental Health and Safety (EHS) Guidelines. The Houthaalboomen PV Cluster Grid Connection is currently being assessed in accordance with the requirements of the 2014 EIA Regulations, as amended (GNR 326), published in terms of Section 24(5) of the National Environmental Management Act (No. 107 of 1998) (NEMA), which is South Africa's national legislation providing for the authorisation of certain controlled activities. Through this assessment, all potential social and environmental risks are identified and assessed, and appropriate mitigation measures proposed.
International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability, January 2012	Yes. The overall objectives of the IFC performance standards are to fight poverty, do no harm to people or the environment, fight climate change by promoting low carbon development, respect human rights, promote gender equality, provide information prior to project development, collaborate with the project developer in order to achieve the performance standard, provide advisory services and notify countries of trans boundary impacts. When considering the development of the grid connection infrastructure associated with the development of the Houthaalboomen PV Cluster Development the following performance standards are anticipated to be applicable at this stage of the BA process: » *Performance Standard 1:* Assessment and Management of Environmental and Social Risks and Impacts

Policy or Plan	Is the development of the Houthaalboomen PV Cluster Grid Connection aligned with this policy or plan?
	» *Performance Standard 2:* Labour and Working Conditions » *Performance Standard 3:* Resource Efficiency and Pollution Prevention » *Performance Standard 4:* Community Health, Safety and Security » *Performance Standard 6:* Biodiversity Conservation and Sustainable Management of Living Natural Resources » *Performance Standard 8:* Cultural Heritage

3.3.2. Policy and Planning on a National Level

National policies and plans adopted by South Africa, which are considered to be relevant to the development of Houthaalboomen PV Cluster Grid Connection have been summarised in **Table 3.2**.

Table 3.2: National policies, plans and legislation relevant to the grid connection infrastructure for the Houthaalboomen PV Developments

Policy, Plan or Legislation	Is the development of the Houthaalboomen PV Cluster Grid Connection aligned with this policy, plan or legislation?
Constitution of the Republic of South Africa, 1996	Yes. Section 24 of the Constitution pertains specifically to the environment. It states that Everyone has the right to an environment that is not harmful to their health or well-being, and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. The Constitution outlines the need to promote social and economic development. Section 24 of the Constitution therefore requires that development be conducted in such a manner that it does not infringe on an individual's environmental rights, health, or well-being. This is especially significant for previously disadvantaged individuals who are most at risk to environmental impacts.
National Environmental Management Act (No. 107 of 1998) (NEMA)	Yes. South Africa's environmental legislation sets the framework for environmental management in South Africa. NEMA is founded on the principle that everyone has the right to an environment that is not harmful to their health or well-being as contained within the Bill of Rights. The national environmental management principles states that the social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed, evaluated, and decisions must be appropriate in the light of such consideration and assessment. The need for responsible and informed decision-making by government on the acceptability of environmental impacts is therefore enshrined within NEMA
The National Energy Act (2008)	Yes. One of the objectives of the Act is to promote the diversity of the supply of energy and its sources. In this regard, the preamble makes direct reference to renewable resources and states that provision must be made for increased generation and consumption of renewable energies. The development of the Houthaalboomen PV Cluster Grid Connection enables the evacuation of renewable power into the national grid and thereby promotes diversity of supply of energy and the source of supply, in line with the Act's objectives.
White Paper on the Energy Policy of South Africa, 1998	Yes. The South African Energy Policy of 1998 identifies five key objectives, namely increasing access to affordable energy services, improving energy sector governance, stimulating

Policy, Plan or Legislation	Is the development of the Houthaalboomen PV Cluster Grid Connection aligned with this policy, plan or legislation?
	economic development, managing energy related environmental impacts and securing supply through diversity. In order to meet these objectives South Africa needs to optimally use available energy resources. The development of the Houthaalboomen PV Cluster Grid Connection will enable the contribution, albeit only to a limited extent, to the achievement of the five objectives of the Energy Policy of the country.
White Paper on the Renewable Energy Policy of the Republic of South Africa (2003)	Yes. This White Paper fosters the uptake of renewable energy in the economy and has a number of objectives that need to be met, including those equitable resources are invested in renewable technologies. South Africa is also endowed with renewable energy resources that can be sustainable alternatives to fossil fuels. The development of additional renewable energy projects (including Houthaalboomen PV Cluster) will promote the use of the abundant South African renewable energy resources and contribute to long-term energy security and diversification of the energy mix. The development of the grid connection infrastructure enables the evacuation of the generated power into the national grid and thereby enables the use of renewable energy technologies for the country.
The Electricity Regulation Act, 2006 (Act No. 4 of 2006), as amended	Yes. The Act establishes a national regulatory framework for the electricity supply industry of the country and introduces the National Energy Regulator of South Africa (NERSA) as the custodian and enforcer of the National Electricity Regulatory Framework. The Act also provides for licences and registration as the manner in which generation, transmission, distribution, trading and the import and export of electricity are regulated. The developer of the Houthaalboomen PV Cluster projects will have to ensure compliance with this Act for the distribution of the generated power into the national grid.
Renewable Energy Policy in South Africa	Yes. Support for the Renewable Energy Policy is guided by a rationale that South Africa has a very attractive range of renewable energy 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. However, the National Energy Policy acknowledges that the development and implementation of renewable energy applications has been largely neglected in South Africa. Challenges regarding the implementation of renewable energy have been identified. Through the development of renewable energy projects (including the Houthaalboomen PV Cluster Solar developments and the Houthaalboomen PV Cluster PVs Grid Connection), additional renewable energy will be made available which will assist with the further growth and development of the renewable energy sector. The development of the grid connection infrastructure enables the evacuation of the generated power into the national grid and thereby enables further growth and development of the renewable energy sector.
National Development Plan (NDP)	Yes. The NDP aims at eliminating poverty and reducing inequality by 2030 and 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 plan also 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 the primary-energy needs, while gas and renewable energy resources – especially wind, solar and imported hydroelectricity – will play a much larger role. Through the development of renewable energy projects (including the Houthaalboomen PV Cluster developments and the associated Houthaalboomen PV Cluster Grid Connection) additional renewable energy will be available which will assist in expanding the renewable energy sector of the country and add to the diversification of

Policy, Plan or Legislation	Is the development of the Houthaalboomen PV Cluster Grid Connection aligned with this policy, plan or legislation?
	the energy mix, which is moving away from coal and towards the use of gas and renewable energy.
Integrated Energy Plan (IEP)	Yes. 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. Eight key objectives were identified which relate mainly to the security, cost, access, diversity, efficiency, impact in terms of emissions, conservation and social benefits in terms of energy planning. The IEP recognises the potential of renewable energy for power generation. With the additional renewable energy to be generated by the Houthaalboomen PV Cluster and to be evacuated to the national grid via the proposed grid connection infrastructure, a contribution to this objective will be made. Also, with the development of the Houthaalboomen PV Cluster Development and the proposed grid connection infrastructure, the eight key objectives in terms of energy planning will be met, even if only to a limited extent.
Integrated Resource Plan (IRP) 2010 - 2030	Yes. The Integrated Resource Plan (IRP) for Electricity 2010 – 2030 constitutes a subset of the IEP and is South Africa's national electricity plan. The document outlines the proposed generation new-build fleet for South Africa. The adopted scenario was derived based on a 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. The IRP essentially drives the assortment of energy to be implemented for South Africa which is known as the energy mix of the country, considering various generation technologies. The plan includes 17.8GW of renewables, 9.6GW of nuclear; 6.25GW of coal, and approximately 8.9GW of other generation sources such as hydro, and gas. The development of the proposed grid connection infrastructure enables the evacuation of the generated power from the Houthaalboomen PV Cluster into the national grid and thereby contributes to the energy mix of the country as set out in the IRP.
Strategic Integrated Projects (SIP)	Yes. 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. The development of the Houthaalboomen PV Cluster Grid Connection solution will support the Strategic Integrated Projects within one SIP, which relates to the development of the associated infrastructure. This is known as SIP 10 – electricity transmission and distribution for all. In support of SIP 10, the Department of Environmental Affairs undertook a Strategic Environmental Assessment (SEA) which aims to provide guidance for the efficient and sustainable expansion of strategic electricity grid infrastructure in South Africa. This SEA identified the optimal location for strategic corridors where transmission infrastructure expansion is needed to enable the balancing of future demand and supply requirements, while minimising negative impacts to the environment. These areas are referred to as Power Corridors and were gazetted within GNR113 of February 2018. The grid connection corridor proposed for the development of the grid connection infrastructure is located within the Northern Transmission Corridor and is therefore considered to be in line with national planning in this regard.
New Growth Path (NGP) Framework, 2010	Yes. The purpose of the New Growth Path (NGP) Framework is to provide effective strategies towards accelerated job-creation through the development of an equitable economy and sustained growth. The target of the NGP is to create 5 million jobs through the green economy. With economic growth and employment creation as the key

Policy, Plan or Legislation	Is the development of the Houthaalboomen PV Cluster Grid Connection aligned with this policy, plan or legislation?
	indicators identified in the NGP. To achieve this, government will seek to, amongst other things, identify key areas for large-scale employment creation, as a result of changes in conditions in South Africa and globally, and to develop a policy package to facilitate employment creation in these areas. The Houthaalboomen PV Cluster Grid Connection solution will assist with the creation of both temporary and permanent employment opportunities during the construction and operation phases, which will contribute, albeit to a limited extent, to the economy and sustainable growth.
National Climate Change Response Strategy	Yes. This strategy aims to address issues identified as priorities for dealing with climate change in the country. The focus of the strategy is adapting to climate change; developing a sustainable energy programme; adopting an integrated response by the relevant government departments; compiling inventories of greenhouse gases; accessing and managing financial resources; and research, education, and training. The development of the Houthaalboomen PV Cluster Grid Connection (through the Houthaalboomen PV Cluster) will enable additional uptake of renewable energy into the national grid which will reduce the need for the use of coal as an energy resource and thereby assist in addressing climate change and global warming.
Climate Change Bill, 2018	Yes, with limited relevance. The Bill provides a framework for climate change regulation in South Africa aimed at governing South Africa's sustainable transition to a climate resilient, low carbon economy and society. The Bill provides a procedural outline that will be developed through the creation of frameworks and plans. The bill aims to provide for the coordinated and integrated response to climate change and its impacts, provide effective management of inevitable climate change impacts and to make a fair contribution to the global effort to stabilise greenhouse gas concentrations. The Houthaalboomen PV Cluster Grid Connection relates only to the evacuation of renewable energy into the national grid and would therefore not result in the generation or release of emissions during its operation.

3.3.3. Policy and Planning at a Provincial Level

Policies and plans have been adopted by the North West Province for the management of the area and are considered to be relevant to the development of the Houthaalboomen PV Cluster Grid Connection solution. **Table 3.3** provides a summary of the relevant provincial plans and policies.

Table 3.3: Provincial policies and plans relevant to the Houthaalboomen PV Cluster Grid Connection

Policy or Plan	Is the development of the Houthaalboomen PV Cluster Grid Connection aligned with this policy or plan?
North West Provincial Development Plan (PDP), 2013 (updated 2017/2022)	The North West Provincial Development Plan (PDP) 2013 (updated 2017/2022) states that the overarching objective, is to overcome certain obstacles relating to the current infrastructure by introducing renewable energy together with energy conservation and efficiency strategies. Furthermore, this will craft a better tomorrow and ensure that underdevelopment, poverty, and inequality is fully addressed in the North West Province. The overall energy objective for the province also includes promoting the development of renewable energy supply schemes which are considered to be strategically important for increasing the diversity of domestic energy supply and avoiding energy imports, while also minimising the detrimental environmental impacts. The implementation of sustainable renewable energy is also to be

	promoted within the province through appropriate financial and fiscal instruments. With the developed and proposed independent power producer capacity (including the Barleria PV facility), the province will produce its own electrical power needs from renewable energy resources (although this energy will be fed into the national grid).
North West Province Spatial Development Framework (SDF) (2016) – Published 2017	The Spatial Development Framework (SDF) addresses the need for spatial planning, socio-economic development, infrastructure and conservation of natural resources. Key socio-economic issues which would require strategic planning provision include: employment (including youth and women); poverty eradication; attracting investment; economic growth; HIV / AIDS and other diseases; food security; physical infrastructure (including availability of industrial land); illiteracy; tourism development; population growth, urbanization and migration. Natural resource issues include inadequate water resources for future development; bush encroachment and alien invasive species; land and soil degradation; and overgrazing. With regard to spatial planning, the legacies of Apartheid-era policy is identified as a key issue and residents of the North West are consequently extremely underdeveloped. As per the North West Provincial Spatial Development Framework (PSDF) (2017) electricity within the province is primarily provided by Eskom to re-distributors – mainly municipalities (10%), commercial (5%), agriculture (5%), mining (30%), industrial (30%) and Residential (20%). According to the North West PSDF the proposed project site is located within the Mahikeng Distribution Area, which is characterised by minor developments, including Commercial, Industrial, and Major Electrification; and has a projected growth of 125MW (Eskom, 2015). Eskom's Transmission Development Plan 2015 – 2024 represents the transmission network infrastructure investment requirements over the 10-year period between 2015 and 2024. Projects proposed for the North West Province for the next 10 years include the introduction of 400kV power lines and transformation to support or relieve the existing networks. Five transmission power corridors have been identified as critical to providing a flexible and robust network that could respond to meet the needs of future IPPs and IRP requirements. The development of the proposed PV facility and its associated grid connection infrastructure will contribute to economic growth and development, which will in turn help eradicate poverty through job creation and skills development in the region which will be in line with the North West SDF.
Renewable Energy Strategy for the North West Province (2012)	In 2012 the North West Province's then Department of Economic Development, Environment, Conservation and Tourism (DEDECT) developed the Renewable Energy Strategy for the North West Province. The strategy was developed in response to the need of the North West Province to participate meaningfully within South Africa's

RE sector. The RE strategy aims to improve the North West Province's environment, reduce its contribution to climate change, and alleviate energy poverty, while promoting economic development and job creation whilst developing its green economy.

According to the strategy in the North West Province consumes approximately 12% of South Africa's available electricity, and is rated as the country's fourth largest electricity consuming province. This is mainly due to the high demand of the electrical energy-intensive mining and related industrial sector, with approximately 63% of the electricity supplied to the province being consumed in its mining sector.

While the strategy recognises that South Africa has an abundance of RE resources available, it is cognisant of the fact that the applicability of these RE resources depend on a number of factors and as a result are not equally viable for the North West Province. The RE sources that were identified to hold the most potential and a competitive strength for the North West Province are Solar Energy (photovoltaic as well as solar water heaters), Municipal Solid Waste, hydrogen and fuel cell technologies, bio-mass, and energy efficiency.

The advantages and benefits for the North West Province associated with the implementation and use of RE technologies include:

- Provision of energy for rural communities, schools and clinics that are far from the national electricity grid.
- Creation of an environment where access to electricity provides rural communities with the opportunity to create an economic base via agricultural and home-based industries and Small, Medium and Micro Enterprises (SMMEs) in order to grow their income-generating potential.
- The supply of water within rural communities.
- It would result in less time taken for the collection of wood and water, thus improving the quality of life within communities and specifically for women.
- Improved health through the reduced use of fuelwood as energy source for cooking and heating that causes respiratory and other hazards.
- Solar water heating for households in urban and rural settings, reducing the need for either electricity (in urban settings) and fuelwood (in rural settings) to heat water, thus lowering our National peak demand and conservation of woodlands in a sustainable manner.
- Large-scale utilisation of renewable energy will also reduce the emissions of carbon dioxide, thus contributing to an improved environment.
- The fact that RE go hand-in-hand with energy efficiency, it will result in additional financial benefit and the need for smaller RE systems.

	» The development of a strong localised RE industry within the NWP holds substantial potential for Black Economic Empowerment (BEE) and job creation within the Province. » The establishment of a strong RE base in the North West Province, especially in the manufacturing of fuel cells could stimulate the market for Platinum Group Metals (PGM), which would in turn help the local mining sector. This is due to RE sources having considerable potential for increasing security of supply by diversifying the energy supply portfolio and increasingly contributes towards a long-term sustainable energy future. In terms of environmental impacts, RE results in the emission of less GHGs than fossil fuels, as well as fewer airborne particulates, and other pollutants. Furthermore, RE generation technologies save on water consumption in comparison with coal-fired power plants.
North West Provincial Growth and Development Strategy (PGDS) 2004-2014	Goals and objectives of the North West Provincial Growth Development Strategy are to fight poverty and unemployment, improve the low level of expertise and skills which are classified as both immediate and long-term goals and require primary goals for sustained growth and economic development. The proposed facility will contribute to employment creation and skills development which is in line with the goals and objectives of the North West PGDS. The North West Provincial Growth Development Strategy aims at building a sustainable economy to eradicate poverty and improve social development. The proposed Grid infrastructure will contribute to growth and development of the local area by expanding the economic base and creating employment opportunities.

3.3.3. Policy and Planning on a District and Local Level

Strategic policies at the district and local level have similar objectives for the respective areas, namely the delivery of basic services, including the provision of electricity. The development of the proposed grid connection infrastructure is considered to align with the aims of these policies.

Table 3.4 below provides a summary of the district and local level policies and plans considered to be relevant to the development of the Houthaalboomen PV Cluster Grid Connection.

Policy or Plan	Is the development of the Houthaalboomen PV Cluster Grid Connection aligned with this policy or plan?
Ngaka Modiri Molema District Municipality Integrated Development Plan (IDP), 2017-2022	The vision of the Ngaka Modiri Molema District Municipality as contained within its IDP 2017 – 2022 can be summarised as follows: "Leaders in integrated municipal governance". The vision of the Ngaka Modiri Molema District Municipality is: "To provide a developmental municipal governance system for a better life for all". In recognition of its vision and mission, the Ngaka Modiri Molema District Municipality has adopted the following strategic development goals for the District: » Institutional Transformation and Organisational Development.

<table>
<tr><th>Policy or Plan</th><th>Is the development of the Houthaalboomen PV Cluster Grid Connection aligned with this policy or plan?</th></tr>
<tr><td></td><td>» Provision of Infrastructure for Basic Service Delivery.
» Economic Development.
» Financial Viability.
» Good Governance.

With regards to “Economic Development”, the following additional strategic objectives have been identified:
» To facilitate economic development by creating a conducive environment for business development.
» Unlock opportunities to increase participation amongst all sectors of society in the mainstream economy to ultimately create decent job opportunities.
» To promote Local Economic Development
» To enhance rural development and agriculture
» To Expand Public Works Programme

The implementation of Houthaalboomen PV facility would therefore contribute positively towards local economic development, as well as the creation of new job opportunities within the Ngaka Modiri Molema District Municipality.</td></tr>
<tr><td>Ditsobotla Local Municipality Integrated Development Plan (IDP), 2017 – 2018 and draft reviewed 2020-2021</td><td>The vision statement for the Ditsobotla LM as contained within the IDP 2017 – 2018 is as follows:

“A developmental municipality dedicated to the social and economic upliftment of its communities.”

The Mission Statement of the Ditsobotla LM is as follows:

“Sustainable service delivery through: transparent administration, dedicated staff, implementation of municipal programmes, and consultation with communities.”

The following key issues and objectives have been identified for the Ditsobotla LM:

<table>
<tr><th>Key issues</th><th>Key objectives</th></tr>
<tr><td>The municipality’s financial position is poor due to inadequate capacity as well as poor finance management controls / systems.</td><td>A fully capacitated municipal administration capable of developing and implementing effective financial controls.</td></tr>
<tr><td>The organisational design does not respond to service delivery challenges. There is no adequate capacity in technical functions of the municipality.</td><td>Capacitated institution structured in a way that enables efficient and effective service delivery.</td></tr>
<tr><td>High levels of poverty and unemployment, skills shortage, and inequalities within the Ditsobotla LM.</td><td>Create an environment conducive for economic growth, sustainable employment opportunities and growth in personal income levels of communities.</td></tr>
<tr><td>Backlogs in the provision of social services, infrastructure, service delivery and economic opportunities.</td><td>A well-structured Ditsobotla LM able to support sustainable human settlement and enable residents meets their social and economic needs.</td></tr>
</table>
</td></tr>
</table>

Policy or Plan	Is the development of the Houthaalboomen PV Cluster Grid Connection aligned with this policy or plan?
	The implementation of Houthaalboomen PV Cluster would contribute towards addressing the Ditsobotla Local Municipality key issue regarding high levels of poverty and unemployment, skills shortage, and inequalities, through the creation of employment opportunities, the provision of skills training opportunities, and local economic growth, including growth in personal income levels of those community members who would be employed on the project. In addition, the REIPPP Programme requires preferred bidders to make minimum contributions towards local economic development and social upliftment, to be focused on benefitting local communities within the vicinity of the project site.

CHAPTER 4: APPROACH TO UNDERTAKING THE BA PROCESS

In terms of the EIA Regulations of December 2014 (amended in April 2017) published in terms of the NEMA (Act No. 107 of 1998) as amended, the Houthaalboomen Grid Connection triggers listed activities requiring environmental authorisation.

The BA process aims at identifying and describing potential environmental issues associated with the Houthaalboomen grid connection. In order to ensure that a comprehensive assessment is provided to the competent authority and I&APs regarding the impacts of development of the grid connection, detailed independent specialist studies were undertaken as part of the BA process.

During the undertaking of the BA process, South Africa was subjected to the spread of COVID-19 throughout the country which led to the declaration and enforcing of Government Gazette 43096 which placed the country in a national state of disaster limiting the movement of people to curb the spread of the virus. Considering the limitations experienced during this time a comprehensive consultation process was designed and implemented to cater for the undertaking of a full-scale, innovative public participation process which included I&APs, the competent authority, directly impacted landowners/occupiers, adjacent landowners/occupiers, relevant Organs of State departments, ward councillors and other key stakeholders. This chapter serves to outline the process that was followed during the BA process.

4.1 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the BA Report includes the following information required in terms of Appendix 1: Content of the BA Report:

Requirement	Relevant Section
3(d)(i) a description of the scope of the proposed activity, including all listed and specified activities triggered and being applied for.	All listed activities triggered as a result of the development of the grid connection infrastructure have been included in section 4.2, **Table 4.1**. The specific project activity relating to the relevant triggered listed activity has also been included in **Table 4.1**.
3(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.	The details of the public participation process undertaken for the grid connection infrastructure have been included and described in section 4.3.2.
3(h)(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.	All comments raised during the 30-day review and comment period of the BA Report and through on-going consultation with I&APs will be included as part of a C&R report to be submitted with the Final BA. to be submitted as part of the Final BA Report to Department of Forestry, Fisheries and the Environment (DFFE) for decision-making.
3(h)(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.	The methodology used to assess the significance of the impacts of the grid connection infrastructure has been included in section 4.4.

Requirement	Relevant Section
(o) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed.	The assumptions and limitations of the BA process being undertaken for the Houthaalboomen Grid connection is included in section 4.5.

4.2 Relevant legislative permitting requirements

The legislative permitting requirements applicable to the development of the Houthaalboomen Grid Connection as identified at this stage in the process, are described in more detail under the respective sub-headings:

4.2.1 National Environmental Management Act (No. 107 of 1998) (NEMA)

NEMA is South Africa's key piece of national environmental legislation that provides for the authorisation of certain controlled activities known as "listed activities". In terms of Section 24(1) of NEMA, the potential impact on the environment associated with listed activities must be considered, investigated, assessed and reported on to the competent authority (the decision-maker) charged by NEMA with granting of the relevant EA.

The need to comply with the requirements of the EIA Regulations published under NEMA ensures that developers are provided the opportunity to consider the potential environmental impacts of their activities early in the project development process, and also allows for an assessment to be made as to whether environmental impacts can be avoided, minimised or mitigated to acceptable levels. Comprehensive, independent environmental studies are required to be undertaken in accordance with the EIA Regulations to provide the competent authority with sufficient information in order for an informed decision to be taken regarding the project.

The BA process being conducted for the grid connection infrastructure is being undertaken in accordance with Section 24 (5) of NEMA. Section 24 (5) of NEMA pertains to Environmental Authorisations (EAs), and requires that the potential consequences for, or impacts of, listed or specified activities on the environment be considered, investigated, assessed, and reported on to the competent authority. Listed Activities are activities identified in terms of Section 24 of NEMA which are likely to have a detrimental effect on the environment, and which may not commence without an EA from the competent authority subject to the completion of an environmental assessment process (either a Basic Assessment (BA) or full Scoping and EIA).

Table 4.1 details the listed activities in terms of the EIA Regulations of December 2014 (as amended) that apply to the development of the grid connection infrastructure, and for which an Application for Environmental Authorisation has been submitted. The table also includes a description of the specific project activities that relate to the applicable listed activities.

Table 4.2: Listed activities as per the EIA regulations that are triggered by the Houthaalboomen Grid Connection

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Describe each listed activity as per the project description
GN 327, 08 December 2014 (as amended on 07 April 2017)	11(i)	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. ***Grid connection infrastructure consisting of a collector substation (Houthaalboomen Collector Substation) and a 132kV power line to connect the Houthaalboomen PV cluster to the Eskom electricity grid. The grid connection corridor is located outside an urban area.***
GN R327, 08 December 2014 (as amended on 07 April 2017)	14	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic meters or more but not exceeding 500 cubic meters. ***The development of the collector substation will require the construction and operation of facilities and infrastructure for the storage and handling of dangerous goods (combustible and flammable liquids, such as oils, lubricants, solvents) such storage will occur inside containers with a combined capacity exceeding 80 cubic meters but not exceeding 500 cubic meters.***
GN 327, 08 December 2014 (as amended on 07 April 2017)	27(i)	The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation except where such clearance of indigenous vegetation is required for the undertaking of a linear activity. ***The development of the collector substation will require the clearance of >1~1.125 ha of indigenous vegetation.***
GN 327, 08 December 2014 (as amended on 07 April 2017)	28(i)	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare. The proposed grid connection infrastructure (i.e. the collector substation / switching station and the overhead powerline to the Watershed MTS) is considered commercial / industrial use and will have a cumulative footprint that will exceed 1 ha.
GNR 327 (LN1)	56(ii)	The widening of a road by more than 6 m, or lengthening of a road by more than 1 km –

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Describe each listed activity as per the project description
		(ii) where no reserve exists, where the existing road is wider than 8 metres; Existing roads may require widening of up to 6m and/or lengthening by more than 1km, to accommodate the movement of heavy vehicles and cable trenching activities.
GNR 324 (LN3	4h(iv)	The development of a road wider than 4 metres with a reserve less than 13,5 metres. **h. North West** (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; The development of the Houthaalboomen grid connection will require the development of roads wider than 4m within ESA areas.
GN 324, 08 December 2014 (as amended on 07 April 2017)	10 (h) (iv)	The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres **h. North West** (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; ***The development of the collector substation will require the storage and handling of a dangerous good with a capacity of 80 cubic meters within ESAs areas.***
GN 324, 08 December 2014 (as amended on 07 April 2017)	12 (h) (iv)	The clearance of an area of 300 square metres or more of indigenous vegetation **h. North West** iv. Within critical biodiversity areas identified in systematic biodiversity plan adopted by the competent authority ***The clearance of more than 300m2 will be required for the construction of the grid connection infrastructure. The site is located within critical biodiversity areas as identified in the North West Province bioregional plans.***
GNR 324 (LN3	18h(v)	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. **h. North West**

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Describe each listed activity as per the project description
		(v) Within critical biodiversity areas identified in systematic biodiversity plan adopted by the competent authority The development of the Houthaalboomen grid connection and associated infrastructures may require the widening of a road by more than 4metres, outside urban areas and within areas classified as ESA.

4.2.2 National Water Act (No. 36 of 1998) (NWA)

In accordance with the provisions of the National Water Act (No. 36 of 1998) (NWA), all water uses must be licensed with the Competent Authority (i.e. the Regional Department Water and Sanitation). Water use is defined broadly and includes taking and storing water activities that reduce stream flow, waste discharges and disposals, controlled activities (activities that impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation.

In terms of the NFEPA (2011) and the NBAs 2018 National Wetlands Map 5 no wetlands or watercourse features are located within the project site as well as within the 500m regulated area of a wetland. It has been concluded that no surface freshwater resource features will be impacted by the Houthaalboomen grid development and as such no assessment relating to the freshwater resource features is necessary.

The study area is situated approximately 7.4 km north west of the Klein Harts River and other tributaries of the Harts River, which forms the most important surface hydrological feature of the region. Generally surface water within the Lichtenburg area is scarce with very few of the watercourses or pans having perennial water.

In terms of the NFEPA (2011) and the SANBI 2018 spatial database no wetlands or freshwater/watercourse features are located within the project site and within the 500m regulated area. Following a desktop mapping exercise and a screening site-visit it was confirmed that no freshwater resource features are located within the project site or within close proximity to the site

4.2.3 National Heritage Resources Act (No. 25 of 1999) (NHRA)

The National Heritage Resources Act (No. 25 of 1999) (NHRA) provides an integrated system which allows for the management of national heritage resources and to empower civil society to conserve heritage resources for future generations. Section 38 of NHRA provides a list of activities which potentially require the undertaking of a Heritage Impact Assessment.

<u>Section 38: Heritage Resources Management</u>

1). Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as –

a. the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
b. the construction of a bridge or similar structure exceeding 50m in length;
c. any development or other activity which will change the character of a site –
i). exceeding 5 000m² in extent; or
ii). involving three or more existing erven or subdivisions thereof; or
iii). involving three or more erven or divisions thereof which have been consolidated within the past five years; or
iv). the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;

Must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

In terms of Section 38(8), approval from the heritage authority is not required if an evaluation of the impact of a development on heritage resources is required in terms of any other legislation (such as NEMA), provided that the consenting authority ensures that the evaluation of impacts fulfils the requirements of the relevant heritage resources authority in terms of Section 38(3) and any comments and recommendations of the relevant resources authority with regard to such development have been taken into account prior to the granting of the consent. However, should heritage resources of significance be affected by the Houthaalboomen Grid Connection, a permit is required to be obtained prior to disturbing or destroying such resources as per the requirements of Section 48 of the NHRA, and the SAHRA Permit Regulations (GNR 668).

4.3 Overview of the Basic Assessment Process for the Houthaalboomen Grid Connection

Key tasks undertaken for the BA included:

- Consultation with relevant decision-making and regulating authorities (at National, Provincial and Local levels).
- Submission of the completed Application for Environmental Authorisation to the competent authority (i.e. DFFE) in terms of Regulations 5 and 6 of the EIA Regulations, 2014 (GNR 326), as amended.
- Undertaking a public participation process in accordance with Chapter 6 of GNR326, and the Department of Environmental Affairs (2017), Public Participation guidelines in terms of the NEMA EIA Regulations, Department of Environmental Affairs, Pretoria, South Africa (hereinafter referred to as "the Guidelines") in order to identify issues and concerns associated with the proposed project.
- Undertaking of independent specialist studies in accordance with Appendix 6 of the EIA Regulations, 2014 (GNR326), as amended.
- Preparation of a BA Report in accordance with the requirements of Appendix 1 of GNR325.
- Preparation of EMPrs through the use of the Generic Environmental Management Programmes (EMPrs) for the development and expansion of overhead electricity transmission and distribution infrastructure and substation infrastructure for the transmission and distribution of electricity. This is in line with GNR 435 of March 2019.
- 30-day public and authority review period of the BA Report.

» Compilation of a C&R report detailing the comments raised by I&APs prior to and during the 30-day review period of the BA Report, addressing these comments in detail and finalisation of the BA Report.
» Submission of a final BA Report to the DFFE for review and decision-making.

The tasks are discussed in detail in the sub-sections below.

4.3.1. Authority Consultation and Application for Authorisation in terms of the 2014 EIA Regulations (as amended)

In terms of GN R779 of 01 July 2016, the National Department of Environmental Affairs (DEA), now known as Department of Forestry, Fisheries and Environment (DFFE) has been determined as the Competent Authority for all projects that relate to the Integrated Resource Plan for Electricity (IRP) 2010 – 2030, and any updates thereto. As the Houthaalboomen Grid Connection solution is necessary associated infrastructure for the Houthaalboomen PV Cluster developments, the DFFE will be the competent authority. Through the decision-making process, the DFFE will be supported by the North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT) as a commenting authority.

Consultation with the regulating authorities (i.e. DFFE and DEDECT), as well as with all other relevant Organs of State, will continue throughout the BA process. To date, this consultation has included the following:

» Submission of a Pre-Application Meeting request with DFFE on 20 April 2022. Following submission of the pre-application form, a case officer has been allocated, and no pre-application meeting was considered necessary (refer to **Appendix C9**).
» Submission of the BA Report for review and comment by:
  * The competent and commenting authorities.
  * State departments that administer laws relating to a matter affecting the environment relevant to an application for Environmental Authorisation.
  * Organs of State that have jurisdiction in respect of the activity to which the application relates.

A record of all authority correspondence undertaken during the BA process is included in **Appendix B**.

4.3.2. Public Participation Process

Public Participation is an essential and regulatory requirement for an environmental authorisation process and is guided by Regulations 41 to 44 of the EIA Regulations 2014 (GNR 326) (as amended). The purpose of public participation is clearly outlined in Regulation 40 of the EIA Regulations 2014 (GNR 326) (as amended) and is being followed for this project.

The benefit to the stakeholder is that all information relevant to application has been made available for review, and not only for comments to be raised across the application at one time, but also provided a complete picture of the potential for impacts and/or benefits related to the project located in close proximity to one another.

The sharing of information forms the basis of the public participation process and offers the opportunity for I&APs to become actively involved in the BA 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 the BA process in the following ways:

During the BA process:
- provide an opportunity to submit comments regarding the project;
- assist in identifying reasonable and feasible alternatives;
- contribute relevant local information and knowledge to the environmental assessment;
- allow registered I&APs to verify that their comments have been recorded, considered and addressed, where applicable, in the environmental investigations;
- foster trust and co-operation;
- generate a sense of joint responsibility and ownership of the environment; and
- comment on the findings of the environmental assessments.

During the decision-making phase:
- to advise I&APs 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 potential stakeholders and I&APs for their review.
- The information presented during the public participation process is presented in such a manner which ensures that the information is carried over to all parties in an understandable manner such that it avoids the possible alienation of the public and prevents them from participating.
- Public participation is facilitated in such a manner that I&APs are provided with a reasonable opportunity to comment on the project.
- Various ways are provided to I&APs to correspond and submit their comments i.e. fax, post, email.
- An adequate review period is provided for I&APs to comment on the findings of the BA Report.

The Public Participation Process undertaken for the proposed grid connection infrastructure considers the restrictions and limitations imposed by Government through section 27 (2) of the Disaster Management Act (Act No. 57 of 2002) of 2002 and the Directions issued by the Minister of Forestry, Fisheries, and the Environment (DFFE) in terms of consultations with I&APs.

Together with the standard public participation approach, additional alternative means of undertaking consultation have been designed and implemented by Savannah Environmental to ensure that I&APs are afforded sufficient opportunity to access project information and raise comments on the project through a web-based platform readily available and accessible to any person registering their interest in the project, and ensures that the public participation process is undertaken in line with Regulations 41 to 44 of the EIA Regulations, 2014 as amended. The Public Participation Plan (**Appendix C9**) considers the limitations applied by the Disaster Management Act Regulations prohibiting the gathering of people, limitations which certain I&APs may have in terms of access to computers and internet, as well as access to public spaces currently not open for operation

that inhibits access to hard copy documentation. The online stakeholder engagement platform contains the BA report available for review. The use of an online tool enables stakeholders and I&APs to explore the project-specific content in their own time, and still enables them to participate in a meaningful way in the consultation process. Where I&APs do not have access to the online platform, information has been shared via other means such as telephone, email, WhatsApp CD and communication via the Ward Councillor and community representatives.

The schematic illustration overleaf provides an overview of the tools that are available to I&APs and stakeholders to access project information and interact with the public participation team to obtain project information and resolve any queries that may arise, and to meet the requirements for public participation whilst maximising the process.

i. Stakeholder identification and register of I&APs	•Register as an I&AP on the online platfrom, via completion of a form and provison of contact information, by responding to an advert, or sending a 'please call me' which will be responded to. •State interest in the project •Receive all project related information via email or other appropriate means.
ii. Notifications	•Advertisements, site notices and written notifications provide information and details on where to access project information. •Notification regarding the BA process and availability of project report for public review to be sent via email, post or SMS notification.
iii. Public Involvement and consultation	•Availability of project information will be via the Savannah website which is accessible and user friendly. •An opportunity for I&APs and stakeholders to request virtual meetings with the project team. •Where limited connectively is encountered, in-person meeting/s will be arranged with strict COVID-19 protocols followed.
iv. Comment on the BA reports	•Availability of the project report via the online platform for a 30-day comment period. • Where applicable, other electronic platforms (WeTransfer or DropBox), and upon written request CD, USB and/or hard copies will be made available. •Submission of comments faciliated through email, WhatsApp/SMS, direct on-site engagement (where necessary) and where required via post to the PP team. •Comments recorded and responded to, as part of the process.
v. Identification and recording of comments	•Comments and Responses Report, including all comments received throughout the process to be included in the reporting.

In terms of the requirement of Chapter 6 of the EIA Regulations of December 2014, as amended, the following key public participation tasks have been undertaken:

» Fix 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;
» Give 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.

» Place an advertisement in a local newspaper.
» Open and maintain a register of I&APs and Organs of State.
» Release a BA Report for a 30-day review period.
» Update the C&R Report with all comments raised during the 30-day review period for submission with the final BA Report.

In compliance with the requirements of Chapter 6: Public Participation of the EIA Regulations, 2014 (as amended), the following summarises the key public participation activities conducted to date.

i. Stakeholder identification and Register of Interested and Affected Parties

42. A proponent or applicant must ensure the opening and maintenance of a register of I&APs and submit such a register to the competent authority, which register must contain the names, contact details and addresses of –
(a) All persons who, as a consequence of the public participation process conducted in respect of that application, have submitted written comments or attended meetings with the proponent, applicant or EAP;
(b) All persons who have requested the proponent or applicant, in writing, for their names to be placed on the register; and
(c) All organs of state which have jurisdiction in respect of the activity to which the application relates.

I&APs have been identified through a process of networking and referral, obtaining information from Savannah Environmental's existing stakeholder database, liaison with potentially affected parties in the greater study area and a registration process involving the completion of a reply form. Key stakeholders and affected and adjacent landowners have been identified and registered on the project database. Other stakeholders and/or I&APs are required to formally register their interest in the project. An initial list of key stakeholders identified and registered is listed in **Table 4.2**.

Table 4.3: List of Stakeholders identified for the inclusion in the project database during the public participation process for the Houthaalboomen Grid Connection.

Organs of State
National Government Departments
Department of Forestry, Fisheries, and the Environment (DFFE)
Department of Mineral Resources and Energy (DMRE)
Department of Agriculture, Land Reform and Rural Development (DALRRD)
Department of Water and Sanitation (DWS)
Department of Communications

Government Bodies and State-Owned Companies
Eskom Holdings SOC Limited
National Energy Regulator of South Africa (NERSA)
South African Civil Aviation Authority (CAA)
South African Heritage Resources Agency (SAHRA)
South African National Roads Agency Limited (SANRAL)
Telkom SA SOC Ltd
Provincial Government Departments
North West Department of Economic Development, Environment, Conservation and Tourism (NW DEDECT)
North West Department of Public Works and Roads (NW DPWR)
North West Provincial Heritage Resources Agency (NW PHRA) – Provincial Heritage Authority
North West Department of Community Safety and Transport Management (NW DCSTM)
North West Department of Agriculture and Rural Development (NWDARD)
Local Government Departments
Ngaka Modiri Molema District Municipality
Ditsobotla Local Municipality – including the Ward Councillor, ward committee members, community representative or local community forum members
Landowners
Affected landowners, tenants and occupiers
Neighbouring landowners, tenants and occupiers
Commenting Stakeholders
Birdlife South Africa
Endangered Wildlife Trust (EWT)
Wildlife and Environment Society of South Africa (WESSA)
Surrounding renewable energy developments
Small, medium and micro enterprises (SMMEs)
Formal local organisations

As per Regulation 42 of the EIA Regulations, 2014 (as amended), all relevant stakeholder and I&AP information has been recorded within a register of I&APs (refer to **Appendix C1** for a listing of the recorded parties). In addition to the above-mentioned EIA Regulations, point 4.1 of the Public Participation Guidelines has also been followed. The register of I&APs contains the names[6], contact details and addresses of:

» all persons who requested to be registered on the database in writing and disclosed their interest in the project;
» all Organs of State which hold jurisdiction in respect of the activity to which the application relates;

[6] Contact details and addresses have not been included in the I&AP database as this information is protected by the Protection of Personal Information Act (No 4 of 2013).

» all persons identified and approached through networking or a chain referral system to identify any other stakeholder (i.e. ratepayers associations); and
» all persons who submitted written comments or attended meetings during the public participation process.

I&APs have been encouraged to register their interest in the BA process from the onset of the project, and the identification and registration of I&APs will be on-going for the duration of the BA process. The database of I&APs will be updated throughout the BA process, and will act as a record of the I&APs involved in the public participation process.

ii. Advertisements and Notifications

40.(2)(a)	Fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of –
	(i) The site where the activity to which the application or proposed application relates is or is to be undertaken; and
	(ii) Any alternative site.
40.(2)(b)	Giving written notice, in any of the manners provided for in section 47D[7] of the Act, to –
	(i) The occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken;
	(ii) Owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken;
	(iii) The municipal councillor of the ward in which the site and alternative site is situated and any organisation of ratepayers that represent the community in the area;
	(iv) The municipality which has jurisdiction in the area;
	(v) Any organ of state having jurisdiction in respect of any aspect of the activity; and
	(vi) Any other party as required by the competent authority.
40.(2)(c)	Placing an advertisement in –
	(i) One local newspaper; or

[7] Section 47D of NEMA pertains to the delivery of documents, and states that:

(1) A notice or other document in terms of this Act or a specific environmental management Act may be issued to a person –
(a) By delivering it by hand;
(b) By sending it by registered mail –
(i) To that person's business or residential address; or
(ii In the case of a juristic person, to its registered address or principal place of business;
(bA) By faxing a copy of the notice or other document to the person, if the person has a fax number;
(bB) By e-mailing a copy of the notice or other document to the person, if the person has an e-mail address; or
(bC) By posting a copy of the notice or other document to the person by ordinary mail, if the person has a postal address;
(c) Where an address is unknown despite reasonable enquiry, by publishing it once in the Gazette and once in a local newspaper circulating in the area of that person's last known residential or business address.
(2) A notice or other document issued in terms of subsection (1)(b), (bA), (bB), (bC) or (c) must be regarded as having come to the notice of the person, unless the contrary is proved."

	(ii) Any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;
40.(2)(d)	Placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in paragraph (c)(ii); and
40.(2)(e)	Using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desirous of but unable to participate in the process due to – (i) Illiteracy; (ii) Disability; or (iii) Any other disadvantage.

The BA process was announced with an invitation to the Organs of State, potentially affected and neighbouring landowners and general public to register as I&APs and to actively participate in the process. This was achieved via the following:

- All detailing correspondence is included in **Appendix C4** and **Appendix C5**.
- Compilation of a letter providing background information, technical and environmental details on this project (in the context of the project), how to become involved in the BA process, announcing the BA process, and notifying Organs of State, potentially affected and neighbouring landowners, as well as registered stakeholders/I&APs of the Houthaalboomen Grid Connection solution (refer to **Appendix C3**). The notification letter was distributed on 13 May 2022 via email to identified and registered stakeholders and I&APs. The information is also available electronically on the Savannah Environmental website (https://savannahsa.com/public-documents/grid-infrastructure/).
- Placement of site notices regarding the BA process at visible points along the affected properties of the grid connection corridor, in accordance with the requirements of the EIA Regulations, on 09 March 2022; a record containing the photographs and the GPS co-ordinates of the site notices are contained in **Appendix C2**.
- Placement of advertisement announcing the BA process and the availability of and inviting comment on the BA Report in Noordwester Newspaper on 13 May 2022, prior to the commencement of the 30-day review period. This advert also included the details on the review period for the BA report and the location of where the report can be accessed. The details of the newspaper advert placement is contained in **Appendix C2** of the BA Report.
- The BA Report has been made available for review by I&APs for a 30-day review period from **13 May 2022 to 13 June 2022**. The BA Report is available on the Savannah Environmental website. The evidence of distribution of the BA Report will be included in the final BA Report, which will be submitted to the DFFE.

iii. Public Involvement and Consultation

In order to accommodate the varying needs of stakeholders and I&APs within the greater study area, as well as capture their views, comments, issues and concerns regarding the project, various opportunities have been and will continue to be provided to I&APs to note their comments and issues. I&APs are being consulted through the following means:

Table 4.4: Consultation undertaken for the Houthaalboomen Grid Connection

Activity	Date
Distribution of Background Information Letter announcing the availability of the BA Report for review for a 30-day review and comment period. These letters were distributed to Organs of State, Government Departments, Ward Councillors, landowners within the greater study area (including neighbouring landowners) and key stakeholder groups.	The detailing letter was distributed on 13 May 2022.
Advertising of the availability of the BA Report for a 30-day review period in Noordwester newspaper.	13 May 2022.
30-day review period of the BA Report	13 May 2022 to 13 June 2022
Focus Group Meetings: » Authorities and Key Stakeholders (including organs of state, local municipality and community-based organisations) » Key Stakeholder Focus Group Meeting » Landowners Focus Group Meeting	To be held during 30-day comment period
On-going consultation (i.e. telephone liaison; e-mail communication) with all I&APs	Throughout BA process

iv. Registered I&APs entitled to Comment on the BA Report and Plans

43.(1) A registered I&AP is entitled to comment, in writing, on all reports or plans submitted to such party during the public participation process contemplated in these Regulations and to bring to the attention of the proponent or applicant any issues which that party believes may be of significance to the consideration of the application, provided that the interested and affected party discloses any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application.

(2) In order to give effect to section 24O of the Act, any State department that administers a law relating to a matter affecting the environment must be requested, subject to regulation 7(2), to comment within 30 days.

44.(1) The applicant must ensure that the comments of interested and affected parties are recorded in reports and plans and that such written comments, including responses to such comments and records of meetings, are attached to the reports and plans that are submitted to the competent authority in terms of these Regulations.

(2) Where a person desires but is unable to access written comments as contemplated in subregulation (1) due to –

(a) A lack of skills to read or write;

(b) Disability; or

(c) Any other disadvantage;

Reasonable alternative methods of recording comments must be provided for.

I&APs registered on the database have been notified by means of a notification letter (e-mail) of the release of the BA Report for a 30-day review period, invited to provide comment on the BA Report, and informed of the manner in which, and timeframe within which such comment must be made. The notification was distributed prior to commencement of the 30-day review period on 13 May 2022.

v. Identification and Recording of Comments

Comments raised by I&APs over the duration of the BA process are synthesised into a Comments and Responses (C&R) Report which will be included in the final BA report. The C&R Report includes detailed responses from

members of the EIA project team and/or the project proponent to the issues and comments raised during the public participation process.

Meeting notes of all the meetings conducted during the 30-day review period of the BA Report will be included in **Appendix C7**.

4.4 Assessment of Impacts Identified through the BA Process

In terms of GN R960 (promulgated on 5 July 2019) and Regulation 16(1)(b)(v) of the 2014 EIA Regulations (as amended), the submission of a Screening Report generated from the national web based environmental screening tool is compulsory for the submission of BA applications in terms of Regulation 19 and 21 of the 2014 EIA Regulations. **Table 4.4** provides a summary of the specialist's assessments identified in the Screening Report and responses to each assessment in terms of the project proposed.

Table 4.5: Specialist assessments identified in terms of the national web based environmental screening tool for the proposed development

Specialist Assessment	Sensitivity Rating as per the Screening Tool (relating to the need for the study)	Project Team Response
Agricultural Impact Assessment	High sensitivity	The Soils and Agricultural Compliance Statement has been undertaken for the proposed project and is included in this EIA Report as **Appendix F.** The verified site sensitivity of the Houthaalboomen grid assessment corridor, differs from the results of the Environmental Screening Tool The entire development area has been assigned Low agricultural sensitivity, except for northern end of the grid where deep Nkonkoni soils are present, this area has been assigned Medium agricultural sensitivity
Landscape/Visual Impact Assessment	Rating not provided	A Visual Impact Assessment has been undertaken for the Houthaalboomen Grid Connection and is included in this BA Report as **Appendix H.**
Archaeological and Cultural Heritage Impact Assessment	Low sensitivity	This BA Report includes a Heritage Impact Assessment (including archaeology palaeontology & cultural heritage) which is included in this BA Report as **Appendix G.** A stone structure was identified within the development area. It is likely that this is a burial site (LICBUR10). This site has been graded IIIA and a no-development buffer of 10m is recommended

		around this site. Additionally, a possible burial was identified within the grid connection corridor by Van der Walt (2014). A further 10m no-development buffer zone has also been recommended around this site (SAHRIS Site ID 51472.
Palaeontology Impact Assessment	Very High	The Heritage Impact Assessment (**Appendix G**) includes an assessment of Houthaalboomen Grid Connection on palaeontological resources within the grid connection corridor. No palaeontological resources of significance were identified within the development area.
Terrestrial Biodiversity Impact Assessment	Very High	An Ecological Impact Assessment (included as **Appendix D**) assesses the impact of Houthaalboomen Grid Connection on the biophysical (i.e. flora and fauna) environment identified within the grid connection corridor of the project. No high sensitive or "No-Go" areas were identified within the project area and the majority of the project site site is located within a medium sensitive area.
Aquatic Biodiversity Impact Assessment	Very High	The Ecological Impact Assessment (**Appendix D**) has assessed the impacts of the proposed development on aquatic within the grid connection corridor. It was found that no wetland/aquatic features were present within the development footprint, and subsequently no such features will be impacted by the development.
Avian Impact Assessment	High	An Avifauna Impact Assessment (**Appendix E**) has been undertaken for the grid connection and included as **Appendix E** of the Basic Assessment Report. A small number of artificial livestock watering points were identified within the development area and have been classified as high sensitive areas. Nevertheless, these features could be removed or re-located away from overhead power lines.
Civil Aviation Assessment	High	The South African Civil Aviation Authority (CAA) will be consulted in order to obtain comments. The applicant will also obtain the necessary CAA approvals for the grid connection infrastructure once the final position of the power line route and

		the collector substation within the grid connection corridor is confirmed and final.
RFI Assessment	Rating not provided	The South African Radio Astronomy Observatory (SARAO) will be consulted during the 30-day review and comment period of the BA report to provide comments on the proposed development.
Geotechnical Assessment	Rating not provided	Prior to initiating construction, a geotechnical survey will be conducted to acquire information regarding the physical characteristics of soil and rocks underlying a proposed project site and informs the design of earthworks and foundations for structures.
Plant Species Assessment	Medium	The Ecological Impact Assessment (**Appendix D**) has assessed the impacts of the proposed development on plant and animal species identified within the grid connection corridor.
Animal Species Assessment	Low	

Impacts identified as requiring investigation, as well as the specialist consultants involved in the assessment of these impacts are indicated in **Table 4.5** below.

Table 4.6: Specialist consultants appointed to evaluate the potential impacts associated with the Houthaalboomen Grid Connection

Specialist Name	Specialist Company	Specialist Area of Expertise	Appendices
Gerhard Botha	Nkurenkuru Ecology & Biodiversity	Terrestrial Ecology and Freshwater	Appendix D
Lukas Niemand	Pachnoda Consulting	Avifauna	Appendix E
Marinè Pienaar	Terra Africa Environmental Consultants	Agricultural Assessment	Appendix F
Lourens du Plessis	LOGIS	Visual	Appendix H
Jenna Lavin	CTS Heritage (Pty) Ltd	Heritage (including archaeology, cultural landscape and palaeontology)	Appendix G

Specialist studies considered direct and indirect environmental impacts associated with the development of all components of the grid connection infrastructure. Impacts were assessed in terms of the following criteria:

- The **nature**, a description of what causes the effect, what will be affected, and how it will be affected;
- The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international. A score of between 1 and 5 is assigned as appropriate (with a score of 1 being low and a score of 5 being high);
- The **duration**, wherein it is 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;
  - 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);
- 10 is very high and results in complete destruction of patterns and permanent cessation of processes.

» The **probability of occurrence**, which describes the likelihood of the impact actually occurring. Probability is 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);
- Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).

» The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high;
» The **status**, which is 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; where

S = Significance weighting.
E = Extent.
D = Duration.
M = Magnitude.
P = 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).

As the proponent has the responsibility to avoid or minimise impacts and plan for their management (in terms of the EIA Regulations, 2014 (as amended)), the mitigation of significant impacts is discussed. Assessment of impacts with mitigation is made in order to demonstrate the effectiveness of the proposed mitigation measures. Generic Environmental Management Programmes, contemplated in Regulation 19(4) of the EIA Regulations, 2014 (as amended) and as per GNR 435 of 22 March 2019 is used for the BA for the Houthaalboomen Grid Connection. This is due to the triggering of activity 11 of Listing Notice 1 of the EIA Regulations, 2014 (as

amended). The generic EMPr template for substation infrastructure for electricity transmission and distribution and the generic EMPr for overhead electricity transmission and distribution infrastructure is included in **Appendix I** of this BA Report.

4.5 Assumptions and Limitations of the BA Process

The following assumptions and limitations are applicable to the studies undertaken within this BA process:

- All information provided by the developer and I&APs to the environmental team was correct and valid at the time it was provided.
- It is assumed that the grid connection corridor identified by the developer represents a technically suitable corridor for the establishment of the grid connection infrastructure associated with the Houthaalboomen Grid Connection.
- This report and its investigations are project-specific, and consequently the environmental team did not evaluate any other grid connection technology alternatives.

Refer to the specialist studies in **Appendices D – H** for specialist study specific limitations.

4.6 Legislation and Guidelines that have informed the preparation of this Basic Assessment Report

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

- National Environmental Management Act (Act No. 107 of 1998);
- EIA Regulations of December 2014, published under Chapter 5 of NEMA (as amended);
- Department of Environmental Affairs (2017), Public Participation guidelines in terms of NEMA EIA Regulations; and
- International guidelines – the Equator Principles, the IFC Performance Standards, the Sustainable Development Goals, World Bank Environmental and Social Framework, and the and World Bank Group Environmental, Health, and Safety Guidelines (EHS Guidelines).

Table 4.6 provides an outline of the legislative permitting requirements applicable to the grid connection infrastructure as identified at this stage in the project process.

Table 4.7: Applicable Legislation, Policies and/or Guidelines associated with the development of the Houthaalboomen Grid Connection Infrastructure

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Legislation			
Constitution of the Republic of South Africa (No. 108 of 1996)	In terms of Section 24, the State has an obligation to give effect to the environmental right. The environmental right states that: "*Everyone has the right –* » *To an environment that is not harmful to their health or well-being, and* » *To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:* * *Prevent pollution and ecological degradation,* * *Promote conservation, and* * *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development*."	Applicable to all authorities	There are no permitting requirements associated with this Act. The application of the Environmental Right however implies that environmental impacts associated with proposed development are considered separately and cumulatively. It is also important to note that the "right to an environment clause" includes the notion that justifiable economic and social development should be promoted, through the use of natural resources and ecologically sustainable development.
National Environmental Management Act (No 107 of 1998) (NEMA)	The 2014 EIA Regulations have been promulgated in terms of Chapter 5 of NEMA. Listed activities which may not commence without EA are identified within the Listing Notices (GNR 327, GNR 325 and GNR 324) which form part of these Regulations (GNR 326). In terms of Section 24(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. A Basic Assessment Process is required to be undertaken for the proposed project.	DFFE – Competent Authority North West DEDECT– Commenting Authority	The listed activities triggered by the proposed project have been identified and are assessed throughout the BA process for the grid connection infrastructure. The BA process will culminate in the submission of a final BA Report to the competent authority in support of the Application for Environmental Authorisation.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Environmental Management Act (No 107 of 1998) (NEMA)	In terms of the "Duty of Care and Remediation of Environmental Damage" provision in Section 28(1) of NEMA every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment. In terms of NEMA, it is the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.	DFFE North West DEDECT– Commenting Authority	While no permitting or licensing requirements arise directly by virtue of the proposed grid connection infrastructure, this section finds application through the consideration of potential cumulative, direct, and indirect impacts.
Environment Conservation Act (No. 73 of 1989) (ECA)	The Noise Control Regulations in terms of Section 25 of the ECA contain regulations applicable for the control of noise in the Provinces of Limpopo, North West, Mpumalanga, Northern Cape, Eastern Cape, and KwaZulu-Natal Provinces. The Noise Control Regulations cover the powers of a local authority, general prohibitions, prohibitions of disturbing noise, prohibitions of noise nuisance, use of measuring instruments, exemptions, attachments, and penalties. In terms of the Noise Control Regulations, no person shall make, produce or cause a disturbing noise, or allow it to be made, produced or caused by any person, machine, device or apparatus or any combination thereof (Regulation 04).	DFFE North West DEDECT– Commenting Authority Ditsobotla Local Municipality	Noise impacts are expected to be associated with the construction phase of the project. Considering the location of the grid connection corridor in relation to residential areas and provided that appropriate mitigation measures are implemented, construction noise is unlikely to present a significant intrusion to the local community. There is therefore no requirement for a noise permit in terms of the legislation.
National Water Act (No. 36 of 1998) (NWA)	A water use listed under Section 21 of the NWA must be licensed with the Regional DWS, unless it is listed in Schedule 1 of the NWA (i.e. is an existing lawful use), is	Regional Department of Water and Sanitation	An Ecological Impact Assessment (including freshwater) was undertaken for the project, and it was found that no wetland/aquatic features were present

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	permissible under a GA, or if a responsible authority waives the need for a licence. Water use is defined broadly, and includes consumptive and non-consumptive water uses, taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation. Consumptive water uses may include taking water from a water resource (Section 21(a)), and storing water (Section 21(b)). Non-consumptive water uses may include impeding or diverting of flow in a water course (Section 21(c)), and altering of bed, banks or characteristics of a watercourse (Section 21(i)).		within the development footprint, and subsequently no such features will be impacted by the development.
Minerals and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA)	In accordance with the provisions of the MPRDA a mining permit is required in accordance with Section 27(6) of the Act where a mineral in question is to be mined, including the mining of materials from a borrow pit.	Department Mineral Resources	Any person who wishes to apply for a mining permit in accordance with Section 27(6) must simultaneously apply for an Environmental Authorisation in terms of NEMA. No borrow pits are expected to be required for the construction of the grid connection infrastructure, and as a result a mining permit or EA is not required to be obtained.
	Section 53 of the MPRDA states that any person who intends to use the surface of any land in any way which may be contrary to any object of the Act, or which is likely to impede any such object must apply to the Minister for approval in the prescribed manner.		In terms of Section 53 of the MPRDA, approval is required from the Minister of Mineral Resources to ensure that the proposed grid connection infrastructure does not sterilise a mineral resource that

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			might be present within the grid connection corridor.
National Environmental Management: Air Quality Act (No. 39 of 2004) (NEM:AQA)	The National Dust Control Regulations (GNR 827) published under Section 32 of NEM:AQA prescribe the general measures for the control of dust in all areas, and provide a standard for acceptable dustfall rates for residential and non-residential areas. In accordance with the Regulations (GNR 827) any person who conducts any activity in such a way as to give rise to dust in quantities and concentrations that may exceed the dustfall standard set out in Regulation 03 must, upon receipt of a notice from the air quality officer, implement a dustfall monitoring programme. Any person who has exceeded the dustfall standard set out in Regulation 03 must, within three months after submission of the dustfall monitoring report, develop and submit a dust management plan to the air quality officer for approval.	North West DEDECT Ngaka Modiri Molema District Municipality	In the event that the construction of the grid connection infrastructure results in the generation of excessive levels of dust, the possibility could exist that a dustfall monitoring programme would be required for the project, in which case dustfall monitoring results from the dustfall monitoring programme would need to be included in a dust monitoring report, and a dust management plan would need to be developed. However, with mitigation measures implemented, construction of the grid connection infrastructure is not anticipated to result in significant dust generation.
National Heritage Resources Act (No. 25 of 1999) (NHRA)	Section 07 of the NHRA stipulates assessment criteria and categories of heritage resources according to their significance. Section 35 of the NHRA provides for the protection of all archaeological and palaeontological sites, and meteorites. Section 36 of the NHRA provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority. Section 38 of the NHRA lists activities which require developers or any person who intends to undertake a	South African Heritage Resources Agency (SAHRA) North West Provincial Heritage Resource Agency) – provincial heritage authority	A full Heritage Impact Assessment (HIA) (with field work) has been undertaken as part of the BA process (refer to **Appendix G** of this BA Report). A stone structure was identified within the development area. It is likely that this is a burial site (LICBUR10). This site has been graded IIIA and a no-development buffer of 10m is recommended around this site. Additionally, a possible burial was identified within the grid connection corridor by Van der Walt (2014). A further 10m no-development buffer zone has also

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	listed activity to notify the responsible heritage resources authority and furnish it with details regarding the location, nature, and extent of the proposed development. Section 44 of the NHRA requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction.		been recommended around this site (SAHRIS Site ID 51472. The grid connection infrastructure may impact on the heritage resources located within the grid connection; pylon placements will have to be placed to avoid the identified site/s. Should a heritage resource of significance be impacted upon, a permit may be required from SAHRA or Ngwao Boswa Kapa Bokone (NBKB) in accordance with of Section 48 of the NHRA, and the SAHRA Permit Regulations (GN R668). This will be determined as part of the final walk-through survey once the final location of the development footprint and its associated infrastructure has been determined.
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Section 53 of NEM:BA provides for the MEC / Minister to identify any process or activity in such a listed ecosystem as a threatening process. Three government notices have been published in terms of Section 56(1) of NEM:BA as follows: » Commencement of TOPS Regulations, 2007 (GNR 150). » Lists of critically endangered, vulnerable and protected species (GNR 151). » TOPS Regulations (GNR 152). It provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR),	DFFE North West DEDECT	Under NEM:BA, a permit would be required for any activity that is of a nature that may negatively impact on the survival of a listed protected species. During the survey no plant SCC was recorded. whilst four protected species were observed and eight South African endemics. All of the SA endemic plants observed within the project site, can be regarded as fairly abundant within their ranges.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	endangered (EN), and vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (NEM:BA: National list of ecosystems that are threatened and in need of protection, (Government Gazette 37596, GNR 324), 29 April 2014).		The following protected species were observed. *Babiana hypogea (Transvaal Nature Conservation Ordinance);* *Gladiolus spp. (Transvaal Nature Conservation Ordinance); and* *Schizocarphus nervosus (Transvaal Nature Conservation Ordinance);* The following South African endemics were observed; *Gymnosporia polyacantha, Selago tenuifolia, Blepharis squarrosa, B. angusta, Chaetacanthus costatus, Ipomoea bathycolpos, Acalypha caperonioides and Delosperma floribundum* Even though, the following species are not listed within the Red Data list (2017) or protected within any legislation, these species and their populations have been determined to be declining and it is subsequently worth mentioning: Hypoxis hemerocallidea, Boophone disticha and Pelargonium spp. (sidoides)
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Chapter 5 of NEM:BA pertains to alien and invasive species, and states that a person may not carry out a restricted activity involving a specimen of an alien species without a permit issued in terms of Chapter 7 of NEM:BA, and that a permit may only be issued after a prescribed assessment of risks and potential impacts on biodiversity is carried out.	DFFE North West DEDECT	Restricted Activities and the respective requirements applicable to persons in control of different categories of listed invasive species are contained within the Alien and Invasive Species Regulations (GNR 598) published under NEM:BA, together with the requirements of the Risk Assessment to be undertaken.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Applicable, and exempted alien and invasive species are contained within the Alien and Invasive Species List (GNR 864).		The EMPr (**Appendix G** to **I**) does make provision for mitigation measures for alien vegetation present within the grid connection corridor.
Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA)	Section 05 of CARA provides for the prohibition of the spreading of weeds. Regulation 15 of GNR 1048 published under CARA provides for the classification of categories of weeds and invader plants, and restrictions in terms of where these species may occur. Regulation 15E of GNR 1048 published under CARA provides requirement and methods to implement control measures for different categories of alien and invasive plant species.	Department of Agriculture, Forestry and Fisheries	CARA will find application throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies need to be developed and implemented. In addition, a weed control and management plan must be implemented. In terms of Regulation 15E (GNR 1048) where Category 1, 2 or 3 plants occur a land user is required to control such plants by means of one or more of the following methods: » Uprooting, felling, cutting or burning. » Treatment with a weed killer that is registered for use in connection with such plants in accordance with the directions for the use of such a weed killer. » Biological control carried out in accordance with the stipulations of the Agricultural Pests Act (No. 36 of 1983), the ECA and any other applicable legislation. » Any other method of treatment recognised by the executive officer that has as its object the control of plants concerned, subject to the provisions of sub-regulation (4).

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			» A combination of one or more of the methods prescribed, save that biological control reserves and areas where biological control agents are effective shall not be disturbed by other control methods to the extent that the agents are destroyed or become ineffective.
National Forests Act (No. 84 of 1998) (NFA)	According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. Notice of the List of Protected Tree Species under the National Forests Act (No. 84 of 1998) was published in GNR 734. 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".	DFFE	A licence is required for the removal of protected trees. It is therefore necessary to conduct a survey that will determine the number and relevant details pertaining to protected tree species present in the development footprint for the submission of relevant permits to authorities prior to the disturbance of these individuals. The Ecological Impact Assessment undertaken as part of the BA Report included a site visit which allowed for the identification of any protected tree species that may require a license in terms of the NFA within the project development corridors (refer to Appendix D of this BA Report). The following protected species were observed. » *Babiana hypogea (Transvaal Nature Conservation Ordinance);* » *Gladiolus spp. (Transvaal Nature Conservation Ordinance); and*

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			» *Schizocarphus nervosus (Transvaal Nature Conservation Ordinance);*
National Veld and Forest Fire Act (No. 101 of 1998) (NVFFA)	Chapter 4 of the NVFFA places a duty on owners to prepare and maintain firebreaks, the procedure in this regard, and the role of adjoining owners and the fire protection association. Provision is also made for the making of firebreaks on the international boundary of the Republic of South Africa. The applicant must ensure that firebreaks are wide and long enough to have a reasonable chance of preventing a veldfire from spreading to or from neighbouring land, it does not cause soil erosion, and it is reasonably free of inflammable material capable of carrying a veldfire across it. Chapter 5 of the Act places a duty on all owners to acquire equipment and have available personnel to fight fires. Every owner on whose land a veldfire may start or burn or from whose land it may spread must have such equipment, protective clothing and trained personnel for extinguishing fires, and ensure that in his or her absence responsible persons are present on or near his or her land who, in the event of fire, will extinguish the fire or assist in doing so, and take all reasonable steps to alert the owners of adjoining land and the relevant fire protection association, if any.	DAFF (soon to be ALR)	While no permitting or licensing requirements arise from this legislation, this Act will be applicable during the construction and operation of the grid connection infrastructure, in terms of the preparation and maintenance of firebreaks, and the need to provide appropriate equipment and personnel for firefighting purposes.
Hazardous Substances Act (No. 15 of 1973) (HAS)	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,	Department of Health	It is necessary to identify and list all Group I, II, III, and IV hazardous substances that may present with the development of the grid connection infrastructure and in what operational context they are used, stored or handled. If applicable, a license would be required to be obtained from the Department of Health.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	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 (No. 59 of 2008) (NEM:WA)	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 NEM:WA (GNR 912), a BA or EIA is required to be undertaken for identified listed activities. Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that: » The containers in which any waste is stored, are intact and not corroded or in	DFFE – Hazardous Waste North West DEDECT – general waste	No listed activities are triggered by the grid connection infrastructure and therefore no Waste Management License is required to be obtained. General and hazardous waste handling, storage and disposal will be required during construction and operation of the grid connection infrastructure. The National Norms and Standards for the Storage of Waste (GNR 926) published under Section 7(1)(c) of NEM:WA will need to be considered in this regard.

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

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Provincial Policies / Legislation		
Bophuthatswana Nature Conservation Act. No. 3 of 1973.	This Act provides for the sustainable utilisation of wild animals, aquatic biota and plants; provides for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; provides for offences and penalties for contravention of the Act; provides for the appointment of nature conservators to implement the provisions of the Act; and provides for the issuing of permits and other authorisations. Amongst other regulations, the following may apply to the current project: » Boundary fences may not be altered in such a way as to prevent wild animals from freely moving onto or off of a property; » Aquatic habitats may not be destroyed or damaged; » The owner of land upon which an invasive species is found (plant or animal) must take the necessary steps to eradicate or destroy such species; The Act provides lists of protected species for the Province.	North West DEDECT	A collection/destruction permit must be obtained from North West Department of Rural, Environment and Agricultural Development for the removal of any protected plant or animal species found on site. During the survey no plant SCC was recorded. The following protected species were observed. » *Babiana hypogea (Transvaal Nature Conservation Ordinance);* » *Gladiolus spp. (Transvaal Nature Conservation Ordinance); and* » *Schizocarphus nervosus (Transvaal Nature Conservation Ordinance);* (Refer to the Ecological Impact Assessment Report. (Appendix D)).

CHAPTER 5: DESCRIPTION OF THE RECEIVING ENVIRONMENT

This chapter provides a description of the local environment. This information is provided in order to assist the reader in understanding the possible effects of the project on the environment within which the project is proposed to be developed. Aspects of the biophysical, social and economic environment that could be directly or indirectly affected by or could affect the Houthaalboomen grid connection have been described. This information has been sourced from both existing information available for the area as well as collected field data by specialist consultants and aims to provide the context within which this BA process is being conducted.

5.1 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter includes the following information required in terms of Appendix 3: Content of BA report:

Requirement	Relevant Section
3(h)(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.	The environmental attributes associated with the development of Houthaalboomen grid is included within this chapter. The environmental attributes that are assessed within this chapter includes the following: » The regional setting of the broader study area and the project site indicates the geographical aspects associated with Houthaalboomen grid. This is included in **Section 5.2**. » The climatic conditions for the greater Lichtenburg area have been included in **Section 5.3**. » The biophysical characteristics of the project site and the surrounding areas are included in **Section 5.4**. The characteristics considered are topography and terrain, geology, soils and agricultural potential and the ecological profile which includes the vegetation patterns, listed plant species, critical biodiversity areas and broad-scale processes, freshwater resources, terrestrial fauna and avifauna. » The heritage and cultural aspects (including archaeology and palaeontology) have been included in **Section 5.5**. » The social and socio-economic characteristics associated with the broader study area and the project site have been included in **Section 5.6.**

A more detailed description of each aspect of the affected environment is included in the specialist reports included in Appendices D to H of this BA report.

5.2. Regional Setting

The Houthaalboomen grid development area is located near Lichtenburg in the North West Province. The province is bordered by Northern Cape Province to the west, and south-west; Free State Province to the south; Gauteng to the east; Limpopo to the north-east; and Botswana to the north. It occupies an area of land approximately 104 882km² in extent, making it South Africa's 6th largest in terms of area, and 7th most densely populated Province.

The North West Province is characterised by altitudes ranging from 920 - 1782m amsl, with the central and western extents of the province characterised by gently undulating plains, while the eastern extent is characterised as mountainous (and includes the Magaliesberg mountain range). Ancient igneous rock formations dominate the north-eastern and north-central extent of the province; and the Gatsrand between Potchefstroom and Carletonville is considered to be one of the most ancient, preserved landscapes in the world. The geology of the province is significant given its mineral resources which are rich in platinum, gold, uranium, iron, chrome, manganese and diamonds.

In terms of land use patterns, approximately 69% of the North West Province is in a natural, or near-natural state, while 31% of the province is irreversibly modified as a result of croplands (25.6%), urban (3.5%), and mining (0.7%) activities. The province is predominantly rural with the main economic activities comprising mining and agriculture. The North West Province comprises four Districts, namely Bojanala Platinum, Ngaka Modiri Molema, Dr Ruth Segomotsi Mompati, and Dr Kenneth Kaunda.

The town of Lichtenburg is located in the Ngaka Modiri Molema District Municipality at the centre of the maize triangle, which is considered to be the primary maize growing area within South Africa. As a result, the area's main economic activity is the production of maize (corn). The production of cement is also considered to be a major economic activity with three large cement producers located within 80km of the town. Several factories manufacturing liquid fertilizer, animal feed, and agricultural equipment have also been established in the area. The Lichtenburg area is considered to have a unique historical background and houses a number of places of interest including the Lichtenburg Diggings Museum, Bakerville, the Burning Vlei, Wondergat, and monuments such as the General De la Rey Square.

5.3. Geographical Setting: Location and description of the Broader Study area and the Development Area

The project site for the proposed grid connection infrastructure is located approximately 5km north of Lichtenburg. The project site is located west east of the R503, furthermore the development area intersects the R505 road, access to the development grid infrastructure will be provided possible via existing roads in close vicinity to the infrastructure (e.g district road D2435 off regional road R505). by a proposed (upgraded) access road (traversing the Elandsfontein small holding) that joins the R505 arterial road near the Watershed MTS, to the east.

The farms traversed by the grid infrastructure corridor are located in an area that has a rural and agricultural character. Farm settlements or residences occur at irregular intervals throughout the study area. Some of these, in close proximity to the proposed development site, include: Houthaalbomen, Boskoppie, Elandsfontein, Talene, Brakpan, Scherppunt, Greeflaagte.

The associated farm portions for the development of the grid connection infrastructure are predominantly owned by private landowners, which primarily used the land for livestock grazing and other agricultural

The associated farm portions for the development of the grid connection infrastructure are owned by private landowners, which primarily used the land for livestock grazing and renewable energy developments.

The existing power lines in close proximity to the proposed infrastructure include:

» Delareyville Municipal-Watershed 1 88kV
» Dudfield-Watershed 1 88kV
» Dudfield-Watershed 2 88kV
» Watershed-Sephaku 1 132kV
» Watershed-Klerksdorp North 1 132kV

The grid connection corridor is located within the Northern Corridor of the Strategic Transmission Corridors which is one of five corridors identified for the rollout of large-scale electricity transmission and distribution infrastructure.

The condition of the general environment within the project site and surrounding the project infrastructure are illustrated in **Figure 5.1**

Figure 5.1: General environment within the project site and surrounding the project infrastructure

5.4. Climatic Conditions

The Lichtenburg area is typically characterised as having a moderate to cold semi-arid climate with wide variations in daily and seasonal temperatures. The area is typically hot in summer and mild-to-cold in winter. The area receives a mean annual average rainfall of approximately 601mm. Precipitation is highest in January with an average of 110mm; and lowest in July and August with an average of 5mm. Minimal rain

occurs between May to September. The average annual temperature in Lichtenburg is 16.9°C. January is the hottest month of the year with an average temperature of 21.7°C, while June is the coldest month of the year with an average temperature of 9.9°C (refer to **Figure 5.2** and **Table 5.1**. Frost is frequent to very frequent during winter, with up to 37 mean frost days per year. Droughts and floods are a regular occurrence at both provincial and local scales and play a significant role in almost every aspect of the social, economic, and ecological environment within the Province.

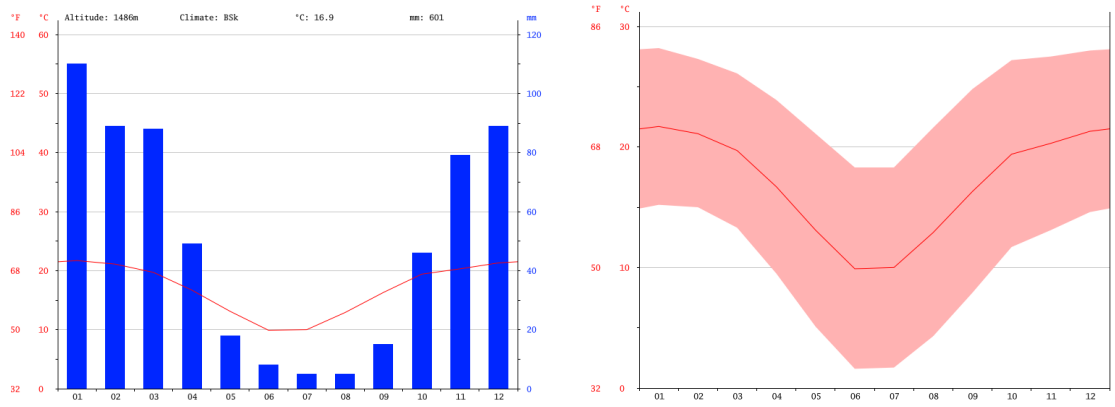

Figure 5.2: Climate and temperature graphs for Lichtenburg, North West Province (Source: en.climate-data.org)

Table 5.1: Climate data for Lichtenburg, North West Province (Source: en.climate-data.org).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Temp. (˚C)	21.7	21.1	19.7	16.7	13.1	9.9	10	12.9	16.3	19.4	20.3	21.3
Minimum Temp. (˚C)	15.2	15	13.3	9.5	5.1	1.6	1.7	4.3	7.9	11.7	13.1	14.6
Maximum Temp. (˚C)	28.2	27.3	26.1	23.9	21.1	18.3	18.3	21.6	24.8	27.2	27.5	28
Precipitation (mm)	110	89	88	49	18	8	5	5	15	46	79	89

5.4. Biophysical Characteristics of the Development Area

The following section provides an overview of the biophysical characteristics of the development area.

5.4.1. Topographical profile

The topography or terrain morphology of the region is broadly described as Plains and Pans or Slightly Undulating Plains of the Central Interior Plain. The slope of the entire study area is extremely even (flat) with a very gradual drop (approximately 70m) from the northern section of the study area (1520m amsl) to the Die Vlei River (1450m) which flows through Lichtenburg. This perennial river, wetlands and farm dams near this town, account for the dominant hydrological features within this region that receives between 500mm to 650mm rainfall per annum.

5.4.2. Geology, Soils and Agricultural Potential

i. Geological profile

The geology of the development area comprises dolomite and chert belonging to the Chuniespoort Group (AGIS), supporting mostly shallow Mispah and Glenrosa soil forms typical of the Fa land type (Mucina & Rutherford, 2006). Chert gravels are abundant on midslopes and footslopes including valley bottoms (AGIS, 2014). The project site overlies Precambrian (Proterozoic) dolomites and associated marine sedimentary rocks that are assigned to the Malmani Subgroup (Chuniespoort Group) within the Transvaal Supergroup. The 2km-thick Malmani Subgroup succession consists of a series of formations of stromatolitic and oolitic carbonates (limestones and dolomites), cherts, and black carbonaceous shales. The bedrock unit represented at the project site is the Monte Christo Formation that comprises some 300m to 500m of breccias as well as stromatolitic and oolitic platform carbonates, including cherty dolomites. The Malmani carbonates in the project site have been subject to karstic (solution) weathering processes with near-surface concentration of insoluble materials (chert, ferromanganese minerals, etc.) through secondary precipitation and downwasting. The diamond deposits in the Lichtenburg area are associated with weathered, kaolinitised alluvial or eluvial (residual) gravels of Late Cretaceous or younger Tertiary age that may have been associated with south-flowing tributaries of the palaeo-Harts drainage system across the Cargonian palaeo-highlands (De Wit 1981, De Wit et al. 2000, Partridge et al. 2006, cf Dollar 1998). Surface gravels in the project site are dominated by cherty, and dolomitic clasts, downwasted from the Malmani dolomites. Surface exposures of pedogenic calcrete overlying the dolomitic bedrocks may also be present in some localities.

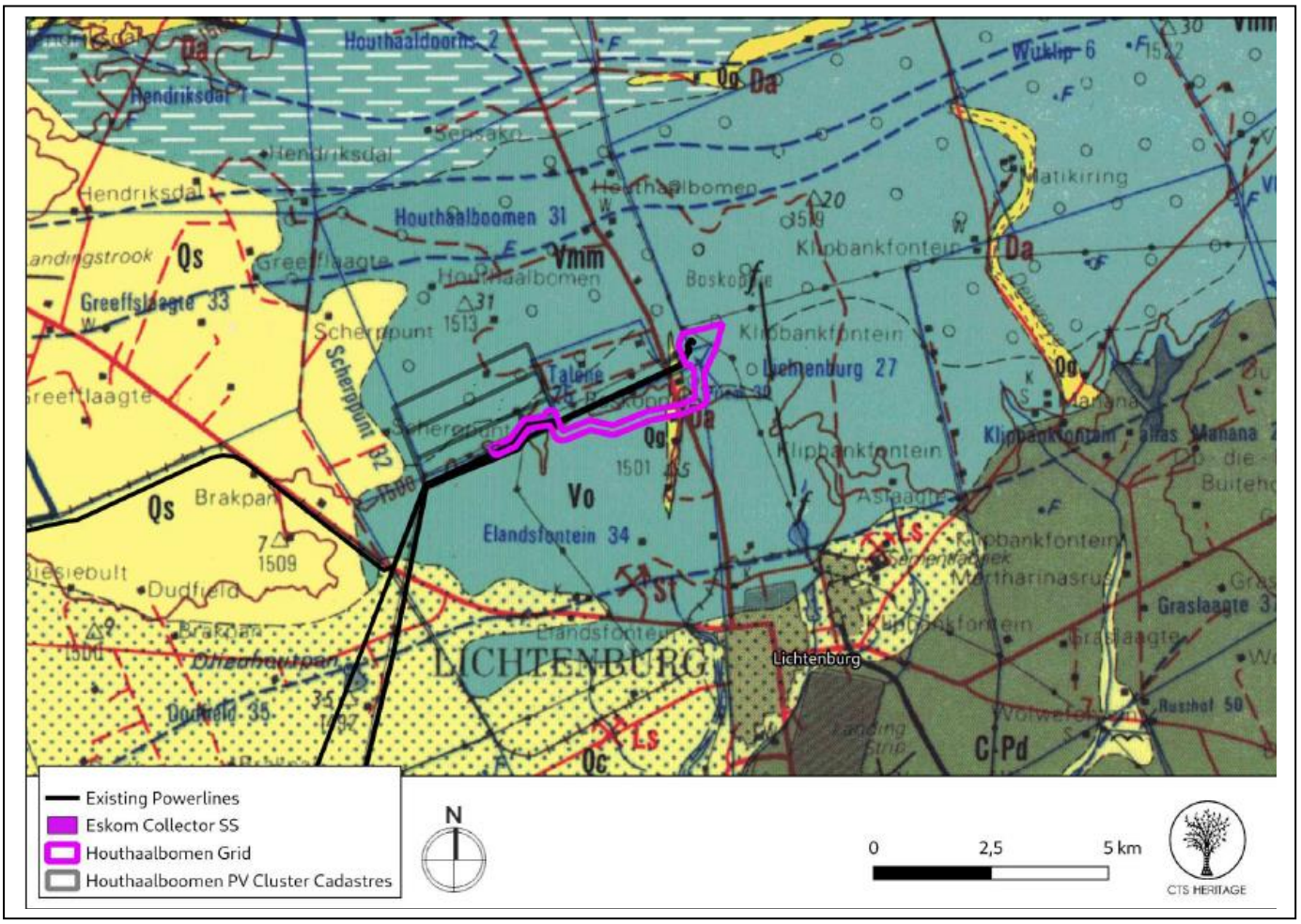

Figure 5.3: Geology underlying the proposed project area extracted from the Council of Geoscience Map (1:250 000) 2626 West Rand

ii. Soils and agricultural capability

Existing soil information was obtained from the Land Type database (Land Type Survey Staff, 1972 – 2002). The land type data is presented at a scale of 1:250 000 and entails the division of land into land types, typical terrain cross sections for the land type and the presentation of dominant soil types for each of the identified terrain units.

The soil profiles classified within the Houthaalboomen grid assessment corridor consists of either natural soil profiles (undisturbed by human activities) or anthropogenic soils (refer to **Figure 5.4**).

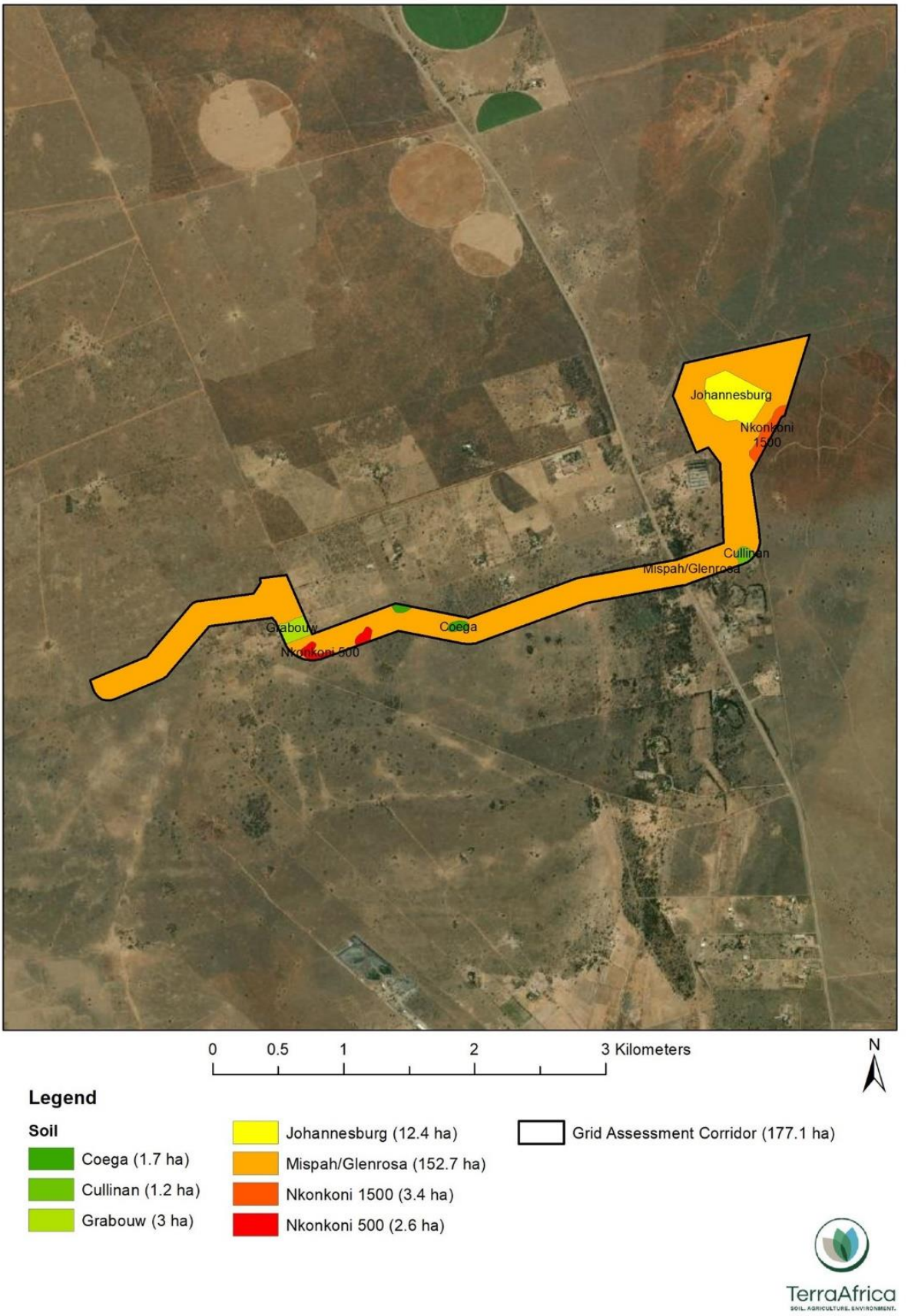

Figure 5.4: Soil classification map of the Houthaalboomen grid assessment corridor

a. Natural soils

» Mispah/Glenrosa soils

The Mispah and Glenrosa soils are grouped together for soil mapping purposes as these soils have similar soil physical properties (except for the nature of the underlying material) and effective depth within the grid assessment corridor. The Mispah/Glenrosa soil group is the dominant soil type within grid assessment corridor and covers approximately 152.7ha (or 86.2% of the total assessment area).

The Glenrosa soils range in depth between 0.05m and 0.30m and consist of orthic topsoil horizons that are either bleached or chromic (light red in colour) with lithic material underneath. The lithic horizon of the Glenrosa soils within the grid assessment corridor belongs to the geolithic family and consists of soil material as illuvial infillings between partly weathered and fractured rock (Soil Classification Working Group, 2018). The Mispah soils have similar shallow soil depth as the Glenrosa soils (0.05 to 0.30m) but differ in regard to the nature of the underlying material. The effective soil depth of the Mispah soils is restricted by solid and fractured rock. In some areas, the solid rock is visible on the surface as rock outcrops.

Figure 5.5: Photographic example of solid rock on the surface of Mispah soils

» Nkonkoni soils

Three small areas of the Nkonkoni soil form is present within the Houthaalboomen grid assessment corridor. Differentiation was made in the soil map between the effective soil depths of the of Nkonkoni soils as two areas have effective soil depth of 0.5m and the area at the northern end of the grid assessment corridor, has effective soil depth of 1.5m (refer to **Figure 5.6**). The effective soil depth has influence on the agricultural potential with the shallower Nkonkoni soils having low-moderate agricultural potential and the deep Nkonkoni soils having moderate-high agricultural potential.

The Nkonkoni soils consist of chromic (red) topsoil with sandy-loam texture that overlies a red apedal horizon. The red apedal horizon is limited in soil depth by the presence of lithic material. The two areas where Nkonkoni soils are 0.5m deep is located along the southern boundary of the middle section of the grid assessment corridor and combinedly covers an area of 2.6ha. The Nkonkoni soils that are 1.5m deep are

located along the southeastern boundary of the northern end of the grid assessment corridor and measures 3.4ha.

Figure 5.6: Nkonkoni soils with 0.5m effective soil depth within the grid assessment corridor

» Coega soils

The Coega soils are found in two areas in the mid-section of the grid assessment corridor with the total area of Coega soils measured at around 1.7 ha. The Coega soils have very shallow effective soil depth (between 0.05 and 0.25m) and are limited in depth by the hard carbonate horizon that underlies the orthic topsoil. In the areas where the Coega soils are present, nodules of hard carbonate are present on the soil surface.

Figure 5.7: Coega soils within the grid assessment corridor with nodules of hard carbonate visible on the surface

b. Anthropogenic soils

» Johannesburg

One area of about 12.4ha in the northern end of the Houthaalbomen grid assessment corridor has been classified as the Johannesburg soil class (Urban Technosols). This area consists of the Watershed MTS that has previously been constructed in the area on concrete foundation. It is classified as Urban Technosols for it include soils and other material where significant areas are disturbed or covered by means of construction and include manufactured layers of different materials. Agriculture is no longer a land use in the area of the Johannesburg soil class.

» Cullinan

The southeastern corner of the grid assessment corridor consists of soil of the Cullinan class. This soil class is present at approximately 1.2 ha. It consists of an old dolomite quarry that has never been backfilled or rehabilitated and little soil material that remained within the excavated area. Indigenous grass and shrubs have already established in the areas within and alongside the sides of the quarry where some soil material is available. However, the uneven, rocky terrain and very sparse grass growth within the Cullinan soil class area, makes it unsuitable for livestock grazing. It also has no potential for crop production.

Figure 5.8: Old dolomite quarry in the northern part of the grid assessment corridor that classify as Cullinan Technosols

» Grabouw

Towards the western end of the grid assessment corridor, one area of 3ha is classified as the Grabouw soil class (Physically Disturbed Anthrosols). Although the soils in this area have not undergone any intentional transportation but have been subjected to physical disturbance, including compaction. Within the grid assessment corridor, the Grabouw soils include a few scattered houses and a gravel road with the remaining

area affected by previous vegetation clearance and other earth-moving activities. While the area has been disturbed by anthropogenic activities, the agricultural potential of the soils in this area is classified as Low-moderate and livestock grazing in the area, is possible.

c. Land capability

The dominant land capability class within the grid assessment corridor, is Low-Moderate (Class 07). The highest land capability class within this area is Moderate-High (Class 09) which is located in four scattered areas that along the middle section of the grid corridor. The higher land capability largely agrees with the areas where the Nkonkoni soils were identified although only one area of these soils is 1.5m and is considered to have Moderate-High potential. Small areas of land with Moderate (Class 08) and Low-Moderate (Class 06) land capability are also scattered along the grid assessment corridor.

Land adjacent and further away from the Houthaalboomen grid assessment corridor consists of a similar mixture of land capability class than that within the grid assessment corridor.

d. Agricultural potential

The largest part of the Houthaalboomen grid assessment corridor, has Low agricultural potential (168ha). Low agricultural potential has been assigned to the Mispah/Glenrosa soil group as well the Coega soils as a result of the shallow soil depth that limits root growth and water storage capacity within these profiles. Some areas where these soils occur also have chunks of rocks or nodules of hard carbonate on the surface. Of the anthropogenic soil classes, both the Cullinan and Johannesburg soil classes have Low agricultural potential as livestock farming is either not possible (Johannesburg soil) or possible with severe limitations (Cullinan soil).

The areas with the deeper Nkonkoni profiles (0.5m effective depth) have Low-Moderate agricultural potential. Although the profiles are slightly deeper than the Mispah/Glenrosa soil group and Coega the soils, the effective soil depth still poses limitations to the water-storage capacity of the soil profiles and can limit crop root growth. In addition to the limitations posed by the soil depth, the total areas of these two pockets of Nkonkoni soils are combinedly only 2.6ha and not considered viable areas for commercial grain production. The Grabouw soil class is also classified as having Low-Moderate agricultural potential. These areas are considered better suited to extensive livestock production, which is also the current land use on site.

The only area with Moderate-High agricultural potential is the area of 3.4ha along the eastern boundary of the northern end of the grid assessment corridor. The area has deep soils that is suitable for rainfed crop production. However, the area of 3.4ha is not used for crop production currently and has neither been used historically for crop production. The area is also considered too small to be viable as a rainfed crop field and in the absence of any irrigation infrastructure, it is also not possible to produce irrigated crops in this area.

The low agricultural potential of the soils within the development area and grid connection is confirmed by the absence of crop field boundaries within the Houthaalboomen grid assessment corridor. Directly north of the grid assessment corridor, there are several small block areas that are delineated as smallholdings. Centre pivot irrigation areas are located further north (2.5km or further) and rainfed annual crops or planted pasture fields are located further west and south (2.5km or further) of the grid assessment corridor.

Grazing capacity is estimated to be approximately 11 – 15 ha / large livestock unit.

5.4.3. Ecological Profile of the Study Area and the Development Area

i. Vegetation description and associated habitats

The entire project area is situated within the grassland biome. The grassland biome comprises many different bioregions and vegetation types. The project site is located within the Dry Highveld Grassland Bioregion with the entirety of project site located within a single vegetation type namely, Carletonville Dolomite Grassland (refer to **Figure 5.9)**.

» **Carletonville Dolomite Grassland**

This vegetation unit is moderate in size, covering an area of approximately 9117.8 km^2. Gh15 is mostly found within the North West Province extending into Gauteng and a small portion of the Free State Province, and is predominantly associated with the Potchefstroom, Ventersdorp and Carletonville regions. This vegetation type extends westwards to the vicinity of Ottoshoop and to the east as far as Centurion and Bapsfontein (Gauteng Province). Gh15 is mainly found between elevations of 1 360m – 1 620m but mostly between 1 500m and 1 560m. This vegetation type has been described by Mucina and Rutherford (2006) as species-rich grasslands forming a complex mosaic pattern across slightly undulating plains dissected by prominent rocky chert ridges. Depending on specific underlying geology and soils, the species composition of plant communities varies in a complex mosaic pattern, and several species may be co-dominant.

Typical plant communities are dominated by the grasses *Brachiaria serrata, Cynodon dactylon, Digitaria tricholaenoides, Diheteropogon amplectens, Themeda triandra, Eragrostis chloromelas, Setaria sphacelata, and Heteropogon contortus. Prominent forbs and low shrubs include Acalypha angustata, Barleria macrostegia, Crabbea angustifolia, Dicoma anomala*, and several *Helichrysum* species. The diversity of perennial grasses and forbs is typically high for these grasslands. The typical low grasslands are interspersed with a low density of high shrubs and low trees. Most of these are Acacia, Ziziphus and Searsia species. Soils are loamy and appear relatively shallow with sections of prominent surface rock (dolomite).

The unit is classified as Least Threatened with a target of protection of 24%. Only a small portion is statutorily conserved. According to Mucina and Rutherford (2006), almost a quarter of this vegetation type has already been transformed for cultivation, by urban sprawl or by mining activities as well as the building of dams. The unit has a very low to low level of erosion.

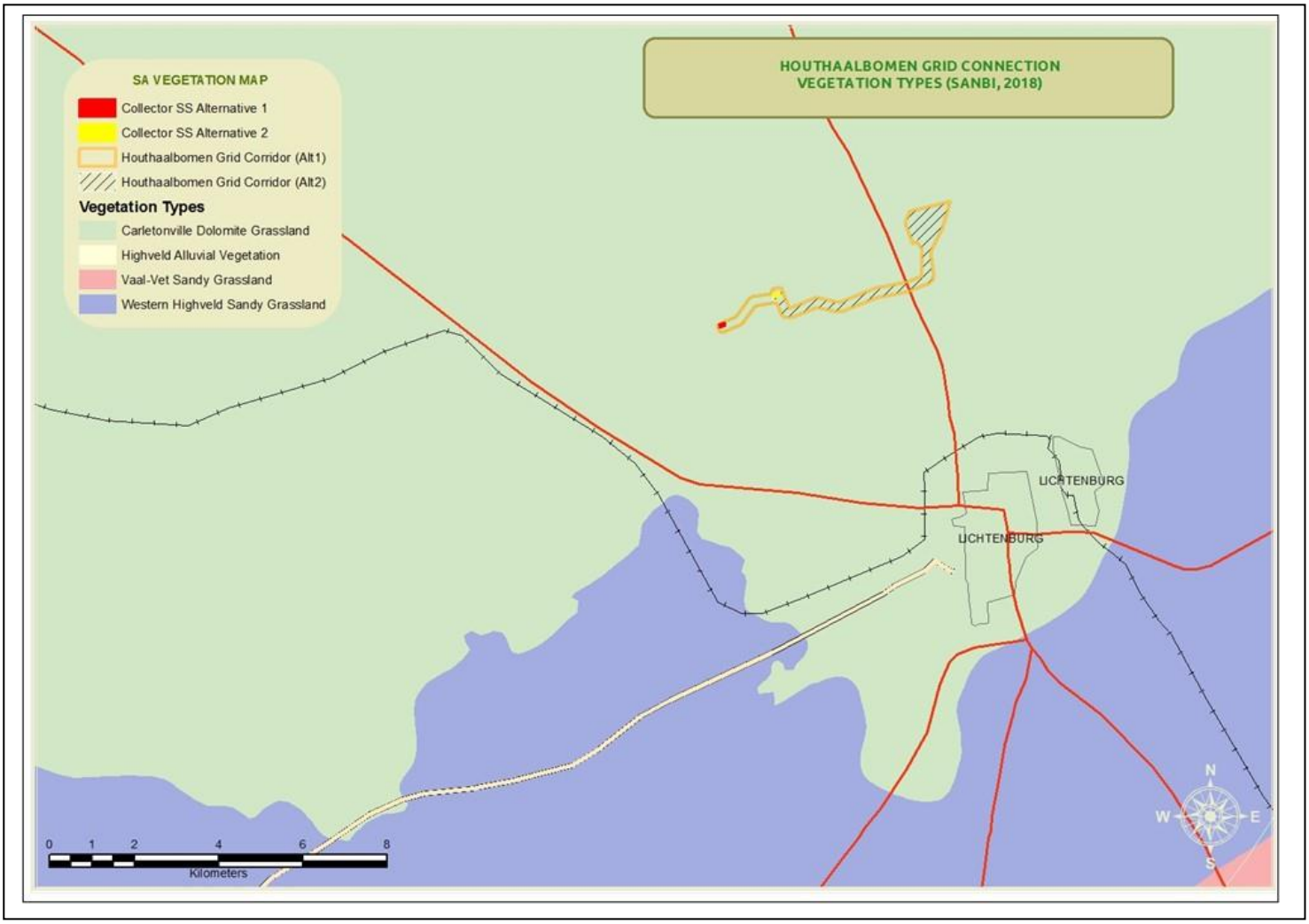

Figure 5.9: Vegetation types mapped across the Houthaalboomen grid development area (VegMap, 2018)

According to the National Vegetation Map 2018, only Carletonville Dolomite Grassland is mapped for the proposed development footprint. Ground truthing confirmed that the vegetation found within the development footprint was consistent with that characteristic of Carletonville Dolomite Grassland.

Small-scale plant diversity and ecological state of vegetation varied across the development footprint and was primarily driven by edaphic and geological factors as well as land use practices (current and historical). Soil depth and surface rockiness were determined to be the most important drivers followed by land use practices (historical cultivation).

Following the site visit three vegetation communities were identified namely:

- *Searsia pyroides – Elionurus muticus* open savanna-grassland on shallow soils overlying dolerite (VegComm SE).
- *Searsia lancea – Vachellia* karroo wooded grassland on moderately shallow soils overlying dolerite (VegComm SV).
- *Hyparrhenia hirta – Eragrostis lehmanniana* secondary grassland on moderately deep soils (VegComm HE)

Some variations may occur within these vegetation communities especially within disturbed areas such as around livestock watering points, kraals, homesteads, along power lines, access routes and firebreaks. Livestock watering points, kraals and homesteads are typically characterised by weedy as well as alien invasive plants.

A total of 213 plant species were found on site, indicating a fairly moderate species diversity. Grasses formed the dominant layer, however forbs where also quite prominent and relive high in diversity. Higher shrubs and trees were typically clustered together with such clumps scattered throughout the grassland. However, the historically ploughed area comprised fewer trees and shrubs. As mentioned, the forb and graminoid layer were well developed and are represented by 122 species (71 forbs and 51 graminoid species). Even though the tree and tall shrub layer are represented by a low diversity of species (16 species), these species play an important role in the vegetation structure of the project site. Geophytes (10.2%), dwarf shrubs (15.5%) and succulents (2.6%) only make up 28.7% of the total species composition. Furthermore, the most dominant plant families within the project site are Poaceae with 22.2%, Asteraceae with 14.2% and Fabaceae with 7.1%. Other noteworthy plant families observed within the affected properties includes Malvaceae, Acanthaceae, Apocynaceae, Rubiaceae, Verbenaceae and Amaranthaceae. Dominant/Key species recorded within the project site are provided below in **Error! Reference source not found.**.

Table 5.2: Key species identified within the project site

DOMINANT SPECIES	
Growth Form	**Key Species**
Graminoids	*Anthephora pubescens, Aristida diffusa, A. congesta, A. adscensionis, A. meridionalis Cymbopogon caesius, C. pospischilii, Cynodon dactylon, Elionurus muticus, Eragrostis gummiflua, E. lehmanniana, E. trichophora, Heteropogon contortus, Schizachyrium jeffreysii, Themeda triandra, Triraphis andropogonoides, Hyparrhenia hirta, Stipagrostis uniplumis*
High Shrubs and Trees	*Vachellia karroo, Senegalia hereroensis, Celtis africana, Grewia flava, Gymnosporia heterophylla, Searsia lancea, S pyroides.*
Low shrubs	*Asparagus setaceus, A. suaveolens, Clematis brachiata, Indigofera heterotricha, Lippia scaberrima, Rosenia humilis, Selago densiflora, Hilliardiella oligocephala, Helichrysum zeyheri, Felicia muricata*
Herbs	*Achyranthes aspera, Berkheya onopordifolia, Chaetacanthus costatus, Geigeria burkei, Helichrysum aureonitens, H. cephaloideum, H. melanacme, Ipomoea oblongata, Barleria macrostegia, Dicoma anomala, Blepharis squarrosa, Pentarrhinum insipidum, Senecio coronatus, S. venosus, Ursinia nana*
Geophytic Herbs	*Boophone disticha, Hypoxis rigidula, Ledebouria cooperi, Rhynchosia minima, Babiana hypogea*
Succulent Herbs	*Aloe davyana*
Geoxylic Suffrutex	*Elephantorrhiza elephantina, Ziziphus zeyheriana.*

During the survey no Species of Conservation Concern (SoCC) where recorded within the project site, while four protected species were observed and eight South African endemics. All of the SA endemic plants observed within the project site, can be regarded as fairly abundant within their ranges.

The following protected species were observed.

- *Babiana hypogea* (Transvaal Nature Conservation Ordinance).
- *Gladiolus spp*. (Transvaal Nature Conservation Ordinance); and
- *Schizocarphus nervosus* (Transvaal Nature Conservation Ordinance).

The following South African endemics were observed.

» *Gymnosporia polyacantha,*
» *Selago tenuifolia,*
» *Blepharis squarrosa,*
» *B. angusta, Chaetacanthus costatus,*
» *Ipomoea bathycolpos,*
» *Acalypha caperonioides and*
» *Delosperma floribundum*

Even though, the following species are not listed within the Red Data list (2017) or protected within any legislation, these species and their populations have been determined to be declining and it is subsequently worth mentioning:

» *Hypoxis hemerocallidea, Boophone disticha and Pelargonium spp. (sidoides*)

Weeds and invasive alien species are not significantly abundant within the more natural areas and tend to be more prominent within recent and/or regularly disturbed areas such as around the kraals, watering points, access roads and trampled areas. At total of 35 weeds and 16 alien plants (APs) have been observed within the project site, with five of the alien plants being listed as Invasives (IAPs) within the NEM:BA - Alien and Invasive Species List (2020).

Weeds and APs frequently observed within disturbed areas include *Alternanthera pungens*, *Conyza bonariensis, Schkuhria pinnata, Tagetes minuta, Zinnia peruviana, Verbena aristigera, Aristida congesta, Cynodon dactylon, Chloris virgata*, and *Urochloa panicoides*. Near the homesteads and the R505 route small Eucalyptus woodlots have been established. Invasive Alien Plants recorded within the project site include *Eucalyptus camaldulensis* (woodlot), *E. sideroxylon* (woodlot), *Datura stramonium Verbena bonariensis, V. aristigera* and *Xanthium spinosum*.

Table 5.3: Total area sizes (approximately) for the fine scale mapped vegetation types

Vegetation Type	Houthaalboomen Grid Corridor (Alt 1)		Collector SS Alternative 1		Houthaalboomen Grid Corridor (Alt 2)		Collector SS Alternative 2	
	Total Area	Total Area	Total Area	Total Area	Total Area	Total Area	Total Area	Total Area (%)
Searsia pyroides – Elionurus muticus open savanna-grassland (VegComm SE)	148.2	67.3%	1.4	100%	29.4	15.9%	0	0
Searsia lancea – Vachellia karroo wooded grassland (VegComm SV).	27.6	12.	0	0	9.4	5.1%	0	0

		6%						
Hyparrhenia hirta – Eragrostis lehmanniana secondary grassland (VegComm HE)	14.9	6.8%	0	0	27.6	15%	1.4	100%
Highly disturbed areas	29.4	13.3%	0	0	118	64%	0	0
Total	***220***	***100%***	***1.4***	***100%***	***184.4***	***100%***	***1.4***	***100%***

Table 5.4: Plant species summary statistics for the vegetation communities

VegComm	Total	Unique	%Unique	Shared	SA Endemic	Red List	Protected (Provincially)	Protected (National Forest Act)	Weeds	Alien Plants (Not Listed)	Invasive Alien Plants (Category 2b)
SE	152	52	34%	100	6	0	2	0	27	6	3
SV	67	8	12%	59	1	0	1	0	13	6	3
HE	125	32	26%	93	4	0	2	0	23	9	3
		N/A	**N/A**	**N/A**	**8**	**0**	**3**	**0**	**34**	**10**	**6**

Unique species are those that were only found in the vegetation type in question, and not in the others. Shared species are species of the specific vegetation type that were shared with one or more of the other vegetation types. Therefore, since some species were found in more than one vegetation type, the "Total" species numbers given below are not necessarily unique to each type.

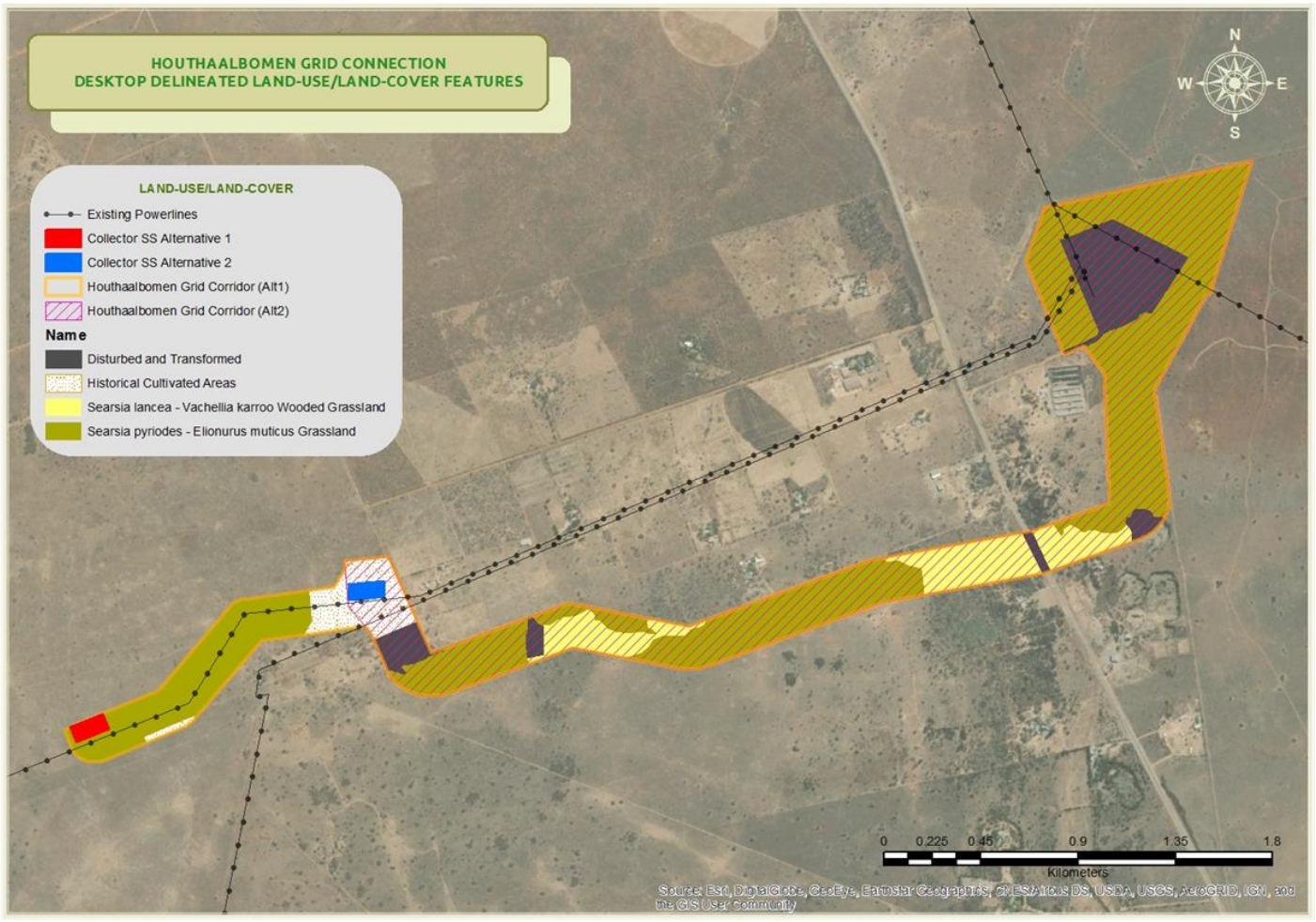

Figure 5.10: Fine scale mapping (ground truth/actual extent) of vegetation communities identified within the Grid Connection Corridor footprint (two available options/alternatives)

» ***Searsia pyroides – Elionurus muticus* Savanna-Grassland (VegComm SE)**

The bulk of the project grid corridor is located within this vegetation community. This vegetation community has been impacted by historical overgrazing; however, the vegetation cover has since stabilized and comprise moderate dense grass coverage with a few tree/tall shrub clusters scattered throughout this vegetation community. The moderate dense coverage of this grassland is likely due to combination of past management regimes (heavy stocking rates) as well as the relative shallow soils and high degree of surface rockiness.

This savanna-grassland type comprises a dominant open grassland with some scattered shrubs and trees (mainly *Searsia pyroides*, *S. Lancea, Celtis africana, Gymnosporia polyacanthus, Diospyros lycioides* and *Grewia flava*). Taller trees are relatively scarce and usually clumped together. Such clumps where, as mentioned scarce within the project site and typically comprise of *Searsia lancea, S. pyroides, Ziziphus mucronata, Celtis africana, Gymnosporia polyacanthus* and *Asparagus setaceus*

Variations within this community exist within the project site and are mainly as a result of the varying edaphic and geological characteristics as well as grazing impacts. These variations have resulted in a variety of mosaic patches with different small-scale species composition. This array of different microhabitats results in the relative high diversity on these plains. Deeper sandy areas typically comprise of a more open grassland

with less trees and shrubs and a well-developed, dense grass layer and a high diversity of forb species. Dominant grass species include *Anthephora pubescens, Aristida meridionals, A. adscensionis, A. canescens, Eragrostis trichophora, E. lehmanniana, E. chloromelas, Elionurus muticus, Themeda triandra, Cymbopogon caesius, C. pospischilii, Elionurus muticus, Eragrostis trichophora, and E. chloromelas.*

Taller shrubs are likely associated isolated deeper soil pockets interspersed between the shallow dolomite areas. These shrubs may occur as singular species dotted throughout the project site, or as clusters of taller tree and shrub species.

The overall ecological state of this vegetation appears to be slightly degraded, considering the relatively moderate vegetation cover and the dominance of low-value and less palatable grasses. The more natural grassland areas contain very few weeds and aliens, however along the access routes and especially around kraals and watering points, were significant trampling and continued overgrazing have occurred, weeds and alien plants are especially abundant.

A total of 152 species were recorded within this unit, of which 32 were found only in this unit (21%) and 120 were shared with one or more of the other units. Furthermore, six South-African endemics were found in this unit, namely *Gymnosporia polyacanthus, Selago tenuifolia, Ipomoea bathycolpos, Blepharis squarrosa, Chaetacanthus costatus* and *Acalypha caperonioides*. The unit did not contain any Red List species. However, the following protected plant was recorded within this vegetation community; *Schizocarphus nervosus.*

The tree/tall shrub layer had a fairly low coverage (±3%) within this community and tend to occur in small clusters scattered throughout this community. The height of this layer was between 3 and 4.5m. The grass layer is the dominant layer, covering approximately 50-75% of this community. Even though the forb layer only constitutes 20% of the total cover, this layer contains the highest species diversity.

» ***Searsia lancea – Vachellia karroo* Wooded-Grassland (VegComm SV)**

The slightly lower lying portion of the development footprint comprise a fairly dense, low to medium woodland/thicket. The area is characterized by gritty and stony soils that vary in depth and primarily overlies dolomite which may become exposed in some areas.

This woodland/thicket is dominated by *Vachellia karroo, Searsia pyroides, Celtis africana* and *Ziziphus mucronata* trees. The ground cover is fairly sparse and is largely dominated by forbs and weeds that can tolerate some shade. The density and height of the tree layer is highly varying. Apart from the above-mentioned tree species, other prominent plant species include *Gymnosporia heterophylla, Setaria verticillata, Eragrostis biflora, Sporobolus pyramidalis, Achyranthes aspera, Cynodon dactylon, Pergularia daemia, Clematis brachiata, Asparagus suaveolens, Grewia flava, Talinum arnotii and Lippia scaberrima*.

The overall ecological state of this vegetation appears to be largely moderately modified and the presence of more shrub like forms of *Vachellia karroo* within these woodland patches are likely due to overgrazing and the removal/disturbance of larger tree species. Disturbed area is prone to the invasion of weeds and low growing alien plants.

In comparison to the surrounding open grasslands, these thicket patches are relative species poor with on 67 plant species being recorded within these thicket patches. Furthermore, a fairly high percentage of these

recorded species are shared with the other two vegetation communities (88%). Furthermore, one South-African endemic was found in this unit, namely *Gymnosporia polyacanthus*. The unit did not contain any Red List species. However, the following protected plan was recorded within this community; *Babiana hypogea*.

The tree/tall shrub layer had a fairly high coverage (60-85%). The height of this layer was between 2m and 5m. The grass layer was fairly sparse covering approximately 10-15% of this community. The forb layer constitutes approximately 50-65% of the total ground cover.

» ***Hyparrhenia hirta – Eragrostis lehmanniana* Secondary Grassland**

This vegetation unit can also be regarded as a plagioclimax unit that has established and stabilised on old, cultivated areas (<30years). Soils are deeper, with rock material being removed from the upper soil layer in order to accommodate cultivation. These rock piles are still present along the edges of these historically cultivated areas. The soil consists of fairly fine-grained loams that are prone to sheet erosion and soil capping.

This secondary grassland comprises a moderate to dense, tall grassland with a variably small-scale species composition. Shrubs and trees tend to be sparse and occur as a few isolated specimens (mainly *Celtis africana*). The dominance of Increaser I, climax and sub-climax grasses are indicative of the past disturbance as well as the fact that some stability have been reached. Dominant grass species include *Hyparrhenia hirta, Cymbopogon caesius, Eragrostis lehmanniana, E. chloromelas, Cynodon dactylon, Aristida congesta* and *Pogonarthria squarrosa*. In comparison with the previous described vegetation communities, the herb and shrub diversity within this vegetation community is fairly poor and include *Seriphium plumosum, Asparagus laricinus, Berkheya onopordifolia, Conyza podocephala, Crabbea hirsuta, Geigeria burkei, Helichrysum cephaloideum, H. rugulosum, Ipomoea oblongata* and *Schkuhria pinnata*.

The overall ecological state of this vegetation appears to be degraded with the dominance of low palatable grasses.

A total of 125 species were recorded within this unit, of which 13 were found only in this unit (10%), of which most weeds and alien plants. Furthermore, 112 species were shared with one or more of the other units. Four South-African endemics were found in this unit, namely, *Blepharis squarrosa, Chaetacanthus costatus, Delosperma floribundum* and *Acalypha caperonioides*. The unit did not contain any Red List species. However, three protected species were recorded within this vegetation community namely, *Schizocarphus nervosus* and *Babiana hypogea*.

The tree/tall shrub layer had a low coverage (1%). The height of this layer was between 2m and 4m. The grass layer is the dominant layer, covering approximately 75% of this community whilst the herb layer only constitutes 12%.

ii. Fauna

a) Amphibians

Based on the IUCN Red List Spatial Data (IUCN, 2017), 19 amphibian species can be expected to occur within the vicinity of the project site, and according to the distribution maps of Du Preez & Carruthers (2009) and Minter *et a*l. (2004) a total of 21 amphibian species may be found within the region.

These 21 amphibian species are known to occur in QDSs 2626AA, 2625BB, 2525DD and 2526CCCB. according to the Animal Demographic Unit (ADU) database. Species that has been frequently observed within these QDGs are:

- Guttural Toad – *Sclerophrys gutturalis (No. of Records: 15)*
- Common Caco – *Cacosternum boetteri (No. of Records: 9);*
- Bubbling Kassina – *Kassina senegalensis (No. of Records: 8); and*

No amphibian species have been recorded within the project area, with very limited suitable habitat available for amphibian species. Artificial water points may provide some potential habitat for highly adaptive amphibians such as the Common Caco.

- **Amphibians Species of Conservation Concern (SCC)**

SCCs include those species listed within the Regional Red Data List (2017), Global Red Data List (2015), that indicate severe recent population decline and those species or populations of species that are highly range restricted.

Of the 21 amphibian species that have a natural distribution range that include the project site, only one species is regarded as of conservation namely *Pyxicephalus adspersus* (Giant Bullfrog) – Declining Population Trend. However due to the absence of suitable habitat, it is highly unlikely that this species will occur within the project site.

- **Protected Amphibians Species**

These area species that are either protected nationally within TOPS (Threatened and Protected Species Issued in terms of Section 56(1) of the National Environmental Management: Biodiversity Act, 2004) or provincially within Schedule 2 and 4 of the Transvaal Nature Conservation Ordinance (No 12 of 1983). In terms of Amphibians, only the Gian Bullfrog (*Pyxicephalus adspersus*) is protected within Schedule 2.

b) Reptiles

Based on the IUCN Red List Spatial Data (IUCN, 2017), 55 reptilian species can be expected to occur within the vicinity of the project site, and according to the distribution maps of Bates *et a*l. (2014) a total of 71 terrestrial reptilian species may be found within the region. Due to the relatively homogenous nature of the study area, it is expected that the diversity within the study area itself will be relatively low.

Of the 71 reptilian species that have a distribution that includes the study area, 28 are known to occur in QDSs 2625BB, 2626AA, 2525DD and 2526CC, according to the Animal Demographic Unit (ADU) database. Species that has been frequently observed within these QDGs are:

- Common Dwarf Gecko – *Lygodactylus capensis (No. of Records: 9)*
- Southern Rock Agama – *Agama atra (No. of Records: 8);*

- Fork-marked Sand Snake – *Psammophis trinasalis (No. of Records: 8);*
- Common Girdled Lizard – *Cordylus vittifer (No. of Records: 6);*
- Yellow-throated Plated Lizard – *Gerrhosaurus flavigularis (No. of Records: 6); and*
- Cape Skink – *Trachylepis capensis (No. of Records: 6)*

During the specialist site survey only six (6) indigenous reptile species have been observed through direct observations, within the project site. The area is, regarded as containing a potentially low diverse and functional reptile assemblage populating.

The following reptiles were observed within the project site:

- Cape Thick-toed Gecko (*Pachydactylus capensis*);
- Holub's Sandveld Lizard (*Nucras holubi*);
- Wahlberg's Snake-eyed Skink (*Afroablepharus wahlbergii*);
- Cape Skink (*Trachylepis capensis*);
- Speckled Rock Skink (*Trachylepis punctatissima*; and
- Mole Snake (*Pseudaspis cana*)

- **Reptiles Species of Conservation Concern (SCC)**

SCCs include those species listed within the Regional Red Data List (2017), Global Red Data List (2015), that indicate severe recent population decline and those species or populations of species that are highly range restricted.

Of the 71 reptile species that have a natural distribution range that include the project site and have a likelihood of occurring within the project site, none are listed as being of conservation concern on a regional or global basis.

- **Protected Reptiles Species**

These area species that are either protected nationally within TOPS (Threatened and Protected Species Issued in terms of Section 56(1) of the National Environmental Management: Biodiversity Act, 2004) or provincially within Schedule 2 and 4 of the Transvaal Nature Conservation Ordinance (No 12 of 1983).

According to the Transvaal Nature Conservation Ordinance all species of reptiles excluding Water Monitor (*Varanus niloticus*), Rock Monitor (*Varanus albigularis*), and all species of snakes (Sub-Order *Serpentes*) are protected within Schedule 2.

In terms of TOPS, only one species that has a distribution range that include the project site, is protected namely, the Southern African Python (*Python natalensis*). The likelihood of this species occurring within the project site is moderate.

c) Mammals

Based on the IUCN Red List Spatial Data (IUCN, 2017), 84 mammal species can be expected to occur within the vicinity of the project site. Of these species, 11 are medium to large conservation dependant species, or species that had a historical range that included the project area, but with natural populations since

becoming locally "extinct" in these areas. These species are now generally restricted to protected areas such as game reserves and protected areas, with most of these species being re-introduced in these areas.

Examples of such species are:

- Wide-lipped Rhinoceros – *Ceratotherium simum* (Near Threatened);
- Blue Wildebeest – *Connochaetes taurinus* (Least Concern);
- Black Wildebeest – *Connochaetes taurinus* (Least Concern);
- Cheetah – *Acinonyx jubatus* (Vulnerable);
- Cape Buffalo – *Syncerus caffer* (Near Threatened); and
- Hook-lipped Rhinoceros – *Diceros bicornis bicornis* (Endangered)

These species are not expected to occur in the project site and are removed from the expected Species of Conservation Concern (SCC) list.

According to the ADU database 93 mammals have been previously recorded within the larger survey area (Quarter Degree Grid: 2626DA) and includes a number of "exotic" mammals, especially antelope species, that have been primarily introduced by game farmers. Most of these species are confined by fences and should be considered as part of the farming system (game farming and hunting) rather than as wildlife per se. Some of these species are indigenous to South African but do not have a natural distribution that include this area. Examples of such introduced mammas species include.

- Roan Antelope – *Hippotragus equinus* (Endangered);
- One-humped Camel – *Camelus dromedarius* (Exotic);
- Fallow Deer – *Dama dama* (Exotic);
- Impala – *Aepyceros melampus* (Least Concern);
- Red River Hog – *Potamochoerus porcus* (Exotic);
- Southern Reedbuck – *Redunca arundinum* (Least Concern);
- Nyala – *Tragelaphus angasii* (Least Concern) and
- South African Giraffe – *Giraffa giraffa giraffa* (Least Concern)

Furthermore, according to the Animal Demographic Unit (ADU) database the following indigenous mammal species have been frequently observed within the relevant QDG:

- Slender Mongoose – *Herpestes sanguineus* (No. of Records: 168)
- South African Ground *Squirrel – Xerus inauris* (No. of Records: 165);
- Black-backed Jackal – *Canis mesomelas* (No. of Records: 161);
- Common Duiker – *Sylvicapra grimmia* (No. of Records: 122);
- Yellow Mongoose – *Cynictis penicillata* (No. of Records: 122);
- Steenbok - *Raphicerus campestris* (No. of Records: 62)
- Spring Hare – *Pedetes capensis* (No. of Records: 61);
- Cape Porcupine – *Hystrix africaeaustralis* (No. of Records: 55);
- Aardwolf – *Proteles cristata* (No. of Records: 52); and
- Cape Hare – *Lepus capensis* (No. of Records: 52)

During the specialist site survey, of the 73-remaining small- to medium sized mammal species, nineteen (18) indigenous mammal species and one (1) introduced species were observed (refer to Table **5.6**) through direct observations and/or the presence of visual tracks and signs, within the project site. These data

represent strong evidence as to a low diverse and functional mammal assemblage populating the study area.

Based on the various sampling techniques, the following mammals were the most frequently observed within the project site:

» Red Veld Rat (*Aethomys chrysophilus*);
» Bushveld Gerbil (*Gerbilliscus leucogaster*);
» Cape Porcupine (*Hystrix africaeaustralis*);
» Yellow Mongoose (*Cynictis penicillata*);
» Cape Ground Squirrel (*Xerus inauris*); and
» Black-backed Jackal (*Canis mesomelas*)

Table 5.6: List of Mammalian species that has been observed within the various habitat types.

Species	Common Name	Faunal Habitats			
		Woodland	Open Grassland	Secondary Grassland	Disturbed and Transformed Areas
Common Duiker	Sylvicapra grimmia	X			X
Raphicerus campestris	Steenbok		X	X	
Cynictis penicillata	Yellow Mongoose		X	X	X
Otocyon megalotis	Bat-eared Fox			X	
Canis mesomelas	Black-backed Jackal		X	X	X
Proteles cristata	Aardwolf		X		
Phacochoerus africanus	Common Warthog		X	X	
Lepus capensis	Cape Hare		X	X	
Rhabdomys pumilio	Four-striped Grass Rat		X	X	X
Gerbilliscus leucogaster	Bushveld Gerbil			X	X
Xerus inauris	Cape Ground Squirrel		X	X	X
Cryptomys hottentotus	Cape Mole-rat	X	X	X	
Hystrix africaeaustralis	Cape Porcupine		X	X	X
Mastomys coucha	Southern Multimammate Mouse			X	
Aethomys chrysophilus	Red Veld Rat		X		
Ictonyx striatus	Striped Polecat	X	X	X	
Orycteropus afer	Aardvark		X	X	
Felis catus	Domestic Cat	X			

Structural and compositional habitat/vegetation unit diversity can be described as low to moderate low diverse within the project site. The most significant habitat within the project site is the open/savanna – grassland. The dense vegetation cover within this wooded grassland maintains the functionality of the soil, maintains food resources for fauna, limits loss of water resources and nutrient resources from the system, creates a diverse habitat for small fauna and prevents degradation of the ecosystem. This habitat type is fairly diverse in terms of its structural diversity allowing for most of the mammal diversity, observed within the project site, to inhabit this area. Furthermore, the higher rodent, and invertebrate activities associated with both wooded grassland habitat also makes this habitat a valuable forage/hunting area for meso-predators and insectivores such as Bat-eared Fox, Aardvark, Black-Backed Jackal, African Striped Weasel, Yellowtail Mongoose, Striped Polecat, and Aardwolf.

» **Mammals Species of Conservation Concern (SCC)**

SCCs include those species listed within the Regional Red Data List (2016), Global Red Data List (2015), that indicate severe recent population decline and those species or populations of species that are highly range restricted.

Of the remaining 73 small- to medium sized mammal species, that have a natural distribution range that include the project site and have a likelihood of occurring within the project site, 11 (eleven) are listed as being of conservation concern on a regional or global basis (refer to **Table 5.7**).

The list of potential species includes:

- Two (2) that are listed as Vulnerable (VU) on a regional basis; and
- Five (4) that are listed as Near Threatened (NT) on a regional scale.

Table 5.7: List of mammal species of conservation concern that may occur in the project area as well as their global and regional conservation statuses (IUCN, 2017; SANBI, 2016)

Species	Common Name	Conservation Status			Likelihood of Occurrence
		Red Data	IUCN	TOPS	
Anonyx capensis	Cape Clawless Otter	NT	NT		Very Low
Atelerix frontalis	South African Hedgehog	NT	LC		High
Felis nigripes	Black-footed Cat	VU	VU		Low
Hydrictis maculicollis	Spotted-necked Otter	VU	NT		Very Low
Leptailurus serval	Serval	NT	LC		Moderate
Mystromys albicaudatus	White-tailed Rat	VU	EN		Moderate
Crocidura mariquensis	Swamp Musk Shrew	NT	DD		Very Low
Smutsia temminckii	Ground Pangolin	VU	VU		Low
Panthera pardus	Leopard	VU	VU		Low
Parahyaena brunnea	Brown Hyena	NT	NT		Moderate
Poecilogale albinucha	African Striped Weasel	NT	LC		Moderate

During the site visit no Mammal SCC were recorded through active searching (diurnal and nocturnal surveys), camera trapping, Sherman trapping and through random observations. Based on the ecology and behaviour of the potential Mammal SCC that may occur within the region, it is highly unlikely that this development will threaten local individuals and populations of Mammal SCC.

- **Protected Mammal Species**

These area species that are either protected nationally within TOPS (Threatened and Protected Species Issued in terms of Section 56(1) of the National Environmental Management: Biodiversity Act, 2004) or provincially within Schedule 2 and 4 of the Transvaal Nature Conservation Ordinance (No 12 of 1983).

During the site visit three protected mammal species (within TOPS as well as Provincial Act) were recorded namely:

- Steenbok (*Raphicerus campestris*);
- Aardwolf (*Proteles cristata*); and

» Aardvark (*Orycteropus afer*).

The most significant habitat for these protected species, are the open grassland (both variations), especially were the soils are suitable for burrowing. Numerous termite mounds were present, especially within the secondary grassland, and these termites for the foundation of the Aardwolf and Aardvark's diet.

iii. Alien invasive species

A total of 19 alien plant species were found within the development footprint (refer to **Table 5.8**). Of these 19 alien plants, nine have been listed as Invasive Alien Plants (NEM:BA Alien & Invasive Species Regulations) (Table 17) and include: *Eucalyptus camaldulensis* (Category 2), E. *sideroxylon* (Category 2), *Opuntia aurantiaca* (Category 1b), *Opuntia ficus-indica* (Category 1b), *Opuntia humifusa* (Category 1b), *Pyracantha angustifolia* (Category 1b), *Datura stramonium* (Category 1b), *Verbena stramonium* (Category 1b) and *V. aristigera* (Category 1b). Furthermore, a total of 34 Weeds were recorded of which most were associated with the secondary grassland.

In terms of the primary grassland communities' weeds (W) and alien plants (AP) where largely absent from the more natural areas. However trampled and overgrazed area as well as the margins of access routes and firebreaks contained varying levels of weeds and alien plants. The most common weeds and APs recorded within these areas includes *Alternanthera pungens (AP), Conyza bonariensis (AP), Schkuhria pinnata (AP), Zinnia peruviana (AP), Nidorela resedifolia (W), Aristida congesta (W), Aristida adscensionis (W), Berkheya onopordifolia (W), Cynodon dactylon (W), Chloris virgata (W), Heteropogon contortus (W) and Urochloa panicoides (W)*. Severely degraded and trampled areas are prone to the invasion of Invasive Alien Plants (IAPs), especially Datura stramonium and Xanthium spinosum (e.g., trampled areas around kraal and artificial water points).

The secondary grassland (VegComm HE) comprises numerous weeds as well as a few alien plants and include *Conyza podocephala (AP), C. bonariensis (AP), Schkuhria pinnata (AP), Tagetes minuta (AP), Chrysocoma ciliata (W), Nidorella resedifolia (W), Aristida congesta (W), Asparagus laricinus (W), Solanum lichtensteinii (W), Aristida adscensionis (W), Hyparrhenia hirta (W), Berkheya onopordifolia (W), Geigeria burkei (W) and Cynodon dactylon (W)*.

Invasive alien plants that were not recorded within the development footprint but was observed within the surrounding properties or in close proximity to the development footprint include: *Melia azedarach (Category 1b), Solanum sisymbriifolium (Category 1b), S. elaeagnifolium (Category 1b), Flaveria bidentis (Category 1b) and Argemone ochroleuca (Category 1b)*. The potential for some of these species to encroach and establish in the disturbed development footprint, during the construction phase an operational phase, are relatively high and as such these species should also be taken into account when drafting the Invasive Alien Plant Management Plan.

Table 5.8: Alien plant species recorded within the project site; W = Weed; AP = Alien Plant; IAP = Invasive Alien Plant

Family	Species	Status
Amaranthaceae	*Alternanthera pungens*	AP
Asteraceae	*Bidens biternata*	AP
Asteraceae	*Conyza bonariensis*	AP

Amaranthaceae	*Gomphrena celosioides*	AP
Plantaginaceae	*Plantago lanceolata*	AP
Asteraceae	*Pseudognaphalium luteo-album*	AP
Asteraceae	*Schkuhria pinnata*	AP
Fabaceae	*Tagetes minuta*	AP
Asteraceae	*Zinnia peruviana*	AP
Asteraceae	*Conyza podocephala*	AP
Cactaceae	*Opuntia aurantiaca*	IAP: Category 1b
Cactaceae	*Opuntia ficus-indica*	IAP: Category 1b
Cactaceae	*Opuntia humifusa*	IAP: Category 1b
Cactaceae	*Pyracantha angustifolia*	IAP: Category 1b
Myrtaceae	*Eucalyptus camaldulensis*	IAP: Category 2
Myrtaceae	*Eucalyptus sideroxylon*	IAP: Category 2
Solanaceae	*Datura stramonium*	IAP: Category 1b
Verbenaceae	*Verbena bonariensis*	IAP: Category 1b
Verbenaceae	*Verbena aristigera*	IAP: Category 1b
Amaranthaceae	*Achyranthes aspera*	W
Asteraceae	*Berkheya onopordifolia*	W
Acanthaceae	*Chamaesyce inaequilatera*	W
Apocynaceae	*Gomphocarpus physocarpus*	W
Convolvulaceae	*Convolvulus sagittatus*	W
Cucurbitaceae	*Cucumis zeyheri*	W
Asteraceae	*Geigeria burkei*	W
Rubiaceae	*Kohautia caespitosa*	W
Asteraceae	*Lactuca inermis*	W
Asteraceae	*Nidorella resedifolia*	W
Fabaceae	*Tripteris aghillana*	W
Poaceae	*Aristida adscensionis*	W
Poaceae	*Aristida adscensionis*	W
Poaceae	*Aristida congesta subsp. Barbicollis*	W
Poaceae	*Aristida congesta subsp. Congesta*	W
Poaceae	*Aristida stipitata*	W
Poaceae	*Chloris virgata*	W
Poaceae	*Cynodon dactylon*	W
Poaceae	*Eragrostis biflora*	W
Poaceae	*Heteropogon contortus*	W
Poaceae	*Hyparrhenia hirta*	W
Poaceae	*Melinis repens*	W
Poaceae	*Schmidtia kalahariensis*	W
Poaceae	*Setaria verticillata*	W
Poaceae	*Sporobolus pyramidalis*	W
Poaceae	*Tragus berteronianus*	W
Poaceae	*Trichoneura grandiglumis*	W
Poaceae	*Urochloa panicoides*	W
Asparagaceae	*Asparagus laricinus*	W

Asteraceae	*Chrysocoma ciliata*	W
Gnidiaaceae	*Gnidia polycephala*	W
Seriphiaceae	*Seriphium plumosum*	W
Solanaceae	*Solanum lichtensteinii*	W

iv. Species of Conservation Concern (SCC)

A list was obtained from the SANBI database (POSA — Plants of southern Africa; http://posa.sanbi.org/) containing all plant species that have been recorded to date from the surroundings of the study area. POSA generated species lists also contain updated Red Data information according to the Red List of South African Plants (Raimondo et al., 2009; updated online version: http://redlist.sanbi.org/). Species listed as protected were also identified in the list. Therefore, only SoCC that may potentially occur in the study area have been listed within the baseline study section of this report.

Of the 453 -plant species, three are listed Red Data species whilst 16 South African Endemic species have been recorded within the region. Furthermore, according to the generated species list, 8 species have been recorded within the area, which is protected under the Transvaal Nature Conservation Ordinance, whist one tree species has been recorded which is protected under the National Forest Act namely *Vachellia (Acacia) erioloba*.

A previous study conducted by Strohbach (2013) within the affected properties identified 187 species. Furthermore, this study did not confirm any plant SCC (Red data and range restricted species), however 10 South African Endemic species, five provincially protected and one national protected tree species (*V. erioloba*) were confirmed within the affected properties (refer to **Table 5.9**).

Table 5.9: List of floral species that are of conservation concern, which may potentially be found in project area

Species	STATUS	BODATSA-POSA, 2021	Strohbach, 2013	Likelihood of Occurrence
Nananthus vittatus	DD	X		Low
Cleome conrathii	NT & Endemic	X		Moderate
Brachystelma incanum	VU & Endemic	X		Moderate
Gladiolus elliotii	Protected	X		Low
Gladiolus permeabilis	Protected	X		Moderate
Gladiolus sp.	Protected	X		
Crinum graminicola	Protected	X		Moderate
Crinum macowanii	Protected	X	X	High
Brachystelma foetidum	Protected	X		High
Habenaria epipactidea	Protected	X		Low
Acacia erioloba	Protected	X	X	High

Schizocarphus nervosus	Protected	X		Confirmed

In terms of the Red Data species recorded within the region; one species is listed as Data Deficient (DD), one species as Near Threatened (NT) and one as Vulnerable (VU).

Ground truthing confirmed no Species of Conservation Concern (SCC) with the affected property while three provincially protected species (Transvaal Nature Conservation Ordinance) and one protected tree (National Forest Act) were confirmed to be present on site (refer to **Table 5.10**). All of these species are fairly common within the region and have a fairly wide range within South Africa. *Babiana hypogea* were fairly common within the project area and were recorded frequently within all three vegetation communities.

Also, worth mentioning are species that are not protected or listed as Red Data species but are declining (population decline within South Africa). Such species recorded within the project site include *Boophone disticha, Hypoxis hemerocallidea and Pelargonium dolomiticum*. Due to their medicinal value, these species are often exposed to illegal collection and trade within the muti-industry. All of these species have a fairly wide distribution range and are regarded as fairly abundant within the Lichtenburg are, and as such it is highly unlike that the development will have a significant impact on local populations.

Table 5.10: Protected Plant Species recorded within the affected properties. "TNCO" = Transvaal Nature Conservation Ordinance; "NFA" = National Forest Act.

Species	IUCN Red List	TNCO (Schedule)	NFA	Declining National Populations
Schizocarphus nervosus	LC	7		
Babiana hypogea	LC	7		
Pelargonium dolomiticum	LC			X
Boophone disticha	LC			X
Hypoxis hemerocallidea	LC			X

v. Critical Biodiversity Areas and Conservation Targets

The Houthaalboomen grid connection corridor falls within the planning domain of the North West Province Biodiversity Conservation Assessment which maps Terrestrial and Aquatic Critical Biodiversity Areas and Ecological Support Areas within the North West Province.

Critical Biodiversity Areas (CBAs) are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services. These form the key output of a systematic conservation assessment and are the biodiversity sectors inputs into multi-sectoral planning and decision-making tools. The use of CBAs within the North West Province follows the definition laid out in the guideline for publishing bioregional plans (Anon, 2008).

According to the guidelines for bioregional plans, three basic CBA categories can be identified based on three high-level management objectives

CBA Category	Land Management Objective
Critical Biodiversity Areas (CBAs) Definition: CBAs are areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained in a natural or near-natural state then biodiversity conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity-compatible land uses and resource uses.	
CBA 1 and Protected Areas	Natural landscapes: » Ecosystems and species fully intact and undisturbed » These are areas with high irreplaceability or low flexibility in terms of meeting biodiversity pattern targets. If the biodiversity features targeted in these areas are lost then targets will not be met. » These are landscapes that are at or past their limits of acceptable change.
CBA 2	Near-natural landscapes: » Ecosystems and species largely intact and undisturbed. » Areas with intermediate irreplaceability or some flexibility in terms of area required to meet biodiversity targets. There are options for loss of some components of biodiversity in these landscapes without compromising our ability to achieve targets. » These are landscapes that are approaching but have not passed their limits of acceptable change.
Ecological Support Areas (ESAs) Definition: ESAs are areas that are not essential for meeting biodiversity representation targets/thresholds but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water and food provision, or carbon sequestration. The degree of restriction on land use and resource use in these areas may be lower than that recommended for critical biodiversity areas.	
ESA	Functional landscapes: » Ecosystems moderately to significantly disturbed but still able to maintain basic functionality. » Individual species or other biodiversity indicators may be severely disturbed or reduced. » These are areas with low irreplaceability with respect to biodiversity pattern targets only.
ONA	Production landscapes: » Manage land to optimise sustainable utilization of natural land.

In terms of Terrestrial CBAs:

- **Houthaalboomen Grid Alternative 1:** Approximately 70% of the grid corridor is located within a T_CBA2 while the remaining 30% of the grid corridor is located within a T_ESA1. Collector substation (Alternative 1) entire site is located within a T_ESA1 (refer to Figure 5.11).
- **Houthaalbomen Grid Alternative 2:** Approximately 90% of the grid corridor is located within a T_CBA2 while the remaining 10% of the grid corridor is located within a T_ESA1. Collector substation (Alternative 2) entire site is located within an A_ESA1 (refer to Figure 5.11).

In terms of Aquatic CBAs:

- **Houthaalboomen Grid Alternative 1:** Approximately 95% of the grid corridor is located within an A_ESA2 whie the remaining 5% of the grid corridor is located within an A_ESA2. Collector substation (Alternative 1) entire site is located within an A_ESA1 (refer to Figure 5.12).
- **Houthaalbomen Grid Alternative 2:** Approximately 90% of the grid corridor is located within an A_CBA2 while the remaining 10% of the grid corridor is located within an A_ESA1. Collector substation (Alternative 2) entire site is located within an A_ESA1 (refer to Figure 5.12).

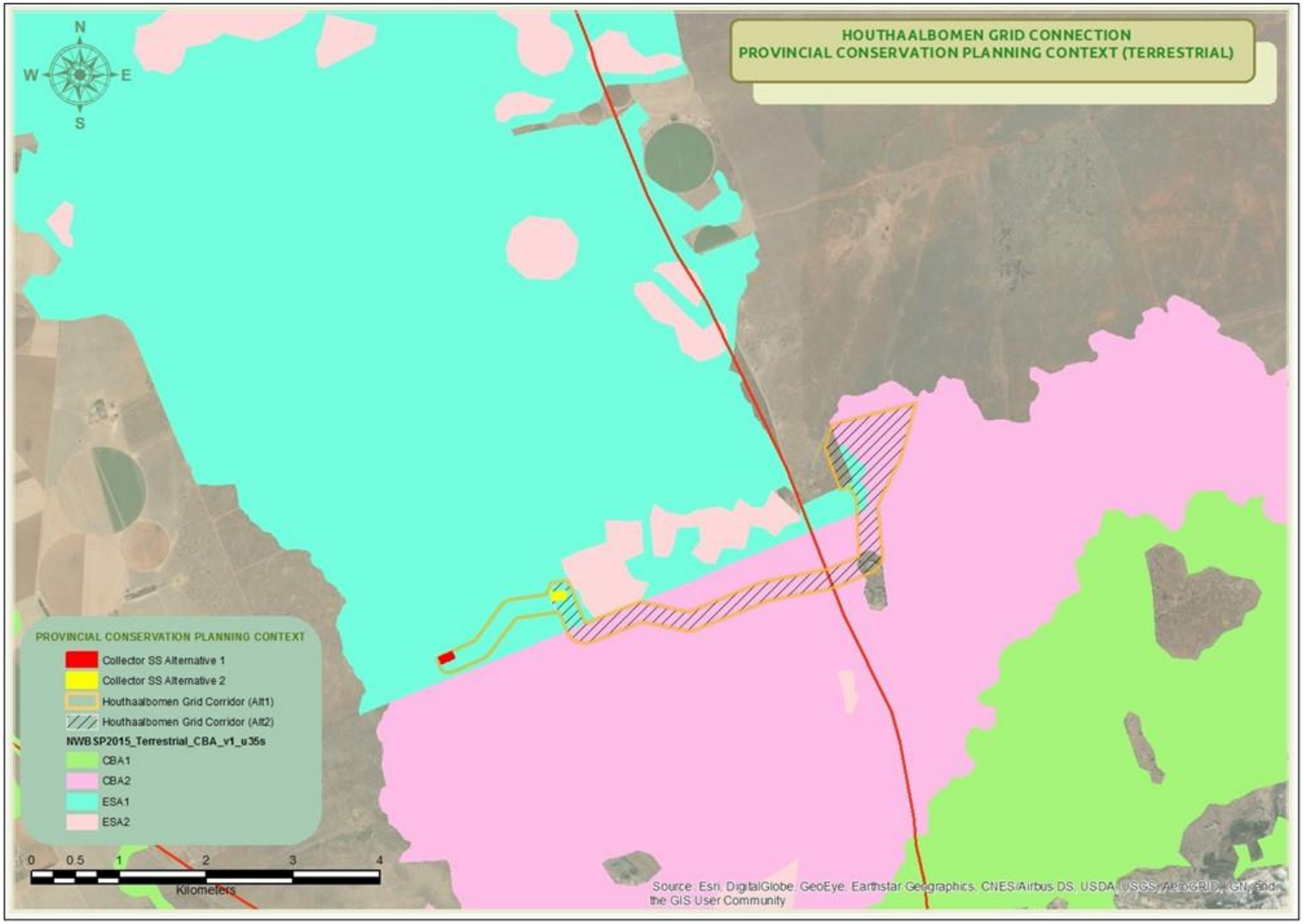

Figure 5.11: Map illustrating Terrestrial CBAs, within the Houthaalboomen grid connection corridor (North West Province Biodiversity Conservation Assessment)

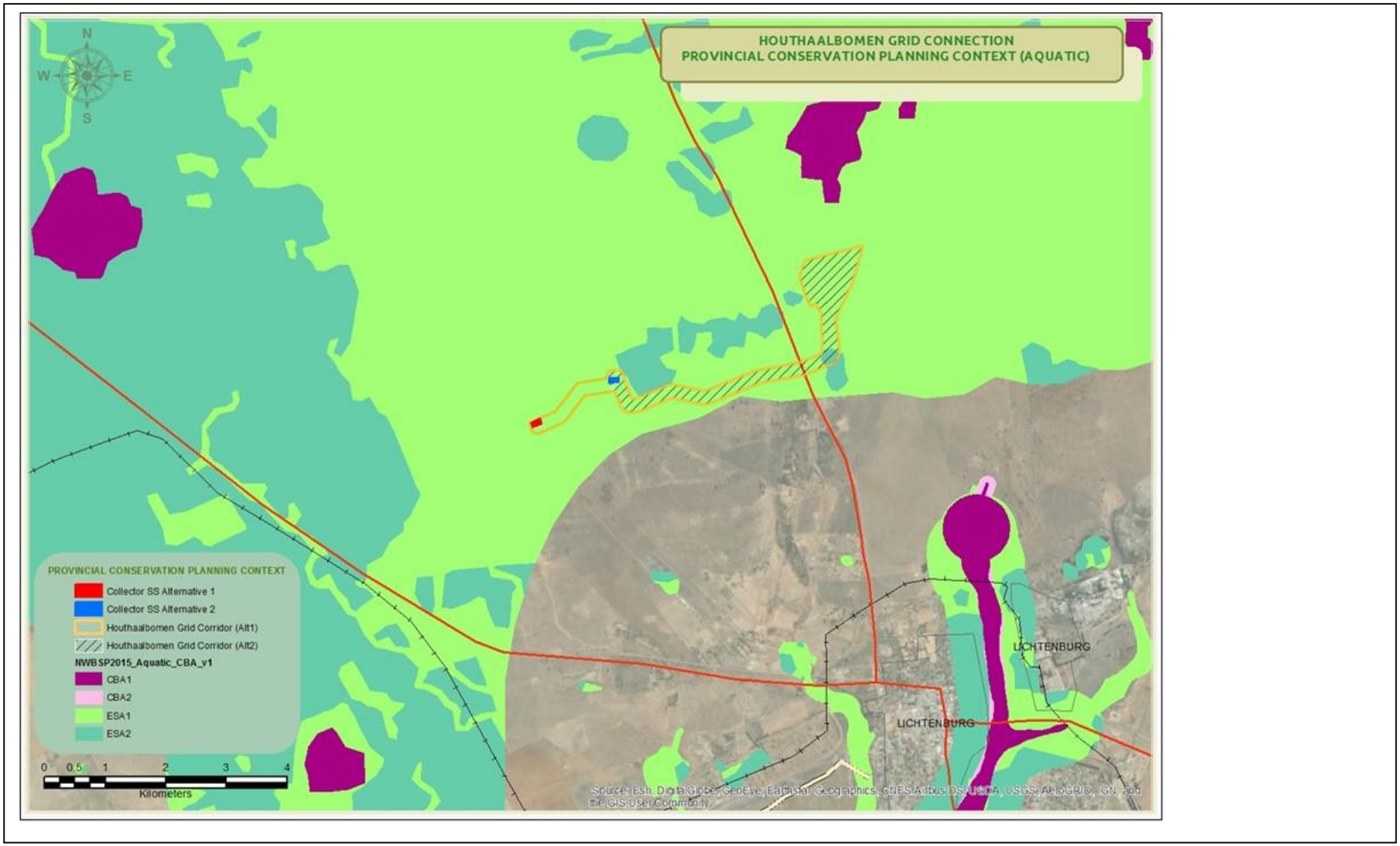

Figure 5.12: Map illustrating Aquatic CBAs, within the Houthaalboomen grid connection corridor (North West Province Biodiversity Conservation Assessment)

vi. Freshwater Features

A review of the NFEPA coverage for the study area revealed that the entire project site is located within a sub-quaternary catchment classified as an "Upstream Management Area" (UMA). These UMAs represent sub-quaternary catchments in which human activities need to be managed to prevent degradation of downstream river FEPAs and Fish Support Areas but do not include management areas for wetland FEPAs, which need to be determined at a finer scale (Driver et al., 2011). The most important drainage feature within this sub-quaternary catchment is an unnamed tributary of the Harts River, located some 7.4km to the south-east of the project site.

The study area is situated approximately 7.4 km north west of the Klein Harts River and other tributaries of the Harts River, which forms the most important surface hydrological feature of the region. Generally surface water within the Lichtenburg area is scarce with very few of the watercourses or pans having perennial water.

In terms of the NFEPA (2011) and the SANBI 2018 spatial database no wetlands or freshwater/watercourse features are located within the project site and within the 500m regulated area. Following a desktop mapping exercise and a screening site-visit it was confirmed that no freshwater resource features are located within the project site or within close proximity to the site.

5.4.4. Avifauna profile for the area

The eastern part of the grid corridor is located adjacent to the Lichtenburg Game Breeding Centre. This conservation area contains a variety of game species, and the facility used to operate a vulture restaurant which attracts foraging vultures (three species) to the region.

There are no other formal protected areas or any Important Bird and Biodiversity Areas in close proximity to the development area. There are supporting avifaunal habitat within the development area (refer to **Figure 5.13 and Figure 5.14),** and this includes:

» ***Open mixed dolomite grassland with bush clump mosaics:***

It is occupied by a typical grassland bird composition dominated by insectivorous and granivore passerine bird species such as Desert Cisticola, (*Cisticola aridulus*), Eastern Clapper Lark (*Mirafra fasciolata*) (Melodious Lark (*Mirafra cheniana*), Spike-heeled Lark (*Chersomanes albofasciata*), Cape Longclaw (*Macronyx capense*), Ant-eating Chat (*Myrmecocichla formicivora*) and African Pipit (*Anthus cinnamomeus*). Prominent non-passerine species include Orange River Francolin (*Scleroptila gutturalis*), Swainson's Spurfowl (*Pternistis swainsonii*), Northern Black Korhaan (*Afrotis afraoides*), Crowned Lapwing (*Vanellus coronatus*) and Black-winged Kite (*Elanus caeruleus*).

» **Mixed open woodland**

The tall vertical heterogeneity assists with the colonisation of a "Bushveld" bird association consisting of mainly insectivorous passerines. Other noteworthy species include Crested Barbet (*Trachyphonus vaillantii*), Crimson-breasted Shrike (*Laniarius atrococcineus*) and Common Scimitarbill (*Rhinopomastus cyanomelas*).

This habitat often provides roosting opportunities for large birds of prey such as the White-backed Vulture (Gyps africanus.

» **Artificial livestock watering points**

These are represented by artificial water troughs and reservoirs with the purpose to provide drinking water to livestock. However, they act as focal congregation areas for many granivore passerine and non-passerine species, including Cape Sparrow (*Passer melanurus*), Laughing Dove (*Spilopelia senegalensis*), Namaqua dove (*Oena capensis*), Scaly-feathered Weaver (*Sporopipes squamifrons*) and Wattled Starling (*Creatophora cinerea*).

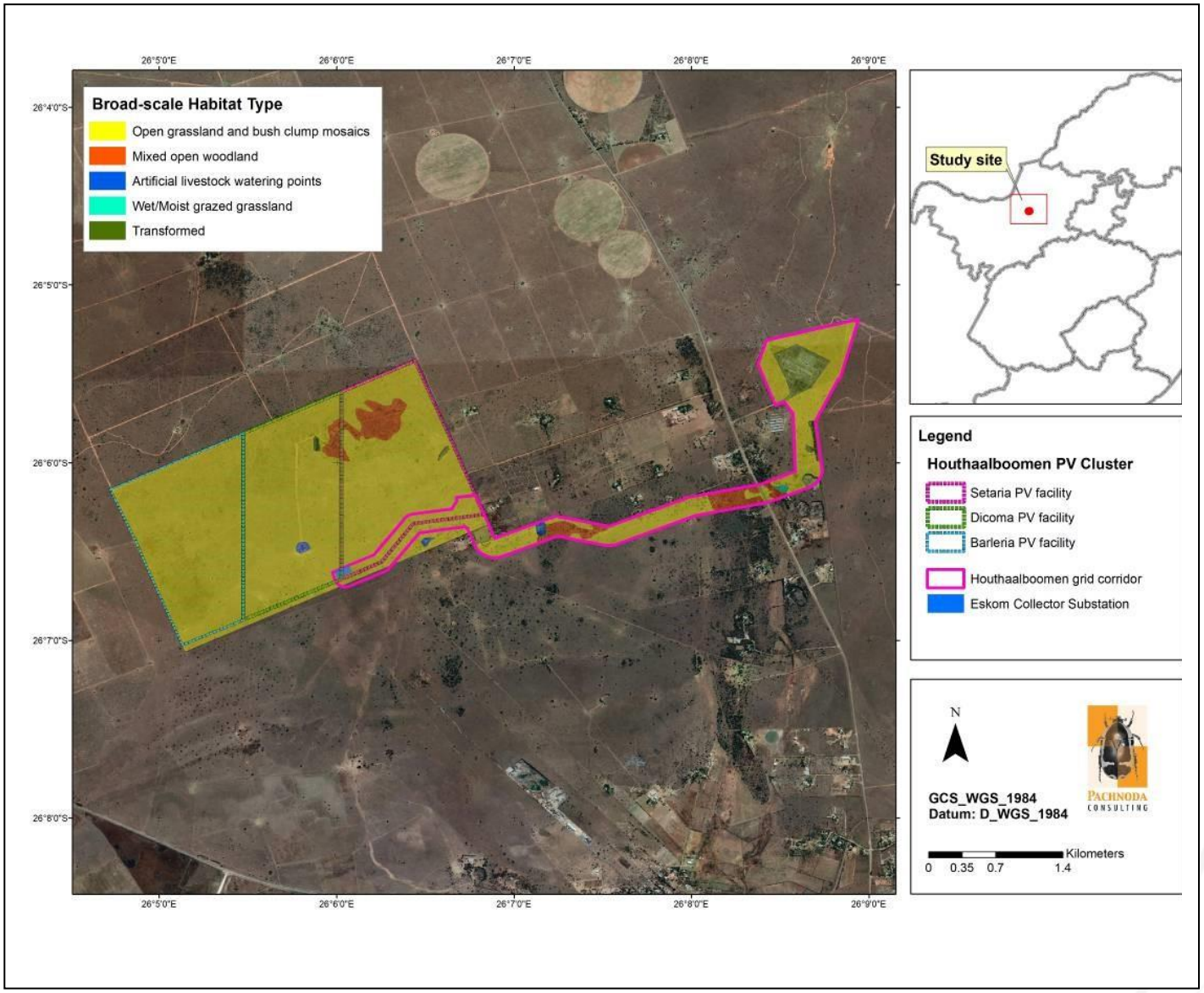

Figure 5.13: A habitat map illustrating the important avifaunal habitat types within the grid connection corridor

Figure 5.14: A collage of images illustrating examples of avifaunal habitat types (open mixed dolomite grassland and bush clumps mosaic, mixed open woodland and artificial livestock watering points).

» ***Avian species richness and predicted summary statistics***

Approximately 176 bird species are expected to occur on the study site and immediate surroundings (refer to **Table 5.11**). The expected richness was inferred from the South African Bird Atlas Project (SABAP1 & SABAP2) and the presence of suitable habitat in the study area. The expected richness is also strongly correlated with favourable environmental conditions (e.g. during good rains) and seasonality (e.g. when migratory species are present). This equates to 17% of the approximate 985[8] species listed for the southern African subregion[9] (and approximately 21 % of the 857 species recorded within South Africa[10]). However, the total species richness obtained from the pentad grid 2605_2605 corresponding to the study site was slightly higher than the expected number of species, with 186 species recorded. The latter mainly includes waterbird and shorebird taxa which were absent from the study site due to the absence of suitable wetland habitat. According to field observations, the total number of species observed on the project area is ca. 97 species (61 species during the austral dry season and 78 during the austral summer. The total species richness obtained from the pentad grid 2605_2605 corresponding to the project area contained 176 species, with an average number of 50 species for each full protocol card submitted (for observation of two hours or more). On a national scale, the species richness per pentad on the study area is considered moderate.

As indicated in **Table 5.11**, the study site is poorly represented by biome-restricted[11] (refer to **Table 5.12**) and local endemic bird species. It does support *ca*. 34% of the near -endemic species present in the subregion. Of the 176 bird species expected to occur in the project area, 11 are threatened or near threatened species, 15 are southern African endemics and 21 are near-endemic species. In addition, one threatened species (White-backed Vulture *Gyps africanus*) was observed on the study site. Furthermore, 11 southern African endemics and 15 near-endemic species were confirmed on the study site and the immediate surroundings. Prominent wetland features and waterbodies are absent from the study site, thereby explaining the absence and low richness of waterfowl, wading birds and shorebird taxa.

Table 5.11: A summary table of the total number of species, Red listed species (according to Taylor et al., 2015 and the IUCN, 2021), endemics and biome-restricted species (Marnewick et al., 2015) expected (*sensu* SABAP1 and SABAP2) to occur in the study site and immediate surroundings.

Description	**Expected Richness Value**	Observed Richness Value
Total number of species*	176 (17 %)	97 (55 %)
Number of Red Listed species*	11 (9 %)	1 (9 %)
Number of biome-restricted species – Zambezian and Kalahari-Highveld Biomes*	4 (29 %)	4 (100 %)
Number of local endemics (BirdLife SA, 2018)*	2 (5 %)	1 (50 %)
Number of local near-endemics (BirdLife SA, 2018)*	7 (23 %)	6 (86 %)

8 *sensu* www.zestforbirds.co.za (Hardaker, 2020)

9 A geographical area south of the Cunene and Zambezi Rivers (includes Namibia, Botswana, Zimbabwe, southern Mozambique, South Africa, Swaziland and Lesotho).

10 With reference to South Africa (including Lesotho and Swaziland (BirdLife South Africa, 2018).

11 A species with a breeding distribution confined to one biome. Many biome-restricted species are also endemic to southern Africa.

Number of regional endemics (Hockey *et al.,* 2005)	15 (14 %)	11 (73 %)
Number of regional near endemics (Hockey *et al.,* 2005)	21 (34 %)	15 (71 %)

only species in the geographic boundaries of South Africa (including Lesotho and Swaziland) were considered.
only species in the geographic boundaries of southern Africa (including Namibia, Botswana, Zimbabwe and Mozambique south of the Zambezi River) were considered
Percentage values in brackets refer to totals compared against the South African avifauna (*sensu* BirdLife SA, 2018)

Table 5.12: Expected biome-restricted species (Marnewick *et al*, 2015) likely to occur on the study site

Species	Kalahari-Highveld	Zambezian	Expected Frequency of occurrence
Kalahari Scrub-robin (*Cercotrichas paena)*	X		Common
Kurichani Thrush (Turdus libonyana)		X	Uncommon
White-throated Robin-chat (*Cossypha humeralis*)		X	Common
White-bellied Sunbird (*Cinnyris talatala*)		X	Common

» ***Bird species of conservation concern***

Table 5.13 provides an overview of bird species of conservation concern that could occur on the study site based on their historical distribution ranges and the presence of suitable habitat. A total of 11 species could occur on the study site which includes six globally threatened species, one globally near threatened species, two regionally threatened species and two regionally near-threatened species.

It is evident from **Table 5.13** that the highest reporting rates (>5%) were observed for the globally endangered Cape Vulture (*Gyps coprotheres*) and the globally critically endangered White-backed Vulture (*Gyps africanus*), the globally endangered Lappet-faced Vulture (*Torgos tracheliotos*). These species have a high likelihood of occurrence pending the presence of suitable food (livestock carcasses). Six independent observations were made of White-backed Vulture (*Gyps africanus*) on the project area during the surveys The regionally vulnerable Lanner Falcon (*Falco biarmicus*), and regionally near threatened Abdim's Stork (*Ciconia abdimii*) show reporting rates show reporting rates between 3% and 4 %. These species have a moderate probability of occurrence and are regarded as occasional foraging visitors to the area.

The remaining species have low reporting rates (<2%) and are regarded as irregular foraging visitors with low probabilities of occurrence. However, during the site survey it was noticed that extensive areas of suitable foraging habitat persist for some of these species (e.g. Secretarybird *Sagittarius serpentarius*) despite being ominously absent from the area. It is possible that the low reporting rates reflect the poor coverage of the study area by citizen scientists (e.g., birdwatchers), and some of these species could occur in higher numbers due to being overlooked. As an example, Red-footed Falcons (*F. vespertinus*) often occur in flocks of the similar-looking Amur Falcon (*F. amurensis*), which based on reporting rates appear to be a common summer visitor to the area. Therefore, it is highly possible that Red-footed Falcons were previously overlooked or misidentified.

Table 5.13: Bird species of conservation concern that could utilise the study site based on their historical distribution range and the presence of suitable habitat. Red list categories according to the IUCN (2021) and Taylor et al. (2015).

Species	Global Conservation Status*	National Conservation Status**	Mean Reporting rate: SABAP1 (n=142)	Mean Reporting rate: SABAP2 (n=64)	Preferred Habitat	Potential Likelihood of Occurrence
Anthropoides paradiseus (Blue Crane)	Vulnerable	Near threatened	47.18	-	Prefers open grasslands. Also forages in wetlands, pastures and agricultural land.	Potential vagrant or highly irregular foraging visitor. It has not been observed on the study area since 2007.
Aquila rapax (Tawny Eagle)	Endangered-	Endangered	2.11	-	Lowveld and Kalahari savannas, especially game farming areas and reserves	An irregular visitor or vagrant to the study site. It has not been observed on the study area since 2007.
Ciconia abdimii (Abdim's Stork)	-	Near threatened	7.75	3.70	Open stunted grassland, fallow land and agricultural fields.	An uncommon summer foraging visitor to areas consisting of secondary grassland or arable land.
Falco vespertinus (Red-footed Falcon)	Near threatened	Near threatened	2.11	2.67	Varied, prefers to hunt open arid grassland and savannoid woodland, often in company with Amur Falcons (F. amurensis).	An occasional summer foraging visitor to the area.
Falco biarmicus (Lanner Falcon)	-	Vulnerable	2.82	4.00	Varied, but prefers to breed in mountainous areas.	An occasional foraging visitor to the study area.
Gyps coprotheres (Cape Vulture)	Endangered	Endangered	17.16	10.67	Mainly confined to mountain ranges, especially near breeding site. Ventures far afield in search of food.	A regular foraging/scavenging visitor to the study site pending the presence of food (e.g. livestock carcasses).
Gyps africanus (White-backed Vulture)	Critically Endangered	Critically Endangered	16.18	13.33	Breed on tall, flat-topped trees. Mainly restricted to large rural or	A regular foraging/scavenging visitor to the study site pending the presence of food

					game farming areas.	(e.g. livestock carcasses).
Leptoptilos crumeniferus (Marabou Stork	-	Near threatened	0.70	1.56	Varied, from savanna to wetlands, pans and floodplains – dependant of game farming areas	An irregular scavenging visitor to the area. It has not been observed on the study area since 2007.
Polemaetus bellicosus (Martial Eagle)	Endangered	Endangered	-	1.33	Varied, from open karroid shrub to lowland savanna.	An irregular foraging visitor
Sagittarius serpentarius (Secretarybird)	Endangered	Vulnerable	2.45	2.67	Prefers open grassland or lightly wooded habitat.	Regarded as an irregular foraging visitor to the study site despite the widespread presence of suitable foraging habitat.
Torgos tracheliotos (Lapped-faced Vulture)	Endangered	Endangered	5.63	5.33	Lowveld and Kalahari savanna; mainly on game farms and reserves	A regular foraging/scavenging visitor to the study site pending the presence of food (e.g. livestock carcasses).

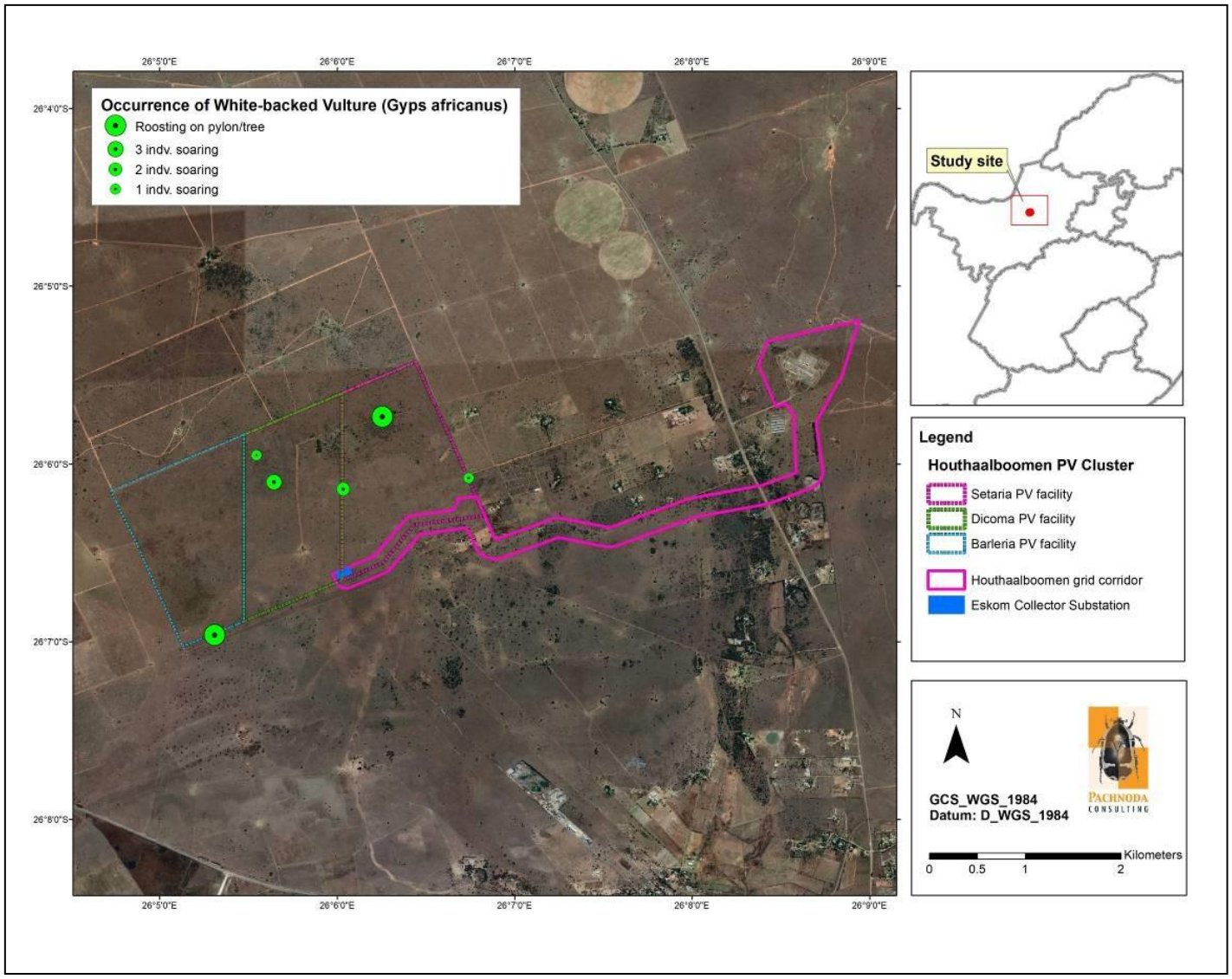

Figure 5.15: A map illustrating the occurrence of threatened and near threatened bird species observed on the study site important avifaunal habitat types on the project site and immediate surrounding during surveys conducted

5.5. Integrated Heritage including Archaeology, Palaeontology and the Cultural Landscape

5.5.1. Historical, Archaeological and Built Environment Heritage

Lichtenburg town was established in 1873 and named "Town of Light". General Del la Rey was buried in Lichtenburg after a fatal shooting incident at Langlaagte. During the 1800's, more and more farmers settled in the area. During the Second Boer War, the strategically important town of Lichtenburg was occupied by both Boer and Briton for short spells. In November 1900, a large British force under Col. Robert Baden-Powell was transferred to Lichtenburg and secured the town, and much of the territory with it. In 1926, Lichtenburg experienced a gold rush that lasted approximately 10 years. Lichtenburg district is now mostly a farming area, combining cattle and crop-farming and large areas of former diamond mine diggings are now used as grazing.

According to van Schalkwyk et al (1995, SAHRIS NID 6237) in their report completed for the Bakerville Diamond Fields, "land use in the area goes back to the Early Stone Age, as can be determined by the number of stone artifacts found near the old mining commissioner's office. This material seems to be disturbed from its primary context because of the mining activities. It is postulated that similar occurrences will be found in other parts of the diggings, but that this material would have been disturbed out of context." As a result of the dominant land use in the area, many of the heritage resources identified by van Schalkwyk et al (1995) are associated with past and present agriculture, and consist of farming implements, a few windmills, and dipping-troughs. One such trough, located at Elandsputte on the farm Uitgevonden 355JP, was the site where the first diamond was discovered. This structure is a proclaimed national monument (now Provincial Heritage Site). Van Schalkwyk et al (1995) identified a number of burial grounds within their surveyed area. Heritage resources known from this area include burial grounds and graves, archaeological artefacts and old structures, often associated with farming activities or diamond mining.

The study area was previously assessed by Van der Walt (2014) where it was noted that most of the Stone Age archaeology in the study area consists of low densities of scattered (and possibly mixed) MSA and LSA artefacts. These find spots are documented as "occurrences" and are of low significance but more substantial and higher density scatters of MSA material do occur and were recorded as "sites". The archaeological sites are described as "Medium density scatters of tools, blades, flakes, cores, MSA mainly of chert" and are graded IIIC i.e. low local significance. Van der Walt (2014) also identified a single unmarked grave (approximately 27 years old) and farm labour housing dating to the 1990's. He further noted that "Cultural landscape elements were noted in the northern portion of the study area consisting of the mentioned farm labourer dwelling together with a windmill, stone walled cattle kraal and a recently constructed kraal." (Van der Walt, 2014).

The field assessment suggests that the area was occupied or traversed intermittently by Stone Age groups potentially through periods in both the Middle Stone Age (MSA – 300ka: ~40ka) and the Later Stone Age (LSA: 40ka: ~2ka), although artefacts that could be clearly linked with chrono-cultural periods were scarce, which is likely a function of the proximity to primary sources of raw-material. The abundance of high-quality chert rocks in the project area was likely the resource that attracted groups there and resulted in them leaving behavioral traces in the form of stone artefacts.

Indeed, the majority of the stone artefacts identified look to be the result of expedient 'testing' of rocks for quality, and the so-called products in many of the scatters were likely transported away. In this sense no evidence of substantial densities of finds or occupational debris were identified, and the stone artefacts present are evidenced to have been produced by mobile groups moving through the area. The raw materials exploited for stone artefact manufacture were exclusively local cherts. The presence of primary and secondary sources of chert in association with stone artefacts are suggestive of the landscape resources that probably drew Stone Age groups to the region over an extended expanse of human evolutionary history.

5.5.2. Palaeontology

According to the extract from the Council of GeoScience Map for the West Rand, the proposed development is located on geological deposits belonging to the Monte Christo Formation of the Chuniespoort Group. The Monte Christo Formation is within the Malmani Subgroup. These deposits have a very high sensitivity for impacts to palaeontological resources. This group is known to contain a range of

shallow marine to intertidal stromatolites (domes, columns *etc*) and organic-walled microfossils. In addition, it is within this group that fossiliferous Late Cenozoic cave breccias have been identified such as within the Cradle of Humankind region. The project area lies on rocks of the Malmani Subgroup, Chuniespoort Group. According to Bamford (2018), the Malmani Subgroup is up to 2000m thick and comprises five formations distinguished by the amount of chert, stromatolite morphology, intercalated shales and erosion surfaces (Eriksson et al., 2006). The basal Oaktree Formation overlies the Black Reef Formation, and is made up of carbonaceous shales, stromatolitic dolomites and locally developed quartzites. Above this is the Monte Christo Formation comprising erosive breccia, overlain by stromatolitic and oolitic platformal dolomites. Next is the Lyttleton Formation of shales quartzites and stromatolitic dolomites. The Eccles Formation comprises a series of erosional breccias, and the overlying Frisco Formation is made up mostly of stromatolitic dolomites.

Bamford (2018) noted that the study site is in the Malmani Subgroup which contains a number of stromatolitic dolomites. These were formed in warm shallow sea and are the accumulation of layer upon layer of minerals deposited by blue-green algae (also known as cyanobacteria) and rarely some filamentous algae. Minerals deposited by the algae include calcium carbonate, calcium sulphate and magnesium carbonate. Very rarely are the algal cells preserved in the stromatolites and these are microscopic. Stromatolites are essentially trace fossils and these ones are 2750 to 2650 million years old and very abundant. Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are much too old to contain fossils other than blue-green algae.

5.6 Social Context

Table 5.14 provides a baseline summary of the socio-economic profile of the Ditsobotla Local Municipality within which Houthaalboomen grid is proposed. The data presented in this section have been derived from the 2011 Census, the North West Provincial Spatial Development Framework (PSDF), and the Ngaka Modiri Molema District Municipality and Ditsobotla Local Municipality IDPs.

Table 5.14: Baseline description of the socio-economic characteristics of the Houthaalboomen grid connection corridor area

Location characteristics
» The project is proposed within the North West Province, the province located to the west of the major population centre of Gauteng Province. » The project is proposed within the Ditsobotla LM of the Ngaka Modiri Molema DM. » The Ditsobotla LM is approximately 6 398.7km² in extent.
Population characteristics
» Ditsobotla LM has a population of 181 866 which is about one-fifth of the figure in Ngaka Modiri Molema 889,108. » The LM occupies an area of land approximately 6 465km² in extent and has a population density of 26/7km². » Between 2001 and 2011 the LM experience a positive population growth of 1.3% per year. This is higher than the DM population growth of 1.0% between 2001 and 2011. » According to Census 2011, the significant majority of 89.1% of the Ditsobotla LM population are Black African, followed secondly by 8.2% which are White, 1.9% which are Coloured, and 0.6% which are Indian / Asian. This population structure corresponds to that of the Ngaka Modiri Molema DM, and North West Province. » The Ditsobotla LM is slightly male dominated with males making up just over half (50.5%) of the municipal population, and females the remaining 49.5% of the population. This correlates with the Provincial population which is also slightly female dominated (comprising 50.7% males, and 49.3% females), but differs from the District and National populations which are both females dominated.

- When assessing five-year age groups, the largest proportion of the population are between the ages of 0 to 4 years old, with the proportion decreasing uniformly as age increases. There are no significant outliers within any one age group. The age structure of the North West Province and South African national populations are similar to one another, but differ somewhat from that of the Ditsobotla LM and Ngaka Modiri Molema DM.
- The dependent portion of the population typically comprises youth below 15 years of age which are yet to enter the workforce, and individuals 65 years and older which would typically already have retired from the workforce.
- The Ditsobotla LM has a dependency ratio of 38.1; implying that for every 100 people within the Ditsobotla LM, over two thirds (i.e. 38.1) of them are considered dependent. This figure is slightly lower than the Ngaka Modiri Molema DM (39.2), but higher than the provincial (35.3) and national (34.5) dependency ratios

Economic, education and household characteristics

- Approximately 14.7% of the Ditsobotla LM population aged 20 years and older have received no formal form of schooling.
- The majority of 29.9% of the LM population have received some secondary education (which correlates with the DM, Provincial, and national averages), followed closely by 22.6% which have received some primary schooling. Approximately one fifth (20%) of the LM population have completed Grade 12 / Matric, with 6.8% having received some form of higher / tertiary education.
- Due to the fact that the majority of almost three quarters (73.2%) of the Ditsobotla LM population have not completed Grade 12 / Matric, it can be expected that a large proportion of the population will either be unskilled or have a low-skill level, and would therefore either require employment in non-skilled or low-skilled sectors; or alternatively would require skills development opportunities in order to improve the skills, and income levels of the area
- The Ditsobotla LM has an unemployment rate of 28.3%.
- Of the Ditsobotla LM's labour force (i.e. individuals ages between 15 and 64 years of age) the majority of 43.2% are not economically active.
- The economically inactive proportion of the Ditsobotla LM's labour force is slightly lower than the DM (47.9%), but higher than the Provincial (40.2%), and national (39.2%) averages.
- Approximately 14.3% of the Ditsobotla LM's labour force is unemployed.
- The unemployment rate for the LM is fractionally lower than the DM (14.8%), as well as the Provincial (17.1%), and national averages (16.5%).
- Over two thirds (68.4%) of households within the Ditsobotla LM fall within the low income (poverty level) bracket (i.e. below R38 400 per annum).
- Approximately one quarter (25.9%) of households within the LM fall within the medium income bracket, while the remaining 5.7% fall within the high-income bracket.
- According to the Ditsobotla LM IDP 2017 – 2018 the LM contributes 22.7% to the DM economy.
- The finance and business services sector represent the largest contributing sector with a contribution of 24.7%, followed by the trade sector with a contribution of 19.1%, the manufacturing sector which contributes 11.8%, and the general government service which contributes 11.4%.
- The dominant economic sectors within the LM include finance and business services (25%); wholesale and retail trade, catering and accommodation (19%); manufacturing (12.2%); and general government services (11.5%).

Services

- Approximately two thirds (66%) of households within the Ditsobotla LM have access to piped water inside their yard / dwelling which is equivalent to the basic level of service provision.
- Approximately 23.2% of households receive piped water outside of their yard, while 10.9% have no access to water services
- The majority of 34.8% of the Ditsobotla LM households make use of the bucket system, followed by 33.7% which have access to and make use of flush or chemical toilets
- A quarter (25%) of households within the LM have access to pit latrines, and 6.5% of households have no access to sanitation services
- Approximately 32 933 (74%) of households within the LM are connected to the electricity grid. The LM has a total backlog of 11 567 (26%) of households without access to electricity.

5.7 Visual Quality

The visual quality of the project site and the broader study area is defined by the following characteristics:

- The project site is in an area that has a distinct rural and agricultural character, with some mining/quarrying activity located west of Lichtenburg.
- The dominating terrain morphology of the study area is described as Plains and Pans or Slightly Undulating Plains of the Central Interior Plain. The slope of the entire study area is extremely even (flat) with a very gradual drop (from the northern section of the study area to the Die Vlei River which flows through Lichtenburg.
- Maize farming (both dryland and irrigated agriculture), with some mining/quarrying activity dominates the land use character in the west part of the study area.
- A great number of power lines, associated with the Watershed Substation, are located near the site.

5.7.1 Settlement and infrastructure

Farm settlements or residences occur at irregular intervals throughout the project site. Some of these, in close proximity to the project site, include: *Houthaalbomen, Boskoppie, Elandsfontein, Brakpan, Scherppunt, Greeflaagte*, etc. The Elandsfontein small holdings are located north of the proposed power line corridor, in between the collector substation and the Watershed MTS.

The project site is used for mainly agricultural purposes such as livestock farming, and the land has never been used for rainfed or irrigated crop production. There is also no irrigation infrastructure, such as centre pivots or drip irrigation, present within the project site.

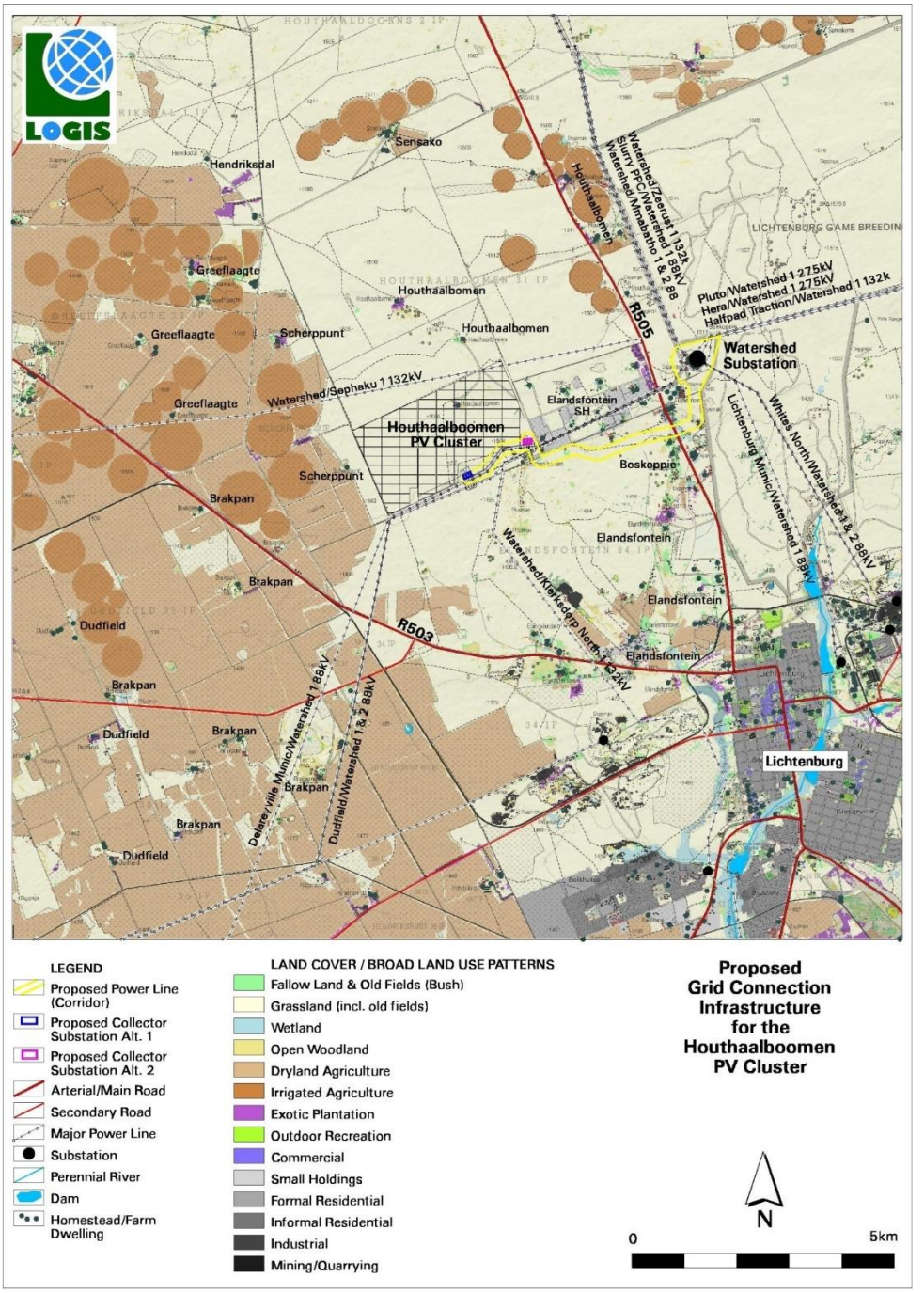

Figure 5.16. Land cover and broad land use patterns of the area surrounding the Houthaalboomen grid connection corridor

CHAPTER 6. ASSESSMENT OF IMPACTS

This chapter serves to assess the significance of the positive and negative environmental impacts (direct and indirect) expected to be associated with the grid connection infrastructure for the Houthaalboomen PV cluster comprising of the Barleria PV, Dicoma and Setaria PV.

This assessment has considered the construction and operation of grid connection infrastructure within a 200m wide corridor which is considered necessary associated infrastructure required for the evacuation of electricity from the Houthaalboomen PV cluster to the national grid. The grid connection infrastructure will comprise of the following key infrastructure and components:

» Collector substation (footprint up to 1.125ha)
» 132kV power line (within 200m wide corridor)

Two alternative Collector substation positions are considered as part of this basic assessment, details of alternatives are provided in **Chapter 3** of this BA Report. The 200m wide power line corridor is shared/common for the bulk of its length, and deviates only to accommodate these two alternative positions for the Collector substation.

The full extent of the grid connection corridor (including the associated infrastructure was considered through the specialist assessments undertaken as part of this BA process, as well as within this impact assessment report. The grid connection infrastructure will be appropriately sited within the grid connection corridor through the consideration of the sensitive environmental features present with avoidance of the features considered to be the preferred option.

The development of the grid connection infrastructure for the Houthaalboomen PV Cluster Grid Connection will comprise the following phases:

» ***Pre-Construction and Construction*** – will include pre-construction surveys; site preparation; establishment of access roads (where required), laydown area; construction of foundations involving excavations; the transportation of components/construction equipment to site, manoeuvring and operating vehicles for unloading and installation of equipment; the construction of the substations and power line infrastructure; laying cabling; and commissioning of new equipment and site rehabilitation. The construction phase for the grid connection infrastructure is estimated to be up to 12 months.

» ***Operation* & Maintenance**– will include the operation of the substation and the 132kV power line, which enable the evacuation of electricity from the three solar PV facilities to the national grid. The operation phase of the grid connection infrastructure is expected to be approximately 20 years (with maintenance).

» ***Decommissioning*** – depending on the economic viability of the Houthaalboomen PV cluster and Eskom's plans for the collector substations, the length of the operation phase may be extended beyond a 20 year period. This would also require the extension of the operation phase for the grid connection infrastructure. At the end of the project's life, decommissioning will include site preparation, disassembling of the components of the grid connection infrastructure, clearance of the relevant infrastructure at the collector substations and along the power line servitude, and rehabilitation. Note that impacts associated with decommissioning are expected to be similar to those associated with construction activities. Therefore, these impacts are not considered separately within this chapter.

Environmental issues associated with pre-construction, construction and decommissioning activities may include, among others, threats to biodiversity and ecological processes, including habitat alteration and impacts to fauna and avifauna, and impacts to sites of heritage value.

Environmental impacts associated with the operation phase include visual impacts, night-time lighting impacts, habitat alteration and impacts to fauna and avifauna, and potential invasion by alien and invasive plant species.

6.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the BA Report includes the following information required in terms of Appendix 1: Content of BA Reports:

Requirement	Relevant Section
3(h)(v) the impacts and risks identified 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.	The impacts and risk associated with the development of the grid connection infrastructure, including the nature, significance, consequence, extent, duration and probability of the impacts and the degree to which the impact can be reversed and cause an irreplaceable loss of resources are included in sections 6.3.3, 6.4.3, 6.5.3, 6.6.3
3(h)(vii) positive and negative impacts that the proposed activity 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	The positive and negative impacts associated with the development of the grid connection infrastructure are included in sections 6.3.3, 6.4.3, 6.5.3, 6.6.3
3(h)(viii) the possible mitigation measures that could be applied and the level of residual risk.	The mitigation measures that can be applied to the impacts associated with the development of the grid connection infrastructure are included in sections 6.3.3, 6.4.3, 6.5.3, 6.6.3
3(i) a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process and (ii) an assessment of the significance of each issue and risk and an indication of	A description of all environmental impacts identified for the development of the grid connection infrastructure during the BA process, and the extent to which the impact significance can be reduced through the implementation of the recommended mitigation measures provided by the specialists are included in sections 6.3.3, 6.4.3, 6.5.3, 6.6.3

Requirement	Relevant Section
the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures,.	
3(j) an assessment of each identified potentially significant impact and risk, including (i) cumulative impacts, (ii) the nature, significance and consequences of the impact and risk, (iii) the extent and duration of the impact and risk, (iv) the probability of the impact and risk occurring, (v) the degree to which the impact and risk can be reversed, (vi) the degree to which the impact and risk may cause irreplaceable loss of resources and, (vii) the degree to which the impact and risk can be avoided, managed or mitigated.	An assessment of each impact associated with the development of the grid connection infrastructure, including the nature and significance, the extent and duration, the probability, the reversibility, and the potential loss of irreplaceable resources, as well as the degree to which the significance of the impacts can be mitigated are included in sections 6.3.3, 6.4.3, 6.5.3, 6.6.3,
3(m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr.	Mitigation measures recommended by the various specialists for the reduction of the impact significance are included in sections 6.3.3, 6.4.3, 6.5.3, 6.6.3,.

6.2. Quantification of Areas of Disturbance within the Grid Connection Corridor

Site-specific impacts associated with the construction and operation of the grid connection infrastructure for the Houthaalboomen Solar PVs Grid Connection relate to the direct loss of vegetation and species of special concern, disturbance of animals (including avifauna) and loss of habitat, and visual disturbance. In order to assess the impacts associated with the development of the grid connection infrastructure, it is necessary to understand the extent of the affected grid connection corridor and the development footprint of the infrastructure proposed to be developed within the corridor. In this regard, the following is relevant, and indicates that the extent of the area impacted for the infrastructure is not excessive:

- The collector substation will occupy an area of ~1.25ha in extent.
- The 132kV power line will be constructed within a servitude of up to 36m in width over a distance of up to ~6km (Alternative 1) and ~4.5km (Alternative 2) (depending on the grid connection configuration). The power line towers are an average distance of 200m apart but can exceed 500m depending on the topography, terrain and sensitive environmental features to be spanned. An area of less than 8m in width would be disturbed (not cleared) underneath the power line across its length for stringing purposes during construction.

6.3. Assessment of impacts on Terrestrial (Flora and Fauna) and Freshwater Ecological Resources

The majority of the terrestrial ecological impacts associated with the development would occur during the construction phase as a result of the disturbance associated with site clearance, excavations, the operation of heavy machinery and the presence of construction personnel. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix D** for more details). The terrestrial and freshwater impact assessment assessed the entire extent of the grid connection corridor, as well as the proposed grid connection infrastructure, including the two substations and a 132kV power line.

6.3.1 Results of the Terrestrial and Freshwater Ecological Impact Assessment

Collector Substation Alternatives

» Terrestrial Ecology:
Two collector substation alternative locations are currently investigated and assessed below.
  » Collector Substation Alternative 1: This substation alternative will be located within a near-natural primary grassland (VegCom SE).
  » Collector Substation Alternative 2: This substation alternative will be located within a secondary grassland (VegComm HE) that has been historically cultivated.
  » Both alternatives are solely located within ESA1 areas and no CBA2 areas will be impacted.
  » For both on-site substation options, the impacts relating to terrestrial ecology are very similar and as such the impact assessment conducted below, relating to terrestrial ecology, is applicable to both alternatives.

» Freshwater/Aquatic Ecology:
Both collector substation alternative options as well as the switching substation are located well away from any freshwater/aquatic resource features and will subsequently not have an impact on such resource features.

Grid Power Line Alternatives

» Both power line alternatives share a common corridor, and are very similar in terms of their potential impacts on terrestrial ecosystems and biodiversity (as the alternatives only have a small section which differs between the two alternatives).
» Gridline Alternative 1: This corridor will be approximately 6km long and 200m wide
» Gridline Alternative 2: This corridor will be approximately 4.5km long and 200m wide
» Both gridline alternatives will traverse three vegetation communities identified on site, namely:
  * *Searsia pyroides – Elionurus muticus* open savanna-grassland on shallow soils overlying dolerite (VegComm SE).
  * *Searsia lancea* – Vachellia karroo wooded grassland on moderately shallow soils overlying dolerite (VegComm SV).
  * *Hyparrhenia hirta – Eragrostis lehmanniana* secondary grassland on moderately deep soils (VegComm HE)
» Due to the fact that Grid Corridor Alternative 1 will impact a slightly larger area, this alternative has a slightly more significant impact on the ecology of the area. However due to the linear nature (relatively small impact area) and fact that a portion of this alternative will traverse secondary grassland, the significance of impacts associated with this alternative will only be slightly higher for certain aspects, while for other aspects the difference in significance be negligible.

6.3.2 Description of Terrestrial and Freshwater Ecological impacts

Potential impacts resulting from the proposed project would stem from a variety of different activities and risk factors associated with the site-establishment and operation phases of the project.

» Human presence and uncontrolled access to the site may result in negative impacts on fauna and flora through poaching of fauna and uncontrolled collection of plants for traditional medicine or other purposes.
» Site clearing for site establishment of the construction camp and for the construction of the foundations for the pylons required for the power line.
» Vegetation clearing could impact locally listed plant species. Vegetation clearing would also lead to the loss of vegetation communities and habitats for fauna and potentially the loss of faunal species, habitats, and ecosystems. On a larger and cumulative scale (if numerous and uncontrolled power line

developments are allowed to occur in the future) the loss of these vegetation communities and habitats may potentially lead to a change in the conservation status of the affected vegetation type, as well as the ability of this vegetation type and associated features to fulfil its ecological responsibilities (functions).

- Soil compaction and increased erosion risk would occur due to the loss of plant cover and soil disturbance created during the construction phase. This may potentially impact the downstream watercourses and aquatic habitats. These potential impacts may result in a reduction in the buffering capacities of the landscape during extreme weather events.
- Invasion by alien plants may be attributed to excessive disturbance to vegetation, creating a window of opportunity for the establishment of these alien invasive species. Also, regenerative material of alien invasive species may be introduced to the project site by machinery traversing through areas with such plants or materials that may contain regenerative materials of such species.
- The power line will require management and if this is not done effectively, it could impact adjacent intact areas through impacts such as erosion and the invasion of alien plant species.

The following are potential impacts associated with the Houthaalboomen Grid Connection :

- Potential impacts on vegetation and listed or protected plant species
- Impacts on fauna through disturbance, transformation and loss of habitat during construction
- Soil erosion and associated degradation of ecosystems
- Alien plant invasion
- Altered runoff patterns due to rainfall interception by Substation infrastructure and compacted areas resulting in high levels of erosion.
- Reduction of a stable vegetation cover and associated below-ground biomass that currently increases soil surface porosity, water infiltration rates and thus improves the soil moisture availability. Without the vegetation, the soil will be prone to extensive surface capping, leading to accelerated erosion and further loss of organic material and soil seed reserves from the local environment.
- Disturbed vegetation in the study area carries a high risk of invasion by alien invasive plants, which may or may not be present in the study area or nearby. The control and continuous monitoring and eradication of alien invasive plants will form and integral part of the environmental management of the facility from construction up to decommissioning.

6.3.3 Impact tables summarising the significance of impacts on ecology during construction and operation (with and without mitigation)

The impacts assessed below apply to the development of the grid infrastructure within the assessed grid connection corridor. Due to the avoidance of sensitive ecological features by the grid connection corridor, the significance of the impacts before and after mitigation is low.

Collector Substation Alternatives

Potential impacts on vegetation and listed or protected plant species (Construction Phase)

Impact Nature: Vegetation clearing will lead to the loss of current habitat and is an inevitable consequence of this type of activity. The extent of the proposed footprint, is however, small. Furthermore, no species of conservation concern were recorded within the proposed footprints. The loss of local vegetation within the footprint is expected to be of relatively minor significance when considered on a broad scale.

Alternative 1 & 2		
	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (3)	Small (2)
Probability	Definite (5)	Improbable (2)
Significance	Medium (40)	Low (14)
Status	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Yes, to a large extent	

Mitigation

- Pre-construction walk-through of the power line route/corridor to locate species of conservation concern that can be translocated or avoided.
- Vegetation clearing to commence only after walkthrough has been conducted and necessary permits obtained.
- Pre-construction environmental induction for all construction staff on-site to ensure that basic environmental principles are adhered to. This includes awareness as to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, remaining within demarcated construction areas, etc.
- Demarcate all areas to be cleared with construction tape or similar material where practical. However, caution should be exercised to avoid using material that might entangle fauna.
- Contractor's EO to provide supervision and oversight of vegetation clearing activities and other activities which may cause damage to the environment, especially at the initiation of the project, when the majority of vegetation clearing is taking place.
- Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared.
- Ensure that laydown areas, construction camps and other temporary use areas are located in areas of low and medium sensitivity and are properly fenced or demarcated as appropriate and practically possible.
- All vehicles to remain within demarcated construction areas and no unnecessary driving in the veld outside these areas should be allowed.
- Existing tracks should be used for access wherever possible.
- The morphology and hydrology of the wetland features not be altered by unnecessary excavations, dumping of soil or other waste.
- No fires should be allowed on-site.

Residual Impacts

Some residual vegetation loss will result from the development, equivalent to the operational footprint of the power line.

Direct Faunal Impact (Construction Phase)

Impact Nature: Disturbance, transformation, and loss of habitat will have a negative effect on resident fauna during construction.

There are fauna residents within the site, and these will be impacted during the construction of the on-site substation. However, faunal diversity and density within the site were very low, and post-mitigation impacts are likely to be Low and of Local significance only. Increased levels of noise, pollution, disturbance, and human presence during the construction and decommissioning phases may affect the local fauna. Sensitive and shy fauna would move away from the area during these phases and may only move back and inhabit the area post-decommission. Some slow-moving species would not be able to avoid the activities and might be killed.

Faunal diversity and density within the site are low and post-mitigation impacts are likely to be Low and of Local significance only.		
Alternative 1 & 2		
	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Low (2)	Low (2)
Probability	Probable (3)	Very Improbable (1)
Significance	Low (15)	Low (5)
Status	Negative	Negative
Reversibility	Moderate	Moderate to High
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Noise and disturbance during the construction, decommission and during maintenance phases cannot be avoided but would be transient in nature and with appropriate mitigation; no long-term impacts from the construction phase can be expected.	
Mitigation » All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises which are often persecuted out of superstition. » Site access should be controlled and no unauthorised persons should be allowed onto the site. » Any fauna directly threatened by the associated activities should be removed to a safe location by a suitably qualified person. » The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the demarcated site. » Fires should not be allowed on site. » All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. » All construction vehicles should adhere to a low speed limit (30km/h) to avoid collisions with susceptible species such as snakes and tortoises. » Construction vehicles limited to a minimal footprint on site (no movement outside of the earmarked footprint).		
Residual Impacts There will be minimal residual impact as the facility will have low operational impacts on fauna, after the construction phase.		

Soil erosion and associated degradation of ecosystems (Construction Phase & Decommission)

Impact Nature: During construction/decommission, there will be a lot of disturbed and loose soil at the site which will render the area vulnerable to erosion. It is critically important that proper erosion control structures are built and maintained over the lifespan of the project.		
Alternative 1 & 2		
	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Medium-term (3)	Short-term (1)
Magnitude	Minor (4)	Small (2)
Probability	Probable (3)	Improbable (2)

Significance	Low (24)	Low (8)
Status	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Yes, to a large extent	
Mitigation » Any erosion problems observed to be associated with the access road and/or hardened/engineered surfaces should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. » All bare areas due to the project activities should be re-vegetated with locally occurring species, to bind the soil and limit erosion potential where applicable. » An erosion control management plan should be utilised to prevent erosion » There should be reduced activity at the site after large rainfall events when the soils are wet. No driving off of hardened roads should occur immediately following large rainfall events until soils have dried out and the risk of bogging down has decreased. » Construction of gabions and other stabilisation features to prevent erosion, if deemed necessary. » Re-instate as much of the eroded area to its pre-disturbed, "natural" geometry (no change in elevation and any banks not to be steepened) where possible. » Roads and other disturbed areas should be regularly monitored for erosion problems and problem areas should receive follow-up monitoring by the EO to assess the success of the remediation. » Topsoil must be removed and stored separately from subsoil. Topsoil must be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas.		
Residual Impacts The loss of fertile soil and soil capping resulting in areas which cannot fully rehabilitate itself with a good vegetation cover. With appropriate avoidance and mitigation residual impacts will be very low.		

Potential increased alien plant invasion (Construction, Operational and Decommissioning phase).

Impact Nature: The disturbed and bare ground that is likely to be present at the site during and after construction would leave the site vulnerable to alien plant invasion for some time if not managed. Furthermore, the National Environmental Management Biodiversity Act (Act No. 10 of 2004), as well as the Conservation of Agricultural Resources Act, (Act No. 43 of 1983) requires that listed alien species are controlled in accordance with the Act.		
Alternative 1 & 2		
	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Short-term (1)
Magnitude	Minor (4)	Small (1)
Probability	Highly Probable (4)	Improbable (2)
Significance	Medium (40)	Low (6)
Status	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Yes, to a large extent	
Mitigation » A site-specific eradication and management programme for alien invasive plants must be implemented during construction.		

» Regular monitoring by the operation and maintenance team for alien plants at the within the power line servitude must occur and could be conducted simultaneously with erosion monitoring. » When alien plants are detected, these must be controlled and cleared using the recommended control measures for each species to ensure that the problem is not exacerbated or does not re-occur and increase to problematic levels. » Clearing methods must aim to keep disturbance to a minimum. » No planting or importing any listed invasive alien plant species (all Category 1a, 1b and 2 invasive species) to the site for landscaping, rehabilitation or any other purpose must be undertaken.
Residual Impacts If the above recommended mitigation measures are strictly implemented and some re-establishment and rehabilitation of natural vegetation is allowed the residual impact will be very low.

Altered runoff patterns due to rainfall interception by infrastructure and compacted areas resulting in high levels of erosion (Operation Phase)

Impact Nature: The presence of an extensive area of hardened surface during operation will generate runoff which can pose a significant erosion risk, if not managed. Erosion is one of the greater risk factors associated with this type of development, and it is therefore essential that proper erosion control structures are built and maintained over the lifespan of the project.		
Alternative 1 & 2		
	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Short-term (1)
Magnitude	Minor (2)	Small (1)
Probability	Highly Probable (4)	Probable (3)
Significance	Medium (32)	Low (9)
Status	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Yes, to a large extent	
Mitigation » Regular monitoring of the site (minimum of twice annually) to identify possible areas of erosion is recommended, particularly after large summer thunder storms have been experienced. » All bare areas due to the project activities should be re-vegetated with locally occurring species, to bind the soil and limit erosion potential where applicable. » Alternatively, soil surfaces where no revegetation seems possible will have to be covered with gravel or small rock fragments to increase porosity of the soil surface, slow down runoff and prevent wind- and water erosion. » Monitor the area below and around the panels regularly after larger rainfall events to determine where erosion may be initiated and then mitigate by modifying the soil micro-topography and revegetation efforts accordingly. » Due to the nature and larger runoff surfaces, the development area should be adequately landscaped and rehabilitated to contain expected accelerated erosion. » Runoff may have to be specifically channelled or storm water adequately controlled to prevent localised rill and gully erosion. » Any erosion problems observed should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. » Roads and other disturbed areas should be regularly monitored for erosion problems and problem areas should receive follow-up monitoring to assess the success of the remediation.		
Residual Impacts		

The loss of fertile soil and soil capping resulting in areas which cannot fully rehabilitate itself with a good vegetation cover. With appropriate avoidance and mitigation residual impacts will be very low.

Grid Connection Power Line Corridor Alternatives

Potential Impacts on vegetation and listed protected plant species (Construction Phase)

Impact Nature: Impacts on vegetation and listed or protected plant species would occur due to the construction of the facility and associated infrastructure. This impact is regarded as the most likely and significant impact and may lead to direct loss of vegetation including listed and protected species.

The most likely consequences include:

» local loss of habitat (to an extent as a natural ground covering will be maintained where possible);
» very small and local disturbance to processes maintaining local biodiversity and ecosystem goods and services; and
» a potential loss of a few local protected species.

The development footprints for both options are largely homogenous in terms of habitat types and vegetation cover thus providing for easier and more accurate calculation of potential impacts, more effective recommendations and implementation of management and mitigation measures, and furthermore lowering the impact and beta diversity. The loss of local vegetation within the footprint is expected to be of relatively minor significance when considered on a broad scale.

	Gridline Alternative 1		**Gridline Alternative 2**	
	Without Mitigation	**With Mitigation**	**Without Mitigation**	**With Mitigation**
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)	Long-term (4)	Long-term (4)
Magnitude	Minor (4)	Small (2)	Moderate (5)	Minor (3)
Probability	Definite (5)	Improbable (2)	Definite (5)	Improbable (2)
Significance	**Medium (45)**	**Low (14)**	**Medium (50)**	**Low (16)**
Status	Negative	Negative	Negative	Negative
Reversibility	Low	Moderate	Moderate	Moderate
Irreplaceable loss of resources	No	No	No	No
Can impacts be mitigated?	Yes, to a large extent			

Mitigation

» Pre-construction walk-through of the power line route/corridor to locate species of conservation concern that can be translocated or avoided.
» Vegetation clearing to commence only after walkthrough has been conducted and necessary permits obtained.
» Pre-construction environmental induction for all construction staff on-site to ensure that basic environmental principles are adhered to. This includes awareness as to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, remaining within demarcated construction areas, etc.
» Demarcate all areas to be cleared with construction tape or similar material where practical. However, caution should be exercised to avoid using material that might entangle fauna.
» Contractor's EO to provide supervision and oversight of vegetation clearing activities and other activities which may cause damage to the environment, especially at the initiation of the project, when the majority of vegetation clearing is taking place.
» Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared.
» Ensure that laydown areas, construction camps and other temporary use areas are located in areas of low and medium sensitivity and are properly fenced or demarcated as appropriate and practically possible.

- All vehicles to remain within demarcated construction areas and no unnecessary driving in the veld outside these areas should be allowed.
- Existing tracks should be used for access wherever possible.
- The morphology and hydrology of the wetland features not be altered by unnecessary excavations, dumping of soil or other waste.
- No fires should be allowed on-site.

Residual Impacts
Some residual vegetation loss will result from the development, equivalent to the operational footprint of the power line.

Potential Faunal Impacts (Construction Phase, Decommission Phase and during maintenance – Operation Phase)

Impact Nature: Disturbance, transformation, and loss of habitat will have a negative effect on resident fauna during construction.

There are fauna residents within the site, and these will be impacted during the construction of the power line. However, faunal diversity and density within the site are low, and post-mitigation impacts are likely to be Low and of Local significance only.

Increased levels of noise, pollution, disturbance, and human presence during the construction phase may affect the local fauna. Sensitive and shy fauna would move away from the area during the construction phase and may move back into the area upon completion of the construction phase. Some slow-moving species (i.e. tortoise & snakes) would not be able to avoid the activities and might be killed.

Faunal diversity and density within the site are low and post-mitigation impacts are likely to be Low and of Local significance only.

	Gridline Alternative 1		**Gridline Alternative 2**	
	Without Mitigation	**With Mitigation**	**Without Mitigation**	**With Mitigation**
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)	Short-term (2)	Short-term (2)
Magnitude	Low (4)	Minor (2)	Low (4)	Minor (2)
Probability	Probable (3)	Very Improbable (1)	Probable (3)	Very Improbable (1)
Significance	**Low (21)**	**Low (5)**	**Low (21)**	**Low (5)**
Status	Negative	Negative	Negative	Negative
Reversibility	Low	Moderate	Moderate	Moderate
Irreplaceable loss of resources	No	No	No	No
Can impacts be mitigated?	Yes, to a large extent			

Mitigation
- All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises which are often persecuted out of superstition.
- Site access should be controlled and no unauthorised persons should be allowed onto the site.
- Any fauna directly threatened by the associated activities should be removed to a safe location by a suitably qualified person.
- The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the demarcated site.
- Fires should not be allowed on site.

- All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.
- All construction vehicles should adhere to a low speed limit (30km/h) to avoid collisions with susceptible species such as snakes and tortoises.
- Construction vehicles limited to a minimal footprint on site (no movement outside of the earmarked footprint).

Residual Impacts

There will be minimal residual impact as the facility will have low operational impacts on fauna, after the construction phase

Potential increased erosion risk (Construction and Decommissioning)

Impact Nature: Impact Nature: During construction/decommissioning, disturbed and loose soil at the site which will render the area vulnerable to erosion. It is important that proper erosion control structures are built and maintained over the lifespan of the project.

	Gridline Alternative 1		**Gridline Alternative 2**	
	Without Mitigation	**With Mitigation**	**Without Mitigation**	**With Mitigation**
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Medium-term (3)	Short-term (1)	Medium-term (3)	Short-term (1)
Magnitude	Low (4)	Minor (2)	Low (5)	Minor (2)
Probability	Probable (3)	Improbable (2)	Probable (3)	Improbable (2)
Significance	**Low (24)**	**Low (8)**	**Low (27)**	**Low (8)**
Status	Negative	Negative	Negative	Negative
Reversibility	Low	High	Low	High
Irreplaceable loss of resources	No	No	No	No
Can impacts be mitigated?	Yes, to a large extent			

Mitigation

- Any erosion problems observed to be associated with the access road and/or hardened/engineered surfaces should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.
- All bare areas due to the project activities should be re-vegetated with locally occurring species, to bind the soil and limit erosion potential where applicable.
- An erosion control management plan should be utilised to prevent erosion
- There should be reduced activity at the site after large rainfall events when the soils are wet. No driving off of hardened roads should occur immediately following large rainfall events until soils have dried out and the risk of bogging down has decreased.
- Construction of gabions and other stabilisation features to prevent erosion, if deemed necessary.
- Re-instate as much of the eroded area to its pre-disturbed, "natural" geometry (no change in elevation and any banks not to be steepened) where possible.
- Roads and other disturbed areas should be regularly monitored for erosion problems and problem areas should receive follow-up monitoring by the EO to assess the success of the remediation.
- Topsoil must be removed and stored separately from subsoil. Topsoil must be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas.

Residual Impacts

The loss of fertile soil and soil capping resulting in areas which cannot fully rehabilitate itself with a good vegetation cover. With appropriate avoidance and mitigation residual impacts will be very low.

Potential increased alien plant invasion (Construction, Operation and Decommissioning)

Impact Nature: The disturbed and bare ground that is likely to be present at the site during and after construction would leave the site vulnerable to alien plant invasion for some time if not managed. Furthermore, the National Environmental Management Biodiversity Act (Act No. 10 of 2004), as well as the Conservation of Agricultural Resources Act, (Act No. 43 of 1983) requires that listed alien species are controlled in accordance with the Act.

	Gridline Alternative 1		**Gridline Alternative 2**	
	Without Mitigation	**With Mitigation**	**Without Mitigation**	**With Mitigation**
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Permanent (5)	Short-term (1)	Permanent (5)	Short-term (1)
Magnitude	Low (4)	Small (1)	Low (5)	Small (1)
Probability	Highly Probable (4)	Improbable (2)	Highly Probable (4)	Improbable (2)
Significance	**Medium (40)**	**Low (6)**	**Medium (44)**	**Low (6)**
Status	Negative	Negative	Negative	Negative
Reversibility	Low	High	Low	High
Irreplaceable loss of resources	No	No	No	No
Can impacts be mitigated?	Yes, to a large extent			

Mitigation

- A site-specific eradication and management programme for alien invasive plants must be implemented during construction.
- Regular monitoring by the operation and maintenance team for alien plants at the within the power line servitude must occur and could be conducted simultaneously with erosion monitoring.
- When alien plants are detected, these must be controlled and cleared using the recommended control measures for each species to ensure that the problem is not exacerbated or does not re-occur and increase to problematic levels.
- Clearing methods must aim to keep disturbance to a minimum.
- No planting or importing any listed invasive alien plant species (all Category 1a, 1b and 2 invasive species) to the site for landscaping, rehabilitation or any other purpose must be undertaken.

Residual Impacts

If the above recommended mitigation measures are strictly implemented and some re-establishment and rehabilitation of natural vegetation is allowed the residual impact will be very low.

6.3.4 Comparative Assessment of Alternatives

A summary of the assessment of impacts for the grid connection and associated infrastructure alternatives are detailed below and include the identification of the preferred alternative, in terms of the potential impacts on terrestrial (Fauna and Flora).

Grid Connection Alternative 1	***Acceptable, but less preferred***
Grid Connection Alternative 2	***Favourable/Acceptable and preferred***

Both options are fairly similar in terms of their potential impacts on terrestrial features. The significance scores of these impacts do however differ very slightly between the two options, with the impacts associated with Grid Alternative 2 being only slightly less significant than the impacts associated with Grid Alternative 1.

Grid Alternative 1 will impact a larger area, and as such impacts associated with this alternative will be slightly higher in significance.

However, due to the nature of such linear developments and that fact that both alternatives will not impact any sensitive habitats, the significance of impacts associated with grid alternative 1 will only be slightly higher for certain aspects, while for other aspects the difference in significance be almost negligible.

in general, the impacts for both options are Low to Medium prior to Mitigation and Low with Mitigation considered

6.3.5 Implications for Project Implementation

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of terrestrial ecological impacts of the grid connection infrastructure can be reduced to low. From the outcomes of the study undertaken, the grid connection infrastructure can be developed as impacts will be of low significance. From the outcomes of the study undertaken, it is concluded that the grid connection infrastructure can be developed and impacts on ecology managed by implementing relevant recommendations and mitigation measures, and managed by taking the following into consideration:

- Concentrate all surface infrastructure, including pylons on habitat of medium to low avifaunal sensitivity.
- Where possible, existing access roads should be used and the construction of new roads should be kept to a minimum.
- Prevent an overspill of construction activities into areas that are not part of the proposed construction site;

6.4. Assessment of Impacts on Avifauna

The significance of the impacts on avifauna expected with the development of the grid connection infrastructure for the Houthaalboomen PV cluster Grid Connection has been assessed as medium to low with the implementation of mitigation measures, depending on the impact being considered. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix E** for more details). The avifauna impact assessment assessed the entire extent of the grid connection corridor, as well as the grid connection infrastructure, including the two substation alternatives and the 132kV power line.

6.4.1 Results of the Avifauna Impact Assessment

Collector Substation Alternatives

It is anticipated that natural vegetation will be cleared during construction phase to accommodate the collector substation and part of the power line servitude. In addition, construction activities go hand in hand with high ambient noise levels. Although the construction of the power line is considered temporary, many species will vacate the area during the construction phase and will become temporarily displaced.

Displacement due to vegetation clearing will mainly affect passerine and smaller non-passerine species inhabiting the untransformed dolomite grasslands and bush clump mosaics. The following bird species are most likely to be impacted by the loss of habitat due to their habitat requirements, endemism and conservation status (although not limited to) due to the proposed grid development:

- Northern Black Korhaan (*Afrotis afraoides*);

- White-throated Scrub-robin (*Cossypha humeralis*);
- Ashy Tit (*Melaniparus cinerascens*);
- Kalahari Scrub Robin (*Cercotrichas p*aena);
- Orange River Francolin (*Scleroptila gutturalis*) and potentially also small to medium birds of prey such as:
- Black-winged Kite (*Elanus caeruleus*)
- Lesser Kestrel (*Falco naumanni*) and
- Black-chested Snake-eagle (*Circaetus pectoralis*).

Both collector substation locations are very similar in terms of their potential impacts on avifauna. As such the impact assessment conducted below, is applicable to both alternatives.

Grid Power Line Alternatives

Both power line options very similar in terms of their potential impacts on avifauna. As such the impact assessment conducted below, is applicable to both grid line alternatives.

6.4.2 Description of Avifaunal Impacts

The highest reporting rates (>5%) were observed for the globally endangered Cape Vulture (*Gyps coprotheres*) and the globally critically endangered White-backed Vulture (*Gyps africanus*), the globally endangered Lappet-faced Vulture (*Torgos tracheliotos*). These species have a high likelihood of occurrence pending the presence of suitable food (livestock carcasses). Six independent observations were made of White-backed Vulture (*Gyps africanus*) on the project area during the surveys. The regionally vulnerable Lanner Falcon (*Falco biarmicus*), and regionally near threatened Abdim's Stork (*Ciconia abdimii*) have a moderate probability of occurrence and are regarded as occasional foraging visitors to the area.

Potential bird impacts associated with distribution power lines include electrocution, collision and disturbances caused during the construction and operation. It is however a common rule that large and heavy-bodied bird species are more at risk of being affected in a negative way when interacting with power lines. These impacts include the following:

Electrocution

Power Line Infrastructure: Electrocution happens when a bird bridges the gap between the live components or a combination of a live and earth component of a power line, thereby creating a short circuit. This happens when a bird, mainly a species with a fairly large wingspan attempts to perch on a pylon or attempts to fly-off a tower. These larger species will attempt to roost and even breed on the tower structures if available nesting platforms are a scarce commodity.

Large transmission lines (from 220kV to 765kV) are seldom a risk of electrocution, although smaller distribution lines (88kV to 132kV) pose a higher risk. However, for this project, the design of the pylon is an important consideration in preventing bird electrocutions. However, electrocution of bird, especially vultures is proportional to the spatial position of livestock carcasses, and will probably only occur when a carcass is located underneath or in close proximity to an overhead power line.

Collision

Power Line Infrastructure: Collision with earth wires have probably accounted for most bird-power line interactions in South Africa. In general, the earth wires are much thinner in diameter when compared to the live components, and therefore less visible to approaching birds. Many of the species likely to be affected include heavy, large-bodied terrestrial species such as cranes, storks, flamingos, bustards, korhaans, Secretarybirds and a variety of waterbirds that are not very agile or manoeuvrable once airborne. These species, especially those with the habit of flying with outstretched necks (e.g. most species of storks) find it difficult to make a sudden change in direction while flying – resulting in the bird flying into the earth wires.

6.4.3 Impact tables summarising the significance of impacts on avifauna during construction and operation (with and without mitigation)

The impacts assessed below are relevant to the development of the grid infrastructure within the assessed grid connection corridor and consider the observed species diversity and abundance in the project area. With the implementation of mitigation measures, the significance of the impacts after mitigation are medium to low. The below tables are applicable to both Alternative 1 & 2.

Collector Substation Alternatives

Loss/Destruction of Avifaunal Habitat (initiated during the construction phase and carried throughout the operational phase)

Impact Nature: Losses of natural habitat and displacement of birds through physical transformation, modifications, removals and land clearance. This impact is mainly restricted to the construction phase.		
	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (4)	Minor (2)
Probability	Definite (5)	Probable (3)
Significance	Medium (50)	Low (24)
Status	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources	Yes	Yes
Can impacts be mitigated?	Yes, to a large extent.	
Mitigation » It is difficult to mitigate against the loss of habitat since clearing of vegetation (or habitat) will be required for the infrastructure associated with the project. Both the power line and collector substation options contain the same habitat types which is mainly of medium sensitivity. However, the footprint of the pylons can be positioned in such a way to avoid areas of high sensitivity (e.g. moist grassland), although this may not be possible during the construction of access roads/tracks. The best practicable mitigation will be to consolidate to infrastructure to areas where existing impacts occur (e.g. placing the proposed power line alongside existing power lines). The proposed collector substation covers a small surface area, which will result in a reduced impact significance rating.		
Residual Impacts		

It is anticipated that during rehabilitation (after removal of the infrastructure) that the vegetation will revert to secondary grassland and shrubland resulting in a decreased bird species richness with low evenness values on a local scale. The residual impact will be medium along the power line servitude. The residual impact of the collector substation will be low due to the small surface area of habitat loss.

Grid Power Line Alternatives

Loss/Destruction of Avifaunal Habitat (initiated during the construction phase and carried throughout the operational phase)

Impact Nature: Losses of natural habitat and displacement of birds through physical transformation, modifications, removals and land clearance. This impact is mainly restricted to the construction phase.		
	Without Mitigation	With Mitigation
Extent	Local (2)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	Moderate (6)	Moderate (6)
Probability	Definite (5)	Highly Probable (4)
Significance	Medium (55)	Medium (52)
Status	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources	Yes	Yes
Can impacts be mitigated?	Yes, to a large extent.	
Mitigation » Development footprint positioned to avoid areas of high sensitivity (e.g. moist grassland) » Consolidate infrastructure to areas where existing impacts occur (e.g. placing the power line alongside existing power lines). The proposed collector substation covers a small surface area, which will result in a reduced impact significance rating.		
Residual Impacts It is anticipated that during rehabilitation (after removal of the infrastructure) that the vegetation will revert to secondary grassland and shrubland resulting in a decreased bird species richness with low evenness values on a local scale. The residual impact will be medium along the power line servitude. The residual impact of the collector substation will be low due to the small surface area of habitat loss.		

Collisions of birds with overhead power line

Impact Nature: Avian collision impacts related to new overhead power (distribution) lines during operation		
	Without Mitigation	With Mitigation
Extent	Regional (4)	Regional (4)
Duration	Long-term (4)	Long-term (4)
Magnitude	Very High (10)	High (8)
Probability	Highly Probable (4)	Probable (3)
Significance	High (72)	Medium (48)
Status	Negative	Negative

Reversibility	Low	Low
Irreplaceable loss of resources	Yes, owing to the potential loss of critically endangered or endangered bird species	Yes, impact could still occur irrespective of mitigation
Can impacts be mitigated?	Yes, to some extent	
Mitigation » Apply bird deterrent devices to the power lines and make use of "bird-friendly" pylon structures. » Avoid the placement of cattle feedlots, kraals and watering points in close proximity to any overhead electrical infrastructure. » All cattle feedlots and watering points within close proximity of power lines should preferably be relocated (outside the 30m servitude from power lines). » Grazing of cattle in close proximity to overhead power lines should preferably be avoided (to minimize potential livestock carcasses near distribution lines). » To aid post-construction monitoring and/or monitoring of bird mortality rates, it is advised to conduct direct observations and carcass searches on a regular and systematic basis. » As a priority, all new power lines should be marked with bird diverters when spanning areas of high sensitivity (at least two consecutive spans on both sides where the alignment spans a sensitive habitat should be marked). » In addition, the impact significance (after mitigation) will be reduced if the proposed corridor is to be placed alongside existing power line servitudes. » The power line should, as far as possible, be placed parallel to existing power lines or other linear infrastructure such as roads, as this will also greatly increase the visibility of the overhead cables		
Residual Impacts Direct mortality is possible and may still happen irrespective of applied mitigation measures. The residual impact will be medium.		

Electrocution of birds due to overhead power lines (Operation Phase)

Impact Nature: Avian electrocution related to the new distribution line during operation.		
	Without Mitigation	With Mitigation
Extent	Regional (4)	Regional (4)
Duration	Long-term (4)	Long-term (4)
Magnitude	Very High (10)	High (8)
Probability	Highly Probable (4)	Probable (3)
Significance	High (72)	Medium (48)
Status	Negative	Negative
Reversibility	Low	Medium
Irreplaceable loss of resources	Yes, owing to the potential loss of critically endangered or endangered bird species	Yes, impact could still occur irrespective of mitigation.
Can impacts be mitigated?	Yes, to some extent	
Mitigation » Electrocution will be proportional to the spatial position of livestock carcasses (with reference to scavenging birds of prey), and will probably only occur when a carcass is located underneath or in close proximity to an overhead distribution power line. » Apply bird deterrent devices to the power line. Avoid the placement of cattle feedlots and watering points near electrical infrastructure. All cattle feedlots and watering points within close proximity of power lines should preferably be relocated (outside the 30m servitude from power lines). » Grazing of cattle at or in close proximity to distribution lines should be monitored at all times and preferably be avoided (to minimise potential livestock carcasses near distribution lines). » Make use of bird-friendly pylons and bird guards as recommended by EWT.		

» Position electrical infrastructure in close proximity to existing infrastructure (e.g. existing roads and power lines). » A "Bird Friendly" structure, with a bird perch (as per standard Eskom guidelines) must be used for the tower structures. » All relevant perching surfaces should be fitted with bird guards and perch guards as deterrents (Hunting, 2002). » Installation of artificial bird space perches and nesting platforms should be installed, at a safe distance from energised components (Goudie, 2006; Prinsen et al., 2012). » Line inspections should be ongoing for the operational life of the line.
Residual Impacts Direct mortality is possible and may still happen irrespective of applied mitigation measures. The residual impact will be medium.

The impact significance will be similar for both grid connection alternatives (including the collector substation alternatives), although Alternative 2 is favourable since the length of grid corridor Alternative 2 is shorter when compared to Alternative 1.

6.4.4 Comparative Assessment of Alternatives

A summary of the assessment of impacts for the grid connection and associated infrastructure alternatives are detailed below and include the identification of the preferred alternative, in terms of the potential impacts on avifauna features.

Grid Connection Alternative 1	***Acceptable, but less preferred***
Grid Connection Alternative 2	***Acceptable and favourable***
The impact significance will be similar for both grid connection alternatives (including the collector substation alternatives), although Alternative 2 is favourable since the length of grid corridor Alternative 2 is shorter when compared to Alternative 1.	

6.4.5 Implications for Project Implementation

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of avifauna impacts associated with the grid connection infrastructure for the Houthaalboomen PV cluster grid connection can be reduced to medium to low.

From the outcomes of the study undertaken, it is concluded that the grid connection infrastructure can be developed and impacts on avifauna managed by taking the following into consideration:

» Apply bird deterrent devices to the power line and make use of "bird-friendly" pylon structures.
» Consolidate infrastructure to areas where existing impacts occur (e.g. placing the proposed power line alongside existing power lines and roads).
» Overall development footprint must be kept as small as possible and sensitive habitats must be avoided.

6.5. Assessment of Impacts on Heritage Resources

Negative impacts on heritage resources will be due to loss during construction activities during the operation of the grid connection infrastructure. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix H** for further details). The heritage impact assessment assessed the full extent of the grid connection corridor, as well as the grid connection infrastructure, including the two alternative collector substations.

6.5.1 Results of the Heritage Impact Assessment (including archaeology, palaeontology and cultural landscape)

Several ex-situ archaeological resources have been identified within the grid connection corridor, however, the potential for finding a dateable in-situ archaeological horizon based on current surface observations appears to be low. The archaeological resources identified have scientifically Low-significance and are graded IIIC. As such, it is unlikely that the proposed grid connection will negatively impact on significant stone age archaeological heritage.

A number of stone structures were identified within the study area. Some of these structures are likely to represent human burial (LICBUR10) and as such, these structures are conservatively graded IIIA (high local significance). It is recommended that a 10m no-development buffer zone around each structure or set of structures is implemented. In addition, a possible burial was identified within the grid connection corridor by Van der Walt (2014). A further 10m no-development buffer zone must also be implemented around this site (SAHRIS Site ID 51472). Not all the stone structures identified are likely human burials. Some of these less typical stone structures should be avoided where possible, and construction in the vicinity should proceed with caution.

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are the correct age and type to contain trace fossils, namely stromatolites in the Malmani Subgroup. Furthermore, the material to be excavated is loose sand and this does not preserve fossils. Since there is an extremely small chance that trace fossils, stromatolites, from the Malmani Subgroup may occur below ground and may be disturbed . A Fossil Chance Find Protocol must be implemented. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low.

Assessment of Impacts on Heritage Resources

Negative impacts on heritage resources will be due to loss during construction activities during the operation of the grid connection infrastructure. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix H** for further details). The heritage impact assessment assessed the full extent of the grid connection corridor, as well as the grid connection infrastructure, including the two alternative collector substations.

6.5.2 Results of the Heritage Impact Assessment (including archaeology, palaeontology and cultural landscape)

Several ex-situ archaeological resources have been identified within the grid connection corridor, however, the potential for finding a dateable in-situ archaeological horizon based on current surface observations appears to be low. The archaeological resources identified have scientifically Low-significance and are graded IIIC. As such, it is unlikely that the proposed grid connection will negatively impact on significant stone age archaeological heritage.

A number of stone structures were identified within the study area. Some of these structures are likely to represent human burial (LICBUR10) and as such, these structures are conservatively graded IIIA (high local

significance). It is recommended that a 10m no-development buffer zone around each structure or set of structures is implemented. In addition, a possible burial was identified within the grid connection corridor by Van der Walt (2014). A further 10m no-development buffer zone must also be implemented around this site (SAHRIS Site ID 51472). Not all the stone structures identified are likely human burials. Some of these less typical stone structures should be avoided where possible, and construction in the vicinity should proceed with caution.

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are the correct age and type to contain trace fossils, namely stromatolites in the Malmani Subgroup. Furthermore, the material to be excavated is loose sand and this does not preserve fossils. Since there is an extremely small chance that trace fossils, stromatolites, from the Malmani Subgroup may occur below ground and may be disturbed . A Fossil Chance Find Protocol must be implemented. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low.

6.5.3 Description of the soils and agricultural potential

The most significant impacts of the proposed project on soil and agricultural productivity will occur during the construction phase of the power line pylons and collector substation During the construction phase, the vegetation will be removed and the soil surface prepared for the delivery of materials and erection of the infrastructure. During the operational phase, the risk remains that soil will be polluted by the waste generated or in the case of a spill incident when maintenance workers visit the area to do any maintenance work or repairs. During the decommissioning phase, soil will be prone to erosion when the infrastructure is removed from the soil surface.

Below follows the rating of the significance of each of the impacts for each of the project phases. It is expected that the impact ratings will be similar for both Grid Connection Alternative 1 and Grid Connection Alternative 2.

Both grid alternatives are very similar in terms of their potential impacts on *soils and agricultural potential*. As such the impact assessment conducted below, is applicable to both grid line alternatives.

6.5.4 Impact tables summarising the significance of impacts on soils and agricultural potential related to the grid connection infrastructure during construction and operation (with and without mitigation). The below tables are applicable to both Alternative 1 & 2.

Impact to reduction of land with natural vegetation for livestock grazing

Nature: The availability of grazing land for livestock farming will be reduced during the construction phase. It is anticipated that the significance of the impact will gradually reduce as vegetation re-establishes during the operational phase and animals can graze again around the pylons.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short duration - 2-5 years (2)	Very short duration - 0-1 years (1)
Magnitude	Low (4)	Minor (2)
Probability	Definite (4)	Probable (3)
Significance	**Low (28)**	**Low (12)**
Status (positive or negative)	Negative	Positive
Reversibility	High	High

Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	N/A

Mitigation:

» Vegetation clearance must be restricted to areas within the servitude where the power line will be constructed.
» Removal of obstacles to allow for access of construction vehicles must be kept to only where essential.
» Prior arrangements must be made with the landowners to ensure that livestock are moved to areas where they cannot be injured by vehicles traversing the area.
» No boundary fence must be opened without the landowners' permission.
» All left-over construction material must be removed from site once construction on a land portion is completed.
» No open fires made by the construction teams are allowable during the construction phase.

Residual Impacts:

The residual impact from the construction and operation of the Houthaalboomen grid infrastructure is considered low.

Cumulative Impacts:

Any additional power lines and other grid infrastructure that are built in the area to strengthen the electricity grid, will result in additional areas where grazing veld will be disturbed.

Impact on soil erosion

Nature: The clearing and levelling of a limited area of land within the proposed power line servitude will increase the risk of soil erosion in the area. It is anticipated that the risk will naturally reduce as grass and lower shrubs re-establishes in the area once the construction has wrapped up and the operational phase continues.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (30)**	**Low (16)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	N/A

Mitigation:

- Land clearance must only be undertaken immediately prior to construction activities and only within the development footprint/servitude;
- Unnecessary land clearance must be avoided;
- Level any remaining soil removed from excavation pits that remained on the surface instead of allowing small stockpiles of soil to remain on the surface.
- Where possible, conduct the construction activities outside of the rainy season.

Residual Impacts:

The residual impact from the construction and operation of the Houthaalbomen grid infrastructure on the susceptibility to erosion is considered low.

Cumulative Impacts:

Any additional power lines and substations that are built in the area to strengthen the electricity grid, will result in additional areas where exposed to soil erosion through wind and water movement.

Impact on soil pollution

Nature: The following construction activities can result in the chemical pollution of the soil:

1. Petroleum hydrocarbon (present in oil and diesel) spills by machinery and vehicles during earthworks and the removal of vegetation as part of site preparation.

2. Spills from vehicles transporting workers, equipment, and construction material to and from the construction site.
3. The accidental spills from temporary chemical toilets used by construction workers.
4. The generation of domestic waste by construction workers.
5. Spills from fuel storage tanks during construction.
6. Pollution from concrete mixing.
7. Any construction material remaining within the construction area once construction is completed.

During the operational phase of the power line, maintenance and repairs can result in waste generation within the servitude area.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Low (4)	Improbable (2)
Significance	**Medium (36)**	**Low (14)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	N/A

Mitigation:

- Maintenance must be undertaken regularly on all vehicles and construction/maintenance machinery to prevent hydrocarbon spills;
- Any waste generated during construction, must be stored into designated containers and removed from the site by the construction teams.
- Any left-over construction materials must be removed from site.

Residual Impacts:
The residual impact from the construction and operation of the proposed project will be low to negligible.

Cumulative Impacts:
Any additional power lines and substations that are built in the area where waste is not removed to designated waste sites, will increase the cumulative impacts associated with soil pollution in the area.

Impact on soil pollution (Operational phase)

Nature: During the operational phase, there can be potential spills and leaks from maintenance vehicles that transport maintenance workers and equipment. Also, any waste generated during maintenance and repairs on site can result in soil pollution.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Low (4)	Improbable (2)
Significance	**Medium (36)**	**Low (14)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	N/A

Mitigation:

- Maintenance must be undertaken regularly on all vehicles used for maintenance work to prevent hydrocarbon spills;
- No domestic and other waste must be left within the grid assessment corridor by maintenance and repair workers.

Residual Impacts:
The residual impact from the operation of the Houthaalbomen grid infrastructure will be low to negligible.
Cumulative Impacts:
The operation of any additional infrastructure to strengthen and support the operation of the Houthaalbomen grid infrastructure and waste not removed to designated waste sites will increase the cumulative impacts associated with soil pollution in the area.

6.5.5 Comparative Assessment of Alternatives

A summary of the assessment of impacts for the grid connection and associated infrastructure alternatives are detailed below and include the identification of the preferred alternative, in terms of the potential impacts on soils and agricultural potential.

Grid Connection Alternative 1	***Acceptable and favourable***
Grid Connection Alternative 2	***Acceptable and favourable***
It is expected that the impact ratings will be similar for both Grid Connection Alternative 1 and Grid Connection Alternative 2.	

6.5.6 Implications for Project Implementation

With the implementation of mitigation measures by the developer, contractors and operation staff, the significance of impacts of the grid connection infrastructure will be low. From the outcomes of the studies undertaken, it is concluded that the grid connection infrastructure can be developed and impacts on soils and agricultural potential managed by taking the following into consideration:

- Vegetation clearance must be restricted to areas within the servitude where the power line will be constructed.
- Removal of obstacles to allow for access of construction vehicles must be kept to only where essential.
- Prior arrangements must be made with the landowners to ensure that livestock are moved to areas where they cannot be injured by vehicles traversing the area.
- No boundary fence must be opened without the landowners' permission.
- All left-over construction material must be removed from site once construction on a land portion is completed.
- No open fires made by the construction teams are allowable during the construction phase.
- Land clearance must only be undertaken immediately prior to construction activities and only within the development footprint/servitude;
- Unnecessary land clearance must be avoided;
- Level any remaining soil removed from excavation pits that remained on the surface instead of allowing small stockpiles of soil to remain on the surface.
- Where possible, conduct the construction activities outside of the rainy season.
- Maintenance must be undertaken regularly on all vehicles and construction/maintenance machinery to prevent hydrocarbon spills;
- Any waste generated during construction, must be stored into designated containers and removed from the site by the construction teams.
- Any left-over construction materials must be removed from site.
- Maintenance must be undertaken regularly on all vehicles used for maintenance work to prevent hydrocarbon spills;
- No domestic and other waste must be left within the grid assessment corridor by maintenance and repair workers.

6.5.7 Description of the Heritage Impacts

Impacts to archaeological and heritage resources are expected to occur during construction phase of the project most likely during foundation excavations. However, with the implementation of mitigation measures, the impact to these resources is expected to be of Low significance. There are no fatal flaws expected to occur with regards to archaeological resources.

No impact to significant palaeontological heritage is anticipated, and the impact to paleontological resources is expected be of Low significance with and without the implementation of mitigation measures. It is recommended that no additional specialist palaeontological assessment is required.

Both grid alternatives are very similar in terms of their potential impacts on heritage resources. As such the impact assessment conducted below, is applicable to both grid line alternatives.

6.5.8 Impact tables summarising the significance of impacts on heritage related to the grid connection infrastructure during construction and operation (with and without mitigation). The below tables are applicable to both Alternative 1 & 2.

Collector Substation Alternatives and Grid line Alternatives

Impacts to Archaeology Resources

Impact Nature: A stone structure was identified within the development area. It is likely that this is a burial site (LICBUR10). This site has been graded IIIA and a no-development buffer of 10m is recommended around this site. A possible burial was identified within the grid connection corridor by Van der Walt (2014). A further 10m no-development buffer zone has also been recommended around this site (SAHRIS Site ID 51472).		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	High (8)	High (8
Probability	High (5)	Low (1)
Significance	High (70)	Low (14)
Status (positive or negative)	Neutral	Neutral
Reversibility	Irreversible	Irreversible
Irreplaceable loss of resources?	Possible	Possible
Can impacts be mitigated?	Yes	
Mitigation: » A 10m no-go development area must be implemented around site LICBUR10 and Site 51472 » Chance Fossil Finds Procedure must be implemented » Should any buried archaeological resources or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.		
Residual Impacts: Should any significant resources be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources.		

Impacts to Palaeontological Resources

Impact Nature:

No palaeontological resources of significance were identified within the development area.		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (2)	Low (2)
Probability	Low (1)	Low (1)
Significance	Low (8)	Low (8)
Status (positive or negative)	Neutral	Neutral
Reversibility	Irreversible	Irreversible
Irreplaceable loss of resources?	Possible	Not likely
Can impacts be mitigated?	Yes	
Mitigation: » A 10m no-go development area must be implemented around potential burial site » The attached Chance Fossil Finds Procedure must be implemented		
Residual Impacts: Should any significant resources be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources.		

6.5.9 Comparative Assessment of Alternatives

A summary of the assessment of impacts for the grid connection and associated infrastructure alternatives are detailed below and include the identification of the preferred alternative, in terms of the potential impacts on heritage resources.

Grid Connection Alternative 1	***Acceptable and favourable***
Grid Connection Alternative 2	***Acceptable and favourable***
There is no objection to the proposed development of the grid connection and collector substation anywhere within this corridor. Collector Substation alternatives and grid line alternatives avoid low sensitivity heritage features within 300m corridor. There is no preferred alternative in terms of impacts to heritage resources.	

6.5.10 Implications for Project Implementation

With the implementation of mitigation measures by the developer, contractors and operation staff, the significance of impacts of the grid connection infrastructure will be low. From the outcomes of the studies undertaken, it is concluded that the grid connection infrastructure can be developed and impacts on heritage managed by taking the following into consideration:

- A 10m no-go and no development buffer is implemented around the potential burial sites LICBUR10 and SAHRIS Site ID 51472
- A chance finds procedure must be implemented for the rescuing of any fossils discovered during construction excavations.
- A management plan is developed for the ongoing and long-term management of the burials within the development area.
- Should any buried archaeological resources or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

6.6. Assessment of Visual Impacts

Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix I** for further details). The visual impact assessment assessed the entire extent of the grid connection corridor, as well as the grid connection infrastructure for the both the grid alternative connection configurations.

6.6.1 Results of the Visual Impact Assessment

The visibility analyses were undertaken from the proposed substation site and power line alignment at 36m above ground level (i.e. the approximate maximum height of the grid connection infrastructure). The viewshed analyses were restricted to a 3km radius due to the fact that visibility beyond this distance is expected to be negligible/highly unlikely for the relatively constrained vertical dimensions of this type of infrastructure (i.e. a 132kV substation and 132kV power line).

Figure 6.1 also indicates proximity radii from the proposed grid connection infrastructure in order to show the viewing distance (scale of observation) of the structures in relation to their surrounds.

- It is expected that the grid connection infrastructure may theoretically be visible within the 3km visual corridor and potentially highly visible within a 0.5km radius (and up to 1,5km radius) of the structures due to the generally flat terrain it traverses. Beyond 1,5km the visibility becomes more scattered due to the undulating nature of the topography and the presence of hills, ridges and mountains. The grid connection structures are unlikely to be visible beyond a 3km radius of the structures. This applies to the power line and to the proposed substation. It should also be noted that the potential visual exposure will not occur in isolation, but rather in conjunction with the existing power lines traversing in between the proposed collector substation and the Watershed MTS.
- The majority of the exposed areas within 0-0.5km zone fall within vacant farm land, generally devoid of observers or potential sensitive visual receptors. There are however a number of homesteads or farm residences present in this zone, namely the Houthaalboomen (6) group of houses to the west of the alignment, residences located to the south of the Elandsfontein smallholding, and the Boskoppie and Elandsfontein group of houses near the R505 arterial road. The proposed power line will traverse this road in between these residences.
- 0.5-1.5km zone contains the central and northern parts of the Elandsfontein smallholdings. Most of the residences within this zone are located north of the Dudfield-Watershed 1 and 2 88kV, and Delareyville Municipal-Watershed 1 88kV power lines. These power lines will be in between the observers at these residences and the proposed power line. The rest of the visually exposed areas fall within vacant farmland and open space.
- There are three potentially exposed receptor sites within 1.5-3km zone, namely observers residing at the Houthaalboomen (3 and 5) homesteads (to the north) and the Scherppunt residence to the west. Exposed homesteads to the south include the Elandsfontein (1 and 2) group of houses closer to the R505 arterial road. The additional exposed areas in this zone fall within vacant farm land and vacant open space.
- At distances exceeding 3km the intensity of visual exposure is expected to be very low and highly unlikely due to the distance between the object (grid infrastructure) and the observer

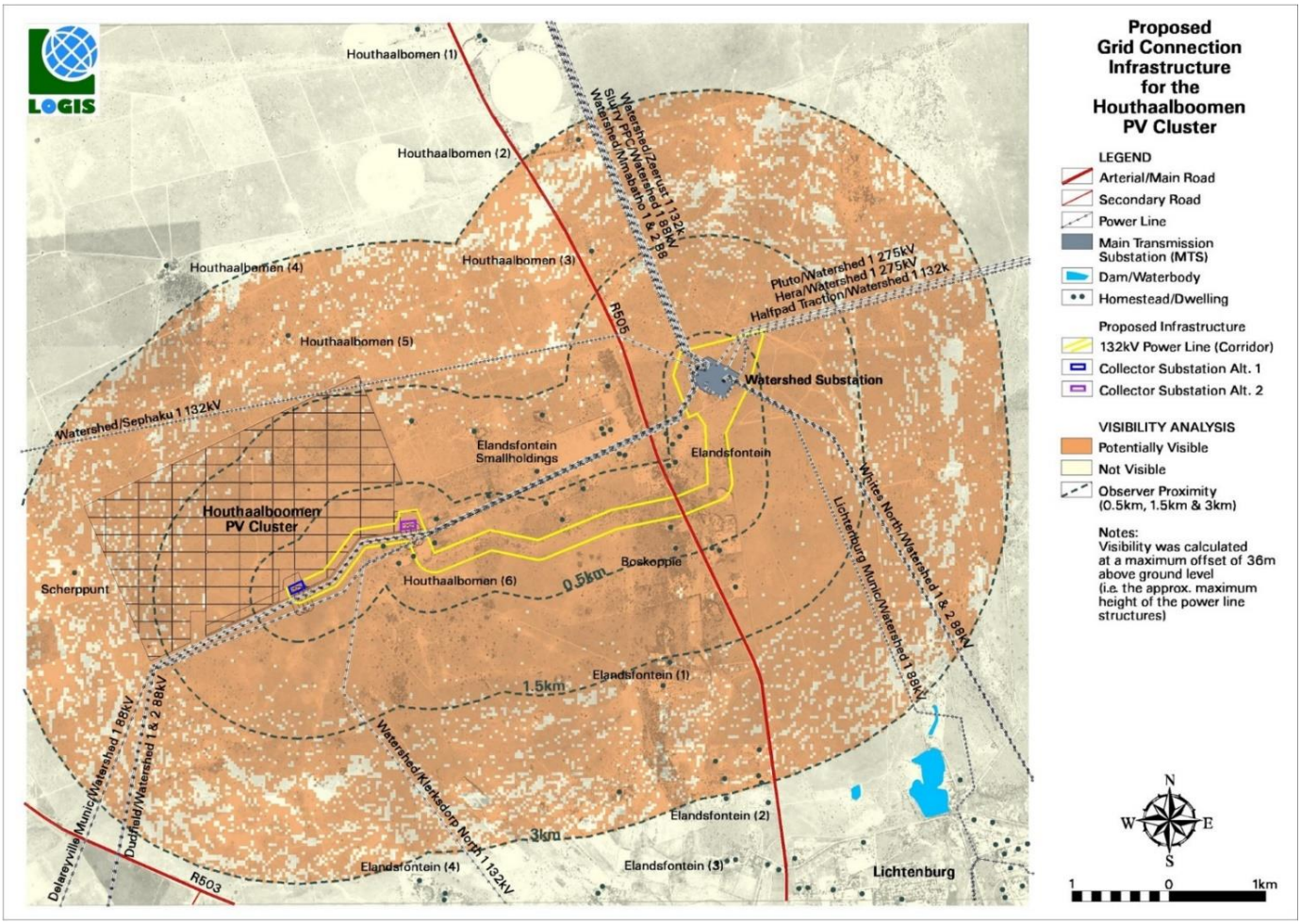

Figure 6.1: Viewshed analysis of the proposed grid connection infrastructure

The number of observers and their perception of a structure determine the concept of visual impact. If there are no observers or if the visual perception of the structure is favourable to all the observers, there would be no visual impact.

Viewer incidence is calculated to be the highest along the R505 arterial road within the study area. Commuters and tourists using this road may be negatively impacted upon by visual exposure to the proposed power line.

Additional sensitive visual receptors are located at the farm residences (homesteads) throughout the study area. It is expected that the viewer's perception, unless the observer is associated with (or supportive of) the grid connection infrastructure, would generally be negative. These potential sensitive visual receptors are displayed on **Figure 6.2.**

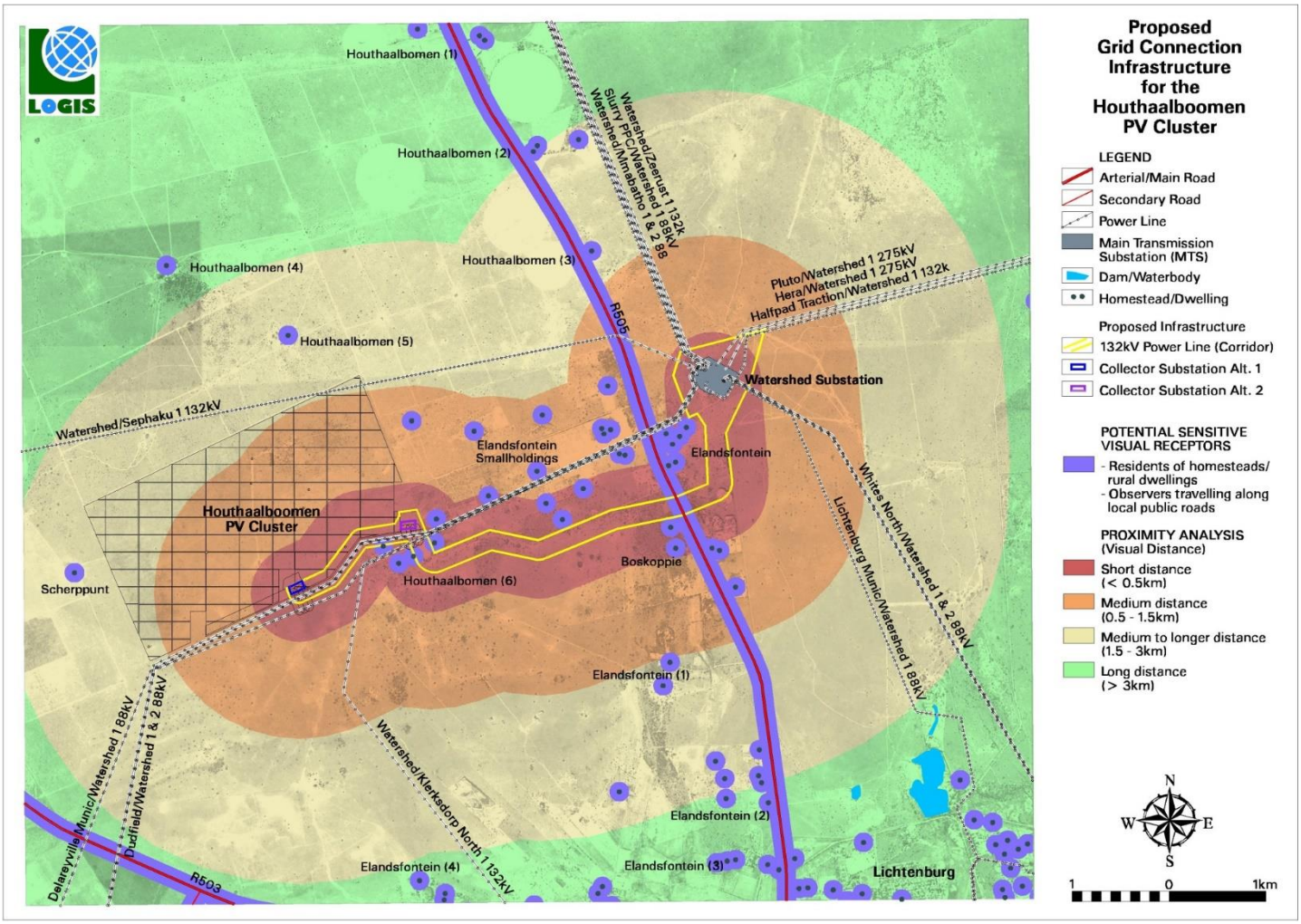

Figure 6.2: Proximity analysis and potential sensitive visual receptor

6.6.2 Description of the Visual Impacts

Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix H** for further details). The visual impact assessment assessed the full extent of the grid connection corridor, as well as the grid connection infrastructure, including the two alternative collector substations.

Visual impacts will occur during the construction and operation phases of the Houthaalboomen Solar PVs Grid Connection. The following potential visual impacts are assessed for the development of the grid connection infrastructure.

- During construction, there may be an increase in heavy vehicles utilising the roads to the power line servitude and substation site that may cause, at the very least, a visual nuisance to other road users and landowners in the area. Construction activities may potentially result in a moderate temporary visual impact, that may be mitigated to low. It is expected that the significance of the impact will be similar for both alternatives.
- The grid connection infrastructure is expected to have a moderate visual impact on observers within a 0.5km radius (and potentially up to a 1.5km radius) of the grid connection infrastructure. The visual impact of the power line will largely be absorbed by the presence of the existing power lines. The location of the proposed substation is also relatively remote and generally far removed from potential sensitive visual receptors. No mitigation of this impact is possible (i.e. the structures will be visible regardless), but general mitigation and management measures are recommended as best practice.
- Sense of place refers to a unique experience of an environment by a user, based on his or her cognitive experience of the place. Visual criteria, specifically the visual character of an area (informed by a combination of aspects such as topography, level of development, vegetation, noteworthy features, cultural / historical features, etc.), plays a significant role. An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light. The greater environment has a predominantly rural, undeveloped character and a natural appearance. These generally undeveloped landscapes are considered to have a high visual quality, except where urban development and power generation/distribution infrastructure represents existing visual disturbances. The anticipated visual impact of the proposed grid connection infrastructure on the regional visual quality (i.e. beyond 3km of the proposed infrastructure), and by implication, on the sense of place, is difficult to quantify, but is generally expected to be of low significance. It is expected that the significance of the impact will be similar for both alternatives.

6.6.3 Impact table summarising the significance of visual impacts during construction and operation (with and without mitigation)

Collector Substation Alternatives and Grid line Alternatives

Both grid alternatives are very similar in terms of their potential impacts on visual resources. As such the impact assessment conducted below, is applicable to both grid line alternatives. The below tables are relevant for both alternatives.

Construction and Operation Phase Impacts

Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed grid connection infrastructure.

Nature of Impact: Visual impact of construction activities on sensitive visual receptors in close proximity to the grid connection infrastructure.		
	Without mitigation	***With mitigation***
Extent	Short distance (4)	Short distance (4)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	Moderate **(36)**	Low **(20)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	No No
Can impacts be mitigated?	Yes	

Mitigation:

Planning:

» Retain and maintain natural vegetation immediately adjacent to the development footprint/servitude.

Construction:

» Ensure that vegetation is not unnecessarily removed during the construction phase.
» Plan the placement of lay-down areas (if required) and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible.
» Restrict the activities and movement of construction workers and vehicles to the immediate construction area and existing access roads.
» Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at licensed waste facilities.
» Reduce and control construction dust using appropriate and effective dust suppression techniques as and when required (i.e. whenever dust becomes apparent).
» Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts.
» Rehabilitate all disturbed areas immediately after the completion of construction works.

Residual impacts:

None, provided rehabilitation works are carried out as specified.

Visual impact on sensitive visual receptors located within a 0.5km radius of the grid connection infrastructure during the operational phase.

Nature of Impact: Visual impact on observers travelling along the roads and residents at homesteads in close proximity to the power line structures.		
	Without mitigation	***With mitigation***
Extent	Short distance (4)	Short distance (4)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	High (8)
Probability	Improbable (2)	Improbable (2)
Significance	Moderate **(32)**	Moderate **(32)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	
Mitigation: Planning: » Retain and maintain natural vegetation immediately adjacent to the development footprint/servitude. Operations: Maintain the general appearance of the infrastructure. Decommissioning: » Remove infrastructure not required for the post-decommissioning use. » Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications..		
Residual impacts: The visual impact will be removed after decommissioning, provided the power line infrastructure is removed. Failing this, the visual impact will remain		

Potential visual impact on sensitive visual receptors located within a 0.5km radius of the grid connection infrastructure during the operation phase

Nature of Impact: Visual impact on observers travelling along the roads and residents at homesteads in close proximity to the power line structures.		
	Without mitigation	***With mitigation***
Extent	Short distance (4)	Short distance (4)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	High (8)
Probability	Probable (3)	Probable (3)
Significance	Moderate **(48)**	Moderate **(48)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	

Mitigation: Planning: » Retain and maintain natural vegetation immediately adjacent to the development footprint/servitude. Operations: Maintain the general appearance of the infrastructure. Decommissioning: » Remove infrastructure not required for the post-decommissioning use. » Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications..
Residual impacts: The visual impact will be removed after decommissioning, provided the power line infrastructure is removed. Failing this, the visual impact will remain.

Potential visual impact on sensitive visual receptors within the region (1.5 – 3km radius) during the operation of the grid connection infrastructure

Nature of Impact: Visual impact on observers travelling along the roads and residents at homesteads within a 1.5 – 3km radius of the grid connection infrastructure.		
	Without mitigation	***With mitigation***
Extent	Short distance (3)	Short distance (3)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Improbable (2)	Improbable (2)
Significance	Low **(26)**	Low **(26)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	
Mitigation: Planning: » Retain and maintain natural vegetation immediately adjacent to the development footprint/servitude. Operations: » Maintain the general appearance of the servitude as a whole.. Decommissioning: » Remove infrastructure not required for the post-decommissioning use. » Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications..		
Residual impacts: The visual impact will be removed after decommissioning, provided that the grid connection infrastructure is removed. Failing this, the visual impact will remain.		

The potential visual impact of the proposed grid connection infrastructure on the sense of place of the region.

Nature of Impact: The potential impact of the development of the proposed grid connection infrastructure on the sense of place of the region.		
	Without mitigation	***With mitigation***
Extent	Medium to longer distance (2)	Medium to longer distance (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Improbable (2)
Significance	Low **(20)**	Low **(20)**

Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No, only best practise measures can be implemented	
Mitigation: Planning: » Retain and maintain natural vegetation immediately adjacent to the development footprint/servitude. Operations: » Maintain the general appearance of the servitude as a whole. Decommissioning: » Remove infrastructure not required for the post-decommissioning use. » Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications..		
Residual impacts: The visual impact will be removed after decommissioning, provided that the grid connection infrastructure is removed. Failing this, the visual impact will remain.		

6.6.4 Comparative Assessment of Alternatives

A summary of the assessment of impacts for the grid connection and associated infrastructure alternatives are detailed below and include the identification of the preferred alternative, in terms of the potential visual impacts.

Grid Connection Alternative 1	***Acceptable and favourable***
Grid Connection Alternative 2	***Acceptable and favourable***
The Grid Connection Alternative 1 will remove the collector substation further away from potential sensitive visual receptors, but it will increase the length of the power line to 6km. The Grid Connection Alternative 2 will shorten the power line to 4.5km, but would place the substation closer to potential sensitive visual receptors. However, at the Alternative 2 position it will align with the technically preferred location for the PV facility substations. If the Alternatives are considered in isolation, Alternative 1 would be preferred. Should the PV facility infrastructure be considered, Alternative 2 would be preferred. It is therefore concluded that both of the Alternatives have merit and that either Alternative may be implemented, provided that the landowners at the Alternative 2 site be consulted and do not object.	

6.6.5 Implications for Project Implementation

The primary visual impact, namely the appearance of the grid connection infrastructure within the landscape is not possible to mitigate. Overall, the significance of the visual impacts is expected to be low as a result of the generally undeveloped character of the landscape. No impacts of high significance are expected to occur.

Both of the Grid Connection Alternatives are considered acceptable from a visual impact perspective. However. The Grid Connection Alternative 1 will remove the collector substation further away from potential sensitive visual receptors, but it will increase the length of the power line to 6km. The Grid Connection Alternative 2 will shorten the power line to 4.5km, but would place the substation closer to potential sensitive visual receptors. However, at the Alternative 2 position it will align with the technically preferred location for the PV facility substations.

Overall, the primary visual impact, namely the appearance of the grid connection infrastructure is not possible to mitigate. The functional design of the structures cannot be changed in order to reduce visual impacts. The following mitigation is, however, possible:

- Retain/re-establish and maintain natural vegetation in all areas immediately adjacent to the development footprint/servitude.
- Mitigation of visual impacts associated with the construction phase, albeit temporary, entails proper planning, management and rehabilitation of the construction site.
- During operation, the maintenance of the grid connection infrastructure will ensure that the infrastructure does not degrade, therefore aggravating visual impact.
- Roads must be maintained to forego erosion and to suppress dust, and rehabilitated areas must be monitored for rehabilitation failure. Remedial actions must be implemented as a when required.
- Once the grid connection infrastructure has exhausted its life span, all associated infrastructure not required for the post rehabilitation use of the site/servitude should be removed and all disturbed areas appropriately rehabilitated. An ecologist should be consulted to give input into rehabilitation specifications.
- All rehabilitated areas should be monitored for at least a year following decommissioning, and remedial actions implemented as and when required.

6.7. Assessment of the 'Do Nothing' Alternative

The 'do-nothing' alternative (i.e. no-go alternative) is the option of not constructing the consolidated grid connection infrastructure for the Houthaalboomen PV cluster . Should this alternative be selected, there would be no environmental impacts within the grid connection corridor due to the construction and operation activities of grid connection infrastructure. From a regional perspective, the 'do-nothing' alternative is not preferred as the optimal evacuation of power from renewable energy facilities will not be realised which may be a perceived loss of benefits for the regional area.

From the specialist studies undertaken, no environmental fatal flaws were identified to be associated with the development of the grid connection infrastructure. All impacts associated with the project can be mitigated to acceptable levels. If the grid connection infrastructure is not developed the following positive impacts will not be realised, which are also associated with the Houthaalboomen cluster PV developments:

- Job creation from the construction and operation phases.
- Meeting of energy generation mix in a most economic and rapid manner.
- Provision of clean, renewable energy in an area where it is optimally available.

As detailed above, the 'do-nothing' alternative will result in lost opportunities in terms of positive impacts as well as the loss of the opportunity to develop consolidated grid connection infrastructure to evacuate power from three authorised PV projects (Barleria PV, Dicoma PV & Setaria PV. The negative impacts associated with the 'do nothing' alternative are considered to outweigh the positive impacts of this alternative. The 'do nothing' alternative is, therefore, not preferred and not proposed (or recommended) to be implemented for the Houthaalboomen PV cluster Grid connection.

CHAPTER 7. ASSESSMENT OF POTENTIAL CUMULATIVE IMPACTS

As identified and assessed in Chapter 6, a grid connection and the associated infrastructure may have effects (positive and negative) on the natural and social environments and on the people living in a project area. The preceding impact assessment chapter has reported on the assessment of the impacts associated with the grid connection infrastructure for the Houthaalboomen PV cluster largely in isolation (from other similar developments).

This chapter assesses the potential for the impacts associated with the grid connection infrastructure to become more significant when considered in combination with the other known or planned projects within the area.

7.1 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the BA Report includes the following information required in terms of Appendix 1: Content of BA Reports:

Requirement	Relevant Section
3(j)(i) an assessment of each identified potentially significant impact and risk, including cumulative impacts.	The cumulative impacts associated with the development of the Houthaalboomen Grid Connection are included and assessed within this chapter.

7.2 Approach taken to Assess Cumulative Impacts

The cumulative impacts of the proposed Houthaalboomen Grid Connection have been assessed through the consideration of existing grid infrastructure associated with the national grid are also considered as part of this cumulative impact assessment.

The cumulative impacts that have the potential to be compounded through the development of the grid connection infrastructure in proximity to other similar developments include impacts such as those listed below. The role of the cumulative assessment is to identify if such impacts are relevant to the grid connection infrastructure, as well as to assess the significance of the relevant impacts:

- Unacceptable loss of threatened or protected vegetation types, habitat or species through clearing, resulting in an impact on the conservation status of such flora, fauna or ecological functioning;
- Unacceptable risk to avifauna through disturbance and collision/interaction with power infrastructure;
- Unacceptable loss of heritage resources;
- Complete or whole-scale change in sense of place and character of an area and unacceptable visual intrusion.

It is important to explore the potential for cumulative impacts as this will lead to a better understanding of these impacts and the potential for mitigation that may be required. 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 grid connection infrastructure throughout South Africa, while the

significance of the cumulative impact on visual amenity may only be influenced by grid connection infrastructure developments that are in close proximity to each other and in close proximity to the viewer.

The grid connection corridor assessed for the grid connection infrastructure is located within the Northern Strategic Transmission Corridor. The area forms part of the areas identified by the DFFE as geographical areas of strategic importance for the development of large-scale grid infrastructure development projects (transmission corridors). Therefore, the area is considered as a node for the development of renewable energy and grid infrastructure projects.

Figure 7.1 indicates the location of other renewable project routes including, Tlisitseng PV cluster grid connection corridor, Lichtenburg 1,2 and 3 PV facilities grid corridor as well as existing grid infrastructure located within the vicinity of the proposed project. Existing grid connection infrastructure in proximity of the Houthaalboomen PV cluster grid connection includes:

- Delareyville Municipal-Watershed 1 88kV
- Dudfield-Watershed 1 and 2 88kV
- Watershed-Sephaku 1 132kV
- Watershed-Klerksdorp North 1 132kV
- Watershed-Zeerust 1 132k
- Slurry PPC-Watershed 1 88kV
- Watershed-Mmabatho 1 and 2 88kV
- Pluto-Watershed 1 275kV
- Hera-Watershed 1 275kV
- Halfpad Traction-Watershed 1 132kV
- Whites North-Watershed 1 and 2 88kV
- Lichtenburg Munic/Watershed 1 88kV

The potential for cumulative impacts resulting from the development of grid connection infrastructure considers the following:

- Cumulative Impacts on Ecological
- Cumulative Impacts on Avifauna
- Cumulative Impacts on Land use, soil and agricultural potential
- Cumulative Impacts on Heritage Resources
- Cumulative Visual Impacts

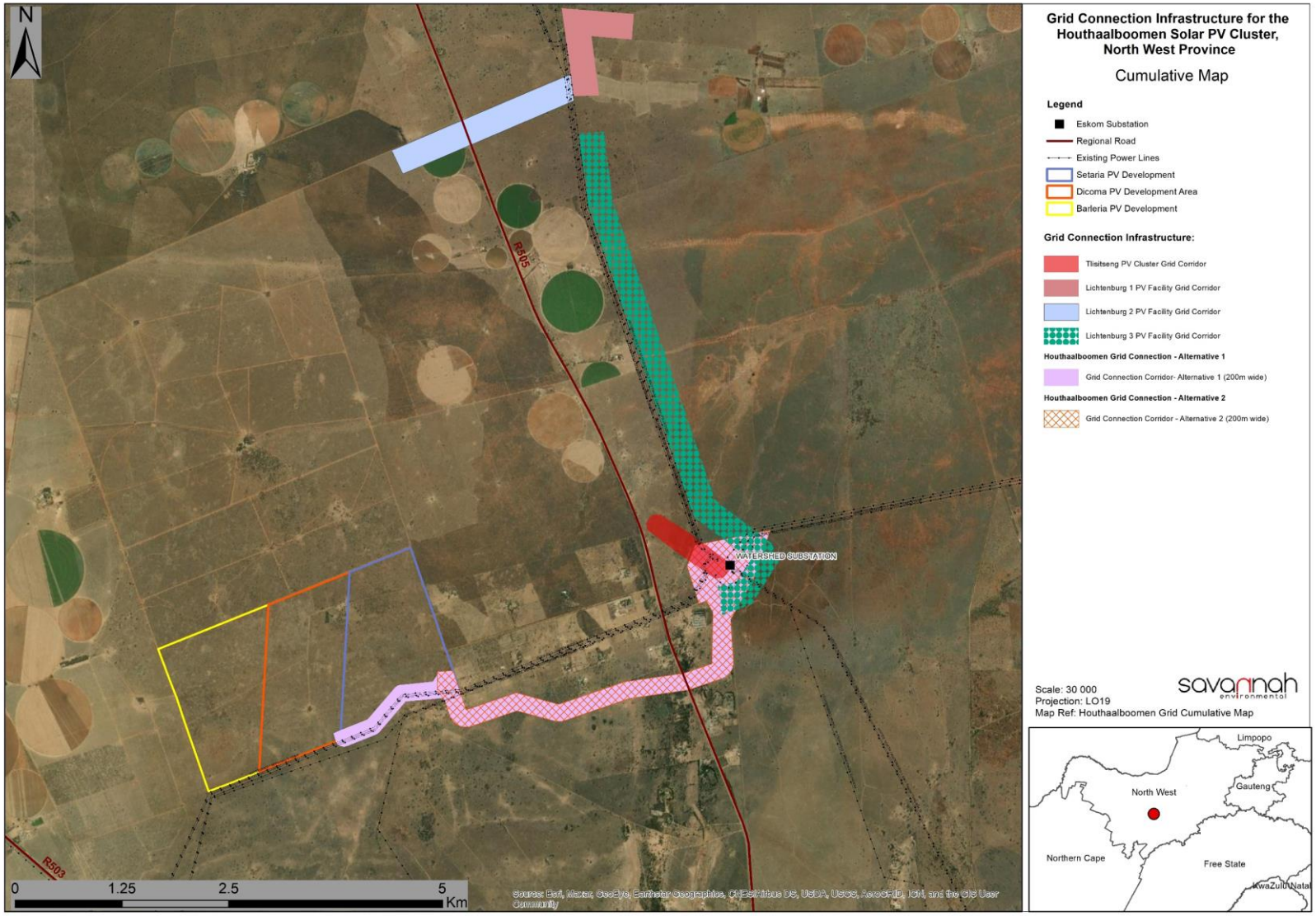

Figure 7.1: Cumulative map for the Houthaalboomen solar PVs grid connection showing location of other renewable project routes including existing grid infrastructure located within the vicinity of the project

7.3 Cumulative Impacts on Ecological

Terrestrial ecology cumulative impacts related to the grid connection infrastructure are related to the cumulative loss unprotected vegetation types from the broad area may impact the country's ability to meet its conservation targets, and transformation of intact habitat would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity. However, given the nature and extent of the grid connection infrastructure, the expected cumulative impact is acceptable in terms of loss and risk, without an unacceptable increase in impact.

Impact Nature: Reduced ability to meet conservation obligations and targets - The loss of unprotected vegetation types on a cumulative basis from the broader area impacts the province's ability to meet its conservation targets.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other grid infrastructure within the area**
Extent	Local (1)	Regional (2)
Duration	Long Term (4)	Long-Term (4)
Magnitude	Small (0)	Minor (2)
Probability	Very Improbable (1)	Highly Improbable (2)
Significance	**Low (5)**	**Low (16)**
Status	Slightly Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources	Highly unlikely	Unlikely
Can impacts be mitigated?	Yes, to a large extent	
Mitigation	» The development footprint should be kept to a minimum and natural vegetation should be encouraged to return to disturbed areas. » Reduce the footprint of the facility within sensitive habitat types as much as possible. » Mitigation measures of the current site should align with neighbouring sites and other developments in the area.	

Impact Nature: Impacts on Broad-Scale Ecological Processes - Transformation of intact habitat could potentially compromise ecological processes of the Critical Biodiversity and Ecological Support Areas as well as ecological functioning of important terrestrial habitats and would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other grid infrastructure within the area**
Extent	Local (1)	Regional (2)
Duration	Long Term (4)	Long-Term (4)
Magnitude	Small (0)	Minor (2)
Probability	Very Improbable (1)	Improbable (2)
Significance	**Low (5)**	**Low (16)**
Status	Neutral	Slightly Negative
Reversibility	Low	Low
Irreplaceable loss of resources	Highly unlikely	Unlikely
Can impacts be mitigated?	Yes, to a large extent	

Mitigation	» The development footprint should be kept to a minimum and natural vegetation should be encouraged to return to disturbed areas. » Mitigation measures of the current site should align with neighbouring sites and other developments in the area.

Impact Nature: Compromise ecological processes as well as ecological functioning of important terrestrial habitats - Transformation of intact terrestrial habitats could potentially compromise ecological processes as well as ecological functioning of important habitats and would contribute to habitat fragmentation and potential disruption of habitat connectivity and impair their ability to respond to environmental fluctuations. This in turn may lead to:

» A change in the status of the Vaal-Vet Sandy Grassland, subsequently also reducing the ability to meet national conservation obligations and targets;
» A reduction in biodiversity and even the loss of some species from the area;
» Fracturing and isolation of landscapes may cut off important migration routes and prevent genetic variability thus reducing "genetic health" which may in turn lead to weaker species incapable to adapt and react to potential environmental changes and consequently also to a reduction in biodiversity and the extinction of some species from certain areas.
» The loss of CBA's which may lead to the province, being incapable to meet their required biodiversity pattern a process targets.

The loss of important corridors essential for some species to allow for movement between important habitat types crucial for the survival of these species.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other grid infrastructure within the area**
Extent	Local (1)	Local (1)
Duration	Long Term (4)	Long Term (4)
Magnitude	Small (1)	Small (1)
Probability	Highly Improbable (1)	Highly Improbable (1)
Significance	**Low (6)**	**Low (6)**
Status	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Yes	
Mitigation	» The development footprint should be kept to a minimum and natural vegetation should be encouraged to return to disturbed areas.	

7.4 Cumulative Impacts on Avifauna

The impact of grid connection infrastructure relates to habitat loss, collisions with power infrastructure (including power lines) and electrocutions as a result of power lines and power infrastructure.

The cumulative avifauna impacts, considering the development of the grid connection and the other similar infrastructure within the surrounding area will be of high significance. This is considering the potential loss of critically endangered or endangered bird species. Cumulative avifaunal impacts associated with the development of the Houthaalboomen grid connection infrastructure in relation to other known grid

connection infrastructure is considered acceptable in terms of loss and risk, with the implementation of mitigation.

Nature: Regional losses of natural habitat and subsequent displacement of birds		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (2)	Local (2)
Duration	Permanent (5)	Long-term (4)
Magnitude	Moderate (6)	High (8)
Probability	Definite (5)	Definite (5)
Significance	**High (65)**	**High (70)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes, to some extent	
Mitigation: » The best practicable mitigation will be to consolidate infrastructure (ie power lines) to areas where existing impacts occur (e.g. placing the proposed power line alongside existing power lines).		

Nature: Avian collision impacts related to the overhead power lines during operation.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Regional (4)	Regional (4)
Duration	Long-term (4)	Long-term (4)
Magnitude	Very high (10)	Very high (10)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**High (72)**	**High (72)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes, owing to the potential loss of critically endangered or endangered bird species.	Yes, owing to the potential loss of critically endangered or endangered bird species
Can impacts be mitigated?	Yes, to some extent	
Mitigation: » Apply bird deterrent devices to the power line and make use of "bird-friendly" pylon structures. » Allow for construction of new powerlines parallel to existing lines. » To aid post-construction monitoring and/or monitoring of bird mortality rates, conduct direct observations and carcass searches on a regular and systematic basis. » As a priority, all new power lines should be marked with bird diverters.		

Nature: Avian electrocution related to the power lines during operation.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Regional (4)	Regional (4)
Duration	Long-term (4)	Long-term (4)
Magnitude	Very High (10)	Very High (10)
Probability	Highly Probable (4)	Highly Probable (4)

Significance	**High (72)**	**High (72)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes, owing to the potential loss of critically endangered or endangered bird species.	Yes, owing to the potential loss of critically endangered or endangered bird species
Can impacts be mitigated?	Yes, to some extent	
Mitigation: » Apply bird deterrent devices to the power line and make use of "bird-friendly" pylon structures. » Move cattle feedlots and watering points away from electrical infrastructure. » As a priority, all new power lines should be marked with bird diverters. » Make use of bird-friendly pylons and bird guards. » Position electrical infrastructure in close proximity to existing infrastructure.		

7.5 Cumulative Impacts on Land Use, Soil and Agricultural Potential

Cumulative impacts from a soils perspective are related to an increase in the loss of agricultural land used for livestock farming and cultivation, as well as an increased risk of erosion. These impacts can be reduced by keeping the footprints of the grid infrastructure minimised where possible and strictly following soil management measures pertaining to erosion control and management and monitoring of any possible soil pollution sources such as vehicles traversing over the sites.

Nature: Decrease in areas with suitable land capability for cattle farming.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Regional (2)
Duration	Short duration (1)	Short duration (2)
Magnitude	Minor (2)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Low (12)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	High	Low
Irreplaceable loss of resources?	No	Yes
Can impacts be mitigated?	N/A	No
Mitigation: » Keep the footprints of all grid infrastructure as small as possible » Manage the soil quality by avoiding far-reaching soil degradation such as erosion.		

Nature: Cumulative impact areas susceptible to soil erosion		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Regional (2)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Moderate (6)	Moderate (6)
Probability	Probable (3)	Probable (3)

Significance	**Medium (30)**	**Medium (33)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	No
Mitigation: » Adherence to the highest standards for soil erosion prevention and management, as defined in the Agricultural Compliance Statement.		

Nature: Cumulative impact on areas susceptible to soil compaction		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Regional (2)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Probable (3)
Significance	**Low (16)**	**Low (27)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Loss of resources?	No	No
Can impacts be mitigated?	Yes	No
Mitigation: » Adherence to the highest standards for soil erosion prevention and management, as defined in the Agricultural Compliance Statement.		

Nature: Cumulative impact on increased risk of soil pollution		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Regional (2)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Low (27)**	**Medium (30)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	No
Mitigation: » Adherence to the highest standards for soil erosion prevention and management, as defined in the Agricultural Compliance Statement.		

7.6 Cumulative Impacts on Heritage (including archaeology and palaeontology)

From a heritage perspective the landscape surrounding Lichtenburg has not been identified as having any special tangible or intangible heritage significance. Therefore, it is unlikely that the proposed grid connection will result in unacceptable risk, unacceptable loss, whole-scale changes to the sense of place

or unacceptable increase in impact. The heritage cumulative impacts associated with the grid connection will be of a low significance. Impacts when considering all similar developments would remain as low significance.

Nature: Cumulative Impact to the sense of place and known archaeological and palaeontological resources		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Low (1)	Low (1)
Duration	Medium-term (3)	Long-term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Probable (3)
Significance	**Low (16)**	**Low (27)**
Status (positive or negative)	Neutral	Neutral
Reversibility	High	Low
Irreplaceable loss of resources?	Unlikely	Unlikely
Can impacts be mitigated?	N/A	
Mitigation: » No impacts are anticipated and as such, no mitigation is required.		

7.7 Cumulative Visual Impacts

The construction of the grid connection infrastructure for the Houthaalboomen PV cluster may increase the cumulative visual impact of industrial type infrastructure within the region. The proposed Substation and grid corridor Alternatives are located parallel to existing Eskom lines and close to the Watershed Substation. It is expected that the existing visual disturbance at this site will largely absorb the potential visual exposure of the proposed infrastructure, i.e. the visual amenity of this area has already been compromised to some degree.

The anticipated cumulative visual impact of the proposed grid connection infrastructure is expected to be of moderate significance. This is considered to be acceptable from a visual impact perspective.

Nature: The potential cumulative visual impact of the grid connection infrastructure on the visual quality of the landscape		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local/ very short distance (4)	Regional/ medium to longer distance (2)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	High (8)
Probability	Improbable (2)	Probable (3)
Significance	**Moderate (32)**	**Moderate (42)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No, only best practise measures can be implemented.	
Mitigation:		

Planning:
» Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint/servitude.

Operations:
» Maintain the general appearance of the servitude as a whole.

Decommissioning:
» Remove infrastructure not required for the post-decommissioning use.
» Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.

7.8 Conclusion regarding Cumulative Impacts

Cumulative impacts are expected to occur with the development of the Houthaalboomen Solar PVs grid connection throughout all phases of the project life cycle and within all areas of study considered as part of this BA Report. The main aim for the assessment of cumulative impacts considering the development of the grid connection infrastructure is to identify associated cumulative impacts and determine whether the development will be acceptable within the landscape proposed for the development, and whether the loss, from an environmental and social perspective, will be acceptable without whole-scale change.

Cumulative impacts associated with the Houthaalboomen Solar PVs grid connection will be of a low, medium and high significance. The following can be concluded regarding the cumulative impacts of the grid connection infrastructure:
Terrestrial ecology cumulative impacts related to the grid connection infrastructure are related to the cumulative loss unprotected vegetation types from the broad area may impact the country's ability to meet its conservation targets, and transformation of intact habitat would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity. However, given the nature and extent of the grid connection infrastructure, the expected cumulative impact is acceptable in terms of loss and risk, without an unacceptable increase in impact.

» ***Ecological processes (terrestrial):*** Cumulative impacts as a result of the project, relates to loss of unprotected vegetation types from the broad area, and transformation of intact habitat. Cumulative impacts on habitat and ecological functioning will be of a low significance. There will be no unacceptable loss of habitat or impact to ecological functioning due to the development of the proposed project within the surrounding area.
» **Avifauna:** Cumulative impacts as a result relates to habitat loss, collisions with power infrastructure (including power lines) and electrocution. The significance of cumulative impacts will be high. Recommended mitigation measures must be implemented.
» **Land Use, Soil and Agricultural Potential:** Cumulative impacts as a result of loss of agricultural land used for livestock farming and soil erosion ranges from low to medium significance. There will be no unacceptable risk to the agricultural potential due to the proposed project subject to the implementation of the recommended mitigation measures.
» **Heritage (including archaeology, palaeontology and the cultural landscape):** Cumulative impacts on heritage resources relate to direct impacts to heritage resources. The significance of the cumulative impacts will be low. There will be no unacceptable loss of heritage resources associated with the proposed project and other grid infrastructure developments within the surrounding areas.
» **Visual:** Cumulative visual impacts relate to a change in the visual quality of the landscape. The significance of the visual cumulative impacts will be moderate. There will be no unacceptable impact

on the visual quality of the landscape associated with the proposed project and grid infrastructure developments within the surrounding areas.

A summary of the cumulative impacts is included in **Table 7.1** below.

Table 7.1: Summary of the cumulative impact significance for the grid connection.

Specialist assessment	Overall significance of impact of the proposed project considered in isolation	Cumulative significance of impact of the project and other projects in the area
Ecology	Low	Low
Avifauna	Medium to High (depending on the impact being considered)	High
Land use, soil and agricultural potential	Low to Medium (depending on the impact being considered)	Low to Medium (depending on the impact being considered)
Heritage (archaeology and palaeontology)	Low	Low
Visual	Medium	Medium

Based on the specialist cumulative assessment and findings, the development of the Houthaalboomen grid and its contribution to the overall impact of all existing and to be developed grid infrastructure to be developed, it can be concluded that the contribution of the project to cumulative impacts will be of a low, medium and of high significance depending on the impact being considered. There are, however, no impacts or risks identified to be considered as unacceptable with the development of the proposed grid connection infrastructure within the assessed corridor. In addition, no impacts that will result in whole-scale change are expected to occur.

CHAPTER 8. CONCLUSIONS AND RECOMMENDATIONS

Houthaalboomen Grid (Pty) Ltd proposes the construction and operation of a 132kV power line, and collector substation to connect the Houthaalboomen PV Cluster comprising the Barleria PV, Dicoma PV, and Setaria PV facilities to the Eskom grid at the existing Watershed Substation. Two alternative grid connection solutions (within a 200m wide corridor) have been assessed and include:

Grid Connection Alternative 1: Houthaalboomen Collector Substation, centrally positioned on the southern boundary of Portion 1 of the Farm Houthaalboomen 31, and a 132kV power line connecting into the existing Watershed MTS. The grid connection infrastructure is located within a 6km long and 200m wide grid connection corridor

Grid Connection Alternative 2: Houthaalboomen Collector Substation, positioned on the south-eastern corner of Portion 1 of the Farm Houthaalboomen 31, and a 132kV power line connecting into the existing Watershed MTS. The grid connection infrastructure is located within a 4.5km long and 200m wide grid connection corridor

The grid connection corridor is located within the Ditsobotla Local Municipality within the Ngaka Modiri Molema District Municipality, and comprises the following affected properties:

- Portion 1 of the Farm Houthaalboomen 31
- Portion 0 of Farm Talene 25
- Portion 39 of Farm Elandsfontein 34
- Portion 93 of Farm Elandsfontein 34
- Portion 41 of Farm Elandsfontein 34
- Portion 0 of Farm Priem 30
- Portion 25 of Farm Houthaalboomen 31
- Portion 1 of Farm Lichtenburg Town and Townlands, No 27

A summary of the recommendations and conclusions for the proposed project as determined through the BA process is provided in this Chapter.

8.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the BA Report includes the following information required in terms of Appendix 1: Content of BA reports:

Requirement	Relevant Section
3(k) where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report	A summary of the findings of the specialist studies undertaken for the grid connection corridor has been included in section 8.2.
3(l) an environmental impact statement which contains (i) a summary of the key findings of the environmental impact assessment, (ii) a map at an appropriate scale which superimposes the proposed activity and its associated	An environmental impact statement containing the key findings of the environmental impacts of the Houthaalboomen PVs Grid Connection has been included as section 8.5. An environmental sensitivity and layout map

Requirement	Relevant Section
structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.	of the grid connection infrastructure has been included as **Figure 8.1** which overlays the assessed grid connection corridor with the sensitive environmental features present within the corridor. A summary of the positive and negative impacts associated with the development of the grid connection infrastructure has been included in section 8.2.
3(n) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation.	All conditions required to be included in the Environmental Authorisation for the grid connection infrastructure have been included in section 8.6.
3(p) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.	A reasoned opinion as to whether the grid connection infrastructure associated with the Houthaalboomen Solar PVs Grid Connection should be authorised has been included in section 8.6.

8.2. Environmental Sensitivity of the Assessed Grid Connection Corridor

From the specialist investigations undertaken for the grid connection infrastructure, the following sensitive areas/environmental features have been identified and demarcated within grid connection corridor for both alternative configurations (refer to **Figure 8.1** and **Figure 8.2**, as well as **Appendix M**). The sensitive features would need to be considered by the developer for the location of the grid connection infrastructure within the assessed grid connection corridor.

- The grid connection corridor is positioned within a medium sensitivity, slightly degraded to near-natural savanna grassland type line. It is recommended that vegetation clearing only commence after a walkthrough has been conducted to locate species of conservation concern that can be translocated or avoided.
- High sensitivity artificial livestock watering points are located within the grid connection corridor. It is recommended that watering points be moved away from electrical infrastructure to reduce the potential for interaction with vulnerable avifauna species using the watering point.
- Heritage features of high local significance (Grade IIIa) are located within the grid connection corridor. It is recommended that a 10m no-development buffer zone be implemented, and that these and any other identified features be considered when placing power line pylons.
- The verified site sensitivity of the Houthaalboomen grid assessment corridor, differs from the results of the Environmental Screening Tool, Medium agricultural sensitivity Nkonkoni soils are located in the northern end of the grid corridor.
- High sensitive receptors identified as per the visual assessments include the Houthaalboomen (6) group of houses, Elandsfontein Smallholding south, Boskoppie group of houses, Elandsfontein group of houses and observers travelling along the R505 arterial road where the powerline alignment cross.

8.3. Evaluation of the grid connection infrastructure of the Houthaalboomen Grid Connection

The preceding chapters of this report together with the specialist studies contained within **Appendices D-F** provide a detailed assessment of the potential impacts that may result from the development of the Houthaalboomen Grid Connection. This chapter concludes the environmental assessment of the development of the grid connection infrastructure within the grid connection corridor by providing a summary of the results and conclusions of the assessment. In doing so, it draws on the information gathered

as part of the BA process, the knowledge gained by the environmental specialists and the EAP and presents a combined and informed opinion of the environmental impacts associated with the project.

No environmental fatal flaws were identified in the detailed specialist studies conducted, and no impacts of unacceptable significance are expected to occur with the implementation of the recommended mitigation measures. These measures include, amongst others, the avoidance of sensitive features and the undertaking of monitoring, as specified by the specialists.

The potential environmental impacts associated with the grid connection infrastructure identified and assessed through the BA process include:

» Impacts on ecology (terrestrial and freshwater)
» Impacts on avifauna
» Impacts on soils and agricultural potential
» Impacts on heritage resources, including archaeology and palaeontology
» Visual impacts on the area as a result of the grid connection infrastructure.

8.2.1 Impacts on Ecology (Terrestrial and Freshwater)

There are no highly sensitive features impacted by the Houthaalboomen Grid Connection corridor. However, it is recommended that vegetation clearing to commence only after walkthrough has been conducted to locate species of conservation concern that can be translocated or avoided. From the findings of the Ecological Impact Assessment (**Appendix D**) it can be concluded that the grid connection corridor assessed for the development of the grid connection infrastructure is of moderate to low ecological sensitivity. As a result, there are no specific long-term impacts associated with the grid connection infrastructure that cannot be reduced to an acceptable level through mitigation and avoidance. There are no high residual impacts or fatal flaws associated with the development and it can be supported from a terrestrial ecology perspective.

8.2.2 Impacts on Soils

The most significant impacts of the proposed project on soil and agricultural productivity will occur during the construction phase of the power line pylons and collector substation during the construction phase, the vegetation will be removed, and the soil surface prepared for the delivery of materials and erection of the infrastructure. During the operational phase, the risk remains that soil will be polluted by the waste generated or in the case of a spill incident when maintenance workers visit the area to do any maintenance work or repairs. During the decommissioning phase, soil will be prone to erosion when the infrastructure is removed from the soil surface.

8.2.3 Impacts on Soils

The most significant impacts of the proposed project on soil and agricultural productivity will occur during the construction phase of the power line pylons and collector substation during the construction phase, the vegetation will be removed, and the soil surface prepared for the delivery of materials and erection of the infrastructure. During the operational phase, the risk remains that soil will be polluted by the waste generated or in the case of a spill incident when maintenance workers visit the area to do any maintenance work or

repairs. During the decommissioning phase, soil will be prone to erosion when the infrastructure is removed from the soil surface.

8.2.4 Impacts on Heritage Resources (including archaeology and palaeontology)

The Heritage Impact Assessment (**Appendix E**) assessed the impact of the grid connection infrastructure on the heritage features (archaeology, palaeontology) associated with the assessed grid connection corridor.

Stone structures which represent human burial were identified within the study area, these structures are conservatively graded IIIA (high local significance). It is recommended that a 10m no-development buffer zone around each structure or set of structures is implemented. Impacts to archaeological and heritage resources are expected to occur during the construction phase of the project, most likely during foundation excavations. However, with the implementation of mitigation measures, the impact to these identified resources is expected to be of Low significance. There are no fatal flaws expected to occur with regards to archaeological resources.

No impact to significant palaeontological heritage is anticipated, and the impact to paleontological resources is expected be of Low significance with and without the implementation of mitigation measures. It is recommended that no additional specialist palaeontological assessment is required.

8.2.4. Visual Impacts

The Visual Impact Assessment (**Appendix F**) identified negative impacts on visual receptors during the construction and the operation phases of the grid connection infrastructure. The impacts include visual impacts due to construction activities, as well as impacts on sensitive visual receptors located within 0.5km to 3km from the grid connection infrastructure, and a visual impact on the sense of place. The assessment concluded that the visual impact of all grid connection infrastructure will have low to medium impact on observers traveling along the roads and residents of homesteads within a 0.5 - 3km radius of the infrastructure. Furthermore, the anticipated visual impact of the proposed grid connection infrastructure on the regional visual quality (i.e. beyond 3km of the proposed infrastructure), and by implication, on the sense of place, is generally expected to be of low significance.

8.2.5 Assessment of Cumulative Impacts

Based on the specialist cumulative assessment and findings, the development of the Houthaalboomen grid connection infrastructure and its contribution to the overall impact of all existing grid infrastructure to be developed, it can be concluded that the contribution of the project to cumulative impacts will be of a low to high significance depending on the impact being considered. There are, however, no impact significance or fatal flaws identified to be unacceptable with the development of the proposed grid connection infrastructure within the assessed grid connection corridor. In addition, no impacts that will result in whole-scale change are expected to occur.

8.2.6 Consideration of Alternatives

Two alternative collector substation positions were considered as part of this assessment. As such, the 200m wide power line corridor is wide power line corridor footprint is largely the same for both alternatives, and

deviates only to accommodate the two alternative positions for the Collector substation. This assessment, therefore, considered two alternative grid connection solutions, both terminating at Watershed Substation. As part of specialist assessments both alternative grid connection solutions were assessed and determined to be acceptable from an environmental perspective. A summary of the assessment of impacts for the grid connection and associated infrastructure alternatives are detailed below:

Aspect	Grid Connection Alternative 1	Grid Connection Alternative 2
Ecology	*Acceptable*	*Preferred & Acceptable*
Avifauna	*Acceptable*	*Preferred & Acceptable*
Soils and agriculture potential	*Preferred & Acceptable*	*Preferred & Acceptable*
Heritage	*Preferred & Acceptable*	*Preferred & Acceptable*
Visual	*Preferred & Acceptable*	*Acceptable*

Grid Connection Alternative 2 was identified by the developer as the preferred alternative from a technical feasibility perspective and has been fully considered and assessed as part of this BA process and within this BA Report to be acceptable from an environmental perspective.

8.4. Environmental Costs of the grid connection infrastructure versus Benefits of the grid connection infrastructure

No fatal flaws have been identified to be associated with the proposed project. Environmental costs (including those to the natural, economic and social environment) can, however, be anticipated at a local and site-specific level, and are considered acceptable provided the mitigation measures as outlined in the BA Report and the EMPr are implemented and adhered to. These environmental costs could include:

- *A loss of biodiversity, flora and fauna due to the clearing of land for the construction and utilisation of land for grid connection infrastructure* - The cost of loss of biodiversity is considered to be limited due to the limited footprint of the development and placement of infrastructure within lower sensitivity areas as a result of the selected alternative.
- *Visual impacts associated with the grid connection solution* - it is envisaged that the grid connection infrastructure, where visible from shorter distances (e.g. less than 0.5km and potentially up to 1.5km), and where sensitive visual receptors may find themselves within this zone, may constitute a high visual prominence, potentially resulting in a visual impact. The incidence rate of sensitive visual receptors is however expected to be quite low, due to the generally remote location of the proposed infrastructure and the low number of potential observers.
- *A loss of heritage resources* – Heritage resources of high local significance area located within the grid connection corridor however the impact is expected to be of low significance with the implementation of recommended mitigation measures.
- *A loss of watering points for livestocks*
- *A loss of soil agricultural potential - Medium agricultural sensitivity Nkonkoni soils are located in the northern end of the grid corridor.*

Benefits of the grid connection infrastructure include the following:

- The consolidated grid connection infrastructure will service the connection of the three solar PV facilities (known as Barleria PV, Dicoma PV and Setaria PV) to the national grid, therefore reducing the amount of grid connection infrastructure required for the developments.
- The project will result in important economic benefits at a local and national scale through an increase in production and GDP-R and employment. These will persist during the construction, operation and decommissioning phases of the project.
- The project indirectly contributes towards the Provincial and Local goals for the development of renewable energy as outlined in the respective IDPs.

The benefits of the Houthaalboomen Grid Connection solution are expected to occur at a national, regional and local level. As the costs to the environment at a site-specific level have been largely limited through the appropriate placement of the grid connection corridor within areas considered to be acceptable for the development of the grid connection infrastructure, the benefits of the project are expected to outweigh the environmental costs of the grid connection infrastructure.

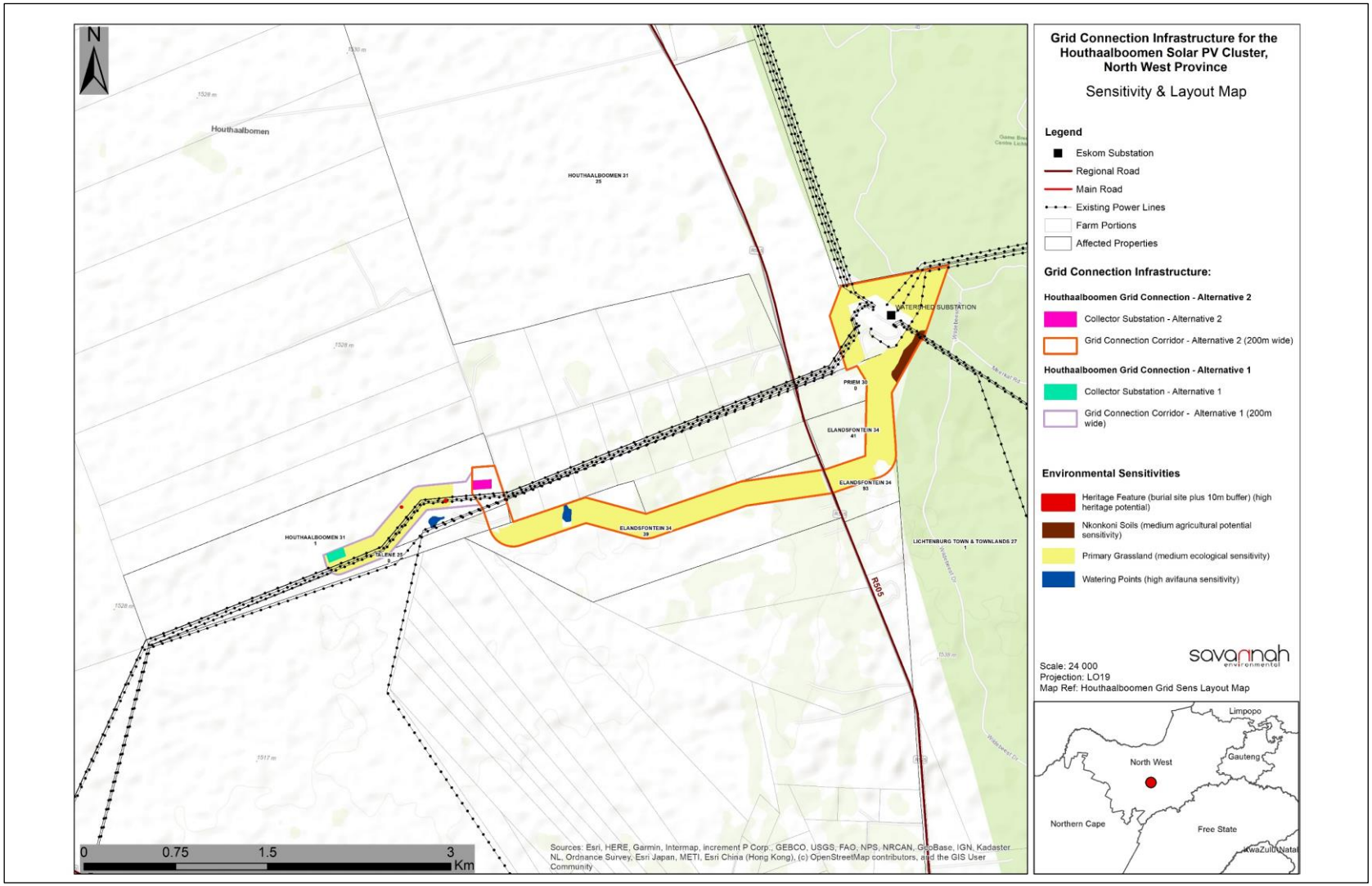

Figure 8.1: Environmental sensitivity map overlain with the assessed grid connection corridor Alternatives 1 and 2within which the grid connection infrastructure for the Houthaalboomen Grid Connection alternative configuration 1 and 2 is proposed to be developed (**Appendix M**)

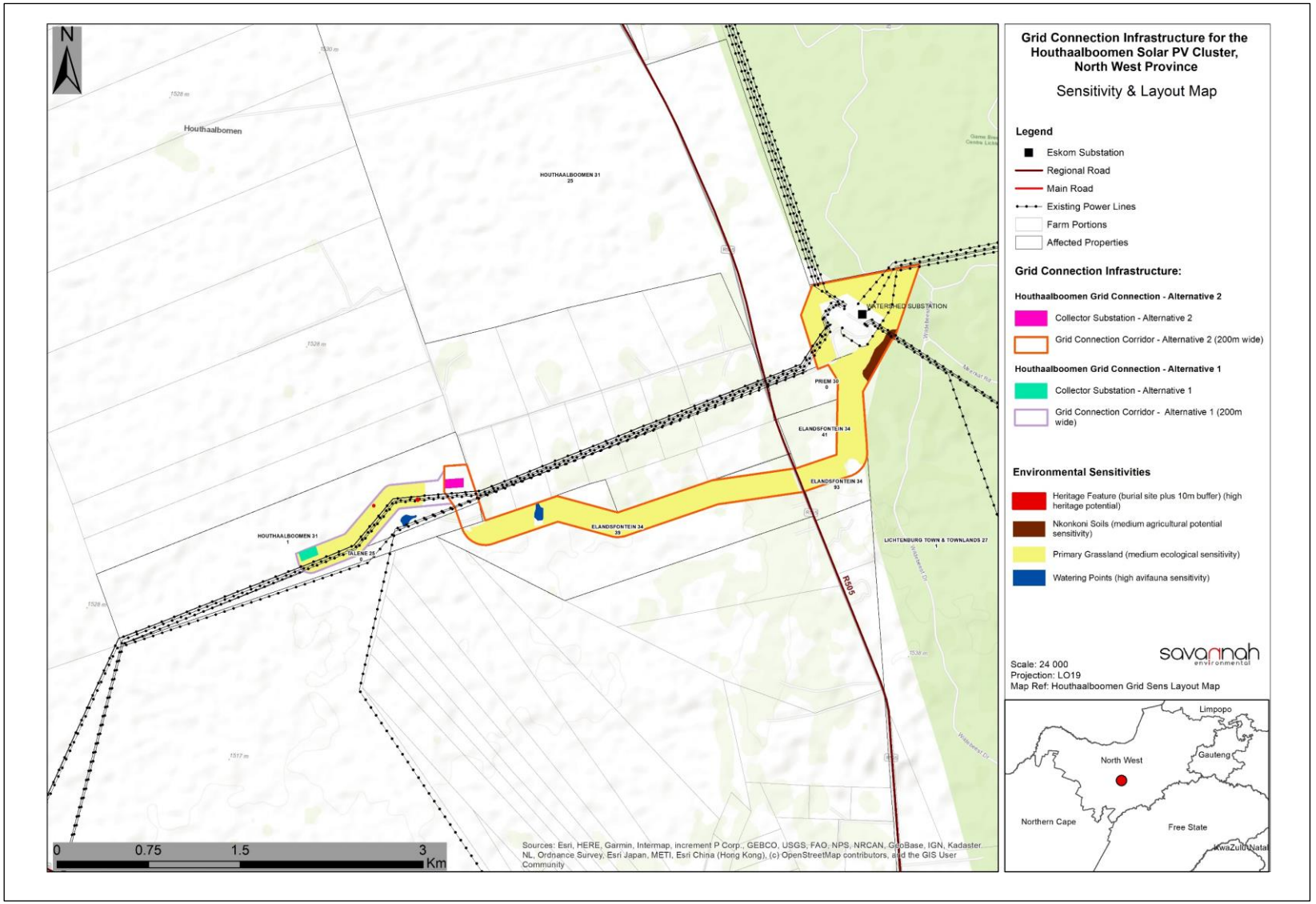

Figure 8.2: Environmental sensitivity map overlain with the assessed grid connection corridor within which the preferred grid connection infrastructure for the Houthaalboomen Grid Connection is proposed to be developed (**Appendix M**)

8.5. Overall Conclusion (Impact Statement)

Houthaalboomen Grid (Pty) Ltd proposes the construction and operation of a 132kV single or double circuit power line, and a collector substation to connect the authorised Houthaalboomen PV cluster (consisting of the Barleria PV, Dicoma PV and Setaria PV) to the Eskom grid via the existing Watershed Substation. Two alternative Collector substation positions are considered as part of this assessment. As such, the 200m wide power line corridor footprint is largely the same for both alternatives, and deviates only to accommodate the two alternative positions for the Collector substation. This assessment as well as specialist assessments, therefore, considers two alternative grid connection solutions, both terminating at Watershed Substation.

The specialist findings have indicated that there are no identified environmental fatal flaws (following the implementation of mitigation) associated with the implementation of the grid connection and associated infrastructure, and that both alternative grid connection configurations and associated infrastructure are acceptable in terms of environmental impacts. The preferred grid connection alternative is therefore the technically preferred option, which is Alternative 1. All impacts associated with the project establishment within the grid connection corridor can be mitigated to acceptable levels through the implementation of the recommended mitigation. The preferred layout overlain with the environmental sensitivities is included as **Figure 8.1**.

Through the assessment of the development of the grid connection infrastructure within the grid connection corridor and the implementation of the preferred grid connection option it can be concluded that the proposed project is environmentally acceptable (subject to the implementation of the recommended mitigation measures) with no unacceptable impact significance of whole-scale change.

8.6. Overall Recommendation

Considering the findings of the independent specialist studies, the impacts identified, the grid connection corridor proposed by the developer, the potential for avoidance of sensitive environmental features within the grid connection corridor on final placement of the grid line, as well as the potential to further minimise the impacts to acceptable levels through mitigation, it is the reasoned opinion of the EAP that the development of the Houthaalboomen Grid Connection is acceptable within the landscape and can reasonably be authorised to be developed within the assessed grid connection corridor for Grid Connection Alternative 1 (refer to **Figure 8.2**).

The grid connection corridor is located within the Northern Corridor of the Strategic Transmission Corridors which is one of five corridors identified for the rollout of large-scale electricity transmission and distribution infrastructure. The recommended validity period for the environmental authorisation is 10 years.

The following infrastructure description and list of infrastructure would be included within an authorisation issued for the project:

» **Grid Connection Alternative 2:** Houthaalboomen Collector Substation, positioned on the south-eastern corner of Portion 1 of the Farm Houthaalboomen 31, and a 132kV single or double circuit power line connecting into the existing Watershed MTS. The grid connection infrastructure is located within a 4.5km long and 200m wide grid connection corridor
» The key infrastructure for the grid connection described above are as follows:
  - Up to 132kV Collector Substation (footprint up to 1.125ha)

- Up to 132kV single or double circuit power line (within 200m wide corridor)
- Informal access roads/service tracks where no existing roads are available

The following key conditions would be required to be included within an authorisation issued for the Houthaalboomen Grid Connection infrastructure:

» The layout of the grid connection infrastructure must be optimised within the preferred grid connection corridor (Alternative 2), and informed following walk-through surveys by an ecologist and heritage specialist.
» Areas where bird collisions are likely to be high could be ameliorated by marking the lines with appropriate bird deterrent devices such as "bird diverters" and "flappers" to increase the visibility of the lines.
» All mitigation measures detailed within this BA Report, as well as the specialist reports contained within **Appendices D to E**, are to be implemented.
» The EMPrs as contained within **Appendix G** to **Appendix I** of this BA Report should form part of the contract with the Contractors appointed to construct and maintain the grid connection infrastructure in order to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all life cycle phases of the infrastructure is considered key in achieving the appropriate environmental management standards as detailed for this project.
» A chance find procedure must be implemented in the event that archaeological or palaeontological resources are found during the construction of the grid connection infrastructure. In the case where the proposed development activities bring these materials to the surface, work must cease and SAHRA must be contacted immediately to determine a way forward.

CHAPTER 9. REFERENCES

Heritage

Heritage Impact Assessments				
Nid	**Report Type**	**Author/s**	**Date**	**Title**
6237	AIA Phase 1	Johnny Van Schalkwyk, Robert de Jong, S Smith	01/08/1995	Reconnaissance of Remaining Cultural Resources in the Bakerville Diamond Fields
8330	AIA Phase 1	Francois P Coetzee	01/03/2008	Cultural Heritage Survey of the PPC Slurry Operation, near Zeerust, North West Province
8455	HIA Phase 1	Udo Kusel	25/07/2008	Cultural Heritage Resources Impact Assessment of Portion 151 of Lichtenburg Town and Townlands 27 IP (Lichtenburg Extension 10) North West Province
8531	HIA Phase 1	Johnny Van Schalkwyk	01/11/2008	Heritage Impact Report for the Proposed 88 kV Power Line from Watershed Substation, Lichtenburg, to the Mmabatho Substation, North West Gauteng Province
50047	HIA Phase 1	M Hutten	01/05/2012	Heritage Impact Assessment for the Proposed Lichtenburg Solar Park North of Lichtenburg, North West Province
50048	PIA Phase 1	Bruce Rubidge	14/07/2012	Palaeontological Assessment - Lichtenburg Solar Park
110338	HIA Phase 1	Julius CC Pistorius	01/06/2011	A PHASE I HERITAGE IMPACT ASSESSMENT (HIA) STUDY FOR THE PROPOSED MAFIKENG CEMENT PROJECT NEAR ITSOSENG IN THE NORTH-WEST PROVINCE OF SOUTH AFRICA
123075	Heritage Scoping	Jaco van der Walt	12/11/2013	Archaeological Impact Assessment Report
138895		Jaco van der Walt, John E Almond	14/10/2013	Archaeological Impact Assessment for the Proposed Hibernia Solar Project near the town of Lichtenburg in the North West Province of South Africa & Paleontological Report: Recommended Exemption From Further Palaeontological Studies: Proposed Hibernia Pv S

Visual

Chief Directorate National Geo-Spatial Information, varying dates. 1:50 000 Topographical Maps and Data.

CSIR, 2017. Delineation of the first draft focus areas for Phase 2 of the Wind and Solar PV Strategic Environmental Assessment.

CSIR, 2015. The Strategic Environmental Assessment for wind and solar photovoltaic energy in South Africa.

DFFE, 2018. National Land-cover Database 2018 (NLC2018).

DFFE, 2021. South African Protected Areas Database (SAPAD_OR_2021_Q1).

DFFE, 2021. South African Renewable Energy EIA Application Database (REEA_OR_2021_Q1).

DEA&DP, 2011. Provincial Government of the Western Cape. Guideline on Generic Terms of Reference for EAPS and Project Schedules.

Department of Environmental Affairs and Tourism (DEA&T), 2001. Environmental Potential Atlas (ENPAT) for the North West Province.

JAXA, 2021. Earth Observation Research Centre. ALOS Global Digital Surface Model (AW3D30).

National Botanical Institute (NBI), 2004. Vegetation Map of South Africa, Lesotho and Swaziland (Unpublished Beta Version 3.0)

Oberholzer, B. (2005). Guideline for involving visual and aesthetic specialists in EIA processes: Edition 1.

The Environmental Impact Assessment Amendment Regulations. In Government Gazette Nr. 33306, 18 June 2010.

Avifauna

Birdlife South Africa. 2018. BirdLife South Africa Checklist of Birds in South Africa, 2018.

Del Hoyo, J., Elliott, A. & Christie, D.A. eds. 1992-2011. Handbook of the Birds of the World. Vol 1-16. Lynx Edicions, Barcelona.

Geoterrainimage. 2015. The South African National Land cover Dataset. Version 05.

Gill, F, D Donsker, & P Rasmussen (Eds). 2021. IOC World Bird List (v 11.2). Doi 10.14344/IOC.ML.10.2. http://www.worldbirdnames.org/.

Hardaker, T. 2020. Southern African Bird List - Version 10 - 22 December 2020.

Harrison, J.A., Allan, D.G., Underhill, L.G., Herremans, M., Tree, A.J., Parker, V. & Brown, C.J. (eds.). 1997. The Atlas of Southern African Birds. Vol. 1 & 2. BirdLife South Africa, Johannesburg.

Hockey, P.A.R., Dean, W.R.J. & Ryan, P.G. (eds.) 2005. Roberts – Birds of Southern Africa, VIIth ed. The Trustees of the John Voelker Bird Book Fund, Cape Town.

IUCN Red List of Threatened Species. Version 2021. http://www.iucnredlist.org/.

Jenkins, A.R, Ralston-Paton, S & Smit-Robinson, H.A. 2017. Best practice guidelines: Birds and Solar Energy. Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa. BirdLife South Africa.

Kruger, R. 1999. Towards solving raptor electrocutions on Eskom Distribution Structures in South Africa. M. Phil. Mini-thesis. University of the Orange Free State. Bloemfontein. South Africa.

Ledger, J. & Annegarn, H.J. 1981. Electrocution Hazards to the Cape Vulture (Gyps coprotheres) in South Africa. Biological Conservation 20: 15-24.

Marnewick, M.D., Retief, E.F., Theron, N.T., Wright, D.R. And Anderson, T.A. 2015. Important Bird and Biodiversity Areas of South Africa. Johannesburg: BirdLife South Africa.

McCrary, M.D., McKernan, R.L., Schreiber, R.W., Wagner, W.D. & Sciarotta, T.C. 1986. Avian mortality at a solar energy power plant. Journal of Field Ornithology 57: 135-141.

Mucina, L. & Rutherford, M.C. (eds.). 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

Pachnoda Consulting. 2018. Proposed Mahikeng main transmission substation and 1x400kv Pluto-Mahikeng power line within the Merafong City Local Municipality of the Gauteng Province and the Ditsobotla, Ramotshere Moiloa, JB Marks and Mafikeng Local Municipalities of the North West Province. A report compiled for Baagi Environmental Consultants.

Taylor, M.R., Peacock, F. & Wanless, R. (eds.). 2015. The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. BirdLife South Africa, Johannesburg

Tsoutsos, T., Frantzeskaki, N. & Gekas, V. 2005. Environmental impacts from solar energy technologies. Energy Policy 33: 289-296.

Van Rooyen, C.S. 2000. An overview of Vulture Electrocutions in South Africa. Vulture News 43: 5-22.

Van Rooyen, C.S. & Taylor, P.V. 1999. Bird streamers as probable cause of electrocutions in South Africa. EPRI Workshop on Avian Interactions with Utility Structures, Charleston, South Carolina.

Vosloo, H. 2003. Birds and power lines. ESI Africa 3: 38.

www.sabap2.birdmap.africa

Soils & Agricultural

Crop Estimates Consortium, 2019. Field crop boundary data layer (NW province), 2019. Pretoria. Department of Agriculture, Land Reform and Rural Development.

Department of Agriculture, Land Reform and Rural Development, 2019. High potential agricultural areas 2019 – Spatial data layer, North West Province, 2021. Pretoria.

Department of Agriculture, Land Reform and Rural Development, 2018. Long-term grazing capacity for South Africa: Data layer. Government Gazette Vol. 638, No. 41870. 31 August 2018. Regulation 10 of the Conservation of Agricultural Resources Act (CARA): Act 43 of 1983. Pretoria. Government Printing Works.

Department of Agriculture, Land Reform and Rural Development, 2016. National land capability evaluation raster data: Land capability data layer, 2016. Pretoria.

Land Type Survey Staff, 1972 – 2006. Land Types of South Africa data set. ARC – Institute for Soil, Climate and Water. Pretoria.

The Soil Classification Working Group, 2018. Soil Classification – Taxonomic System for South Africa. Dept. of Agric., Pretoria.